STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

Caltrans

MANUAL CHANGE TRANSMITTAL

NO. 17-1

TITLE:	APPROVED BY:	DATE ISSUED:
Department of Transportation *Construction Manual*	Rachel Falsetti, Chief Division of Construction	July 17, 2017
SUBJECT AREA Table of Contents and various sections of the *Construction Manual*	ISSUING UNIT Division of Construction	
SUPERSEDES Existing *Construction Manual*	DISTRIBUTION All Requested Manual Holders	

This edition of the Caltrans *Construction Manual* supersedes in authority the procedures contained in all previous editions issued by the California Department of Transportation and updates language, information, and references to align with the 2015 *Standard Specifications*.

Following are the Construction Policy Bulletins and Construction Procedure Directives superseded by this Manual Change Transmittal and other changes that have been incorporated into this revision. Supplementary Construction Policy Bulletins will continue to be issued as conditions require.

The following changes were made to each section listed below, if applicable:

- Removes from first page of section the notification that bracketed section numbers refer to the 2006 *Standard Specifications*.
- Removes bracketed 2006 *Standard Specifications* references and updates *2010 Standard Specifications* references to 2015 *Standard Specifications* references.
- Updates *2010 Standard Plans* references to *2015 Standard Plans* references.
- Updates cross-references to other *Construction Manual* sections.
- Updates broken web links and changes titles to other documents or manuals.
- Updates references to Caltrans' or other entities' job or office titles.
- Updates organizational changes to align with the 2015 *Standard Specifications*.

- Incorporates and supersedes the following Construction Policy Bulletins (CPBs):
  - CPB 07-1, "Certification Program for Suppliers of Asphalt"
  - CPB 07-6, "Progress Pay—Entering Contract Milestones in the Contract Administration System"
  - CPB 09-4, "American Recovery and Reinvestment Act Monthly Employment Reporting Requirements—Federal-Aid Contracts"
  - CPB 09-6, "Oversight Project Completion Checklist"
  - CPB 09-17, "State-Only Funded Contract Retention"
  - CPB 10-2, "Contract Change Order Standardized Clause on Merited Disputes"
  - CPB 10-3, "Administration of Emergency Force Account or Emergency Limited Bid Contracts"
  - CPB 11-1, "Primavera P6 CPM Scheduling Software"
  - CPB 12-3, "Pavement Safety Edge"
  - CPB 12-4, "Field-Sampling Procedures for Traffic Paint, Thermoplastic, and Glass Beads"

  - CPB 13-1, “Construction to Maintenance 90% Best Management Practice Completion Walkthrough”
  - CPB 13-2, “Inertial Profiler Construction Inspection Guidance”
  - CPB 14-1, “Americans with Disabilities Act Facilities Construction Inspection Guidance”
  - CPB 14-2, “Buy America Provisions for Steel and Iron Materials”
  - CPB 14-3 “Closure Requests and Lane Closure System Training for Contractors”
  - CPB 15-1, “Acceptance Sampling and Testing of Job-Produced Materials”
  - CPB 15-2, “Submission of Good Faith Efforts and Uniform Report of DBE Awards/Payments”
  - CPB 15-3, “Public Works Contractor Registration Requirement”
  - CPB 15-4, “Changes to Contractor Action Request Forms”
  - CPB 15-5, “Changes to Construction Project Records and Forms”
  - CPB 15-6, “Implementation of Hot Mix Asphalt Superpave Mix Design”
  - CPB 16-1, “Vehicle Load Limits on Structures for Material Transfer Vehicles and Other Equipment”
  - CPB 16-2, “Lane Closure System Mobile Web Page Closure Status”
  - CPB 16-3, “Temporary Transverse Joint Taper”

- Supersedes CPBs:
  - CPB 09-17, “State-only funded contract retention”

- Eliminates the following Construction Procedure Directives (CPDs):
  - CPD 00-5, “Clarifications to Differing Site Specifications”
  - CPD 00-8.1, “Addendum, Aerially Deposited Lead Variance”
  - CPD 00-10, “Contractor Contingency Plans”
  - CPD 00-13, Revised SSP S5-170, “Dispute Review Board,” New SSP S5-056, “Final Payment and Claims”
  - CPD 01-01, “Construction Contract Time”
  - CPD 01-05, “Energy Crisis Contingency Planning”
  - CPD 02-4, “Hazardous Materials Internet Information”
  - CPD 02-5, “Traffic Signal and Lighting Poles”
  - CPD 02-7, “Water Pollution Control Inspection for Off-Site Contractor Activities”
  - CPD 04-1, “Contractor Licensing”
  - CPD 05-5, “Expiration of the Variance for Aerially Deposited Lead”
  - CPD 05-6, “Construction’s Role in the Development of the Division of Design’s Storm Water Data Report”
  - CPD 05-8, “Availability of Storm Water Pollution Prevention Documents to State Agencies and Public”
  - CPD 06-5, “Disadvantaged Business Enterprise Program”
  - CPD 06-7, “Eliminate haunch details for Type 1 Retaining Walls with safety barrier”
  - CPD 06-9, “Change in Flare Gap in Flared Columns”
  - CPD 07-2, “Portland Cement Specification”
  - CPD 07-4, “2008 Time Extension on Existing Variance for Aerially Deposited Lead”
  - CPD 08-3, “Equipment Rental Rates Effective August 1, 2008”
  - CPD 08-4, “2009 Time Extension on Existing Variance for Aerially Deposited Lead”
  - CPD 08-5, “Quality Management Work on the State Highway System”
  - CPD 08-6, “Cost Reduction Incentive Proposals”
  - CPD 09-1, "District Director Determination of Claim”
  - CPD 09-5, “Five Percent Limestone in Portland Cement”
  - CPD 09-11, “Equipment Rental Rates Effective October 1, 2009”
  - CPD 09-13, “Variance for Aerially Deposited Lead”
  - CPD 10-5, “Adding Water to Concrete in the Field”
  - CPD 10-7, “Supplemental G-12 Funds Requests Memorandum--Signature Change”
  - CPD 10-8, “Stem to Deck Construction Joint”
  - CPD 10-13, “Revised Implementation of Traffic Operations Policy Directive 09-06”

- CPD 10-14, “Relative Mortar Strength of Fine Aggregate”
- CPD 11-1, “ADA Requirements for Temporary Pedestrian Facilities”
- CPD 11-4, “Smoothness Specification Requirements for Thin Hot Mix Asphalt Overlays”
- CPD 11-5, “Construction General Permit Training”
- CPD 13-2, “Release of Revised Standard Plan RSP B11-47, ‘Cable Railing’ ”
- CPD 13-7, “Seed Samples for Erosion Control Work”
- CPD 13-8, “Contractor Option to Use Inertial Profiler to Determine Pavement Smoothness”
- CPD 14-3, “Temporary Pedestrian Facilities Updates”
- CPD 14-7, “Modification and Reduction of Construction Projects Stormwater Monitoring and Inspection Forms”
- CPD 14-11, “Advance Ramp Meter Control Signal Signs”
- CPD 16-2, “Pavement Smoothness Data Submittal”
- CPD 16-6, “Guardrail End Terminal Inspection”
- CPD 16-9, “Administration of Drought-Related Emergency Contracts”

Section 1-0, “Construction Manual Overview”

- Clarifies the purpose of the *Construction Manual*.

Section 1-1, “Construction Organization”

- Updates language specifying that an engineer in charge of the project must be licensed instead of registered.
- Adds Section 1-102B, “Assistant Division of Construction Chief,” with description of role.
- Renames Section 1-106, “Local Projects” to “Proper Charging Practices,” and adds guidance for local projects including recording accurate time and expenses for Caltrans employees.
- Renumbers Section 1-106, “Local Projects.” to new Section 1-107.

Section 1-2, “Public Relations”

- In Section 1-201, updates list of categories requiring public relations to include the public living and working near the project, the media, and the traveling public.
- Includes Director’s Policy DP-06, “Caltrans Partnerships,” Deputy Directive DD-19-R2, “Media Relations/Public Information,” Caltrans *Right of Way Manual.*
- Section 1-203, “Relations With the Contractor,” updates types of specifications to align with the *Construction Quality Assurance Program Manual*.
- Renames Section 1-205, “Relations With Property Owners” to “Relations With the Public” to include people living or working near the project.
- Renames Section 1-206, “Relations With the General Public,” to “Relations With the Media and Traveling Public” and discusses methods of disseminating information to larger groups of people.

Section 1-3, “Personnel Development”

- In Section 1-304, adds links to Construction training intranet websites and guidance regarding Resident Engineer Certificate Program.
- In Section 1-305, “Resources and Budgeting,” clarifies what is included in 2 percent occupational training goal.
- Adds *Surveys Manual* chapter to list of training references in Section 1-308, “Training Methods.”

Section 1-4, “Facilities and Equipment”

- Updates guidance of use of the Division of Accounting’s *Coding Manual* for setting up field offices and filing expenses.
- Adds guidance regarding importance of proper charging practices as included in Deputy Directive 41, “Caltrans Charging Practices.”
- Updates guidance on vehicle home storage.

Section 1-5, "Field Expenses and Purchases"

- Section 1-503 directs users to guidance from the Division of Procurement and Contracts and replaces reference to the *Caltrans Acquisition Manual* with reference to Division of Procurement and Contracts.

Section 2-1, "Safety"

- In Section 2-101, "General," added clarifying information regarding the construction *Code of Safe Practices*.
- Revises Section 2-102A, "District Deputy Director for Construction," to clarify supervisor's responsibility regarding safety of subordinates.
- Updates "Material Safety Data Sheets" to "safety data sheets" to align with the 2015 *Standard Specifications*.
- In Section 2-102C, "Construction Engineer," adds importance of documentation of closure of items mentioned in safety audit.
- Revises Section 2-102D, "Resident Engineer," as follows:
  - Adds a reference to Section 7-1.02K(6), "Occupational Safety and Health Standards," of the 2015 *Standard Specifications.*
  - Adds language for permit submittals.
  - Adds guidance to ensure contractors notify regional Underground Service Alert before beginning roadway excavation work.
- In Section 2-104C, "Classes of Employers," adds information about controlling employer.
- Revises Section 2-104D (3), "Procedures If Citations Are Received," to update references from "Office of Safety and Health" and "Administrative Service Center" to "Office of Health and Safety" and "Division of Safety and Management Services," and adds an email address to send a copy of Cal/OSHA citations to if received.
- Renames Section 2-105, "Specific Safe Practices," to "Emergency Contracts," and replaces section with guidance that emergency contracts present additional safety concerns.
- Renumbers Section 2-105, "Specific Safe Practices," to Section 2-106.
- Renumbers 2-105A, "Code of Safe Practices," to Section 2-106A and adds guidance for operations not covered in the base construction *Code of Safe Practices* and for items added in support of a contractor's *Code of Safe Practices*.
- Renumbers Section 2-105B, "Tailgate Safety Meetings," to Section 2-106B and adds guidance that tailgate safety meetings should be project-specific and lists suggested topics to discuss.
- Renumbers Section 2-105C, "High-Visibility Garment," to Section 2-106C, adds information about a compliant garment, and updates ANSI number for garments used during nighttime.
- Renumbers Section 2-106, "Safety Precautions for the Public in Construction Areas," to Section 2-107 and clarifies information about visitors to the job site.
- In Section 2-106A, "Code of Safe Practices," adds guidance on additional COSPs for contract safety items that are unique to the contract.
- Renumbers Section 2-107, "Hazardous Materials," to Section 2-108.

Section 2-2, "Traffic"

- Partially incorporates CPB 14-3, "Closure Requests and Lane Closure System Training for Contractors."
- Incorporates and supersedes CPD 00-10, "Contractor Contingency Plans," CPD 11-1, "ADA Requirements for Temporary Pedestrian Facilities," and CPD 14-3, "Temporary Pedestrian Facilities Updates."
- Changes "runoff area" to "clear recovery zone" throughout section.
- In Section 2-204A" Resident Engineer," adds reference to Section 8-1.06, "Suspensions," of the *Standard Specifications* for guidance on suspending work due to a contractor's failure to perform; updates guidance on contractor requests for modifications to the traffic control plans; .
- Adds pavement structure to the list of temporary roadway items to evaluate in Section 2-205A, "Basic Instructions."
- Changes the title of Section 2-206D, "Run-off Areas," to "Clear Recovery Zone."

- Adds reference to the *Highway Design Manual*, Topic 902.2, "Sight Distance and Clear Recovery Zone Standards."
- In Section 2-208, "Night Work," updates guidance for garments to protect workers and adds a link in to the *Code of Safe Practices* for use of amber lights.
- Section 2-211, "Informing the Public," updates guidance for publicizing temporary traffic measures.
- Updates guidance in Section 2-213, "Roadway Over Railroad Tracks."
- Updates guidance in Section 2-214C (4), "Construction Engineers, Resident Engineers, and Construction Inspectors" regarding use of Lane Closure System.
- Updates guidance in Section 2-215, "Construction Zone Enhanced Enforcement Program," (COZEEP).
- Updates guidance for accommodating pedestrians in temporary traffic zones in Section 2-216, "Pedestrian Facilities" for compliance with the Americans with Disabilities Act.

Section 2-3, "Major Construction Incidents"

- Updates reference from *Caltrans Safety and Health Manual* to *Caltrans Safety Manual*.
- Renames Section 2-302C from "Highway Closure Notification" to "Notification of Emergency Highway Closure," updates guidance, and adds reference to Section 4-1203C, "Maintaining Traffic," of the *Construction Manual*.
- Revises Section 2-303 to update email address for sending reportable accident and major incident reports, and changes references from "Office of Safety and Health" and "Administrative Service Center" to "Office of Health and Safety" and "Division of Safety and Management Services."

Section 3-0, "Introduction"

- Removes from first page of section the notification that bracketed section numbers refer to the 2006 *Standard Specifications*.

Section 3-1, "General"

- Clarifies what information is found in the *Standard Specifications* and *Standard Plans* regarding terms, abbreviations, and units of measure.

Section 3-2, "Bidding"

- Provides web links for plans and specifications and solicitation documents for Major, Minor A, and Minor B projects.
- Notes that Minor B solicitation documents are no longer available in hard copy.
- Provides update to Minor B project dollar limit.
- Provides information on bid openings, including web links and teleconference information.
- Provides time requirement for responding to bidder inquiries, and direction for posting responses to the consolidated bidder inquiry system.
- Provides instructions for bidder response language, and review of all bidder inquiries and responses.
- Updates DPAC web link for disclosure of construction estimates on Minor B projects.
- Updates web link for obtaining names of prospective bidders for all projects except Minor B construction projects.

Section 3-3, "Contract Award and Execution"

- Provides updated title of *Ready to List and Construction Contract Award Guide*, and referenced section title.
- Clarifies name of Caltrans contract awards division.

Section 3-4, "Scope of Work"

- Eliminates the following Construction Procedure Directives (CPDs):
  - CPD 00-5, "Clarification to Differing Site Conditions Specifications."
  - CPD 08-6, "Cost Reduction Incentive Proposals."

Section 3-5, "Control of Work"

- Eliminates CPD 00-13, *Revised Standard Specification* (Revised SSP) S5-170, "Dispute Review Board," and new *Standard Specification* (SSP) S5-056, "Final Payment and Claims."
- Eliminates CPD 04-1, "Contractor Licensing."
- In Section 3-501, "General," adds reference to Section 3-606, "Quality Assurance," of this manual.
- Section 3-504, "Partnering," directs users of the manual to the CT Partnering Coordinators link.
- Partially incorporates CPB 15-3, "Public Works Contractor Registration Requirement," and CPB 15-4, "Changes to Contractor Action Request Forms."
  - Updates Section 3-506, "Assignment," to include the signed Form STD. 204, "Payee Data Record," as part of the contractor's change request submittals.
- Updates language in Section 3-507C (3b) to audio recording rather than taping to include current technology.
- Specifies in Section 3-507C (5c) that the violation is alleged until a decision is rendered after a hearing.
- In Section 3-510A, "Permits, Licenses, Agreements, and Certifications," updates the reference to an information handout to make it clear the handout is not a specific publication.
- Adds specific references in Section 3-510B, "Contractor-Property Owner Agreement," to testing, detection, and acceptable levels of lead in soils and provides a link for the District Aerially Deposited Lead Coordinator.
  - Provides specific language to include in agreements with property owners and contractors regarding lead in soils.
  - Updates links to sites regarding hazardous waste disposal and guidance about such disposal.
  - Changes reference from Office of Structure Design to Structure Design.
- Refers to Section 5-103E, "Change Order Billing," for updated guidance.
- Adds guidance for load and weight limits in Section 3-519B, "Load Limits," and specifies the requirement for weighmaster certificates.
- Updates dispute resolution processes available to help Caltrans and contractors resolve disputes.
  - Adds Section 3-521E (1d), "If Partial Merit," to include guidance for disputes that includes partial merit.
  - Adds Section 3-521E (2d), "If Partial Merit," to include guidance for protests over time adjustments that includes partial merit.
  - Updates guidance on disputes in Section 3-521E (3b), "If No Merit."
  - Adds Section 3-521E (3d), "If Partial Merit," to include guidance related to working days for the controlling operation.
  - Renames Section 3-521E (4d), "Request Additional Information," to "If No Merit," and adds guidance for potential claims records found to have no merit.
  - Renumbers Section 3-521E (4d), "Request Additional Information," to 3-521E (4e).
- Adds to Section 3-5.22C, "Dispute Resolution Advisor and Dispute Resolution Board," links for DRA and DRB submittal requirements and traditional dispute meeting timelines.

Section 3-6, "Control of Materials"

- Includes new definition for Department Accepted.
- Adds suggested guidance for inspection frequency and quality assurance.
- Updates link to access construction quality assurance program guidance.
- Updates links to test methods and requirements for contractor and Caltrans testing of materials for compliance to specifications.
- Updates guidance for testing done by the contractor to include subsection 3-609A, "Action Limit and Suspension Limit."
- Adds guidance from CPB 14-2, "Buy America Provisions for Steel and Iron Materials" and CPB 15-1, "Acceptance Sampling and Testing for Job-Produced Materials."
- Renames Section 3-604, "Quality," to "Buy America," and moves content from old Section 3-606, "Buy America."
- Deletes Section 3-611, "Guarantee," and moves content to Section 3-524, "Guarantee."

Section 3-7, "Legal Relations and Responsibility to the Public"

- Incorporates CPB 15-4, "Changes to Contractor Action Request Forms," CPB 15-5, "Changes to Construction Project Records and Forms," and CPB 16-3, "Temporary Transverse Joint Taper."
- Incorporates and supersedes CPD 04-1, "Contractor Licensing," into guidance in Section 3-701, "Laws to be Observed."
- Adds link for *Trenching and Shoring Manual* to Section 3-701D (1), "Excavation Safety."
- Renames Section 3-702B, "Maintenance and Improvement of Passageway Through Construction," to "Maintenance of Passageway Through Construction." and adds guidance for construction of temporary joint tapers.
- In Section 3-703A, "Temporary Clearance and Bridge Permit Rating Changes," updates guidance on pedestrian facilities, passage through construction, temporary vertical or horizontal clearances.
- In Section 3-704, "Indemnification and Insurance," updates entity that monitors contractor insurance from Office of Risk Management to the Division of Construction.
- In Section 3-704A, "Responsibilities," adds guidance from CPB 15-4, "Changes to Contractor Action Request Forms" regarding validation and approval of insurance policies and contract bonds for contractor business name change. For contractor business name change (CEM-1202A) the Division of Construction will validate and approve insurance policies and contract bonds issued with the new business name.

Section 3-8, "Prosecution and Progress"

- Eliminates CPD 01-01, "Construction Contract Time," because it is obsolete.
- In Section 3-801, "Schedule," adds intranet site for Division of Construction, updates or clarifies what should be included in a schedule.
- Supersedes and incorporates CPB 11-1, "Primavera P6 CPM Scheduling Software."
- In Section 3-803A, "Work Before Contract Approval," adds web site listing executed contracts.
- Changes name of Section 3-806A, "Payment Adjustments" to "Time or Payment Adjustments and Nonworking Days," adds reference to *Standard Specifications* for working days and nonworking days, and adds guidance for administering concurrent delays.
- In Section 3-806B, "Material Shortage," updates the name of the American Society for Testing and Materials to ASTM International, and American Wood Preservers' Association to American wood Protection Association.
- In Section 3-808, "Contractor's Control Termination," adds intranet website for guidance on termination of contracts.
- Eliminates examples of Form CEM-2701 "Weekly Statement of Working Days," and provides website address where examples can be found.

Section 3-9, "Payment"

- Updates terminology throughout section from load slip to weighmaster certificate to align with the 2015 *Standard Specifications* and replaces CT 109 guidance with *Material Plant Quality Program* testing.
- Supersedes CPB 9-17, "State-only Funded Contract Retention." The CPB was issued to inform staff of change to the Contract Administration System and no information needed to be incorporated into the manual.
- Eliminates CPD 09-11, "Equipment Rental Rates Effective October 1, 2009," and CPD 08-3, "Equipment Rental Rates Effective August 1, 2008," because they are no longer needed.
- In 3-906D, replace "extra work payments" with "change order bills."
- Updates Section 3-902E, "Weighing Equipment and Procedures," and Section 3-908I, "Equipment Rental."
- Adds new Section 3-906F (2), "Performance Failure Withholds," with guidance on when to take a performance failure withhold and examples of which required submittals the withhold may be taken for if not received on time.

Section 4-0, "Introduction"

- Section 4-001, "Scope," expands on what sections of the *Standard Specifications* are covered in Chapter 4 and lays out the format of subsequent sections in Chapter 4. Added "Level of Inspection" and "Quality Control" to description of sections that may be included in each Chapter 4 section.
- Moves guidance from other Chapter 4 sections that are common to all Chapter 4 sections under the corresponding locations in this section. For example, includes what resources are essential to study before work begins in the "Before Work Begins" description.

Section 4-10, "General Construction"

- Renames Section 4-10 from "Dust Control" to "General Construction."
- Moves all "Watering" content from Section 17 to Section 10 and adds guidance related to *Standard Specifications* Sections 12, "Temporary Traffic Control," 13, "Water Pollution Control," 18 "Dust Palliatives," and 19, "Earthwork."
- Renames Section 4-1004, "Measurement and Payment," to "Payment," and updates content.

Section 4-11, "Welding"

- Renames section from "Quality Control and Assurance" to "Welding."
- Moves guidance for Quality Assurance from this section to Section 3-6.
- Adds guidance for monitoring quality control activities and inspection frequency.

Section 4-12, "Temporary Traffic Control"

- In Section 4-1201, "General," specifies in guidelines that contract plans and specifications govern in the event of a discrepancy with the *California Manual on Uniform Traffic Control Devices*.
- Rearranges and updates guidance throughout Section 4-12, "Temporary Traffic Control," and lays out inspections and checks to make before the work begins by device, such as, temporary traffic control devices or temporary crash cushion modules, as well as after work is begun.
- Incorporates CPB 16-2, "Lane Closure System Mobile Web Page Closure Status."
- Renames Traffic Management Center to Transportation Management Center.
- Provides updated link to authorized materials lists in subsection 4-1202B, "Temporary Traffic Control Devices."
- In subsection 4-1202C, updates guidance on closures and requires the use of the Caltrans Lane Closure System.
- In subsection 4-1203C (1a-d), updates guidance on requesting and statusing of closures during the work.
- Adds subsection 4-1204, "Level of Inspection."
- Adds subsection 4-1205, "Quality Control."
- Renumbers and renames 4-1204, "Measurement and Payment" to 4-1206, "Payment" and updates guidance to align with the 2015 *Standard Specifications*.

Section 4-15, "Existing Facilities"

- Updates description of work in Section 4-1501, "General."
- To align with the 2015 *Standard Specifications*, makes the following changes:
  - Moves Section 4-1503A, "Obliterating Roads and Detours," to new Section 4-78, "Incidental Construction."
  - Deletes Section 4-1503B, "Removing Traffic Stripes, Pavement Markings, and Pavement Markers," and moves content as follows:
    - Moves removing traffic stripes and pavement markings information to Section 4-84, "Markings."
    - Moves removing pavement markers information to Section 4-81, "Miscellaneous Traffic Control Devices."
  - Moves Section 4-1503C, "Removing Latent Traffic Stripes and Pavement Markings" to Section 4-84, "Markings."
  - Moves Section 4-1503F, "Removing Bridges," to Section 4-60, "Existing Structures."

  - Moves Section 4-1503G, "Handling Mailboxes," to new Section 4-78, "Incidental Construction."
  - Renames old Section 4-1504, "Measurement and Payment," to "Payment," and changes number to 4-1505.
- Renumbers Section 4-1503E, "Removing Concrete" to Section 4-1503A.
- Renumbers Section 4-1503D, "Salvaging Materials," to Section 4-1503B.
- Adds new Section 4-1504, "Level of Inspection," and adds guidance for suggested inspection levels and frequencies.

Section 4-16, "Temporary Facilities"

- Renames section from "Clearing and Grubbing" to "Temporary Facilities."
- Moves clearing and grubbing content to Section 4-17, "Clearing and Grubbing."
- New section incorporates elements of Section 2-216, "Pedestrian Facilities," of the *Construction Manual* and Section 16, "Temporary Facilities," of the *Standard Specifications*.
- Provide guidance for before work begins on temporary pedestrian facilities, fences, and construction mats in Section 4-1602, "Before Work Begins."
- Provides guidance for inspection and quality assurance for temporary pedestrian facilities, fences, and construction mats in Section 4-1603, "During the Course of Work."
- Adds guidance in Sections 4-1604, "Level of Inspection," and 4-1605, "Quality Control."
- Refers to special provisions and *Standard Specifications* for the basis of measurement and payment in 4-1606, "Payment," a renamed and renumbered Section 4-1604, "Measurement and Payment" to align with the 2015 *Standard Specifications*.

Section 4-17, "Clearing and Grubbing"

- Renumbers Section 4-16 to Section 4-17, "Clearing and Grubbing" content from Section 16 to Section 17.
- Moves watering content from old Section 4-17, "Watering" to Section 4-10, "General Construction."
- Eliminates guidance on timber sales in Section 4-1703.
- Adds "Levels of Inspection" in Section 4-1704.
- Updates content, renumbers section, and changes the name for Section 4-1705 to "Payment," from Section 4-1603, "Measurement and Payment."

Section 4-18, "Dust Palliatives"

- Adds all content from Section 4-10, "Dust Control."
- Removes guidance for Caltrans directing or advising the contractor.
- Provides *Standard Specifications* references regarding dust palliatives.
- Identifies activities requiring dust palliatives.
- Adds guidance for dust suppressant and dust control binder.
- Adds new Section 4-1804, "Level of Inspection," and adds guidance for suggested inspection levels and frequencies.
- Adds new section 4-1805, "Quality Control," and adds guidance for quality control activities.
- Introduces new terms: dust suppressant and dust control binder.
- Renumbers Section 4-1804 to 4-1806 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-19, "Earthwork"

- Updates guidance on permits for hazardous materials or optional disposal permits.
- Updates guidance on submitting plans for review.
- Adds guidance for level of inspection and quality control.
- Adds website for guidance on submitting shop drawings for approval.
- Renumbers Section 4-1902D "Ditch Excavation" to 4-1902C.
- Renumbers Section 4-1902C "Structure Excavation and Backfill," to 4-1902D.
- Updates guidance on use of borrow materials and excavation in Section 4-1902F.

- Updates guidance by renaming Section 4-1902G to from "Shoulder Backing," to "Subgrade-Enhancement Geosynthetics."
- Updates guidance by renaming Section 4-1902H from "Shoulder Backing," to "Subgrade-Enhancement Geosynthetics," on preparing for work.
- Adds reference to Section 20-10.02C(2), "Check and Test Existing Irrigation Facilities," of the *Standard Specifications* regarding existing irrigations system deficiencies.
- Updates reference from Public Interest Determination to Public Interest Finding to match currently used terminology.
- Renumbers Section 4-1904 to 4-1906 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-20, "Landscape"

- Aligns with updates to Section 20, "Landscape," of the *Standard Specifications*.
- Adds guidance about fertilizer, rock blanket, gravel mulch, and decomposed granite to Section 4-2002, "Planting."
- Adds guidance about inspecting and testing existing and new irrigation systems to Section 4-2003.
- Adds new Section 4-2004, "Level of Inspection," and includes guidance for inspection levels and frequencies.
- Adds new Section 4-2005, "Quality Control," and includes guidance for monitoring the contractor's quality control.
- Renumbers and renames Section 4-2003D, "Measurement and Payment," to Section 4-2006, "Payment."

Section 4-21, "Erosion Control"

- In Section 4-2104, "During the Course of Work," changes terminology from "weight tickets" to "weighmaster certificates" and updates link to get the name and address of the Caltrans-contracted seed clearinghouse.
- In Section 4-2105D, updates link to Caltrans-contracted seed clearinghouse.
- Adds new Section 4-2104, "Level of Inspection," and includes guidance for inspection levels and frequencies.
- Adds new Section 4-2105, "Quality Control," and includes guidance for monitoring the contractor's quality control.
- Renumbers and renames Section 4-2107, "Measurement and Payment," to Section 4-2109, "Payment."
- Eliminates CPD 13-7, "Seed Samples for Erosion Control Work."

Section 4-22, "Finishing Roadway"

- Updates language in Section 4-2201, "General," to be consistent with other Chapter 4 sections.
- Adds Section 4-2203, "Level of Inspection," for guidance on suggested inspection level and frequency.
- Renumbers Section 4-2203 to 4-2204 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-24, "Stabilized Soils"

- Updates descriptions of soil stabilization methods.
- Adds new Section 4-2404, "Level of Inspection," and adds guidance for suggested inspection levels and frequencies.
- Adds new Section 4-2405, "Quality Control," and adds guidance for monitoring quality control activities.
- Renumbers Section 4-2404 to 4-2406 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-25, "Aggregate Subbases"

- In Section 4-2502, recommends a preconstruction meeting to review contractor's construction and quality control plan.

- In Section 4-2503, replaces guidance for waiving testing for R-value with guidance for reducing testing; adds guidance for when geosynthetic materials are used with aggregate subbases. Adds guidance on settling test results disputes.
- Improves consistency of language between guidance on frequency of testing with Section 6-1 of the manual.
- Adds Section 4-2504, "Level of Inspection," and adds guidance for suggested inspection levels and frequencies.
- Adds Section 4-2505, "Quality Control," and adds guidance for monitoring quality control activities. Adds guidance on elements that quality control plans must include.
- Renumbers old Section 4-2504 to 4-2406 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-26, "Aggregate Bases"

- In Section 4-2602, recommends a preconstruction meeting to review contractor's construction and quality control plan.
- In Section 4-2603, replaces guidance for waiving testing for R-value with guidance for reducing testing; adds guidance for when geosynthetic materials are used with aggregate bases. Adds guidance on settling test results disputes.
- Improves consistency of language between guidance on frequency of testing with Section 6-1 of the manual.
- Adds Section 4-2604, "Level of Inspection," and adds guidance for suggested inspection levels and frequencies.
- Adds Section 4-2605, "Quality Control," and adds guidance for monitoring quality control activities. Adds guidance on elements that quality control plans must include.
- Renumbers old Section 4-2604 to 4-2606 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-27, "Cement Treated Bases"

- In Section 4-2702, recommends a preconstruction meeting to review contractor's construction and quality control plan.
- In Section 4-2703, adds guidance on settling test results disputes; improves consistency of language between guidance on frequency of testing with Section 6-1 of the manual.
- Adds Section 4-2704, "Level of Inspection," and adds guidance for suggested inspection levels and frequencies.
- Adds Section 4-2705, "Quality Control," and adds guidance for monitoring quality control activities.
- Renumbers old Section 4-2704 to 4-2706 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-28, "Concrete Bases"

- In Section 4-2802, recommends a preconstruction meeting to review contractor's construction and quality control plan.
- In Section 4-2803, adds guidance on settling test results disputes; improves consistency of language between guidance on frequency of testing with Section 6-1 of the manual; update guidance on curing.
- Adds Section 4-2804, "Level of Inspection," and guidance for suggested inspection levels and frequencies.
- Adds Section 4-2805, "Quality Control," and guidance for monitoring quality control activities.
- Renumbers old Section 4-2804 to 4-2806 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-29, "Treated Permeable Bases"

- Updates Section 4-2902 to recommend a meeting between the contractor and resident engineer prior to construction to review plans and examine equipment.
- In Section 4-2903, adds guidance on settling test results disputes; improves consistency of language between guidance on frequency of testing with Section 6-1 of the manual.
- Adds Section 4-2904, "Level of Inspection," and guidance for suggested inspection levels and frequencies.
- Adds Section 4-2905, "Quality Control," and guidance for monitoring quality control activities.

- Renumbers old Section 4-2904 to 4-2906 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-30, "Reclaimed Pavements"

- Provides inspection guidance for new Section 30, "Reclaimed Pavements," of the *Standard Specifications* including suggested inspection levels, monitoring quality control activities, and measurement and payment information.
- Introduces new terminology "full depth reclamation."
- Requires a preoperation meeting to discuss contractor's plans for pavement mix and design.

Section 4-36, "Surfacing and Pavements–General"

- This new section adds guidance for Section 36, "General," of the *Standard Specifications* and provides guidance for pavement and surfacing preconstruction meetings and pavement smoothness.
- Incorporates and supersedes CPB 13-2, "Inertial Profiler Construction Inspection Guidance."
- Includes guidance from new Section 36-3, "Pavement Smoothness," of the *Standard Specifications*, which requires the use of inertial profile to measure pavement smoothness and submittal of ProVAL reports and data.
- Eliminates CPD 11-4, "Smoothness Specification Requirement for Thin Hot Mix Asphalt Overlays," and CPD 16-2, "Pavement Smoothness Data Submittal."
- Includes bond breaker guidance moved from Sections 4-28, "Concrete Bases"; 4-40, "Concrete Pavement"; and 4-41, "Concrete Pavement Repair," of this manual.
- Adds terms including inertial profiler, ProVAL, International Roughness Index, Mean Roughness Index, and Areas of Localized Roughness.
- Partially incorporates:
    - CPB 12-3, "Pavement Safety Edge"
    - CPB 15-1, "Acceptance Sampling and Testing of Job-Produced Materials"
    - CPB 15-6, "Implementation of Hot Mix Asphalt Superpave Mix Design"
    - CPB 16-1, "Vehicle Load Limits on Structures for Material Transfer Vehicles and Other Equipment"
    - CPB 16-3, "Temporary Transverse Joint Taper."

Section 4-37, "Seal Coats"

- Changes the name of the section from "Bituminous Seals" to "Seal Coats" and adds or updates descriptions for six types of chip seals.
- Adds guidance on seal coats and link to the *Maintenance Technical Advisory Guide, Vol. 1 Flexible Pavement Preservation*.
- Adds guidance for monitoring quality control activities for each type of seal coat.

Section 4-39, "Asphalt Concrete"

- Changes the name of the section from "Hot Mix Asphalt" to "Asphalt Concrete."
- Partially incorporates the following Construction Policy Bulletins:
    - CPB 12-3, "Pavement Safety Edge"
    - CPB 13-2, "Inertial Profiler Construction Inspection Guidance"
    - CPB 15-1, "Acceptance Sampling and Testing of Job-Produced Materials"
    - CPB 15-6, "Implementation of Hot Mix Asphalt Superpave Mix Design"
    - CPB 16-1, "Vehicle Load Limits on Structures for Material Transfer Vehicles and Other Equipment"
    - CPB 16-3, "Temporary Transverse Joint Taper"
- Modifies guidance provided for hot mix asphalt (HMA) production and placement from the Quality Control/Quality Assurance and Standard processes to the Quality Assurance process defined in the *Standard Specifications*.
- Specifies that under the Quality Assurance process, the contractor performs quality control testing while Caltrans performs acceptance testing and inspection.

- Updates guidance on types of hot mix asphalt, deletes Type B asphalt.
- Updates link for approved asphalt binder suppliers.
- Refers to Section 3-902E, "Weighing Equipment and Procedures," of the *Construction Manual*, for additional information on qualifications of hot mix asphalt plants under the *Material Plant Quality Program* (*MPQP*).
- Specifies that HMA must meet the requirements of AASHTO 283, "Standard Method of Test for Resistance of Compacted Mixtures to Moisture-Induced Damage," and AASHTO 324, "Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA)."
- Requires that when HMA is receiving treatment (antistrip additive or lime treatment), California Test 204, "Method of Tests for Liquid Limit, Plastic Limit and Plasticity Index of Soils," be run on the aggregates. Section 39-2.01B(2)(b), "Hot Mix Asphalt Treatments," of the *Standard Specifications,* is used for guidance.
- Requires stockpiling any slurry-treated aggregates for 24 hours before use.
- Updates various test method references from California Test methods to AASHTO test methods.
- Updates guidance on discussing the use of tapered edges and assuring pavement smoothness in the prepaving conference in Section 4-3902I, and inspection for treatment of new work at existing concrete in Sections 4-3903D (11), "Temporary Transverse Joint Tapers," and 4-3903D (12), "Existing Asphalt Concrete," of this manual.
- Adds policy to ensure contractors do not cross a structure with a vehicle that exceeds vehicle code weight limits without written authorization. Requires the review of requests to be coordinated through the projects structure representative, or to the bridge engineer if a structures representative has not been assigned to the project.
- Specifies that the contractor is required to perform quality control density testing, and updates requirements in Section 39-2.01C(15)(b), "Method Compaction," and the "Construction" sections of applicable type of HMA; 39-2.02C for Type A, 39-2.03C for RHMA-G, 39-2.04C for OGFC, of the *Standard Specifications.*
- Specifies that Caltrans should document and report roller passes and temperatures for compaction performed using the "Method Compaction" process.

Section 4-40, "Concrete Pavement"

- Incorporates guidance from CPB 12-3, "Pavement Safety Edge."
- Partially incorporates CPB 13-2, "Inertial Profiler Construction Inspection Guidance."
- Eliminates CPD 13-8, "Contractor Option to Use Inertial Profiler to Determine Pavement Smoothness," as this was an interim option during the change in method from California Profilograph to the inertial profiler.
- Updates information based on reorganization of Section 40 of the 2015 *Standard Specifications*, and relocates portions to Sections 4-36, "Surfacing and Pavement—General," and 4-41, "Concrete Pavement Repair," of the *Construction Manual* as appropriate.
- Adds guidance for suggested inspection frequency (for example, level of inspection).
- Adds/relocates guidance for quality assurance elements (for example, quality control) as described in the 2015 *Standard Specifications*.
- Clarifies guidance by discerning guidance for general (implied), continuously reinforced concrete pavement (explicit), and jointed plain concrete pavement (explicit).
- Provides additional focused guidance on elements of concrete pavement including: early age crack mitigation system; proper dowel/tie bar placement; pavement repair of noncompliant work; shrinkage test data with mix design; pavement climate region identification; reinforcement and bar inspection; just-in-time training; proposed plastic chair usage; coefficient of thermal expansion specimens and testing; pavement smoothness; test strips; finishing, curing, and inspection of concrete cracks; slab panel lengths, and base bond breakers and rumble strip by reference.

Section 4-41, "Existing Concrete Pavement"

- Updates concrete repair information based on reorganization and requirements of Section 41 of the 2015 *Standard Specifications* including the move of crack existing concrete pavement to Section 30.

- Improves guidance for quality control activities of individual slab replacement and frequency of testing with Section 6-1 of the manual.
- Adds Section 4-4104, "Level of Inspection," and adds guidance for suggested inspection levels and frequencies.
- Adds Section 4-4105, "Quality Control," and adds guidance for monitoring quality control activities.
- Renumbers and renames Section 4-4104, "Measurement and Payment," to Section 4-4106, "Payment," to align with the 2015 *Standard Specifications*.

Section 4-42, "Groove and Grind Concrete"

- Adds guidance for pavement smoothness with inertial profiler and reminds the contractor that failure to achieve compliance is covered under Section 5-1.30, "Noncompliant and Unauthorized Work" of the *Standard Specifications*.
- Renames Section 4-4204 from "Measurement and Payment," to "Level of Inspection," and adds guidance for suggested inspection levels and frequencies.
- Adds Section 4-4205, "Quality Control," and adds guidance for monitoring quality control activities.
- Renumbers Section 4-4204 to Section 4-4206 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-46, "Ground Anchors and Soil Nails"

- Adds Section 4-4601, "General" to refer to Structure Construction's *Foundation Manual* for guidance on ground anchors and soil nails.
- Adds Section 4-4602, "Payment," for guidance on calculating quantities for payment of soil nails.

Section 4-47, "Earth Retaining Systems"

- Adds Section 4-4701, "General," to refer to specific guidance in Structure Construction's *Bridge Construction Records and Procedures* manual on earth retaining systems and mechanically stabilized embankments.
- Adds Section 4-4702, "Payment," for guidance to refer to appropriate sections of the special provisions and *Standard Specifications* for measurement and payment.

Section 4-48, "Temporary Structures"

- New content describes types of temporary structures and refers to updated guidance for such structures.
- Includes Section 4-4802, "Payment," for guidance to refer to appropriate sections of the special provisions and *Standard Specifications* for measurement and payment.

Section 4-49, "Piling"

- Updates quality control guidance for different pile types.
- Adds guidance for how cast-in-place concrete piles are measured.
- Updates links for guidance on piling and recordkeeping on piling in 4-4901, "General," and 4-4902, "Before Work Begins."
- Renames Section 4-4904, "Measurement and Payment" to "Quality Control" and adds guidance for quality control.
- Moves content from old Section 4-4904, "Measurement and Payment" to new Section 4-4905, "Payment," to align with the 2015 *Standard Specifications*.

Section 4-50, "Prestressing Concrete"

- Updates links to Structure Construction's *Bridge Construction Records and Procedures* manual and Prestress Manual in Section 4-5001, "General."
- Updates guidance and provides link to safety information in Section 4-5003, "During the Course of Work."
- Renames Section 4-5004, "Measurement and Payment," to "Quality Control," and provides guidance for quality control activities.

- Moves and renames Section 4-5004, "Measurement and Payment" to Section 4-5005, "Payment," and provides a link to the *Bridge Construction Records and Procedures* manual.

Section 4-51, "Concrete Structures"

- Requires the use of Form CEM-3101, "Notice of Materials to Be Used" for concrete structure materials.
- Renames Section 4-5104, "Measurement and Payment, to "Quality Control," and provides guidance for quality control activities."
- Moves and renames Section 4-5104, "Measurement and Payment" to Section 4-5105, "Payment."
- Eliminate CPDs:
  - 13-2, "Release of Revised Standard Plan RSP B11-47, 'Cable Railing' "
  - 10-8, "Stem to Deck Construction Joint"
  - 06-9, "Change in Flare Gap in Flared Columns"
  - 06-7, "Eliminate haunch details for Type 1 Retaining Walls with safety barrier"

Section 4-52, "Reinforcement"

- Adds guidance for monitoring quality control activities.
- Updates Section 4-5204 title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications.*

Section 4-53, "Shotcrete"

- Section 4-5301, "General," specifies that shotcrete is used for facing soil nail walls in addition to other potential uses.
- Specifies review of the contractor's quality control plan and obtaining test result for sample cores in Section 4-5302, "Before Work Begins."
- Adds guidance for level of inspection and quality control.
- Section 4-5303, "During the Course of Work," and Section 4-5304, "Quality Control," outlines steps to take to verify proper mixing and application of shotcrete.
- Updates Section 4-5304 to 4-5305 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-54, "Waterproofing"

- Adds guidance for level of inspection and quality control.
- Adds guidance for activities to perform before work begins, including the contractor's quality control plan and overseeing materials tests.
- Updates Section 4-5404 to 4-5405 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-55, "Steel Structures"

- Adds guidance for monitoring quality control activities.
- Adds guidance for payments on out-of-state testing of materials.
- Updates Section 4-5504 to 4-5505 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-56, "Overhead Sign Structures, Standards, and Poles"

- Changes the name of the section from "Signs" to "Overhead Sign Structures, Standards, and Poles."
- Updates section to align with Section 56, "Overhead Sign Stuctures, Standards, and Poles" of the 2015 *Standard Specifications*.
- Moves guidance for "Sign Panels" and "Roadside Signs" from this section to Section 4-82, "Signs and Markers," of this manual.
- Updates references and links for guidance on overhead sign structures, standards, and poles.
- Differentiates and adds guidance for inspections on sign structures and standards.

- Renames Section 4-5603B, "Roadside Signs," to "Standards" and adds guidance to follow during the course of work.
- Renames Section 4-5604, "Measurement and Payment," to "Quality Control," and adds guidance for quality control activities.
- Moves and renames Section 4-5604, "Measurement and Payment," to 4-5605, "Payment" and updates guidance to align with the 2015 *Standard Specifications*.

Section 4-57, "Wood and Plastic Lumber Structures"

- In Section 4-5701, "General," deletes listing of *Construction Manual* sections that specify use of treated lumber.
- In Section 4-5702, "Before Work Begins," updates reference for painting wood or plastic structures to Section 4-78, "Incidental Construction."
- In Section 4-5703, "During the Course of Work," requires resident engineers to verify that lumber delivered to the job site complies with grading specifications.
- Renames Section 4-5704, "Measurement and Payment," to "Quality Control," and adds guidance for monitoring quality control activities and recommends stiffness tests for plastic lumber be done in the presence of the METS inspector.
- Renumbers, renames, and moves content from Section 4-5704, "Measurement and Payment," to 4-5705, "Payment," to align with the 2015 *Standard Specifications*.

Section 4-58, "Sound Walls"

- In Section 4-5801, "General," deletes listing of *Construction Manual* sections that specify guidance on sound walls.
- In Section 4-5802, "Before Work Begins," deletes guidance to contractor on potential staffing problems.
- Renames Section 4-5804, "Measurement and Payment," to "Quality Control," moves the requirement that contractors have specialized inspector for reconstruction testing from section 4-5802 and Section 4-5803, "During the Course of Work."
- Renumbers, renames, and moves content from Section 4-5804, "Measurement and Payment," to 4-5805, "Payment," to align with the 2015 *Standard Specifications*.

Section 4-59, "Structural Steel Coatings"

- Renames section from "Painting" to "Structural Steel Coatings" to align with 2015 *Standard Specifications.*
- Adds reference to inspection checklist found in the *Bridge Construction Records and Procedures* manual, Volume 2.
- Moves guidance for miscellaneous coatings including painting timber or concrete, staining concrete and shotcrete and rock, anti-graffiti coating, and painting electrical material to new Section 4-78, "Incidental Construction."
- Adds guidance for monitoring quality control activities.
- Updates Section 4-5904 to 4-5905 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-60, "Existing Structures"

- New section incorporates and adds guidance for elements of Section 60, "Existing Structures," of the 2015 *Standard Specifications*, which includes Section 60-2, "Structure Removal," Section 60-3, "Structure Rehabilitation," and Section 60-4, "Modifying Structures."
- Adds link to the *Bridge Construction Records and Procedures* manual, the *Bridge Deck Construction Manual*, and the *Falsework Manual* for further guidance.
- Adds guidance for inspections to perform before work begins and steps to take during the work for removing concrete or bridges.
- Adds guidance for monitoring quality control activities.
- Adds guidance for measurement and payment for existing structures.

Section 4-61, "Drainage Facilities—General"

- Moves guidance for "Alternative Culverts," "Alternative Slotted Pipe," "Temporary Culverts," and "Concrete Backfill for Pipe Trenches" from Section 4-62 to Section 4-61.
- Renames section from "Culvert and Drainage Pipe Joints" to "Drainage Facilities—General" to align with 2015 *Standard Specifications.*
- Adds guidance for inspection in Section 4-6101 and 4-6102, testing in Section 4-6103, and level of inspection in Section 4-6105.
- Adds guidance for monitoring quality control activities in Section 4-6104.
- Moves content from Section 4-6104 to 4-6106 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-64, "Plastic Pipe"

- Updates guidance to include slotted plastic pipe.
- Adds guidance for suggested inspection frequency in Section 4-6404, "Level of Inspection."
- Adds guidance for monitoring quality control activities in Section 4-6405, "Quality Control."
- Renumbers, renames, and moves content from Section 4-6404, "Measurement and Payment," to 4-6406, "Payment," to align with the 2015 *Standard Specifications*.

Section 4-65, "Concrete Pipe"

- Specifies that section covers inspections for circular reinforced concrete pipe, oval-shaped reinforced concrete pipe, reinforced concrete pipe arch, and nonreinforced concrete pipe.
- Requires contractor to specify the class of reinforced concrete pipe and the method of backfill, as well as the method of manufacturing the culverts.
- Moves details of hydrostatic test into Section 4-6505, "Quality Control."
- Renames, renumbers, and moves content from 4-6504, "Measurement and Payment" to 4-6506, "Payment."

Section 4-66, "Corrugated Metal Pipe"

- Aligns with Section 66, "Corrugated Pipe," of the *Standard Specifications*.
- Adds guidance for activities to perform before work begins, including materials tests.
- Adds guidance for level of inspection and quality control.
- Renumbers, renames, and moves content from Section 4-6604, "Measurement and Payment," to 4-6606, "Payment," to align with the 2015 *Standard Specifications*.

Section 4-67, "Structural Plate Culverts"

- Updates guidance from Section 67, "Structural Plate Culverts" of the *Standard Specifications*.
- Renames Section 4-6704, "Measurement and Payment," to "Level of Inspection," and adds suggested levels of inspection for structural metal plate pipe and metal liner plate pipe.
- Adds Section 4-6705, "Quality Control," and adds guidance for quality control.
- Renumbers, renames, and moves content from Section 4-6704, "Measurement and Payment to Section 4-6706, "Payment," to align with the 2015 *Standard Specifications*.

Section 4-68, "Subsurface Drains"

- In Section 4-6801B, "Horizontal Drains," clarifies guidance for vertical wells.
- Updates Section 4-6803A, "Underdrains," to require only one type of alternative pipe at installation of underdrains.
- Renames Section 4-6804, "Measurement and Payment," to "Level of Inspection," and specifies levels of inspection for underdrains and edge drains, horizontal drains, and geocomposite drain systems.
- Adds Section 4-6805, "Quality Control," and includes guidance for quality control.
- Renumbers, renames, and moves content from Section 4-6804, "Measurement and Payment," to Section 4-6806, "Payment."

Section 4-69, "Overside Drains"

- In Section 4-6902, "Before Work Begins," deletes reference to guidance from Section 6-2, "Field Tests" of this manual.
- In Section 4-6903, "During the Course of Work," adds guidance to require use of only one type of alternative pipe downdrain, to require use of plastic pipe from only one manufacturer, and advises avoiding mixing steel with aluminum to prevent galvanic corrosion.
- Renames Section 4-6904, "Measurement and Payment," to "Level of Inspection," and suggests intermittent levels of inspection for overside drain work activities.
- Adds guidance for quality control in Section 4-6905, "Quality Control."
- Renumbers, renames, and moves content from Section 4-6904, "Measurement and Payment," to 4-6906, "Payment."

Section 4-70, "Miscellaneous Drainage Facilities"

- Specifies in Section 4-7001, "General," that the section is for inspecting the items in miscellaneous drainage facilities.
- Adds link to Structure Construction for guidance on casings for bridges in Section 4-7001, "General."
- Adds guidance in Section 4-7003, "During the Course of Work," to consult the *Standard Specifications* about coated pipes, and guidance for inspecting insulated connections, welded steel pipe, inlet depressions, and grated line drains.
- Renames Section 4-7004, "Measurement and Payment," to "Levels of Inspection" and adds guidance for suggested inspection frequencies.
- Adds Section 4-7005, "Quality Control" and includes guidance for quality control.
- Renumbers, renames, and moves content from Section 4-7004, "Measurement and Payment" to 4-7006, "Payment."

Section 4-71, "Existing Drainage Facilities"

- Adds new section to align with the *Standard Specifications* section on general guidance for inspecting existing drainage facilities.
- Defines rehabilitation of drainage facilities and advises preconstruction meeting to review contractor plans and materials.
- Adds guidance for addressing rehabilitation, modification, adjustment, or abandonment of drainage facilities.
- Adds guidance on inspection and assuring quality control for existing drainage facilities.

Section 4-72, "Slope Protection"

- Updated name for "Bank Protection—Erosion Control" from "Channel and Shore Protection—Erosion Control."
- Deletes Section 4-7203H, "Sacked Concrete Slope Protection," on guidance for use of sacked-concrete slope protection.
- Renames Section 4-7204, "Measurement and Payment," to "Level of Inspection" and adds guidance for suggested inspection levels and frequencies.
- Adds section 4-7205, "Quality Control," and adds guidance for monitoring quality control activities.
- Renumbers, renames, and moves content from Section 4-7204, "Measurement and Payment" to Section 4-7206, "Payment."

Section 4-73, "Concrete Curbs and Sidewalks"

- Incorporates and supersedes CPB 14-1, "Americans with Disabilities Act Facilities Construction Inspection Guidance."
- Incorporates Design Information Bulletin (DIB) 82-05, "Pedestrian Accessibility Guidelines for Highways Projects," which includes guidance from Americans with Disabilities Act (ADA) guidance for these facilities in 4-702.

- Recommends use of smart levels for measuring slopes and dimensions of pedestrian facilities.
- Adds recommendations that preconstructions meetings include discussions of contractor's construction and quality control of temporary and permanent pedestrian access facilities to ensure conformance with ADA design and legal requirements.
- Advises contractor to check forms prior to placing concrete to ensure that dimension and slope requirements will be met, and includes a reminder that failure to achieve compliance is covered under Section 5-1.30, "Noncompliant and Unauthorized Work" of the *Standard Specifications*.
- Requires consultations with the designer and the district ADA engineer to ensure that plans are in ADA compliance, and issuance of change orders to correct layouts or grades that do not meet requirements.
- Requires contractor compliance with Section 7-1.02A, "General," Section 7-1.04, "Public Safety," Section 12, "Temporary Traffic Control," and Section 16-2.02, "Temporary Pedestrian Facilities" of the *Standard Specifications* for temporary pedestrian facilities requirements.
- Requires checking of slopes and dimensions to record compliance and district ADA certification prior to construction contract acceptance.
- Renames Section 4-7304, "Measurement and Payment," to "Level of Inspection" and adds guidance for suggested inspection levels and frequencies.
- Adds Section 4-7305, "Quality Control," and adds guidance for monitoring quality control activities.
- Renumbers, renames, and moves content from Section 4-7304, "Measurement and Payment," to 4-7306, "Payment," to align with the 2015 *Standard Specifications*.

Section 4-74, "Pumping Equipment and Controls"

- Adds guidance for monitoring quality control activities.
- Updates Section 4-7404 to 4-7405 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.
- Adds guidance for transferring electrical service and operation manuals to Caltrans.

Section 4-75, "Miscellaneous Metal"

- Adds guidance for monitoring quality control activities.
- Updates Section 4-7504 to 4-7505 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-78, "Incidental Construction"

- Moves guidance for inspecting incidental bid items from Sections 4-15, 4-59, 4-73, 4-81, and 4-86 to this new section to align with Section 78, "Incidental Construction," of the 2015 *Standard Specifications*.
- Adds guidance for levels of inspection in Section 4-7805, "Level of Inspection."

Section 4-80, "Fences"

- Updates terminology from "Type ESA temporary fence" to "high-visibility temporary fence" to align with 2015 *Standard Specifications.*
- In Section 4-8002, "Before Work Begins," adds requirement for certificates of compliance to be submitted for fence posts and braces and a reference to Section 6-2 of the *Construction Manual*.
- Renames Section 4-8004 from "Measurement and Payment" to "Level of Inspection" and adds guidance for suggested inspection levels and frequencies.
- Adds Section 4-8005, "Quality Control," and adds guidance for monitoring quality control activities.
- Adds Section 4-006, "Payment," and updates old section to include measurement of gates, payment of number of units, and updated reference to *Construction Manual*.

Section 4-81, "Miscellaneous Traffic Control Devices"

- Renames section from "Monuments" to "Miscellaneous Traffic Control Devices" to align with the 2015 *Standard Specifications*.
- All content from Section 81, "Monuments," moved to new Section 78, "Incidental Construction."

- Moves part of existing guidance for delineators from Section 4-82.
- Moves all existing guidance from Section 4-85.
- Moves existing guidance for removal of pavement markers from Section 4-15.
- Adds Section 4-8104, "Level of Inspection," and adds guidance for suggested inspection levels and frequency.
- Adds Section 4-8105, "Quality Control," and adds guidance for monitoring quality control activities.
- Renumbers old Section 4-8104 to 4-8106 and changes title from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*. Adds guidance for delineators, pavement markers, and existing facilities.
- Improves consistency of language between guidance on frequency of testing with Section 6-1 of the *Construction Manual*.

Section 4-82, "Signs and Markers"

- Section 4-82 title changes from "Markers and Delineators" to "Signs and Markers."
- Moves guidance for "Delineators" from Section 4-82 to Section 4-81, "Miscellaneous Traffic Control Devices."
- Moves guidance for existing roadside signs and markers from Section 4-15, "Existing Facilities," to Section 4-82.
- Moves guidance for "Roadside Signs" and "Overhead Sign Panels" from Section 4-56, "Signs," to Section 4-82.
- Adds guidance for suggested inspection frequency and monitoring quality control activities.

Section 4-83, "Railings and Barriers"

- Incorporates CPD 16-6, "Guardrail End Terminal Inspection," and adds guidance to assure proper installation and quality assurance review.
- In Section 4-8301, "General," includes updated elements from Chapter 7, "Traffic Safety Systems," of the *Traffic Manual* and updates link, and specifies height increase to 32 inches for Midwest Guardrail System, a new term.
- In Section 4-8302, "Before Work Begins":
  - Adds title for Section 4-8302A, "Metal Beam Guard Railing, Thrie Beam Barrier, and Midwest Guardrail System," and updates guidance and references to the *Traffic Manual*.
  - Adds title for Section 4-8302B, "Concrete Barrier."
- Changes title for Section 4-8303A, "Metal Beam Guard Railing and Thrie Beam Barrier" to "Metal Beam Guard Railing, Thrie Beam Barrier, and Midwest Guardrail System," and updates guidance.
- Renames Section 4-8303B, "Pipe Handrailing, Steel Bridge Railing, Cable Railing, Metal Railing (Tubular), and Chain Link Fence," to "Guardrail and Terminals Inspection," and adds guidance for installation of guardrail end terminals, bolts and washers, and nesting requirements.
- Renumbers Section 4-8303B, "Pipe Handrailing, Steel Bridge Railing, Cable Railing, Metal Railing (Tubular), and Chain Link Fence," to 4-8303C.
- Renumbers Section 4-8303C, "Concrete Barriers and Railings," to 4-8303D.
- Renames Section 4-8304, "Measurement and Payment," to "Level of Inspection" and adds guidance for inspection levels and frequencies.
- Adds Section 4-8305, "Quality Control," and adds guidance for monitoring quality control activities.
- Renumbers, renames, and moves content from Section 4-8304, "Measurement and Payment," to 4-8306, "Payment," to align with the 2015 *Standard Specifications*.

Section 4-84, "Markings"

- Renames section from "Traffic Stripes and Pavement Markings" to "Markings," and includes specific guidance for applying or removing markings.
- Incorporates CPB 12-4, "Field-Sampling Procedures for Traffic Paint, Thermoplastic, and Glass Beads"
- In 4-8401, "General," updates guidance for inspecting pavement markings work and adds reference to Section 84, "Markings," of the *Standard Specifications*.

- Adds Section 4-8402A, “Traffic Stripes and Pavement Markings,” to Section 4-8402, “Before Work Begins,” and offers specific re-work guidance for pavement markings, including discussions to have with the contractor.
- Adds section title 4-8403A, “Traffic Stripes and Pavement Markings,” to Section 4-8403, “During the Course of Work,” and updates guidance to include specific steps during the application of traffic stripes and pavement markings. Incorporates CPB 12-4, “Field Sampling Procedures for Traffic Paint, Thermoplastic, and Glass Beads,” to require field sampling and testing of pavement-marking materials when quality of material is suspect as required in the CPB.
- Adds new Section 4-8403B, “Rumble Strips,” and adds guidance for rumble strips constructed on concrete pavement and asphalt concrete pavement.
- Moves guidance for removal of existing traffic stripes and pavement markings from Section 4-15, “Existing Facilities” to new section 4-8403C, “Existing Markings.”
- Renames Section 4-8404, “Measurement and Payment,” to “Level of Inspection” and adds guidance for inspection levels and frequencies.
- Adds Section 4-8405, “Quality Control,” and adds guidance for monitoring quality control activities.
- Renumbers, renames, and moves content from Section 4-8404, “Measurement and Payment,” to 4-8406, “Payment,” to align with the 2015 *Standard Specifications*.

Section 4-86 “Electrical Equipment and Materials”

- Changes the name of the section from “Electrical Systems” to “Electrical Equipment and Materials.”
- In Section 4-8601, “General”:
  - Specifies that the section is guidance for inspection of equipment and materials in Sections 86 and 87 of the *Standard Specifications* regarding electrical systems.
  - Delineates the most common types of electrical systems and advises engineers to expect evolution of technology and construction requirements.
  - Advises the use of electrical engineer as resident engineers when electrical work predominates in projects.
- Recasts Section 4-8602, “Before Work Begins,” with list of references for guidance and instruction for verifying lists of materials for inspecting those materials before work begins.
- Moves content from Section 4-8603, “During the Course of Work,” to Section 4-87, “Electrical Systems”; renames section to “Quality Assurance” and adds guidance for quality assurance listing commonly used items.
- Eliminates
  - CPD 02-05, “Traffic Signal and Lighting Poles”
  - CPD 10-13, “Revised Implementation of Traffic Operations Policy Directive 09-06”
  - CPD 14-11, “Advance Ramp Meter Control Signal Signs”
- Deletes Section 4-8604, “Contract Administration.”
- Renumbers and renames Section 4-8605, “Measurement and Payment,” to Section 4-8604, “Payment,” and updates guidance on costs.
- Deletes Example 4-86, “Electrical Systems Sample Checklist.”

Section 4-87, “Electrical Systems”

- Adds new section to align with the *Standard Specifications* section on general guidance for and testing of electrical systems used in highway and traffic work.
- Moves content from Section 4-8603, “During the Course of Work,” to Section 4-8703, “During the Course of Work.”
- Specifies a thorough review of the job plans and coordinate work with utilities, as necessary, to keep the job on schedule.
- Offers guidance on verifying that the contractor is siting, installing, and testing elements of the job correctly based on material type.

- Includes new policy or procedures from CPBs on bicycle detection at signalized intersections and new advanced warning sign requirements at ramp meter locations.
- Moves Example 4-86, "Electrical Systems Sample Checklist," to Example 4-87.1.
- In Section 4-8704, "Level of Inspection," adds guidance for inspection levels and frequencies.
- In Section 4-8705, "Quality Control," adds guidance for monitoring quality control activities.
- In Section 4-8706, "Payment," adds guidance for payment of electrical systems.
- Eliminates
    - CPD 02-05, "Traffic Signal and Lighting Poles";
    - CPD 10-13, "Revised Implementation of Traffic Operations Policy Directive 09-06;"
    - CPD 14-11, "Advance Ramp Meter Control Signal Signs."

Section 4-90, "Concrete"

- Updates description of work in Section 4-9001, "General."
- Updates Section 4-9001A, "Before Work Begins," with additional common test methods.
- Updates terminology throughout section due to changes associated with 2015 *Standard Specifications* such as slump, gradation instead of grading, supplementary cementitious materials (SCM), and tier 1, 2, 3, and 4 classifications of precast concrete members, and weighmaster certificate instead of load ticket.
- Adds Section 4-9001C, "Level of Inspection," which includes guidance for quality assurance elements (for example, quality control) as described in the 2015 *Standard Specifications*.
- Renumbers and renames Section 4-9001C, "Measurement and Payment," to Section 4-9001D, "Payment."
- In Section 4-9001A (2), "Check of Mix Design," adds shrinkage test data guidance for mix design reviews of pavements, approach slabs, and bridge decks.
- Adds admixture guidance for mix design review in Section 4-9001A (2a) 4, "Admixtures."
- Replace California Test 109 with MPQP requirement.
- Adds test method ASTM C143, if applicable, for determining consistency and uniformity of concrete.
- Adds guidance on electronic delivery for weighmaster certificates.
- Renames Section 4-9003C, "Measurement and Payment," to "Payment."
- Updates precast concrete guidance in consideration of specification changes (refer to 2010 revised *Standard Specifications*) in Section 4-9004A, "Before Work Begins."
- Renames Section 4-9004C, "Measurement and Payment," to "Payment."
- Eliminates the following Construction Procedure Directives (CPDs):
    - CPD 07-2, "Portland Cement Specification"
    - CPD 09-5, "Five Percent Limestone in Portland Cement"
    - CPD 10-5, "Adding Water to Concrete in the Field"
    - CPD 10-14, "Relative Mortar Strength of Fine Aggregate"

Section 4-91, "Paint"

- Updates *Construction Manual* reference.
- Changes title of Section 4-9104 from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-92, "Asphalt Binders"

- Renames section from "Asphalt" to "Asphalt Binders" to align with 2015 *Standard Specifications*.
- Updates Section 4-9201, "General," as follows:
    - Adds new definition of modified asphalt binder.
    - Adds reference to *MS-2 Asphalt Mix Design Methods* published by the Asphalt Institute.
    - Adds overview of policy on bumping an asphalt binder one performance grade.
    - Deletes link to Pavement Climate Regions map.
    - Adds link to Office of Pavement Engineering's "Performance Graded (PG) Binder."

  - Deletes Section 4-9201C, "Certificate Program for Suppliers of Asphalt," and Section 4-9201D, "Quality Assurance," because this information is covered in Sections 4-9204C, 6-1, and 6-203C (1) of the *Construction Manual*.
- Updates Section 4-9202, "Before Work Begins," as follows:
  - Provides link to Caltrans approved asphalt suppliers and requires resident engineer to verify that suppliers are on this list.
  - Provides link to Certification Program for Suppliers of Asphalt.
  - Provides link to Tack Coat Guidelines.
- Updates Section 4-9203, "During the Course of Work," as follows:
  - Moves certificate of compliance requirements from Section 4-9203A to Section 4-9204C, "Certificates of Compliance."
  - Adds reference to the *Independent Assurance Manual: Procedures for Accreditation of Laboratories and Qualification of Testers for California Test 125 Qualification*.
- Changes title of Section 4-9204, "Contract Administration," to "Quality Control," and makes the following updates:
  - Updates Section 4-9204A, "Acceptance Test Results," to reflect current process.
  - Updates Section 4-9204B, "Stop Production," to reflect current process.
- Eliminates the following Construction Procedure Directives (CPDs):
  - CPD 07-2, "Portland Cement Specification"
  - CPD 09-5, "Five Percent Limestone in Portland Cement"
  - CPD 10-5, "Adding Water to Concrete in the Field"
  - CPD 10-14, "Relative Mortar Strength of Fine Aggregate"
- Updates Section 4-9205, "Payment," as follows:
  - Changes title of Section 4-9205 from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.
  - Moves Section 4-9204D, "Compensation Adjustments for Price Index Fluctuations," to Section 4-9205A. Specifies that payment adjustments for crude oil index are to be made monthly and that change orders be issued with both positive and negative payment methods. Also references the Crude Oil Index Adjustment tool added to the Hot Mix Asphalt Construction website.

Section 4-94, "Asphaltic Emulsions"

- Adds an internal link to new Adobe Acrobat document titled "Minimum Spray Application Rates of Diluted and Undiluted Emulsions" along with an example of its use.
- Incorporates part of CPB 15-1, "Acceptance of Sampling and Testing of Job-Produced Materials."
- Adds guidance for monitoring quality control activities.

Section 4-95, "Epoxy"

- In Section 4-9501, aligns order of applications with 2015 *Standard Specifications* and adds clarification language.
- In Section 4-9503, provides clarifying epoxy guidance concerning storage, mixing, surface preparation, and application.
- Changes title of Section 4-9504 from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 4-96, "Geosynthetics"

- Geosynthetic guidance moved from Section 4-88 to new Section 4-96.
- Introduces new term—geotechnical subsurface reinforcement.
- Reorders presentation of *Standard Specifications* sections.
- Provides additional instructions regarding Form CEM-3101.
- Provides additional instructions regarding certificates of compliance.

- Changes title of Section 4-9604 from "Measurement and Payment" to "Payment," to align with the 2015 *Standard Specifications*.

Section 5-0, "Conduct of the Work"

- Updates terminology throughout section of federal-aid projects that are delegated to state oversight and that do not require any federal oversight from assigned projects to delegated projects, updates classification of federal-aid projects from high profile projects to projects of division interest, and updates the website for the stewardship agreement between FHWA and Caltrans.
- In Section 5-002, "Preconstruction Conference With Caltrans Personnel," adds FHWA transportation engineer to the list of preconstruction meeting invitees.
- In Section 5-003, "Preconstruction Conference With the Contractor," expands list of meeting discussion items to include temporary pedestrian access routes, Americans with Disabilities Act requirements for pedestrian facilities, contingency plans, quality-control and acceptance testing, and Buy American requirements, and eliminates CPD 00-10, "Contractor Contingency Plans," and CPD 01-05, "Energy Crisis Contingency Planning." Adds guidelines to preconstruction discussions on pedestrian facilities and access requirements.
- In Section 5-006, "Maintenance Reviews," adds guidance for a field review meeting and inspections when the job is 90 percent complete and calls for the use of MTCE-0023, "Construction to Maintenance 90% BMP Completion Walkthrough"; incorporates and supersedes CPB 13-1, "Construction to Maintenance 90% Best Management Practices Completion Walkthrough," and CPB 09-6, "Oversight Project Completion Checklist."
- In Section 5-007A, "Federal Highway Administration Involvement on Projects of Division Interest—N," calls for the use of new Form CEM-6303, "Final Acceptance Checklist for Federal-Aid Projects of Division Interest."

Section 5-1, "Project Records and Reports"

- Incorporates and supersedes CPB 07-6, "Progress Pay-Entering Contract Milestones in the Contract Administration System," and adds guidance from the CPB regarding CAS and Form 6301.
- Partially incorporates and CPB 10-3, "Administration of Emergency Force Account and Emergency Limited Bid Contracts," in Section 5-103E, "Change Order Billing."
- Partially incorporates CPB 15-2, "Submission of Good Faith Efforts and Uniform Report of DBE Awards/Payments."
- Incorporates and supersedes CPB 15-5, "Changes to Construction Project Records and Forms," requirement to use records retention table for record storage to Section 5-104C "Disposition of Construction Project Records." This change was made to mitigate an audit finding on Caltrans' records procedures and to incorporate electronic storage of records.
- In Section 5-101, "Forms Used for Contract Administration":
  - Updated form titles and descriptions where applicable.
  - Removed form stock numbers.
  - Added or deleted the following forms:
    - Deleted CEM-1101, "Documents Bond of State Highway Oversight Projects"
    - Deleted CEM-1202, "Contractor Action Request, Change of Name/Address- Assignment of Contract Monies
    - Added CEM-1202A, "Contractor Action Request - Change of Name/Address
    - Added CEM-1202B, "Contractor Action Request - Assignment of Contract Monies, Assignee Change of Name/ Address"
    - Deleted CEM-1204, "American Recovery and Reinvestment Act (ARRA) Monthly Employment Report"
    - Deleted CEM-2001, "National Pollution Discharge Elimination Annual Certification"

- Deleted CEM-2002, “Notification of Construction (NOC)”
- Deleted CEM-2004, “Notification of Completion of Construction (Desert Areas)”
- Deleted CEM-2005, “Notification of Rainfall Erosivity Waiver”
- Deleted CEM-2031, “Daily Stormwater Site Inspection Report”
- Added CEM-2031T, “Daily Stormwater Site Inspection Report – Lake Tahoe Hydrologic Unit”
- Added Form CEM-2035T, “Stormwater Corrective Actions Summary – Lake Tahoe Hydrologic Unit”
- Deleted CEM-2040, “Weather Forecast Log”
- Deleted CEM-2041, “Weather Monitor Log”
- Deleted CEM-2046, “Rain Event Action Plan - Plant Establishment Phase”
- Deleted CEM-2047, “Rain Event Action Plan - Inactive Project”
- Deleted CEM-2048, “Storm Event Sampling and Analysis Plan”
- Deleted CEM-2049, “Qualifying Rain Event Sampling and Analysis Plan”
- Deleted CEM-2049T, “Qualifying Rain Event Sampling and Analysis Plan - Lake Tahoe Hydrologic Unit”
- Deleted CEM-2050, “Sample Information Identification and Chain of Custody Record”
- Deleted CEM-2054, “Stormwater Sample Laboratory Test Report”
- Deleted CEM-2055, “Stormwater Equipment Maintenance Log”
- Deleted CEM-2056, “Stormwater Turbidity Meter Calibration Record”
- Deleted CEM-2057, “Stormwater pH Meter Calibration Record”
- Added CEM-2061T, “Notice of Discharge Report – Lake Tahoe Hydrologic Unit Stormwater Sample Field Test Report/Receiving Water Monitor Report”
- Deleted CEM-2065, “Notice of Discharge Instructions”
- Added CEM-2075, “Project Stormwater Annual Report”
- Added CEM-2075T, “Project Stormwater Annual Report – Lake Tahoe Hydrologic Unit”
- Deleted CEM-2090, “Notice of Completion of Construction”
- Added CEM-2405, “Disabled Veteran Business Enterprise (DVBE) Substitution Request to the Department of General Services (DGS)”
- Added CEM-2406, “Monthly Disadvantaged Business Enterprises (DBE) Payment”
- Added CEM-3673A, “American with Disabilities Act (ADA) Compliance Inspection Report – Sidewalk”
- Added CEM-3673B, “Americans with Disabilities act (ADA) Compliance Inspection Report – Sidewalk at Driveway”
- Added CEM-3673C, “Curb Ramp (Case A) Americans with Disabilities Act (ADA) Compliance Inspection Report”
- Added CEM-3673D, “Curb Ramp (Case B) Americans with Disabilities Act (ADA) Compliance Inspection Report
- Added CEM-3673 E, “Curb Ramp (Case C) Americans with Disabilities Act (ADA) Compliance Inspection Report”
- Added CEM-4410, “Crumb Rubber Usage Report”
- Deleted CEM-6002, “Contract Administration System (CAS) Report Requests”
- Added TR-0405, “Certificate of Compliance with Americans with Disabilities Act (ADA),” with updated internet link.

• Section 5-102, “Organization of Project Documents”:
  - Noted that project records may be scanned and filed electronically, and hard copy files maintained for backup.
  - Under Category 63, added form CEM-6302, “Final Materials Certification.”

- Section 5-103, "The Contract Administration System":
  - Added clarifying language regarding tracking federally participating and non-participating projects.
  - Relabeled Table 5-1.1 to Figure 5-1.1 and updated information regarding Contract Administration System, Systems Interface.
  - Updated information regarding Minor B project limit.
  - Added requirement to use iEWB (internet Extra Work Billing) for submission of extra work bills. Added link to internet.
  - In Section 5-103G (2), "District Director," deleted reference to Form FA 7294 because it is no longer used.
- Section 5-104, "Final Construction Project Records":
  - Updated information on retaining and storing project records.
  - Deleted categories for permanent history file.
  - Added Table 5-1.1, "Construction Records Retention Schedule," showing disposition of all contract records.
  - Clarified storage and archiving requirements of as-built plans in Section 5-104D (1), "District Procedure on As-Built Plans," due to electronic storage options.

Section 5-2, "Funds"

- In Section 5-201, "General," updates guidance for requesting additional project funds and provides a link for instructions.
- In Section 5-203A, "G-12 Funds Request," updates guidance for language to include in a G-12 funds request memo, adds information for G-11 funding request, and updates email address for sending requests for additional funding.
- In Section 5-203B, "California Transportation Commission Supplemental Funds Request," specifies link to access instructions to request and obtain approval for additional funds beyond G-11 and G-12 allowances.
- Eliminates CPD 10-7, "Supplemental G-12 Funds Requests Memorandum--Signature Change."

Section 5-3, "Change Orders"

- Adds a consideration for change orders regarding a cost effectiveness/pubic interest finding to 5-305, "Preliminary Considerations" and adds guidance in 5-307C (2), "Project Management."
- Adds web link in 5-306C (1) where change order standard clauses and change order formats can be found.
- Adds web link in 5-306C (3a) and 5-306C (3b) for change order examples.
- Adds web link in 5-305E for change order standard clauses and 5-306F for change order templates.
- Updates terminology for federal-aid projects in 5-308A from High-Profile Projects to Projects of Division Interest.
- Updates reference to Stewardship & Oversight Agreement and updates link in Section 5-308A.
- Removes change order examples and adds link to access them on the internet.
- Updates name of 5-311C to "Prior Authorization to Proceed" and specifies that delegated authority be one who may approve change orders and adds that person's name be added to the resident engineer's daily report.
- Deletes Section 5-311D, "District Prior Authorization to Proceed."
- Updates Figure 5-3.1, "Change Order Decision-Making Concept Flowchart."

Section 5-4, "Disputes"

- Incorporates information from and eliminates CPD 09-1, "District Director Determination of Claims."
- Eliminates CPD 00-13, "Revised SSP S5170, 'Dispute Review Board,' New SSP S5-056, 'Final Payment and Claims.' "
- Reorganizes, adds, and clarifies information in Section 5-401, "General."
- Renames Section 5-402, "Claims Avoidance," to "Disputes and Claims Prevention," and clarifies information.

- Renames Section 5-403, “Requests for Information, Potential Claim Records, and Claims,” to “Requests for Information and Potential Claim Records.”
- Moves Section 5-403D, “Claims,” to new Section 5-405 to directly precede sections on claims resolution types and timelines.
- Renumbers Section 5-405 “Claims Resolution Process” to 5-406.
- Renumbers and renames Section 5-405I (7), “California Victims Compensation and Government Claims Board, and Superior Court,” to Section 5-406I (7), “Department of General Services, Government Claims Program and Superior Court.”
- Renumbers Section 5-406, “Claim Settlements,” to 5-407.
- Renumbers Section 5-407, “Claim Payments,” to 5-408.
- Renumbers Section 5-408, “Overhead Claims,” to 5-409.
- Renumbers Section 5-409, “Audits,” to 5-410.
- Renumbers Section 5-410, “Arbitration,” to 5-411.
- Renumbers Section 5-411, “Preliminary Construction Claim Findings and Category 62 Preparation and Guidelines,” to 5-412.
- Renumbers Section 5-412, “Board of Review Report Preparation Guidelines,” to 5-413.
- Renumbers and renames Section 5-412A (3), “Summary of Settled Claims,” to Section 5-413A (3), “Summary of Resolved Claims.”
- Renumbers Section 5-413, “Construction Claim Findings Preparation and Guidelines,” to 5-414.
- Renumbers Section 5-414, “District Director Determination of Claims Preparation and Guidelines,” to 5-415.
- Renumbers Section 5-415,” Copy Distribution of Claim Documents,” to 5-416.
- Removes examples and samples and adds link to access them on the internet.

Section 5-5, “Emergency Contract Administration”

- In Section 5-501, “General,” changes cost ceiling from $270,000 to the upper limit of Minor B contracts for emergency contracts, supersedes CPB 10-3, “Administration of Emergency Force Account and Emergency Limited Bid Contracts.”
- Updates the name of Form ADM-0366 to “Confirmation of Verbal Agreement for Emergency Force Account Highway Projects” and lists the website from which to download the form.
- Adds Form MTC-0130 to authorize or fund emergency work in Section 5-507, “Tracking Costs.”
- Includes a reference to the *EFA and ELB Desk Guide* for cost tracking.
- Updates the SMARA website in 5-508.
- Eliminates CPD 16-9, “Administration of Drought-Related Emergency Contracts,” because it is no longer needed, and CPD 00-13, “Revised SSP S5170. ‘Dispute Review Board,’ New SSP S5-056. “Final Payment and Claims.’ ”

Section 6-1, “Sample Types and Frequencies”

- Incorporates guidance from and supersedes:
  - CPB 07-1, “Certification Program for Suppliers of Asphalt”
  - CPB 15-1, “Acceptance Sampling and Testing of Job-Produced Materials”
  - CPB 15-6, “Implementation of Hot Mix Asphalt Superpave Mix Design”
- Updates reference names and links in Section 6-101A, “References.”
- Asphalt suppliers furnishing asphalt on state highway projects to comply with the “Certification Program for Suppliers of Asphalt” requirements. Guidance instructs that job-produced materials are to be sampled and tested in accordance with Section 6-107, “Materials Acceptance Sampling and Testing,” and Table 6-1.13, “Materials Acceptance Sampling and Testing Requirements: Asphalt Concrete,” which governs the HMA mix design based on Superpave mix design requirements.
- Adds requirement for the Caltrans representative to include a Form TL-0101, “Sample Identification Card,” with the acceptance samples taken for Caltrans.

- Adds guidance on shipping and timing of test samples sent to laboratories, chain of custody, and notification of results to contractor.
- Replaces Table 6-1.2, “Time Required for Materials Acceptance Tests.”
- Updates the name from Caltrans Construction Quality Assurance Program to Caltrans Acceptance Program in 6-102D, “Dispute Resolution Samples.”
- Advises affixing the form TL-0101 by tape to the sample container.
- Updates link to the SMARA AB 3098 List.
- Adds guidance for asphalt emulsion with that for tack coat samples.
- Adds guidance to note frequency, results, and timelines to acceptance records.
- Renumbers and updates materials references to tables on sampling and testing requirements:
  - Deletes from Table 6-1.4, “Materials Acceptant Sampling and Testing Requirements: Earthwork,” test guidance on shoulder backing with reclaimed aggregate.
  - In Table 6-1.5, “Materials Acceptance Sampling and Testing Requirements: Stabilized Soils, ” updates table content and renames Completed Treated Soil to Mixed Stabilized Soil, and Asphaltic Emulsion (Curing Seal Method Only) to Curing Seal (Asphaltic Emulsion).
  - In Table 6-1.6, “Materials Acceptance Sampling and Testing Requirements: Aggregate Subbases” deletes class levels of aggregate subbase and updates sampling locations.
  - In Table 6-1.7, “Materials Acceptance Sampling and Testing Requirements: Aggregate Bases” deletes class levels of aggregate base and updates sampling locations.
  - In Table 6-1.8, “Materials Acceptance Sampling and Testing Requirements: Cement Treated Bases” updates sampling locations and guidance on testing for Curing Seal (Asphaltic Emulsion).
  - Replaces guidance in Table 6-1.9, “Materials Acceptance Sampling and Testing Requirements: Concrete Bases.”
  - Deletes Durability in Cement Treated Permeable Base (CTPB) section of Table 6-1.10, “Materials Acceptance Sampling and Testing Requirements: Treated Permeable Bases.”
  - Adds new Table 6-1.11, “Materials Acceptance Sampling and Testing Requirements: Reclaimed Pavement.”
  - Renames and renumbers Table 6-1.11, “Materials Acceptance Sampling and Testing Requirements: Bituminous Seals,” to Table 6-1.12 “Materials Acceptance Sampling and Testing Requirements: Seal Coats,” and updates guidance.
  - Renumbers and renames Table 6-1.12, “Materials Acceptance Sampling and Testing Requirements: Hot Mix Asphalt,” to Table 6-1.13 to “Materials Acceptance Sampling and Testing Requirements: Asphalt Concrete” and updates materials references, Pavement Smoothness, Spread Rate, and other guidance.
  - Renumbers old Table 6-1.13, “Materials Acceptance Sampling and Testing Requirements: Concrete Pavement,” to Table 6-1.14, deletes materials, and updates guidance.
  - Renumbers old Table 6-1.14, “Materials Acceptance Sampling and Testing Requirements: Concrete Structures,” to Table 6.1.16, and updates guidance.
  - Adds new Table 6-1.15, “Materials Acceptance Sampling and Testing Requirements: Existing Concrete Pavement.”
  - Renumbers old Table 6-1.15, “Materials Acceptance Sampling and Testing Requirements: Concrete,” to Table 6.1.17 and updates guidance.
  - Renumbers old Table 6-1.16, “Materials Acceptance Sampling and Testing Requirements: Miscellaneous Materials,” to Table 6.1.18 and updates guidance.

Section 6-2, “Acceptance of Manufactured or Fabricated Materials and Products”

- Adds guidance for accepting manufactured and fabricated materials and products.
- Updates Table 6.2.1, “Inspection of Fabricated and Manufactured Materials.” and updates link for mechanical equipment, scales, pump truck inspection stations, roadside rests; deletes piling, timber category.
- Updates Table 6.2.2, “Materials Accepted on the Basis of a Certificate of Compliance.”
- Updates Table 6.2.3, “Materials Accepted by Certificate of Compliance.”

- Updates entity names that generated list of references used.
- Updates links and offers more specific guidance on quality control and quality assurance plans.
- Updates address for submitting materials to the materials administrator for testing.
- Adds a link for the *Quality Assurance and Source Inspection Manual*.
- Updates Figure 6-2.2, "Source Inspection Flowchart."
- Updates link for approved asphalt sources in Section 6-203C (1), "Asphalt."
- Superseded: CPB 12-4, "Field Sampling Procedures for Traffic Paint, Thermoplastic, and Glass Beads."

Section 6-3, "Field Tests"

- In Section 6-301A, "References," updates references to use for sampling and testing frequencies for field tests.
- Updates link to test methods used by Materials Engineering and Testing Services.
- Updates sections covering material plant quality and accuracy.
- In Section 6-304D, "Profilograph," deletes guidance for calibration and repair of Profilograph equipment.
- Superseded and partially includes CPB 15-1, "Acceptance Sampling and Testing of Job-Produced Materials"

Section 7-1, "Environmental Rules and Requirements"

- In Section 7-102, "Environmental Commitments Record," adds guidance for meeting environmental commitments.
- Adds Section 7-102A, "Resident Engineer Responsibilities," and adds guidance for resident engineer activities and commitments before the work begins, during the course of work, and before accepting the contract.
- Section 7-103 categorizes guidance for protecting and preserving environmental resources during stages of work.
- Renames Section 7-103A, "Resident Engineer Responsibilities," to "Biological Resources and Species Protection," and moves guidance from old Sections 7-103I, "Biological Resources and Species Protection," and 7-103J, "Bird Protection," into the section.
- Renumbers old 7-103A, "Resident Engineer Responsibilities," to Section 7-103A (1) and updates guidance.
- Renumbers 7-103B, "Contractor Inspections," to Section 7-103A (2) and updates guidance.
- Renumbers Section 7-103C, "Project Files," to 7-103A (3) and updates guidance to include record retention.
- Renumbers Section 7-103D, "Environmentally Sensitive Area," to Section 7-103B and adds guidance regarding remediation and administrative deductions.
- Renumbers Sections 7-103E, 7-103F, 7-103G, and 7-103H to Sections 7-103C, 7-103D, 7-103E, and 7-103F respectively and adds minimal clarification.
- Deletes Sections 7-103I and 7-103J and moves guidance to Section 7-103A, "Biological Resources and Species Protection."
- Renumbers Sections 7-103K, 7-103L, 7-103L (1) , and 7-103L (2) to Sections 7-103G, 7-103H, 7-103H (1), and 7-103H (2) respectively and adds minimal clarification.
- Renumbers Section 7-103M, "Other Contractor Uses of the State Right-of-Way," to Section 7-103I, and deletes guidance for on-site disposal of portland cement concrete grooving and grinding residue.
- In Section 7-104B, "Water Pollution Control," updates guidance for use of stormwater permits and includes website for the Storm Water Multiple Application and Report Tracking System (SMARTS) portal; and adds guidance and a website for Notice of Termination issues for stormwater permits.
- In Section 7-104B (2), "Resident Engineer Responsibilities," adds guidance that approval should precede any job site activities if Regional Water Quality Control Boards review is required.
- Updates Table 7-1.1, "State and Local Agency Permits, Licenses, Agreements, and Certifications," to reference the Soil Management Agreement for ADL Contaminated Soils (ADL Agreement).
- In Section 7-107B, "Aerially Deposited Lead," adds guidance to include special language in the Contractor-Property Owner Agreement.
- In Section 7-107B (1), updates links to the agreement and to the coordinators for ADL.

- In Section 7-107B (2), "Hazardouse Waste Concentrations," adds guidance for ADL soil that must be disposed of in a Class I disposal facility, updates guidance for Types Y-1 and Y-2 soil, and includes a list of requirements and documents for the resident engineer to provide to the district ADL coordinator regarding management and disposal of aerially deposited lead soil.
- Adds new content to 7-108, "Crumb Rubber Usage Reporting," which lists guidance for using and tracking crumb rubber on jobs.
- Section 7-109, "Solid Waste Disposal and Recycling Reporting," adds guidance requiring contractors to lay out in preconstruction meetings plans for disposal of solid waste.
- Incorporates CPB 13-1, "Construction to Maintenance 90% Best Management Practices Completion Walkthrough."
- Incorporates, if applicable, and eliminates the following CPDs:
  - CPD 00-8.1, "Addendum, Aerially Deposited Lead Variance"
  - CPD 02-4, "Hazardous Materials Internet Information"
  - CPD 02-7, "Water Pollution Control Inspection for Off-site Contractor Activities"
  - CPD 05-5, "Expiration of the Variance for Aerially Deposited Lead"
  - CPD 05-6, "Construction's Role in the Development of the Division of Design's Storm Water Data Report"
  - CPD 05-8, "Availability of Storm Water Pollution Prevention Documents to State Agencies and Public"
  - CPD 07-4, "2008 Time Extension on Existing Variance for Aerially Deposited Lead"
  - CPD 08-4, "2009 Time Extension on Existing Variance for Aerially Deposited Lead"
  - CPD 09-13, "Variance for Aerially Deposited Lead"
  - CPD 11-5, "Construction General Permit Training"
  - CPD 14-7, "Modification and Reduction of Construction Projects Stormwater Monitoring and Inspection Forms"

Section 8-1, "Labor Compliance"

- Incorporates and supersedes CPB 15-3, "Public Works Contractor Registration Requirement."
- Updates the title of cited Section 7-1.02K(3) to align with the *Standard Specifications*.
- In Section 8-103A (3), updates definition of a workday to "limited and restricted to 8 hours during any one calendar day."
- Updates the names of forms to Form CEM-2505, "Owner Operator Listing," Form CEM-2508, "Contractor Payroll Source Document Audit Summary," and Form CEM-2509, "Checklist—Source Document Audit."
- Adds references to frequently cited state laws, including Section 1725.5, Section 1742 (previously 1777.1), Section 1771.1, Section 1771.3, and Section 1771.4.

Section 8-2, "Equal Employment Opportunity"

- In Section 8-206, "Contractor Employee Title VII Complaints—Discrimination Complaint Processing," updates link to Department of Fair Employment and Housing brochures on complaints.
- Updates phone number for the Office of Business and Economic Opportunity in Example 8-2.2, "Sample Letter to the Contractor."

Section 8-3, "Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises"

- Incorporates and supersedes CPB 15-2, "Submission of Good Faith Efforts and Uniform Report of DBE Awards/Payments."
- Partially incorporates CPB 15-3, "Public Works Contractor Registration Requirement."
- In Section 8-303A, "Disadvantaged Business Enterprise and Disabled Veteran Business Enterprise Commitment Form," adds guidance to use Form DES-E-0102.11A for bidders to show DBE good faith efforts.
- In Section 8-304A, "Monitoring and Enforcement," adds guidance to resident engineers to make sure the contractor submits a Form CEM-2406, "Monthly Disadvantaged Business Enterprises (DBE) Payment," by

the 15th of the month for the previous month's activities and updates reference from "weight tickets" to "weighmaster certificates."

- Adds Section 8-305C, "Monthly Disadvantaged Business Enterprises (DBE) Payment," to clarify guidance to resident engineers on monthly payments for Disadvantaged Business Enterprises.

Section 9-1, "Construction Contract Administration for Projects Sponsored by Others"

- Eliminates CPD 08-5, "Quality Management Work on State Highway System."
- Updates the section title and content emphasis to "Construction Contract Administration for Projects Sponsored by Others" from "Construction Contract Administration for Projects Funded by Others."

Section 9-2, "Projects Administered by a Local Agency on the State Highway System"

- Eliminates CPD 08-5, "Quality Management Work on the State Highway System."
- Specifies that when Caltrans is the implementing agency, quality assurance is described in construction technical manuals, including the *Construction Quality Assurance Program* manual.
- Provides links for recommended local agency quality management plan and source inspection quality management plan outlines.
- Specifies that any reimbursement to Caltrans is documented in a cooperative agreement before construction starts.

CONSTRUCTION MANUAL

CALIFORNIA DEPARTMENT OF TRANSPORTATION

CONSTRUCTION MANUAL









STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

Construction Manual

(MCT 17-1)

Issued by
Division of Construction



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Chapter 1 Caltrans Construction Organization

Section 0 Construction Manual Overview

Section 0 Construction Manual Overview

1-001 Purpose

1-001 Purpose

When applying Caltrans policy to the administration of construction contracts, knowing how to interpret contract documents and plans, and how to apply engineering experience and judgment is important. The *Construction Manual* provides guidance for the administration of construction contracts and is not a replacement but rather a supplement to engineering experience and judgment, as well as personnel training and development.

Caltrans intends that this manual be used as a resource to provide procedural guidance for personnel engaged in contract administration. This manual is a guide, not a compilation of mandatory instructions. Unless guiding language is explicitly mandatory, personnel are expected to perform in accordance with the guidance in this manual within the resources allotted for construction contract administration. The resident engineer has a primary role of contract administration and is in responsible charge for administration of the contract. The assistant resident engineer (inspector) has a primary role of field inspection of contractor quality of work. The resident engineer coordinates with inspectors to determine appropriate priorities for testing and inspection of work quality based on contractor-proposed order of work for the shift. A contract may have one or more inspectors assigned and each may have one or more activities to inspect as part of their daily responsibilities. There is no contractual requirement to provide full time inspection of any activity; inspectors may not be on site from start to end of contractor operations, and they may be required, due to staffing levels, to rotate inspection activities among their assigned work areas during the work shift or as work progresses. The provisions herein for contract inspection are only applicable when the inspector is present and observing a particular contractor operation and recognizes the issue as it develops or after completion of the work.

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 use the manual as a substitute or supplement to the specifications and other contract requirements. Similarly, the guidance in this manual does not relieve contractors from their obligation and responsibility for their means and methods, quality control, and compliance with contract requirements.

1-002 Scope

1-002 Scope

This manual covers topics in two general areas:

1. Policies and procedures related to 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
   - Inspection, testing, 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 engineer working in the field must have a thorough understanding of the specifications and other contract requirements.

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

This manual is not designed to establish a legal standard of care. It is published solely for the information and guidance of the employees of Caltrans. Also, it is not intended that any standard of conduct or duty toward the public shall be created or imposed by the publication of this manual. Each chapter in this manual is subject to modifications as conditions warrant.

1-003 Format

1-003 Format

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

1-004 Changes

1-004 Changes

The Division of Construction issues Construction Policy Bulletins (CPBs) to change policies and procedures. CPBs supersede 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 a policy contained in this manual is unclear or has been superseded and no CPB has been issued covering the changed policy, use the following procedure to recommend a manual change:

Complete Form CEM-9001, "Construction Manual Proposed Change," and send it to construction.publications@dot.ca.gov. 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 future revision.

Chapter 1 Caltrans Construction Organization

Section 1 Construction Organization

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Chapter 1 Caltrans Construction Organization

Section 1 Construction Organization

Section 1
Construction
Organization

1-101 General

1-101
General

According to the California 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 contracts 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.

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 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 Deputy Division of Construction Chief

The deputy division chief provides guidance to office chiefs for development of construction standards, policies, and procedures for statewide consistency; assists the division chief; and acts as division chief when delegated.

1-102C 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.

1-102D 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 district personnel for administering construction contracts.

1-103A District Director

Within district boundaries, the district director must efficiently administer and operate Caltrans construction activities.

1-103B District Construction Deputy Director

The district construction deputy director must execute 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 and Caltrans directives.
- Implementing 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 this 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.
- Allow for adequate training for those assigned personnel who are or may be assigned as resident engineers, encouraging diligent pursuit of their Caltrans Resident Engineer Certificate.
- Ensuring that materials and completed work generally comply with plans, specifications, and design criteria.
- Approving or not approving a resident engineer's recommendation for change orders and time extensions.
- Ensuring that the maintenance of project records complies with this manual.
- Ensuring the performance of Caltrans employees' 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 Engineers Act.

1-104 Structure Construction Organization

1-104 Structure Construction Organization

Structure Construction is responsible for the technical control of structure work. Engineers from 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 on projects where structure work predominates.

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

1-104A Structure Construction Chief

The Structure Construction chief must uniformly provide statewide structure construction services to the districts. The duties of the position include the following:

- Planning and directing the statewide activities of Structure Construction.
- 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 statewide activities of structure construction with all district functions and with other Division of Engineering Services functions.

- Recommending to the Division of Construction chief revisions to the Division of Construction's policies and objectives.
- Producing and distributing policies and procedures for inspecting and administering structure construction work.

1-104B Structure Construction Manager

The 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 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.
- Allow for adequate training for assigned structure construction personnel.
- Collaborating with the Division of 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 change orders and time extensions on structure work items.
- Ensuring and verifying that the maintenance of project records complies with this manual.
- Ensuring the performance of Caltrans employees' safety-related activities.
- Ensuring that the practice of civil engineering on contracts in the assigned area complies with the Professional Engineers 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 Structure Construction

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

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

To provide 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 5-1.03, "Engineer's Authority," of the *Standard Specifications*
- This 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 licensed engineer must be responsible for the engineering integrity of a construction project. The resident engineer, in charge of the project, bears this responsibility, and

must be a licensed engineer in the State of California, as defined by the Professional Engineers 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
- Pursuit or completion of the Caltrans Resident Engineer Certificate Program

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 licensed 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. 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, estimates, 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 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 to obtain additional funds, refer to 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 change orders. As a representative of the Division of Engineering Services, the structure representative acts within the authority of the following:

- The State Contract Act
- The *Standard Specifications*
- This 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 with 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 licensed engineer. If the structure representative is not a licensed engineer, 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 Engineers Act.

1-105D Assistant Resident Engineer

The assistant resident engineer must verify that 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:

- Verifying that the contractor complies with all contract requirements.
- Performing, or calling for, required tests to verify 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.
- Working effectively by knowing construction methods and inspection techniques.

1-105E Field Office Engineer

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

- Monthly progress pay estimates
- Extra work reports
- Change orders
- Labor and equipment records
- Correspondence
- Personnel records
- Records of material testing and acceptance
- Detailed calculations for paid quantities

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

1-105F Specialists and Coordinators

Projects require the use of district specialists and coordinators. These may include the following:

- Materials and plant specialists
- Weights and measures coordinators
- Survey coordinators
- Labor compliance personnel
- Safety coordinators
- Traffic handling, signing, and electrical specialists
- Landscape specialists
- Environmental - construction liaisons
- Stormwater coordinators
- Schedule analysts
- Claims engineers
- Partnering coordinators
- Change order specialists
- Progress payment specialists
- Construction coordinators

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

1-106 Proper Charging Practices

1-106 Proper Charging Practices

Caltrans employees must accurately record time and expenses in accordance with Deputy Directive 41, "Caltrans Charging Practices," by charging to the appropriate activity codes. Refer to the Caltrans Coding Manual for definitions and information on activity codes.

1-107 Local Projects

1-107 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, refer to Chapter 9, "Projects Sponsored by Others," of this manual.

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Section 2 Public Relations

Section 2
Public Relations

1-201 General

1-201
General

As representatives of Caltrans, construction personnel should at all times conduct themselves professionally. The subject of public relations is divided into the following categories:

- Internal relations among Caltrans personnel.
- Relations with the contractor.
- Relations with utility companies and other public agencies.
- Relations with the public.
- Relations with the media and traveling public.

1-202 Relations Among Caltrans Personnel

1-202
Relations Among
Caltrans Personnel

Within Caltrans, public relations is divided into two subcategories: relations between the resident engineer and staff, and 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.

Communication is important between project personnel and the resident engineer. It is recommended that resident engineers hold short staff meetings each workweek. At these meetings the resident engineer should brief assistant resident engineers on the planned operations, announce any changes or new assignments of responsibility, and discuss any other subjects deemed pertinent.

Resident engineers should provide personnel with an opportunity to demonstrate their capabilities and capacity for responsibility, and provide opportunities for assistant resident engineers 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, assigning personnel to operations different from those handled on previous projects is an option. Newly assigned personnel should study the applicable portions of the *Standard Specifications*, special provisions, plans, this manual, and any other Caltrans publications deemed applicable. An individual should not be assigned new work responsibilities until the resident engineer is satisfied 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, supervisors should keep their personnel informed of decisions affecting an employee's area of responsibility. A

resident engineer should first learn about district decisions that affect the project from the supervisor, not outside sources.

Construction personnel also sometimes communicate and work with the other Caltrans functional units. People in other units do their work with information available to them, just as construction forces do. When there is a difference of opinion on some part of the project, whether it is about design, traffic handling, or some other aspect, the resident engineer should approach the other party with an open mind to discuss the issue.

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 better to start on a basis of administering the contract firmly in accordance with the plans and specifications than it is to address a situation later in the contract's life caused by laxity.

The employees assigned to construction should have a thorough knowledge of the plans and specifications governing the contract. This should promote good relations with the contractor's personnel. If the resident engineer and assistant resident engineers demonstrate thorough knowledge of the plans and specifications, it is more likely the contractor's personnel will respect the resident engineer's judgment in cases where contract interpretation becomes an issue. A satisfactory relationship between Caltrans and the contractor generally results from good communication between the resident engineer and the contractor's superintendent.

Contract administration involves several 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.

There are two types of specifications: method and quality assurance. Method specifications list explicit materials, equipment, and construction requirements; whereas, quality assurance specifications contain statements of required results that focus on the desired quality level of the finished product.

Method specifications are more restrictive as to the contractor's options. Deviations from specified methods require change orders. Deviations must also provide equal or better results while preserving the contract's integrity.

1-204 Relations With Utility Companies and Other Public Agencies

1-204 Relations With Utility Companies and Other Public Agencies

Good public relations with internal and external stakeholders will have a beneficial effect in completing a construction project within scope, schedule, and budget. Preconstruction discussions that may affect Caltrans functional units or local agencies and communities should involve all stakeholders.

The resident engineer should make early personal contact and establish a good working relationship with staff of affected utility companies and other agencies. Such agencies may include: local school districts, local transit agencies, permitting agencies, California Highway Patrol and local police organizations, local bicyclist and pedestrian advocacy groups, local community groups, and any other government agency or local group with interest in the project. Early personal contact with staff from these agencies and groups will acquaint them with upcoming construction operations and will enable

them to have input and schedule their work or services to the best advantage of all concerned.

1-205 Relations With the Public

1-205 Relations With the Public

Another important part of public relations is courteously dealing with the people living or working near the project. They are the ones most affected by construction operations.

By courteously listening to and addressing questions and concerns, the resident engineer can generate good faith with the general public or individuals.

Construction operations, including temporary closures of streets and driveways, and construction noise (especially at night) may have an adverse effect on residents and businesses adjacent to the project. Informing people living and working 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.

The necessity for residential relocations should be considered during constructability reviews and, if necessary, discussed at project development team meetings. Details for temporary relocations appear in Section 10.10.05.01 of the *Right of Way Manual*.

If nighttime noise levels become an issue during construction, and temporary relocation of residents is not addressed in the project files, contact the construction field coordinator for guidance.

Start public relations early. The fullest possible cooperation of the contractor's organization should be solicited to achieve good public relations most effectively. The resident engineer and the superintendent can assure people living and working in the area 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 area residents and businesses. This practice should be encouraged.

1-206 Relations With the Media and Traveling Public

1-206 Relations With the Media and Traveling Public

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 public information officer will use print and social media, radio, internet, and television to publicize the upcoming work.

Another helpful method of promoting good public relations is to use district personnel as speakers at meetings of the local chambers of commerce and service clubs. Resident engineers so inclined might consider joining a service organization. Frequent notices and progress reports in the local media are also common and effective methods of keeping the public informed of changing project conditions.

On advice by the resident engineer, the district should also issue news releases. The district should contact members of the local news media 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.

If someone from the media asks for information, refer them to the district public information office. Unless specifically instructed to speak to the media, politely refer all questions to the appropriate public information officer. Sometimes the public information officers will be the only ones who may respond for Caltrans about an issue. The public information office may arrange for site visits for the media and will inform the construction engineer of the scheduled visit. Inform the contractor of these scheduled visits. In the case of a traffic event, an emergency, or other incidents that prompt unscheduled media visits, inform the public information officer immediately.

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, be a credit to the organization, and pass along vital information to the public.

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' mission, vision, goals, and strategic priorities. Moreover, most construction employees want to learn new job skills. A comprehensive training and development program helps in recruiting and retaining 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 fulfill the employee's training and development plan.
- For each construction employee, maintain a 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, if collective bargaining agreements and memorandums of understanding allow such opportunities. Effective cross-training adds:
  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 assume the duties of the supervisor and the employees when they are absent. Update the plan each year based on staff performance and anticipation of planned staff training and development needs.
- Take immediate action to correct any known deficiency in an employee's capability to perform currently assigned tasks.
- Encourage the professional career development of subordinates, and foster a working environment in which employees are encouraged to learn new job skills.
- Assist employee participation in external training opportunities they request. 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 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. Information related to training classes is available at:

  http://construction.onramp.dot.ca.gov/training-0

- Assistant resident engineers are encouraged to complete necessary training classes to obtain their Resident Engineer Certificate. Certificate completion requirements are available at:

  http://construction.onramp.dot.ca.gov/administrative-training-support/resident-engineer-certificate-program#overlay-context=.

- Upon completing the necessary training classes to receive the certificate, work with your training coordinator to submit the certificate program completion form to headquarters.
- Attend a classroom-based training when scheduled to do so; complete online training within the established timeframe.
- Evaluate their ability to perform the essential job duties for each task they are asked to perform. Notify their supervisor if more training is required to execute a specific job task.
- 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 it 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, employees are to follow the

procedures for requesting and documenting training detailed in the Learning Management System on Caltrans' intranet.

1-305 Resources and Budgeting

1-305 Resources and Budgeting

Individual construction employees will devote regularly scheduled work time to "in-service occupational training" as determined by the employee's supervisor. This occupational training is in addition to other mandatory training as required by Caltrans' policies, and will be executed within the district's training and development plan.

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, Office of Construction Training and Environmental, 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 performing the work.

1-308 Training Methods

1-308 Training Methods

Depending on the particular subject, varying instruction methods may be appropriate for in-service training. In all instances, encourage instructors to use teaching techniques that involve their students rather than transmitting information through 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, either in the classroom or online training, 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*
- Chapter 12, "Construction Surveys," of the *Surveys Manual*
- *Highway Construction Checklists*
- *California Manual on Uniform Traffic Control Devices*

- *Maintenance Manual*
- California Tests
- Other technical publications

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 by respecting the experience of the mentor, being genuinely interested, and being actively involved in the training process.

Occupational training must be accomplished as an organized effort followed by on-the-job experience. No substitute exists for experience, and often a well-regulated, on-the-job training program is an excellent method for spreading knowledge.

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 Structure Construction can also exchange qualified instructors.

Section 4 Facilities and Equipment

1-401 General

1-402 Resident Engineer's Offices

1-402A General 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 project number as a Department-furnished expense. When an office is used for more than one project, appropriately prorate the charges.

The Advantage financial system requires coding of resident engineer's office expenses. For a description of items and services included in Object Code 184 for resident engineer's office, refer to the *Coding Manual*, Volume I, Chapter 5, Table 1-2, "Object Code Descriptions." Department-furnished expense funds may also be used for monthly utilities expenses (Object Code 002), monthly office phone service fee (Object Code 725), and monthly cell phone service fee (Object Code 726). Refer to the *Coding Manual* to determine appropriate sub object that must be included in each Advantage financial transaction.

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.

Arrange to place office trailers in maintenance yards or on state highway rights-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

Use a service contract for field office utility work. Notify the Division of Accounting when starting, transferring, or terminating utility services. Complete and mail Form FA-2134, "Utility Service Request," to the Division of Accounting. Keep a copy in the project files under Category 4, "Service Contracts." The form and instructions are available on Caltrans' Electronic Forms System and Division of Accounting intranet websites:

http://cefs.dot.ca.gov/jsp/forms.jsp

http://accounting.onramp.dot.ca.gov/utility-service-payments-section

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 from Department-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, refer to Section 8.05, "Emergency Action Plan Requirements," of the *Caltrans Safety and Health Manual* (*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, "Administrative Instructions for 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 consideration for the needs of Structure Construction 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, refer to 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."

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

A vehicle home storage permit must be obtained when a state-owned vehicle is stored at or in the vicinity of the employee's home more than 72 nights over a 12-month period or for more than 36 nights over any 3-month period. The director of the Division of Equipment develops, publishes, maintains, and oversees the administration of guidelines for home storage permits issued to Caltrans employees. These guidelines are available on the Division of Equipment website:

> http://equipment.onramp.dot.ca.gov/office-budgets-administration/vehicle-home-storage-permits

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

1-406 Reporting Losses

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 (coordinator), notify the local police authorities, giving full details as you know them, and complete descriptions of the damaged or missing articles. The 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."

Section 5 Field Expenses and Purchases

1-501 General
1-502 Travel Expenses
1-503 Miscellaneous Purchases
1-503A CAL-Cards
1-503B Cash Purchase Transactions
1-504 Service Contracts

Section 5 Field Expenses and Purchases

Section 5
Field Expenses
and Purchases

1-501 General

1-501
General

This section contains guidelines for paying for travel expenses and obtaining goods and services.

1-502 Travel Expenses

1-502
Travel Expenses

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

Supervisors must ensure employees do not abuse travel expenses. The *Caltrans Travel Guide*, issued by the Division of Accounting, 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. The Division of Procurement and Contracts provides information and guidelines about acquiring the following:

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

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

1-503A CAL-Cards

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, refer to the *CAL-Card Handbook* on the website of the Division of Procurement and Contracts. To use CAL-Cards, follow the procedures established by 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 reimbursement for approved purchases, submit Form FA-0302, "Travel Expense Claim."

1-504 Service Contracts

1-504 Service 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.

Chapter 2-
Safety and Traffic

Chapter 2 Safety and Traffic

Section 1 Safety

2-101 General

2-102 Duties and Responsibilities

2-102A District Deputy Director for Construction
2-102B District 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 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
2-104D (3) Procedures if Citations are Received

2-105 Emergency Contracts

2-106 Caltrans-Specific Safe Practices

2-106A Caltrans Division of Construction Code of Safe Practices
2-106B Tailgate Safety Meetings
2-106C High-Visibility Garment

2-107 Safety Precautions for the Public in Construction Areas

2-108 Hazardous Materials

Section 1 Safety

2-101 General

Employers must comply with occupational safety and health standards established by federal and state laws. State laws require all employers to provide a safe place of employment, reasonably free from danger to life or health and to maintain a written Injury and Illness Prevention Program (IIPP).

The *Caltrans Safety Manual*, Chapter 1, is the official Caltrans IIPP. The *Caltrans Safety Manual* lists safety policies and procedures, provides a centralized reference to operational safety advisories, and standardizes procedures for reporting employee occupational injuries, vehicular accidents, and claims against Caltrans. The construction *Code of Safe Practices* (COSP), along with the *Caltrans Safety Manual*, defines standard safety practices for employees involved with inspecting construction activities and operations. The construction COSP is applicable only to Caltrans personnel performing duties in accordance with their job description. The contractor is responsible for means and methods to complete the work, is required to provide for public safety, and to provide safe access to Caltrans employees. Contractors and subcontractors follow the prime contractor's IIPP and COSP. If a subcontractor's IIPP and COSP are more stringent, the subcontractor must follow its own IIPP and COSP.

Federal Highway Administration requirements, the *Standard Specifications*, and contract standard special provisions establish compliance with safety regulations as a contract requirement.

2-102 Duties and Responsibilities

Districts are responsible for safety on Caltrans construction projects.

2-102A District Deputy Director for Construction

The district deputy director for construction should confirm that funding is adequate to maintain a training program to acquaint Caltrans construction personnel with the basics of construction safety. This training should take place a minimum of 4 hours per employee per year and be included in the district's annual training plan. Safety training includes orientation for employees when they receive their first construction assignment. Employees returning to construction following an absence of 5 years or more should also receive the safety orientation.

Recent California laws have added a responsibility requiring supervisors to ensure that subordinates are implementing all safety requirements and are provided with the tools and the training necessary to protect them from being exposed to any potentially unsafe condition.

2-102B District Construction Safety Coordinator

The district's construction safety coordinator (CSC) should act as a technical advisor to construction field personnel. The CSC should also do the following:

- Understand Caltrans safety policies; contract specifications; and the California Department of Industrial Relations, Division of Occupational Safety and Health

(Cal/OSHA), California Code of Regulations, Title 8 (CCR Title 8), "Industrial Relations." Cal/OSHA is the state enforcing agency for safety regulations.

- Make unannounced site visits to ongoing construction projects on a routine and rotating basis. The CSC should also respond promptly to requests from the resident engineer or other Caltrans staff to visit projects to review project safety concerns.
- Collaborate with the resident engineer about specialized contract work, such as full freeway closures and unusual or complex operations including blasting and confined space operations. The CSC should visit the project periodically to observe the contractor's overall efforts, answer questions, or look at specific areas when the engineer requests it. The frequency of the visits will depend upon the type and complexity of the work.
- Write a safety audit of each visit to the project site, giving the resident engineer the original safety audit and copies to the construction engineer and the construction manager for review and follow-up.
- Be the district's primary contact with the Division of Construction safety engineer and the local Cal/OSHA representative, except for emergencies involving imminent hazards. Refer to Section 2-103A, "Imminent Hazards," of this manual for more information. Maintain regular communication with local Cal/OSHA representatives.
- Administer the district's construction safety training program, structured to meet district needs as mentioned in Section 2-102A, "District Deputy Director for Construction," of this manual, including the mandatory heat illness prevention training required annually for all field staff and the mandatory hazard communication training offered every 2 years.
- Serve as advisor for the construction safety portion of the preconstruction conference.

2-102C Construction Engineer

The construction engineer should review construction projects to verify that the resident engineer is monitoring the contractor's construction safety program. The construction engineer should review the CSC's safety audit and confirm that the resident engineer addresses, adequately closes, and documents closure of items mentioned in the safety audit. The construction engineer confirms that all deficiencies in the field are abated, signs the safety audit, and sends it to the construction manager for review and signature.

Construction engineers are responsible for the performance of employees under their supervision. They provide them with the training, personal protective equipment, and tools necessary to protect themselves from hazards. As part of the training, construction engineers should stress that under no circumstances should any Caltrans employees instruct the contractor how to correct a deficiency, either orally or in writing. They advise, correct, and reprimand employees for safety violations and should document their reviews of employee safety programs.

2-102D Resident Engineer

The resident engineer verifies that the contractor complies with all aspects of the contract, including applicable safety orders found in the CCR Title 8. To accomplish this, do the following:

- Identify unsafe conditions and the specific contract provisions or CCR Title 8 regulations involved.

- Assign a project safety coordinator if needed.
- Involve the district CSC in specialized contract work such as full freeway closures, blasting operations, confined space operations, multi-crane picks of large loads, or other unusual or complex contractor operations. Consult with the CSC to interpret Cal/OSHA regulations.
- Inform the CSC how unsafe conditions identified in the safety audit were resolved. Complete written documentation of the review and abatement results and file it with other project documents.
- In a special safety audit 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 a project safety audit and file it in Category 6, "Safety," of the project records. Use Form CEM-0606, "Construction Safety Checklists," to support the project safety audit.
- Using normal contract administration procedures, verify that the contractor complies with Caltrans contract requirements and CCR Title 8.
- Develop a project-specific COSP document for Caltrans employees addressing all operations in the project for each contract and all contractor operations. Make it accessible to workers in the field, and confirm all project personnel have read and signed it. Keep the COSP in a conspicuous location at the job site office. Refer to Section 2-106A, "Caltrans Division of Construction Code Safe Practices," of this manual for additional guidance on developing a COSP. A baseline COSP document is on the Division of Construction website:

  http://www.dot.ca.gov/hq/construc/safety/
- Discuss project safety at the preconstruction conferences and document safety discussions in the project files throughout the duration of the project. Cover at least the following items:
  1. Address new Cal/OSHA regulations that might be applicable to the contract.
  2. Discuss requirements for contractors to make available the safety data sheets (SDS) for chemicals or construction materials used on the construction site so that Caltrans employees can determine their potential risk from contractor use of products requiring SDS and verify that Caltrans employees have safe access. The SDS may require provisions for eyewash stations, respirators, and other devices.
  3. Discuss other safety items that may pertain to the contract, such as blasting operations, work in confined spaces, personal protective equipment, backup alarms, traffic control, shoring and tunneling, and access to elevated work.
- Before starting work, confirm that contractors do the following:
  1. Submit an IIPP to the resident engineer, as required in Section 7-1.02K(6), "Occupational Safety and Health Standards," of the *Standard Specifications*.
  4. Submit permits required before starting certain work, such as: trenches or excavations 5 feet or deeper in which any person is required to descend; demolition over 36 feet in height; falsework erection and scaffolding in excess of 36 feet in height; confined spaces; or mining and tunneling.
  2. Notify the regional Underground Service Alert (USA). Refer to Section 4-1902A, "Roadway Excavation," of this manual.

- During the course of work, verify that contractors do the following:
  1. Report to the resident engineer any disabling or fatal accidents.
  2. Notify the resident engineer immediately if Cal/OSHA arrives on the project for a site visit. As the site owner, Caltrans staff needs to participate in all Cal/OSHA site visits.

2-102E Project Safety Coordinator

The resident engineer may delegate safety responsibilities to an assistant resident engineer who will act as the project safety coordinator. This delegated work will usually be in addition to other assigned duties, but may be full time on large contracts. If there is significant structures work, the resident engineer may need to coordinate with the structures representative to have a structures project safety coordinator assigned for the structures specialty work.

The project safety coordinator acts as a safety advisor to Caltrans project personnel. The project safety coordinator should monitor and document contractor compliance with safety requirements, keep the resident engineer informed, and do the following:

- Monitor ongoing operations on the job site daily.
- Inform the contractor, verbally and in writing, of any operation or activity that does not comply with Caltrans contract requirements or Cal/OSHA regulations. Provide reference to the *Standard Specifications* or the specific regulation violated. Use Form CEM-0606, "Construction Safety Checklists," to find the appropriate reference. These checklists are on the Division of Construction website:

  http://www.dot.ca.gov/hq/construc/forms.htm

- Prepare a weekly project safety audit and file it in Category 6 of the project records.

2-102F Project Staff

Caltrans does not intend that the resident engineer and the project safety coordinator do all monitoring of the contractor's construction safety activities. All construction personnel should consider the safety of the operations in conjunction with their normal inspections and to confirm that they have safe access to perform their duties. Inspectors—closest to and most familiar with the field operations—should do the following:

- Be familiar with construction zone traffic management, Cal/OSHA regulations, Caltrans safety policies, and specifications. Use Form CEM-0606 to monitor the contractor's compliance with safety regulations and specifications.
- Routinely monitor, document, and discuss contract safety requirements with the contractor.
- Request assistance from the project safety coordinator or the district CSC if uncertain about a regulation's requirements.

2-103 Managing Safety Hazards

2-103 Managing Safety Hazards

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

2-103A Imminent Hazards

Imminent hazards are work conditions that, if not corrected, could result in an accident causing severe or permanently disabling injury or death. When an imminent hazard is

found or the contractor permits repeated occurrences of a hazardous condition, the Caltrans representative should take the following steps:

- Advise the contractor verbally of the condition and the need for correction.
- Remove all Caltrans employees from the hazardous exposure.
- If the contractor complies, document the incident in the project's safety audit with appropriate references in Form CEM-4501, "Resident Engineer's Daily Report." Document the unsafe work condition, discussions with the contractor, and how and when the unsafe condition was corrected.
- If the contractor does not comply, temporarily suspend the affected operation. Confirm the suspension order in writing to the contractor.
- Document the incident and the action taken in the resident engineer's daily report. Document the unsafe work condition, discussions with the contractor, and how and when the unsafe condition was corrected.

Whenever it is necessary to suspend a contractor's operation, notify the CSC, resident engineer, and the construction engineer of the hazardous condition and the actions taken. Verify that all contractual remedies to address the contractor's safety issues have been exhausted and documentation fully prepared and filed before considering notifying Cal/OSHA. Involve the CSC as a checker in the process to verify nothing was overlooked. Get permission from the construction manager before calling Cal/OSHA. These actions will limit potential multi-employer liability against Caltrans. Notify the Division of Construction safety engineer about the actions taken. Place safety audits, including all details leading up to the suspension and copies of orders, in Category 6, "Safety," of the contract files.

2-103B Serious Hazards

Serious hazards are work conditions that, if not corrected, could result in a disabling injury and possibly death or develop into an imminent hazard. When a serious hazard is found to exist, the Caltrans representative should take the following steps:

- Advise the contractor orally 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 fails to provide timely correction, consider ordering a temporary suspension of the affected operation. Confirm the suspension order in writing to the contractor.
- Document the incident in the project's safety audit with appropriate references in the resident engineer's daily report. Document the unsafe work condition, discussions with the contractor, and how and when the unsafe condition was corrected.

2-103C Minor or Nonserious Conditions

Minor or nonserious conditions are ones that could result in minor injuries or might be classified as minor threats to health. When a nonserious or minor condition is found to exist, the Caltrans representative should take the following steps:

- Advise the contractor orally of the condition and the need for correction.
- Remove all Caltrans and consultant employees from the hazardous exposure.

- Document the incident in the project's safety audit. Document the unsafe work condition, discussions with the contractor, and how and when the unsafe condition was corrected.
- If the contractor fails to correct the condition or permits a repeated occurrence, notify the resident engineer and CSC.

2-104 Division of Occupational Safety and Health

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

2-104A Authority and Responsibility

The law requires Cal/OSHA to enforce safety orders and promote safe workplaces and practices. Caltrans enforces contract requirements, not safety orders. 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 safety orders. Both state and federal law require that the safety orders be no less restrictive than federal Occupational Safety and Health safety orders.
- Cal/OSHA has a number of branches 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, appealed to a superior court.

To allow Cal/OSHA to accomplish its mission, the California Labor Code gives Cal/OSHA the authority to enter and inspect any place of employment to ensure that the contractor is observing safe conditions and practices. If necessary, this right of entry can be enforced with a warrant.

2-104B Citations and Civil Penalties

If Cal/OSHA uncovers and documents unsafe conditions or work practices, it may issue citations. The severity of the violations cited determines the civil penalties, and the penalty amount is based on procedures established in the regulations. Public agencies are not exempt from these penalties.

Violations—classified as regulatory, general, serious, willful, or repeat—result in monetary penalties. Failing to abate hazards or making false statements also mandates penalties.

Under the multi-employer liability clause, Cal/OSHA has authority to cite all employers who are observed as having employees exposed to a hazard at a multi-employer worksite. Cal/OSHA identifies an exposing, creating, controlling, or correcting employer (defined in next subsection) for each unsafe condition found. It bases employers' degree of responsibility on their awareness of the condition, the foreseeability of the condition, and reasonable steps they take to protect employees.

In addition to receiving the civil penalties noted above, both Caltrans and contractor managers can be held criminally responsible. To be held criminally responsible, the manager must knowingly or negligently allow a serious violation, repeatedly violate safety orders, or directly refuse to correct a known unsafe condition. Criminal penalties can be as severe as 6 months to 1 year in jail and may include fines.

Occasionally, Cal/OSHA will issue an informational memorandum when it encounters a condition or potential condition to which no employee has been exposed, but if an employee were to be exposed, a safety violation would exist. Cal/OSHA always classifies a violation of an informational memorandum as a willful violation.

2-104C Classes of Employers

California recognizes four different types of employers, any of which can be cited by Cal/OSHA for safety violations. The classification can result in more than one employer cited for the same violation. The California Labor Code identifies these employer categories:

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 worksite, the one who had the authority for ensuring the hazardous condition was corrected.

Correcting employer—the employer responsible for correcting the hazard.

On a standard contract put out to bid with plans and specifications, the prime contractor is the controlling employer in accordance with Section 7-1.02K(6)(a) of the *Standard Specifications*.

Caltrans may be the exposing employer if Cal/OSHA observes that a Caltrans employee is exposed to a hazard and the employee failed to remove themselves from exposure to the hazard or ask the contractor for correction to provide safe access to the work. Taking a proactive role in addressing and documenting safety and communicating it to the contractor would help create a common understanding, emphasize Caltrans' priority, and help in protecting the state from being cited under any of the above categories.

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 while it is carried out.

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.

Opening conference—The Cal/OSHA inspector requests the highest level of onsite management, makes introductions, and states the reason and purpose of the inspection. The inspector asks questions about the employer, such as the size of the organization, number of employees on site, addresses, and phone numbers. The inspector may also ask about the employer's IIPP, emergency contact numbers, and the addresses of the medical facilities closest to the job site. The inspector asks the employer for permission to make a walk-through site inspection and invites the employer to join the inspection.

Walk-through inspection—The inspector will tour the site observing the work in progress, condition of the site, and work practices followed. The inspector may interview employees about their training, work procedures, and protective equipment. During the inspection, the inspector may take photographs and measurements. If it is a post-accident investigation, the inspector identifies and interviews witnesses and may request contact information such as name, address, and phone number. The inspector notes violations observed, findings that will probably result in a citation during the closing conference.

Closing conference—After completing the walk-through inspection, the inspector meets with managers, supervisors, and employee representatives to discuss the violations and proposed citations. The inspector bases citations on the observations and on manager, supervisor, and employee statements. The inspector may hold this conference immediately after the walk-through inspection or defer it. Although the conference is usually conducted in person, the inspector may conduct it on the phone.

2-104D (2) Participation in the Inspection

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

Opening conference—Notify the CSC that Cal/ OSHA is planning to inspect. If the CSC is not available, notify the district safety officer and construction engineer of the pending inspection. If the CSC or safety officer can arrive in a reasonable length of time, request a delay of the walk-through inspection until their arrival. The resident engineer or representative should participate in the inspection, and the construction engineer should also participate.

Walk-through inspection—Participate in and document the inspection. Record what areas were inspected, who was interviewed, and what violations the Cal/OSHA inspector mentioned. For Caltrans records, take the same photographs and make the same measurements as the Cal/OSHA inspector.

Closing conference— Participate in the closing conference. The construction engineer or another representative should also participate. If the district safety officer or CSC is not present, insist that the closing conference be delayed until one of them can attend. If the inspector proposes citations, remain open and noncommittal.

2-104D (3) Procedures if Citations are Received

If you receive citations by personal delivery or mail, take the following actions:

- Notify the district safety officer, CSC, and construction engineer that a citation has been served.
- Fax a copy of the citation to the Office of Health and Safety in the Division of Safety and Management Services at (916) 227-2639 or email a copy of the citation to:

  Safety.Suggestions.HQ@dot.ca.gov
- For citations related to structure work, confirm structure representatives notify Structure Construction.

Work with the district safety officer, CSC, and the Office of Health and Safety in the Division of Safety and Management Services to resolve citations. If necessary, arrange for legal support.

2-105 Emergency Contracts

2-105 Emergency Contracts

Emergency contracts (refer to Section 5-501, "General," of this manual) present additional safety concerns for Caltrans. Cal/OSHA could consider Caltrans as the controlling employer for this type of work because Caltrans is defining the work and agreeing to the means and methods to complete the work.

Section 5-506, "Initial Stages of the Project," of this manual discusses documenting all discussions regarding safety.

Section 5-508, "Prosecution of the Work," of this manual discusses prosecution of the work and requires verification that the proposed means and methods are safe and effective.

2-106 Caltrans-Specific Safe Practices

2-106 Caltrans-Specific Safe Practices

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

2-106A Caltrans Division of Construction Code of Safe Practices

CCR Title 8, Construction Safety Order 1509, "Injury and Illness Prevention Program," requires that every employer adopt a written COSP. Verify that one is prepared for every project. Verify that it includes project-specific items. If unique contract safety items are not addressed in the COSP, consult with the CSC to have additional COSPs prepared for the project and included in the project file. If the contractor has developed a project-specific COSP item that they request Caltrans amend into our COSP, consult with the CSC. The project file should contain documentation that all employees have read and understood the COSP.

2-106B Tailgate Safety Meetings

Cal/OSHA safety orders require tailgate or toolbox safety meetings. As stated in Construction Safety Order 1509, the meetings must be held at least once every 10 working days.

Construction engineers or resident engineers should conduct a tailgate safety meeting with all employees who are new to the project to discuss the project and potential safety issues that might arise due to contractor operations.

Tailgate safety meetings should be project-specific. Topics to discuss might include: upcoming work; specialty work, such as crane critical picks and confined space entry; review of incidents; or the most recent project safety audit.

Under Cal/OSHA safety orders, contractors and subcontractors are required to hold their own tailgate safety meetings for the benefit of their own employees.

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

2-106C High-Visibility Garment

The following are required for all Caltrans staff during field operations:

- For daytime use, a minimum of a Class 2 garment is required. Its attached label must identify the garment as Class 2 and should clearly state that it is an ANSI 107-2010 garment (ANSI 107-2004 garments are also compliant in this and requirements below).
- For nighttime use, a Class 3 garment is required. A Class 3 garment may be used in the daytime. The following options meet Class 3 requirements:
    1. A Class 3 "sleeved" vest with the ANSI 107-2010 Class 3 label.
    2. A newer Caltrans rain jacket with an attached ANSI 107-2010 Class 3 label.
    3. A Class 3-equivalent garment—a Class 2 vest with the ANSI 107-2010 label worn with Class E pants.

2-107
Safety Precautions for the Public in Construction Areas

2-107 Safety Precautions for the Public in Construction Areas

Construction sites receive many visitors, including nonconstruction staff from Caltrans; personnel from federal, state, and local agencies such as the Department of Water Resources, Department of Fish and Wildlife, and Air Quality Management District; property or business owners; and members from the media. All visitors not associated with the contractor should follow Caltrans personal protection equipment requirements and construction *Code of Safe Practices* requirements unless their agency's is more stringent. Resident engineers and assistant resident engineers should monitor for potential hazards to the general public and work with the contractor to take reasonable precautions to exclude the public from the construction area. Provide fencing, if practical, and "no trespassing" signs at sites that have potential dangers.

2-108
Hazardous Materials

2-108 Hazardous Materials

If unanticipated hazardous materials are encountered on the project, notify the district hazardous waste coordinator who will advise you and may assist in the disposal procedures. The coordinator may also suggest extra safety measures to take to protect the public and workers.

Refer to Chapter 7, "Environmental Rules and Requirements," 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 California Streets and Highways Code authorizes Caltrans to close or restrict the use of any state highway whenever it considers such actions necessary for these reasons:

- To protect the public.
- To protect the highway during construction, improvement, or maintenance operations.
- To protect the highway from damage during storms.

Closures may also be necessary for major earthquakes or other natural disasters.

Closures are reported and managed using the web-based Lane Closure System (LCS) Mobile. Refer to Section 4-1202C (1a), "Lane Closure System," of this manual.

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

All traffic control devices should conform to Section 12, "Temporary Traffic Control," of the *Standard Specifications*. For their application, review the current *California Manual on Uniform Traffic Control Devices* (*California MUTCD*).

2-202 Objective

2-202
Objective

The objective of traffic control is to provide for worker protection and the safe passage of public traffic—including bicycles, motorcycles, and pedestrians—through and around the work zone with as little inconvenience and delay as possible.

2-203 Planning

2-203
Planning

Consideration for worker safety and the safe movement of traffic through work zones starts with planning. All contract plans and special provisions must include a traffic control plan, which may include T Series *Standard Plans*, detour plans, or motorist information plans. District construction should review it before the district submits the plans, specifications, and estimate to headquarters.

The traffic control plan should be appropriate for anticipated conditions that may occur during construction. The reviewer should determine that the plan can be implemented and that it adequately facilitates the movement of traffic—including bicycles, motorcycles, and pedestrians. Discuss comments or suggestions regarding traffic control with district design and traffic operations during the project's planning and design phase.

2-204 Responsibilities and Procedures

2-204
Responsibilities and
Procedures

Key personnel involved in traffic control have certain responsibilities and procedures as follows.

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. Administration of traffic control may be delegated to another person assigned to the project.

Once assigned to the project, do the following:

- Compare the traffic control plan to site conditions. Note any unusual local traffic patterns and scheduled special events during the life of the contract. At the preconstruction conference, discuss the traffic control plan with the contractor. For details related to preconstruction conferences, refer to Sections 5-002, "Preconstruction Conference with Caltrans Personnel," and 5-003, "Preconstruction Conference with the Contractor," of this manual.
- If the contractor requests modifications to the contract traffic control plans, refer them to Section 7-1.04, "Public Safety," of the *Standard Specifications* and note that temporary facilities require shop drawings that must be signed and sealed by a California-licensed engineer. Issue a change order for unanticipated conditions or changes to the contract plans or specifications. Change orders should include traffic control plans in sufficient detail to define all elements of the proposed changes.
- The district will establish a procedure for preparation, review, and approval of changes related to roadway construction and detour plans that include traffic control devices. Generally, the district traffic operations office is responsible for this review activity.
- Urgent, unpredictable situations—minor or of short duration—can arise during the work and should be addressed using engineering judgement. These instances do not require formally approved plans. Maintain written records of orders given and actions taken.
- To establish the geometry, markings, devices, and signs that existed during the project, maintain in sufficient detail a record of the placement into service, the changes, and the discontinuance of roadways and detours. The record's form may vary according to the magnitude and complexity of the subject. Dated notations or revisions to plans may be helpful. Dated photographs or video recordings, particularly of points of transition, may be especially valuable.
- If the contractor's activities interfere with vehicular or pedestrian traffic, contact the contractor and request correction of the deficiency. If necessary, direct the contractor in writing to act at once to remedy any issue not in compliance with the contract:
    - If the contractor cannot address the traffic safety issue due to lack of materials and it is safe to do so, consider temporarily suspending the work until correction can be made.
    - If the contractor cannot address the traffic safety issue and it is not safe to suspend the work, request the contractor take all steps necessary to provide for traffic safety and allow only the work that had started at the time the issue was recognized to continue. Consider suspending work for the next shift until a written plan is provided to address future public safety.
    - Call on Caltrans work forces only 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 suspend work. Refer to Section 8-1.06, "Suspensions," of the *Standard Specifications*.

2-204B State Representative on Projects Administered by Others

When others administer the contract, oversight of traffic through and around a work zone involves overseeing and working with the local agency or private entity's resident engineer. The state representative assigned to the project should make sure the local agency resident engineer performs the duties as outlined above.

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

As a last resort, the state representative has authority to stop the contractor's operation, wholly or in part, or take appropriate action when public safety is jeopardized. Refer to the *Oversight Resident Engineer Guidelines*, Sections 3.2.2(d), "Safety," and 5.2.1, "Encroachment Permit," for further guidance.

2-204C District Construction Safety Coordinator

Section 2-1, "Safety," of this manual covers the responsibilities of the district's construction safety coordinator (CSC) who should 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 CSC should document the reviews in the project records and discuss concerns about the traffic control plan or traffic safety with the construction engineer, traffic engineer, and resident engineer.

2-204D Construction Traffic Manager

The *Traffic Management Plan Guidelines* describe the roles and responsibilities of the construction traffic manager who works in cooperation with the CSC. Responsibilities include:

- Reviewing periodically the traffic control setup for each work zone and discussing any deficiencies with the resident engineer.
- Serving as a liaison between construction, the district traffic manager (DTM) and the transportation management plans (TMP) manager.
- Reviewing the TMP and traffic contingency plan for constructability issues.
- Acting as a resource for the resident engineer, construction engineer, DTM, and TMP manager during TMP implementation and reviewing the contractor's construction contingency plan.

2-204E Construction Engineer

The construction engineer is responsible for confirming that traffic moves through the work zone according to traffic control plans. If a change order modifies the plans, construction engineers should take steps necessary to verify that the modified plans are adequate to provide the highest level of traffic safety and service consistent with conditions actually encountered. During routine visits to the project, construction engineers should also review signing, delineation, construction contingency plans, and general traffic handling.

2-205 Guidelines for Traffic Control Plans

Follow these guidelines and general considerations for reviewing and approving traffic control plans.

2-205 Guidelines for Traffic Control Plans

2-205A Basic Instructions

Basic instructions usually apply more to the planning and design phase of a project, but they also help provide construction personnel with basic concepts for safe and efficient traffic flow through a highway construction project. Use these guidelines when necessary during construction to make changes in traffic control plans.

- Whenever possible, allow traffic to have continued full use of the existing facilities.
- When full use is not possible, accommodate traffic by verifying a continuous roadway throughout the length of the project, achieved by using 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, including pedestrians and bicycles, is diverted over a temporary roadway.
    5. Passage of traffic through the work in progress.
- Confirm that the temporary roadway is engineered to the same design considerations as those in new construction:
    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.
    7. Pedestrian and bicycle facilities.
    8. Pavement structure.
- Show the design of the temporary roadway, including pedestrian and bicycle facilities, in the traffic control plan. Verify pedestrian facilities comply with the Americans with Disabilities Act.
- Make safety and convenience the primary design considerations. Economy will be a factor only as necessary to obtain balance between benefits and resources. By itself, cost should not be a primary limiting factor.

2-205B General Considerations

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

- Create a physical facility that will encourage motorists to appropriately guide their vehicles on the intended path of travel and make it possible for the vehicle to perform as intended.
- The traffic lane—the path the car is intended to follow—is a critical element of the roadway. The following elements affect the driver's ability to navigate 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. If differences exist, try to make them readily apparent.
- Collision concentrations and inconvenience may occur with changes in direction, number of lanes, alignment, and speed. Where possible, compensate for a required reduction of one by an improvement of another. For example, compensate for a sharper curve with solutions such as increased lane width or a clear recovery zone.
- Visualize what effect changing conditions of visibility and lighting will create. Glare conditions in rain, at night, or when facing the rising or setting sun may affect 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 in daytime and at night. Consider sight distance for drivers due to temporary features (for example, falsework impeding view of traffic signal system). Anticipate needs for special treatments such as lighting.
- Review the project for indications of driving difficulty. For instance, look for such signs as broken delineators, skid marks, and tire marks on temporary railing, all of which indicate a potential need for improvement. Be aggressive in seeking changes to improve the situation. Perform additional reviews periodically throughout the duration of the construction project, since changes may affect the facility's effectiveness.
- Reductions in the width or number of lanes affect the capacity and flow of traffic. When severe congestion is forecast because of capacity reductions, include plans for using the media to notify the public, Construction Zone Enhanced Enforcement Program (COZEEP) services, alternate route development, metering by upstream ramp closures, changeable message signs, radar feedback speed signs, highway advisory radios, and monitoring the end of the traffic queue.

2-206 Elements of a Roadway

Following are guidelines for the design of roadways carrying traffic through work zones.

2-206A Geometrics

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

- Design for the speed that vehicles will travel. The following determine the safe speed of a vehicle:
  1. Alignment
  2. Profile
  3. Cross section
  4. Pavement surface characteristics
  5. Lateral clearances to obstructions

- Design the temporary roadway for speeds consistent with the permanent roadway. 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, confirm that the design speed differential is no more than 10 mph. Geometrics for a transition at the end of a high-speed approach should be better than those adequate for a situation within the work zone.
- Locate the transition so it is visible to the approaching motorist. Avoid placing entering transitions on or just beyond horizontal curves or the crest of a summit vertical. The transition should be accessed before 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 clear the work zone.
- In the transition, if physically possible, 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 for the least change in alignment, speed, or both. When changes are necessary, make one change at a time. For example, if the number of lanes is reduced and the direction changed, complete the lane drop before starting the alignment change.

2-206B Crossover Transitions

The following guidelines apply to crossover transitions:

- Design crossover transitions to the highest geometric standards within tolerable limits of cost. Use tangent diagonal crossing in preference to reversing curves.
- When crossovers 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 crossovers are not in use, place positive barriers across entry areas. Include appropriate signage.
- Consider additional signage and temporary lighting for crossovers. Consider driver expectation and ambient light in the area of the crossover for temporary lighting.

2-206C Existing Ramps

For temporary modifications of existing ramps, review acceleration and deceleration lanes. Reducing standards on existing roadways, such as sharpening curves and shortening auxiliary lanes, can adversely affect operating characteristics. Supplemental construction work may be necessary to retain the existing roadway's effective operating characteristics.

2-206D Clear Recovery Zone

Whenever physically possible, establish and maintain a safely traversable area outside the delineated roadway wide enough for a clear recovery zone. To enhance night visibility, delineate material, equipment, excavations, or obstructions 15 feet or more from the traveled way (outside normal required protection parameters). Creating clear recovery zones may also require ordering staging of certain elements of the work,

cleanup grading, and temporary placement or removal of materials. Refer to Section 7-1.04, "Public Safety," of the *Standard Specifications*, and Topic 902.2, "Sight Distance and Clear Recovery Zone Standards," of the *Highway Design Manual*.

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 lanes or additional surfaced shoulder width in transitions and critical alignment. Confirm that the minimum lane widths in the standard special provisions and those shown on the Traffic Handling Plans match. If they don't, the standard special provisions govern.

2-206F Lateral Shifting

Construction situations frequently require a lateral shifting of traffic in relation to the normal path of travel and may involve dropping a lane. Use the standard formula for taper length shown in the *California MUTCD* or in the project's traffic control plan details.

Before opening lanes to traffic, remove or obliterate all conflicting traffic stripes and markings. Obliterated traffic stripes and markings should not be visible to drivers as pavement delineation during the day, at night, and under all weather conditions. Verify that the pavement was not damaged during removal.

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 critical. If new asphalt concrete joins existing asphalt concrete, the difference in texture and color between them 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 concrete, because at night and during rainy weather, the joints often stand out more prominently than traffic lane lines.
- When conditions prevent starting the temporary surfacing at a square joint on the existing pavement, a treatment such as a light sand seal can establish the continuity of the traveled lane. Establishing continuity 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 work zone is significantly less than the approach speed of highway traffic, a reduced work-zone regulatory speed limit may be established.

- Do not use a reduced regulatory speed limit as a substitute for other means of creating a safe roadway.
- Establish reduced regulatory speed limits in accordance with procedures in the *California MUTCD*. District construction and traffic operations office should jointly review and agree to the limits, and it is advisable to discuss the limits with the California Highway Patrol (CHP). Caltrans recommends using COZEEP for any project with a proposed reduced speed zone when funding is available. Refer to Section 2-215, "Construction Zone Enhanced Enforcement Program," of this manual.
- To avoid having to obtain more than one speed reduction order per project, verify that 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 placed.
- It is imperative that the regulatory speed limit be posted only in areas of the project where required and only for the duration of the conditions justifying the reduction as discussed in the speed reduction order provided by district traffic operations staff.
- Regulatory speed limit signing may be considered during work activities when workers are present on foot and have direct exposure to vehicular traffic. When work activities are complete for the day, verify that the contractor removes or covers the signs. When possible, implement temporary speed limit reductions in conjunction with a COZEEP operation.
- Twenty-four-hour-a-day regulatory speed reductions require prior coordination with the local CHP office prior to implementation. Imposing a 24-hour-a-day regulatory speed reductions can be difficult to justify and obtain approval for. Consult with your CSC, construction traffic manager, and DTM to discuss 24-hour-a-day speed reductions.
- Use the posting of advisory speeds on warning signs to advise the public what speed is considered appropriate at specific locations, such as points of curvature or traffic diversion. The selected speed should be what a driver exercising due care would drive in normal conditions of light and weather. Advisory speeds are not enforceable by the CHP.

2-208 Night Work

2-208 Night Work

Frequently, special provisions restrict work on the existing traveled way to a specified period at night. Based on traffic counts, the district traffic operations office determines times for closures and for night work.

The effectiveness of handling traffic through night construction depends on the contract plans and the details of the contractor's activities. Consider these details:

- Avoid traffic splits if possible. Shift traffic to one side or the other, but do not split it into two traffic streams. This requirement may mean closing an extra lane.
- Confine the work area to as short a distance as practical.
- Work areas should be well lighted, but in a way not to blind drivers of approaching vehicles. If properly shielded, most lights can be mounted on construction equipment. Confirm that lighting intensity complies with the Cal/OSHA requirements.

- Providing for exit ramp traffic within the coned-off area may be difficult. Sometimes through traffic tends to follow an exiting vehicle. To expedite the work, it is helpful to close the exit temporarily if the contract, traffic patterns, and volumes permit. Consult with the transportation management center prior to temporarily closing a ramp not previously scheduled through the LCS.
- In addition to 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. Refer to Section 4-1203B (13), "Portable Changeable Message Signs," of this manual. You may also consult the district traffic operations office.
- For the use of amber flashing lights and for driving and parking in a closed lane at night, refer to the *Code of Safe Practices* at:

  http://www.dot.ca.gov/hq/construc/publicationlist.htm
- Verify all equipment is visible to traffic as required by the California Code of Regulations, Title 8 (8 CCR), "Industrial Relations."
- Review closure layouts for visibility and effectiveness. Confirm cone locations are straight and spaced in accordance with sheet T9 of the *Standard Plans*.
- 8 CCR 1599, "Flaggers," requires illuminating flagger stations during the hours of darkness and lighting should be in compliance with 8 CCR 1523, "Illumination," for nighttime highway construction. The traffic control system for flaggers should follow Sheet T13 of the *Standard Plans*. Confirm that all flaggers are clearly visible to traffic and their positioning is safe and effective.
- For high-visibility garment requirements refer to Section 2-106C, "High-Visibility Garment," of this manual.
- For nighttime operations for contractor staff, the law recommends but does not require ANSI 107-2004 Class 3 garments. Caltrans inspectors should verify that garments worn by the contractor's staff comply at least with ANSI 107-2004 Class 2.
- To maintain cones, signs, and other safety devices, the contractor must patrol the project's traffic control systems. Verify that the contractor has assigned a dedicated person to full time maintenance of traffic control as required by the *Standard Plans*.
- Personnel representing the contractor who are capable of and empowered to make decisions quickly if the need arises must be on the job at all times.

2-209 Delineation

2-209 Delineation

In accordance with Caltrans policy, no undelineated roadway can be opened to unrestricted or uncontrolled traffic. Before opening a roadway to unrestricted public traffic, the final delineation must be in place on the roadway either by using long-term or short-term temporary delineation or channelizing devices.

For a detailed discussion of acceptable temporary delineation methods, refer to Section 4-12, "Temporary Traffic Control," of this manual. For a discussion of final delineation and pavement markings, refer to Section 4-84, "Markings," of this manual.

2-210 Ramp Closures

2-210 Ramp Closures

During the planning and design phase of any project, an impact study is made for a proposed prolonged ramp closure. The public distribution of the environmental

document includes local businesses that may be affected and notifies them of any public hearing.

District construction should request an impact study for proposed prolonged ramp closures not formally considered in the planning or design phase. Contact the project manager to arrange 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 a change order that would result in a prolonged ramp closure, weigh the results of the study with factors, such as construction costs, travel costs, delay, and safety.

Request an impact study for ramp closures of short duration where the possibility of adverse results or 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. Motorists who are forewarned of construction conditions will be ideally more tolerant of delay and inconvenience and probably will be more alert and responsive to work zone traffic control.

Coordinate with the district public information office to provide the public with advance information on project road closures, new road openings, traffic rerouting, and changes in traffic conditions available. Follow the district's instructions for distributing news releases. For guidelines on publicizing information, refer to Section 1-206, "Relations With the Media and Traveling Public," of this manual.

2-212 Keeping the Roadway Clear and Clean

2-212 Keeping the Roadway Clear and Clean

Caltrans or the contractor prepares plans to provide unobstructed roadways. Periodic project safety audits should note deficient areas and provide recommendations for the contractor to correct those deficiencies. During these audits, examine the locations of planned roadside obstacles as well as protective safety devices, signs, striping, detours, falsework, temporary railing, attenuators, and clear recovery zones. Retain documentation of these audits 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. Verify the contractor maintains an unobstructed roadside when work is not in progress.

Verify that all traffic control facilities are in good repair with a continuing program of inspection, replacement, and cleaning.

2-213 Roadways Over Railroad Tracks

2-213 Roadways Over Railroad Tracks

When construction activities involve railroad rights-of-way or grade crossings, contact the district railroad liaison agent to confirm 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 should report to the Public Utilities Commission any proposed detours that include an at-grade railroad 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 shown on the railroad crossing sign.
- Existing protection at the crossing.
- Date the detour will be put into use and the estimated time it will be in use.
- Estimated volume of traffic to be detoured over the crossing.
- Whether additional protection is proposed.

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

The special provisions provide detail for railroad requirements including contractor's responsibilities with the railroads to move materials or equipment within the limits of the railroad property.

2-214 Transportation Management Plans

2-214 Transportation Management Plans

A TMP is a program of activities for minimizing or alleviating work-related traffic delays through traffic-handling practices and strategies, including: public awareness campaigns, motorist information, demand management, incident management, system management, alternate route planning, and construction methods and staging. Depending on the complexity of the work or the magnitude of anticipated effects, a TMP may provide closure charts, standard special provisions for maintaining traffic, traffic control plans, and—for major projects—a separate comprehensive report. Caltrans' *Transportation Management Plan Guidelines* provide more information on the recommended level of detail for TMPs.

2-214A Policy

The Code of Federal Regulations, Title 23, Section 630, "Work Zone Safety and Mobility," requires Caltrans to adopt a policy that implements TMPs on all federally funded highway projects. TMPs should be consistent with the Final Rule guidelines for developing and implementing the policy.

Caltrans requires TMPs for all planned activities on the state highway system. During the project initiation or planning stage, Caltrans considers TMP measures with associated road user costs and additional construction costs to the fullest extent feasible. TMPs include strategies to minimize work-related traffic delays while reducing the overall duration of work activities where appropriate. Strategies that may result in a net reduction of overall delay for motorists include full facility closures, extended weekend closures, continuous weekday closures, A+B contract specifications, and performance-based, traffic-handling specifications.

2-214B Definitions

Major lane closures—those expected to result in significant traffic impacts despite the implementation of TMPs.

Significant traffic impact—an individual traffic delay of 30 minutes or more above normal travel time during recurring congestion on the existing facility. TMP strategies are designed to maintain additional delays below this maximum threshold, that is, less

than 15 or 20 minutes. With approval from the District Lane Closure Review Committee, you may exceed the 30-minute maximum delay.

2-214C Responsibilities

The district construction office and the resident engineer should confirm that the contractor's activities are compatible with the TMP that affects the project.

2-214C (1) District Traffic Manager

- Acts as the single focal point for all traffic decisions resulting from planned activities on the state highway system.
- Determines the extent of a TMP.
- Facilitates review and approval of TMP measures and planned lane closure requests.
- Directs the termination or modification of active planned lane closure operations when traffic delays become significant, without compromising traveler or worker safety.

2-214C (2) TMP Manager

- Acts as the single focal point for development and implementation of TMPs.

2-214C (3) Construction Traffic Manager

- Serves as a liaison between construction, the DTM, and the TMP manager.
- Reviews the TMP and traffic contingency plan for constructability issues.
- Acts as a resource for the resident engineer, the DTM, and the TMP manager during TMP implementation.
- Reviews the contractor's contingency plan.

2-214C (4) Construction Engineers, Resident Engineers, and Construction Inspectors

- Confirm full implementation of approved TMPs in close coordination with the DTM so that the disruption to the traveling public is minimized.
- Work with the DTM to verify that project activities conform to the TMP, contingency plans are implemented when necessary, and disruption to the traveling public is minimized and does not exceed limits established in the TMP.
- Include the district TMP manager, the DTM, and the public information officer as appropriate in preconstruction or work planning meetings.
- Determine when the contractor must submit a construction contingency plan.
- Verify that the contractor is prepared to comply with TMPs related to work performance.
- Notify the district transportation management center when unforeseen traffic delays result from planned work.
- Verify that the contractor uses the LCS Mobile website to status closures in a timely manner. Refer to Section 4-1202C (1a), "Lane Closure System," of this manual.
- Coordinate work activities with the CHP and other local and regional transportation stakeholders as appropriate.

During construction, district construction directs the implementation of TMP elements that are part of the contract or encroachment permit. Contract managers direct their

respective separate contracts or agreements, such as for rideshare activities, transit activities, and public awareness campaigns.

Confirm that changeable message signs, highway advisory radio, and other media tools provide accurate and timely information to motorists regarding closure times. Caltrans can enforce contractor compliance with closure pickup deadlines in two ways:

- A "maintaining traffic" standard special provision allows assessing the contractor a contract payment deduction for the value of a traffic delay when the contractor exceeds the closure window. The special provisions specify the minimum penalty of $1,000 for each 10 minutes and can exceed the minimum depending on the duration of the delay, traffic volumes, and the highway facility. The DTM calculates the delay penalty during the design phase of the project.
- The Caltrans representative can suspend the contract work.

Caltrans can order a contractor to pick up a closure early if traffic delays become significant because of a project incident or activities outside the project area. Caltrans should order early pickup only when traveler and worker safety will not be compromised. The "maintaining traffic" special provisions for capital projects provide for compensating contractors for early pickup. Encroachment permit provisions require the permittee to pick up a closure early without compensation.

2-214D Construction Contingency Plan

The contractor develops a construction contingency plan to identify activities, equipment, processes, and materials that may delay reopening of closures in the event of failure or breakage. The contingency plan identifies alternative or additional equipment, materials, or workers necessary to allow continuing activities and on-time reopening of closures if a problem occurs. If the equipment, materials, or workers are not onsite, the contingency plan specifies the method of mobilizing these items and personnel, and the time required to complete the mobilization.

Critical pieces of equipment are those necessary to complete the planned work in the closure, for which no close onsite substitutes exist, and which—if rendered inoperative—would extend the closure beyond the time allowed in the closure charts.

Critical work activities are those performed in a closure that would render any portion of the traveled way unsuitable for public traffic use. The activities would, therefore, cause the closure to remain past the time allowed in the closure charts.

The contractor develops a contingency plan and submits it within 1 day of the resident engineer's request or as specified in the standard special provisions. Discuss the contingency plan at the project partnering or preconstruction meeting.

Samples of activities that may require a contingency plan:

- Any activity requiring a full roadway closure
- Blasting
- Rapid-strength concrete operations, including concrete slab replacement
- Roadway excavations that encroach on the traveled way and are not protected by K-rail
- Cold planing hot mix asphalt for depths of 2 inches or greater
- Hot mix asphalt paving
- Asphalt or concrete grinding

- Chip seal
- Asphalt or concrete pavement sealing operations
- Bridge work
- Placement of reinforcing steel or structural members
- Falsework erection or removal, including adjustments
- Bridge demolition
- Striping

A construction contingency plan describes:

- Critical stage for each operation when the alternative or additional equipment, materials, or workers must be activated.
- Communication equipment (for example, cell phones) and procedures to follow when communicating with the resident engineer's field representatives during contingency plan activation.
- Intended amount of work to be done during each closure. Describe the work by length, width, and unit of measure conforming to the appropriate progress pay items.
- Operation work schedule with a timeline set at 20-minute intervals.
- How the contractor will meet the projected rates for material delivery to the job site. Materials produced offsite and delivered to a job site, such as asphalt concrete and concrete, can be delayed by events including plant breakdown, loss of trucking, or trucking delayed by traffic congestion because of accidents or by the project itself.
- Beginning and ending times for critical work activities for work conducted in a closure.
- A general time-scaled logic diagram displaying the major activities and sequence of planned activities that comply with special provision requirements.
- A set of contingency action plans for each stage of the activities to prevent late opening of the traffic lanes. Clearly identify early-finish and late-finish milestones for every major activity. The contingency action plans should include detailed operations undertaken in case a major activity passes the late-finish milestone.
- Anticipated cooling times needed for asphalt concrete pavements before opening a lane, shoulder, or ramp to public traffic.
- Anticipated times for sweeping the roadway following grinding or import borrow haul operations to allow public travel with little to no visible dust when the lane is opened to traffic.
- Anticipated times to place and compact temporary asphalt tapers once paving is complete and prior to opening to traffic.
- Anticipated times for beginning the closure pickup.
- Anticipated length of time, rounded to the nearest 5 minutes, to pick up the closures.
- Timelines for the contractor and the engineer to meet at the job site, review progress, and forecast when work will be stopped to open the lane, shoulder, ramp, or route to the public.

The contractor verifies or updates the contingency plan at the same time as submitting the written schedule of planned closures. If a revision is required, the contractor should

not close any lanes until the resident engineer has reviewed the contingency plan.

2-215 Construction Zone Enhanced Enforcement Program

2-215 Construction Zone Enhanced Enforcement Program

Caltrans and the CHP have an interagency agreement that is the basis for the Construction Zone Enhanced Enforcement Program (COZEEP). It is an enhancement tool for construction zones and is not intended as a replacement for other temporary traffic control measures. Caltrans contracts, procedures, and guidelines form the basis for traffic-control measures throughout its construction projects and establish a baseline for operations statewide. COZEEP is not a baseline measure—an important fact when resources are limited and CHP personnel may not be available when requested. Under the agreement, Caltrans pays the CHP for furnishing officers and cars for construction zones.

To implement COZEEP, use the guidelines below, intended to apply COZEEP resources more uniformly throughout the state. Use the guidelines when determining when and how to use COZEEP on a project. Document the reasons for COZEEP use.

2-215A COZEEP Funding

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

2-215A (1) Estimating COZEEP Funding Requirements

The project engineer should include the project estimate funds necessary to provide COZEEP as state-furnished materials and services. The pending file for the project maintained by the resident engineer should include the basis of that estimate.

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

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

- CHP policy requires two officers in each unit from 10:00 p.m. through 6:00 a.m. Caltrans obtained an exception to have one officer per vehicle whenever two or more units are near one another on the same project, however, this is a local CHP office commander decision. Coordination with the district COZEEP coordinator is needed to determine local CHP policies.
- CHP policy and the COZEEP agreement require that a sergeant or higher ranked officer be assigned to oversee COZEEP officers if there are more than 4 officers assigned to a project.
- The CHP memorandum of understanding requires a minimum payment of 4 hours per officer. Caltrans reimburses CHP officers who provide COZEEP services on overtime at time and a half.
- Time and mileage are based on officers' starting and stopping times at their reporting station and include travel to and from the project. CHP officers are supposed to be assigned from the nearest local office. Check with the COZEEP coordinator to determine location of the nearest CHP office that will be supporting your project.

2-215A (2) Redirection of Project Funds

The detail estimate will show the initial funding level provided for COZEEP as supplemental funds for state-furnished materials and services. If additional funds are required during the life of the project, the resident engineer can transfer available contingency funds to "state-furnished materials and services—COZEEP." Likewise, the resident engineer may transfer unused COZEEP funds to the contingency fund and use them for other purposes when 90 percent of the contract item work is completed.

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 supplemental work funds and contingency funds, propose a fund request. The request may be processed under the G-12 process or require a California Transportation Commission supplemental vote. Process, justify, and document the request the same way as any other fund request.
- Maintenance funded projects—on maintenance projects, obtain additional funding through a request to the district Maintenance Unit.

2-215B COZEEP Responsibilities

The resident engineer and project engineer share responsibilities for COZEEP implementation and funding allocation.

2-215B (1) Project Engineer

- On every project that requires the contractor to close traffic lanes, the project engineer should assess the need for COZEEP as part of the project's safety review, constructability review, or both. The project engineer should consult with the resident engineer to determine which specific construction operations should use COZEEP and use that as the basis of the initial funding.
- The project engineer should include adequate COZEEP funds in the project estimate. Look in the resident engineer's pending file for design assumptions and estimate calculations.

2-215B (2) Resident Engineer

- The resident engineer administers the COZEEP program on the project.
- The resident engineer should determine which contractor activities might use COZEEP support. This should be done when a request for COZEEP has been received in writing from the contractor. Supporting justification for use or nonuse of COZEEP should be documented in Category 21, "Construction Zone Enhanced Enforcement Program," of the project files. Any contractor requests for COZEEP that are denied by the resident engineer should be in writing to the contractor stating the reasons for denial of the COZEEP support.
- If a change order is processed that requires COZEEP support, and it is estimated that existing state-furnished materials funding for COZEEP is not sufficient, include additional funding for COZEEP as part of the change order.
- If the contractor requests additional CHP support beyond what the project plan includes, you may, if appropriate, write a change order. The contractor bears costs

and expenses for additional support from the CHP, and Caltrans deducts associated costs from monies due the contractor.

- When evaluating cost reduction proposals and 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 day, report to the district COZEEP coordinator the COZEEP services used during that week.

2-215C COZEEP Implementation

Use the following criteria and risk factors to determine when COZEEP is needed on a project.

2-215C (1) Freeways and Expressways

As funding and operations allow, consider providing COZEEP for the following situations:

- Day 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.
- Other closures determined on a project-specific basis.

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

2-215C (2) Connectors and Ramps

Evaluate the COZEEP use criteria for lane closures on freeway-to-freeway connectors and for night closures of exit and entrance ramps. Daytime ramp closures do not usually need COZEEP.

2-215C (3) Conventional Highways

Evaluate the COZEEP use criteria for complete highway closures and nighttime closures of one or more lanes on multilane highways. In general, closures on two-lane highways and daytime closures on multi-lane highways do not require COZEEP.

2-215C (4) COZEEP Use Criteria

The following COZEEP use criteria are not an all-inclusive list. Safety reviews conducted during the project's development may identify other deciding factors.

- A median barrier, bridge rail, or retaining wall may block worker escape routes. Lack of escape options increases the likelihood of motorist-involved accidents that will disrupt traffic flow.
- Night construction activities (for example, replacing pavement slab, replacing bridge joint seals, and replacing pavement markers) that do not create an obvious work zone, except while operations are in progress, can create an unexpected condition for drivers—even those familiar with the highway.
- Construction activities such as night paving may be a deciding factor when the operation requires a large number of trucks into and out of the work area.

- End-of-queue management is desirable at locations where traffic queues are anticipated.
- 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 downgrades, or both.

2-215D COZEEP Administrative Procedures

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

2-215D (1) 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.

2-215D (2) Completing the Task Order

- To order work by the CHP, complete and use Form CEM-2102, "COZEEP/ MAZEEP Task Order." Before ordering the work, and while preparing the task order, check that:
  1. CHP support is appropriate for the type of work to be performed.
  2. The request has been submitted in a timely manner.
  3. The project has sufficient funds available to pay for the CHP support.
- Confirm that the task order, which has five parts, is completely filled out. Most parts are self-explanatory. In Part 4, identify a Caltrans project supervisor, usually the resident engineer or an assistant resident engineer.
- You may submit a single task order to cover more than 1 day. For example, a project that will occur Monday through Thursday for the next week would require only one task order. Task orders must specify by date, time, and location 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, sign, and return the form to the Caltrans construction office.

2-215D (3) Cancellations

- If it becomes necessary to cancel the work, call the local CHP contact person listed in Part 4 of the task order as soon as possible. The statewide agreement requires that cancellations be made during normal working hours and at least 24 hours before the time that the CHP is to arrive on the project. Also confirm it in writing using Form CEM-2103, "COZEEP/MAZEEP Cancellation Form." Once contact is made, the CHP coordinator will return the completed cancellation form.
- In accordance with the agreement, cancellations received less than 24 hours before work is to begin will be charged a cancellation fee ($50). If you cannot contact the local CHP coordinator in advance and the officer actually reports for duty, the fee will be equal to 4 hours of overtime pay. The local CHP contact person will note in

the cancellation form if Caltrans is being charged a cancellation or 4-hour overtime fee. If the cancellation form indicates a fee is being charged, retain the form in the project records under Category 21, "Construction Zone Enhanced Enforcement Program," and send a copy to the district COZEEP coordinator.

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

2-215D (4) 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 who should initiate form CEM-2101, "COZEEP Daily Report." The daily report number will also be the project identifier number. In the daily report, enter a description of the services the CHP provided (for example, traffic breaks, stationary patrol upstream of the work area, or circulating patrol), and complete the CHP officer and CHP vehicle information. At the end of the shift, the senior CHP officer onsite should estimate travel time and mileage for each officer 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 should sign the completed COZEEP daily report.

The CHP has 5 working days to notify Caltrans if the actual travel time, mileage, or both, are greater than the allowances estimated on the daily report. Submit the CHP notification to the person who issued the daily report. If a notice of change is received, attach a copy to your copy of the COZEEP daily report, and submit the original to the district COZEEP coordinator.

2-215D (5) Tracking Expenditures

The resident engineer should track COZEEP hours used and estimate expenditures each month.

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

The CHP will submit the COZEEP service summary electronically for payment with a confirming hard copy to the district COZEEP coordinator.

2-215D (6) Reconciling the CHP Invoice

CHP invoices will include monthly charges for services provided. The invoice backup will include the COZEEP service summary and copies of cancellation notices. Invoices should include the agreement number and be submitted monthly in arrears, in triplicate, within 60 calendar days of date of service.

The CHP sorts and subtotals the COZEEP service summary by project, including cost information. Within 45 calendar days of receipt of the invoice, the district COZEEP coordinator reviews and approves the summary and submits it for payment to the Caltrans Division of Accounting, which uses it as the "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 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. Instead, the district coordinator should contact the statewide contract manager to verify the correct billing rates.

2-215D (7) Problem Resolution

Resolve any accounting differences between the information Caltrans gives the CHP and the internal information CHP obtains from its payroll system. Return exceptions to the district and area offices involved for resolution. Make every effort to resolve disputes at the lowest level (between the resident engineer and the CHP coordinator at the local CHP area office). If an impasse occurs, the district COZEEP coordinator and the designated CHP division office contact should act as the second level of review. The last level of review will be the COZEEP statewide coordinator.

2-216 Pedestrian Facilities

2-216 Pedestrian Facilities

Work zone activities can disrupt the public's mobility and access. Caltrans attempts to maintain safe and convenient access for pedestrians and bicyclists, who are susceptible to disruptions because of their slower speeds and sensitivity to uneven surfaces, noise, airborne dust, road debris, and fumes.

Reviewing the needs and control of all road users is an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents through a work zone. Users include motorists, bicyclists, and pedestrians within the highway, including persons with disabilities, defined by the Americans with Disabilities Act of 1990 (ADA). The *California MUTCD* Part 6 contains figures that can be adapted for traffic-handling plans. Figures 6H-28 and 6H-29, "Sidewalk Detour or Diversion," and "Crosswalk Closures and Pedestrian Detours" of the *California MUTCD* are examples for accommodating the needs and control of pedestrians.

The design phase of a project considers accommodating pedestrians through or around the work zone.

2-216A Related Caltrans *Standard Specifications*

The contractor is responsible for accommodating pedestrians through or around the work zone. These *Standard Specifications* sections apply to pedestrian facilities:

- Section 7-1.02A, "General," requires the contractor to comply with current laws, regulations and decrees.
- Section 7-1.04, "Public Safety," requires that the contractor provide for the safety of the public during construction.
- Section 12, "Temporary Traffic Control," directs the contractor's attention to the *California MUTCD*.
- Sections 12-4.04, "Pedestrian Facilities," and 16-2.02, "Temporary Pedestrian Facilities," require the contractor to provide pedestrian access.

Verify that the contractor adheres to the following:

- If the contractor's activities require the closure of one accessible pedestrian facility, provide a travel path that replicates, if possible, the most desirable characteristics of the existing walkway. Take special care to consider areas in schools or senior citizen center locations.
- When construction affects the pedestrian facility, the contractor should maintain a continuous unobstructed path connecting existing accessible elements (parking lots, bus stops, and so forth) through the project.
- Provide advanced notification of sidewalk closures.

- Keep pedestrian facilities clear of obstructions. Traffic control devices, equipment, and other construction materials and features should not protrude into the usable width of the sidewalk, temporary pathway, or other pedestrian facility.
- In addition to required openings through falsework, provide accessible pedestrian facilities during pile driving, footing, wall, and other bridge construction activities where an accessible route was available before construction began.
- Provide hand railings on each side of pedestrian walkways as necessary to protect pedestrian traffic from construction operation hazards. Maintain railings and walkways in good condition.
- Provide protective overhead covering as necessary to protect from falling objects and dripping from overhead structures.
- A pedestrian traffic handling plan may be required if the contract plans do not identify the affected facility. Refer to Section 7-1.04, "Public Safety," of the *Standard Specifications* for guidance on temporary facilities that provide safe passage of traffic.
- The contractor is responsible for accommodating pedestrians through or around the work zone whenever the work disrupts pedestrian facilities.

At the preconstruction conference, discuss the need for temporary pedestrian facilities and ADA requirements. For details related to preconstruction conferences, refer to Section 5-003, "Preconstruction Conferences with the Contractor," of this manual.

2-216B Requirements of the *California Manual on Uniform Traffic Control Devices*

When planning for pedestrians in work zones, verify that the contractor does the following items:

- Avoids putting pedestrians into conflicts with worksite vehicles, equipment, and operations and with vehicles moving through or around the worksite.
- Provides pedestrians with a reasonably safe, convenient, and accessible path that replicates, as nearly as practical, the most desirable characteristics of the existing sidewalks or footpaths.

When existing pedestrian facilities are disrupted, closed, or relocated, the temporary facilities should be detectable and include accessibility features consistent with those in the existing pedestrian facility. Refer to Part 6, Chapter 6D of the *California MUTCD*. If the pedestrian facility existing before construction began was accessible to pedestrians with disabilities, the one provided during construction should also be accessible.

Do not sever or move a pedestrian route for nonconstruction activities such as parking for vehicles and equipment.

Maintain a width of 60 inches throughout the length of the pedestrian pathway. When it is not possible to maintain a width of 60 inches, provide a 60-by-60-inch passing space at least every 200 feet to allow individuals in wheelchairs to pass. The path must have a clear width of no less than 48 inches. Verify that no fixed objects (cabinets, poles, and so forth) will reduce the path width at any point.

The path must be stable, firm, and slip resistant. Pedestrian facilities must be surfaced with asphalt concrete, portland cement concrete, or timber. Dirt is not an acceptable surface.

The cross slope must be no greater than 1:50 (2 percent) and the running slope no greater than 1:20 (5 percent).

Signs and other devices mounted lower than 7 feet above the temporary pedestrian pathway should not project more than 4 inches into accessible pedestrian facilities. Refer to Part 6, Section 6D.02, "Accessibility Considerations," of the *California MUTCD*.

Place a barrier across the full width of a closed sidewalk. A person with a visual disability traveling with the aid of a long cane should be able to detect it.

Unless the contractor can provide a reasonably safe route that does not involve crossing the roadway, use appropriate advance signing to direct pedestrians to cross to the opposite side of the roadway. In urban and suburban areas with high vehicular traffic volumes, place the signs at intersections. Midblock worksites should not cause pedestrians to skirt the worksite or make a midblock crossing. Refer to Part 6, Section 6H, "Typical Applications," and figures 6H-28 and 6H-29 of the *California MUTCD*.

Consider separating pedestrian movements from both job site activity and vehicular traffic. When pedestrians are routed adjacent to live traffic, provide barrier protection to prevent vehicles from entering the pedestrian facility.

Do not use tape, rope, or plastic chain strung between devices as controls for pedestrian movements. They are not detectable by persons with visual disabilities.

2-216C Permanent Facilities

Verify that the contractor constructs permanent new facilities and alterations to existing facilities in accordance with the contract plans and specifications.

Additional resources for consideration:

- Caltrans Design Information Bulletin 82-05, "Pedestrian Accessibility Guidelines for Highway Projects," which addresses requirements for pedestrian accessibility for public use in new construction and alterations of existing facilities.
- *Standard Plans* A87A, A88A, A88B, A90A, A90B, ES-4C, ES-5C, and ES-7A.
- Section 4-73, "Concrete Curbs and Sidewalks," of this manual provides policies and procedures for those facilities.

If a change order is needed to add a permanent facility, contact the district Design Unit to develop plans.

During the inspection process, check that all contractor-installed finished elements comply with dimensions and installation requirements.

Do not exceed the maximums shown in the requirements listed in Section 4.3, "Pedestrian Accessibility Guidelines for Highway Projects," of Design Information Bulletin Number 82-05. They are absolute.

2-216D Temporary Facilities

For temporary pedestrian facilities, do the following:

- Pedestrians, including persons with disabilities, need to be accommodated through and around work zones. If a temporary pedestrian facility is needed, it should follow the ADA checklist in the *Temporary Pedestrian Facilities Handbook* available at:

  http://www.dot.ca.gov/hq/construc/safety/

- Routinely inspect temporary pedestrian facilities for compliance.

- Document reasons why an item does not comply with the ADA checklist in Category 46, "Assistant Resident Engineer's Daily Reports," of the project records.
- Construction staff needs to complete the job-related temporary pedestrian facilities training within 6 months of assignment to inspect or administer contracts if they have not taken the online training within the previous 3 years. In addition, it is recommended that construction field staff take the online training every 3 years as a refresher. To sign up for the training, submit a training request in Staff Central for this course by following the instructions at:

  http://construction.onramp.dot.ca.gov/temporary-pedestrian-facilities-training

Section 3 Major Construction Incidents

2-301 General

2-302 Reportable Accidents and Incidents

2-302A Accidents

2-302B Unusual or Extraordinary Construction Occurrences

2-302C Notification of Emergency Highway Closure

2-303 Reporting Procedures

2-304 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 more detailed guidelines on reporting, refer to Chapter 19, "Special Reporting of Serious Injury, Illness, or Fatality," of the *Caltrans Safety Manual*. The chapter also discusses special reporting for a serious occupational injury, illness, or fatality connected with employment activity.

2-302 Reportable Accidents and Incidents

2-302 Reportable Accidents and Incidents

Below are descriptions of accidents and construction incidents to report.

2-302A Accidents

Report accidents that:

- Have resulted in serious injury to or death of a contractor's employee.
- Have involved serious injury to or death of a state or a consultant employee.
- Have involved serious damage to equipment owned by the state, a consultant, or the contractor.
- Have resulted in the serious injury to or death of a member of the public in the construction zone or were influenced in any way by construction-related activities, conditions, equipment, or personnel.
- Were catastrophic or have received wide media coverage.
- Have involved vehicles entering the active work zone.
- Have involved vertical or horizontal clearance issues.
- Had no injuries, but had a high potential for being fatal or disabling, such as falsework or guying system failures, overturned cranes, high-voltage power line contacts, trench excavation or shoring failures, gas or fuel line fires or explosions, hazardous utility breaks, and collisions with structures under construction or their supporting falsework that caused displacement of a major member.

2-302B Unusual or Extraordinary Construction Occurrences

Unusual or extraordinary construction occurrences are reportable incidents that may not be classified as accidents, such as these:

- 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 material on a construction project.

- A hazardous spill on a roadway within construction project limits.
- An incident causing major traffic delays.

2-302C Notification of Emergency Highway Closure

Immediately report to the district dispatch center or the traansportation management center (TMC) any situation that requires emergency closures of traffic lanes or the highway. For information on reporting closures, refer to Section 4-1203C, "Maintaining Traffic," of this manual. Provide timely and accurate information to allow the TMC to notify the California Highway Patrol, the media, and the public of possible delays.

2-303 Reporting Procedures

2-303 Reporting Procedures

Immediately report all reportable accidents and major incidents to the district TMC, the district dispatch center, or—when TMC or the center is closed—the Caltrans Highway Information Center. Use Form CEM-0603, "Major Construction Incident Notification."

Email an initial report to Major.Incidents.Reports@dot.ca.gov. The Office of Health and Safety in the Division of Safety and Management Services and the Division of Construction monitor this email address. Also send copies of the report to the district construction safety coordinator and district management.

If email is unavailable, fax the form to the numbers at the top of the form, the district construction safety coordinator, and district management.

When necessary, Form CEM-0603 may also be used to email or fax an updated report providing supplementary information to the initial report.

2-304 Guidelines

2-304 Guidelines

When responding to major incidents in construction zones, do the following:

- Take appropriate action without jeopardizing public or employee safety.
- Document all incident details, paying special attention to traffic controls set up and the contractor's activity at the time of the incident. Take pictures of the job site along the incident location and file them with the incident details in Category 6, "Safety," of the project file.
- Provide timely and accurate information to management to document the extent of the incident and to identify major issues and current actions.
- In the event of a closure or restriction, restore the transportation facility to full operation as quickly as possible.
- Mitigate the effect on the public or the project caused by unusual or extraordinary occurrences.

The district construction deputy director activates a construction incident response team when warranted by the sensitivity and severity of a major incident. The team's principal purpose is to provide incident 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:

- A representative of the district public relations staff.

- Technical personnel from other Caltrans functional areas such as safety, traffic, structures, design, or environmental.

Report hazardous material encounters and hazardous spills as outlined in 2-303, "Reporting Procedures," earlier in this section. For more information on procedures to follow in the event of hazardous material encounters or hazardous spills, see Figure 7-1.1, "Unknown Hazards Procedures," in Chapter 7, "Environmental Stewardship," of this manual.

As described in Section 2-214D, "Construction Contingency Plan," of this manual, the contractor must have a contingency plan for reopening closed traffic lanes.

Chapter 3-
General Provisions

Chapter 3 General Provisions

Section 0 Introduction

3-001 Scope
3-002 Purpose

Chapter 3 General Provisions

Section 0 Introduction

Section 0
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 Specifications* 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. It 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 them in contract administration. This chapter answers many frequently asked questions about the procedures for administering contracts.

Chapter 3 General Provisions

Section 1 General

Section 1
General

Sections 1-1.06, "Abbreviations," and 1-1.07, "Definitions," of the *Standard Specifications* define terms and abbreviations used in specifications and the Bid Item List. Some sections of the *Standard Specifications* may include definitions that are specific to that section. The *Standard Plans* also contain a list of abbreviations and symbols that the engineer's estimate uses for unit of measure.

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

Section 2 Bidding

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 Bidding

Section 2
Bidding

3-201 General

3-201
General

Section 2, "Bidding," of the *Standard Specifications* covers proposal requirements and conditions that apply to a contractor bidding on a project. The Division of Engineering Services - Office Engineer (DES-OE) and the Division of Procurements and Contracts (DPAC) must adhere to requirements of this specification. District construction personnel must be familiar with this specification, 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 publication of contract information in the California State Contracts Register. Before bid opening, Caltrans will allow a minimum of 3 weeks (more if the project is complex) for contractors to obtain plans and specifications, and prepare their bids. Emergency projects may have a shortened advertisement period. Plans and specifications for major and Minor A projects are available at:

http://www.dot.ca.gov/hq/esc/oe/contract_awards_services.html

DPAC advertises for Minor B projects. The Minor B limit is evaluated and re-established every 2 years and DPAC announces the new policy by issuing a DPAC Information Bulletin:

http://dpac.onramp.dot.ca.gov/bulletins-and-memos

Solicitation documents for Minor B projects are no longer provided in hard copy form. Plans and specifications for Minor B projects are available at:

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

3-203 Bid Opening

3-203
Bid Opening

Information on where and when the bid openings are held for all projects, including electronically bid projects if scheduled, is available at:

http://www.dot.ca.gov/hq/esc/oe/contract_awards_services.html

DPAC opens bids in Sacramento for Minor B projects. Bid openings are held at 1727 30th Street, 1st Floor, Sacramento at 3:00 p.m. on the date specified in the solicitation. Bidders may participate in person or via teleconference by calling 1-866-700-7952 and entering the pass code 7089821#.

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 designated district construction personnel must answer bidder inquiries. The design engineer, construction field personnel, or other nondesignated Caltrans

personnel must never respond to bidder inquiries. Respond to inquiries within two business days, even if only to acknowledge receipt, pending further review.

- Thoroughly investigate bidder inquiries, and provide timely and conclusive responses. Post responses to the consolidated bidder inquiry system located at:

  http:/cap3/oe/inquiry/

- Number the responses to facilitate bidder comments and the 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 2-1.07, "Job Site and Document Examination," 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 given previously.

- 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. 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, the resident or construction engineer responsible for administering the project will review all inquiries and subsequent responses at the Office Engineer website.
- 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 DES-OE as soon as possible of addenda proposed or under consideration. Responses to inquiries, whether made orally or in writing, do not become part of or 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 "Please bid per the current contract documents" 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 submitted too close to the bid opening date. Although you should aggressively pursue the investigation of all bidder inquiries, Caltrans may consider the particular circumstances and waive posting a response, if warranted.
- Post all responses, including "Please bid per the current contract documents" responses.

3-205 Disclosure of Construction Estimates

3-205 Disclosure of Construction Estimates

Until bids are opened, the engineer's estimate of the cost of each contract item, supplemental fund allocation, contingency fund allocation, Department-furnished materials allocation, and any other portion of the project estimate are not public information.

Before bid opening, bidders may know only the total allocated funds available on a specific project. This information is available for Minor A and major projects. The weekly advertisement for bid listing provides the information either in hard-copy form or on the internet:

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

For Minor B project funds allocation information, call the Sacramento office at (916) 227-6000 or use the internet:

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

3-206 Names of Prospective Bidders

3-206 Names of Prospective Bidders

For all projects except Minor B construction projects, the names of prospective bidders are available at:

http://www.dot.ca.gov/hq/esc/oe/contract_awards_services.html

Section 3 Contract Award and Execution

3-301 General
3-302 District Recommendation

Section 3 Contract Award and Execution

3-301 General

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

The Division of Engineering Services-Office Engineer (DES-OE), 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. Section 3-803A, "Work Before Contract Approval," of this manual covers administrative details.

3-302 District Recommendation

Ready to List and Construction Contract Award Guide, Section 14, "District Recommendation for Award/Requests to Reject Bids," describes the district recommendation procedure in detail, including questions to ask contractors.

The district must not reveal the award recommendation to any contractor or external agency or entity until DES-OE makes the final award decision. DES-OE will inform the contractor of Caltrans' decision.

Section 4 Scope of Work

3-401 Intent
3-402 Use of Materials Found on the Job Site
3-403 Changes and Extra Work
3-403A Work-Character Changes
3-404 Differing Site Conditions
3-404A Types of Differing Site Conditions
3-404A (1) Type 1
3-404A (2) Type 2
3-404B Procedure
3-404C Management Review Committee
3-405 Value Engineering
3-405A Procedure
3-406 Cleanup

Section 4 Scope of Work

Section 4
Scope of Work

3-401 Intent

3-401
Intent

The contractor must construct the project in accordance with the contract, including ordered changes. Be as familiar as the contractor is with the work to be done, and the commonly accepted practices, customs, and terminology used in the work.

Use judgment 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 design engineer's. Exercise prudence and caution; any interpretation should be one that a reasonable contractor would obtain from the contract documents. Also, avoid searching out and using pure technicalities or making unreasonable inferences.

3-402 Use of Materials Found on the Job Site

3-402
Use of Materials Found on the Job Site

Designated selected material takes precedence over the contractor's request for the use of materials found on the job site. Refer to Section 4-1903A (7), "Selected Material," of this manual for more information.

The specifications provide that the resident engineer's approval is necessary for the contractor to use materials from within the planned slopes and grade lines. 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 job site will be given in writing from the resident engineer; but written authorization to use materials outside of planned slope and grade lines must be by change order.

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

3-403 Changes and Extra Work

3-403
Changes and Extra Work

Project plans, specifications, and other bid documents define the scope of the contract, and describe the details for the construction and completion of the whole work contemplated.

Limit changes to those required to complete the work as contemplated at the time the plans and specifications were approved. Otherwise, the work must be performed by a separate contract unless authorized as indicated in Section 5-302, "Change Order Policy," of this manual. If proposed changes are not required immediately, consider performing the work with a separate contract.

If a change must be made, formalize it by executing a change order. Discuss with the contractor all elements of that change, including the method of compensation and the effect on contract time. During the discussion, develop full agreement, identify elements that require negotiation, or identify elements that could lead to protest. Ensure that the contractor accurately understands all the elements of the change.

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.

Extra work is any work, desired or performed, but not included in the original contract. Extra work is not a payment method. Refer to Section 3-9, "Payment," and Section 3-5, "Control of Work," of this manual for a discussion of payment methods for extra work.

Use the specifications' definitions of the various bid items if the changed work is extra work. If the changed work is the same as items included in the contract, make payment at the bid item price.

If the changed work can be defined as bid items, but the unit cost differs materially, make payment under the provisions of Section 4-1.05B, "Work-Character Changes," of the *Standard Specifications*, rather than for the entire added work as changed work.

Changed work becomes a part of the contract when added by an approved change order. The contractor bears the same responsibility for this changed work as for any other work performed under the contract.

3-403A Work-Character Changes

Before work can be considered a work-character change, an ordered change to the plans or specifications must occur. If such an ordered change materially increases or decreases the unit cost of a bid item, then a work-character change has occurred. Work-character changes are not to be confused with differing site conditions, discussed in Section 3-404 of this manual.

When calculating the adjustment for a work-character change, 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, "Change Orders," of this manual contains examples of calculations. Example change orders are available at:

http://www.dot.ca.gov/construction/change-order/examples.html

Also refer to Section 9-1.15, "Work-Character Changes," of the *Standard Specifications* and Section 3-904C, "Work-Character Changes," of this manual.

3-404 Differing Site Conditions

3-404 Differing Site Conditions

A differing site condition clause was initially developed by the federal government in the 1920s to protect contractors from excessive risk. The inclusion of the clause benefits Caltrans by reduced bidding contingencies that may be included by contractors. The differing site condition clause is required on all federally funded projects under Code of Federal Regulations, Title 23, Section 635.109 (23 CFR 635.109), "Standardized Changed Condition Clauses."

When a differing site condition occurs, Section 4-1.06, "Differing Site Conditions (23 CFR 635.109)," of the *Standard Specifications* provides requirements for Caltrans and the contractor. When a differing site condition arises, contact the district Materials Unit or Geotechnical Services.

3-404A Types of Differing Site Conditions

Two types of differing site conditions are recognized by the contract and are described as follows.

3-404A (1) Type 1

Type 1 consists of actual subsurface or latent physical conditions materially different from those indicated or shown in any of the following:

- The contract.
- *Information Handout* or supplemental project information, including the logs of test borings.
- Other records of geotechnical data obtained by Caltrans' investigation of subsurface conditions.
- Other records of data to the extent they were available to the contractor prior to the bid opening.
- An examination of site conditions above ground.

Examples of differing site conditions that are Type 1 include the following: conditions that are unknown, shown or not shown in the plans; groundwater elevations lower or higher; quantity, strength, and sizes of rocks; soil type and contour that is difficult to excavate; as-built conditions different from the plans; inaccurate log of test borings and boring locations.

The following are examples that are not differing site conditions: changes that occur after bidding or contract award such as flooding, normal water table variations, landslides, illegal dumping, and weather-related events.

Consider the following when determining if a differing site condition is Type 1:

- Contract documents must have affirmatively indicated the conditions forming the basis of the differing site condition.
- Contractor must have acted reasonably and prudently in the interpretation of the contract documents related to the differing site condition.
- Contractor must have reasonably relied on the indications in developing its bid at bid time.
- Conditions actually encountered must have differed materially from those indicated for contracts located in the same area.
- Conditions actually encountered must have been reasonably unforeseeable.
- Additional claimed cost must be solely attributable to the materially different conditions by comparative analysis.

3-404A (2) Type 2

Type 2 differing site conditions consist of unknown physical conditions of an unusual nature that are materially different from those ordinarily encountered and generally recognized as not inherent in the work provided for in the contract.

Examples of Type 2 differing site conditions include the following: archaeological finds, hazardous materials, endangered species, unusual buried man-made objects, or a subsurface boulder found between soil borings showing dune sands only.

Type 2 differing site conditions are more difficult to prove and are most frequently asserted by the contractor when there is no soils report data available for comparative analysis. Consider the plans and specifications when evaluating a Type 2 differing site condition. Certain designs imply expected conditions; for example, a spread footing foundation may mean that groundwater will not be present at the footing.

Consider the following three elements when analyzing a Type 2 differing site condition:

1. Unknown physical condition encountered not inherent in the area.
2. Physical condition at the site is unusual in nature.
3. Materially different than ordinarily encountered in the type of work required by the contract.

3-404B Procedure

The contractor is required to investigate the site and carefully examine the bid documents under Section 2-1.07, "Job Site and Document Examination," of the *Standard Specifications*. For the contractor to recover damages for a differing site condition claim, the following steps must be taken:

- Before disturbing the conditions, the contractor must provide to the resident engineer written notice in the form of a request for information. Refer to Section 3-5, "Control of Work," of this manual for additional information.
- The resident engineer or structure representative must investigate the conditions and determine if they differ materially and cause an increase or decrease in the cost or time to do the work. Compare the encountered conditions with the contract documents as well as the following: the log of test borings; any other records of geotechnical data obtained by Caltrans' investigation of sub-surface conditions; the materials *Information Handout*; the site conditions above ground; and other available records of data. The conditions encountered must either be materially different from those represented by the bid documents or be materially different from those normally encountered or inherent in the industry.

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 other sections of the *Standard Specifications*. For example, those situations found in Section 5-1.36D, "Nonhighway Facilities," and Section 19-1.03D, "Buried Man-Made Objects," are not differing site conditions.

Differing site conditions are not considered work-character changes 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 work-character changes. To determine how compensation is made for work-character changes and for an example change order, refer to Section 5-3, "Change Orders," of this manual.

3-404C Management Review Committee

If the resident engineer disagrees with the contractor's claim of a differing site condition, a management review committee is formed to clarify Caltrans' position on

the dispute. The management review committee was created to help resident engineers make an informed decision and resolve differing site condition disputes timely.

The management review committee is composed of the deputy district director of construction as the chairperson, the structure construction area manager, and the Division of Construction's field coordinator. Also involve the structure designer on record, Geotechnical Services, area construction managers, and other subject matter experts that have expertise with differing site condition disputes.

The process involving the management review committee consists of three steps:

1. Within 5 days of receipt of a supplemental potential claim record pertaining to a differing site condition dispute, the resident engineer prepares a draft response to the potential claim record and submits the response to the deputy district director of construction.
2. The management review committee reviews the resident engineer's draft response and provides any comments within 10 days of receipt of the supplemental potential claim record. The committee or the contractor can initiate further communication with the other party during this period to clarify information related to the differing site condition dispute.
3. Within 20 days of the supplemental potential claim record, the resident engineer will incorporate any response from the management review committee into the supplemental potential claim record response and submit it to the contractor.

In addition, follow Sections 3-521C, "Potential Claim Records," and 3-521E (1), "Request for Information for Notification of a Possible Differing Site Condition," of this manual for detailed guidelines and format of potential claim record responses.

3-405 Value Engineering

3-405 Value Engineering

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 4-1.07, "Value Engineering," of the *Standard Specifications* identifies the method and procedure for sharing construction cost savings. A contractor's proposal made in accordance with this section of the *Standard Specifications* is called a value engineering change proposal (VECP).

Section 4-1.07B, "Value Engineering Change Proposal," of the *Standard Specifications* 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. Section 4-1.07C, "Value Analysis Workshop," of the *Standard Specifications* describes the requirements for a contractor-requested workshop. The workshop's purpose is to identify value-enhancing opportunities that will reduce the total project cost, time of construction, or traffic congestion. Items identified in the workshop can be developed into a VECP.

3-405A Procedure

Following is the VECP procedure:

- After discussing the merits of a potential VECP 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 4-1.07B, "Value Engineering Change Proposal," 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 what the deadline is that the contractor requires a decision be made on the proposal.

- Get concurrence from the construction manager that the preliminary written proposal is acceptable. If acceptable, notify the contractor to submit a complete proposal. The proposal must have 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.
- With assistance from the resident engineer, the construction engineer coordinates Caltrans' evaluation of the VECP to meet the deadline requested. The review includes the designer and the project manager. It may be necessary to consult with additional subject matter experts to aid in the evaluation, such as the structure designer on record and Geotechnical Services. In addition to the subject matter experts, the evaluation may also include the Division of Construction's field coordinator, the construction manager, and the deputy district director or region division chief of construction.
- 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 the VECP net savings due to the changed work in accordance with the methods detailed in Section 4-1.05B, "Work-Character Changes," 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 the contractor agreed to share.

- 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 sub-job number. Establish this number regardless of the proposal's subsequent approval or rejection. Charge all time spent evaluating the proposal to the sub-job number.
  2. To provide the means of segregating costs, the district must immediately prepare and submit for master file the sub-job number. After executing the change order for the VECP, do not charge construction engineering to the sub-job number.
  3. In conformance with Section 4-1.07B, "Value Engineering Change Proposal," of the *Standard Specifications*, you may deduct from progress payments a portion of Caltrans' engineering costs for evaluating the VECP. 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, a change order may be issued based on public benefit. However, the change order would not be written as a change order for a VECP but as an engineer-requested change order.
- In accordance with Section 4-1.07B, "Value Engineering Change Proposal," of the *Standard Specifications*, prepare a change order to authorize the VECP. For guidance in preparing a change order for a VECP, refer to Section 5-314, "Value Engineering Change Proposals," of this manual. Carefully consider the change order's clauses covering payment to the contractor. In the change order, resolve all compensation and other issues related to the proposal. Before starting the authorized work, the contractor must execute and Caltrans must approve the change order.
- If you determine the proposal is not acceptable, you must get concurrence from the district construction deputy director.

3-406 Cleanup

3-406 Cleanup

Section 4-1.13, "Cleanup," 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, refer to Section 4-22, "Finishing Roadway," of this manual.

Before recommending relief of maintenance or acceptance of the contract, ensure the contractor meets all the requirements for cleaning up the site. Section 4-1.13 of the *Standard Specifications* allows 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.

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Section 5 Control of Work

Section 5
Control of Work

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 resident engineer ensure control.

Ensure the contractor provides quality control over the work. During the manufacture of products and the execution of the project, the contractor performs the actions necessary to assess and adjust production and construction processes to control the level of quality produced in the end product or facility, and to fulfill specified requirements.

Caltrans performs activities required for Department acceptance. The resident engineer and authorized representatives sample, test, and inspect the work to determine if the quality characteristics meet the contract requirements within the tolerances specified. When tolerances are not specified, use judgment to determine if any deviation is allowed consistent with the trades involved.

For additional information on quality control and Caltrans acceptance, refer to Section 3-606, "Quality Assurance," of this manual.

Standard Specifications Section 5-1.01, "General," requires the contractor to provide safe and unrestricted access to the work for inspection by Caltrans. The resident engineer must take full advantage of this access.

The Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA) establishes standards for safe access to work, and Caltrans enforces them under Section 7-1.02K(6), "Occupational Safety and Health Standards," of the *Standard Specifications*.

The cost of providing access for inspection of bid item work is included in the bid item price. If the contractor is required to construct facilities specifically to provide access for inspection of extra work, the cost may be included on change order bills. These costs, however, are limited to only the increased cost of providing inspection for the extra work, and may not include the access costs that fall under the original item work.

Never operate the contractor's equipment or allow any Caltrans representatives to operate the contractor's equipment. During quality assurance inspections, only the contractor's own equipment operators must operate the equipment.

3-502 Engineer's Authority

3-502
Engineer's
Authority

The term "engineer" refers to the resident engineer and authorized representatives. The engineer is responsible for contract administration and is authorized to make the final decision on questions regarding the contract. The engineer must act in accordance with Caltrans policies and procedures and, in the absence of written policy or procedures, must exercise judgment within their ability and span of control as established by the district.

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

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

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

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

The resident engineer is the lead for contact and correspondence with the contractor.

3-503 Protests

3-503 Protests

Section 5-1.06, "Protests," of the *Standard Specification*s allows the contractor to protest an engineer's decision by submitting a request for information. Protests by the contractor of weekly statements of working days, change orders, or failure to issue a change order must be done through a request for information.

3-504 Partnering

3-504 Partnering

Partnering allows all parties and stakeholders to establish and maintain cooperative communication channels and mutually resolve conflicts at the lowest responsible level. Become familiar with and follow Section 5-1.09, "Partnering," of the *Standard Specifications* and the Caltrans publication, *Field Guide to Partnering on Caltrans Construction Projects*. This publication is available at the partnering website:

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

For additional guidance, contact the partnering coordinator in either the district or the Division of Construction. The names and contact numbers for these coordinators are available on the partnering website at the CT Partnering Coordinators link.

Supplemental funds to cover the anticipated partnering costs are included in projects with an engineer's estimate of more than $1 million. To pay for Caltrans' share of the partnering costs, execute a change order using the change order code AUZZ.

Use of a partnering facilitator is recommended on all projects. Use of a partnering facilitator is required, however, on all projects above $10 million and greater than 100 working days. A list of partnering facilitators is available on the Caltrans partnering website.

When selecting a partnering facilitator:

- Consider the extent of a candidate's experience as a partnering facilitator on other Caltrans projects.
- Check with other resident engineers or the partnering coordinator in either the district or in the Division of Construction for information regarding potential facilitators.
- Interview several facilitators. Do not assume all facilitators are the same. Search for the right facilitator for the job.
- Confirm the full scope and cost of the facilitator's work. Not all facilitators perform the same amount of work and the cost differences for a 1-day session can be as much as $15,000. The cost for each session should include all costs of the

facility, full payment for the facilitator, materials used during the session, and all pre- and post-session work. The facilitator should make an effort to get to know the parties, facilitate the sessions to foster a team dynamic, provide meeting notes, and follow up on any action items discussed at the meeting.

- Ensure the facilitator's services include administering monthly project surveys. The facilitator is allowed to charge for this survey.

3-505 Order of Work

3-505
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 the proposed modification as it would under the specified plan, the contractor's plan may be implemented with a 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 value engineering change proposal. Refer to Section 3-405, "Value Engineering," of this manual and Section 4-1.07, "Value Engineering," 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. Construction in stages is often a part of the contract on major projects, and revised progress schedules may be required as the stages of work develop.

3-506 Assignment

3-506
Assignment

If the contractor submits any of the following contractor action request forms to the resident engineer, the contractor must also include a completed and signed Form STD. 204, "Payee Data Record," as part of the submittal in accordance with Section 5-1.12, "Assignment," of the *Standard Specifications*. Submittal of scanned or faxed copies is acceptable.

- Form CEM 1202A, "Contractor Action Request–Change of Name/Address," is submitted by the original contractor as an informational submittal to notify Caltrans of change to the contractor's business name or mailing address.
- Form CEM 1202B, "Contractor Action Request–Assignment of Contract Monies, Assignee Change of Name/Address" is submitted by the original contractor or surety as an informational submittal to provide notification if a contractor is assigning contract payments to another entity (surety, bonding company, or escrow company, among others). If payments are assigned to another entity and the remaining contract work is assigned to a new prime contractor, the contractor must submit Forms CEM-1202B and CEM-1203 to cover both actions.
- Form CEM 1203, "Contractor Action Request–Assignment of Contract Performance," is submitted by the original contractor, surety, or bonding company to assign contract performance to another contractor. An assignment of performance request is an action submittal that requires the Division of Construction Chief's consent (as authorized agent for the director) in order for the request to be approved.

Carefully review and verify the information in contractor action request submittals. Adhere to the procedures listed in the instructions of Forms CEM-1202A, CEM-1202B, and CEM-1203. For a contractor business name change submitted under Form CEM-1202A, refer to Section 3-704A, "Responsibilities," of this manual for information regarding validation of insurance bonds and contract bonds.

3-507 Subcontracting

3-507 Subcontracting

Contractors can use subcontractors on their projects provided the subcontractor and the prime contractor comply with Section 5-1.13, "Subcontracting," of the *Standard Specifications*, and with state and federal laws and regulations. The contractor is required to submit Form CEM-1201, "Subcontracting Request," before subcontracted work starts.

When projects use subcontractors, the resident engineer must focus primarily on:

- Always knowing which subcontractors are working on the project and on which specific items they are working.
- Ensuring that listed subcontractors have a valid public works contractor registration number before they begin work.
- Ensuring that listed subcontractors are not improperly removed or replaced.
- Ensuring that the prime contractor achieves the subcontracting level pledged when the contract was awarded to meet requirements of the Disadvantaged Business Enterprise (DBE), Disabled Veteran Business Enterprise (DVBE), and small business programs.
- Ensuring adherence to the provisions of the Public Contract Code.

For more information on these subcontracting requirements, refer to Section 8-3, "Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises," of this manual.

3-507A Amount of Work Subcontracted

Section 5-1.13, "Subcontracting," of the *Standard Specifications*, requires that the prime contractor perform at least 30 percent of work using the contractor's own organization unless a different percentage is specified in the special provisions. This requirement does not apply if the work is for a building-construction, non-federal-aid contract.

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

Discuss unusual subcontracting situations with the construction engineer. If the situation indicates that additional information is necessary but only available through an inspection of the contractor's records, request a copy of the subcontract agreement from the prime contractor. If a review of the subcontract agreement does not help resolve the situation, discuss the possibility of an audit with Division of Construction's field coordinator.

3-507B Calculating the Amount of Work Subcontracted

The contractor must submit Form CEM-1201, "Subcontracting Request," stating what percentage and dollar amount of an item will be subcontracted. The resident engineer

must verify the amount. Any rational method of estimating the amount will be acceptable; for example:

- The percentage of an area, volume, or length.
- The portion applicable to material cost.
- The portion of labor and equipment cost.

When an entire item is subcontracted, use the prime contractor's item bid price as the dollar amount for the form. When a portion of an item is subcontracted, apply the percentage of the bid item subcontracted to the prime contractor's item bid price as the dollar amount for the form.

To ensure that the contractor is not requesting approval for a subcontractor other than those listed in the bid documents, the resident engineer must check the DBE, DVBE, and small business commitment listings and the list of subcontractors. If a discrepancy is noted, advise the contractor and ask for an explanation. The resident engineer must not approve the subcontracting request until the contractor provides an acceptable explanation.

3-507C The Subletting and Subcontracting Fair Practices Act

3-507C (1) Subcontracting in the Bidding Process

Sections 4100 through 4114 of the Public Contract Code are called the "Subletting and Subcontracting Fair Practices Act" (Act) and apply to Caltrans construction projects. The 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 one-half of 1 percent (0.005) of the contractor's total bid amount or $10,000 (whichever is greater), must be listed in the prime contractor's bid proposal. When a prime contractor fails to list a subcontractor in its bid, the law requires that the prime contractor must perform the work with its own forces. The prime contractor may not add an unlisted subcontractor by requesting a substitution. Exceptions to this requirement are discussed in Public Contract Code 4107 (c) and Public Contract Code 4109.

For building projects such as a maintenance station or other off-highway project, all subcontracted work in excess of one-half of 1 percent (0.005) of the contractor's total bid amount must be listed.

Ensure that the listed subcontractor performs the work or that the contractor complies with the substitution procedures in the Act.

3-507C (2) Substitution Process

- To replace a subcontractor listed in the bid documents, the prime contractor must submit a written request based on the reasons identified in Public Contract Code Section 4107, and include the public works contractor registration number of each substituted subcontractor. To ensure this requirement is met, verify that the subcontractor's registration number is valid at the California Department of Industrial Relations' Public Works Contractor (PWC) Registration Search website:

  https://efiling.dir.ca.gov/PWCR/Search

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

1. Send the request to the district construction office for review.

2. The district construction office must send a written notice to the listed subcontractor by certified mail, overnight mail, or fax, informing the listed subcontractor of the prime contractor's request to substitute and the reasons for the request. The notice must provide the subcontractor 5 business days to submit a written objection to the substitution.
3. If the listed subcontractor does not file a timely written objection, the resident engineer must approve the substitution. The resident engineer must approve the new subcontractor following the guidelines under Section 3-507D, "Procedure for Approval or Acknowledgment of Subcontractors," of this manual. If the removed subcontractor's firm was a listed DBE, DVBE, or small business, refer to Section 8-3, "Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises," of this manual for additional steps required in the process.
4. If the listed subcontractor submits timely written objections to the substitution, the district must conduct a hearing. Send written notice of the hearing to the prime contractor and the subcontractor a minimum of 5 business days before the hearing is conducted. The written notice should include a request that any substantiating documents be provided before the hearing.

3-507C (3) Hearing Process for Substitutions

The intent of the substitution hearing is to give both parties the opportunity to explain to the hearing officer why a substitution should or should not occur. Substitution hearings are conducted informally. Normally, the hearing officer is the district construction deputy director.

3-507C (3a) Before the Substitution Hearing

- Obtain from both parties documents to substantiate the reasons for substitution.
- Review all information submitted by both parties and provide copies to the hearing officer. If the hearing officer believes legal or other assistance may be required during the substitution or hearing process, the district must contact the construction field coordinator, who will arrange for such assistance as appropriate.
- The hearing officer must develop a line of questioning to ensure that sufficient evidence exists on which to base a decision about the request.

3-507C (3b) During the Substitution Hearing

- Audio or video recording may be used to assist in taking notes but is not required.
- The hearing officer should allow each party sufficient time to present its position and offer a counterargument on the substitution request. List additional supporting information presented by either party in the hearing notes.

3-507C (3c) After the Substitution Hearing

- The hearing officer will issue written findings and a decision on the substitution request. As soon as possible after the hearing, send a copy of the decision to the prime contractor and the objecting subcontractor by certified mail with a return receipt.
- Send the Division of Construction's labor compliance manager a copy of the final decision.
- Require the contractor to submit a Form CEM-1201, "Subcontracting Request," for the new subcontractor.

3-507C (4) Violations of the Subletting and Subcontracting Fair Practices Act

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

- Subcontracting additional work to a listed subcontractor where the work was not originally listed as subcontracted work and is in excess of the threshold requirements.
- Using a subcontractor not listed at bid time whose dollar value of work is in excess of the threshold.
- Substituting subcontractors without Caltrans' consent.
- Performing work that the bid documents designated a subcontractor to perform.

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

- Discuss the apparent violations with the construction engineer and the district labor compliance officer.
- If the construction engineer and district labor compliance officer agree that an apparent violation has occurred, send the prime contractor a certified letter including the following:

> You are in apparent violation of the Subletting and Subcontracting Fair Practices Act, Sections 4100 through 4114 of the Public Contract Code, for work being performed on item(s) ____ of Caltrans Contract No. ____. You will be assessed a penalty of $____ as provided in Section 4111 of the Public Contract Code.
>
> If you wish to dispute this apparent violation or the assessed penalty, you must request a hearing with Caltrans. You will be given 5 days' notice of the time and place of the scheduled hearing 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 district labor compliance officer.
- If a contractor requests a hearing, schedule it using the same procedure described in Section 3-507C (3), "Hearing Process for Substitutions," of this manual.

Occasionally, the contractor will list subcontractors that the Act does not require to be listed. In this case, changes require only an updated subcontracting request to identify the new subcontractor. For the process, refer to Section 3-507D, "Procedure for Approval or Acknowledgment of Subcontractors," of this manual. If the subcontractor is a DBE, DVBE, or small business, refer to Section 8-3, "Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises," of this manual for additional requirements.

3-507C (5) Hearing Process for Substitution Violations

Section 4110 of Public Contract Code requires Caltrans to conduct a hearing for violations of the Subletting and Subcontracting Fair Practices Act. The intent of the violation hearing is to determine whether a penalty should be assessed against the prime contractor for the violations. Each party is entitled to present its arguments on the alleged violations. The hearing should follow the process outlined below.

3-507C (5a) Before the Violation Hearing

- Retain a neutral decision-maker to be the hearing officer. To keep the process as short as possible, this person would preferably be a Caltrans employee at senior transportation engineer level or above who is completely out of the chain of command for the project at issue.
- Hire a certified court reporter to transcribe the proceedings. Contact the Division of Construction labor compliance program manager for assistance with this process.
- If necessary, subpoena third parties (the subcontractor, supplier, or others). Contact the Division of Construction labor compliance program manager for assistance with this process.

3-507C (5b) During the Violation Hearing

- The resident engineer and district labor compliance officer testify under oath to the facts that led Caltrans to conclude an issue or apparent violation existed. They should be prepared to provide copies of all documents or other evidence used to reach that conclusion, for example, correspondence, diaries, or payroll records. Caltrans should provide the original documents. Conclusions drawn from the documents can be summarized verbally as testimony.
- The hearing officer will conduct direct and cross-examination of witnesses under oath.
- The hearing officer will accept any documents provided by each party and have the court reporter place them into the record as part of the certified transcript. The hearing officer will verbally verify that documents were received by noting what they are and assigning them an exhibit number.
- The hearing officer will ensure that the only issue addressed at the hearing is the violation of the Act (for example, not a DVBE violation or labor compliance issue). For violations of DBE, DVBE, or small business requirements, refer to Section 8-3, "Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises," of this manual.

3-507C (5c) After the Violation Hearing

- The hearing officer must evaluate the evidence provided at the hearing and render a decision on the alleged violation within 10 days of the hearing.
- 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 hearing officer will determine the penalty amount based on the circumstances involved. The hearing officer's finding is the final Caltrans administrative decision on the application and enforcement of the Act.
- Send the decision to the contractor and, if applicable, the subcontractor. Send a copy to the Division of Construction, which may refer the violation to the Contractors State License Board, in accordance with Section 4111 of the Subletting and Subcontracting Fair Practices Act.
- Deduct the penalty amount from the next estimate.

3-507D Procedure for Approval or Acknowledgment of Subcontractors

The resident engineer has the responsibility of approving subcontractors on federally

funded projects and acknowledging subcontractors on state-financed projects. In general, approving or acknowledging subcontractors is necessary for only first-tier subcontractors. The contractor must submit Form CEM-1201, "Subcontracting Request," to request subcontracting of contract work. When the contract is awarded, the contractor receives a blank Form CEM-1201, "Subcontracting Request." Provide additional blank forms to the contractor when necessary. The last page of the form contains instructions for completing the form.

Upon receipt of Form CEM-1201, and before approving the contractor's request, do the following:

- Check the contractor's portion of the form to confirm that the listed subcontractors and work percentages match the bid documents.
- Verify that subcontractors are not on the Department of Industrial Relation's debarred contractors list available at:

  http://www.dir.ca.gov/dlse/debar.html
- Complete lines 1 through 9.
- Verify that subcontractors comply with the DBE, DVBE, and small business goals submitted by the contractor before contract award. Ensure that no conflict exists between DBE, DVBE, and small business requirements and the listing requirements of the Act.
- If the contractor's request meets all the requirements, sign, date, and distribute the form.

Process the requests in the order of the request number since lines 2 and 6 contain running balances based on the percentage of work required. Follow the form's instructions to complete the rest of the form.

3-508 Representative

3-508 Representative

As required by Section 5-1.16, "Representative," of the *Standard Specifications*, contractors, including those in a joint venture, must name in writing one authorized representative and provide the representative's contact information. Resident engineers must insist that contractors meet this requirement promptly. If the contractor's representatives from a joint venture disagree with each other, the resident engineer can contractually refuse to work with more than one representative.

3-509 Character of Workers

3-509 Character of Workers

Caltrans policy calls for a work environment with zero tolerance for violence, threats, harassment, and intimidation. This policy also applies to any subcontractor or employee of a contractor in their work with Caltrans personnel. Caltrans may discharge a worker from the project for engaging in any of these actions. Refer to Section 5-1.17, "Character of Workers," of the *Standard Specifications* for more information.

If possible, notify the worker's supervisor and discuss the decision to remove a worker before or as soon as possible after issuing the directive. The contractor may request reinstatement of the worker. If so, the resident engineer conducts a meeting with the construction engineer, the contractor's authorized representative, and—at the contractor's discretion—the affected worker, to discuss the reason for removing the worker and the contractor's request for reinstatement.

None of these procedures affect the engineer's authority to direct the removal of a worker from the project.

3-510 Coordination with Other Entities

Section 5-1.20, "Coordination with Other Entities," of the *Standard Specifications* requires the contractor to coordinate with other contractors or entities at or near the job site and materials sources to avoid delays.

3-510A Permits, Licenses, Agreements, and Certifications

The contractor is to possess all required permits, licenses, agreements, and certifications (PLAC) before starting the work covered by them. Ensure that the contractor maintains a copy of the required PLAC at the job site.

Unless the necessary PLAC needed to enable the contractor to use a possible local material source or disposal site are included in the information handout, the contractor must obtain them at no cost to Caltrans even if the agreement made between Caltrans and the property owner is included in the information handout.

3-510B Contractor-Property Owner Agreement

If the contractor is proposing to use a noncommercial material source or disposal site, ensure the contractor has met the requirements of Sections 5-1.20A, "General," 5-1.20B, "Permits, Licenses, Agreements, and Certifications," and 6-1.03, "Local Materials," of the *Standard Specifications*.

Arrange a joint meeting with the contractor and agencies that have jurisdiction over the use of the site to discuss the work and the required documentation to be submitted. This documentation may include permits, environmental studies, grading plans, Stormwater Pollution Prevention Plan, and testing imported soil from noncommercial sources, for example, lead and pH.

Provide the contractor with a copy of the appropriate sample agreement. The contractor may use one of the sample agreements below or provide an equivalent agreement:

- Example 3-5.1, "Agreement Between a Contractor Working on State Facilities and a Real Property Owner for Acquiring Construction-Related Material from Property Owner's Property"
- Example 3-5.2, "Agreement Between a Contractor Working on State Facilities and a Real Property Owner for Disposing of Construction-Related Material on Property Owner's Property"

Review Section 7-1.02K(6)(j)(iii) of the *Standard Special Provisions* and consult with the district aerially deposited lead coordinator concerning lead level of the existing soils on site, at:

http://www.dot.ca.gov/hq/construc/environmental/

Add the following text to the Agreement when applicable:

> *Owner acknowledges the material being deposited on the property contains lead with concentrations between 80 mg/kg and 320 mg/kg, which is above the residential California human health screening level for lead as determined by the California Environmental Protection Agency. By submission of this agreement, the owner certifies 1) the property is a commercial/industrial property and 2) the property is not and will not be used for any type of housing, including but not limited to, apartment, motel, hotel, farm, ranch, or any other type of property, including but not limited to, daycare, park, school, hospital, or university, which could allow occupants to reside on the property now or in the future or would lead*

to daily, repeated, long term exposure to the material. The property is zoned as _____.

After the contractor and property owner enter into an agreement and obtain all required documentation, the contractor must submit these for approval. After review and verification of the adequacy of the contractor's submittals, provide written approval to the contractor to use the site. Refer to Examples 3-5.3 and 3-5.4 for approval letter samples.

In those cases in which Caltrans has made prior arrangements by designating a disposal or borrow site and entering into an agreement with a private property owner for disposal, removal, or excavation of material, the designated sites may be made available for contractor use as discussed in Section 7-103H, "Disposal, Staging, and Borrow Sites," of this manual. In accordance with Section 5-1.20B, "Permits, Licenses, Agreements, and Certifications," of the *Standard Specifications*, the contractor must comply with the provisions of the Caltrans-owner agreement if the contractor uses the site or the contractor may make a new agreement with the property owner.

When the contractor makes a new agreement with the property owner that revises the terms of the Caltrans-owner agreements, the new agreement supersedes the Caltrans-owner agreement. Review the new agreement to ensure that Caltrans is relieved of its obligations under the terms of the original agreement.

Under some agreements, Caltrans will directly pay the owner of the material or disposal site. Payment must be made to the owner and royalties deducted from payments to the contractor. In the case of county-consummated agreements, royalties usually are deducted in a similar way.

Before contract acceptance, Section 5-1.20B(4), "Contractor-Property Owner Agreement," of the *Standard Specifications* requires the contractor to submit a document signed by the owner of the site indicating that the contractor has satisfactorily complied with the provisions of the agreement. If the owner is not satisfied, determine what additional work is necessary before recommending acceptance of the contract and advise the contractor accordingly. Do not delay recommending acceptance of the contract if you determine that the contractor has complied with the terms of the agreement.

An agreement between the contractor and a property owner is not required for procuring local material from an established commercial source.

For the disposal of waste material in a commercial landfill or treatment facility, verify the types of wastes accepted and the permit status of the landfill or treatment facility by accessing the California Water Resources Control Board, CalRecycle, and Department of Toxic Substances Control websites:

http://www.waterboards.ca.gov/water_issues/programs/land_disposal/walist.shtml

http://www.calrecycle.ca.gov/DataCentral/Facilities.htm

http://www.dtsc.ca.gov/HazardousWaste/

Alternatively, contact the facility to obtain a copy of the facility's permit.

Example 3-5.1. Agreement Between a Contractor Working on State Facilities and a Real Property Owner for Acquiring Construction-Related Material From Property Owner's Property (1 of 2)

AGREEMENT BETWEEN A CONTRACTOR WORKING ON STATE FACILITIES AND A REAL PROPERTY OWNER FOR ACQUIRING CONSTRUCTION-RELATED MATERIAL FROM PROPERTY OWNER'S PROPERTY

Contract No.: _____

County/Route/Mile post: _____

The contractor, _____, ("Contractor") has entered into Contract No. _____ ("Contract"), with the State of California, Department of Transportation ("Department"), for work that is described as follows:

_____

_____ ("Project").

The owner, _____, ("Owner") of the real property ("Property") located at _____ (for example, address, location, county and parcel number(s), project station(s), offsets, and other property location information) agrees to allow the Contractor to remove from the Owner's Property approximately _____ cubic yards of _____ (such as soil, aggregate, asphalt grindings, or other material) ("Material") for use on the Project.

Owner agrees that the Contractor has assumed ownership of the Material once it is removed from the Property.

Contractor and Owner agree to abide by the requirements of Section 5-1.20, "Coordination with Other Entities," of the *Standard Specifications*. The *Standard Specifications* are available at:

http://www.dot.ca.gov/hq/esc/oe/standards.php

Contractor and Owner agree to obtain and furnish to the Department's engineer, all necessary permits, licenses, agreements, and clearances prior to removing Material from the Property.

By submission of this agreement to the Department's engineer, Contractor and Owner are acknowledging that they have been informed, or otherwise apprised, of all restrictions, laws and permit requirements associated with the transporting and removal of the Material from the Property and have agreed to abide by the same. These laws include but are not limited to:

- Local Ordinances—Grading permits for the grading, filling, excavation, storage, or disposal of soil or earthen material.
- California Fish and Game Code (Section 1602), "Lake or Stream Bed Alteration Agreement"—A permit required prior to the removal or placement of material in a location where it can pass into waters of the state, directly or indirectly, through causes such as erosion or maintenance.

Example 3-5.1. Agreement Between a Contractor Working on State Facilities and a Real Property Owner for Acquiring Construction-Related Material From Property Owner's Property (2 of 2)

- California Fish and Game Code (Section 5650)—A prohibition against the deposition of petroleum products (including asphalt), or any material deleterious to fish, plants, or birds where it can pass into the waters of the state.
- Federal Clean Water Act (Sections 301 and 402), "General Permit for Discharges of Storm Water Associated with Construction Activity"—A permit is required prior to soil disturbance of an area of one acre or more.
- Federal Clean Water Act (Section 404), "Permit for Discharge of Dredged or Fill Material"—A permit from the United States Army Corps of Engineers may be required for the discharge of fill material into waters of the United States including wetlands.
- State Contract Act, aggregate sources must comply with the Surface Mining and Reclamation Act of 1975 (SMARA).

Owner and Contractor agree that the Material will be excavated, removed, and transported, and the Property left in a manner that will not cause injury or harm to any person or property. If an injury or harm does occur to any person or property or should any environmental impacts or litigation arise as a result of the excavation, removal, transportation, deposition, or the final form in which the Property is left, the Contractor agrees to indemnify, defend, protect, and hold harmless the Department in any action in law or equity in accordance with Section 7-1.05, "Indemnification," of the Standard Specifications.

Pursuant to Section 5-1.20B(4),"Contractor-Property Owner Agreement," of the *Standard Specifications*, Owner acknowledges Contractor will submit this agreement to the Department as evidence that the Owner has authorized the use of the Property as a Material source for the Project. Owner acknowledges that the Contractor is not authorized to make any representations or agreements on behalf of the Department. Contractor and Owner agree that the Department is released from any and all obligations to Owner made by Contractor under this agreement and the Department is released from any and all obligations to Owner under any prior agreement made between the Department and Owner.

Owner and Contractor acknowledge that they have had the opportunity to receive independent legal advice with respect to the meaning, implications, and advisability of entering into and executing this agreement.

Date: _____ _____

(Signature of Property Owner)

Date: _____ _____

(Signature of Contractor's Authorized Representative)

Example 3-5.2. Agreement Between a Contractor Working on State Facilities and a Real Property Owner for Disposing of Construction-Related Material on Property Owner's Property (1 of 2)

AGREEMENT BETWEEN A CONTRACTOR WORKING ON STATE FACILITIES AND A REAL PROPERTY OWNER FOR DISPOSING CONSTRUCTION-RELATED MATERIAL ON PROPERTY OWNER'S PROPERTY

Contract No.: _____

County/Route/Mile post: _____

The contractor, _____, ("Contractor") has entered into Contract No. _____ ("Contract"), with the State of California, Department of Transportation ("Department"), for work that is described as follows:

_____

_____ ("Project").

The owner, _____, ("Owner") of the real property ("Property") located at_____ (for example, address, location, county and parcel number(s), project station(s), offsets, and other property location information) agrees to allow the Contractor to dispose on the Owner's Property approximately _____ cubic yards of _____ (such as soil, aggregate, asphalt grindings, or other material) ("Material") generated from the Project.

Owner agrees that the Contractor has assumed ownership from the Department of the Material that is being deposited on the Property.

Contractor and Owner agree to abide by the requirements of Section 5-1.20, "Coordination with Other Entities," of the *Standard Specifications*. The *Standard Specifications* are available at:

http://www.dot.ca.gov/hq/esc/oe/standards.php

Contractor and Owner agree to obtain and furnish to the Department's engineer, all necessary permits, licenses, agreements, and clearances prior to placing Material on the Property.

By submission of this agreement to the Department's engineer, Contractor and Owner are acknowledging that they have been informed, or otherwise apprised, of all restrictions, laws and permit requirements associated with the transporting and placement of the Material on the Property and have agreed to abide by the same. These laws include but are not limited to:

- Local Ordinances—Grading permits for the grading, filling, excavation, storage, or disposal of soil or earthen material.
- California Fish and Game Code (Section 1602), "Lake or Stream Bed Alteration Agreement"—A permit required prior to the removal or placement of material in a location where it can pass into waters of the state, directly or indirectly, through causes such as erosion or maintenance.

Example 3-5.2. Agreement Between a Contractor Working on State Facilities and a Real Property Owner for Disposing of Construction-Related Material on Property Owner's Property (2 of 2)

- California Fish and Game Code (Section 5650)—A prohibition against the deposition of petroleum products (including asphalt), or any material deleterious to fish, plants, or birds where it can pass into the waters of the state.
- Federal Clean Water Act (Sections 301 and 402), "General Permit for Discharges of Storm Water Associated with Construction Activity"—A permit is required prior to soil disturbance of an area of one acre or more.
- Federal Clean Water Act (Section 404), "Permit for Discharge of Dredged or Fill Material"—A permit from the United States Army Corps of Engineers may be required for the discharge of fill material into waters of the United States including wetlands.

Owner and Contractor agree that the Material will be transported, deposited, and left in a manner that will not cause injury or harm to any person or property. If an injury or harm does occur to any person or property or should any environmental impacts or litigation arise as a result of the excavation, removal, transportation, deposition, or the final form in which the Property is left, the Contractor, agrees to indemnify, defend, protect, and hold harmless the Department in any action in law or equity in accordance with Section 7-1.05, "Indemnification," of the *Standard Specifications* regardless of the manner or form of the action.

Pursuant to Section 5-1.20B(4),"Contractor-Property Owner Agreement," of the *Standard Specifications*, Owner acknowledges Contractor will submit this agreement to the Department as evidence that the Owner has authorized the placement of the Material on the Property. Owner acknowledges that the Contractor is not authorized to make any representations or agreements on behalf of the Department. Contractor and Owner agree that the Department is released from any and all obligations to Owner made by Contractor under this agreement and the Department is released for any and all obligations to Owner under any prior agreement made between the Department and Owner.

Owner and Contractor acknowledge that they have had the opportunity to receive independent legal advice with respect to the meaning, implications, and advisability of entering into and executing this agreement.

Date: _____ _____

(Signature of Property Owner)

Date: _____ _____

(Signature of Contractor's Authorized Representative per Std. Spec 5-1.16)

Example 3-5.3. Sample Approval to Acquire Material From Property Owner's Property Letter

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DIVISION OF CONSTRUCTION
[Resident Engineer's Address]
[City, CA ZIP]
[PHONE (Area Code) xxx-xxxx]
[FAX (Area Code) xxx-xxxx]
TTY 711
www.dot.ca.gov

Making Conservation a California Way of Life.

Date: [*Month dd, yyyy*]

[*Contractor's Name*]
[*Address*]
[*City, State ZIP*]

Subject: Approval to Acquire Material From [*property owner's name and address*]

Dear [*contractor name*]:

In accordance with the provisions of Sections 5-1.20, "Coordination With Other Entities" and 6-2.04, "Local Materials," of the *Standard Specifications*, you are authorized to remove [*insert number*] cubic yards of [*type of material*] ("Material") from [*property owner name*]'s property located at [*property address*]. According to the submitted agreement, [*contractor name*] and [*property owner*] have represented all necessary permits, licenses, and clearances were obtained and submitted before the removal of the Material and have released the Department of Transportation (Department) from any obligations resulting from its removal.

The Department does not warrant or guarantee that the Material is of any particular type or is suitable for any particular purpose.

The agreement also includes [*contractor*]'s and [*property owner*]'s promise to hold the Department harmless from all claims for injury to persons or damage to property resulting from the disposal. The contractor shall comply with all parts of the contract including Section 7-1.06, "Insurance," and 7-1.05, "Indemnification," of the *Standard Specifications*. [*Contractor name*] shall defend, indemnify, and save harmless the state from any and all claims, demands, causes of action, damages, costs, expenses, actual attorneys' fees, losses or liabilities, in law or in equity arising out or in connection with [*contractor name*]'s performance of this contract including acquiring material from [*property owner name*]'s property.

Sincerely,

[*Name of resident engineer*]

c:

bc:

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Example 3-5.4. Sample Approval for Disposal of Material Outside the Highway Right-of-Way Letter

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DIVISION OF CONSTRUCTION
[Resident Engineer's Address]
[City, CA ZIP]
[PHONE (Area Code) xxx-xxxx]
[FAX (Area Code) xxx-xxxx]
TTY 711
www.dot.ca.gov

Making Conservation a California Way of Life.

Date: [*Month dd, yyyy*]

[*Contractor's Name*]
[*Address*]
[*City, State ZIP*]

Subject: Approval for Disposal of Material Outside the Highway Right-of-Way

Dear [*contractor name*]:

In accordance with the provisions of Sections 5-1.20, "Coordination With Other Entities," of the *Standard Specifications*, you are authorized to dispose of [*insert number] cubic yards of* [*type of material*] ("Material") to [*property owner name*]'s property. According to the submitted agreement, [*contractor name*] and [*property owner*] have represented all necessary permits, licenses, and clearances were obtained and submitted before the disposal of the Material and have released the Department of Transportation (Department) from any obligations from its disposal.

The Department does not warrant or guarantee that the Material is of any particular type or is suitable for any particular purpose.

The contractor shall comply with all parts of the contract including Sections 7-1.06, "Insurance," and 7-1.05, "Indemnification," of the *Standard Specifications*. [*Contractor name*] shall defend, indemnify, and save harmless the state from any and all claims, demands, causes of action, damages, costs, expenses, actual attorneys' fees, losses or liabilities, in law or in equity arising out or in connection with [*contractor name*]'s performance of this contract including disposing material on [*property owner name*]'s property.

Sincerely,

[*Name of resident engineer*]

c:

bc:

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

3-511 Submittals

3-511 Submittals

The contract may require that plans, working drawings, or samples be submitted to the engineer for authorization. Submittals are considered either "action submittals" or "informational submittals."

Action submittals consist of written and graphic information and samples that require the engineer's response. The engineer reviews the submittals, makes corrections, or sends the submittals back to the contractor for correction.

Informational submittals consist of written information required to be provided before the affected work can start, but they do not require a response by the engineer.

Caltrans has a procedure for authorizing plan submittals for facilities that were designed by Structure Design. Resident engineers should review this procedure if the work includes such facilities. To view this procedure, refer to Section 132, "Miscellaneous Buildings," of *Bridge Construction Records and Procedures,* Vol. 2. Pumping plants and electrical and mechanical equipment use a similar procedure. Districts must establish procedures for facilities designed by the district.

In addition, the contract may require that plans and calculations be submitted to the resident engineer for review and authorization for falsework, shoring, and bridge demolition. Refer to Sections 120, 122, and 124, respectively, of the manual *Bridge Construction Records and Procedures*, Vol. 2, for guidelines for the review and approval process.

3-512 Construction Surveys

3-512 Construction Surveys

Section 5-1.26, "Construction Surveys," of the *Standard Specifications* requires Caltrans to place stakes and marks necessary to permit satisfactory completion of the work. For information on construction surveys, refer to Chapter 12, "Construction Surveys," of the *Caltrans Surveys Manual*.

The district Surveys Unit will set the construction marks and stakes when the area is ready and will start setting marks and stakes within 2 business days of receiving the request for construction stakes.

3-513 Records

3-513 Records

Section 5-1.27, "Records," of the *Standard Specifications* requires the contractor to retain project records for at least 3 years after final project payment or resolution of any claims, whichever is later.

These records must be available for inspection, copying, and auditing by state representatives, and must be segregated by work cost categories:

- Bid item work.
- Change order work that is not extra work.
- Extra work.
- Work performed under a potential claim record.
- Overhead.
- Subcontractors, suppliers, owner-operators, and professional services.

This section also requires the contractor to use the Caltrans internet change order billing system. Provide training within 30 days of a contractor's request, and help the

contractor's representative establish an account after receiving the training. Refer to Section 5-103E, "Change Order Billing," of this manual for additional information.

3-514 Noncompliant and Unauthorized Work

3-514
Noncompliant and Unauthorized Work

Section 5-1.30, "Noncompliant and Unauthorized Work," of the *Standard Specifications*, specifies the contractor's responsibility for rejected or unauthorized work and for the removal and replacement of material that does not meet specification requirements.

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

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.

Ensure the rejected material gets removed and replaced or remedied in some other manner if it is appropriate. When rejected material is remedied, it may remain in place only if the resident engineer gives written approval. In most cases, the approval requires a contractor-requested change order. For example, a change order would be necessary to approve a contractor's proposal to remedy out-of-specification aggregate base by adding more aggregate to material deposited previously. A change order is necessary in this situation because the remedy requires a change in specifications. However, the resident 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 noncompliant material to remain in place without contract payment, unless the specifications, in consideration of "operating range" and "contract compliance," or an approved change order, provide for such action.

3-515 Job Site Appearance

3-515
Job Site Appearance

Section 5-1.31, "Job Site Appearance," of the *Standard Specifications* requires the contractor to keep the job site neat and includes provisions for disposal of debris.

3-516 Areas for Use

3-516
Areas for Use

Section 5-1.32, "Areas for Use," of the *Standard Specifications* allows the contractor to occupy the highway only for purposes necessary to perform the work unless arrangements are made with Caltrans for temporary storage. The contractor has no right to make use of the property or to allow others to use 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 if the engineer approves temporary storage within the right-of-way.

Prohibit any use of a Caltrans right-of-way that conflicts with the above requirements.

If a contractor requests the use of the highway for temporary storage or for any unusual or complicated situations, discuss the request with the construction field coordinator.

The contractor may enter into a rental agreement to use state-owned property outside the right-of-way.

Also, usable property under bridges or viaducts or other property that cannot be sold as excess, but can be leased, is 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 prohibit the use, of nonoperating right-of-way by the contractor. 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 normal provisions requiring insurance and parcel protection will be enforced.

3-517 Equipment

3-517 Equipment

Section 5-1.33, "Equipment," of the *Standard Specifications*, requires each piece of equipment to have a number stamped or stenciled on it. The identifying number should further be referenced to the license plate issued for the piece of equipment. The additional reference is especially important in the case of tractor and trailer combinations where the tractor may pull different trailers on separate occasions.

Use the identifying numbers to keep records of working and idle time for both 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. 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.

Do not instruct the contractor's employees in equipment operation because the contractor may interpret suggestions as the resident 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.

3-518 Property and Facility Preservation

3-518 Property and Facility Preservation

Section 5-1.36, "Property and Facility Preservation," of the *Standard Specifications* makes the contractor responsible for protecting and preserving all property involved in the project, including underground facilities and other facilities that are not openly visible. The resident engineer must be diligent in determining and pointing out the existence of property Caltrans knows about, especially underground facilities and other facilities that are not openly visible. For information about locating and protecting underground utilities, refer to Section 3-518C, "Nonhighway Facilities," of this manual.

Ensure that the contractor does everything required under the contract to protect and preserve property. The contractor may be required to install temporary safeguards to protect existing facilities. However, the contractor's responsibility includes only what is necessary to protect against damage by construction activity.

If a facility was not sufficiently protected and it is damaged, the contractor is responsible for replacing it with material of equal or better quality.

Ensure that the contractor does not begin any excavation without first contacting the regional notification center.

3-518A Landscape

The plans and specifications may require that certain trees, shrubs, and other vegetation be preserved. Ensure that the contractor is aware of all plant life to be protected.

If any permanent protection is ordered, pay for this work as for any other ordered additional work.

3-518B Railroad Property

Ensure the contractor's operations do not interfere with railroad operations. Do not allow the contractor's operations to encroach on the railroad right-of-way unless it is specifically allowed by the contract. If work is required on or affecting the railroad right-of-way, the railroad requires a railroad flagger be present.

For any excavations on or affecting railroad property, ensure the contractor submits work plans showing the protection system to be used. The district railroad coordinator is Caltrans' liaison with the railroad and should submit the work plans to the railroad for approval. The review time for these work plans is 65 days.

3-518C Nonhighway Facilities

3-518C (1) General

In some instances, utilities will be relocated or abandoned to clear the right-of-way before construction of a highway project. A utility relocation resident engineer is assigned to coordinate and inspect utility relocation to clear the right-of-way before construction. The resident engineer assigned to a project assumes the responsibility of the utility relocation resident engineer. Make contact with all of the affected utility owners to facilitate the coordination of the work with the contractor's activities.

The district Right of Way Unit, acting through the district utility coordinator, is responsible for making changes to "notice to owner" forms and right-of-way agreements. The district Right of Way Unit must also make all decisions about financial liability between Caltrans and the owner for utility work. Send change orders involving utility work to the district utility coordinator for concurrence.

3-518C (2) Duties of the Utility Relocation Resident Engineer

The utility relocation resident engineer must perform the following duties:

- Review all documents for the utility relocation work, including the "notice to owner" forms, encroachment permits, special provisions, contract plans, and correspondence about utilities not shown on the plans.
- Check the location of proposed and existing utility installations for possible conflicts with the proposed construction of the highway project.
- Determine whether Caltrans or the utility will establish necessary survey control and establish lines and grades. If Caltrans is responsible for these items, ensure that necessary lines and grades are properly established so that relocation crews can efficiently perform 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.
- If utility relocation or abandonment is to occur before the highway project starts and there is sufficient time for entries to be made before contract advertising, submit to the district utility coordinator any changes or notices of newly

discovered facilities and enter them on the contract plans or in the special provisions. Document in the resident engineer's pending file the changes or new facilities that cannot be included in the contract before advertising.

- If utility relocation or abandonment is concurrent with the highway project, 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:
  1. Special provision requirements.
  2. The contractor's schedule as it affects relocation work, project safety, and traffic control.
  3. Potential problems.
  4. Keep records of such meetings, and confirm any decisions made 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 that 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 records for the following as complete as possible:
  1. Number of workers
  2. Equipment description
  3. Hours worked
  4. Materials salvaged
- When inspection is part-time, record all detail 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 work activities. 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 adjustments resulting from such delays. Refer to Section 3-804A (2), "Change Order Time Adjustments (Center Block)," of this manual for procedures for time extensions.
- The contractor is required to notify the resident engineer in writing of discovery of an underground facility not indicated on the plans or in the special provisions. In the absence of written notification from the contractor, document the location of the underground facility and include this documentation in a written confirmation sent to the contractor.
- Whenever the contractor has not received prior indication of an existing facility, change orders, including the repair of any damage, will be considered for approval. However, Caltrans will not pay for the repair of damage caused by negligence after the contractor was notified of the existence of a utility facility.

- Whenever underground facilities are discovered and they are not shown in the plans or the special provisions, notify the district utility coordinator. Instead of relocating the underground facility, the parties involved may reach an agreement with the utility owner about satisfactory protection of the facility before the contractor begins any physical work. If the contractor must protect the utility facility, prepare a change order to cover the payment for such work. The term "protection work," as used in contract administration, must include any work necessary to ensure the utility's service, reliability, and ability to operate at approximately the same level as before any disturbance from construction activities. 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, this protection work will not include facility repairs for damage resulting from negligent equipment operation around properly protected facilities.
- Notify the district utility coordinator immediately when a utility facility 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 work activities and time of completion. The district utility coordinator must arrange 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 required by the specifications, take into account the type of facility involved. Consider such things as the consequences of a potential accident. When 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 calculations made from plans are accurate whether the plans were prepared by Caltrans or the utility owner.

3-519 Maintenance and Protection

3-519 Maintenance and Protection

3-519A General

Section 5-1.37, "Maintenance and Protection," of the *Standard Specifications* requires the contractor to maintain and protect the work until Caltrans has granted maintenance and protection relief or has accepted the contract. This section also requires the contractor to prevent construction equipment that exceeds legal maximum weight limits from operating on completed or existing treated base, pavement, or structures.

If the highway in question is a state highway, Caltrans' maintenance forces will maintain the part of the existing highway outside of the limits necessary to construct the bid item work. If the highway in question (or highway part) is under the control of a local authority, either the local authority or Caltrans maintenance forces will maintain the part of the existing highway outside the limits necessary to construct the bid item work in accordance with the maintenance agreement between Caltrans and the local authority.

The maintenance area supervisor or area superintendent, and the resident engineer must have a clear understanding of which portions of the highway Caltrans maintenance

forces will continue to maintain during the project's construction. The following guidelines should be used when discussing roadway maintenance:

- If new work is required on 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 bid item work. The owner will resume maintaining the highway or portions of it when the contractor is relieved from maintenance responsibility under Section 5-1.38, "Maintenance and Protection Relief," of the *Standard Specifications*.
- Often, on widening or improvement projects, existing highway facilities will be located outside the areas of work where no alterations, modifications, or replacements are planned. In these cases, except for repair of damage because of the contractor's operations, the owner will maintain the highway facility. If the new work consists of widening the existing highway's pavement or roadbed and the contractor's operations are restricted to a portion of the width of the roadway, the owner will continue maintaining the balance of the width.
- If damage caused by the public occurs to an existing facility within the construction limits and the work required to repair the damage is similar to the work being done by the contractor, the contractor may do the repairs.
- In case of emergency conditions within construction limits, the maintenance area supervisor and the resident engineer should determine how to address the condition quickly and safely.
- Pay as extra work any work done by the contractor to maintain and repair damage to existing facilities (except for damage the contractor caused).

3-519B Load Limits

Except for special conditions described in Section 5-1.37, "Maintenance and Protection," of the *Standard Specifications*, all equipment hauling material over roads or streets open to public traffic to, from, or within the project must comply with weight limitations required by the Vehicle Code Division 15. If the contractor wishes to move equipment that exceeds the size or weight limits, the contractor must provide necessary protective measures and repair any damage resulting from those overloads.

Refer to the *Bridge Construction Records and Procedures* manual when the contractor requests moving or placing overloads on structures.

To enforce weight limitations for overloads hauled over public roads and streets, follow the procedure outlined below:

- Ensure contractors do not place or move equipment that exceeds the weight limits on or across a structure without written authorization.
- Coordinate with the project's structure representative on the review of all submittals requesting authorization to place on, or cross a structure with equipment that exceeds the weight limits. If a structure representative has not been assigned, coordinate the review through the bridge construction engineer. Structure Construction personnel will review the overload proposal in accordance with *Bridge Construction Records and Procedures* manual, Bridge Construction Memo 150-1.0, "Weight Overload Guidelines for Bridges on Construction Projects." After written authorization is provided, coordinate with the structures representative (or bridge construction engineer) to ensure the contractor's plan to

move the overload on or across the structure is implemented in accordance with the authorized plan.

- Recognize that the most commonly used material transfer vehicles have axle loadings double the legal limit when empty, and triple the legal limit when loaded. When the contract requires the use of transfer vehicles or other types of heavy paving equipment, or the contractor at their option has determined they will use a material transfer vehicle, discuss at the prepaving and preconstruction conferences the contractor's plans to conform to the load limitation requirements.
- The assistant resident engineer receiving a weighmaster certificate indicating an overload may accept a load that is not more than 200 pounds 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 California Highway Patrol.
- When a weighmaster certificate indicates that a load is more than 200 pounds over the legal gross weight, reject the load and notify the California Highway Patrol that overloads are being hauled.
- Prohibit rejected material from being used in the work unless the load is reduced and is again weighed to ensure the legal gross vehicle weight.
- Record the identification of rejected weighmaster certificates in the daily report.

3-519C Damage by Public Traffic

Only in some cases will Caltrans pay to repair damage to completed permanent facilities caused by public traffic. Completed permanent facilities are any features constructed by the contractor that will become a permanent part of the project. Unless specifically provided for, 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 example, 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.

Following are guidelines for determining payment for damage by public traffic:

- 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 traffic is placed on 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 or shown order of work, it must be covered by a change order approved by headquarters, in accordance with Section 5-3, "Change Orders," of this manual. If Caltrans will not compensate the contractor for damage to completed permanent facilities, the change order must state this fact.

    2. When the opening does not conform to the specified or shown order of work, the resident engineer will normally base approval or disapproval of the change order on an evaluation of the benefit to public traffic. If the benefit is substantial, it is appropriate to approve the change order and compensation in accordance with Sections 5-1.38, "Maintenance and Protection Relief," 5-1.39, "Damage Repair and Restoration," and 7-1.03, "Public Convenience," of the *Standard Specifications*. If measurable benefits accrue to the contractor, ensure the change order provides a credit to Caltrans.

    3. If the benefits to public traffic are borderline or negligible, it is appropriate to approve the 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 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 5-1.38, "Maintenance and Protection Relief," 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 contract 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 the plans or special provisions require public traffic to be temporarily placed on the shoulder to facilitate construction.

3-520 Maintenance and Protection Relief

3-520 Maintenance and Protection Relief

The contractor may be relieved from maintaining and protecting certain completed portions or sections of the work under conditions specified in Section 5-1.38, "Maintenance and Protection Relief," of the *Standard Specifications*.

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

For completed roadways, the specified length of 0.3 miles is the minimum practical length of completed main roadway on which to recommend relief from maintenance and protection. However, shorter units of completed work, such as on-ramps, off-

ramps, frontage roads, or approaches to under-crossings and overcrossings, may also be eligible for maintenance and protection relief.

Do not recommend relief from maintenance and protection on a 0.3-mile section with exceptions within that length unless you provide a valid reason to support the recommendation. Exceptions must be defined in terms of longitudinal sections of highway or certain specified areas. For example, it is unacceptable to recommend maintenance and protection relief for a total project except for the inlet ditch to the right of stations 20+00 to 25+00. It is acceptable to recommend relief for the total project except for stations 15+00 to 27+00 (the section of highway that could be affected by the uncompleted ditch to the right of stations 20+00 to 25+00).

Completed bridges or other major structures may also receive maintenance and protection relief. For purposes of relief from maintenance and protection, the following describes what constitutes a "bridge or other major structure:"

- Section 1-1.07, "Definitions," of the *Standard Specification*s indicates a structure will be considered a bridge if the plans or other portions of the contract so identify it.
- Other structures to be considered of major importance are culverts in excess of 6.5 feet 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 all of the bid items (including mobilization).
- Projects with noncontiguous locations may be accepted location by location, provided the work at each requested location is complete. Noncontiguous areas of work outside the right-of-way on major projects may also be accepted if the procedures outlined in Section 3-523C, "Work for Other Agencies or Owners," of this manual have been followed.

Maintenance and protection relief excuses the contractor from responsibility for repair of damage from causes other than those resulting from the contractor's own operations or from the contractor's negligence. Before recommending a request for maintenance and protection relief, determine that the requested work will not be damaged as a result of incomplete adjoining work. For example, 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 maintenance and protection relief, analyze each situation critically to determine if it qualifies in all respects. Indiscriminate recommendations for relief from maintenance and protection must not jeopardize the project's proper completion. 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 the engineer has any doubts about the requested area's eligibility, deny the contractor's request for relief from maintenance and protection. Inform the contractor in writing so no doubt exists as to the status of the contractor's request and the nature of uncompleted work. Section 5-1.38, "Maintenance and Protection Relief," of the *Standard Specifications* states that the portion of work must have been completed under the contract and to the engineer's satisfaction before it becomes eligible for maintenance and protection relief.

For landscape projects, the contract usually includes a special provision to allow granting relief from maintenance and protection for items not directly connected with plant establishment work or highway planting and irrigation systems. The special provisions could grant relief from maintenance and protection for typical items of work, such as asphalt concrete placed as island paving or sidewalks and seal coats placed on islands, curbs, and fences. Such items may not have a direct bearing on the success or failure of plant establishment, and it is unreasonable to require the contractor to maintain them.

However, to be consistent with the policy for nonlandscape contracts, this type of relief from maintenance and responsibility will be granted for an entire group of items, not item by item. An item that protects the planting or is involved in plant establishment should not be submitted for maintenance and protection relief. This category typically includes planter boxes, sprinkler systems, header boards, or mesh.

Safety roadside rest areas will not be accepted item by item but may be recommended as completed units.

Maintenance and protection relief denotes recognition of completed work. Therefore, the resident engineer must conduct a maintenance review of areas that will be granted maintenance and protection relief. Also, recommendations for this action on work for other public agencies or owners require the concurrence of these agencies and owners. Before recommending relief from maintenance and protection on such portions of the work, complete the procedures outlined in Section 3-523C, "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 justification for relief.

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

3-521 Requests for Information and Potential Claim Records

3-521 Requests for Information and Potential Claim Records

3-521A General

During the course of the project, and up to receiving the proposed final estimate, the contractor must submit a contract dispute or protest in the form of a request for information. If the request for information leads to a dispute, the contractor must follow the three-part potential claim process specified in the contract. The three parts of the potential claim process are the initial potential claim record, the supplemental potential claim record, and the full and final potential claim record.

Ensure that on all potential claims-related documents, the date and time of receipt, and the name of the person who received it are noted.

Ensure that the request for information and potential claim documents are complete and timely. If the information is incomplete, notify the contractor of the deficiencies and request that the contractor resubmit the document with the complete information. If the contractor failed to submit the request for information or potential claim record within the specified time, notify the contractor that the submittal was not timely and state that this failure to comply with the procedure provided for in the contract is a waiver of the potential claim, a waiver of the right to a corresponding claim for the disputed work, and a bar to arbitration.

Some sample dispute response clauses are located in Section 3-521E, "Sample Dispute Response Clauses," of this manual.

3-521B Requests for Information

The contractor may submit a request for information at any time to clarify contract provisions, notify the resident engineer of a change in condition, or file a protest. The request for information must be in writing and delivered to the resident engineer (in person, by mail, or by email) by the contractor.

Using a request for information, the contractor may protest an approved change order not executed by the contractor, compensation for work specified in the change order, adjustment of contract time, Weekly Statement of Working Days, progress payment, delays, liquidated damages, or any decision by the resident engineer.

Note that not all requests for information will result in a potential claim.

Upon receipt of a request for information used as a protest, however, the resident engineer starts a section in Category 62, "Disputes," of the project records. Additional information, including related documents and correspondence will be included in this section.

The resident engineer references the contractor's request for information and must respond in writing within the time specified in the contract. A response should include acknowledgement that the request for information was received and may include the information requested, an invitation for further discussion, a request for clarification, or the anticipated date for a complete response.

3-521C Potential Claim Records

The contractor submits a written potential claim record when the contractor believes additional compensation is due in accordance with Section 5-1.43, "Potential Claims and Dispute Resolution," of the *Standard Specifications*. Follow the potential claim record process when protested issues and disputes are not resolved.

The contractor provides a unique identification number for each potential claim submitted. For supplemental potential claim records and full and final potential claim records, the contractor must certify each form with reference to the False Claims Act, Government Code Section 12650–12655.

If a supplemental potential claim record or a full and final potential claim record is received without this certification or is otherwise incomplete or incorrectly filled out, notify the contractor in writing that it was not submitted in accordance with Section 5-1.43, "Potential Claims and Dispute Resolution," of *the Standard Specifications* and that the contractor is allowed 15 days to correct the deficiencies or withdraw the potential claim. If the corrected record is not provided in the required time, notify the contractor in writing that Caltrans will not consider the potential claim. Discuss this latter notification with the construction engineer.

If the nature, circumstances, or basis of the claim differs from the prior potential claim record, reject the record and return it with a letter indicating which component has changed.

3-521C (1) Form CEM-6201D, Initial Potential Claim Record

The initial potential claim record provides a notification to Caltrans of a disputed issue. This record provides the nature and circumstances of the dispute and gives the parties the opportunity to mitigate the associated costs with the goal of an early resolution.

When the contractor's initial potential claim record is not timely, Caltrans may be

disadvantaged by limiting available corrective actions. The timeliness of the original initial potential claim record is one of the many considerations in evaluating a contractor's protest, especially when quantifying the contractor's damages and compensation requests.

3-521C (1a) Resident Engineer's Response to the Initial Potential Claim Record

The resident engineer's response to the initial potential claim record acknowledges the dispute, directs the contractor on how to proceed with the disputed issue, and informs the contractor of the contractual time requirements to submit the supplemental and full and final potential claim record.

The resident engineer must determine if the contractor's dispute has merit. If the dispute does have merit, the resident engineer must take appropriate action 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.

3-521C (2) Form CEM-6201E, Supplemental Potential Claim Record

The supplemental potential claim record provides justification for additional compensation and adjustments with references to the appropriate provisions of the contract. The record must also include the estimated costs and impacts to the schedule. The contractor must update the cost estimate or the impact to the schedule as soon as a change is recognized.

Upon receipt of Form CEM-6201E, "Supplemental Potential Claim Record," analyze the contractor's potential claim. This may involve discussing the potential claim with peers, subject matter experts, and district management.

Potential claims involving differing site conditions that lack merit must also include an internal review by a management review committee as referenced in Section 3-404, "Differing Site Conditions," of this manual.

3-521C (2a) Resident Engineer's Response to the Supplemental Potential Claim Record

Ensure the supplemental potential claim record is timely and is submitted on Form CEM-6201E, "Supplemental Potential Claim Record."

Once you receive a complete potential claim record submittal, evaluate it and provide a detailed response letter to the contractor within the time specified in the contract. The response letter must include the following sections:

- Background—Explain the circumstances that led to the dispute. Include only information such as events, dates, discussions, meetings, memos, and letters.
- Contractor's Position—Base the position on the information provided in the contractor's supplemental potential claim record. Use direct quotes from the information provided by the contractor without attempting to interpret or clarify them.
- Resident Engineer's Position—State the merits of the potential claim clearly and concisely. Fully document the contract requirements such as permits, plans, specifications, and other requirements supporting the findings.
- If the potential claim is determined to have no merit, remind the contractor of the

option to further pursue the potential claim as specified in the contract. Inform the contractor of the contractual time requirements for the alternative dispute resolution procedures and for submitting the full and final potential claim record.

When properly prepared, the response letter serves as the basis for the preliminary construction claim findings.

Follow the guidelines in Section 3-521D, "Documentation Guidelines for Disputes," later in this section.

3-521C (3) Form CEM-6201F, Full and Final Potential Claim Record

Upon receipt of Form CEM-6201F, "Full and Final Potential Claim Record," evaluate it and respond within the time specified in the contract. Do not respond to the contractor if the full and final potential claim record is submitted after contract acceptance. Review and consider the information before processing the proposed final estimate.

3-521C (3a) Resident Engineer's Response to the Full and Final Potential Claim Record

The requirements and format for the resident engineer's response to the full and final potential claim record are the same as outlined in Section 3-521C (2a), "Resident Engineer's Response to the Supplemental Potential Claim Record." Refer also to Section 3-521D, "Documentation Guidelines for Disputes," later in this section.

3-521D Documentation Guidelines for Disputes

The following are guidelines for keeping records and responding to requests for information and potential claim records:

- Ensure that reports and documents are factual and accurate. 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 about the effect of a conversation is not helpful; a statement of the conversation is better.
- Answer letters containing questionable or erroneous statements made by the contractor in writing by refuting or correcting the contractor's statement.
- Put orders and decisions in writing. Confirm any important statement about the unacceptability of the work in writing. Before ordering the contractor to proceed with extra or additional work, obtain approval. If the contractor verbally informs you of a dispute, advise the contractor to comply with the applicable requirements of the *Standard Specifications*. Include this verbal discussion in the resident engineer's daily report.
- Identify the issue and try to come to agreement with the contractor on a brief description of the dispute. Identify areas of agreement and disagreement within the issue. This will help to minimize the peripheral items that could cloud the dispute.
- The engineer's response to the contractor's supplemental potential claim record will serve as the basis for the Caltrans position paper in alternative dispute resolution proceedings.
- Focus on costs specific to the dispute, but do not discuss any funding availability, such as project 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 involved.
- Take preconstruction and project progress photographs. Photographs and videos are valuable in confirming job conditions at a particular point in time. Dated pictures of areas where work is not underway may be as important as pictures of construction operations or completed work.
- Record the full names of all of the contractor's personnel involved in any dispute. These individuals may need to be located later. Information such as full names and addresses of the contractor's personnel are contained in the certified payrolls.
- Record equipment information such as description, model number, contractor's equipment number, size, and capacity to help calculate and confirm costs associated with disputes.

Category 62, "Disputes," of the project records must contain copies of all documents related to every dispute on the project including progress schedules. This information provides the basis for preparing the preliminary construction claim findings. Follow the procedures outlined in Section 5-102, "Organization of Project Documents," of this manual to provide a good basis for documenting claims.

3-521E Sample Dispute Response Clauses

Use the following sample clauses in responses to requests for information and potential claim records. Edit the clauses to fit the specific situation.

3-521E (1) Request for Information for Notification of a Possible Differing Site Condition

3-521E (1a) General

"I have received your request for information dated [*insert date*] providing notification of a possible differing site condition encountered at [*give location*]. It is my understanding that you believe the material encountered differs materially from that shown on the plans or is considered to be of an unusual nature . . ."

3-521E (1b) If No Merit

"I have investigated the material and the 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 extension of contract time is warranted to complete the work.

"If you still believe a differing site condition exists, follow the procedures and processes described in Sections 5-1.42, 'Requests for Information,' and 5-1.43, 'Potential Claims and Dispute Resolution,' of the *Standard Specifications*."

3-521E (1c) If Merit

"I have investigated the material and the contract documents [*specify which documents*], and have found that the material does vary from that shown on the contract documents. Therefore, additional cost or extension of contract time may be 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."

3-521E (1d) If Partial Merit

"I have investigated the material and the contract documents [*specify which documents*], and have found that the material from [*specify locations/stations*] does not vary from that shown on the contract documents and the material from [*specify locations/stations*] does vary from that shown on the contract documents. Therefore, additional cost or extension of contract time may be warranted to complete the work from [*specify locations/stations*].

"Please furnish me with the additional costs for the work from [*specify locations/stations*] that may result from the increased work as a result of this differing site condition."

3-521E (2) Requests for Information to Protest a Time Adjustment Determination in a Change Order

Use the following clauses in your response to a protest of time determination in a change order:

3-521E (2a) General

"I have received your request for information dated [*insert date*] to protest the time adjustment under Change Order No. [*x*]. I understand that you are protesting the determination of [*y*] working days time extension for this change and you believe you are entitled to [*z*] working days time extension."

3-521E (2b) If No Merit

"My review of Change Order No. [*x*], anticipated work, and the progress schedule indicates that the work required by the change order does not impact the controlling operation [*if a critical path method (CPM) review was performed substitute "critical path" for "controlling operation"*]. Therefore, you are not entitled to an extension of contract time.

"If you still believe that a time extension is warranted, please provide documentation to support your position, either in narrative form or an analysis showing the impact of this work on the completion date of the project. Continue to follow the procedures and processes described in Sections 5-1.42, 'Requests for Information,' and 5-1.43, 'Potential Claims and Dispute Resolution,' of the *Standard Specifications*."

3-521E (2c) If Merit

"My review of Change Order No. [*x*], anticipated work, and the progress schedule indicates that the work required by the change order impacts the controlling operation [*if a CPM review was performed, substitute "critical path" for "controlling operation"*]. I have determined a time extension of [*y*] days associated with the work.

"Change Order No. [*x*] will be revised to reflect this adjustment of contract time. Please review and sign the revised change order if you agree with the change."

3-521E (2d) If Partial Merit

"My review of Change Order No. [*x*], anticipated work, and the progress schedule indicates that the work required by the change order does not alter the controlling operation [*if a CPM review was performed substitute "critical path" for "controlling operation"*] as you have indicated. My review indicates that the timeline for the controlling operation [*if a CPM review was performed substitute "critical path" for "controlling operation"*] was lengthened by [*no. of days or dates*]. Therefore, you are

entitled to an extension of contract time by [*y*] days. Change Order No. [*x*] will be issued to provide an adjustment of contract time for [*no. of days or dates*].

"If you still believe that an additional time extension is warranted, please provide documentation to support your position, either in narrative form or an analysis showing the effect of this work on the completion date of the project. Continue to follow the procedures and processes described in Sections 5-1.42, 'Requests for Information,' and 5-1.43, 'Potential Claims and Dispute Resolution,' of the *Standard Specifications*."

3-521E (3) Requests for Information to Protest a Weekly Statement of Working Days

Use the following clauses in your response to a request for information to protest the determination of contract time in a Weekly Statement of Working Days:

3-521E (3a) General

"I have received your request for information dated [*insert date*], to protest the Weekly Statement of Working Days No. [*x*]. It is my understanding that you are protesting the charging of [*specify day or days protested*] as a working day because [*specify the contractor's reasons for protesting the days in question*]."

3-521E (3b) If No Merit

"The Weekly Statement of Working Days was completed in accordance with Section 8-1.05, 'Time,' of the *Standard Specifications*. Our records indicate that you were working on the controlling operation more than 50 percent of the scheduled work shift in question. This constitutes a working day as defined in Section 1-1.07, 'Definitions,' of the *Standard Specifications*. If you believe that the day(s) in question should be considered nonworking days, please submit documentation in support of your protest. In the absence of such documentation, the Weekly Statement of Working Days No. [*x*] will remain unchanged.

"If you decide to pursue this as a potential claim, follow the procedures and processes described in Sections 5-1.42, 'Requests for Information,' and 5-1.43, 'Potential Claims and Dispute Resolution,' of the *Standard Specifications*."

3-521E (3c) If Merit

"I have reviewed the project records and have determined that [*insert date*] should be revised to indicate a nonworking day. Attached is the revised weekly statement of working days no. [*x*]."

3-521E (3d) If Partial Merit

"Our records indicate that you were working on the controlling operation for the entire day on [*insert date(s)*] but not on [*insert date(s)*]. [*insert date(s)*] should be revised to indicate a nonworking day. Attached is the revised Weekly Statement of Working Days No. [*x*].

"The Weekly Statement of Working Days was completed in accordance with Section 8-1.05, 'Time.' of the *Standard Specifications.* Our records indicate that you were working on the controlling operation more than 50 percent of the scheduled work shift in question. This constitutes a working day as defined in Section 1-1.07, 'Definitions,' of the *Standard Specifications*. If you believe that the day(s) in question should be considered nonworking days, please submit documentation in support of your protest. In the absence of such documentation, the revised Weekly Statement of Working Days

No. [*x*] will remain unchanged.

"If you decide to pursue this as a potential claim, follow the procedures and processes described in Sections 5-1.42, 'Requests for Information,' and 5-1.43, 'Potential Claims and Dispute Resolution,' of the *Standard Specifications*."

3-521E (4) Potential Claim Record

Use the detailed format and response guidelines in Section 3-521C, "Potential Claim Records," of this manual in conjunction with the following clauses to respond to a potential claim record. Also, refer to Section 3-521C (1a), "Resident Engineer's Response to the Initial Potential Claim Record," 3-521C (2a), "Resident Engineer's Response to the Supplemental Potential Claim Record," and 3-521C (3a), "Resident Engineer's Response to the Full and Final Potential Claim Record," of this manual.

3-521E (4a) General

"I have received your [*state initial, supplemental, or full and final*] potential claim record dated [*insert date*], regarding [*state the issue*]. It is my understanding that this potential claim is the result of a dispute over [*state the dispute and give background of the dispute*].

"I understand your position to be [*quote the contractor's position as described in the potential claim record*]."

3-521E (4b) If No Merit

"I have reviewed your [*state initial, supplemental, or full and final*] potential claim and based on the information you provided I find that it has no merit. [*Explain why in detail.*]

"If you decide to pursue this as a potential claim, follow the procedures and processes described in Sections 5-1.42, 'Requests for Information,' and 5-1.43, 'Potential Claims and Dispute Resolution,' of the *Standard Specifications*."

3-521E (4c) If Merit

"I have reviewed your [*state initial, supplemental, or full and final*] potential claim and based on the information you provided I find that it has merit. [*Explain why.*] Change Order No. [*x*] will be issued to address the points that have merit. Please provide me with the cost associated with your notice of potential claim for review and determination of compensation."

3-521E (4d) If Partial Merit

"I have reviewed your [*state initial, supplemental, or full and final*] potential claim and based on the information you provided I find that the following points have merit: [*List points and explain why in detail.*] The following points do not: [*List points and explain why in detail.*]

"If you decide to pursue this as a potential claim, follow the procedures and processes described in Sections 5-1.42, 'Requests for Information,' and 5-1.43, 'Potential Claims and Dispute Resolution,' of the *Standard Specifications*. Change Order No. [*x*] will be issued to address the points that have merit. Please provide me with the cost associated with your notice of potential claim for review and determination of compensation."

3-521E (4e) Request Additional Information

"I have reviewed your [*state initial, supplemental, or full and final*] potential claim

record [*or request for information*]; however, 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."

3-522 Alternative Dispute Resolution Processes

3-522 Alternative Dispute Resolution Processes

Alternative dispute resolution helps resolve disputes and potential claims, mitigate damages, and maintain project schedules.

The alternative dispute resolution processes are partnering, dispute resolution ladders, (DRL), dispute resolution advisors (DRA), and dispute resolution boards (DRB). Their use is based on the size and duration of the contract. Refer to the special provisions and Sections 5-1.09, "Partnering," and 5-1.43E, "Alternative Dispute Resolution," of the *Standard Specifications* to determine which alternative dispute resolution process is appropriate for the contract.

In order for the alternative dispute resolution processes to be most effective, they must be set up and used in accordance with the applicable provisions. Set up partnering, the DRL, the DRA, or the DRB as quickly as possible within the time specified to avoid putting timely referral and resolution of a dispute in jeopardy.

3-522A Partnering-Facilitated Dispute Resolution

As one of the alternative dispute resolution processes, partnering is used to develop and maintain trust and collaboration among project team members. Using partnering best practices makes it more likely that the project team will jointly resolve project issues and prevent them from becoming disputes. Refer to Section 5-1.09, "Partnering," of the *Standard Specifications* and Section 3-504, "Partnering," of this manual for further guidance.

If facilitated dispute resolution is included in the partnering charter for the project and the project team is no longer having a productive dialogue regarding a dispute, discuss with the contractor the use of facilitated dispute resolution as a way to reestablish productive dialogue and obtain a better understanding of the dispute. Schedule facilitated dispute resolution within the timelines provided in Section 5-1.43E(3)(e), "DRB Traditional Dispute Meeting," of the *Standard Specifications.* Partnering-facilitated dispute resolution is not a substitute for any other contract requirement or administrative claims procedure or provision. Refer to Chapter 7, "Resolving Disputes," of the *Field Guide to Partnering on Caltrans Construction Projects* for further direction and guidance.

3-522B Dispute Resolution Ladder

Projects with bids less than $3 million may use the partnering dispute resolution ladder (DRL). The optional DRL process will be included in the special provisions or can be added with a no cost change order.

The DRL is an optional part of the alternative dispute resolution process. If used, the DRL runs concurrently with requests for information and potential claim records. It is not a substitute for any other contract requirement or administrative claims procedure or provision.

3-522B (1) Dispute Resolution Ladder—Establishment

- At the preconstruction conference, kickoff partnering workshop, or any time before contract acceptance, the resident engineer offers the contractor the option of using a DRL as an alternative dispute resolution process. When accepted by the

contractor, the resident engineer should document the DRL by filling out Form CEM-6208, "Dispute Resolution Ladder Establishment," which lists the names, titles, and contact information for Caltrans and contractor personnel. Caltrans' dispute resolution ladder, in ascending order, is as follows:

- Field Level—Inspector
- Level 1—Resident Engineer
- Level 2—Construction Engineer
- Level 3—Construction Manager, Office Chief, or Deputy District Director of Construction, as designated by the Deputy District Director of Construction.

The resident engineer and the contractor's representative may use Form CEM-6209, "Elevation of a Dispute," to define the dispute before elevating it.

The resident engineer does not pay the contractor's costs for participating in the DRL process.

3-522B (2) Dispute Resolution Ladder—Operation

A dispute will be advanced up the ladder when an agreement between the parties on a defined level cannot be reached within the time specified. A dispute can be elevated sooner if both representatives on the defined level agree and the representatives at the next higher level concur.

3-522C Dispute Resolution Advisor and Dispute Resolution Board

A DRA and a DRB are used on projects with at least 100 working days. A DRA is an experienced neutral party that Caltrans and its contractor use to help resolve disputes on contracts with a total bid of $3 million to $10 million. A DRB is a three-member board of knowledgeable neutral parties that Caltrans and the contractor use to resolve disputes on contracts with a total bid of more than $10 million.

Use of a DRA or DRB allows knowledgeable and experienced board members who are not directly involved with the contract an opportunity to review and analyze a dispute and provide their recommendations. Although these recommendations are not binding, they are valuable in helping to resolve disputes before disputes become claims. These recommendations become important if the dispute is carried over to arbitration.

Disputes are documented in a Potential Claim Record. They must be referred to the DRA or DRB, and a dispute meeting must be held within the timelines specified. Generally, it is not in Caltrans' best interest to wait to have a dispute heard. Rarely do disputes get smaller as time passes. Furthermore, memories fade with time, and project personnel often move on. Adhering to the timelines is key to resolving disputes as quickly and as fairly as possible. For DRA and DRB submittal requirements and traditional dispute meeting timelines, refer to:

http://www.dot.ca.gov/hq/construc/dispute_resolution/drainfo.htm

http://www.dot.ca.gov/hq/construc/dispute_resolution/drbinfo.htm

If a contractor is not adhering to the specified timelines for referring a dispute to the DRA or DRB, remind the contractor, in writing, of the contractual requirement to do so. If a contractor indicates that they wish to defer having the dispute meeting, a new date can be arranged if the resident engineer agrees to the request. If not, remind the

contractor of the contractual requirements regarding the timelines for having a dispute meeting.

The Division of Construction's alternative dispute resolution (ADR) engineer maintains the DRA and DRB websites and a list of prequalified member candidates.

3-522C (1) Establishment

When contractually required, the parties establish and use the DRA or DRB as part of the administrative dispute resolution and potential claims process. Early establishment of the DRA and DRB is important for resolving disputes as they occur. Delays may affect the ability of the DRA or DRB to accurately analyze disputes without a baseline reference.

Use the following procedure to select the best candidates from the prequalified lists. Links to the lists can be found under "Dispute Resolution" at the Division of Construction's internet website.

1. Review the list of names and associated summaries of experience to find the most qualified candidates for the particular project.
2. Select a candidate with the knowledge and work history that best match the type of project.
3. Select a candidate with dispute resolution experience in the areas with the largest potential for dispute.
4. Contact the Division of Construction field coordinator and ADR engineer for guidance and additional information about the prospective candidates.
5. Contact the candidates, provide them with the project information, and determine their desire and availability to serve. If a candidate is willing and available to serve, request a disclosure statement with an updated résumé.

The Division of Construction field coordinator must approve the candidates nominated by Caltrans and the third DRB candidate. The division field coordinator must also approve candidates not on the Caltrans prequalified list.

Nominating a DRA or DRB candidate not on the prequalified list requires that the candidate has completed training by the Dispute Resolution Board Foundation. In addition, the candidate needs to have a minimum of 10 years of experience in or directly related to public works, heavy-highway construction projects with, or on behalf of, federal, state (particularly Caltrans), or local government agencies. The experience must be any combination of the following:

1. Supervisor, manager, or executive in public-works heavy-highway construction contracts with emphasis in resolving disputes arising out of those contracts.
2. Attorney representing parties in litigating or arbitrating public-works, heavy-highway construction contract claims.
3. Judge or arbitrator adjudicating or otherwise resolving public-works, heavy-highway construction contract claims.

Require the candidate to submit a candidate application and send the application to the ADR engineer who processes it. A link to the application can be found at the Division of Construction website. If the candidate is approved and agrees, the candidate is added to the prequalified list by the ADR engineer.

Submit the names, disclosure statements, and résumés of the dispute resolution candidates to the contractor at the preconstruction conference, and ask the contractor to do the same. Jointly with the contractor, review the disclosure statements and résumés of the potential DRA or DRB candidates for qualifications and possible conflicts of interest. Jointly select the most qualified candidates as the DRA or DRB members in accordance with the specifications.

Upon selection, promptly notify the DRA or DRB member in writing, with a courtesy copy to the contractor. Notify the candidates not selected that they are no longer under consideration for the project.

For the DRA, complete Form CEM-6206, "Dispute Resolution Advisor Establishment Report," and send it to the ADR engineer. For the DRB, require the first two approved members to nominate the third member and provide the appropriate documentation for the third member's approval. Once there is approval of all three members, complete Form CEM 6202, "Dispute Resolution Board Establishment Report," and send it to the ADR engineer.

Sign the DRA or DRB agreement as soon as you have established the members. Links to the *Dispute Resolution Advisor Agreement* and the *Dispute Resolution Board Agreement* are on the Division of Construction website.

3-522C (2) DRA or DRB Member Replacement

With 15 days' notice, a DRA or DRB member may be replaced, or the member may voluntarily resign. Caltrans or the contractor may terminate the service of a member who fails to comply fully with all required employment and financial disclosure conditions of the DRA or DRB membership.

If Caltrans wants to replace the DRA or Caltrans-nominated DRB member, the resident engineer discusses the proposal with district management. If district management concurs, the district submits its recommendation to the Division of Construction's field coordinator for approval before notifying the advisor or board member and the contractor.

When the need arises, a replacement member is nominated and approved using the appropriate contractual selection process. In the case of a board member, if the previous member was the chairperson, the new board must agree on a new chairperson. In the case of an impasse, the two original DRB members may select the chairperson by blind draw. Caltrans, the contractor, and the DRA or DRB members sign a revised agreement. The replacement process begins immediately upon receiving a notice of termination and is completed within 15 days.

3-522C (3) Operation

Alternative dispute resolution is for the benefit of both parties to the contract, so either party may refer a dispute to the DRA or DRB.

As a complement to the agreement, the DRA or DRB chairperson may produce operating procedures with details for conducting meetings. Work with the DRA or DRB and the contractor to reach an equitable agreement on the meeting process for the individual project circumstances. Ensure that the operating procedures comply with all the contract requirements and the DRA or DRB agreement before approving them.

For projects with federal funding, notify the Federal Highway Administration (FHWA) representative when an issue is referred to the DRA or DRB. Coordinate with the

FHWA representative on full-oversight projects to ensure the agency's participation in any related change order. Give the FHWA representative the date of dispute resolution meetings, information regarding the dispute, and the DRA's or DRB's recommendation.

3-522C (3a) Informal Dispute Meetings

The informal meeting is meant for small, uncomplicated disputes. The informal meeting is optional and is meant to reduce the duration and effort needed to hear a dispute. All parties must agree that the informal process is appropriate for resolving the dispute. The informal dispute process parallels the traditional process.

Typically, very little documentation is provided at an informal dispute meeting. The parties generally just tell their story to the DRA or DRB members and await the recommendation, which should come the same day as the meeting. Use of the informal process must not delay the hearing of a dispute using the traditional process.

3-522C (3b) Traditional Dispute Meetings

The traditional dispute meeting must be used for more complex issues or those issues that were not resolved informally. A traditional dispute meeting is mandatory if the contractor wishes to pursue the dispute.

The contractual time period for submitting the position paper and having a dispute meeting is in the specifications and agreements. Remind the contractor of the contractual time period for referring disputes to the DRA or DRB when responding to the supplemental potential claim record.

When a dispute is referred to a DRA or DRB, prepare the position paper for submittal to the contractor and the DRA or DRB in advance of the oral presentation at the meeting. Present an effective position paper, because the recommendation may be introduced in arbitration proceedings. Remember, the purpose of the position paper is to persuade the DRA or DRB that your position complies with the contract.

Use the following format for the position paper:

- Table of Contents.
- Description of the dispute—A summary paragraph defining both the nature of the dispute, as agreed upon with the contractor, and the clearly defined basis for denying compensation.
- Background or chronology of the dispute—The history of the issue in a narrative format including the facts, presented in a nonjudgmental manner. This section must include a description of any partial or attempted resolutions.
- Contractor's stated position—As stated in the contractor's potential claim records, other written materials, or oral communications. Quoted segments are most effective when supplemented by exhibits. Present this section in a nonjudgmental manner and do not elaborate on the contractor's previously stated position.
- Caltrans' position—State the logical flow of information and the relevant contractual requirements that resulted in the determination of no merit. All supporting information must be referenced within this section and included in the exhibit section.
- Summary—A concluding paragraph stating why contractually and factually there is no merit to the contractor's dispute. The summary must be a strong absolute

statement of Caltrans' position requesting that the DRA or DRB find in Caltrans' favor. Avoid expressing feelings or beliefs within this section.

- Exhibits—A number of exhibits for illustrating and clarifying the contractual and technical requirements. Number and tab exhibits. When compiling the written position paper, provide complete information related to the dispute including those exhibits used within the oral presentation at the dispute meeting. Failure to provide certain exhibits will likely result in the DRA or DRB disallowing related items within the oral presentation. Distribute written position papers in accordance with the contract.

Submit a draft written position paper to the construction engineer and peers for review and comment in advance of the formal dispute meeting. These internal reviews provide an opportunity to improve the position paper and benefit Caltrans by informing management of dispute issues.

The oral presentation given during the dispute meeting is important to effectively put forward Caltrans' position. Begin preparing for the presentation well in advance of the dispute meeting. Hold a mock presentation at least a week in advance of the dispute meeting to allow incorporation of comments from attendees. Attendees at the mock presentation should include the resident engineer, construction engineer, structure representative, bridge engineer, and construction field personnel. Other attendees may include technical experts, district construction claims engineer, construction manager, Division of Construction field coordinator, and others with dispute resolution board experience, depending on the size and complexity of the issue under consideration.

The objective of the mock presentation is to further examine the contractor's position, to review the basis of Caltrans' determination of no merit, and to rehearse Caltrans' presentation including potential rebuttal statements. During the mock presentation, it is advisable that an experienced participant, not directly involved in the contract, provides constructive criticism of Caltrans' position and the rebuttal of the contractor's position.

Typically, either the resident engineer or structure representative gives the presentation to the DRA or DRB depending on the dispute issue. Other personnel associated with the project may provide additional evidence. Use of experts not associated with the contract is not allowed unless requested by the DRA or DRB. All parties must agree to the use of a technical specialist in advance.

The dispute meeting will follow the procedure outlined in the dispute resolution agreement and any operating procedures agreed to by all of the parties involved.

3-522C (3c) Dispute Resolution Board Progress Meetings

In addition to the specific dispute meetings, there are mandatory initial and follow up progress meetings. The DRB progress meetings give members the opportunity to gain knowledge of the progress of work. Hold the first meeting at the start of the project. Each progress meeting must include a site visit allowing the DRB members to view construction operations, construction work completed, and areas where construction work must begin before the next meeting. A representative from both the contractor and Caltrans must attend all progress meetings. The minimum frequency of the progress meetings is stated in the *Standard Specifications* and in the DRB agreement; however, the frequency of meetings may be increased if the work is proceeding quickly. The agenda of a typical progress meeting is contained within the DRB agreement. At a minimum, the agenda should include a discussion of the following:

- Status of change orders
- Status of the work in terms of expended time and dollars
- Summary of potential claims

Promptly prepare and circulate progress meeting minutes to the parties for revision and approval.

3-522C (4) DRA or DRB Recommendations and Responses

Upon receiving a DRA's or DRB's recommendation regarding a dispute, provide a copy to the Division of Construction's field coordinator and ADR engineer.

Discuss the recommendation with the construction engineer and begin preparing the Caltrans response once the DRA or DRB issues its recommendation to the parties.

Although the recommendation is nonbinding, the parties must respond to the DRA or DRB and the other party within the time specified so it is clear if the dispute is resolved or remains unresolved. Accept or reject a recommendation in accordance with the following:

1. Acceptance of a recommendation that finds in favor of Caltrans is delegated to the district.
2. Acceptance of a recommendation in the contractor's favor or rejecting a DRA or DRB recommendation will require approval from the Division of Construction's field coordinator. The deputy district director of construction and the field coordinator will review and discuss the reasoning for the proposed response before sending it to the DRA or DRB and the contractor.

Complete Form CEM-6207, "Dispute Resolution Advisor—Dispute Meeting Report," or Form CEM-6204, "Dispute Resolution Board Dispute Meeting," to notify the Division of Construction's ADR engineer of the dispute meeting and each party's acceptance or rejection of the recommendation.

A request for clarification of the recommendation will only be considered if made within the time specified in the contract. Any request for clarification of a DRA or DRB recommendation needs to be discussed with the Division of Construction's field coordinator before its submittal. Requests for clarification are warranted when the recommendation fails to thoroughly explain the rationale for the recommendation, when the DRA or DRB has not stated Caltrans' position accurately, or when the contractual provisions have been disregarded.

A request for reconsideration of an issue may be made, and will only be considered, if new evidence concerning the dispute is provided and the request is made within the time specified. Reconsideration requests must be discussed with the Division of Construction's field coordinator before submittal.

3-523 Final Inspection and Contract Acceptance

3-523 Final Inspection and Contract Acceptance

3-523A General

As a project's completion approaches, schedule appropriate reviews with maintenance, traffic, and safety personnel. Before the final inspection, give the contractor a written list of items needing attention.

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

In accordance with Section 5-1.46, "Final Inspection and Contract Acceptance," of the *Standard Specifications*, the resident engineer must do a final inspection of the contract work.

Maintain a record of the final inspection in the resident engineer's daily report. The record should include a statement similar to the following:

> "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 agreed 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.

3-523B Contract Acceptance

On the day project work is completed in accordance with the requirements of the *Standard Specifications*, special provisions, plans, and approved change orders, notify the district construction office recommending district acceptance of the contract. Refer to Section 5-1.46, "Final Inspection and Contract Acceptance," of the *Standard Specifications*.

For recommendations of acceptance, use Form CEM-6301, "Contract Acceptance." Follow the same procedure for accepting emergency contracts.

3-523C Work for Other Agencies or Owners

As a courtesy, when any work performed under the contract is for other agencies or owners, 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 the acceptance of the contract or relief from maintenance and protection to the director. 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:

- A reference to the cooperative agreement or other 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, the resident engineer and an agency representative should make a preliminary joint inspection to correct minor deficiencies before the final inspection described above.

Write a record of the preliminary and final joint field inspections. Note what actions were necessary to complete the work to the agency representative's satisfaction. Record if the agency representative is satisfied with the completeness of the work but declines to concur in writing.

3-524 Guarantee

3-524 Guarantee

3-524A General

The contractor must perform corrective work due to a substantial defect as part of the guarantee if all of the following can be demonstrated:

1. The substantial defect existed in the contractor's work based on the specifications.
2. The substantial defect existed when the contract work was accepted.
3. A reasonable inspection by the resident engineer during construction would not have revealed the defect.

If the resident engineer cannot demonstrate the substantial defect is the responsibility of the contractor, the corrective work cannot be completed as part of the contract.

If a substantial defect is identified, the resident engineer will discuss the substantial defect with district management and the Division of Construction field coordinator. Send a letter to the contractor describing the substantial defect to be remedied. Any correspondence with the contractor regarding corrective work and the substantial defect must include the following language:

"Your refusal may result in a review of your responsibility to perform future work with Caltrans."

The contractor can perform corrective work without obtaining an encroachment permit.

The contractor may dispute the need for the corrective work but is nevertheless contractually bound to perform the necessary repairs. If the proposed final estimate (PFE) has not been issued, the contractor can file an exception in response to the PFE. Otherwise, the contractor must file for arbitration pursuant to Section 10240.1 of the Public Contract Code. The contractor has 90 days from the completion of the corrective work or the end of the guarantee period, whichever is later, to file for arbitration.

The end of the guarantee period is 1 year from contract acceptance and will not be suspended or extended based on any corrective work being required or performed.

3-524B Work Not Completed by Contractor

If the contractor refuses to perform the corrective work or if the corrective work requires an immediate response, Caltrans will perform the corrective work. The district may complete the corrective work with its own forces, day labor, by informal contract or by director's order. Discuss this process with district management and the Division of Construction field coordinator.

The contractor is liable to the state for the costs to Caltrans resulting from the contractor's failure to complete the corrective work. The resident engineer will need to maintain records on corrective work expenditures to expedite billing.

The resident engineer will send the detailed billing to the Division of Accounting, abatements section, with instructions to prepare the accounts receivable bill and to mail it to the contractor. If the contractor is not available, the bill should be mailed to the surety.

Section 6 Control of Materials

3-601 General
3-602 Department-Furnished Materials
3-603 Local Materials
3-604 Buy America
3-604A Crumb Rubber
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3-604B (1) Resident Engineer Approval of Minimum Use Requirements
3-604B (2) Federal Highway Administration Approval of Waivers
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3-610 Suspected Fraudulent Test and Inspection Reports

Section 6 Control of Materials

Section 6
Control of
Materials

3-601 General

3-601
General

Section 6, "Control of Materials," of the *Standard Specifications*, describes the contractor's responsibilities regarding materials used on the project.

The service life of a properly designed highway depends on the construction methods and quality of materials used in the highway's construction. The resident engineer must ensure that materials used in the work comply with contract specifications. This section presents general guidelines for ensuring that specifications are met.

Materials Engineering and Testing Services (METS) will assign inspectors for materials that require inspection during manufacture or at the source of supply. 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, then forward the completed form to METS. METS will ensure the proper assignment of inspectors and notify the suppliers of the required inspections. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

For a list of products inspected by METS, refer to Table 6-2.1, "Inspection of Fabricated and Manufactured Materials," of this manual.

Not all products will be inspected by METS. METS has assigned to the resident engineer the inspection and release at the job site of those products listed in Table 6-2.2, "Materials Acceptance Based on Authorized Material List," and Table 6-2.3, "Materials Accepted by Certificate of Compliance," of this manual.

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

3-602 Department-Furnished Materials

3-602
Department-
Furnished
Materials

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

- Review the special provisions for materials to be Department-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 them.
- Obtain the contractor's written request for all Department-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 Department-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 or disposal of Department-furnished material that has not been used in the work.

3-603 Local Materials

3-603 Local Materials

Section 6-1.03, "Local Materials," of the *Standard Specifications*, covers the requirements for the use of local materials and the resident engineer's responsibility for testing the material. This section also requires the contractor to furnish material from any source the contractor may elect; however, when mandatory local sources of certain materials are designated in the special provisions or on the plans, the contractor must furnish material from those designated mandatory sources.

If the contractor elects to obtain material from a non-mandatory local source, the contractor is responsible for making all arrangements necessary to obtain materials from that source. The contractor must furnish the resident engineer with a copy of the contractor's agreement with the property owner and provide copies of all necessary permits, licenses, and environmental clearances prior to removing any material. Refer to Section 3-510, "Coordination With Other Entities," of this manual and Section 5-1.20, "Coordination With Other Entities," of the *Standard Specifications* for additional information.

Where Caltrans has entered into agreements with property owners in the vicinity of a project for obtaining material from an owner's property, the arrangements are made solely for the purpose of providing all bidders an equal opportunity to obtain material from that property. Provide the contractor a copy of the agreement between Caltrans and the property owner. Refer to Section 3-510, "Coordination With Other Entities," of this manual for more information.

The special provisions may require the contractor to obtain materials from a specified source. It may be necessary for the contractor to process the material as indicated in the special provisions to produce acceptable materials from this source.

If the resident engineer determines that the specified local material source can no longer be used for any reason, designate an alternative local material source for the balance of the material. Pay for the costs associated with the change in material source as extra work.

Occasionally, it becomes necessary to obtain additional embankment material from outside the local area and there is no item for "imported borrow." Under these circumstances, it is normal practice for Caltrans to locate an alternative source for this material. Consult with the district materials engineer for help locating an alternative material source.

In accordance with the State Contract Act, material sources must comply with the Surface Mining and Reclamation Act of 1975 (SMARA). Refer to Chapter 7, "Environmental Stewardship," of this manual and the Department of Conservation's website at the link provided later in this section for further information regarding SMARA requirements.

If a 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 finding before approval of the change order.

At a minimum, the public interest finding, 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.

All such sites are subject to compliance with 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 website:

http://conservation.ca.gov/omr/SMARA%20Mines/ab_3098_list/Pages/Index.aspx

The above requirements do not apply to "local borrow," as defined in Section 19-7, "Borrow Material," of the *Standard Specifications*. Refer to Chapter 7, "Environmental Stewardship," of this manual for a list of mining operations that are or are not subject to SMARA requirements.

3-604 Buy America

3-604
Buy America

Section 6-1.04 "Buy America" of the *Standard Specifications* includes Buy America provisions for crumb rubber, steel, and iron materials. Buy America provisions apply to Caltrans projects regardless of funding source, unless the special provisions indicate otherwise.

3-604A Crumb Rubber

Buy America requirements apply to crumb rubber incorporated into the work. The crumb rubber must be produced in the United States and derived from waste tires taken from vehicles owned and operated in the United States. Ensure the contractor submits a certificate of compliance with furnished crumb rubber showing compliance with Buy America requirements.

3-604B Steel and Iron Materials

Buy America requirements apply to steel and iron materials permanently incorporated into the work. This includes steel and iron components of a manufactured product regardless of the overall composition of the manufactured product. For example, Buy America applies to the steel welded wire reinforcement or steel reinforcing components of a precast reinforced concrete pipe.

The steel and iron materials must be melted and manufactured in the United States, except that foreign (a) pig iron and (b) processed, pelletized, and reduced iron ore may be used in the domestic production of the steel and iron materials.

Manufacturing begins with the initial melting and mixing and continues through the bending and coating stages. Coating includes all processes that protect or enhance the value of the material to which the coating is applied.

The manufacturing process for a product with steel or iron content is considered complete when the product is ready for use in items such as fencing, posts, and girders. It could also be considered complete if the material is installed as a component of a more complex product through further assembly, as is the case for a traffic signal head. The final assembly process does not need to be accomplished domestically as long as the steel or iron component is only installed and no manufacturing process is performed on the steel or iron component.

A certificate of compliance from the manufacturer, not the contractor, showing compliance with Buy America requirements must accompany products with steel or iron content. Ensure receipt of the required certificates of compliance and mill test reports.

3-604B (1) Resident Engineer Approval of Minimum Use Requirements

Buy America requirements do not apply to a minimal use of steel and iron materials incorporated in the work as specified in Section 6-1.04C, "Steel and Iron Materials," of the *Standard Specifications*.

Before incorporating foreign steel and iron materials into the work, the contractor must submit documentation regarding the quantity and value of the foreign steel and iron to the resident engineer. Review the documentation to determine if it supports the minimum-use rule before allowing the material to be incorporated into the project. If the minimum-use rule applies, approve the exception in writing. This applies as a one-time total exemption for each contract and not for each purchase. File the documentation, exceptions, and a running total of the value of minimum-use foreign steel and iron under Category 41, "Report of Inspection of Material (TL-0029)."

3-604B (2) Federal Highway Administration Approval of Waivers

Caltrans does not have the authority to allow the use of foreign steel and iron content in products subject to Buy America in federal-aid projects without FHWA approval, except under the minimum-use rule. The California FHWA division administrator may grant waivers only upon receiving concurrence from FHWA headquarters in Washington, D.C. Approval or denial may take several months.

Approval by FHWA of the waiver is required prior to allowing foreign steel or iron that exceeds the minimum-use rule into the project. Lack of an FHWA-approved waiver can result in the loss of all federal funds for the project.

The contractor must submit the following information to the resident engineer when requesting a waiver to Buy America requirements:

- A detailed description of the waiver item.
- Item cost—obtained from the manufacturer or supplier.
- The country of origin for the product.
- The reason for the waiver.

The resident engineer must provide the following information when preparing a waiver request for the FHWA engineer:

- The contractor's waiver submission.
- Federal-aid project number, description, and location.
- Analysis of proposed redesigns using available domestic products.

3-605 Brand or Trade Names and Substitutions

3-605 Brand or Trade Names and Substitutions

When specific brand or trade names are used to designate required products, the contractor may furnish other products that are of equal or better quality.

A product is not necessarily equivalent merely because it is on an Authorized Material List published by Caltrans. These lists indicate that the products meet the general qualifications. However, some of the listed products may not meet the specific needs of the project or may not be appropriate for a particular location due to factors such as climate conditions or maintenance difficulties. Consult with the responsible unit (the Design Unit, Traffic Unit, Maintenance Unit, or METS, for example) before making decisions about the acceptability of substitutes.

3-606 Quality Assurance

3-606 Quality Assurance

Quality assurance encompasses all materials and construction activities on a project and directly affects the service life of a transportation facility.

Section 6-2, "Quality Assurance," of the *Standard Specifications* includes provisions covering the contractor's quality control over the work and Caltrans' verification and acceptance of the work.

Section 6-2.02, "Quality Control," of the *Standard Specifications* informs the contractor of general quality control requirements regarding the materials incorporated into the work. Ensure the contractor maintains a quality control program including employing appropriate personnel and keeping thorough quality control records.

Section 6-2.03, "Department Acceptance," of the *Standard Specifications* allows the resident engineer access to the material sources to inspect, sample, and test materials for Department acceptance. Refer to Section 3-501, "General," of this manual for information regarding safe access.

Resident engineers and their authorized representatives have a primary duty to inspect the work and to sample and test the materials incorporated into the work to ensure compliance with the *Standard Specifications*, special provisions, and plans.

Deduct retesting costs. Contact the district materials engineer who oversees the district materials lab for guidance on determining the costs. For hot mix asphalt verification retesting, refer to Section 39-2.01A(4)(b), "Job Mix Formula Verification," of the *Standard Specifications*.

Additional information about quality assurance can be found in the Division of Construction publication *Construction Quality Assurance Program Manual* at:

http://www.dot.ca.gov/hq/construc/publicationlist.htm

3-607 Out-of-State Fabrication

3-607 Out-of-State Fabrication

Section 6-2.01E, "Material Source Inspection and Testing," of the *Standard Specifications* includes deductions 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. Use a standard description of "Out of State Inspect" on Form CEM-6101, "Project Record—Estimate Request." This deduction should be made in whole, when appropriate. However, if the deduction is large, the resident engineer has the option to deduct incremental amounts until the full deduction is made.

3-608 Testing by Caltrans

In addition to the California test methods, the *Standard Specifications* contain references to the standards and tests of the American Association of State Highway and Transportation Officials and the American Society for Testing and Materials.

California test methods are available at:

http://www.dot.ca.gov/hq/esc/ctms/index.html

American Association of State Highway and Transportation Officials, American Society for Testing and Materials, and other test methods are available under the IHS Spec's and Standards Search link accessible by Caltrans staff on the Caltrans intranet at:

http://des.onramp.dot.ca.gov/materials-engineering-and-testing-services-mets

Whenever samples are taken from materials sites, the resident engineer must ensure that 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, confirm the contractor tests at the frequencies shown in the specifications as the material is being incorporated into the work. Also, perform and record acceptance sampling and testing as required by Section 6-1, "Sample Types and Frequencies," of this manual. Deliver acceptance samples to the district laboratory within 1 business day for projects within 50 miles and within 2 business days for projects more than 50 miles from the district laboratory, except where sampling or test methods conflict. Report acceptance test results to the contractor within 2 business days of receipt from the laboratory. The contractor must be advised that all test results are available for their inspection. Accordingly, test results must remain in the project files. Provide copies of acceptance tests to the contractor upon request.

3-608A Operating Range and Contract Compliance

Section 25, "Aggregate Subbases"; Section 26, "Aggregate Bases"; Section 27, "Cement Treated Bases"; Section 28, "Concrete Bases"; Section 37, "Seal Coats"; and Section 90, "Concrete," of the *Standard Specifications*, all contain provisions for an acceptable range of test results. 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 that 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 of reasons for leaving the material in place and the contractor's actions, is sufficient for the contract records. A 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.

3-609 Testing by the Contractor

3-609 Testing by the 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, except where verification testing is specified.

3-609A Action Limit and Suspension Limit

Action and suspension limits are similar to operating range and contract compliance except they apply to the contractor's quality control testing as specified in Section 40, "Concrete Pavement," and Section 41-9, "Individual Slab Replacement With Rapid Strength Concrete," of the *Standard Specifications*.

3-610 Suspected Fraudulent Test and Inspection Reports

3-610 Suspected Fraudulent Test and Inspection Reports

When fraudulent tests or inspection reports are suspected, discuss the situation with the Division of Construction field coordinator. Contact the district materials engineer or METS for assistance in evaluating the reports. Retest the material represented by suspect tests, as appropriate. If after investigating, fraud is still suspected, the deputy district director provides the facts in writing to the Division of Construction field coordinator.

Section 7 Legal Relations and Responsibility to the Public

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Example 3-7.1 Sample Notice of Contract Suspension of Work Due to Insurance Lapse Letter

Section 7 Legal Relations and Responsibility to the Public

Section 7
Legal Relations and Responsibility to the Public

3-701 Laws to Be Observed

3-701
Laws to Be Observed

The contractor must be familiar with and comply with all laws, regulations, and ordinances that affect the labor, materials, and conduct of the work. However, the specifications do not intend or require that the resident engineer exercise police enforcement power. If the resident 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 weighmaster certificates, padding the number of loads of a commodity delivered, tampering with scales, or falsifying test or inspection reports 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 Division of Construction field coordinator.

3-701B Labor Code Requirements and Fair Labor Standards Act

For the resident engineer's duties with regard to California Labor Code requirements and the U.S. Fair Labor Standards Act, refer to Chapter 8, "Employment Practices," of this manual.

3-701C 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. Refer to Section 3-519B, "Load Limits," of this manual.

3-701D Occupational Safety and Health Standards

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

3-701D (1) Excavation Safety

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 excavation safety. The *Trenching and Shoring Manual* is available at:

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

3-701D (2) Tunnel Safety

The California Code of Regulations, Title 8, Subchapter 20, "Tunnel Safety Orders," establishes minimum safety standards for excavation, construction, alteration, repair, or demolition. The contract will describe tunnel locations and the information handout with it will describe the classification. However, the contractor's activities may also create work conditions that will fall under the tunnel safety orders that were not identified in the contract. Be aware of potential tunneling activities such as the following:

- Boring and jacking operations of pipes with an outside diameter of 30 inches or greater.
- Shafts where excavations are greater than 20 feet deep, the depth is at least twice its greatest cross-sectional dimension, and employees may enter the shaft or approach the shaft area. Cofferdams may fit this definition.

The regulations related to these activities are covered in detail at the California Department of Industrial Relations web site:

http://www.dir.ca.gov/Title8/sub20.html

Consult the district construction safety coordinator for guidance.

3-701E Falsework Erection or Removal

Detailed instructions for reviewing falsework for bridges or other major structures are contained in Structure Construction's *Falsework Manual*. When the erection or dismantling of falsework is over or adjacent to a traveled way, the resident engineer 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 7-1.04, "Public Safety," of the *Standard Specifications*.

3-702 Public Convenience

3-702 Public Convenience

The following sections provide guidelines for enforcing the provisions in Section 7-1.03, "Public Convenience," of the *Standard Specifications* and contain discussion of other topics related to the passage of public traffic through construction projects.

3-702A 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 7-1.03, "Public Convenience," of the *Standard Specifications* requires that operations present 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.

Ensure that the contractor maintains safe and convenient access through and around work zones for bicyclists and pedestrians, including persons with disabilities. For guidance, refer to Section 2-216, "Pedestrian Facilities," of this manual.

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. 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 example, 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 7-1.03, "Public Convenience," of the *Standard Specifications* is to ensure public convenience, not to minimize construction cost. Frequently, the contractor can achieve both through careful planning and skillful operation.

3-702B Maintenance 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 7-1.03 "Public Convenience," of the *Standard Specifications* specifies the responsibility of the contractor for providing reasonably smooth and even surfaces for passage of public traffic through the work. Ensure the contractor constructs a temporary joint taper at the specified slope when a drop-off between the existing pavement and paving or cold planing area at transverse joints cannot be avoided before opening to traffic.

3-703 Public Safety

3-703 Public Safety

The contractor 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 the public from all potential hazards that may result from the construction activities including, but not limited to, 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 placement, movements, and actions of workers and equipment, the disposition of workers and the placement and handling of materials.

Under the specifications, the resident 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.

3-703A Temporary Clearance and Bridge Permit Rating Changes

The following guidelines apply to situations where temporary changes occur in vertical or horizontal clearance for vehicular traffic or where temporary changes occur in bridge permit ratings. When providing notification of changes, use Forms TR-0019, "Notice Of Change In Clearance Or Bridge Weight Rating," for divided highways; TR-0020, "Notice of Change in Vertical Or Horizontal Clearance"; or TR-0029, "Notice Of Change In Clearance Or Bridge Weight Rating." The forms are available at:

http://www.dot.ca.gov/trafficops/permits/notice.html

3-703A (1) Temporary Vertical and Horizontal Clearance Changes

Whenever an operation will reduce clearances available to public traffic, the specifications require the contractor to notify the resident engineer at least 25 days and not more than 125 days before the anticipated start of an operation that will change the vertical or horizontal clearance available to public traffic (including shoulders). At least 15 days before implementing proposed changes in vertical clearances, horizontal clearances, or both, notify the Transportation Permits Branch of the proposed changes and their duration. If the clearance change is on a local jurisdiction roadway, notify the affected agency in writing at the same time.

3-703A (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 of the proposed ratings and their duration. Use Forms TR-0019 or TR-0029. The bridge rating engineer must then immediately notify the Transportation Permits Branch of any rating changes.

Within 3 days of rescinding the temporary bridge permit rating, the structure representative must notify the resident engineer in writing and the bridge rating engineer. The bridge rating engineer must then immediately notify the Transportation Permits Branch.

3-703B Permanent Clearance and Bridge Permit Rating Changes

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

3-703B (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 of the proposed changes. Use form TR-0019, TR-0020, or TR-0029. Also, to confirm the necessary information, the resident engineer must consult the Transportation Permits Branch before making field measurements.

3-703B (2) Permanent Bridge Permit Rating Changes

Fifteen days before implementing proposed changes to the bridge permit rating, the structure representative must notify the resident engineer in writing and the bridge rating engineer of the proposed bridge permit ratings. Use form TR-0019 or TR-0029. The bridge rating engineer must then immediately notify the Transportation Permits Branch of any rating changes.

3-703B (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.

The Transportation Permits Branch will, within 1 business day, send a fax to the resident engineer confirming receipt of the change.

3-704 Indemnification and Insurance

3-704 Indemnification and Insurance

The contractor's obligation for insurance is contained in various sections of the *Standard Specifications*. Section 3-1.07, "Insurance Policies," has provisions describing the types of insurance documents required. Section 3-1.18, "Contract Execution," requires the contractor to submit those insurance documents at the time the contract is executed. Section 7-1.05, "Indemnification," requires the contractor to indemnify Caltrans and Section 7-1.06, "Insurance," requires the contractor to carry liability insurance without allowing it to lapse.

The contractor must also have railroad protective insurance when required by the contract. This topic is covered in Section 3-704C, "Railroad Protective Insurance," of this manual.

3-704A Responsibilities

The Division of Construction is responsible for reviewing, approving, and monitoring contractor insurance documents.

The Division of Construction sends a notice of insurance approval to the districts. Each district has a designated person responsible for notifying resident engineers about insurance-related matters. That person serves as the resident engineer's contact for all insurance issues. The resident engineer files insurance-related documents in the contract records.

For a contractor business name change submitted under Form CEM-1202A, "Contractor Action Request—Change of Name/Address," the Division of Construction will validate and approve insurance policies and contract bonds issued with the new business name. For additional information on Form CEM-1202A, refer to Section 3-506, "Assignment," of this manual. Send by email an electronic copy of the reviewed CEM-1202A (including all attachments) and a copy of the original contract bonds to the Division of Construction at orm.insurance.review@dot.ca.gov.

3-704B Evidence of Insurance

The contractor may show evidence of insurance in two ways:

- A contractor may be pre-approved for insurance before bidding on a Caltrans contract. If a contractor is pre-approved, the Division of Construction will issue a certificate of pre-approved insurance valid until the next insurance policy expiration date. The Division of Construction has posted information and instructions for pre-approval of a contractor's insurance on its website at:

  http://www.dot.ca.gov/hq/construc/riskmanagement/insurancepreapproval/

- The contractor may bid on any Caltrans contract without first obtaining insurance. If the contractor is the apparent low bidder, it must submit the insurance documents to the Office Engineer as a condition of contract approval.

Ensure the contractor's required insurance does not lapse during the life of the project. If the contractor has not submitted the renewed insurance documents 10 days before expiration of its previous insurance, the Division of Construction will:

- Send a notice to the contractor of the failure to comply with the insurance requirements of the contract.
- Send a copy of the notice to the district's insurance contact and the deputy district director of construction.

If the contractor has not submitted the renewed insurance documents 1 day before the expiration of the contractor's insurance, the Division of Construction sends a second notice to the district's insurance contact with a copy to the deputy district director for construction and the Division of Construction's field coordinator.

3-704B (1) Actions Allowed by the Standard Specifications

After consultation with the deputy district director for construction and the Division of Construction field coordinator, take one or both of the following actions:

- Suspend the contractor's operations in accordance with Section 8-1.06, "Suspensions," of the *Standard Specifications* until the contractor submits the insurance documents and the Division of Construction approves them. Inform the contractor's surety in writing that the contractor has failed to maintain insurance as required by the contract and that the work has been suspended temporarily.
- Act in accordance with the provisions of Section 7-1.06H, "Enforcement," of the *Standard Specifications*, which allows Caltrans to maintain the required insurance coverage and withhold or charge the expense to the contractor or to terminate the contractor's control of the work in accordance with Section 8-1.13, "Contractor's Control Termination," of the *Standard Specifications*.

Example 3-7.1, "Notice of Contract Suspension of Work," in this section can be used for either or both of the previous actions.

3-704C Railroad Protective Insurance

State highway construction occasionally requires a contractor to work on or near a railroad's operating property. This varies from minor side encroachments to work involving the direct crossing of a railroad's tracks. The contract 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.

Requirements for railroad protective liability insurance vary depending on the railroad company involved. If the contract includes an agreement with a railroad company, Caltrans makes the provisions of the agreement available in the *Information Handout* in the document titled "Railroad Relations and Insurance Requirements."

The district railroad agreements coordinator within the Right of Way and Land Surveys Unit in the district is the point of contact for all railroad insurance issues. Before the contractor performs contract work that encroaches on the railroad's operating

properties, the resident engineer must either receive a copy of the approved insurance documents from the contractor or district railroad agreements coordinator, or confirm with the district railroad agreements coordinator that the contractor has furnished railroad protective insurance.

For emergency contracts, obtain verbal release and authority to start work after the railroad has received all the insurance documents.

3-704C (1) Responsibility

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

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

- The railroad or the district railroad agreements coordinator advises the resident engineer that the contractor, subcontractor, or both, have furnished the specified insurance.
- The resident engineer receives a copy of the approved proof of insurance.

3-704C (2) Insurance Renewal

The contractor's or subcontractor's obligation to renew the required railroad protective insurance before expiration is specified in the contract. The Division of Construction monitors the expiration of an approved railroad protective insurance. The Division of Construction will notify the district's insurance contact if the contractor fails to renew the railroad protective insurance.

If the contractor fails to renew the railroad protective insurance, suspend the operation related to the railroad operating property as stated in Section 3-704B (1), "Actions Allowed by the *Standard Specifications*," of this manual.

Example 3-7.1. Sample Notice of Contract Suspension of Work Due to Insurance Lapse Letter

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DIVISION OF CONSTRUCTION
[Resident Engineer's Address]
[City, CA ZIP]
[PHONE (Area Code) xxx-xxxx]
[FAX (Area Code) xxx-xxxx]
TTY 711
www.dot.ca.gov

Making Conservation a California Way of Life.

Date: [*Month dd, yyyy*]

[*Name of Surety Company*]
[*Address*]
[*City, State ZIP*]

Subject: Notice of Contract Suspension of Work Due to Insurance Lapse
[*Contractor's Name*]
[*Contract Number/Project Description*]

Dear Surety:

This is to notify you that [*insert contractor's name*] has failed to maintain insurance on Contract No. [*insert contract EA and project description*] as required under Sections 7-1.05, "Indemnification," and/or 7-1.06, "Insurance," of the *Standard Specifications*. In accordance with Section 8-1.06, "Suspensions," of the *Standard Specifications* [*contractor's name*]'s operations on Contract No. [*insert contract EA*] are suspended effective [*effective date of temporary work suspension]*.

Your attention is directed to the provisions of Section 10253 of the Public Contract Code and to Section 8-1.13, "Contractor's Control Termination," of the *Standard Specifications* relating to the contractor's failure to comply with the insurance provisions of the contract. According to PCC §10253, unless the contractor submits proof of the required insurance as required by the contract, Caltrans may issue a 5-day notice to terminate the contractor's control.

You will be notified if the contractor provides the required proof of insurance before a notice to terminate the contractor's control of the work.

If you have questions, please contact me at [*(area code) xxx–xxxx*].

Sincerely,

[*Name of resident engineer*]
Resident Engineer

c:
bc:

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Section 8 Prosecution and Progress

3-801 Schedule

3-802 Preconstruction Conference

3-803 Start of Job Site Activities

3-803A Work Before Contract Approval

3-803B Flexible Start

3-803C Potential Budget Impasse Start

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Section 8 Prosecution and Progress

Section 8
Prosecution and
Progress

3-801 Schedule

3-801
Schedule

Three levels of critical path method schedules are defined in Section 8-1.02, "Schedule," of the *Standard Specifications*. The level is determined by the number of working days and the total bid amount.

Make every effort to obtain a reasonable baseline schedule at the beginning of the contract. Record in a daily report any communication regarding the schedule. Notify the contractor in advance if a progress payment will be withheld for failure to submit a satisfactory schedule.

In general, schedules should:

- Separate contract items into activities to show controlling activities as well as non-controlling activities.
- Be used by the resident engineer and the contractor to monitor and evaluate progress, determine controlling activities of work, and analyze time consequences from changes or work delays.
- Be consistent with all contract time requirements.
- Display internal milestones and other time constraints, such as placing traffic on detours or new pavement, and beginning new phases of the work in staged construction.

The contractor is required to submit a revised schedule monthly to evaluate alterations to the critical path or an adjustment to the completion date. For Levels 1 and 2, the revised schedule may be used in lieu of a time impact analysis. Also refer to critical path method training publications *Advanced CPM Scheduling* and *Project Scheduling with Primavera P6* at:

http://www.dot.ca.gov/hq/construc/publicationlist.htm

3-802 Preconstruction Conference

3-802
Preconstruction
Conference

Schedule a preconstruction conference as soon as is practical after a contractor has been selected for a project. Be prepared to discuss with the contractor the items in Section 8-1.03, "Preconstruction Conference," of the *Standard Specifications*.

Refer to Section 5-003, "Preconstruction Conference with the Contractor," of this manual for additional guidance. Review the job with Caltrans personnel before the start of job site activities, and refer to Section 5-002, "Preconstruction Conference with Caltrans Personnel," of this manual.

3-803 Start of Job Site Activities

3-803
Start of Job Site
Activities

This section covers the subject of when the contractor begins work. Do not confuse the beginning of work with the beginning of contract time, which is specified in Section 8-1.05, "Time," of the *Standard Specifications*, and the date used on Form CEM-2701,

"Weekly Statement of Working Days." For additional information, refer to Section 3-804, "Time," of this manual.

Section 8-1.04, "Start of Job Site Activities," of the *Standard Specifications* requires the contractor to begin work on a project within 15 calendar days after receiving notice of contract approval. The special provisions may modify the 15-day requirement for some projects including:

- Flexible start
- Delayed start
- Potential budget impasse start
- Next-day start

The start of job site activities may not coincide with the first chargeable working day. The contractor is required to submit a 72-hour notice before the start of job site activities. If the project has work at more than one location, require submittal of a separate notice for each location.

Determine when to record the beginning of job site activities based on judgment and experience. For example, setting up construction area signs might be the only work underway. If conversations with the contractor indicate movement toward pursuing the work, the setting up of signs is sufficient to indicate the beginning of job site activities. Record the date the contractor begins job site activities on Form CEM-2701, "Weekly Statement of Working Days," on 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, refer to Section 5-103B (3), "Completing Form CEM-6003, 'Progress Pay-Estimate Project Initiation or Update,'" of this manual.

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 with notice that, according to Section 8-1.05 "Time," of the *Standard Specifications*, the contract time starts on the day specified in Section 8-1.04 "Start of Job Site Activities," of the *Standard Specifications* or on the day job site activities are started, whichever occurs first.

If you determine that the contractor's failure to begin work will result in unsatisfactory progress, discuss the situation with district management.

3-803A 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 job site activities.

When a contractor wants to start work before contract approval, call the Office Engineer, Construction Contract Awards, to determine whether Caltrans has received the executed contract documents. If the office has received the documents, proceed as set forth in Section 8-1.04, "Start of Job Site Activities," of the *Standard Specifications*. Executed contracts are listed at the Division of Engineering's intranet website:

http://des.onramp.dot.ca.gov/office-engineer/construction-contract-awards

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 8-1.04 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 5-1.20, "Coordination with Other Entities," 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 activities and that the work of the others will take precedence over the contractor's job site activities. When obvious conflicts are apparent, a permit should not be issued.
- The limits of the area in which work will be performed.
- The activity or activities to be performed.
- A statement that the contractor will comply with the requirements of the contract plans, the *Standard Specifications*, the project's special provisions, and any order of work specified in these documents.
- A statement that the contractor's job site activities 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 *Encroachment Permits* manual:

  http://www.dot.ca.gov/trafficops/ep/manual.html
- 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, "Change Orders," of this manual. After the executed contract documents have been delivered as specified, change orders may be approved in accordance with Section 5-3. The district must not process requests for maintenance and protection relief or contract acceptance until after the contract's approval.

3-803B Flexible Start

Flexible start is a beginning-of-work specification that allows a contractor to choose the first working day based on conditions defined by the district before advertising. This section applies in cases where the standard 15-day start has been modified to a flexible start in the special provisions.

The contractor must submit a request for authorization to establish the first working day within 10 days after contract approval. If the contractor does not submit the request for authorization to begin work within 10 days after contract approval, the first working day will be 15 days after contract approval.

3-803C Potential Budget Impasse Start

Minor A or highway maintenance program projects advertised before the fiscal year in which the project is budgeted may include additional contract language restricting the start of work date to begin after the State of California budget becomes law.

3-803D Delayed Start

This section applies in cases where the standard 15-day start has been modified to a delayed start. For example, the special provisions may allow a 55-day delayed start.

Work should not be started at the job site until the resident engineer approves the submittals listed in the special provisions. Work may be started at the job site before the time specified in the delayed start if the submittals are approved and the resident engineer authorizes the start in writing. The beginning of work provision allows adequate time for contractors to prepare, and for the resident engineer to approve, specified submittals before job site activities begin. Review and approve satisfactory contractor submittals or return insufficient submittals within contractually required time frames.

3-803E Next-Day Start

Informal-bid contracts may be used after a catastrophic incident or after a notification of a threat of future significant damage. The special provisions for these types of projects require that the start of job site activities begin the next business day after contract approval.

3-804 Time

3-804 Time

Section 8-1.05, "Time," of the *Standard Specifications* discusses the use of the Form CEM-2701, "Weekly Statement of Working Days," as the method of tracking contract time. Issue this weekly statement to the contractor every week until the contract is accepted. To determine if the progress of the work may require a withholding, refer to Section 3-906F (1), "Progress Withholds," of this manual.

Section 1-1.07, "Definitions," of the *Standard Specifications*, defines the terms "day," "working day," and "controlling activity." Days during the contract are either a working day or a nonworking day. 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, based on the number of working days specified in the original contract. On most projects, situations arise that extend the date for completion beyond the "computed date for completion." The "computed date for completion" will be extended by either charging a nonworking day or by writing a change order that adds working days to the contract.

3-804A Weekly Statement of Working Days

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 end of the following week, forward the original statement to the contractor. Send one copy to the district construction office for review, and file another copy with the project records. Form CEM-2701 consists of three sections.

3-804A (1) The Record Section (Upper Block)

This section is used to record all working days, nonworking days as defined in Section 1-1.07, "Definitions," of the *Standard Specifications*; and working days on which no productive work was performed on the controlling activity. In this section, tabulate each elapsed working and nonworking day during the life of the project.

Each day, determine whether to charge a working day and, if necessary, discuss the decision with the contractor. The "current controlling activity" is the basis of this determination; therefore, the resident engineer must base the decision on conditions effective on the day under consideration. If the progress schedule does not accurately represent conditions effective on that day, request that the contractor update the next progress schedule to provide an accurate representation. Note on Form CEM-2701 the activity that, in your opinion, is currently controlling. If the contractor does not concur, the entry will give the contractor an opportunity to protest formally.

If the controlling activity is not dependent upon weather, such as concrete curing or an embankment settlement period, a working day must be charged during adverse weather.

When determining nonworking days, loss of time because of adverse weather may extend beyond the period of actual adverse weather. Situations occur where there is no progress toward contract completion though the full crew might have worked the entire day. This may be due to the grade being too wet to work, access to the work needing to be reestablished, or saturated material needing to be removed from the tops of slopes.

Adverse weather can be other than wet or cold weather. For example, 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 activity, a weather nonworking day should be granted.

If a nonworking day is granted because of requirements in Section 12, "Temporary Traffic Control," of the *Standard Specifications*, state the reason as "traffic restriction" in the "Remarks" section of Form CEM-2701.

In the column "Working Day No Work Done on Controlling Activity," record any working day on which no work is done on the project or on the controlling activities. If the reasons are known for lack of work, note them in the "Remarks" section and on the daily report.

3-804A (2) Change Order Time Adjustments (Center Block)

This section is used for recording adjustments of time as a result of approved change orders. In the column under "Change Order Days Approved," record working days granted for approved change orders during the week. In the column under "Change Order Number," list the approved change order numbers corresponding to the working days granted during the week. In considering a time adjustment, deduct all nonworking days within the adjustment period, and ensure that the adjustment is made only for the working days charged to the contract during the adjustment period. For additional information on time adjustments after contract completion, refer to Section 3-807, "Liquidated Damages," of this manual.

3-804A (3) Computation of Extended Date for Completion (Lower Block)

In the lower section of Form CEM-2701, summarize the information the contractor will receive. The "first working day" is the calendar day specified in Section 8-1.05,

"Time," of the *Standard Specifications*. This day is usually the 15th day after contract approval. If the contractor starts job site activities before the 15th day after contract approval, the first working day is the day the contractor starts job site activities.

Several methods are used to specify the first working day. Read and understand the contract's specifications and correctly record the date of the first working day.

Use the Construction Workday 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. Standard 5-day and 7-day calendars are available online:

http://www.dot.ca.gov/hq/construc/calendar/index.htm

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

Refer to Section 4-2002C (8), "Plant Establishment Work," of this manual for guidelines on plant establishment time requirements and computation of the extended date for completion.

3-804A (4) Final Weekly Statement of Working Days

Designate the Form CEM-2701 that is used for the week when 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 that the statement reflects the "approved status of time" on this date. For revising the status of time from that shown on the final Weekly Statement of Working Days, refer to Section 3-807, "Liquidated Damages," later in this section.

3-804A (5) Examples

Examples of typical entries for Form CEM-2701, "Weekly Statement of Working Days," are available at:

http://www.dot.ca.gov/construction/contract-time/example-working-days.html

3-805 Suspensions

3-805 Suspensions

Temporary suspension of work is covered under Section 8-1.06, "Suspensions," of the *Standard Specifications* and gives the resident engineer the authority to suspend work. The two general categories of suspensions are described below.

In areas subject to adverse weather, it is permissible to suspend an entire project if this action is considered to be in the best interest of Caltrans. However, authority to suspend work is limited to the reasons stated in Section 8-1.06. When an entire project is suspended for reasons that do not fall under the scope of Section 8-1.06, the suspension must have the contractor's concurrence. Mutually agreed-upon suspensions are covered under Section 1-1.07 "Definitions," of the *Standard Specifications*.

A suspension does not always impact the entire project; it might only affect some items. Usually this type of suspension is used when either the work or the public will be affected adversely by continued work activity. Although this type of suspension is an option available only to the resident engineer, consider the contractor's opinion on such a suspension.

3-805A Suspensions Related to Contractor Performance

Any letter that orders 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.

3-805B Suspensions Unrelated to Contractor Performance

This type of suspension may result from any condition unfavorable for the prosecution of the work. This includes anticipated heavy traffic because of a holiday or a special event, or a winter suspension.

During any suspension, advise the contractor of the conditions under which maintenance will be performed. Preferably use the contractor to perform work necessary 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, which 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 for resuming work are expected, notify the contractor in writing. The letter must state the date when working days will resume and must allow sufficient time to permit the contractor to remobilize the necessary labor and equipment. Generally speaking, a period of 10 working days is considered reasonable.

Because of an ordered suspension of work that did not have mutual agreement, the contractor may be due additional compensation, contract time, both, or neither, depending on whether the delay is a critical delay, an excusable delay, or a concurrent delay.

3-806 Delays

3-806A Time or Payment Adjustments and Nonworking Days

Section 8-1.07, "Delays," of the *Standard Specifications* covers provisions for delay-related time or payment adjustments. Section 1-1.07, "Definitions" of the *Standard Specifications* covers nonworking day provisions for concurrent delays under the "Working Day" definition. No time or payment adjustment is allowed for concurrent delays.

The resident engineer must monitor the progress of any work that may cause an excusable delay or critical delay. To avoid or mitigate the effects of delays, initiate action such as the following:

- Initiate requests to the district utility coordinator to modify agreements that would allow the contractor's forces to perform work under change order. Section 5-1.36D, "Nonhighway Facilities," of the *Standard Specifications* covers such work by the contractor.
- Initiate any changes in the order of work that would eliminate or mitigate an excusable delay or critical delay, provided that any cost involved would not exceed the estimated cost resulting from a delay.

If an excusable delay or critical 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 8-1.07C, "Payment Adjustments," of the *Standard Specifications*.
- 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, pay only 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.

3-806B Material Shortage

Material shortage is defined in Section 1-1.07, "Definitions," of the *Standard Specifications*. Do not make a time adjustment for a material shortage. Days during a material shortage are considered nonworking days. Before a determination of nonworking days can be made, several conditions must be satisfied:

- A request for information for the delay exists.
- The contractor's request for information must be received no later than 15 days after the material shortage first caused the work delay.
- The delay must affect the controlling activity.
- If the delay does not affect the controlling activity, advise the contractor accordingly in writing. If the contractor asks to be allowed to substitute the unavailable material with available material, the resident engineer must seek assistance from those responsible for the design. Change orders are to be processed as contractor-requested changes.
- The materials, articles, parts, or equipment are standard items.

  Standard items are produced to meet the specifications of such industry-wide organizations as the American Association of State Highway and Transportation Officials, the American Society for Testing and Materials International, the American Wood Protection Association, the American Institute of Steel Construction (AISC), and the U.S. Department of Agriculture (USDA). The fact that Caltrans 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 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:

  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 Caltrans plans and specifications are not standard items. The following are examples of nonstandard items:

1. Processed structure backfill material
2. Pervious backfill material
3. Aggregates for bases and subbases

4. Aggregates for cement-treated base, hot mix asphalt, concrete, rock slope protection, and screenings
5. Wood chips
6. 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.

- If a "physical shortage" exists.

  The term "physical shortage" means that the standard item or component of a standard item is not available at the time it is required for work on a controlling activity. However, do not consider a time adjustment 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

  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.

- Whether the contractor diligently tried to obtain the material.

  Require the contractor to furnish 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 proof of efforts to obtain material from alternate sources that normally supply 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. 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.

3-807 Liquidated Damages

Section 8-1.10A, "General," of the *Standard Specifications* lists the daily rate to be charged for damages related to a contract time overrun.

3-807A Failure to Complete Work Parts Within Specified Times

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:

3-807A (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.

3-807A (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 change orders. Time adjustments resulting from change orders should have been resolved before the contract's acceptance in accordance with Section 5-3, "Change Orders," of this manual. For those instances where extenuating circumstances result in unresolved time for change orders after completion, complete all deferred-time 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.

3-807A (3) Case 3

The district intends to change the status of time from that shown on the final "Weekly Statement of Working Days" by changing working days to nonworking days. Obtain concurrence for making such changes from the Division of Construction. Report the recommended disposition of each item of unresolved time so clearly and completely that no interpretation or further explanation is needed. Upon receipt of the recommendations, the division 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	3/06/2012	744
First working day	3/21/2012	755
Working days specified in contract		40
Computed date for completion	5/15/2012	794
Total change order time adjustments, final CEM-2701		5
Nonworking days, final CEM-2701		75
Additional change order days (if applicable)		14
Additional working days recommended (if applicable)		10
Extended date for completion	10/12/2012	898
Date contract completed	10/12/2012	898
Remaining overrun		0

After the disposition of overruns has been determined, the district will advise the contractor directly. Place copies of all memorandums in the project files 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.

3-807A (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 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.

3-808 Contractor's Control Termination

3-808 Contractor's Control Termination

Section 8-1.13, "Contractor's Control Termination," of the *Standard Specifications* explains the contractual requirements for terminating the contractor's control of the work. 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, fails to make proper and timely

payments to subcontractors, or fails in any other respect to perform the work with the diligence and force specified by the contract. Normally, when Caltrans terminates the contractor's control, the surety (bonding company) assumes responsibility for completing the contract. The following are guidelines for determining if the contractor may be failing to supply an adequate workforce:

- If the "percent completed" of the contract is more than 25 percent behind the "percent time elapsed." These percentages can be found in the project status report.
- Complete cessation of the work.
- The work 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 of control may be necessary, the resident engineer must immediately notify the construction engineer and construction manager.

With agreement from the construction engineer, the Division of Construction field coordinator, and the structure construction engineer (if applicable), 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 8-1.13, "Contractor's Control Termination," of the *Standard Specifications*, Caltrans will start the termination of control process if the defaults are not remedied. A copy of this letter is sent to the contractor's surety. Typically, Caltrans allows 5 business days to remedy either failure to supply an adequate work force or failure to supply proper quality material. Generally, 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 of control process. The request must include:

- 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 Division of 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, giving the contractor 5 business 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 5-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 5-day notice letter in the most conspicuous place within the project limits. If the contractor does not remedy the defaults within the time required, the Division of Construction chief will send a letter to the contractor stating that the contractor's control of the work has been terminated. The Division of Construction field coordinator will notify the district of the effective starting date of the notice and will transmit any further instructions deemed necessary.

All 5-day notices and termination of control letters must include the following language:

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

Once the contractor's control has been terminated, the Division of Construction field coordinator will notify the arbitration engineer in the Division of Construction by forwarding a copy of the termination letter. The arbitration engineer will update and maintain the termination database.

The district will maintain a file that can be used as evidence to defend the termination or in a future responsibility hearing for the terminated contractor. The file should remain in the district for a minimum of three years.

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.

For additional information, refer to the *Construction Field Coordinator's Termination Desk Guide* on the Division of Construction's intranet:

http://construction.onramp.dot.ca.gov/field-coordinators

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

3-808A Work Completed by the Surety

As requested by the surety, the Division of 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 recommended by the surety. The recommended 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 Division of 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 Division of Construction field coordinator will review the agreement and forward it to the Legal Division. Both the Division of Construction field coordinator and the Legal Division recommends approval. The Division of Construction chief approves either agreement.

In 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 any 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.

3-808B 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. In 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 any 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 contractor and the surety 3 days 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 either the surety 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 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
- Change orders
- All other pertinent information

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

3-808B (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.

3-808B (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 the Caltrans maintenance forces.

3-808B (3) Section 3

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

3-808B (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 finished its contract.

3-808B (5) Section 5

This section shows the amounts determined in Sections 1, 2, 3, and 4, and adds 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.

3-808C Billing

The resident engineer sends the detailed billing, as described above, to the Division of Accounting abatements section, with instructions to prepare the accounts receivable bill and to mail it to the contractor. If the contractor is not available, the resident engineer should mail it 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 Division 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.

3-809 Contract Termination

3-809 Contract Termination

Section 8-1.14, "Contract Termination," 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 not in the best interest of Caltrans to continue with the project.

When the majority of the contract work has been completed, it is preferred to delete the remaining work by change order, accept the contract, and provide additional payment to the contractor, if necessary, in accordance with Section 9-1.17C, "Proposed Final Estimate," of the *Standard Specifications*.

Termination of contracts is rare. The Division of Construction must ensure that all necessary steps are taken in handling contracts terminated for the best interests of Caltrans. 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:

- 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 of Project Delivery, 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 in accordance with Section 8-1.14, "Contract Termination," 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 9-1.17D, "Final Payment and Claims," of the *Standard Specifications*.

For additional information, refer to the *Construction Coordinator's Termination Desk Guide* on the Division of Construction's intranet website.

3-809A Federal-Aid Contracts on the National Highway System

For federal-aid contracts, the resident engineer or construction engineer must contact the Division of Construction field coordinator to obtain concurrence from the Federal Highway Administration's engineer on the termination of a contract. Refer to the Code of Federal Regulations, Title 23, Section 635.125.

Section 9 Payment

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Section 9 Payment

Section 9
Payment

3-901 General

3-901
General

This section covers measurement and payment of bid item work and change order work, partial payments, and payment to the contractor after contract acceptance. The contract provides the following methods to make payment for all work performed:

- Payment for bid item work at unit prices. The contractor establishes the fixed prices of the bid items included in the contract. Fixed prices of bid items should not be confused with the costs to produce the work. Loss of profit, damage, repair, cost escalation, or other unanticipated changes of item costs are the sole responsibility of the contractor unless specifically provided for in the contract.
- Adjustments to contract prices (known as payment adjustments).
- Payment for change order work. Before payment can be made for change order work, the resident engineer must issue an approved change order as described in Section 5-3, "Change Orders," of this manual. For additional information regarding Caltrans policies on change order work, refer to Section 3-403, "Changes and Extra Work," of this manual. The methods specified for paying for change order work are bid item prices, force account, agreed price, and specialist billing.
- Deductions and withholds are temporarily or permanently taken from monies due under the contract.

3-902 Measurement

3-902
Measurement

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

3-902A Method of Measurement

Check the "measurement" and "payment" clauses in the specifications for the required method of measurement for each bid item. Use the specified method to measure quantities. For more information about measuring quantities for specific bid items, refer to Chapter 4, "Construction Details," of this 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 change order.

3-902B Accuracy

Measure and calculate bid item quantities to a degree of accuracy consistent with the unit 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 within 0.2 percent to 0.5 percent. A $50,000 item should be measured and calculated to result in payment within about $100.

3-902C Source Documents

Enter measurements and calculations for bid item quantities on permanent record sheets that are commonly referred to as "source documents." Include on each source document the appropriate bid 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 bid item quantities as the work on a bid 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, refer to Section 5-1, "Project Records and Reports," of this manual.

3-902D 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 bid item.

Consider organizing source documents for each bid item so an easily followed audit trail exists. Category 47, "Drainage Systems," 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 bid items. Category 48, "Bid Item Quantity Documents," in the same manual section, describes the numbering system to be used for source documents for other bid items.

3-902E Weighing Equipment and Procedures

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

3-902E (1) Personnel

The process of determining bid item quantities by weighing and measuring 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 are involved in the weighing and measuring process:

- County sealers of weighing and measuring devices
- Representatives of the California Department of Food and Agriculture, Division of Measurement Standards
- Private scale technicians performing *Material Plant Quality Program (MPQP)* testing.

3-902E (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 measuring:

3-902E (2a) Resident Engineers

The resident engineer 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 measuring device.
- To ensure accuracy, order the resealing and retesting of scales and meters as often as necessary.
- Determine when weighmaster certificates are to be used. Order the use of weighmaster certificates except when the number of loads is very small or conditions preclude proper weighing procedures. In the daily report, record the reasons for not using weighmaster certificates.

3-902E (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 the *MPQP*
- Furnish copies of the *MPQP* report to each project using material plants tested in accordance with the *MPQP*.
- Furnish and attach Form CEM-4204, "*MPQP* Acceptance 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 measuring devices and procedures in the district, and furnish written reports to the resident engineer.
- Determine whether any weighing or measuring problems should involve the California Department of Food and Agriculture, Division of Measurement Standards. Request any such involvement through the Division of Construction weights and measures coordinator.

3-902E (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. 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 that the district weights and measures coordinator observes 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 measures coordinator. Check the scale sheets and weighmaster certificates to ensure they are being used properly.
- Spot-check tare and gross weights to see that weighmasters are using the correct tare. Ensure the weighmaster is licensed for the scale location.
- Observe all meters that are required under the contract, and ensure they have been tested and sealed.
- Collect weighmaster certificates at delivery. A Caltrans employee should be present at the work site to collect weighmaster certificates. Sign or initial the weighmaster certificate to indicate that the represented material was used in the work.

When certified summary scale sheets are used, and weighmaster certificates 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 the type of 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 weighmaster certificates or scale sheets representing loads or partial loads that are not to be paid for. On the weighmaster

certificate 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 whom you advised of the reduction.

3-902E (2d) Contractors

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

- The contractor and materials suppliers must maintain scales and meters within the accuracy specified.
- 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 noncommercial devices, the contractor must ensure the *MPQP* test 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.

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.

3-902E (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 California Department of Food and Agriculture, Division of Measurement Standards.
- Keeps the district weights and measures coordinators informed of the latest equipment and technology being developed throughout the industry.

3-902F Final Pay Items

Section 9-1.02C, "Final Pay Item Quantities," of the *Standard Specifications*, defines and specifies the procedure for calculating pay quantities for final pay items.

3-903 Force Account

3-903 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 9-1.04, "Force Account," of the *Standard Specifications* specifies the force account method of payment. Section 5-3, "Change Orders," of this manual contains examples of change orders with payment for extra work at force account.

Normally the contractor will use labor and equipment that is on the site and used for work in progress. The 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.

3-903A Authorization for Force Account Payment

On the authorizing change order, always show the amount to be paid for extra work at force account as an estimated amount. For the format for change orders, refer to Section 5-3, "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 change order.

3-903B Force Account 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 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.

The daily report must also contain a reference to any known off-site work.

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. 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:

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].

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:

6/24/16 – 10:15 a.m. – Change Order No. 17 – Placing Riprap Lt. of Sta. 500.

Crew of two laborers and foreman with a D-6 crawler tractor with side-boom and operator laid about 150 sq ft of salvaged rubble riprap. Estimate crew and tractor worked about 4 hours.

3-903C 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 shift or no later than the following shift 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 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.

3-903D Markup for Subcontracted Work

Section 9-1.04A, "General," of the *Standard Specifications* includes an administrative markup 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 markup in the calculation of the work performed by a subcontractor in the following situations:

- Changes and extra work at the agreed prices in accordance with Section 4-1.05A, "General," of the *Standard Specifications*.
- Work performed before item elimination in accordance with Section 9-1.06D, "Eliminated Items," of the *Standard Specifications*.
- Bid item adjustment due to increased or decreased quantities in accordance with Section 9-1.06B, "Increases of More Than 25 Percent," and Section 9-1.06C, "Decreases of More Than 25 Percent," of the *Standard Specifications*.
- Payment adjustments for work-character changes are made in accordance with Sections 4-1.05B, "Work-Character Changes," and 9-1.15, "Work-Character Changes," of the *Standard Specifications*.

3-903E Owner-Operated Labor and Equipment

For owner-operated labor and equipment, refer to Section 9-1.04A, "General," of the *Standard Specifications*. The method for paying for owner-operated equipment on a force account basis is at market-price invoice. Because owner-operators include labor and equipment markups and the labor surcharge in their invoice price, only apply the applicable administrative markup for the owner-operated labor and equipment invoice. The administrative markup to be applied to the invoice for projects with the time-related overhead bid item is 10 percent. The administrative markup to be applied to the invoice for projects without the time-related overhead bid item is 15 percent.

3-903F Billing for Extra Work at Force Account

The following are the procedures for billing for extra work at force account:

- The contractor must submit change order bills covering extra work under each change order each day that extra work is performed. The contractor must use the Caltrans internet change order billing system to submit change order bills. Refer to Section 5-103E, "Change Order Billing," of this manual for additional information.
- Field construction personnel must do the following when reviewing change order bills:

    1. Compare change order bills against assistant resident engineer's daily 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 assistant resident engineer's daily reports and tentative agreements, refer to Sections 3-903B, "Force Account Records," and 3-903C, "Tentative Agreements," of this manual.
    2. The contractor must include everything to be paid for on the change order 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 change order 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. Reject any change order bill with incorrect wage rates. 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 reject the reports. 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 a change order bill must print out, sign (not initial) and date the corrected change order bill.
    8. Maintain a log of change order bills received and rejected.

The resident engineer must approve the change order bill to authorize payment for extra work. The resident engineer's approval of a change order bill for progress

payment certifies that payment is in accordance with contract requirements and established administrative procedures.

3-903G Labor

The markups to be applied to the cost of labor performed on force account work are specified in Section 9-1.04B, "Labor," of the *Standard Specifications*, or as changed by the special provisions.

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 change order 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 bid item work.

When 7-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 bid item work in the same day, prorate subsistence payments and travel allowances between the contractor and Caltrans. Base the prorated amount on the first 8 hours worked. Do not pay per diem for time worked after the first 8 hours in any one day.

3-903H 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 change order bill. In the statement, explain how the unit prices were verified. Any invoice the contractor submits must represent the material actually used.

3-903I Equipment Rental

For equipment used for extra work paid at force account, refer to Section 9-1.04D, "Equipment Rental," of the *Standard Specifications* or as modified by the special provisions. The following are guidelines for paying for equipment rental.

3-903I (1) Equipment Selection

In accordance with Section 5-1.03, "Engineer's Authority," of the *Standard Specifications*, approve equipment used on force account work. Before giving approval, determine whether available and suitable equipment is already on the job site or whether equipment not on 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 if it will be economical to use oversized equipment at its rate or to obtain equipment of the proper size. Obtaining equipment not on the job site necessitates payment for move-in and move-out expenses and for minimum rental periods. The determination may also be based on other factors, such as public safety and the urgency of the work. Availability of equipment on the job site can be determined by using daily diaries, progress schedule, and other contractor-provided information. When there is no contractor-owned equipment available for use and only rented equipment is available on the job site, the engineer may approve the use of the rented equipment at the rental invoice price in accordance with Section 9-104D, "Equipment Rental," of the *Standard Specifications*. If both contractor-owned and rented equipment on the job site are suitable and available for use, the contractor-owned equipment should be used.

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. When the accessories are not integral and not necessary for the effort of the extra work, payment is only for the equipment required.

3-903I (2) Equipment Rental Rates

The *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* book contains the cost of ownership rates for most of the equipment used on Caltrans projects. However, the Division of Construction has also established cost of ownership rates for some equipment that is not in the book. These rates are available on the Caltrans Division of Construction website. To establish rates that are not listed in the book or on the website, 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, 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 cost of ownership rate, codes, and effective time period and advise the district by mail, email, 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 job site, 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 9-1.04D(1), "General," of the *Standard Specifications*. The higher rate will constitute a change to the contract and must be established by a 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 9-1.04D(1), "General," 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 change order that provides for the proposed rate. State in the change order whether the table titled "Equipment Rental Hours" is applicable. The table appears in Section 9-1.04D(3), "Equipment Not On the Job Site and Not Required for Original-Contract Work," of the *Standard Specifications*. If the equipment is used for bid item work, use the normally established rental rates for the entire time the equipment is used for extra work. Include in the change order a clause similar to the following: "In the event this equipment is subsequently used on bid item work, this rate is void."
    4. Include justification for approval in the 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.

3-903I (3) Time in Operation

The engineer in the field must determine the rental time to pay for equipment in accordance with Section 9-1.04D(2), "Equipment on the Job Site," 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 on the job site for 8 hours on a force account operation. It is actually used for only a few periods during the 8 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 bid item work intermittently, prorate the 8 hours between the extra work and the bid item work.
- An air compressor is on the job site for 8 hours. It is used for the first 2 hours, but after those hours, it is no longer needed. Pay the rental for only 2 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 2 hours and a tamper intermittently for 2 hours, pay 2 hours for each tool. If the pavement breaker is needed for the first hour and the tamper for a second hour, pay 1 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, however the skip loader is used only intermittently during the shift because one of the dump trucks broke down. The resident engineer allows the operation to continue because it is critical. Make payment for the loader for the entire shift. In such a situation, the resident engineer must try to do whatever is necessary to balance the operation. When balancing cannot be achieved, 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 accept (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.

3-903I (4) Equipment Not on the Job Site

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 on the job site that must be brought in especially for the extra work. The resident engineer should make decisions regarding the type of equipment and its scheduled use. Sections 9-1.04D(3), "Equipment Not On the Job Site and Not Required for Original-Contract Work," and 9-1.04D(4), "Equipment Not On the Job Site and Required for Original-Contract Work," of the *Standard Specifications* specify the requirements for paying for the use of such equipment. These specifications apply when the contractor does not use or uses the equipment for bid item work. Change any previous payment as "equipment not on the job site" to payment as "equipment on the job site" when such equipment is used for bid 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. Perform a cost analysis to determine the most cost-effective alternative. 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.

3-903I (5) Non-Owner-Operated Dump Truck Rental

Section 9-1.04D(5), "Non-Owner-Operated Dump Truck Rental," of the *Standard Specifications* specifies that 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 with 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.

3-903I (6) Standby Time

Pay standby charges for commercial delivery at the invoice rate.

3-903J Extra Work Performed by Specialists

Section 9-1.05, "Extra Work Performed by Specialists," of the *Standard Specifications*, allows extra work to be performed by a specialist subcontractor that neither the contractor nor its current subcontractors can perform. In general, specialists are to be used only for minor portions of the work. The specifications also allow for the specialist work to be paid for by invoice if itemized billing is not the established practice of the specialist's industry.

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 bid 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, do not authorize the use of the specialist.
- Allow the contractor to hire a specialist only if an established firm with established rates would do the work.

- Districts must establish procedures to pre-approve invoiced billing. Invoiced billing must not be used to circumvent the force account method for determining payment.

3-904 Payment Adjustments

3-904 Payment Adjustments

A payment adjustment is a monetary increase or decrease applied to the unit price of a bid item. The adjustment is a change to the contract and must be made by change order. Payment adjustments are either unit adjustments to the unit price of a bid item or they may be a lump sum increase or decrease applied to a bid item.

Payment adjustments are provided for in Sections 9-1.06, "Changed Quantity Payment Adjustments"; 9-1.15, "Work-Character Changes"; "9-1.17C, "Proposed Final Estimate"; and 9-1.17D(2)(b), "Overhead Claims," of the *Standard Specifications*. Other payment adjustments may be required, depending on the bid items, such as hot mix asphalt and concrete pavement.

Do not pay for payment adjustments until change orders authorizing the adjustments have been approved.

If you anticipate that payment adjustments in accordance with Sections 9-1.06, "Changed Quantity Payment Adjustments," or 9-1.15, "Work-Character Changes," of the *Standard Specifications* will result in decreases in final payment, withhold an amount sufficient to cover the value of the decrease.

For more discussion about determining payment adjustments, refer to Section 5-3, "Change Orders," of this manual.

3-904A Changed Quantity Payment Adjustments

When the total pay quantity of a bid item varies from the Bid Item List by more than 25 percent, the variation may be the result of more or fewer units than shown in the Bid Item List 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 exceeds 25 percent, adjust the compensation in accordance with Section 9-1.06, "Changed Quantity Payment Adjustments," of the *Standard Specifications*, or document in the contract records the reason for not making a payment adjustment. When the accumulated increase or decrease in bid item units shown on a change order exceeds 25 percent of the Bid Item List, the overrun or underrun must be acknowledged and provided for in the current change order. Refer to Section 5-306C, "Methods of Payment," of this manual for more information on change orders. Provide for this overrun or underrun through one of the following options, whichever is applicable:

- Adjust the contract price in accordance with Section 9-1.06, "Changed Quantity Payment Adjustments," of the *Standard Specifications*.
- Defer any payment adjustment due to the overrun or underrun.
- State in writing that the bid item is not subject to adjustment. Refer to Section 5-3, "Change Orders," of this manual for a discussion and examples of change orders providing for payment adjustments resulting from increased or decreased quantities.

3-904A (1) Increases of More Than 25 Percent

It is usually appropriate to defer adjustment if work on the bid item has not been completed. Additional change orders may affect 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 change order. When work on the bid item is completed, apply the unit adjustment to the total number of units in excess of 125 percent of the quantity shown on the Bid Item List.

Unless requested by the contractor in writing, the engineer does not have to adjust the contract price of an item if the bid item cost of the work in excess of 125 percent of the quantity shown on the Bid Item List is less than $5,000. However, before exercising this right, verify that 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.

3-904A (2) Decreases of More Than 25 Percent

If a bid item underruns the quantity shown on the Bid Item List 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.

3-904A (3) Eliminated Items

Section 9-1.06D, "Eliminated Items," of the *Standard Specifications* applies only to bid 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 change order providing for the elimination of a bid item, ensure it covers the disposition of surplus material. Refer to Section 3-904A (4), "Surplus and Salvaged Material" of this manual for how to handle surplus material resulting from an eliminated item that cannot be returned to the vendor.

3-904A (4) Surplus and Salvaged Material

Minor differences between quantities of material required to complete the planned work and quantities shown in the Bid Item List 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 quantity shown on the Bid Item List, include any actual loss due to excess material in the costs as computed in accordance with Section 9-1.06C, "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 usable 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 9-1.06D "Eliminated Items," of the *Standard Specifications*. The guidelines below describe how to dispose of material that the contractor cannot economically dispose of.

A determination to salvage items made surplus by ordered changes should be based 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.

Also, 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.

3-904B Payment Adjustments for Price Index Fluctuations

Section 9-1.07 "Payment Adjustments for Price Index Fluctuations," of the *Standard Specifications* specifies payment adjustments for various bid items that contain paving asphalt. The payment adjustment occurs when the California statewide crude oil price index fluctuation exceeds the threshold as described in the contract specifications. Compensation is adjusted when the paving asphalt price fluctuates from the month of the bid date to the month in which the contract item containing paving asphalt was placed. Refer to the example in Section 5-3, "Change Orders," of this manual.

It is important to make timely payments for price index fluctuations. Increases in the cost of paving asphalt may place financial burdens on contractors and can cause projects to exceed allocated supplemental and contingency funds. The resident engineer is responsible for the following:

- Initiating a change order within 30 days of contract approval.
- Verifying that monthly payment adjustments for paving asphalt are included in monthly estimates when items that contain paving asphalt are used.
- Monitoring monthly expenditures and estimating future months of expenditures of payment adjustments for paving asphalt to avoid exhausting the project supplemental funds and contingency balance.
- Notifying the construction engineer and project manager if you anticipate the project contingency balance will be depleted so that appropriate action can be taken.

- At the time of bid, the contractor has the option to opt out of payment adjustments for price index fluctuations. Form DES-OE-0102.12A, "Opt Out of Payment Adjustments for Price Index Fluctuations," is included in the bid book. To determine if the contractor has opted out, review the bid book for the project. If the opt out form in the bid book is not completed, then all of the requirements apply to the project.

3-904C Work-Character Changes

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

When calculating the adjustment for a change in work-character, 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, "Change Orders," of this manual contains examples of calculations and sample change orders.

3-905 Time-Related Overhead

3-905 Time-Related Overhead

Section 9-1.11, "Time Related Overhead," of the *Standard Specifications* applies to projects that have a time-related overhead bid item. This section includes a description of time-related overhead and a description of time-related field- and home-office overhead included in the time-related overhead bid item. The contractor includes time-related overhead costs in the time-related overhead bid item. Overhead that is not related to time is included in the various other bid items. Any contract time adjustments made by change order will result in an equivalent adjustment to the time-related overhead bid item quantity.

The markups for force account work performed by the prime contractor on time-related overhead projects are modified in Section 9-1.04A, "General," of the *Standard Specifications*.

Refer to Section 5-409, "Overhead Claims," of this manual for information regarding claims for overhead for projects without a time-related overhead bid item.

3-905A Audit Examination and Reports

When the time-related overhead bid item quantity exceeds 149 percent of the quantity at time of bid, consult with your district management before requesting that the contractor provide an audit of its overhead costs. Refer to Section 5-409, "Audits," of this manual for more information.

3-905B Payment

Time-related overhead is paid on the monthly progress payment for each working day charged during the pay period. The quantity of time-related overhead is not adjusted for concurrent delays. The quantity of time-related overhead will be adjusted only as a result of critical delays that revise the current contract completion date. Adjustments to contract time are handled as follows:

- If contract time is adjusted by change order, and there are no revisions to working days charged to date, payments for the adjusted time occurs when the original bid item quantity is exceeded.

- If you have charged nonworking days that you later determine to be a critical delay, write a change order to make a time adjustment and promptly pay for the revised working days charged to date.

3-906 Progress Payments

Section 9-1.16, "Progress 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 payment for change order bills that are submitted timely. Also include payment for extra work performed at agreed price and payment adjustments. Billing for this work must be submitted by the resident engineer during the pay period in which the work was performed.

Resident engineers must transmit to the district construction office the documents and information required to prepare progress payment vouchers. All 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.

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. Form CEM-4801 is shown in Example 3-9.1. 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. Refer to Section 3-902C, "Source Documents," in this manual for a discussion of source documents. Example 3-9.1, "Quantity Calculations," is a sample of a source document.

The quantity shown on the estimate for a bid item must agree with the sum of the quantities to date on all of the source documents for that item.

The resident engineer is responsible for the accuracy of a progress pay estimate. By approval, the resident engineer verifies that the quantities are correct and that 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.

Refer to Section 5-103, "The Contract Administration System," of this manual for technical details on the production of estimates.

3-906A Bid Items

Include all bid item work completed satisfactorily in accordance with the contract in progress payments. Do not include in progress payments preparatory or organizational work such as assembling equipment, shop work, forming, or crushing or stockpiling of aggregate (unless provided for in the special provisions). Do not pay for material

placed or installed for which you have not obtained 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).

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.

Refer to intermediate source documents for items that are bid on a unit basis with a fixed final pay quantity, such as structural concrete 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 the withheld amount on a force account analysis of the remaining incidental work.

The following examples are listed to illustrate the procedure for partial payments:

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 bid 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. Structural Concrete, Bridge (Final Pay Quantity)

   Bridge construction generally requires erecting falsework to carry dead loads of concrete (or steel) members until they become self-supporting. When falsework supports the superstructure concrete of box girder or slab bridges, make partial payments for the bid item.

   When the soffit plywood is complete in place, make a partial payment equivalent to 35 percent of the projected superstructure concrete volume.

   Withhold 5 percent for removal of the falsework materials and the final surface finishing of concrete.

9. Bar Reinforcing Steel

   Pay for bar reinforcing steel that is complete and 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. Refer to the *Bridge Construction Records and Procedures* manual for additional instructions.

For lump sum bid items, if a schedule of values is required, refer to Section 3-906B, "Schedule of Values," of this manual. Otherwise, pay a percentage of the lump sum bid price as work progresses. Use for this calculation 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. Be aware that such a simplified method might not reflect the value of the work actually 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 5-1.39B, "Damage Caused by an Act of God," of the *Standard Specifications*.

Do not pay for item work added by change order until the change order is approved. However, payment for bid item overruns that are not the result of a change in the contract may be included in the monthly estimate.

3-906B Schedule of Values

A schedule of values is required for specific lump sum bid items such as electrical systems. Building construction will also be a lump sum bid item and will require a schedule of values as specified in the special provisions. Structure Construction will

provide a technical review to ensure progress payments can be based on the value of the work in place.

3-906C Extra Work

Do not pay for change order work until the change order is approved. Refer to Section 3-403, "Changes and Extra Work," Section 3-906D, "Interest" and Section 5-3, "Change Orders" of this manual, for further information on change orders providing for extra work.

3-906D Interest

Section 9-1.03, "Payment Scope," of the *Standard Specifications* provides for interest to be paid on unpaid and undisputed progress payments, payments after acceptance, change order bills, claim payments, and awards in arbitration.

Keep a log of the dates when change order bills are received, rejected, and resubmitted. In a timely manner, process all change order bills, and fully document reasons for rejecting change order bills.

Make interest payments for late payments by change order as a payment adjustment at lump sum. Refer to Section 5-3, "Change Orders," of this manual for more information.

3-906E 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 in duplicate a properly completed Form CEM-5101. 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 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." Form 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. Piling—Steel plate used for steel pipe piling and driven steel shells filled with concrete and reinforcement as described in Section 49, "Piling," of the *Standard Specifications* may be considered acceptable as raw material. However, pay for such material as raw material only until shop fabrication of the pile 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. Structural Steel—Structural steel used in steel structures as described in Section 55, "Steel Structures," 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 job site) is 100 percent complete. After shop fabrication is complete, the estimated fabricated value may be paid, subject to other specified restrictions and administrative guidelines.

3. Sign Structures—Structural steel used in overhead sign structures as described in Section 56, "Overhead Sign Structures, Standards, and Poles," 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:

3-906E (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.

3-906E (2) Materials Not at the Project

For materials not delivered to the job site, obtain evidence, and establish the fact of purchase, proper storage, acceptability, accessibility, and other factors. Materials Engineering and Testing Services (METS) maintains representatives in major industrial areas and provides inspection in all other areas for this purpose. The following is the procedure for requesting METS assistance:

- 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 immediately notify the appropriate inspection office or offices. The METS representative will notify the resident engineer directly using 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 Form CEM-5101 and the above verification, the resident engineer can approve the partial payment. The contractor must submit a new Form 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.

3-906F Withholds

3-906F (1) Progress Withholds

Progress withholds are usually determined by noncompliant (unsatisfactory) progress. Whenever a contractor's performance is unsatisfactory, the resident engineer notifies the contractor of the apparent failure.

3-906F (1a) Noncompliant Progress

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. Refer to Section 9-1.16E(2), "Progress Withholds," of the *Standard Specifications* for noncompliant progress conditions.

After each progress estimate, update Form CEM-2601. The Contract Administration System (CAS) uses the formula contained on this form to determine progress. For a description of this process, refer to 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.

The percentage of work completed (except on landscape projects with Type 1 plant establishment) is determined by dividing the amount on the line titled "Total Work Completed" on the "Project Record Estimate" by the "Authorized Final Cost" on the "Project Status." CAS calculates this percentage. Calculations for percentage of work

completed for Type 1 plant establishment are shown in Section 3-906F (1b), "Plant Establishment work," of this manual.

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," on Form CEM-2701, "Weekly Statement of Working Days."

Whenever the contractor fails to prosecute the work adequately, evidenced by the plot of actual progress and your concurrence, you must notify the contractor of the apparent lack of progress. If you judge that the work on the remaining work activities will not be completed by the "computed date for completion" as defined in Section 3-804, "Time," of this manual, you must request that the contractor submit a revised schedule showing how the balance of the work will be carried out.

Occasionally, the resident engineer has information indicating that the percent of time elapsed is different from that which CAS will calculate. 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 described above. 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-6101, "Project Record—Estimate Request." CAS will calculate satisfactory or unsatisfactory progress based on this figure.

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 district will initiate the notification.

If the district believes the lack of progress on a contract justifies a meeting, the district arranges 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 Section 3-808, "Contractor's Control Termination," of this manual.

3-906F (1b) Plant Establishment Work

For specifications and administrative guidelines for plant establishment time requirements refer to Section 20-4, "Plant Establishment Work," of the *Standard Specifications*, and Section 4-2002C (8), "Plant Establishment Work," of this manual. In general, a withhold 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 for Type 1 and Type 2 plant establishment.

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 before the start of plant establishment. After the start of Type 1 plant establishment, the resident engineer will decide if the progress is satisfactory. In general, consider progress 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.

Determine the percentage 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 on Form CEM-2701 by the total contract time limit plus "Total change order days approved to date" on Form CEM-2701 and minus the length of the plant establishment period.

$$\% \text{ Time} = \frac{\text{Working Days Elapsed}}{(\text{Orig. Cont. Time} + \text{Time Ext. to date} - \text{Plant Estab. Period})}$$

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-6101, "Project Record-Estimate Request."

3-906F (2) Performance Failure Withholds

Whenever the contractor fails to comply with a contract part, including timely submittal of a required document, the resident engineer notifies the contractor of the apparent performance failure. For example, performance failure withholds may be taken for the following required documents:

- Quality control plan
- Baseline schedule
- Updated schedules
- Revised schedules
- Time impact analyses
- Final schedule
- Traffic control plans
- Traffic contingency plan
- Water pollution control plan
- Storm water pollution prevention plan

The resident engineer gives the contractor 7 days from this notification to either provide the submittal or a request for information. If neither is provided timely, the resident engineer should take the performance failure withhold in the next progress pay estimate. If the contractor submits a request for information, the resident engineer should allow another 7 days from the time the request for information is answered in full before taking the performance failure withhold. Refer to Section 9-1.16E(3), "Performance Failure Withholds," of the *Standard Specifications*. Other withholds such as progress withholds, stop notice withholds, and penalty withholds are separate and may be taken simultaneously if justified.

3-906F (3) Stop Notice Withholds

Refer to the Division of Accounting all inquiries regarding bills for labor, material, or equipment rental not paid by Caltrans' contractor. Detailed information for construction payments, legal withholds, labor compliance withholds, levies and liens,

including stop notice contacts can be found on the Division of Accounting "Major Construction Payment and Information" website:

http://www.dot.ca.gov/hq/asc/oap/payments/

3-906F (4) Penalty Withhold

For penalty withholds, refer to Sections 7-1.02, "Laws," and 9-1.16E(5), "Penalty Withholds," of the *Standard Specifications*. Penalty withholds may become a deduction if appropriate. Withholds may be required per Sections 7-104, "Air, Water, and Noise Pollution Control"; 7-105, "Permits, Licenses, Agreements, and Certifications"; and 8-102, "Labor Compliance Responsibilities," of this manual.

3-906G Deductions

Deductions (as opposed to withholds) are those amounts held back for specific purposes. The resident engineer must identify, initiate, and control all deductions. Refer to Section 5-103F (1c), "Deductions," of this manual for information on administering 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, 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 probable 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 withhold for unsatisfactory progress. Enter the amount and description of deductions on Form CEM-6101, "Project Record-Estimate Request," and check "Override Unsatisfactory Progress," to prevent the withhold.

3-906H Supplemental Progress Payments

Resident engineers are responsible for the completeness and accuracy of each progress payment. Supplemental progress payments are used to correct omissions or make adjustments to a previously processed progress payment estimate for work performed within that pay estimate period. Supplemental progress payments may be run only between the completion of the original monthly progress payment and the 15th of the following month.

Refer to Section 5-103F, "Generating Estimates," of this manual for the process of generating a supplemental progress payment.

3-906I Negative Estimates

The resident engineer is responsible for the accuracy of all payment estimates, including progress payment, after acceptance, semifinal, and final estimates. Negative estimates reflect an overpayment made to the contractor. When a negative estimate is necessary, you must prepare a brief justification and submit it with the estimate request to the district construction office. The district construction office must obtain

concurrence from the deputy district director of construction, or delegate, and the Division of Construction's field coordinator before running the negative estimate.

When a negative estimate is approved for processing, the Division of Accounting bills the contractor for the amount due. If, for any reason, you believe that the contractor should not be billed, notify the district construction office and the Division of Construction progress pay coordinator. Once notified, the Division of Construction progress pay coordinator, with the Division of Construction field coordinator's concurrence, will notify the Division of Accounting not to bill the contractor.

Section 3-907E, "Payment Offset," of this manual describes another method available to the resident engineer and the Division of Accounting to resolve overpayment to the contractor.

3-907 Payment After Contract Acceptance

3-907 Payment After Contract Acceptance

Caltrans makes final payment as soon as possible after the contract is accepted and the contractor submits the required documents requested by the resident engineer. Any estimate covering a payment after contract acceptance is identified either as "after acceptance," "semifinal," or "final."

Soon after the contract is accepted, meet with the contractor to discuss submitting required information to complete the contract. If the contractor does not submit required data within 4 weeks after acceptance, you must notify the contractor in writing that Caltrans will issue the proposed final estimate and deduct the appropriate amount. Section 5-406, "Claims Resolution Process," of this manual lists the timeline for completing payment steps after the acceptance process.

3-907A Payment Before Final Estimate

A payment after acceptance but before the proposed final estimate must adhere to Section 9-1.17B, "Payment Before 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 withheld 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:
   a. Any work completed since the previous estimate
   b. Any errors that may have been discovered and corrected
   c. 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.
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 Form CEM-2402F, "Final Report—Utilization of Disadvantaged Business Enterprises First-Tier Subcontractors."

   The deductions will be in the same amount as for any progress estimate. Refer to Section 8-1, "Labor Compliance," Section 8-2, "Equal Employment

Opportunity," and Section 8-3, "Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises," 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:

   a. Reduced prints of working drawings

   b. Outstanding payrolls that are not yet delinquent

   c. Or any information upon which to base the proposed final estimate, such as payment adjustments of contract unit prices

   The deduction, regardless of the number of outstanding items, will be the lesser of 10 percent of the "Subtotal Amount Earned Without Mobilization," or $10,000, and at least $1,000.

In addition to the steps listed above for determining amounts to be paid or deducted for an 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:

   a. The contractor has delinquent or inadequate payrolls.

   b. The contractor failed to correct deficiencies in its equal employment opportunity program.

   c. 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.
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.

3-907B 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 5-406, "Claims Resolution Process," of this manual.

- Before processing the proposed final estimate, ensure all change order bills submitted by the contractor are processed and ready for payment. Ensure the estimate's issuance is not delayed for change order bills that remain outstanding.
- If the contractor has not submitted required information in a timely manner, the proposed final estimate must still be issued. In this situation, the following guidelines apply:

    1. Anytime before a proposed final estimate is issued, the district may exercise an option described in Section 9-1.04C, "Materials," 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 change order, and have it unilaterally approved. To determine compensation, refer to Sections 9-1.06, "Changed Quantity Payment Adjustments," or 9-1.15, "Work-Character Changes," of the *Standard Specifications.*

        b. If the established cost is necessary to make force account payment on an existing change order, include this established cost as a lump sum payment on a supplemental change order. Also, unilaterally approve this supplemental 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 in Section 3-907A, "Payment Before Final Estimate," of this manual.) 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-6101, "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 3-9.2, "Form Letter for Submitting Proposed Final Estimate to the Contractor."

    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 3-9.3, "Acceptance Statement Form."

    3. The proposed final estimate report showing the status of item payments generated by CAS along with the "schedule of extra work" and "schedule of deductions" reports. Samples of these reports are shown in Examples 3-9.4 through 3-9.8.

    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 deducted 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 the "statement of total amount earned," rather than a "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 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 in accordance with the appropriate option below:

    1. If the returned Acceptance Statement has no exceptions (administrative claims or contract claims) and all documents required under the contract have been received, prepare the final estimate. Refer to Section 3-907D, "Final Payment and Claims," of this manual for more information.

    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 Division of 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.

    5. If the Acceptance Statement is returned requesting a payment adjustment in accordance with Section 9-1.17C, "Proposed Final Estimate," of the *Standard Specifications*, determine if the payment adjustment is warranted. If the payment adjustment is warranted, make the payment in the same manner as for any other adjustment and unilaterally approve in the district. The following is an example of a calculation to determine this payment adjustment:

Example:	
Contractor's original bid (including mobilization)	$100,000
90 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 (10 percent of difference)	$ 500

    6. When the Acceptance Statement is not returned within the specified 30 days, ensure it has not been lost in transit and then proceed in accordance with the appropriate option below:

        a. If all documents have been received, prepare and process the final estimate.

        b. If some documents are still outstanding, request advice from the Division of Construction's field coordinator about further action.

        c. 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 Mile-Post).

A final estimate is, therefore, being processed for issuance to you as provided in Section 9-1.17C, "Proposed Final Estimate," of the *Standard Specifications*.

Sincerely,

District Construction Office

d. 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:

Acknowledgment 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 9-1.17D(2), "Claim Statement," 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.

e. If the initially submitted claim statement is obviously deficient in information, use a paragraph similar to the following example 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 4-1.05A, "General," Section 5-1.43, "Potential Claims and Dispute Resolution," or both of the *Standard Specifications*
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.

f. Examine claims expeditiously. For detailed instructions, refer to Section 5-4, "Disputes," of this manual.

3-907C 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.

3-907D Final Payment and Claims

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 Division of Construction field coordinator to proceed.

Refer to Section 5-406, "Claims Resolution Process," of this manual for more information. As soon as the district approves the final estimate, it must use a transmittal letter. The letter must state the following: "Submitted herewith in accordance with Section 9-1.17D(3), 'Final Determination of Claims,' of the *Standard Specifications* is a copy of the final estimate for your Contract No. X."

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 will mail to the contractor the corresponding copy of the progress payment voucher.

3-907D (1) Material to Submit with the Final Estimate

Before payment of a final estimate, the Division of Construction 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 returned by the contractor. If the contractor has refused to sign the statement, submit it with an explanation of the contractor's refusal.
- 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. Form CEM-2402F, "Final Report—Utilization of Disadvantaged Business Enterprises, First-Tier Subcontractors."

3-907E Payment Offset

A payment offset is a method of obtaining monies due to Caltrans on one contract by levying against future payments being made to a contractor on another Caltrans contract. Offsets may be taken to obtain adequate funds for any amount due and for determinations made by an arbitrator. The offset process should be completed within 90 calendar days of contract acceptance except when an offset for a determination by an arbitrator is required.

Many stakeholders are involved in the payment offset process. The following should be considered when choosing an active contract to apply an offset against:

1. There should be sufficient payments pending.
2. Bonded by the same bonding company if possible.
3. Administrated within the same district.

To begin the payment offset process, send a letter to the contractor, bonding company, and offset bonding company. The contractor and the bonding companies have 20 calendar days from receipt of the letter to request a meeting to discuss the offset.

If the contract or bonding companies do not request a meeting, execute the offset. If a meeting is requested, a meeting will be held within 10 calendar days of receipt of the request. The meeting is conducted by the district director or as delegated to at least a supervising transportation engineer.

The resident engineer prepares a summary of the facts, minutes of the meeting, and a final determination report. If the offset is warranted, notify the district administering the contract being offset, the contractor, and bonding companies of the final determination, and the amount of the offset. If the contractor or the bonding companies do not request a hearing, execute the offset. If the hearing officer determines that an offset is not warranted, continue through the collections process administered by the Division of Accounting. The Division of Accounting executes only those offsets authorized by the Division of Construction.

3-908 Arbitration

3-908 Arbitration

If the contractor has diligently pursued and exhausted the administrative procedures specified in the contract for Minor A projects and major projects, the contractor is entitled to file for arbitration of its claims 240 days after contract acceptance even if the district director determination of claims has not been issued.

The Caltrans Legal Division handles all construction contract arbitrations. Refer to Section 5-411, "Arbitration," of this manual for more information.

Example 3-9.1. Quantity Calculations

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION
QUANTITY CALCULATIONS
CEM-4801 (REV 11/1992) CT# 7541-3520-0

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 A. Sistantre	DATE 09/17/2012
	CHK. BY R. Engineer	DATE 09/18/2012

Field Measurement: X
Field Counted: NO
Final Pay Item: NO

Estimated Quantity: 1,500
Unit of Measure: feet
Unit Price: $8.00/foot
75% of item: 1,125 feet
125% of item: 1,875 feet

Remarks or other calculations:

500 feet placed on September 10, 2012 at Maple Street offramp, Station 3+00 RT

Material Inspection/Release: Certificate of compliance obtained on September 5, 2012.

Pay this estimate:	500 feet
Previously paid:	250 feet
Total to date:	750 feet

POSTED BY	DATE	POSTED TO
O.E. Ngineer	09/20/2012	CEM 6004, page 4 line 5

CEM4801

ADA Notice For individuals with sensory disabilities, this document is available in alternate formats. For information call (916) 654-6410 or TDD (916) 654-3880 or write Records and Forms Management, 1120 N Street, MS-89, Sacramento, CA 95814.

Example 3-9.2. Form Letter for Submitting Proposed Final Estimate to the Contractor

Subject: Proposed Final Estimate

In accordance with the provisions of Section 9-1.17D(1), "General" of the *Standard Specifications*, attached (in triplicate) is a proposed final estimate for

_____ _____
(Contract) (Dist. Co. Rte. M.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 9-1.17D(1), "General" of the *Standard Specifications*, which states:

"If you accept the proposed final estimate or do not submit a claim statement before the 31st day of receiving the estimate, the engineer furnishes the final estimate to you and the Department pays the amount due within 30 days. This final estimate and payment is conclusive except as specified in Sections 5-1.27, "Records"; 5-1.47, "Guarantee"; and 9-1.21, "Clerical Errors." If you submit a claim statement before the 31st day of receiving the Engineer's proposed final estimate, the Engineer furnishes a semifinal estimate to the Contractor and the Department pays the amount due within 30 days. The semifinal estimate is conclusive as to the amount of work completed and the amount payable except as affected by the claims or as specified in Sections 5-1.27, "Records"; 6-3.06, "Guarantee"; and 9-1.21, "Clerical Errors."

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 9-1.17D(2)(c), "Declaration," of the *Standard Specifications*.

If claims are submitted in connection with this contract, you will be expected to comply fully with Section 9-1.17D(2), "Claim Statement," of the *Standard Specifications*. The engineer will base the determination of claims upon the investigation of your statement, in which you are expected to present your position fully as to the contractual basis of the claim; compliance with contract requirements such as Sections 5-1.43, "Potential Claims and Dispute Resolution," subsections A through D; or 9-1.17D, "Final Payment and 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 9-1.17D(1), "General," of the *Standard Specifications*, in case neither approval nor a statement of claims is received, postmarked or hand delivered, before the 31st day, 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 3-9.3. Acceptance Statement Form

Subject: Acceptance Statement

Attachment to transmittal letter

Dated _____ Contract Identification _____

I have examined the quantities of bid items and amounts indicated as payment for extra work and the deductions on the proposed final estimate 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 3-9.4. Sample of the Proposed Final Estimate

PROGRAM CAS145 — PAGE 1
DATE 06/13/12 — STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — 04-888884
TIME 10:46 AM — ESTIMATE NO. 29
BID OPENING 11/10/09 — P R O J E C T R E C O R D - E S T I M A T E — WORK PERFORMED THROUGH 05/21/12
R.E. NAME: MAYA, TYKE — DATE OF THIS ESTIMATE 06/13/12
LOCATION
04-SON-128-41.8/44.7

PROPOSED FINAL ESTIMATE

COASTAL MOUNTAIN CONSTRUCTORS, INC.
8884 GOLDENEYE COURT
SANTA ROSA, CA 95402

IN SONOMA COUNTY ABOUT 9 KM EAST OF PETALUMA FROM ADOBE ROAD TO 0.2 KM WEST OF ARNOLD DRIVE

FED. AID NO. ACHS-P128(42)E ,STP-P128(42)E

CONSTRUCT RETAINING WALLS

ITEM NO.	ITEM DESCRIPTION	UNIT	CONTRACT PRICES	ORIGINAL AUTH. AMT	THIS ESTIMATE QUANTITY	THIS ESTIMATE $ AMOUNT	TOTAL ESTIMATE QUANTITY	TOTAL ESTIMATE $ AMOUNT
001	PROGRESS SCHEDULE (CRITICAL PATH METHOD)	LS	2,500.0000	2,500.00			0.900	2,250.00
002	SMALL BUSINESS UTILIZATION REPORT	EA	250.0000	2,250.00			6.000	1,500.00
003	TIME-RELATED OVERHEAD	WDAY	410.0000	180,400.00			440.000	180,400.00
004	TEMPORARY FENCE (TYPE BW)	M	8.2000	30,094.00			3,844.860	31,527.85
005	TEMPORARY FENCE (TYPE ESA)	M	6.2000	11,718.00			1,986.150	12,314.13
006	TEMPORARY SHORING	M2	137.0000	104,120.00			44.400	6,082.80
007	TEMPORARY CREEK DIVERSION SYSTEM (LOCATION 1)	LS	16,000.0000	16,000.00			1.000	16,000.00
008	TEMPORARY CREEK DIVERSION SYSTEM (LOCATION 2)	LS	18,500.0000	18,500.00			1.000	18,500.00
009	TEMPORARY CREEK DIVERSION SYSTEM (LOCATION 3)	LS	16,000.0000	16,000.00			1.000	16,000.00
010	TEMPORARY CREEK DIVERSION SYSTEM (LOCATION 4)	LS	23,000.0000	23,000.00			1.000	23,000.00
011	TEMPORARY CREEK DIVERSION SYSTEM (LOCATION 5)	LS	16,000.0000	16,000.00			1.000	16,000.00
012	TEMPORARY CREEK DIVERSION SYSTEM (LOCATION 6)	LS	23,000.0000	23,000.00			1.000	23,000.00
013	CONSTRUCTION SITE MANAGEMENT	LS	2,500.0000	2,500.00			1.000	2,500.00
014	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	2,500.0000	2,500.00			0.905	2,262.50
015	TEMPORARY SILT FENCE	M	8.0000	35,040.00			4,507.200	36,057.60
016	TEMPORARY GRAVEL BAG BERM	M	5.5000	14,080.00			295.000	1,622.50
017	TEMPORARY CONSTRUCTION ENTRANCE	EA	1,700.0000	10,200.00			15.000	25,500.00
018	TEMPORARY COVER	M2	3.1000	7,967.00			988.000	3,062.80
019	TEMPORARY CHECK DAM	M	6.4000	832.00			1,457.000	9,324.80
020	MOVE-IN/MOVE-OUT (TEMPORARY EROSION CONTROL)	EA	825.0000	4,950.00			9.000	7,425.00
021	TEMPORARY DRAINAGE INLET PROTECTION	EA	118.0000	7,080.00			70.000	8,260.00
022	TEMPORARY HYDRAULIC MULCH (BONDED FIBER MATRIX)	M2	0.7500	12,900.00			48,149.850	36,112.39

Example 3-9.5. Sample of the Project Record Estimate, Summary of Payment

PROGRAM CAS145 — PAGE 7
DATE 06/13/12 — STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — 04-888884
TIME 10:46 AM — ESTIMATE NO. 29
BID OPENING 11/10/09 — P R O J E C T R E C O R D - E S T I M A T E — WORK PERFORMED THROUGH 05/21/12
R.E. NAME: MAYA, TYKE — DATE OF THIS ESTIMATE 06/13/12

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 WITHOUT MOBILIZATION				678.00			9,895,807.47
	ADJUSTMENT OF COMPENSATION				16,640.84			416,295.18
	EXTRA WORK				31,368.17			2,150,540.17
	SUBTOTAL AMOUNT EARNED WITHOUT MOBILIZATION				48,687.01			12,462,642.82
151	MOBILIZATION	LS	440,000.0000	440,000.00			1.000	440,000.00
	ORIGINAL CONTRACT AMOUNT			10,972,373.50				
	TOTAL WORK COMPLETED				48,687.01			12,902,642.82
	MATERIALS ON HAND ON SITE							0.00
	MATERIALS ON HAND ELSEWHERE							0.00
	DEDUCTIONS				-10,000.00			-12,130.00
	TOTAL				38,687.01			12,890,512.82

ITEMS FOR WHICH CONTRACT PRICE EXCEEDS MAXIMUM VALUE
N O N E

DATE APPROVED	CONTR DAYS	CONTRACT 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
01/06/10	565	01/20/10	01/20/10	05/21/12	440	0	0	0	100%	100%

MAYA, TYKE
RESIDENT ENGINEER

PROGRAM CAS145
DATE 06/13/12

Example 3-9.6. Schedule B – Extra Work and Adjustment of Compensation

```
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 06/13/12                                                   EST. NO.29
TIME 10:46 AM
R.E. NAME: MAYA, TYKE                                        04-888884
-------------------------------------------------------------------------
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
-------------------------------------------------------------------------
001 0583         299.24 E.W. @ F.A.(+) 050312 N 1039.0
    0584       1,040.25                050312 N 1040.0
    0585       2,005.32                051512 N 1045.0
010 0103      16,640.84 A.C. @ U.P.(+) 123111 N 100RS0
035 0003       5,742.24 E.W. @ F.A.(+) 061411 N 0662.0
054 0005      21,651.92 E.W. @ F.A.(+) 121911 N ABL2 0
058 0003         629.20 E.W. @ F.A.(+) 050112 N 1041.0
              48,009.01  TOTAL THIS ESTIMATE
           2,518,826.34  TOTAL PREVIOUS ESTIMATE
           2,566,835.35  TOTAL TO DATE
```

Example 3-9.7. 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 06/13/12                                                   EST. NO.29
TIME 10:46 AM
R.E. NAME: MAYA, TYKE                                        04-888884
-------------------------------------------------------------------------
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
-------------------------------------------------------------------------
001 0583         299.24 E.W. @ F.A.(+) 050312 N 1039.0
    0584       1,040.25                050312 N 1040.0
    0585       2,005.32                051512 N 1045.0
010 0103      16,640.84 A.C. @ U.P.(+) 123111 N 100RS0
035 0003       5,742.24 E.W. @ F.A.(+) 061411 N 0662.0
054 0005      21,651.92 E.W. @ F.A.(+) 121911 N ABL2 0
058 0003         629.20 E.W. @ F.A.(+) 050112 N 1041.0
              48,009.01  TOTAL THIS ESTIMATE
           2,518,826.34  TOTAL PREVIOUS ESTIMATE
           2,566,835.35  TOTAL TO DATE
```

Example 3-9.8. 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 06/13/12                                                   EST. NO.29
TIME 10:46 AM
R.E. NAME: MAYA, TYKE                                        04-888884
-------------------------------------------------------------------------
DEDUCTION DESCRIPTION          AMOUNT  EST          THIS          TOTAL
                                       NO.        ESTIMATE      ESTIMATE
-------------------------------------------------------------------------
ADMINISTRATIVE
RESTAKING CHARGE REQ 62     -1,065.00   18
RESTAKING CHARGE REQ 65     -1,065.00   22
                                                      0.00      -2,130.00
LABOR COMPLIANCE VIOLATION
MISSING PAYROLLS           -10,000.00   20
RETURN PAYROLL DEDUCTION    10,000.00   21
MISSING PAYROLLS           -10,000.00   29
                                                -10,000.00      -10,000.00
                      TOTAL DEDUCTIONS          -10,000.00      -12,130.00
```

Chapter 4 Construction Details

Section 0 Introduction

Section 0
Introduction

4-001 Scope

4-001
Scope

Each section in this chapter of the manual corresponds to a section in the *Standard Specifications*. All sections in the *Standard Specification*s are included here except Division I, "General Provisions," and Division XII, "Building Construction." Division II, Section 10, "General Construction," includes specifications for general construction that are applicable to every contract unless specified as applicable only under certain conditions. Materials specifications for a material specified in Division XI, "Materials," apply to the material specified in any section of the *Standard Specifications*.

Each section in this chapter contains parts identified with **bold type** and the guidance included in this Section 4-0, "Introduction," applies to the other sections in this chapter.

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.

Before beginning work, it is essential to study the contract plans, *Standard Plans*, *Standard Specifications*, special provisions, and the work site.

Ensure that aggregate material or borrow sources comply with Section 7-103H (2), "Surface Mining and Reclamation Act," of this manual. For more information, refer to Sections 3-603, "Local Materials," and 6-103, "Field Sampled Material Identification for Testing," of this manual.

Verify that Form CEM-3101, "Notice of Materials to Be Used," includes all materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

During the Course of Work describes the actions the resident engineers and assistant resident engineers must take when the contractor is performing the work.

Ensure job-produced materials are sampled and tested for acceptance in conformance with Section 6-107, "Materials Acceptance Sampling and Testing," of this manual.

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." Refer to Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual for more explanation.

Level of Inspection provides suggested frequency of inspection. Level of inspection is not included for sections that include work that is typically the responsibility of Structure Construction.

The level of engineering inspection varies, depending on the type of work being performed, and is categorized into three basic levels:

- Continuous Inspection—Inspect 80 to 100 percent of the time work is in progress with assistant resident engineers assigned only to one operation.

- Intermittent Inspection—Inspect 30 to 80 percent of the time work is in progress with assistants assigned to two or three operations simultaneously.
- Benchmark Inspection—Inspect up to 30 percent of the time work is in progress.

Quality Control provides guidelines for inspecting the contractor's quality control activities for which the specifications require specific levels of inspection, sampling, and testing. When specific levels of quality control inspection, sampling, and testing are not detailed in the *Standard Specifications*, the contractor is responsible for providing quality control under Section 5-1.01, "General," of the *Standard Specifications*.

Caltrans inspection, sampling, and testing are performed for compliance verification and payment of the materials but do not relieve the contractor of the responsibility to provide quality control on these materials as they are processed and incorporated into the project.

Section 6-2.01A, "General," of the *Standard Specifications* states that quality control includes sampling, testing, and inspections performed by the contractor under the contractor's quality control program to control material quality and ensure the specified quality characteristics for the project are met. Generally, the quality characteristics will be identified within the material section of the specifications, but additional requirements may also be found in the quality assurance and construction sections of the specifications.

Section 6-2.02, "Quality Control," of the *Standard Specifications* further describes general requirements for the contractor's quality control, including minimum quality control program requirements for personnel, testing equipment, and testing laboratories. Ensure the contractor is actively performing quality control throughout production operations by reviewing copies of quality control records, including quality control test results. Where review of the contractor's quality control program information or absence thereof shows a failure to actively perform quality control, the production operations should be suspended until the contractor identifies what actions will be taken to comply with the contract.

If quality control test results show questionable material quality, the contractor should make corrections to ensure materials meeting specified requirements are incorporated into the work. Where repeated concerns are found, provide a written order to the contractor to identify what corrective actions are being taken to address the material quality.

It is important to note that contractor quality control inspection, sampling, and testing is not to be used for rejection, acceptance, or payment of items of work unless allowed by the specifications. However, quality control test results indicating material quality issues should result in increased frequency of acceptance sampling and testing until quality issues have been resolved.

Payment provides guidelines for measuring and paying for the work covered in the section.

4-002 Purpose

4-002 Purpose

Although each section in Chapter 4 of this manual closely follows the corresponding section in the *Standard Specifications*, the intent of 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 structures-related work covered in Division VI, "Structures," of the *Standard Specifications*, the guidelines in Chapter 4 of this manual are general in nature. The guidance for technical structures issues, including inspecting, measuring, and paying for structures contract item work, is included in Structure Construction's construction records and procedures manuals available at:

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

For the most part, only the *Standard Specifications* are considered in the guidance provided in Chapter 4. Special provisions may 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 contract 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 General Construction

4-1001 General

4-1002 Before Work Begins

4-1002A Work Sequencing

4-1002B Water Usage

4-1002C Watering

4-1003 During the Course of Work

4-1003A Work Sequencing

4-1003B Water Usage

4-1003C Dust Control

4-1003D Watering

4-1004 Payment

Section 10 General Construction

4-1001 General

Section 10, "General Construction," of the *Standard Specifications* includes the general requirements for construction work that applies to all projects unless otherwise specified.

4-1002 Before Work Begins

4-1002A Work Sequencing

Review Section 87-21, "Existing Electrical Systems," of the *Standard Specifications*.

Ensure all signs, pavement delineation, and pavement markings are in place before starting the operation of a traffic management system that directly affects traffic.

If maintaining existing traffic management system elements during construction is shown on the Bid Item List:

- Invite the Caltrans traffic operations electrical representative to the preconstruction meeting.
- At the preconstruction meeting, discuss the requirements for system operational status check.
- Conduct the preconstruction status check with the contractor and the Caltrans traffic operations electrical representatives.

Conduct a site visit and verify all the irrigation facilities are described in the contract. If an unspecified irrigation system is discovered, order the contractor to protect the system.

At the prepaving meeting, discuss the existing traffic stripes, pavement markings, and pavement markers within the project limits and the need for reference control points.

Require the contractor to submit reference control points 5 business days before obliterating existing surface traffic-related markings.

4-1002B Water Usage

When Caltrans or any local water authority mandates a water rationing due to water shortage:

- Notify the contractor of the water usage constraints.
- Review the contractor's water conservation plans for compliance with Section 10-4, "Water Usage," of the *Standard Specifications*.

4-1002C Watering

The contractor is responsible for developing a water supply, including any permits, and applying water.

Take these steps during preliminary inspection:

- Determine the quality of the water to be used in products with specific water quality requirements.
- Determine if the contractor intends to use chemical additives in water, and ensure that the additives are appropriate for their use.
- If the contract requires a mobile watering unit, ensure that one is available on the project at all times.
- Ensure that all necessary watering equipment is the type specified.
- Ensure that the contractor has acquired all applicable permits.

4-1003 During the Course of Work

4-1003 During the Course of Work

4-1003A Work Sequencing

If maintaining existing traffic management system elements during construction is not shown on the Bid Item List and an existing system is discovered during construction, conduct the system operational status check with the contractor and Caltrans' traffic operations electrical representative.

Before contract acceptance, conduct the postconstruction status check of all traffic management system elements identified within the project, with the contractor and Caltrans' traffic operations electrical representatives.

If an unspecified irrigation system is discovered during the work, require the contractor to protect the system.

Conduct field inspections to verify that the traffic stripes, pavement markings, and pavement markers are removed according to plan.

Conduct field inspections to verify the contractor is in compliance with Section 10-1.02E, "Excavation," of the *Standard Specifications*.

4-1003B Water Usage

Verify the contractor is in compliance with their water conservation plan.

4-1003C Dust Control

Verify the contractor is in compliance with Sections 13-4.03C(3), "Stockpile Management"; 13-5, "Temporary Soil Stabilization"; and 18, "Dust Palliatives," of the *Standard Specifications.* Refer to Sections 7-104A (2), "Dust Control" and 4-18, "Dust Palliatives," of this manual for additional information.

4-1003D Watering

Determine whether the developed water supply is sufficient for the project and is adequate for dust control.

- If the contractor uses a fire hydrant, ensure that arrangements have been made with the local water utility company. Verify that the contractor has obtained a permit for the use of the hydrant.

4-1004 Payment

4-1004
Payment

The operational status check for a traffic management system element discovered during construction is paid as change order work if:

- The existing system element is not identified in the information handout.
- Maintaining existing traffic management system elements during construction is not shown on the Bid Item List.

Once the water supply is developed and the project's needs are met, authorize progress payment for 100 percent of the item, subject to limiting pay clauses. When determining percentages for partial payments, consider work possibly required in future stages. Payment for applying water is included in other items.

Section 11 Welding

Section 11
Welding

4-1101 General

4-1101
General

Section 11, "Welding," of the *Standard Specifications* describes the requirements for welding where welding is specified to comply with an American Welding Society welding code. A primary purpose of this section is to assure quality control for welding items of work. Other sections also cover welding requirements such as Sections 48, "Temporary Structures"; 49, "Piling"; 52, "Reinforcement"; 55, "Steel Structures"; 56, "Overhead Sign Structures, Standards, and Poles"; and 60, "Existing Structures," of the *Standard Specifications.*

This manual section provides guidance for inspecting and monitoring the contractor's quality control activities involving welding that must meet the requirements of Section 11 of the *Standard Specifications*. The activities include handling correspondence, submittals, reports, quality control plans and records, and certificates of compliance, along with sampling, testing, and inspection of work in progress.

For details about welding, refer to Structure Construction's *Bridge Construction Records and Procedures* manual at:

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

4-1102 Before Work Begins

4-1102
Before Work
Begins

Before work begins, take the following steps:

- Ensure that the contractor has assigned a qualified quality control manager and inspection personnel.
- Meet with the welding quality control personnel to discuss the requirements for submitting welding quality control plans. Guidance on items to include in the Welding Quality Control Plan can be found at the following Structural Materials website:

  http://www.dot.ca.gov/hq/esc/Translab/OSM/smbresources.htm
- Inform the welding quality control personnel that their quality control activities may at times need to be coordinated with Caltrans' ongoing quality verification activities, as described throughout this manual.

4-1103 During the Course of Work

4-1103
During the Course
of Work

During the course of work do the following:

- Verify that the required quality control personnel perform duties as specified. Ensure that correspondence, submittals, reports, quality control plans and records, and certificates of compliance are handled as specified.
- Until the engineer, typically the structures representative, authorizes the proper submittals, do not permit welding of any type on materials permanently incorporated in the work. Refer to the *Bridge Construction Records and Procedures* manual, Vol. 2, Section 180, for guidelines

- Ensure that the contractor submits the time and location of quality control sampling and testing with sufficient notice to allow Caltrans staff to intermittently witness quality control sampling and testing.
- Ensure that welding follows the authorized Welding Quality Control Plan and is carried out by certified welders.
- Ensure that appropriate nondestructive testing is done by certified welding inspectors and testing inspectors to Caltrans' standards and in a timely manner.
- Refer to Chapter 6, "Sampling and Testing," of this manual for additional guidance in ensuring materials and workmanship comply with specifications.

4-1104 Level of Inspection

4-1104 Level of Inspection

Suggested level of inspection for welding work activities is intermittent inspection.

4-1105 Payment

4-1105 Payment

For measurement and payment details, review contract specifications.

Section 12 Temporary Traffic Control

4-1201 General

4-1202 Before Work Begins

4-1202A Flagging

4-1202B Temporary Traffic Control Devices

4-1202B (1) Traffic Cones

4-1202B (2) Plastic Traffic Drums

4-1202B (3) Portable Delineators

4-1202B (4) Channelizers

4-1202B (5) Barricades

4-1202B (6) Construction Area Signs

4-1202B (7) Type K Temporary Railing

4-1202B (8) Temporary Traffic Screens

4-1202B (9) Temporary Crash Cushion Module

4-1202B (10) Impact Attenuator Vehicles

4-1202B (11) Flashing Arrow Signs

4-1202B (12) Portable Flashing Beacons

4-1202B (13) Portable Changeable Message Signs

4-1202B (14) Temporary Signal Systems

4-1202B (15) Temporary Flashing Beacon Systems

4-1202B (16) Automated Work Zone Information Systems

4-1202C Maintaining Traffic

4-1202C (1) Traffic Control Systems

4-1202C (1a) Lane Closure System

4-1202C (2) Pedestrian Facilities

4-1202C (3) Bridge Cleaning and Painting Activities

4-1202D Temporary Pavement Delineation

4-1202D (1) Temporary Pavement Markers

4-1203 During the Course of Work

4-1203A Flagging

4-1203B Temporary Traffic Control Devices

4-1203B (1) Traffic Cones

4-1203B (2) Plastic Traffic Drums

4-1203B (3) Portable Delineators

4-1203B (4) Channelizers

4-1203B (5) Barricades

4-1203B (6) Construction Area Signs

4-1203B (7) Type K Temporary Railing
4-1203B (8) Temporary Traffic Screens
4-1203B (9) Temporary Crash Cushion Module
4-1203B (10) Impact Attenuator Vehicles
4-1203B (11) Flashing Arrow Signs
4-1203B (12) Portable Flashing Beacons
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4-1206B (6) Construction Area Signs
4-1206B (7) Type K Temporary Railing
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4-1206B (9) Temporary Crash Cushion Modules
4-1206B (10) Impact Attenuator Vehicles
4-1206B (11) Flashing Arrow Signs
4-1206B (12) Portable Flashing Beacons
4-1206B (13) Portable Changeable Message Signs
4-1206B (14) Temporary Signal System
4-1206B (15) Temporary Flashing Beacon Systems
4-1206B (16) Automated Work Zone Information Systems
4-1206C Traffic Control Systems

Section 12 Temporary Traffic Control

4-1201 General

This section provides guidelines for inspecting temporary traffic control devices in construction areas. For traffic control requirements, refer to Section 12, "Temporary Traffic Control," of the *Standard Specifications* and the *California Manual on Uniform Traffic Control Devices* (*California MUTCD*). If a discrepancy occurs between the contract plans and specifications and the *California MUTCD*, the plans and specifications govern. Also refer to Section 2-2, "Traffic," of this manual, which provides guidelines and a general overview of providing a safe and convenient passage of public traffic through the construction area and is complementary to this section.

Temporary traffic control devices are divided into categories:

- Category 1 devices include traffic cones, plastic traffic drums, portable delineators, and channelizers.
- Category 2 devices include barricades and portable sign supports.
- Category 3 devices include crash cushions, impact attenuator vehicles, temporary railing, temporary barrier, and end treatments for temporary railings and barriers.

The condition of temporary traffic control devices should comply with the most current edition of the American Traffic Safety Services Association (ATSSA) publication *Quality Guidelines for Temporary Traffic Control Devices and Features*.

4-1202 Before Work Begins

Take the following steps before work begins:

- Determine what construction area signs should be placed before work begins for the entire project and before 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.

4-1202A Flagging

Discuss any flagging operation with the contractor before the operation begins. Confirm flaggers are wearing ANSI-compliant garments in accordance with the Construction Safety Orders, or the prime contractor's or subcontractor's Injury and Illness Prevention Program or *Code of Safe Practices*, whichever is more stringent. Review with the contractor how flaggers will communicate with each other, with pilot cars, and with workers inside the controlled area. The contractor should develop a plan for handling emergencies and emergency vehicles in the control zone.

4-1202B Temporary Traffic Control Devices

Verify that temporary traffic control devices comply with the contract requirements.

The resident engineer may accept use of contractor-proposed devices on the Authorized Material List for Highway Safety Features.

Authorized Materials Lists are available at:

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

Determine if the temporary traffic control devices to be used are on the Authorized Material List for Signing and Delineation Materials and if they require a certificate of compliance.

Obtain self-certification for crashworthiness of Category 1 temporary traffic control devices.

Request a list of Category 2 temporary traffic control devices to be used on the project and copies of their Federal Highway Administration (FHWA) acceptance letters.

Verify that Category 3 temporary traffic control devices are on the Authorized Material List for Highway Safety Features.

4-1202B (1) Traffic Cones

If the contractor plans to use cones for night work, determine the type of cone proposed. All cones should use the same type and brand of retroreflective sheeting.

4-1202B (2) Plastic Traffic Drums

All drums should use the same type and brand of retroreflective sheeting. Verify the base is shaped to prevent rolling after impact from vehicles.

4-1202B (3) Portable Delineators

Obtain a sample of the type of portable delineator to be used on the project. Verify the base is shaped to prevent delineators from rolling after impact from vehicles.

4-1202B (4) Channelizers

Verify the channelizer's post is predominantly orange.

4-1202B (5) Barricades

Verify barricade construction complies with Section 12-3.10, "Barricades," of the *Standard Specifications* and sheet A-73C of the *Standard Plans*.

Request proof that any Type 3 barricade to be used as sign support has been crash-tested to the Transportation Research Board's *NCHRP Report 350* criteria or *Manual for Assessing Safety Hardware (MASH)* as a single unit with a sign panel of the size and type used on the project.

4-1202B (6) Construction Area Signs

At the preconstruction conference, remind the contractor to 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.

Verify construction area signs are from a commercial sign manufacturer and have a Type 3 or higher grade retroreflective sheeting.

Review Section 12-3.11, "Construction Area Signs," of the *Standard Specifications* for additional requirements.

4-1202B (7) Type K Temporary Railing

Determine if Type K temporary railing is to be cast on or off the project. If the K-rail is cast off the project, obtain a certificate of compliance.

Type K temporary railing placed within 10 feet of a traffic lane requires a reflector on each rail unit.

Review sheet T3B of the *Standard Plans* for staking requirements.

4-1202B (8) Temporary Traffic Screens

Review the specification requirements and sheet T4 of the *Standard Plans.*

4-1202B (9) 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 the contractor requests usage of alternative temporary crash cushion modules, verify that their proposed modules are on the Authorized Material List for Highway Safety Features.

Verify that temporary crash cushion modules used were manufactured after March 31, 1997.

Inspect crash cushion modules to confirm they comply with the specification and manufacturer requirements.

Temporary crash cushions may be installed on wooden pallets as an option. Verify that pallet height is 4½ inches or less. Pallets that exceed this height raise the sand in the crash cushions above an acceptable level. Do not allow the use of commercial pallets that exceed the maximum height.

4-1202B (10) Impact Attenuator Vehicles

Verify that the impact attenuator vehicle complies with all specification requirements.

Check that the attenuator meets the test level requirement for the posted speed limit.

Verify that the weight of the attenuator and the weight of the support truck are within the specified limits as shown on the Authorized Material List for Highway Safety Features.

Verify the contractor conducts a meeting with all involved parties to discuss the operation of the impact attenuator vehicle.

4-1202 B (11) Flashing Arrow Signs

Verify that Type 1 and Type 2 flashing arrow signs comply with the specification requirements, including number of panel lights, display modes, power source, and devices to plumb and level the trailer.

4-1202B (12) Portable Flashing Beacons

Verify that portable flashing beacons conform to the specification requirements.

4-1202 B (13) Portable Changeable Message Signs

A certificate of compliance should be requested for each portable changeable message sign (PCMS).

Obtain a contact cell phone number for the contractor before starting activities that require a portable changeable message sign and arrange for an inspection with the contractor before the first deployment.

Verify that the sign complies with the *Standard Specifications* requirements including number of lines and characters per line, display modes, power source, and devices to plumb and level the trailer.

4-1202B (14) Temporary Signal Systems

Confirm temporary signal systems comply with the requirements in Section 12-3.33, "Temporary Signal Systems," of the *Standard Specifications*.

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

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

When temporary signal systems are used in forests or grasslands, confirm adherence to all fire safety requirements. Checking fire safety requirements may require coordination with personnel from the U.S. Forest Service, U.S. Bureau of Land Management, or California Department of Forestry.

4-1202B (15) Temporary Flashing Beacon Systems

Confirm temporary flashing beacon systems comply with the requirements in Section 12-3.34, "Temporary Flashing Beacon Systems," of the *Standard Specifications*.

4-1202B (16) Automated Work Zone Information Systems

Verify that automated work zone information systems comply with the general system functionality, motorist information messages, system communications, traffic data acquisition, and user interface specification requirements.

Obtain the name and contact information for the assigned onsite system coordinator.

Request the user interface software and provide it to the Transportation Management Center for installation.

4-1202C Maintaining Traffic

Before work begins, carefully review the plans, specifications, closure charts, and sheets T9 through T17 of the *Standard Plans*. It is important to plan which personnel, signage, and equipment will be required to implement the traffic control system.

Verify that the contractor has all components on hand before setting up any traffic control system and that all components meet the specifications requirements.

Verify the contractor notifies and cooperates with local authorities wherever the local authorities regulate traffic.

When multiple projects in a particular area occur at the same time, require contractors to coordinate their efforts by resolving schedule conflicts prior to submitting their schedules for closures and verify there are no closure conflicts prior to implementation. Review these requirements with the contractors before work starts.

4-1202C (1) Traffic Control Systems

Verify the contractor removes or covers any construction area signs that duplicate or contradict the signs for a project within 250 feet of another project. Refer to Section 5-

1.20 "Coordination with Other Entities," of the *Standard Specifications*, if applicable, and the special provisions.

- Inspect the signs and equipment the contractor proposes to use, at the contractor's or subcontractor's yard if possible, before their first 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 in the ATSSA publication *Quality Guidelines for Temporary Traffic Control Devices and Features*. Require the contractor to replace any unacceptable equipment. It is easier to correct deficiencies before the system is installed.
- If the contractor is to place the traffic control system repeatedly in the same place, the contractor can request to mark on the shoulder the locations of advance warning signs, cones, and drums. This will speed the placing of closures and allow for a more consistent taper alignment.

4-1202C (1a) Lane Closure System

Contractors are required to request closures using the Caltrans Lane Closure System (LCS) and status closures using the Lane Closure System Mobile web page.

To confirm that contractors can access LCS and LCS Mobile, do the following before work begins:

- Inform the contractor they need to complete the LCS web-based training.
- Provide the contractor with the internet link to access the LCS web-based training.

  http://www.dot.ca.gov/hq/construc/training.htm
- Obtain the information of trained contractor representatives, including whether they will be requesting or statusing closures, or both.
- Set up "Requestor" or "Statuser" LCS accounts for the trained contractor's employees accordingly and provide them with their login information within 5 days after they have completed the training. The LCS will send the contractor's employees a unique password by email after the accounts are created. Create a "Requestor" LCS account and set the option in the account to status closures for those who will request and status closures.
- Contact the district traffic manager for assistance with either of these tasks.

4-1202C (2) Pedestrian Facilities

Review Sections 12-4.04, "Pedestrian Facilities," and 16-2.02, "Temporary Pedestrian Facilities," of the *Standard Specifications* for the temporary pedestrian facilities requirements.

4-1202C (3) Bridge Cleaning and Painting Activities

Review Section 12-4.05, "Bridge Cleaning and Painting Activities, of the *Standard Specifications*."

Verify signs to be used comply with the specification requirements.

4-1202D Temporary Pavement Delineation

Review Sections 12-6, "Temporary Pavement Delineation" and 84-2, "Traffic Stripes and Pavement Markings," of the *Standard Specifications* for temporary pavement delineation requirements.

4-1202D (1) Temporary Pavement Markers

Verify temporary pavement markers comply with Section 81-3, "Pavement Markers," of the *Standard Specifications*, except for the waiting period before placing pavement markers on new asphalt concrete.

Verify signs to be used comply with the specification requirements.

Refer to Section 12-6.03, "Temporary Lane Line and Centerline Delineation," of the *Standard Specifications* for temporary signing requirements for no-passing zones.

4-1203 During the Course of Work

4-1203 During the Course of Work

Use the ATSSA publication *Quality Guidelines for Temporary Traffic Control Devices and Features* to confirm acceptability of traffic control devices

Inspect Category 2 temporary traffic control devices to confirm they are labeled with the FHWA acceptance letter code and the name of the manufacturer.

Verify Category 3 temporary traffic control devices are the type shown on the Authorized Material List for Highway Safety Features.

Verify that traffic handling devices meet the visibility and legibility requirements.

Verify the contractor maintains all traffic control devices in good working order throughout the project's life. Verify that all traffic control devices are correctly located and functioning properly. If temporary traffic control devices are damaged, displaced, or stop operating or functioning as described from any cause during the progress of the work, have the contractor repair, repaint, or replace the components and restore them to their original locations and positions.

Do not allow the contractor to mix different types of temporary traffic control devices on the same alignment. Types include plastic traffic drums, portable delineators, channelizers, tubular markers, traffic cones, and Type 1 and Type 2 barricades.

Verify the contractor removes traffic-handling equipment and devices from the job site when they are no longer needed for controlling traffic.

4-1203A Flagging

Observe the flagging operation to verify that flaggers are using the correct procedures for directing motorists in accordance with California Code of Regulations, Title 8, Section 1599, "Flaggers," and Chapter 6E, "Flagger Control," of the *California MUTCD*. Also, verify that flagging stations are laid out correctly, are visible to approaching traffic, are illuminated during nighttime, and have correct advance warning signs. If there are questions as to flagger competency, contact your construction safety coordinator to have them come and observe the flagging operation. When pilot vehicles are used, radios are required.

4-1203B Temporary Traffic Control Devices

Inspect all traffic control devices to verify conformity with the specifications. If you authorize the devices for use, record the authorization in the daily reports.

4-1203B (1) Traffic Cones

Require the contractor to anchor bases of traffic cones that do not have enough size and weight to keep the cones in an upright position.

Prohibit the use of traffic cones that have been damaged or coated with asphalt or other substances that prevent the cones from functioning as intended.

4-1203B (2) Plastic Traffic Drums

Check the contractor's layout work. Allow only one type of plastic traffic drum on the project.

Require ballast for drums according to manufacturer specifications. Do not allow the use of sandbags.

Require proper maintenance of plastic traffic drums.

4-1203B (3) Portable Delineators

Allow only one type of portable delineator on the project.

Verify the portable delineators meet the dimension requirements.

Confirm portable delineators remain upright when unattended, otherwise require the contractor to place a ballast on the delineator's base.

4-1203B (4) Channelizers

Check the contractor's layout work.

Verify the pavement is clean and dry and the contractor places the channelizers during conditions that meet the required temperatures. Review Section 81-3, "Pavement Markers," of the *Standard Specifications*. Do not allow the contractor to use the double-stick butyl pads provided by the channelizer manufacturer; these pads do not meet Caltrans requirements.

Ask the contractor to replace channelizers that are displaced or fail to remain in an upright position. The contractor is responsible for the replacement expenses.

4-1203B (5) Barricades

Check Type 3 barricades, used as sign supports, for label with FHWA acceptance letter number showing they have been crash tested as a single unit with a sign panel of the size and type used on the project. According to the Authorized Material List for Signing and Delineation Materials, 0.5 inch Intelplast "Intelcel" or similar is authorized and according to FHWA Work Zone Letter 85 from the FHWA's Safety Program website, this type of sign substrate is authorized for use on Type 3 barricades.

Allow the contractor to use only bags of dry sand when weighting is necessary. Verify weights are placed on the feet or lower parts of the frame or stays. Do not allow the contractor to place objects any higher, or use hard objects such as concrete or rocks for weights.

Confirm the contractor maintains barricades in good condition and keeps the reflective surfaces clean.

4-1203B (6) Construction Area Signs

Remind the contractor to notify the regional notification centers before digging for the installation of signposts. Hand digging is required unless the location is free of underground utilities.

Allow only the use of sandbags when it is necessary to weigh down sign standards to prevent the wind from overturning them. Do not permit rocks, concrete, or other hard objects to be used for this purpose.

Check construction area signs often during the course of the work. Verify visibility and legibility requirements. Require the contractor to keep signs clean and clearly visible, and repair them if damaged.

Verify construction area signs are placed outside the traveled way, do not block or protrude more than 4 inches into bicycle and pedestrian pathways, and comply with Americans with Disabilities Act requirements.

Do not allow the use of nonretroreflective portable signs during hours of darkness.

Check sign posts to confirm compliance with breakaway features.

Verify that the contractor installs, relocates, covers, and removes signs as required. 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.

4-1203B (7) Type K Temporary Railing

Check the exposed surfaces of Type K temporary railing to verify they have received a fresh coat of white paint before initial placement on the job. Order repainting when needed.

Verify all new and used rail elements comply with requirements for end connection and surface finish. Verify Type K temporary railing is placed on a firm, stable foundation uniformly graded throughout the entire length of the railing.

Check railing alignment for any substantial offset to each other.

Verify staking of railing according to sheet T3B of the *Standard Plans*.

Verify the contractor offsets the approach end of Type K temporary railing by 15 feet minimum from the edge of an open traffic lane, according to Section 7-1.04 "Public Safety," of the *Standard Specifications*.

Verify the contractor protects Type K temporary railing blunt-ends within 15 feet of the edge of the traveled way with temporary crash cushions. If the blunt end is within 8 feet, appropriate approved crash cushion protection other than sand filled modules should be provided.

Check the installation and maintenance of Type P marker panel according to sheet A81C of the *Standard Plans*.

Confirm the contractor installs a reflector on each rail unit placed within 10 feet of a traffic lane.

Verify all threaded rods or dowels are removed and the area is restored to its previous condition or constructed to its planned condition after removal of Type K temporary railing.

4-1203B (8) Temporary Traffic Screens

After installation, review the screen placement, especially near entrance and exit ramps. If the screen blocks motorist visibility, order its removal and consult with the district traffic engineer concerning alternatives.

Confirm supporting steel pipes are placed on the traffic side of the screen so that if a panel becomes dislodged, the plywood will fall away from traffic.

The specifications require temporary traffic screen to have 3-foot-long openings spaced at 200-foot intervals. The purpose of the gaps is to allow drivers and passengers of vehicles to get behind the barrier in case of a disabled vehicle. If the opening has a drop off behind it that might present a hazard to the public, document in the resident engineer's diary an exception to the *Standard Plan* note and have the contractor close the gap for public safety purposes.

4-1203B (9) Temporary Crash Cushion Module

Verify that one type of crash cushion module is used for a single grouping or array.

Verify the crash cushion array is in place before opening traffic lanes adjacent to the protected obstacle.

Verify that crash cushion module arrays are installed according to the manufacturer's instructions. Check that all crash cushion modules are filled with the proper weight of sand. Check pallet heights when used.

Verify a minimum clearance of 8 feet between the array and the nearest traffic lane. Contact the district traffic engineer for recommendations if the clearance to the traffic lane cannot be obtained.

Verify the contractor installs Type P or Type R markers when required.

4-1203B (10) Impact Attenuator Vehicles

Verify the contractor uses an impact attenuator vehicle as a shadow vehicle in moving closures and during placement and removal of components in stationary closures. After placing components of stationary closures, the contractor may place the impact attenuator vehicle in advance of the work area to protect workers and traffic.

Verify there is enough shoulder width before allowing the use of an impact attenuator vehicle for placement and removal of components on two-lane, two-way highways.

Do not allow the use of a damaged impact attenuator vehicle.

4-1203B (11) Flashing Arrow Signs

Verify the proper types of flashing arrow signs are used.

- Verify the flashing arrow sign trailer can be leveled and plumbed.
- Verify 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.
- Confirm compliance with the minimum legibility distances.
- Verify 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 conventional bulbs and, therefore, require greater care while being aimed.

4-1203B (12) Portable Flashing Beacons

Confirm the contractor places portable flashing beacons according to the plans and removes them from the traveled way at the end of each night's work.

Verify portable flashing beacons operate according to the specifications.

4-1203B (13) Portable Changeable Message Signs

PCMSs are a supplement to and not a substitute for the traffic control system required by the specifications and *Standard Plans.*

Verify that the trailer bearing the sign can be leveled and that the sign operates within the required minimum and maximum heights. Verify the contractor delineates a PCMS with a taper consisting of nine traffic cones.

Confirm the sign is placed where it is most visible to approaching motorists. Check that the sign complies with the visibility and legibility requirements. Pay special attention to locations where vertical or horizontal curvature restricts the sight distance. Drivers should be able to read the entire message at least two times before passing the sign.

Confirm the signs display only pre-approved messages and that the messages conform to the *Changeable Message Sign Guidelines*, and district and Caltrans policy. The Traffic Operations Headquarters Division's *Changeable Message Sign Guidelines* provides a listing of approved abbreviations for PCMSs. Prohibit messages that do not convey real-time information to the motorist. Examples of unacceptable messages include "Drive carefully," "Have a Nice Day," and "Thank you."

PCMSs are working equipment when actively displaying a message, otherwise they are nonoperating. Ask the contractor to remove nonoperating portable message signs from the job site away from traffic or protect it in accordance with Section 7-1.04 "Public Safety," of the *Standard Specifications*. Consult with the district traffic engineer for other acceptable means to protect the sign in lieu of the Type K temporary railing required by the specifications. In many cases, placing a PCMS behind existing guard railing will protect it.

PCMSs are required only during times, places, or activities stated in the plans and specifications and are not required when the traffic control system is nonoperational or for discretionary use.

4-1203B (14) Temporary Signal Systems

Verify the planned temporary signal system includes a backup power source and automatic transfer switches.

Do not allow the use of power from private parties to power the temporary signal system.

If a system shutdown occurs, planned or unplanned, the contractor should provide flaggers to control traffic until the traffic signals are functioning correctly.

Periodically review the temporary signal system to document its maintenance. Record inspection dates and conditions observed in the project records.

4-1203B (15) Temporary Flashing Beacon Systems

Verify the temporary flashing beacon system includes a backup power source and automatic transfer switches.

Do not allow the use of power from private parties to power the temporary flashing beacon system.

Verify temporary flashing beacon systems are relocated as work progresses according to the specifications.

4-1203B (16) Automated Work Zone Information Systems

Provide the contractor with the message content and the thresholds used for triggering

when the messages will be displayed. Consult with the district traffic manager for assistance with these items.

When necessary ask the contractor to adjust placement or message content of signs based on changing project or traffic conditions.

4-1203C Maintaining Traffic

4-1203C (1) Traffic Control Systems

Do not allow the contractor to close two adjacent ramps in the same direction of travel unless necessary because of the operation or project conditions. Require the contractor to set up an off-the-highway detour before closing all ramps in both directions of travel at the same interchange.

Verify the contractor follows the notification and signing requirements before setting up any traffic control systems.

Remind the contractor of Americans with Disabilities Act requirements if the traffic control system will affect pedestrian traffic and a temporary pedestrian facility is needed.

4-1203C (1a) Closure Schedules

Confirm the contractor submits a schedule of planned closures in advance as required by Section 12-4.02A(3), "Submittals," of the *Standard Specifications*. Closures that will reduce horizontal or vertical clearances require even more notification. Inform the Transportation Permits Unit 15 days in advance of the closure. This notification affords Caltrans the opportunity to coordinate work within the highway corridor.

Confirm the contractor's closure requests comply with the closure charts. Review the requests to avoid oversights and to identify and reduce the number of unnecessary requests (overbooking).

4-1203C (1b) Contingency Plans for Closures

If the contractor fails to reopen the highway according to the closure charts, suspend work and request a detailed written construction contingency plan demonstrating that the highway will be opened in a timely manner in the future (refer to Section 2-214D, "Construction Contingency Plan," of this manual).

Do not permit any closures until the contractor submits this plan and it is authorized in accordance with the specifications.

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.

4-1203C (1c) Lane Closure System

- Confirm the contractor's employee uses the assigned user identification to submit the closure requests in the LCS. The closure requests are stored with a "SAVED" status.
- Review the closure requests for compliance with the closure requirements charts and other contract requirements. If you accept the closure request, the status will change to "PENDING." If you reject the closure request, LCS will send the contractor an

email asking for a correction and resubmission.

- Verify the district traffic manager reviews the closure requests for conflicts before approving it. The status in LCS will change to "APPROVED." The LCS will notify the contractor by email of the approval or rejection.
- Confirm the contractor cancels scheduled closures that are not needed at least 2 days in advance, using the LCS. The LCS will generate email notifications to the resident engineer and the district traffic manager when the contractor cancels a closure.

4-1203C (1d) Status Updates for Authorized Closures

During the course of work, monitor the contractor's activities to verify closures are statused in LCS as follows:

- Stationary closures on a traffic lane are 10-97 before placing the first cone on the traffic lane, and 10-98 after removing all the cones from the traffic lane.
- Stationary closures on the shoulder are 10-97 before placing the first cone after the last advance warning sign, and 10-98 after removing the last cone before the advance warning signs.
- Moving closures are 10-97 before the actual start time of the closure, and 10-98 after the actual end time of the closure.
- Closures not needed on the authorized date are 10-22 within 2 hours after the authorized start time.

The LCS will notify the resident engineers and designated inspectors by email when the contractor changes the status of a closure.

If a contractor is unable to access the LCS Mobile web page, obtain the closure status from the contractor and notify the transportation management center.

Keep the project's completion dates current in the LCS. The contractor will not be able to access projects in LCS after the completion date.

4-1203C (1e) Field Adjustments

Field adjustments to the traffic handling plans are frequent occurrences. Adjustments should be made to create adequate sight distance, to avoid locations that require drivers to make multiple decisions, to accommodate expected queues, and to coordinate activities at multiple locations. The following are typical situations where field adjustments are necessary:

- T Series *Standard Plans*—Show minimum acceptable standards for traffic control. Increasing taper lengths, addition of extra signs, and increasing sign spacing to allow for traffic queuing are all acceptable measures as long as the *Standard Plan* minimum requirements are met.
- Signs—Review sign line of sight visibility and verify it complies with Section 12-3.11, "Construction Area Signs," of the *Standard Specifications*. Signs should not be placed at the apex of horizontal curves, crests of vertical curves, or where trees or bushes hinder visibility of the sign.
- Vertical and horizontal curves—Verify 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 in a tangent with the taper placed on a slight upgrade for improved visibility.)

- Ramps and connectors—Managing ramps and connectors within a closure requires additional consideration. Extend exit ramp tapers back through the 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 advance 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 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 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. Confirm that the contractors are coordinating placement and pick up of the closure so that the traffic control system is maintained in accordance with the *Standard Plans* at all times.
- 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. Confirm advance 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 or an impact attenuator vehicle between the approaching motorist and workers on foot.

4-1203C (1f) Placement Sequence and the Start of Work

Verify the contractor completely installs the traffic control system before commencing work. An impact attenuator vehicle must be used for the placement and removal of temporary traffic control devices when required by the contract. The following are some possible installation procedures that may be used by the contractor, 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 W20-1 "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.

4-1203C (1g) Drive-Through Inspection

After installation and when the inspector is available, make a drive-through inspection of the system. During the inspection, drive through the system as though you had no knowledge of the work zone. Confirm 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; indicate weather, traffic conditions, and time of inspection.

4-1203C (1h) Maintenance

Verify contractors are assigning personnel and maintaining closures in accordance with the T Series *Standard Plans*. 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 damaged by traffic.

4-1203C (1i) Reverse Operations Inside Closures

Workers may operate vehicles opposite the flow of traffic inside a closed lane only with the prior authorization of the resident engineer. Certain equipment, like dike placement machines, can only operate off one side of the equipment and may need to be operated against live traffic. Similarly, certain striping operations require the operator to operate against live traffic due to clearances.

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.
- At no time should a U-turn be permitted in traffic.

4-1203C (2) Pedestrian Facilities

- Confirm the contractor provides another walkway nearby, off the traveled way, when the construction activities require the closure of a walkway.
- Verify the contractor provides overhead covering, overhead lighting, or both when required.
- Verify the walkway is Americans with Disabilities Act compliant.

4-1203C (3) Bridge Cleaning and Painting Activities

- Verify the required signs are placed during the cleaning and painting activities and removed at the end of each work shift.
- Verify the traveled way is free of obstructions and residue before opening the area to traffic.

4-1203D Temporary Pavement Delineation

- Verify temporary or permanent pavement delineation is in place before opening the traveled way to traffic.
- Verify temporary pavement markers are the same color as the lane line or centerline markers being replaced. Confirm the contractor uses the long-term temporary pavement marker for 180 days or less and the short-term temporary pavement marker for 14 days or less.
- Do not allow the application of temporary pavement delineation over existing pavement delineation.
- Verify removal of any temporary delineation that conflicts with any subsequent or new traffic pattern for the area.

4-1203D (1) Temporary Pavement Markers

- Do not allow the use of epoxy adhesive to place pavement markers in areas where the removal of the pavement markers is required.
- Temporary pavement markers will not adhere to a cold in-place recycling surface. Use alternate methods to delineate this type of surface.
- Use of 180-day temporary pavement markers on an open-graded surface is not advised, when removed the marker glue can peel up the open grade.

4-1203D (2) Channelizers

- Verify channelizers used for temporary edge line delineation are predominantly orange and the surface mounted type.

4-1203D (3) Temporary Lane Line and Center Delineation

- Verify pavement marker spacing.
- Verify the contractor installs the temporary no-passing zone signs if no-passing centerline pavement delineation is obliterated. Determine the exact location of the temporary signs and when they are no longer needed for the direction of traffic.
- Verify no-passing zone signs are removed when no longer required.

4-1203D (4) Temporary Edge Line Delineation

- Verify the contractor cements the bases of channelizers used for temporary edge line delineation as specified.
- Allow the use of paint only if the temporary traffic stripe is not required to be removed.

4-1203D (5) Temporary Traffic Stripe Tape

- Verify that temporary traffic stripe tape for use more than 14 days is applied according to the specifications, and temporary traffic stripe tape to remain in use 14 days or less is applied according to the manufacturer's instructions.

4-1203D (6) Temporary Traffic Stripe Paint

- Review Section 84-2.03, "Construction," of the *Standard Specifications* for the application requirements for temporary traffic stripe paint.

4-1203D (7) Temporary Pavement Marking Tape

- Verify that temporary pavement marking tape to remain in place more than 14 days is applied according to the specifications, and that temporary pavement marking tape to remain in place 14 days or less is applied according to the manufacturer's instructions.

4-1203D (8) Temporary Pavement Marking Paint

- Review Section 84-2.03, "Construction," of the *Standard Specifications* for the application requirements for temporary pavement marking paint.

4-1203E Temporary Pavement Delineation for Seal Coats

- Verify the contractor installs the temporary no-passing zone signs if no-passing centerline pavement delineation is obliterated. Determine the exact location of the temporary signs and when they are no longer needed for the direction of traffic.
- Verify temporary pavement delineation is maintained until it is replaced with the permanent pavement delineation. Direct the contractor to remove any temporary pavement delineation that conflicts with the permanent pavement delineation.

4-1204 Level of Inspection

4-1204 Level of Inspection

Intermittent day and night inspections to verify compliance with visibility and legibility requirements for:

1. Retroreflective bands on portable delineators.
2. Retroreflective sheeting on channelizers.
3. Retroreflective sleeves on traffic cones.
4. Construction area signs.
5. Portable changeable message signs.
6. Flashing arrow signs.

4-1205 Quality Control

4-1205 Quality Control

While specific levels of quality control for temporary traffic control are not included in Section 12 of the *Standard Specifications*, the contractor is responsible for providing quality control under Sections 5-1.01, "General," and 6-2.02, "Quality Control," of the *Standard Specifications*.

Verify that the contractor schedules and conducts a meeting to discuss the operation of impact attenuator vehicle as required under Section 12-3.23A(4), "Quality Assurance," of the *Standard Specifications*. Verify attendance of subcontractor's and other contractor's personnel involved with traffic control. Ensure your designated staff and other state staff involved with traffic control attend the meeting when possible.

4-1206 Payment

4-1206 Payment

The following guidelines are for measuring and paying for various traffic control devices for construction areas.

4-1206A Flagging

Section 12-1.04 "Payment," of the *Standard Specifications* requires that the cost of providing flaggers be divided equally between Caltrans 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. Caltrans' share of flagging costs is 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 does not include the costs of placing, maintaining, and removing construction area signs or lighting for nighttime operations during flagging operations nor does it include the cost of the pilot car or pilot car operator. That cost is paid as part of the contract item for traffic control system.

The flagging costs incurred in connection with increased or decreased work paid for at contract prices will be subject to the 50-50 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 in accordance with Section 4-1.05 "Changes and Extra 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.

4-1206B Temporary Traffic Control Devices

4-1206B (1) Traffic Cones

Traffic cones are paid for as part of the contract item for the traffic control system.

4-1206B (2) Plastic Traffic Drums

Count the plastic traffic 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" section in the contract are not to be paid for at contract item price.

4-1206B (3) Portable Delineators

Portable delineators are paid for as part of the contract item for the traffic control system.

4-1206B (4) 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.

4-1206B (5) Barricades

Initial placement of each barricade 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 should be repaired at the contractor's expense, regardless of the cause, including damage by public traffic.

4-1206B (6) Construction Area Signs

Construction area signs, except those used in traffic control systems for 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.

4-1206B (7) Type K Temporary Railing

Review the "Public Safety" section in the contract. Do not use the contract item for Type K temporary railing to pay for temporary railing that is placed to fulfill the requirements of the "Public Safety" section.

Withhold some payment from progress pay estimates to cover the cost of removing Type K temporary railing

4-1206B (8) Temporary Traffic Screens

Measure and pay temporary traffic screen according to the specifications.

4-1206B (9) Temporary Crash Cushion Modules

Review the "Public Safety" section in the contract. 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.

4-1206B (10) Impact Attenuator Vehicles

Impact attenuator vehicle is paid for as part of the contract item for the traffic control system.

4-1206B (11) Flashing Arrow Signs

Flashing arrow signs are paid for as part of the contract item for the traffic control system.

4-1206B (12) 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.

4-1206B (13) Portable Changeable Message Signs

The contract item for PCMSs, commonly bid as "furnish-each" or "furnish-lump sum," includes all costs for placement, operation, maintenance, relocation, and removal of the signs.

Direct the contractor to provide PCMSs for use not otherwise provided for in the contract, with a minimum notice of 1 full working day. Payment is computed as extra work.

4-1206B (14) Temporary Signal Systems

The lump sum payment for this item includes all the costs of hauling Department-furnished materials between the designated pickup locations, the project, and the designated salvage location. If the pickup or salvage location is changed, then additional costs or savings to Caltrans 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.

4-1206B (15) Temporary Flashing Beacon Systems

The contract item for a temporary flashing beacon system, commonly bid as "furnish-each" or "furnish-lump sum," includes all costs for placement, operation, maintenance, relocation, and removal of the system.

4-1206B (16) Automated Work Zone Information Systems

The lump sum payment for this item includes all costs for placement, operation, maintenance, relocation, and removal of the Automated Work Zone Information System.

4-1206C Traffic Control Systems

For all project work, the lump sum payment for the traffic control system includes payment for all labor, equipment, and materials to install, maintain, and remove the 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 and impact attenuator vehicle.

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 change order that authorizes the extra work should reflect these costs.

In addition to adjustments for ordered changes, consider adjustments to the contract item for the traffic control system when the following circumstances exist and result in additional 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 closures required.
- The additional 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 Facilities

4-1501 General
4-1502 Before Work Begins
4-1503 During the Course of Work
4-1503A Removing Concrete
4-1503B Salvaging Materials
4-1504 Level of Inspection
4-1505 Payment

Section 15 Existing Facilities

4-1501 General

The information in this section corresponds to Section 15, "Existing Facilities" of the *Standard Specifications*. The following sections of the *Standard Specifications* have related information:

- Section 5-1.36, "Property and Facility Preservation"
- Section 7-1.05, "Indemnification"
- Section 7-1.06, "Insurance"

The work described in this section includes abandoning, adjusting, modifying, obliterating, reconstructing, relaying, relocating, remodeling, removing, repairing, or resetting a facility. The work may overlap with the area that must be cleared and grubbed, as specified in Section 17-2, "Clearing and Grubbing," of the *Standard Specifications*.

The contractor is required to protect all existing facilities, whether described in the contract or not, that are to remain in place, temporarily or permanently. When existing facilities are damaged as a result of the contractor's operations, the contractor is responsible for repair or replacement. Caltrans is responsible for repair or replacement of existing facilities that are damaged by public traffic.

Check for cooperative agreements where existing facilities transition onto local agency right-of-way. A local agency may maintain the existing facilities.

4-1502 Before Work Begins

Before work begins, do the following:

- Inspect existing facilities that are to be relaid, reset, relocated, or reconstructed. If their condition has deteriorated sufficiently to prevent the planned use, write a 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

During the work, take the following steps for removing concrete and salvaging materials.

4-1503A 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. Record your observations in the daily report and note that the minimum depth requirements have been met.
- Disposal into adjacent embankments. Refer to Section 19-6, "Embankment Construction," of the *Standard Specifications*. Note that both lateral and vertical limitations are met. Include disposal locations on the as-built plans.
- Breakage of floors of concrete basements, pits, and structures to prevent entrapment of water. Note the inspections in the daily report.

4-1503B 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, refer to Section 3-4, "Scope of Work," of this manual.

4-1504 Level of Inspection

4-1504 Level of Inspection

The suggested level of inspection for work activities associated with existing facilities, including removing concrete and salvaging materials, is intermittent inspection.

4-1505 Payment

4-1505 Payment

The resident engineer must be familiar with the measurement and payment clauses for existing facilities that are to be removed. Determine whether the necessary measurements must be taken before or during removal.

Section 16 Temporary Facilities

4-1601 General

4-1602 Before Work Begins

4-1602A Temporary Pedestrian Facilities

4-1602B High-Visibility Fences

4-1602C Temporary Construction Mats

4-1603 During the Course of Work

4-1603A Temporary Pedestrian Facilities

4-1603B High-Visibility Fences

4-1603C Temporary Construction Mats

4-1604 Level of Inspection

4-1605 Quality Control

4-1606 Payment

Section 16 Temporary Facilities

4-1601 General

This section provides guidelines for inspecting temporary facilities for work specified under Section 16, "Temporary Facilities," of the *Standard Specifications*. The specification includes Sections 16-2.02, "Temporary Pedestrian Facilities"; 16-2.03, "High-Visibility Fences"; 16-2.04, "Temporary Construction Mats"; and 16-2.05, "Job Site Water Control."

The contractor may make use of used materials for temporary facilities if the used materials comply with the specifications for new materials.

4-1602 Before Work Begins

All temporary facilities must be well maintained as long as they are needed and disposed of when they are no longer needed.

4-1602A Temporary Pedestrian Facilities

Review Section 12-4.04, "Pedestrian Facilities" of the *Standard Specifications*.

Ensure that temporary pedestrian facilities are in compliance with *California MUTCD*, Part 6, Chapter 6D, "Pedestrian and Worker Safety."

Ensure that lighting is in compliance with the specifications for falsework lighting in Section 48, "Temporary Structures," of the *Standard Specifications*.

Request shop drawings and supporting calculations for temporary pedestrian facilities designed by the contractor. Verify shop drawings and calculations are signed by an engineer who is a California-licensed civil engineer.

4-1602B High-Visibility Fences

Ensure that high-visibility fence is shown on the Bid Item List as a temporary fence (Type ESA).

Upon delivery of the materials to the job site, ensure that certificates of compliance are submitted for high-visibility fabric. All other fencing materials must be field inspected and released by the engineer. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

Arrange for necessary control staking when the contractor has submitted the required survey request.

Fences should not obstruct flow in streams or drainage areas.

4-1602C Temporary Construction Mats

Ensure that temporary construction mat is shown on the Bid Item List as a temporary wetland protection mat.

The contractor must submit a schedule for the placement and removal of the mats. Include the location, mat type, and placement and removal dates for each location. Describe the method of installing and removing the mats.

4-1603 During the Course of Work

4-1603 During the Course of Work

4-1603A Temporary Pedestrian Facilities

Ensure the pedestrian facility is surfaced with asphalt concrete, commercial-quality concrete, or wood. The surface must be firm, skid resistant and free of irregularities.

Ensure handrails are provided on each side of a temporary pedestrian facility as necessary to protect pedestrian traffic from hazards due to work activities or adjacent vehicular traffic.

Verify the minimum width between the inside face of the handrails and the clear height of the facility meet the contract requirements. Ensure adequate lighting is provided at all times.

Verify overhead protection for pedestrians extends at least 4 feet beyond the edge of the bridge deck and all pedestrian openings through falsework are illuminated.

4-1603B High-Visibility Fences

Observe the placing of fence posts. Also, measure the spacing of posts and 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 on the plans.

Decide on which side of the posts the contractor should place fabric when the side is not specified.

Inspect the fastening of fabric to wood posts with nails or to steel posts with tie wires or locking plastic fasteners at a maximum spacing of 8 inches.

Ensure the contractor is maintaining posts in a vertical position, reattaching any detached fabric and replacing any damaged fabric.

4-1603C Temporary Construction Mats

Inspect that mats provide a continuous cover over the wetlands and openings around any columns or other obstacles are sealed.

Inspect that mats are free from soil, seeds, or other organic or hazardous material before entering the work area.

Inspect the mats and immediately inform the contractor to replace or repair damaged or broken mats.

When no longer needed, confirm that mats are moved to a washout location and cleaned before they are removed from the job site.

4-1604 Level of Inspection

4-1604 Level of Inspection

Suggested levels of inspection for work activities included in temporary facilities are:

- Benchmark inspection of temporary facilities locations and alignments.
- Intermittent inspection during placement of temporary facilities.
- Benchmark inspection to ensure temporary facilities are properly maintained.

- Benchmark inspection to ensure the proper disposal of temporary facilities when they are no longer needed.

4-1605 Quality Control

4-1605
Quality Control

While specific levels of quality control sampling and testing for temporary facilities are not included in Section 16, "Temporary Facilities," of the *Standard Specifications*, the contractor is responsible for providing quality control under Sections 5-1.01, "General," and 6-2.02, "Quality Control," of the *Standard Specifications*.

4-1606 Payment

4-1606
Payment

For the basis of measurement and payment, refer to the appropriate sections of the special provisions and *Standard Specifications*. Make partial payments to account for placement, maintenance, and removal of various items under Temporary Facilities.

Section 17 Clearing and Grubbing

Section 17 Clearing and Grubbing

4-1701 General

4-1701 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 acre. During clearing and grubbing, pay special attention to the preservation of property and environmentally sensitive areas.

4-1702 Before Work Begins

4-1702 Before Work Begins

Before work begins, do the following:

- Review the plans, special provisions, and right-of-way agreements for details that may require special staking or issuing change orders.
- Ensure the approval of the water pollution control plan. Review the plan to ensure clearing and grubbing conforms to the water pollution control plan.
- Ensure the clear marking of features and facilities that are to be preserved. Review and verify the contractor's submitted list of existing irrigation system deficiencies.
- Discuss with the contractor such items as the marking of any special locations, including environmentally sensitive areas and any other 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.
- Before disposing of material outside of the highway right-of-way, review any planned disposal sites. Refer to Section 5-1.20B(4), "Contractor-Property Owner Agreement," of the S*tandard Specifications* to determine the contractor's necessary actions.
- If a planned disposal site is not available for state use, discuss the Caltrans policy in Section 7-103H, "Disposal, Staging, and Borrow Sites," of this manual with the contractor. To ensure mutual understanding and agreement, hold a joint meeting including the contractor, environmental-construction liaison, and appropriate regulatory agencies. The contractor must obtain and submit permits, environmental studies, and documentation, among other items required by agencies having jurisdiction over the site. If the contractor satisfies all submittal requirements for the disposal site, provide written authorization for disposal outside the highway right-of-way.
- Before allowing the contractor to chip plant materials for disposal on the job site, investigate to determine if plant disease or insect pests would 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.

4-1703 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, and consult with the district environmental-construction liaison 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 in the right-of-way but outside the clearing limits constitute a hazard. Any such trees should be removed.
- 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 waste that might interfere with future work is disposed of by burying it adjacent to the roadway. 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 required by Section 17-2.03B, "Clearing," of the *Standard Specifications*. During the removal of additional branches, direct the contractor to give the trees a balanced appearance.
- 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.

4-1704 Level of Inspection

4-1704
Level of Inspection

Suggested levels of inspection for clearing and grubbing work activities are:

- Benchmark inspection for typical clearing and grubbing work, such as removal of trees, stumps, roots, bushes, and other vegetation or debris.
- Intermittent inspection for more complex clearing and grubbing work that involves environmentally sensitive areas.

4-1705 Payment

4-1705
Payment

If the clearing and grubbing work is not completed within one pay period, make monthly progress payments that represent the percentage of work completed.

Section 18 Dust Palliatives

Section 18
Dust Palliatives

4-1801 General

4-1801
General

Dust palliatives are used to stabilize soil and aggregates to control dust during construction as required in Sections 7-1.03, "Public Convenience," and 10-4, "Water Usage," of the *Standard Specifications*. Dust palliatives include water, dust suppressants, and dust control binders as provided in Section 18, "Dust Palliatives," of the *Standard Specifications*.

4-1802 Before Work Begins

4-1802
Before Work
Begins

Identify construction activities that will require use of dust palliatives. Typical construction activities that require dust control are:

- Clearing, excavation, and grading
- Use of unpaved roads and staging areas
- Demolition of concrete facilities
- Stockpiles
- Aggregate and soil loading and unloading

If a dust suppressant or dust control binder is to be used, ensure that the contractor submits a dust treatment plan before start of job site activities. Review the dust treatment plan for application methods and rates, required weather conditions for application, and drying or curing time. Also review the manufacturer's instructions.

4-1803 During the Course of Work

4-1803
During the Course
of Work

During the course of construction, ensure that:

- Dust suppressant is applied to temporary haul roads; staging, material storage, and layout areas; compacted soil, AB roads, or driveways; and paved surfaces and other areas identified in the project specifications.
- Dust control binder is applied to rough-graded soils, completed slopes, and stockpiles (unless another practice is used).
- Dust suppressant or dust control binder is not applied to areas within 100 feet of a wetland or body of water.

4-1804 Level of Inspection

4-1804
Level of
Inspection

Suggested level of inspection for typical work requiring application of dust palliatives for dust control are:

- Continuous inspection during initial application of dust suppressant or dust control binder to verify application equipment and application rates. Verify adequate cure of dust suppressant before opening treated areas to traffic.

- Intermittent inspection to monitor construction activities that require dust palliatives: daily when water is used, weekly when a dust suppressant or dust control binder is used.

4-1805 Quality Control

4-1805 Quality Control

For dust suppressant, verify test results listed on the certificate of compliance are in compliance with specified values for quality characteristic requirements and environmental requirements.

4-1806 Payment

4-1806 Payment

The resident engineer must keep sufficiently detailed records to differentiate and support payment for ordered dust control versus contract bid item work while also excluding portions for which payment is included in the bid items involved. Record verbal agreements about payment in the daily report.

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Section 19 Earthwork

4-1901 General

Earthwork includes operations connected with roadway excavation, repair of slope failures, blasting, structure excavation, backfill, ditch excavation, compaction, embankment construction, grading, borrow excavation, placement of subgrade enhancement geosynthetic (SEG), placement of shoulder backing, and removal of unsuitable material or a buried man-made object. For earthwork requirements, refer to Section 19, "Earthwork," of the *Standard Specifications*. Also refer to Sections 10-5, "Dust Control," and 17-2, "Clearing and Grubbing," of the *Standard Specifications*.

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

Resident engineers and assistant resident engineers must do the following to prepare for earthwork operations:

4-1902A Roadway Excavation

- Review 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.
- Before any excavation, under California Government Code, Section 4216, "Regional Notification Center System," the contractor must notify the regional Underground Service Alert (USA) notification center by calling 811 or submitting an electronic ticket request at least 2 days before excavating. To ensure that the contractor has notified the regional USA notification center, request the contractor provide the ticket number issued by the USA center. Caltrans is not affiliated with USA, so Caltrans is not notified to mark out Caltrans underground facilities. To ensure that existing Caltrans underground facilities are identified before allowing the contractor to excavate, contact the local electrical maintenance regional manager for help in locating Caltrans facilities. To help identify any Caltrans facilities within the right-of-way, such as irrigation systems, signal and lighting systems, ramp metering systems, traffic monitoring stations and communication conduits, obtain the latest utility "as-built" from the Electrical Maintenance Unit.
- Review the information handout regarding permits; hazardous waste, asbestos or lead investigation reports; and optional disposal sites.
- Make a preliminary check of earthwork quantities. Decide how quantities will be measured for partial payments. Refer to Section 4-1906, "Payment" of this manual.

- Review the status of utility relocation work. Advise the contractor of any changes that may affect the work. Refer to Section 3-518C, "Nonhighway Facilities," of this manual for more details on utilities.
- Ensure the clear marking of features and facilities that are to be preserved.
- Review and verify the contractor's submitted list of existing irrigation system deficiencies. For more information, refer to Section 20-10.02C(2), "Check and Test Existing Irrigation Systems," of the *Standard Specifications*.
- When the contract requires trench excavation, obtain from the contractor a detailed plan showing the design of shoring, bracing, sloping, or other provisions for worker safety. Ensure either that a licensed civil or structural engineer signs the plan or that it conforms to the shoring system standards established by the *Construction Safety Orders* (CSOs) of the Department of Industrial Relations, 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 licensed 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 Structure Construction in the same manner as for falsework drawings. Structure Construction will obtain the railroad company's approval and notify the resident engineer. For additional details, refer to Structure Construction's *Bridge Construction Records and Procedures* manual, Vol. 2, and the Caltrans *Trenching and Shoring Manual*. After review by 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 under Section 5-1.23B(2), "Shop Drawings," of the *Standard Specifications*. Structure Construction manuals are available at:

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

- 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.
- Verify that the contractor's plan to control water pollution has been approved and implemented before beginning work. Refer to Section 13, "Water Pollution Control," of the *Standard Specifications*.

4-1902B Blasting

4-1902B (1) Safety Considerations

All blasting work must be conducted in strict accordance with the CSOs or a properly approved alternate safety plan. An alternate safety plan is required when a 45-foot clear zone cannot be maintained around the loading area, such as a blasting area adjacent to traffic. The CSOs 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 security plans 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. Some activities may use unusual entry routes.
- Electrical storms—No explosive can be considered "safe" should lightning 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. Audible signals (as shown in the CSOs) 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. 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 CSOs. Adhering to safe distances becomes critical when "rolling roadblocks" or "traffic breaks" are to be used.
- Onsite 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 post-detonation 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 CSOs 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 Ditch Excavation

Before ditch excavation, review the plans and the site to determine if original ground needs to be cross-sectioned. Most ditches will require slope stakes and, on 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.

4-1902D 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. 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 and ensure that any required strutting or bracing, as shown on the plans, is in place.
- Test backfill material for compliance with specifications and test compaction.

4-1902E Embankment Construction

Carefully examine areas upon which embankments are to be constructed. Include a review of the information handout and an onsite observation during clearing.

Review permits, environmental studies, and requirements to ensure that the contractor meets all commitments, including any measures pertaining to providing necessary access roads. Where work will affect areas beyond those approved for construction purposes or involves an environmentally sensitive area, consult with the district or regional environmental office.

Look for the following:

- Lush vegetative growth in local areas, seepage, and springs indicating groundwater.
- 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 address treatment of such areas. However, when serious problems exist that the contract has not addressed, consult with the district materials engineer, the geotechnical engineer, or both.

The following 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. Removing the plastic material if it is economically feasible.
    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 9 to 24 feet 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

If the contractor requests that import borrow be measured and paid for based on borrow site cross sections, verify that the source of borrow is used exclusively for the project. Coordinate testing and survey of the imported borrow material site prior to opening.

Review the contract for specific types of borrow the contractor will use. Also, in the resident engineer's pending file, review environmental and other requirements and commitments. This includes compliance with the Surface Mining and Reclamation Act, permits and right-of-way agreements, and other items that may affect borrow excavation.

4-1902G Shoulder Backing

Review the contract documents to determine the type of shoulder backing and the locations where shoulder backing will be placed. Verify the locations in the field for accessibility and applicability.

4-1902H Subgrade Enhancement Geosynthetic

Review the contract for the specific type of SEG. The layout plans should show the limits of SEG (width and length). The typical cross sections should clearly show the location of SEG within the pavement or embankment section. If separation geotextile is used with an SEG, the pavement cross section should show the location of separation geotextile that is typically placed at the subgrade interface (below the SEG). To determine SEG material compliance, refer to Section 96-1.02O, "Subgrade Enhancement Geotextile," of the *Standard Specifications*. For further information on

SEG, refer to the *Subgrade Enhancement Geosynthetic Design and Construction Guide* at:

http://www.dot.ca.gov/hq/maint/Pavement/Offices/Pavement_Engineering/Pavement_Foundations.html

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 to Section 3-519B, "Load Limits,'' of this manual. Section 7-1.04, "Public Safety," of the *Standard Specifications* further covers the hauling of earth, specifically with respect to spillage of material.

4-1903A (2) Unsuitable Material

Section1-1.07, "Definitions," 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. . ." For unsuitable material, the resident engineer's duties include the following:

- 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 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 available for state use on the project, any or all of the following actions may be necessary before the work may proceed: 1) obtain new or revised permits; 2) conduct new environmental studies; and 3) meet new environmental compliance requirements. Review all previously identified haul roads and flattened slopes to determine if they involve impacts not disclosed by existing environmental documentation. If the needed area extends beyond that approved for construction or may affect an environmentally sensitive area, consult with the district or regional environmental office.
- 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, record this decision in the change order memorandum. Then process a change order for an ordered change or extra work.
    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. Refer to 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 5-1.26, "Construction Surveys," of the *Standard Specifications*. Also, refer to Section 3-5, "Control of Work," of this manual and Chapter 12, "Construction Surveys," in 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 that 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 that the contractor satisfies the conditions in Section 5-1.20B(4), "Contractor–Property Owner Agreement," 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 adequacy of the amount of embankment estimated for subsidence of original ground, considering different field conditions than those the design engineer anticipated.
- Calculate variations of slopes. Even within specified tolerances, slope variances can significantly affect 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 affect 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 finding." 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 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 Groundwater

When excessive groundwater 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 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 CSOs.
- To anticipate changes because of the foundation's condition, periodically inspect the excavation. When the foundation's condition is not stable and requires further investigation, contact the district geotechnical engineer to discuss the materials information and a viable foundation investigation. In consultation with the geotechnical engineer, direct the contractor to conduct a foundation investigation, which may include digging test pits, drilling test borings, and performing foundation bearing capacity tests. This additional work will be paid as extra work.
- 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 that 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 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 Sections 53, "Shotcrete," or 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, verify that the thicknesses of the layers meet specifications. Also, verify that 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 4 inches 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 6 feet. 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 engineer's 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 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:

- Make measurements and keep adequate records for progress and final payment.
- When material is to be paid for by the ton, ensure there is sufficient moisture testing to determine pay quantities. For more information, refer to Section 9-1.02D, "Quantities of Aggregate and Other Roadway Materials," of the *Standard Specifications*.
- Ensure the contractor submits the necessary documents covering possible local material sources. For details, refer to Section 3-6, "Control of Materials," of this manual.

4-1903G Shoulder Backing

Test the shoulder backing materials for meeting the specification. Ensure the compaction is adequate. Make sure the shoulder backing is completed within 5 days after placement of adjacent new surfacing.

4-1903H Subgrade Enhancement Geosynthetic

SEG material can be damaged easily if mishandled during construction. During placement of SEG, the resident engineer should ensure that the product has been installed correctly by adhering to the following installation requirements:

- SEG shall be placed directly on a cleared surface along the alignment to the limits shown on the plans. The surface to receive the geogrid or geotextile, immediately prior to placing, shall conform to the elevation tolerance and cross slopes as specified in the plans.
- The subgrade to receive the SEG must conform to the compaction and elevation tolerance specified in Section 25-1.03B, "Subgrade," of the *Standard Specifications* and project special provisions and must be free of loose or extraneous material and sharp objects that may damage the SEG during installation.
- SEG must be handled and placed in accordance with the manufacturer's recommendations and pulled taut to form a wrinkle-free mat on the prepared surface.
- Borders of rolled out geogrid or geotextile must be overlapped a minimum of 2 feet in the direction as ordered by the resident engineer. All roll ends must be overlapped a minimum of 2 feet in the direction of the spreading of the aggregate subbase material. As determined by the resident engineer, an overlap larger than 2 feet may be required for lower-strength subgrade (R-value < 5).
- The geotextile or geogrid must be cut to conform to the curves. A minimum overlap of 1.5 feet shall be provided for adjacent geotextile or geogrid cut sides. The overlap must be held in place by staples, pins, or piles of fill of the materials to be placed on the geotextile or geogrid, or as directed by the resident engineer.
- Construction equipment must not operate directly on the geogrid or geotextile. A minimum of 6 inches of fill cover is required prior to operation of construction vehicles atop the geotextile or geogrid.
- The amount of SEG placed on subgrade must be limited to that which can be covered with aggregate subbase or base material within 72 hours.

- Special care must be taken in the handling of geogrids manufactured from polypropylene at temperatures at or below 0 degrees Fahrenheit.
- Stockpiling of materials directly on the SEG is not allowed. Once a sufficient working platform has been constructed, all remaining materials must be placed and compacted in accordance with special provisions and the *Standard Specifications*. A minimum of 6 inches of fill material must be maintained between the geotextile or geogrid and the equipment to prevent damage to the geotextile or geogrid. Until this sufficient working platform has been constructed, compaction must be achieved by using either smooth wheel (without vibratory action) or rubber-tired rollers. Sheepsfoot or other types of compactor equipment employing a sheepsfoot shall not be used. Excessive turning of vehicles must not be allowed on the aggregate subbase or aggregate base material placed directly over the geotextile or geogrid.
- Areas of geotextile or geogrid damaged beyond repair during placement must be covered by a new geosynthetic covering. The overlap from the edge of the damaged area must be a minimum of 3 feet.
- Geotextile or geogrid must be laid at the proper elevation and alignment as shown on the plans or as directed by the resident engineer. Geogrid must be oriented such that the roll length runs parallel to the roadway alignment.

4-1904 Level of Inspection

4-1904 Level of Inspection

Suggested levels of inspection for typical earthwork activities are:

- Continuous inspection of structure excavation under Section 19-3, "Structure Excavation and Backfill," of the *Standard Specifications*.
- Intermittent inspection of grading, blasting, and compaction of roadway structural section.
- Benchmark inspection of placement of structure backfills, embankment, shoulder backing, subgrade geosynthetic and foundation preparation for embankment and roadway.
- Intermittent sampling and testing of material and compaction measurement of embankment within 150 feet of bridge abutments.
- Benchmark sampling and testing of imported borrow and relative compaction of material where specified.

4-1905 Quality Control

4-1905 Quality Control

While specific levels of quality control sampling and testing for earthwork are not included in Section 19, "Earthwork," of the *Standard Specifications*, the contractor is responsible for providing quality control under Sections 5-1.01, "General," and 6-2.02, "Quality Control," of the *Standard Specifications*. Ensure the contractor is actively performing quality control on production and placement of structure backfills, shoulder backing, and subgrade enhancement geosysnthetic.

4-1906 Payment

4-1906 Payment

The following measurement and payment information covers roadway excavation, structure excavation and backfill, and ditch excavation.

4-1906A 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 involves determining daily production by reaching an 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. 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" of this manual. 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.

- 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.

4-1906B Structure Excavation and Backfill

To determine methods and limits for calculating structure excavation and backfill pay quantities, and payment clauses, review the special provisions, the *Standard Plans*, and Section 19-2.04, "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.

4-1906C 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.

4-1906D Borrow Material

Before beginning work, verify the planned ground surface of excavations and the embankment area by measuring the ground surface. Determine the theoretical volume of the embankment and excavation from the planned or authorized cross sections of embankment or excavation and the verified measured ground surface. The payment quantity of imported borrow is the material deficiency calculated as the difference between the theoretical volume of the embankment (fill) and theoretical volume of excavation (cut).

In lieu of measurement of imported borrow by theoretical volume basis, the contractor may request to be paid for imported material quantity if the borrow material is from a single dedicated borrow site. Do not authorize to import borrow from multiple sites or from a single site that is not used exclusively for the project. If authorized, the contractor must inform the engineer and give Caltrans access to the site. Before beginning work, take cross-section elevations and ground surface measurements of the borrow site after any clearing, grubbing or stripping before as well as after any excavation of borrow materials. The quantity of the import borrow is measured based on the calculated volume of material from the average area and the distance between the pre-borrow excavation and post excavation cross section.

When the source of borrow material is unknown or multiple borrow sources are used, payment for imported borrow material is determined by the volume of material deficiency. The material deficiency is calculated as the difference of cut and fill based on the cross-sections of the embankment and the roadway excavation shown on the plan. If a borrow source is used exclusively for the project and borrow is paid for based on the volume, borrow material can be paid for based on the cross section of borrow areas. Before beginning work, cross-section all known borrow areas that are dedicated to the project. Calculate the volume of borrow from the cross sections average area and the distance between them before and after the excavation.

4-1906E Shoulder Backing

Measuring and paying for shoulder backing by the station is not permitted.

Shoulder backing is paid for by the ton. For payment, use the factor 145 lb/cu ft or 0.0725 ton/cu ft when volume is known. If a more accurate factor of conversion is needed, determine the actual dry density of the shoulder backing material being used.

4-1906F Subgrade Enhancement Geosynthetic

SEG is measured and paid for by the square yard of the surface. Caltrans does not pay for additional geosynthetic used for overlaps.

Section 20 Landscape

4-2001 General

4-2002 Planting

4-2002A Materials

4-2002A (1) Soil Amendment

4-2002A (2) Iron Sulfate

4-2002A (3) Lumber

4-2002A (4) Plants

4-2002A (5) Foliage Protectors

4-2002A (6) Root Protectors

4-2002A (7) Fertilizer

4-2002A (8) Wood Mulch

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4-2002A (10) Gravel Mulch

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Figure 4-20.1 Roots

4-2002C During the Course of the Work

4-2002C (1) Roadside Clearing

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4-2002C (8a) Administering Plant Establishment Time Requirements

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4-2003 Irrigation

4-2003A Components of Irrigation Systems

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4-2003A (4) Main Supply Line

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4-2003A (6) Remote Control Valves
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4-2003A (8) Gate Valve
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4-2003A (10) Emitters and Sprinklers
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Section 20 Landscape

4-2001 General

Landscaping is covered under Section 20, "Landscape," of the *Standard Specifications*. Landscaping includes highway planting and installing irrigation systems. It involves preparing areas for planting, furnishing and planting plants, and performing plant establishment work. Landscaping is sometimes combined with erosion control. Erosion control is covered under Section 21, "Erosion Control," of the *Standard Specifications*. For guidelines refer to Section 4-21, "Erosion Control," of this manual.

For questions about the acceptability of materials and work for landscaping, consult the district landscape architect and landscape specialist from the Division of Maintenance.

4-2002 Planting

Planting consists of preparing areas for planting, applying pesticides, furnishing and planting plants, controlling weeds, and maintaining plants until the start of the plant establishment period.

4-2002A Materials

The following provides general information on materials used for planting.

4-2002A (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.

4-2002A (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 to correct soils deficient in iron and to lower the pH of the soil. It makes the existing iron more readily available for plants.

4-2002A (3) Lumber

Lumber, as described in the specifications, is used for header boards to define landscaped areas.

4-2002A (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.

4-2002A (5) Foliage Protectors

Foliage protectors protect newly installed plants from animals foraging the various above-ground parts of the plants. Eventually, as the plants grow larger, the need for foliage protectors decreases. On projects with lengthy plant establishment periods, the specifications may require the protectors be removed before contract acceptance.

4-2002A (6) Root Protectors

Wire mesh root protectors serve a similar purpose as the foliage protectors, providing below-ground protection from burrowing rodents.

4-2002A (7) Fertilizer

Fertilizer provides nutrients to plants that might otherwise be missing or not abundantly available from the soil. All fertilizers are labeled with the amount of nitrogen, phosphorus, and potassium they are providing to the plant. The plans and specifications will indicate the type of fertilizer (organic, packet, slow-release) and applied amounts for each plant (or area) on the project.

4-2002A (8) Wood Mulch

Wood mulch 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. Wood mulch has the following benefits:

- Retains soil moisture to assist in healthy plant development.
- Acts as a weed barrier.
- Reduces surface erosion.

Use the type of mulch shown on the plans or in the specifications. If a type is not specified, the contractor may choose one. The plans will indicate the applied amount for each plant (or area) on the project. Verify that the wood mulch sample complies with the size and type specified. Verify receipt of a certificate of compliance for the wood mulch. At time of delivery, verify that the wood mulch delivered matches the sample provided. Bring the sample to the field to compare. Measure each delivery in the vehicle prior to unloading.

4-2002A (9) Rock Blanket

Rock blanket is cobble rock that is placed in a concrete base on the ground. It provides an attractive alternative to bare ground and keeps soil from eroding. The specifications will state what the size of the rock should be and the detail will show the depth of excavation and thickness of the mortar and concrete.

4-2002A (10) Gravel Mulch

Gravel mulch is used to provide pathways or cover the ground plane to minimize erosion. The rock is crushed and compacted to provide a more solid surface. The rock size gradations are shown in the specifications.

4-2002A (11) Decomposed Granite

Decomposed granite is used similarly to gravel mulch. The material is more complex to construct as it needs to have solidifying emulsions and layered construction to achieve a solid surface. The rock size gradations are shown in the specifications.

Section 20-5.03, "Inert Ground Covers and Mulches," of the *Standard Specifications* provides material and size requirements for rock blanket, gravel mulch, and decomposed granite. Verify receipt of a certificate of compliance for these materials.

4-2002B Before Work Begins

Before work begins, do the following:

- Review the plans and specifications to determine the requirements for highway planting.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes highway planting materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Take photos of existing site conditions.
- 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.

4-2002B (1) Pesticides

Before any work using pesticides begins, 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*.
- 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 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 application of granular pesticides unless they are covered by mulch. Without mulch, these pesticides can be carried to other locations by runoff.
- Upon completion of the necessary reviews, advise the contractor in writing that the pest control adviser's recommendations have been authorized subject to the provisions of Sections 5-1.23, "Submittals," and 20-1.01C, "Submittals," of the *Standard Specifications*.

4-2002B (2) Plants

Before any work with plants begins, 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 20-3, "Planting," of the *Standard Specifications*, and with any special provisions. The following are guidelines for plant inspection.

    1. Examine the plants and their name tags to confirm the plants are of the variety and size specified.
    2. Observe the methods of transporting and storing the plants. Reject plants that are wilted, broken, out of the container, or otherwise unsuitable when delivered to the planting area. Note such rejection in the daily report.
    3. Check to see if plants are obviously deformed, diseased, or insect-infested. Obtain inspection certificates that indicate all plants comply with federal and state laws requiring inspection for diseases and infestations. Before accepting plants from another county, require the contractor to produce evidence of clearance from the county agricultural commissioner.
    4. For the specified number of plants, remove soil from the roots of container-grown plants to determine the condition of the roots. Ensure enough roots have grown so that the soil and root ball will hold together when planting.
    5. Do not accept root-bound plants. Refer to Figure 4-20.1 "Roots," for an example of acceptable and unacceptable 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 in the ground.

Figure 4-20.1. Roots

Good Roots **Acceptable**	
Root-Bound Plant **Unacceptable**	

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 large containers have not recently been transplanted from a smaller container. Roots should be 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.

4-2002C During the Course of Work

Use the following guidelines to ensure planting complies with the plans and specifications.

4-2002C (1) Roadside Clearing

Roadside clearing includes killing, removing, or mowing weeds and other vegetation, and controlling rodents. During roadside clearing, do the following:

- Review the requirements for water pollution control. It may be desirable to leave some vegetation on the slopes to reduce the potential for stormwater 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.

4-2002C (2) Pesticides

During pesticide use, 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-0017, "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. Repeating the application after about one week is sometimes necessary for a complete weed kill.

4-2002C (3) Preparing Planting Areas

After roadside clearance, irrigation system installation, and pressure testing and backfilling, the preparation of planting areas begins. During this preparation, 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 or in a detail 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.
- Prior to planting, irrigate and kill weeds for the length of time specified.
- Ensure the soil is loosened to the specified depth.
- When rocks are encountered in an area of predominantly fine native materials, most rocks larger than 2.5 inches 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 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.

4-2002C (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.

4-2002C (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
- Basin mulch
- Foliage and root protectors
- Plant stakes, if required

Observe planting activities to ensure the following:

- No more plants are distributed along the roadside than can be planted and watered on the same work shift.
- 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.

Do the following during the course of planting:

- Note all observations in the daily report, including any pertinent instructions given to the contractor.
- 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, "Prosecution and Progress," of the *Standard Specifications.*

4-2002C (6) Watering

For watering, 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. If your district has a "Water Manager," obtain guidance regarding when the irrigation controller is ready to be programmed.
- 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.

4-2002C (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 change order and obtain concurrence from the project landscape architect.

4-2002C (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 planting as specified. The plant establishment period begins on the date stated in your written notification to the contractor. However, each plant must still be maintained after it is planted and watered for the first time. Planting must be properly maintained both before and during plant establishment. During the course of plant establishment, do the following:

- Ensure that the contractor replaces plants that have not been properly maintained. 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 in Section 14, "Environmental Stewardship," of the *Standard Specifications* and as required in the stormwater permit.
- Ensure 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.
- Keep construction area signs in place until all work is complete, including plant establishment. If appropriate, use temporary traffic control signs during plant establishment work.

4-2002C (8a) Administering Plant Establishment Time Requirements

In administering the time requirements for plant establishment, do the following:

- 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 the plant establishment period, credit the contractor with one plant establishment working day for each day, except Saturdays and holidays, that plant establishment work is satisfactory. Note that holidays include Sundays under state statute.
- Ensure that all required establishment work is complete before beginning to give the contractor 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 2 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, do not give credit for plant establishment days.

4-2002C (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 and holidays (holidays include Sundays) as working days, regardless of weather or other conditions. Track the progress of plant establishment under "Remarks" in a manner similar to that shown in the sample Weekly Statement of Working Days at:

http://www.dot.ca.gov/construction/contract-time/example-working-days.html

Credit all working days as plant establishment days except for days on which the contractor fails to satisfactorily perform plant establishment work.

4-2002C (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 an example of how to track contract time when both time periods are running concurrently, refer to:

http://www.dot.ca.gov/construction/contract-time/example-working-days.html

Show the "Revised working days for contract" as the number of days specified plus approved change order days for all work except plant establishment. Fill in the Weekly Statement of Working Days in the normal manner, and track the progress of plant establishment as shown under "Remarks."

For an example of the final Weekly Statement of Working Days after the contractor has completed all work including plant establishment, refer to:

http://www.dot.ca.gov/construction/contract-time/example-working-days.html

4-2003 Irrigation

4-2003 Irrigation

Irrigation systems may be manual or automatic, as specified in Section 20-2, "Irrigation," of the *Standard Specifications*. The special provisions may require the installation of equipment that can communicate with a centrally located computer.

4-2003A Components of Irrigation Systems

The following are the major components of an irrigation system.

4-2003A (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.

4-2003A (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.

4-2003A (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.

4-2003A (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 the remote control valves and sprinkler heads.

4-2003A (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 opened when any remote control valve is activated.

4-2003A (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.

4-2003A (7) Quick Coupling Valve

A quick coupling valve is used to attach a hose to the irrigation system.

4-2003A (8) Gate Valve

Gate valves are manually operated to shut off water to allow repairs or modifications to the irrigation system.

4-2003A (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.

4-2003A (10) Emitters and Sprinklers

Emitters are watering devices used for drip irrigation. 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.

4-2003A (11) Drip Valve Assembly

Drip valve assemblies prevent small particles from clogging sprinklers or emitters.

4-2003A (12) Irrigation Conduit

Irrigation conduit consists of furnishing and installing conduit and pipe used to carry irrigation water or electrical wire under roadways. They are often installed as part of a highway construction project before the highway landscaping project begins.

4-2003A (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.

4-2003A (14) Electrical Pull Boxes and Conductors

These electrical components of the irrigation system supply electrical power to operate irrigation controllers and valves. Power to the irrigation controllers is 110-volt and is work performed by electricians from the electrical plans. Power to the remote control valves is low voltage and work is performed by the contractor.

4-2003B Before Work Begins

Before the irrigation system is installed, do the following:

- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes all irrigation system materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- When there is a bid item for Check and Test Existing Irrigation Facilities, review the operation of the existing irrigation systems with the contractor. Review the contractor's deficiency list for completeness. Review items needing correction to determine what should or should not be repaired. Keep a copy of the list for later review prior to contract acceptance.
- 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 operating existing irrigation systems. When Caltrans maintenance forces are involved, ensure that the contractor and Caltrans maintenance personnel are aware of each party'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 Department-furnished material.
- As required by Section 20-2.01A(3), "Submittals," of the *Standard Specifications*, obtain from the contractor shop drawings for the electrical components of the irrigation systems. Ensure that the manufacturer of the controller has approved the wiring plans. Also send the shop drawings to the district landscape architect for review. After review and authorization, forward a copy of the shop drawings to the contractor with the following written statement:

  > The shop drawings are authorized pursuant to Section 5-1.23, "Submittals," of the *Standard Specifications*.

- Structure Design's Office of Electrical, Mechanical, Water and Wastewater Engineering 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, 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 METS, 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 irrigation conduit 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, pull boxes, and metal detectors. After you have determined the locations as closely as possible, require the contractor to excavate and backfill exploratory holes. Process a change order, if necessary, to pay for additional exploration in accordance with Section 20-2.08 , "Irrigation Supply Line," of the *Standard Specifications*. After the ends of existing conduits are exposed, examine them for damage. Ensure the conduits are free of obstructions. Process a change order to pay for any necessary repair or replacement.
- If existing irrigation conduits will be used in the new work, isolate the plastic pipe supply line and pressure test it under Section 20-2.07A(4), "Quality Assurance," of the *Standard Specifications*.
- 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 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 with the project landscape architect. This meeting provides an opportunity to look at the overall layout of the landscape system and make any desired changes.

4-2003C During the Course of Work

Use the following guidelines to ensure the various components of irrigation systems are installed and constructed as required.

4-2003C (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 4-2002C (3), "Preparing Planting Areas," of this manual. 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 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 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 in accordance with 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 in accordance with 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 irrigation 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 began 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 has the backflow preventers tested 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.

4-2003C (2) Electrical Installations

During the course of installing water lines and conduit, the resident engineer must do the following:

- Observe the installation of electrical conduit for control and neutral conductors 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.

4-2004 Level of Inspection

4-2004 Level of Inspection

Suggested levels of inspection for landscape work activities are:

- Benchmark inspection for typical landscape work such as irrigation system installation, planting, and plant establishment.
- Intermittent inspection for work such as pressure testing of water lines and irrigation system functional tests.

4-2005 Quality Control

4-2005 Quality Control

Pressure testing of irrigation system water lines is covered under Section 20-2.01A(4)(b), "Pressure Testing," of the *Standard Specifications*.

For water supply lines on structures, ensure the contractor tests the lines before:

- Backfilling at locations that would cover lines.
- Starting work on box girder cell decks.
- Doing any other work that would cover lines.

The contractor must repair any water lines that fail required tests. The lines must be retested after the repairs are completed.

Record the results of tests in the daily report.

4-2006 Payment

4-2006 Payment

The specifications normally require that irrigation system work is paid for by measurable individual contract items rather than lump sum. Use the methods of measurement specified for each contract item.

Section 21 Erosion Control

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Section 21 Erosion Control

Section 21
Erosion Control

4-2101 General

4-2101
General

Erosion control is covered under Section 21, "Erosion Control," 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. Landscaping involves preparing areas for planting, furnishing and planting plants, and performing plant establishment work. Such landscaping is sometimes combined with erosion control. Landscaping is covered under Section 20, "Landscape," of the *Standard Specifications*. Refer to Section 4-20, "Landscape," of this manual for additional information.

For questions about the acceptability of materials and work for erosion control, resident engineers may consult with landscape architects and landscape specialists in the district.

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.

4-2102 Materials

4-2102
Materials

The following provides general information on various materials used in erosion control.

4-2102A Topsoil

Topsoil is the balance of organic matter, sand, clay, and nutrients necessary to support healthy plant life. For the specifications for topsoil, refer to Section 21-2.02C, "Topsoil," 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 parts per million. If the topsoil's composition is questionable, laboratory tests can determine the salt content.

Reject 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.

4-2102B Fertilizer

The *Standard Specifications* or the special provisions cover the requirements for fertilizer, which is expressed as percentages of nitrogen, phosphoric acid, soluble potash, and sulfur. Fertilizer may be spread with seed and other erosion control materials using hydroseeding equipment. Fertilizer may also be specified for highway planting.

4-2102C 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 maintain uniform soil surface temperatures, thereby promoting seed germination and early growth.
- Dissipates the impact of rainfall.
- Slows the velocity of runoff.

4-2102D 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 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 tackifier, 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.

4-2102E 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 (PLS) is the product of percent seed purity and percent germination. (percent PLS = percent purity times percent germination).

4-2102F Tackifier

Tackifier may be applied with fiber and fertilizer. The tackifier 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 tackifier normally specify the amount of water that must be added to the tackifier.

4-2102G Compost

Requirements for compost are covered in Sections 21-2.01D, "Quality Assurance," and 21-2.02K, "Compost," of the *Standard Specifications*.

4-2103 Before Work Begins

4-2103 Before Work Begins

Before work begins, do the following:

- Review the plans and specifications to determine the specified type of erosion control material and the time of application.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes erosion control materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- When local 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 local 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.
- The contractor must provide the seed vendor's lab test results. Ensure they are complete and received in a timely manner.
- Erosion control materials are applied at a specified rate, in pounds or tons per acre. 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.

4-2104 During the Course of Work

4-2104 During the Course of Work

As materials for erosion control arrive on the project, and prior to application, do the following:

- Through examination, ensure imported topsoil meets the specified requirements.
- To determine if 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 weighmaster certificates with each load of straw delivered to the project. Keep records for the mass of straw delivered to stockpiles. Based on specifications, check for County Agricultural Certification if out-of-county straw is used.
- Ensure the receipt of a certificate of compliance for fiber. Check the labeling on the package for moisture content.
- Verify the species of seed listed on the seed label for consistency with the species listed in the special provisions.
- Compare the percent total viability stated on the vendor seed label with the percent total viability in the special provisions for the seed species.

- Ensure that the percent of total weed identified on the seed label is less than the percent stated in the special provisions.
- Verify that no California-prohibited noxious weeds are identified on the vendor seed label.
- Check the seed lot test date. For purity and germination, the seed must have been tested within the past 12 months.
- Check seed package labels and other required documentation. Calculate the weight of PLS in each sack by referring to Section 4-2102E, "Seed," of this manual.
- Collect seed samples in accordance with Section 4-2105, "Seed Sampling," of this manual.
- Send the complete package to the Caltrans-contracted seed clearinghouse in accordance with Section 4-2105D, "Sample Preparation, Preservation, and Packaging" of this manual. Get the name and address of the clearinghouse at:

  http://design.onramp.dot.ca.gov/landscape-architecture-program/seed-testing
- 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 project landscape architect.
- Ensure the receipt of a certificate of compliance for tackifier.

During the application of erosion control materials, do the following:

- Ensure the contractor prepares areas to receive erosion control as required in the specifications.
- Ensure topsoil, duff, or compost is spread uniformly at the specified rate or depth. Ensure the contractor loosens any compacted topsoil.
- Ensure the contractor applies erosion control materials in the specified sequence and application rate.
- When straw is required, determine the spread rate by counting bales and using average bale weights. If the contractor applies the straw pneumatically, suspend the operation if wind conditions cause the straw or visible dust to be blown onto public roadways or across the property line onto private property.
- 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.

4-2105 Seed Sampling

4-2105 Seed Sampling

Use the following guidelines for obtaining samples for testing.

4-2105A Scope

The purpose of seed testing is to get quality assurance data regarding the purity and viability (germination) of seed. For accurate laboratory test results, seed must be

collected and handled to get representative samples. Samples submitted to the laboratory that are not representative can result in inaccurate or erroneous test results.

4-2105B Size of Sample

For each seed lot greater than 2 pounds, take a seed sample of approximately 1 ounce or ¼ cup.

4-2105C Procedure for Sampling

Before handling the seed sample, observe the following requirements:

- Do not touch or sample fungicide-dyed seed, such as dyed red or green seed, or seed labeled "treated seed."
- Use protective gloves when sampling seed.
- Use clean gloves to avoid affecting the purity of the seed samples.
- Avoid inhaling any dust.

When taking the seed sample:

- Take a seed sample from a newly opened seed bag.
- Do not mix samples from different seed species or seed lots.
- Sample the seed by thrusting your gloved hand into the bag and withdrawing representative portions.
- Take at least seven equal portions of seed from various parts of the bag.
- Place each portion in a clean container and examine the seed for uniformity.
- When the portions appear to be uniform, combine them in a glassine lined bag provided by the contractor.

4-2105D Sample Preparation, Preservation, and Packaging

Sample preservation maintains the integrity of the sample from the time of collection until the tests are performed.

- Keep the samples in a suitable and shaded location. Avoid placing samples in a hot or a damp location.
- Identify the contents of each sample by placing the vendor's original seed label in each bag. Place a custody seal over the bag opening.
- Protect the seed from damage. Package samples in a cardboard box with bubble wrap or insulating peanuts. No additional preservation is necessary.
- Include the following documentation:
    1. Completed Form TL-0101, "Identification Card."
    2. Copy of the seed requirements from the project special provisions.
    3. Seed vendor's seed lot test results.
    4. Copy of the vendor's original seed label.

Send (within 24 hours) the sample and documentation by express mail to the Caltrans contracted seed clearinghouse. The clearinghouse information is located at:

http://design.onramp.dot.ca.gov/landscape-architecture-program/seed-testing

4-2106 Quality Assurance Seed Testing Results

Consider the following areas when making determinations about seed.

4-2106A Results

Quality assurance testing results will be provided through Caltrans contracted seed clearinghouse.

The clearinghouse contacts the resident engineer by letter with the results of the quality assurance testing in conformance with the specifications. Some potential issues are:

- Species of seed on the seed label does not match the species in the special provisions.
- The percent total viability of the seed is lower than what is specified in the special provisions.
- The percent total weed identified on the vendor seed label is greater than what is specified in the special provisions.
- The presence of California prohibited noxious weeds is identified on the vendor seed label or test results.

4-2106B Nonconformance Procedures

If the contractor fails to comply with the contract specifications for seed, enforce the appropriate contract provisions to ensure compliance based on the nature and severity of the situation. Refer to Section 6, "Control of Materials," in the *Standard Specifications*.

4-2107 Level of Inspection

Suggested level of inspection for typical erosion control work activities, including applying temporary and permanent erosion control measures to the soil surface, is benchmark inspection.

4-2108 Quality Control

Verify that erosion control materials used on the project are sampled and tested under Section 21, "Erosion Control," of the *Standard Specifications* using the test methods specified and meet the requirements for each quality characteristic described.

4-2109 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.

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 pure live seed using the germination and purity rates of the bulk seed.

Section 22 Finishing Roadway

Section 22 Finishing Roadway

4-2201 General

4-2201 General

Section 22, "Finishing Roadway," of the *Standard Specifications* describes the requirements for the final cleanup operation within project limits and the right-of-way, so that the completed project, upon acceptance, will be neat, presentable, and functional, as required by the *Standard Specifications*. The work required under this section should not be mistaken for clearing and grubbing activities.

Finishing activities include such work as grading slopes and contour areas to remove vehicle tracks; obliterating haul roads; removing debris from the pavement; removing trash and debris generated by construction activities; cleaning out culverts; cleaning culvert markers, guideposts, and signs; removing construction stakes and lath that present an unsightly appearance; and disposal of the material resulting from the finishing roadway activities.

The contractor may request and be authorized to dispose of soil and rock generated by the finishing activities within the project limits and right-of-way. Disposal of soil and rock along the roadway should not be allowed if it will affect the overall grading or functionality of the roadway.

4-2202 During the Course of Work

4-2202 During the Course of Work

During the course of work, 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.
- 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 the list 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 5-1.38, "Maintenance and Protection Relief," of the *Standard Specifications*, ensure that the contractor has completed all the finishing roadway activities.
- Ensure measures for permanent erosion control are installed as soon as finishing roadway activities are completed.

4-2203 Level of Inspection

4-2203 Level of Inspection

The suggested level of inspection for finishing roadway work activities is intermittent inspection.

4-2204 Payment

4-2204 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 Stabilized Soils

Section 24
Stabilized Soils

4-2401 General

4-2401
General

Soil stabilization is used to improve the shear strength, stability, and durability of native subgrade soils (basement material) to meet the pavement design requirements and for successful pavement performance. Stabilization methods include reworking existing soils by blending or increased compaction (mechanical stabilization), or by adding a stabilizing agent (chemical stabilization). Soil stabilization can also be accomplished by removing the native basement material and replacing it with a higher quality material. Section 24 of the *Standard Specifications* provides requirements for chemical stabilization of soil by adding lime as the stabilizing agent.

Lime stabilization is effective for basement material containing a large percentage of clay particles. The lime stabilization process includes spreading lime over the basement material, thoroughly mixing it in place, compacting it at an appropriate moisture content, and curing. The special provisions specify the amount of lime to be added to the basement 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 and optimum moisture content for each soil type.
- 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.
- Obtain a lime sample with a certificate of compliance, including a statement certifying the lime to be furnished is the same as on the Authorized Material List.
- 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 required by the specifications, observe a test strip that demonstrates the contractor's equipment and methods provide uniform distribution of lime and achieve the specified compaction.
- If necessary, prepare a change order to provide for the removal and disposal of any oversized material.
- Prohibit lime stabilization when ground temperature is below specified temperature or expected to fall below specified temperature before mixing and compaction can be completed.

4-2403 During the Course of Work

Once work begins, do the following:

- Ensure the preparation of the basement material that requires that stabilizing conforms to the requirements in Sections 24-1.03B and 24-2.01D(1)(a), "Preparing Basement Material," of the *Standard Specifications*.
- For each delivery of lime, obtain the certificate of compliance and the weighmaster certificate. Obtain samples of the lime at the frequency rate shown in Section 6-1, "Sample Types and Frequencies," of this 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 (8 to 10 ft), similar to the drop pan or calibration pan method.
    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 might 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, from passing over the basement material.
- During the mixing operation and throughout the mellowing period, 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. Where mixing depth exceeds the specified tolerance, ensure additional lime is added proportionally. Note this in the daily report, including the additional lime quantity provided at the contractor's expense.
- 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 Sections 24-1.01D(2)(d) and 24-2.01D(2)(c), "Compaction," of the *Standard Specifications*.
- Ensure any disputes regarding test result discrepancies follow Section 24-2.01D(1)(c), "Test Result Disputes," 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 is applied.
- Ensure the contractor uses one of the specified methods for curing. Also, obtain necessary certificates of compliance and samples where a curing seal is used.
- Ensure the contractor meets the time and temperature requirements for the curing seal. Order any necessary repairs to the damaged curing seal.
- Where a curing seal is used, 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 Level of Inspection

4-2404 Level of Inspection

Suggested levels of inspection for typical stabilization work activities are:

- Continuous inspection of the test strip work.
- Intermittent inspection of preparing basement material.
- Continuous inspection of applying and mixing of lime. For projects where the stabilization work will span multi-week durations, the level of inspection can be reduced to intermittent inspection if inspection and testing of the initial work shows that the contractor's operations are consistent and result in satisfactory stabilization work.
- Intermittent inspection of sampling and testing of materials, compaction, and applying curing seal.
- Benchmark inspection of finish grading.

4-2405 Quality Control

4-2405 Quality Control

- Verify that the contractor's quality control laboratory is certified in accordance with Caltrans' Independent Assurance Program.

- Ensure that the contractor submits the time and location of quality control sampling and testing with sufficient advance notice to allow Caltrans staff to intermittently witness quality control sampling and testing.

4-2406 Payment

4-2406 Payment

To determine the pay quantity for lime stabilization, make area measurements of the planned surface.

At the point of delivery, collect weighmaster certificates for the lime. Deduct the weight of any wasted or unused lime from the pay quantity for lime and document these quantities in the daily report. If the contractor has added additional lime to compensate for depths exceeding the specified allowance, make the required adjustment to the scale weights of the lime.

Measure the quantity of curing seal in accordance with Section 94, "Asphaltic Emulsions," of the *Standard Specifications*. Payment for water cure or moist material blanket curing methods is included within the lime stabilization pay item.

Section 25 Aggregate Subbases

Section 25 Aggregate Subbases

4-2501 General

4-2501 General

This section provides guidelines for inspecting aggregate subbases for work specified under Section 25, "Aggregate Subbases," of the *Standard Specifications.*

Aggregate subbase is designated by class. The Bid Item List and plans specify the class of aggregate subbase, and the *Standard Specifications* and special provisions provide the requirements for each class.

Aggregate subbase is usually the lowest layer in the pavement structure, as shown in the typical cross sections of the contract plans. Typical cross sections show the thickness of aggregate subbase and layout sheets show where to place it.

4-2502 Before Work Begins

4-2502 Before Work Begins

Before placement begins, review contract plans and specifications to determine the aggregate subbase requirements. For sampling and testing requirements, including frequency of testing, refer to Chapter 6, "Sampling and Testing," of this manual.

Include the following steps in the preliminary review and inspections:

- Obtain the contractor's quality control plan, which details the methods the contractor will use to ensure quality of work and conformance with the *Standard Specifications* requirements.
- If mutually agreed with the contractor, hold a preconstruction meeting with the contractor and the district Materials Unit prior to construction to discuss the quality control plan and contractor's method for performing each element of work affecting material quality, including acceptance testing priorities, shipping of samples, lines of communication for test results, timeframes for reporting quality control and acceptance test results, and any contractual testing dispute resolution processes.
- Verify the design R-value by testing the basement material at the grading plane to verify the planned thickness shown in the pavement structure. Testing should be completed early enough before the placement of aggregate subbase to allow time for redesign if necessary. (Refer to Topic 614.3, "California R-Value," in the *Highway Design Manual* for a discussion of R-value and pavement structure design.)
- Test potential sources of aggregate subbase when the contractor requests such testing in writing. Deduct applicable Caltrans costs for sampling and testing from contract payments as required under Section 6-1.03, "Local Materials," of the *Standard Specifications*.
- Review compaction tests of the subgrade that is to receive the aggregate subbase. Examine the subgrade to ensure that it has not deteriorated since it was tested and that it is still firm and stable. Give special attention to isolated areas where pumping occurs.

- Measure the subgrade grading plane for compliance with Section 19-1.03C, "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. Determine the extent of this measurement based on 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). The grade will be established from markings on the final grade stakes that Caltrans Surveys set. (Refer to the *Staking Information Booklet* for information on state-furnished construction
- When subgrade is cohesionless soil and you decide that the subgrade is unstable for placing aggregate subbase on the roadbed in layers or windrows, give the contractor written permission to dump aggregate subbase in piles and spread ahead.
- Determine whether the contractor has complied with all requirements related to the use of local materials. Refer to Section 5-1.20B(4), "Contractor-Property Owner Agreement," of the *Standard Specifications*.

4-2503 During the Course of Work

4-2503 During the Course of Work

During work operations, do the following:

- Sample the aggregate subbase at the time it is deposited on the roadbed. Observe delivered aggregate subbase to ensure that it is clean of debris and other harmful materials. For requirements related to material quality, perform the tests at the frequencies shown in Section 6-1, "Sample Types and Frequencies," of this manual. The frequency table has a provision for reducing R-value testing, but exercise caution when doing so. Consider reducing frequency when initial test results show R-values significantly exceeding the specified R-value and ongoing gradation and sand equivalent test results indicate acceptable and consistent material quality. Do not reduce R-value frequency when failing or borderline test results occur. Include in the project records an explanation of why you reduced R-value testing.
- Compare sand equivalent and grading test results with requirements for operating range and contract compliance. (Refer to Section 3-608A, "Operating Range and Contract Compliance," of this manual.) Note that it is prudent to take frequent samples, especially with borderline test results, but test only at 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 previously taken samples to determine the quantity of material represented by the failing test result.
- Ensure that aggregate subbase is spread on the subgrade without significant segregation. Normally, you would verify this step through observation, but if problems persist, support your observations with a sieve analysis. If segregation is taking place, it can sometimes 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.
- Where geosynthetic materials are shown, ensure materials are properly placed, including overlapping requirements, and securely holding materials in place during aggregate subbase placement. Ensure that the geosynthetic materials are not damaged during placement, spreading, and compaction of the aggregate subbase.

Specifications provide limits on the contractor's equipment and operations. Ensure any damaged materials are repaired or replaced. Refer to Section 4-96, "Geosynthetics," of this manual for additional guidance on geosynthetics.

- Observe the spreading and compacting operation to ensure that it conforms to the layer thickness requirements of the specifications.
- Test the relative compaction of aggregate subbase layers using the area concept procedures under California Test 231, "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates Using Nuclear Gage."
- Observe the compacting operation to ensure that the material forms a uniformly firm, stable base.
- Measure the surface of the finished aggregate subbase for conformance with tolerances specified in Section 25-1.03E, "Compacting," of the *Standard Specifications*. Use the markings on the final grade stakes Caltrans set to determine compliance with the planned elevation of the aggregate subbase surface. Require corrective action for any deficiencies.
- Measure the thickness of the completed aggregate subbase. Use your judgment to determine the number of measurements necessary. The minimum acceptable thickness equals the planned thickness minus the sum of the specified tolerance for high subgrade and the specified tolerance for low finished aggregate subbase surface. A thin section is acceptable if an increased thickness of the base material placed above the aggregate subbase makes up the deficiency. The *Standard Specifications* allow the engineer to accept a deduction for deficient thickness in lieu of other corrective action. Caltrans policy is to ensure that thickness complies with requirements by ordering corrective action if it is deficient. Therefore, apply the deduction in only the most extenuating circumstances. Keep adequate records for payments on progress pay and final estimates.
- 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 according to specified layer thicknesses, because this information is not recorded elsewhere.
- If the contractor disputes Caltrans' acceptance results, follow Section 23-1.01D(1)(b), "Test Result Disputes," of the *Standard Specifications*. An independent third party performs referee testing as specified, must have no prior direct involvement with the contract, and be mutually selected with the contractor.

4-2504 Level of Inspection

4-2504 Level of Inspection

Suggested levels of inspection for typical aggregate subbase work activities are:

- Benchmark inspection of subgrade grading plane.
- Intermittent sampling and testing of aggregate subbase materials.
- Intermittent inspection of placement, spreading, and compaction operations.
- Intermittent review of contractor's quality control program including quality control test results.
- Benchmark inspection of finished surface grading plane.

4-2505 Quality Control

4-2505 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Ensure the contractor is actively performing quality control on aggregate subbase materials throughout production operations by reviewing copies of quality control records, including quality control test results.
- The quality control plan must include, but is not limited to:
- Frequency of quality control sampling and testing that meets or exceeds specification requirements as listed in Section 25-1.01D(2)(d), "Quality Control Testing," of the *Standard Specifications*.
- Time and frequency of submitting test results.
- Action and suspension limits, and details of corrective action to be taken if any process is outside of those limits. Suspension limits must not exceed specified acceptance criteria.
- Responsibilities of subcontractors and testing laboratories.
- Quality control manager if the quantity of aggregate subbase exceeds the requirements listed in the "QC Manager Requirement" table of Section 23-1.01D(2)(a), "Quality Control," of the *Standard Specifications*.

4-2506 Payment

4-2506 Payment

- Review quantity calculations found in the resident engineer's pending file to determine if they are sufficiently detailed and accurate to be used in the project records.
- Calculate the aggregate subbase volume based on the dimensions shown on the plans. Make quantity calculations as early in the project as possible.

Section 26 Aggregate Bases

Section 26
Aggregate Bases

4-2601 General

4-2601
General

This section provides guidelines for inspecting aggregate bases for work specified under Section 26, "Aggregate Bases," of the *Standard Specifications.*

Aggregate base is designated as Class 2 or Class 3. The Bid Item List and plans specify the class and unit of measurement, and the *Standard Specifications* and special provisions provide the requirements for each class.

Typical cross section sheets of the contract plans show the thickness and layer placement of aggregate base within the pavement structure, and layout sheets show where to place it.

4-2602 Before Work Begins

4-2602
Before Work
Begins

Before placement begins, review the contract plans and specifications to determine the aggregate base requirements. For sampling and testing requirements, including frequency of testing, refer to Chapter 6, "Sampling and Testing," of this manual.

Include the following steps in the preliminary review and inspections:

- Obtain the contractor's quality control plan, which details the methods the contractor will use to ensure quality of work and conformance with the *Standard Specifications* requirements.
- If mutually agreed with the contractor, hold a preconstruction meeting with the contractor and the district Materials Unit prior to construction to discuss the quality control plan and contractor's method for performing each element of work affecting material quality, including acceptance testing priorities, shipping of samples, lines of communication for test results, timeframes for reporting quality control and acceptance test results, and any contractual testing dispute resolution processes.
- If the pavement structure cross sections show aggregate base to be placed on soil, verify the design R-value by testing the basement material at the grading plane to verify the planned aggregate base thickness shown in the pavement structure. Complete testing early enough before placement to allow time for any redesign needed. (Refer to Topic 614, "Soil Characteristics," in the *Highway Design Manual* for a discussion of R-value and pavement structure design.)
- Test potential sources of aggregate base when the contractor requests such testing in writing. Deduct applicable Caltrans costs for sampling and testing from contract payments as required under Section 6-1.03, "Local Materials," of the *Standard Specifications*.
- 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 and that it is still firm and stable. Give special attention to isolated areas where pumping occurs.

- Measure the subgrade grading plane for compliance with elevation tolerance requirements for the material involved. When measuring for compliance, spot-check the staked locations and areas between stations where stakes are set. Determine the extent of this measurement based on 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). The subgrade tolerances can be found in the specification for the subgrade material. The grade will be established from markings on the final grade stakes that Caltrans Surveys set. (Refer to the *Staking Information Booklet* for information on Caltrans-furnished construction surveys.)
- When subgrade is cohesionless soil and you decide that the subgrade is unstable for placing aggregate base on the roadbed in layers or windrows, you may give the contractor written permission to dump aggregate base in piles and spread ahead.
- Determine whether the contractor has complied with all requirements related to the use of local materials. Refer to Section 5-1.20B(4), "Contractor-Property Owner Agreement," of the *Standard Specifications*.

4-2603 During the Course of Work

4-2603 During the Course of Work

During work operations, do the following:

- Sample the aggregate base at the time it is deposited on the roadbed. Observe delivered aggregate base to ensure that it is clean of debris and other harmful materials. For requirements related to material quality, perform the tests at the frequencies shown in Section 6-1, "Sample Types and Frequencies," of this manual. The frequency table has a provision for reducing R-value testing, but exercise caution when doing so. Consider reducing frequency when the initial test results show R-values significantly exceeding the specified R-value and ongoing gradation and sand equivalent test results indicate acceptable and consistent material quality. Do not reduce R-value frequency when failing or borderline test results occur. Include in the project records an explanation of why you reduced R-value testing.
- Compare sand equivalent and grading test results with requirements for operating range and contract compliance. (Refer to Section 3-608A, "Operating Range and Contract Compliance," of this manual.) Note that it is prudent to take frequent samples, especially with borderline test results, but test only at 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 previously taken samples to determine the quantity of material represented by the failing test result.
- If aggregate base will be paid for by weight, obtain the optimum moisture content from the aggregate base moisture-density compaction curve and sufficient moisture samples to determine pay quantity adjustments.
- Ensure that the aggregate base is spread on the subgrade without significant segregation. Normally you would verify this through observation, but if problems persist, support your observations with a sieve analysis. If segregation is taking place, it can sometimes 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.

- Where geosynthetic materials are shown, ensure materials are properly placed, including overlapping requirements and securely holding materials in place during aggregate base placement. Ensure that the geosynthetic materials are not damaged during placement, spreading, and compaction of the aggregate base. Specifications provide limits on the contractor's equipment and operations. Ensure any damaged materials are repaired or replaced. Refer to Section 4-96, "Geosynthetics," of this manual for additional guidance on geosynthetics.
- Observe the spreading and compacting operation to ensure that it conforms to the layer thickness requirements of the specifications. Note in the daily report any wasting of material.
- If payment is by weight, measure waste and deduct those quantities. Some material may be lost during any trimming, and district personnel will decide when to measure the trimmings. In general, measure trimmings when the cost of such measurement does not exceed the anticipated deduction.
- Test the relative compaction of aggregate base layers using the area concept procedures under California Test 231, "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates Using Nuclear Gage."
- Observe the compacting operation to ensure that the material forms a uniformly firm, stable base.
- Measure the surface of the finished aggregate base for conformance to tolerances specified in Section 26-1.03E, "Compacting," of the *Standard Specifications*. Use the markings on the final grade stakes that Caltrans set to determine compliance with the planned elevation of the aggregate base surface. Require corrective action for any deficiencies.
- Measure the thickness of the completed aggregate base. Use your judgment to determine the number of measurements necessary. The minimum acceptable thickness equals the planned thickness minus the sum of the specified tolerance for high subgrade and the specified tolerance for low-finished aggregate base surface. 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 that thickness complies with requirements by ordering corrective action if thickness is deficient. Therefore, apply the deduction in only the most extenuating circumstances. Keep adequate records for payments on progress payment and 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 according to specified layer thicknesses, because this information is not recorded elsewhere.
- If the contractor disputes Caltrans' acceptance results, follow Section 23-1.01D(1)(b), "Test Result Disputes," of the *Standard Specifications*. An independent third party performs referee testing as specified, must have no prior direct involvement with the contract, and be mutually selected with the contractor.

4-2604 Level of Inspection

4-2604 Level of Inspection

Suggested levels of inspection for typical aggregate base work activities are:

- Benchmark inspection of subgrade grading plane.
- Intermittent sampling and testing of aggregate base materials.
- Intermittent inspection for verification of material deliveries where aggregate base is paid for by weight.
- Intermittent inspection of placement, spreading, and compaction operations.
- Intermittent review of contractor's quality control program including quality control test results.
- Benchmark inspection of finished surface grading plane.

4-2605 Quality Control

4-2605 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Ensure the contractor is actively performing quality control on aggregate base materials throughout production operations by reviewing copies of quality control records, including quality control test results.
- The quality control plan must include, but is not limited to:
  - Frequency of quality control sampling and testing that meets or exceeds specification requirements as listed in Section 26-1.01D(2)(d), "Quality Control Testing," of the *Standard Specifications*.
  - Time and frequency of submitting test results.
  - Action and suspension limits, and details of corrective action to be taken if any process is outside of those limits. Suspension limits must not exceed specified acceptance criteria.
  - Responsibilities of subcontractors and testing laboratories.
  - Quality control manager if the quantity of aggregate base exceeds the requirements listed in the "QC Manager Requirement" table of Section 23-1.01D(2)(a), "Quality Control," of the *Standard Specifications*.

4-2606 Payment

4-2606 Payment

Review the quantity calculations in the resident engineer's file to determine if they are sufficiently detailed and accurate to be used in the project records.

If aggregate base is paid for by weight, refer to the discussion of weighing and metering procedures in Section 3-902E, "Weighing Equipment and Procedures," of this manual.

If aggregate base will be paid for by volume, calculate the volume based on the dimensions shown on the plans. Make quantity calculations as early in the project as possible.

Section 27 Cement Treated Bases

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Section 27 Cement Treated Bases

Section 27
Cement Treated
Bases

4-2701 General

4-2701
General

This section provides guidelines for inspecting cement treated base (CTB). Section 27, "Cement Treated Bases," of the *Standard Specifications* provides requirements for placing CTB—a mix of aggregate, portland cement, and water. CTB specified as either Class A or Class B is generally used with asphalt pavements and can be either plant-mixed or road-mixed. However, plant-mixed is most common.

Although the spread method may be specified in the special provisions, CTB may be spread by one of three allowable methods: Type 1, Type 2, or Type 3. The Bid Item List and plans will specify the class and mix method. The special provisions will specify the percent of cement to be added to the CTB.

4-2702 Before Work Begins

4-2702
Before Work
Begins

Include the following steps in the preliminary review and inspections:

- Obtain the contractor's quality control plan, which details the methods the contractor will use to ensure quality of work and conformance with the requirements of *Standard Specifications*.
- If mutually agreed with the contractor, hold a preconstruction meeting with the contractor and the district materials unit prior to construction to discuss the quality control plan and contractor's method for performing each element of work affecting material quality, including acceptance testing priorities, shipping of samples, lines of communication for test results, timeframes for reporting quality control and acceptance test results, and any contractual testing dispute resolution processes.
- For initial testing, obtain representative samples from the contractor's source of CTB aggregate and test for the required quality characteristics. 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, requires new tests for quality characteristics. Request strength tests at 5 percent cement and other percentages above and below 5 percent (usually in 0.5 percent increments) to determine the correct cement content. For aggregates of borderline quality, consider making additional initial strength tests at varying gradations (within specifications), using 5 percent cement.
- For suppliers whose past performance has been reliably verified, 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 7-day compressive strength of initial samples is less than approximately 1,000 psi.
2. Decrease cement content if the 7-day compressive strength of initial samples at the percent specified is more than approximately 1,250 psi.

- Verify that safe and convenient facilities have been provided for sampling cement.
- Ensure the aggregate material source complies with Section 7-103H (2), "Surface Mining and Reclamation Act," of this manual.
- 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 placing 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.

4-2703 During the Course of Work

4-2703 During the Course of Work

During the course of work, do the following:

- For acceptance quality characteristics and associated sampling and testing frequencies, refer to Chapter 6-1, "Sample Types and Frequencies," of this manual.
- Before mixing, obtain samples of the aggregate for acceptance testing.
- 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 tests reasonably match the anticipated results based on the initial tests, the frequency of the tests can be reduced (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." 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 layer whenever this separate measurement is physically possible.

If the contractor disputes Caltrans' acceptance results, follow Section 23-1.01D(1)(b), "Test Result Disputes," of the *Standard Specifications*. An independent third party performs referee testing and must have no prior direct involvement with the contract as specified and be mutually selected with the contractor.

4-2703A Road-Mixed Cement Treated Base

For road-mixed CTB, do the following:

- 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 will not fall below 1 percentage point from optimum before initial compaction.

For multilayer construction, ensure the contractor mixes and compacts each layer separately.

4-2703B Plant-Mixed Cement Treated Base

For plant-mixed CTB, 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 1 percentage point from optimum at the point of delivery to the work.
- 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 Cement Treated Base

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 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 Cement Treated Base

During the compaction of CTB, do the following:

- Measure the operation's total time interval to ensure it conforms to Section 27-1.03G, "Operation Time Requirement," 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.

4-2703E Curing Cement Treated Base

Ensure that the asphaltic emulsion used for curing seal is diluted, mixed, and uniformly applied on the completed CTB as required under 27-1.03I, "Curing."

Ensure that the contractor keeps the CTB surface moist until curing seal is applied.

Determine 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.

Obtain necessary certificates of compliance and samples of asphaltic emulsion.

4-2704 Level of Inspection

4-2704 Level of Inspection

Suggested levels of inspection for typical cement treated base work activities are:

- Benchmark inspection of subgrade grading plane.
- Intermittent sampling and testing of cement treated base materials.
- Intermittent inspection of placement, spreading, and compaction operations.
- Intermittent review of contractor's quality control program including quality control test results.
- Benchmark inspection of finished surface grading plane.

4-2705 Quality Control

4-2705
Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Ensure the contractor is actively performing quality control on CTB materials throughout production operations by reviewing copies of quality control records, including quality control test results.
- The quality control plan must include, but is not limited to:
  - Frequency of quality control sampling and testing that meets or exceeds specification requirements as listed in Section 27-1.01D(2)(d), "Quality Control Testing," of the *Standard Specifications*.
  - Time and frequency of submitting test results.
  - Action and suspension limits and details of corrective action to be taken if any process is outside of those limits. Suspension limits must not exceed specified acceptance criteria.
  - Responsibilities of subcontractors and testing laboratories.
  - Quality control manager if the quantity of subbase or base exceeds the requirements listed in the "QC Manager Requirement" table of Section 23-1.01D(2)(a), "Quality Control," of the *Standard Specifications*.

4-2706 Payment

4-2706
Payment

For measurement and payment, do the following:

- Use 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 weight, refer to the discussion of weighing and metering procedures in Section 3-902E, "Weighing Equipment and Procedures," of this manual. Make any appropriate deductions for excess moisture.
- When CTB is to be paid for by volume, review the plans and quantity calculations in the resident engineer's file to determine if there is sufficient detail and accuracy to be used in the project records. Make appropriate deductions for any lack of compliance with thickness specifications.
- For information about measurement and payment of curing seal, refer to Section 4-94, "Asphaltic Emulsions," of this manual.

Section 28 Concrete Bases

Section 28
Concrete Bases

4-2801 General

4-2801
General

This section provides guidelines for inspecting concrete bases for work specified under Section 28, "Concrete Bases," of the *Standard Specifications*.

The most common type of concrete base is lean concrete base, which is proportioned, mixed, and placed in a manner similar to concrete pavement. Lean concrete base rapid setting has the same applications, but is usually specified for projects with short construction windows. The Bid Item List and plans will specify the type of concrete base.

Resident engineers need to plan carefully to fully meet the requirements for inspecting and testing materials. When planning for the inspection of concrete bases, consider the following:

- The production of concrete base.
- The placing, finishing, and curing of concrete base.
- The subgrade, specified equipment, and construction of joints for concrete base.

Plant inspection specialists and testing personnel usually perform inspection and testing duties at the concrete batch plant. However, in addition to onsite inspection, mix design authorization and plant inspection are part of the resident engineer's responsibility. Good communication between plant and inspection specialists, and assistant resident engineers is essential. Inspectors and assistants must inform the resident engineer of test results in a timely manner.

This section covers mostly onsite inspection duties. For information on producing and transporting concrete base, refer to Section 4-90, "Concrete," of this manual.

4-2802 Before Work Begins

4-2802
Before Work
Begins

For preliminary review and inspections, do the following:

- Obtain the contractor's quality control plan, which details the methods the contractor will use to ensure quality of work. Review the quality control plan for conformance with the *Standard Specifications* requirements.
- Meet prior to construction to discuss the quality control plan and contractor's method for performing each element of work affecting material quality including acceptance testing priorities, shipping of samples, lines of communication for test results, timeframes for reporting quality control and acceptance test results, and any contractual testing dispute resolution processes.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes the aggregate, cement, and curing material. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

- Review the contractor's proposed mix design for conformance with the specifications.
- 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 verify they have the specified attributes for items such as composition, weight, dimensions, and rigidity. Before each use, ensure that the forms are cleaned and oiled.
        b. Check that the installation of the forms complies with specifications. Before the placement of concrete, order any necessary corrective work.
        c. Ensure that the paving equipment complies with specifications.
    2. For slipform construction, verify that the paver has the specified attributes. Require the specified demonstration of satisfactory operation and note such activity in the daily report.
    3. For base protection, determine that the contractor meets the requirements by examining 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 quantifying concrete base.
- 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 concrete base. Section 4-90, "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.
- 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.
- When the project requires long hauls, review the contractor's proposed placement method to ensure adequate time.
- Ensure the subgrade is uniformly moist.

4-2803 During the Course of Work

4-2803 During the Course of Work

During the course of work, do the following:

- For acceptance quality characteristics and associated sampling and testing frequencies, refer to Chapter 6-1, "Sample Types and Frequencies," of this manual.
- Before mixing, obtain samples of the aggregate in accordance with the frequency shown in Section 6-1, "Sample Types and Frequencies," of this manual.
- When the results of grading or sand equivalent tests, or both, are outside the limits for contract compliance, determine whether the concrete base represented by the tests is structurally adequate. When 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 base in place, and notify the contractor of your decision and the deduction amount.
- Prior to mixing and placement of concrete base, ensure the subgrade is not frozen and the ambient temperature exceeds the minimum specified.
- As it is placed, observe the concrete base for any improper proportions or inadequate mixing. In the daily report, record the reasons for rejecting any concrete base and the approximate amount rejected.
- Ensure the contractor furnishes the required tachometer. Also, check 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 weighmaster certificates at the delivery point, refer to Section 4-90, "Concrete," of this manual.
- Obtain samples of the plastic concrete, and perform penetration, strength, and air content tests in accordance with the frequencies shown in Section 6-1, "Sample Types and Frequencies," of this manual.
- Ensure the material for longitudinal weakened plane joints is placed to the dimensions specified. Also, ensure the contractor vibrates the concrete base to cause an even flow of material surrounding the joint.
- Ensure the construction of a contact joint whenever the time interval is greater than the specifications allow for placement of two successive loads of concrete base.
- When the contractor uses side form construction, ensure screeding and tamping conform to the specifications. Where the hand-float method is permissible, ensure the contractor uses the specified floats and methods.
- Ensure the surface of the concrete base is textured as specified. Concrete base to be surfaced with hot mix asphalt pavement must have a rough texture to prevent slippage between surfacing and base. Concrete base to be surfaced with concrete pavement must have a smooth texture to allow the pavement to adjust for early thermal and moisture changes without forming random cracks.
- Measure the finished surface of the concrete base. Record the measurements, and require the specified corrections for areas not meeting elevation requirements. Ensure high areas are addressed immediately.

- If the contractor disputes Caltrans' acceptance results, follow Section 23-1.01D(1)(b), "Test Result Disputes," of the *Standard Specifications*. An independent third party, selected with the contractor, performs referee testing and must have no prior direct involvement with the contract as specified.

4-2803A Curing Concrete Bases

- Determine the curing method the contractor proposes to use and ensure the curing equipment, material, and application complies with the specifications. The curing material specified depends on whether the overlying surface is concrete or hot mix asphalt pavement.
- When specified, require additional applications of curing material.
- Ensure curing is reapplied on any disturbed areas.
- For curing compound:
  - Ensure shipments of curing compound are labeled and packaged as specified.
  - Obtain a certificate of compliance, including required test results, for each batch of curing compound.
  - 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 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.
  - Ensure curing compound is applied at an ambient temperature above the minimum specified.
- For curing seal:
  - Ensure that the asphaltic emulsion used for curing seal is diluted, mixed, and uniformly applied as specified.
  - Determine 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.

4-2804 Level of Inspection

4-2804 Level of Inspection

Suggested levels of inspection for typical concrete base work activities are:

- Benchmark inspection of subgrade for compaction and elevation requirements.
- Benchmark inspection of forms and paving equipment.
- Benchmark inspection of forms and paving equipment.
- Continuous inspection of concrete delivery, placement, finishing, curing, and contraction joint operations.
- Intermittent review of contractor's quality control program including quality control test results.
- Continuous acceptance sampling and testing.
- Benchmark inspection of finished surface texture.

4-2805 Quality Control

4-2805 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Ensure the contractor is actively performing quality control on concrete base materials throughout production operations by reviewing copies of quality control records, including quality control test results.
- The quality control plan must include, but not be limited to:
  - Frequency of quality control sampling and testing that meets or exceeds specification requirements.
  - Time and frequency of submitting test results.
  - Action and suspension limits and details of corrective action to be taken if any process is outside of those limits. Suspension limits must not exceed specified acceptance criteria.
  - Responsibilities of subcontractors and testing laboratories.
  - Quality control manager if the quantity of subbase or base exceeds the requirements listed in the "QC Manager Requirement" table of Section 23-1.01D(2)(a), "Quality Control," of the *Standard Specifications*.

4-2806 Payment

4-2806 Payment

For measurement and payment, do the following:

- Review the plans and quantity calculations in the resident engineer's file to determine if there is sufficient detail and accuracy to be used in the project records.
- For information about measurement and payment of curing seal, refer to Section 4-94, "Asphaltic Emulsions," of this manual.

Section 29 Treated Permeable Bases

4-2901 General
4-2902 Before Work Begins
4-2903 During the Course of Work
4-2903A Asphalt-Treated Base
4-2903B Cement-Treated Permeable Base
4-2903C Protection
4-2903D Surface Tolerance
4-2904 Level of Inspection
4-2905 Quality Control
4-2906 Payment

Section 29 Treated Permeable Bases

Section 29
Treated
Permeable Bases

4-2901 General

4-2901
General

This section provides guidelines for inspecting treated permeable base for work specified under Section 29, "Treated Permeable Bases," of the *Standard Specifications*. Treated permeable base is placed under concrete or hot mix asphalt pavement and provides a highly permeable drainage layer within the pavement structure. The Bid Item List and plans will specify the type of binder material, either asphalt or cement.

4-2902 Before Work Begins

4-2902
Before Work
Begins

For preliminary review and inspections, do the following:

- Obtain the contractor's quality control plan, which details the methods the contractor will use to ensure quality of work and conformance with the requirements of the *Standard Specifications*.
- If mutually agreeable with the contractor, hold a meeting prior to construction to discuss the quality control plan and contractor's method for performing each element of work affecting material quality, including acceptance testing priorities, shipping of samples, lines of communication for test results, timeframes for reporting quality control and acceptance test results, and any contractual testing dispute resolution processes.
- 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, "Concrete," of this manual provide guidelines.
- Ensure the underlying subgrade meets compaction requirements and is uniformly moist and free of loose or extraneous material.
- Inspect the subgrade elevation. Areas lower than the grade established by the resident engineer must be filled with permeable base. Spot check areas at stations where stakes are set and between stations.
- Verify that filter fabric meets specifications.
- Review planned locations of cross-drain interceptors and Sheet P53 of the *Standard Plans*. Ensure the interceptors are properly located to prevent water collecting under the pavement. Refer to Section 4-68, "Subsurface Drains," of this manual for information about underdrains.
- Ensure spreading and compacting equipment complies with the specifications.

4-2903 During the Course of Work

During the course of work, follow these inspection steps:

- Verify that the air temperature exceeds the minimum specified temperature during spreading.
- Verify that filter fabric is placed on the high side of the treated permeable blanket in accordance with the plans and specifications.
- Refer to Chapter 6-1, "Sample Types and Frequencies," of this manual for acceptance quality characteristics and associated sampling and testing frequencies.
- Follow Section 23-1.01D(1)(b), "Test Result Disputes," of the *Standard Specifications* if the contractor disputes Caltrans' acceptance results. An independent third party, selected with the contractor, performs referee testing as specified in the specifications and must have no prior direct involvement with the contract.

4-2903A Asphalt-Treated Permeable Base

- Determine which compaction method the contractor plans to use and verify that rollers used do not exceed the specified weight requirements.
- Check the temperature of the asphalt-treated permeable base to ensure that compaction is performed within the specified temperature range.
- During placement of the asphalt treated permeable base over edge drains, verify that the temperature of the material falls within the limits specified in Section 68-4.03, "Construction," 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 that is segregated or not uniformly mixed.
- Observe rolling to determine that compaction meets specifications.
- Observe the consistency of cement-treated permeable base during placement. If the mix is too wet, order an adjustment to the water-cement ratio to ensure that the cement paste does not plug the openings in the edge drains.
- Determine that the base is cured as specified.

4-2903C Protection

Contamination or filling voids with foreign material will destroy the base's function. The assistant resident 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 5-1.37, "Maintenance and Protection," of the *Standard Specifications*.

4-2903D Surface Tolerance

For the finished surface of treated bases, the specifications provide tolerances above and below the grade established by the resident engineer. Check the finished surface as

described for subgrade under "Before Work Begins" in this section. Document the results in the resident engineer's daily report and require the specified corrections for low or high areas. For low areas, decide whether permeable base is removed and replaced or allowed to remain after correcting with specified pavement materials. Information in Chapter 650, "Pavement Drainage," of the *Highway Design Manual* may be used to determine the adequate thickness of treated permeable base layers.

4-2904 Level of Inspection

4-2904
Level of Inspection

Suggested levels of inspection for typical treated permeable base work activities are:

- Benchmark inspection of subgrade grading plane.
- Intermittent sampling and testing of treated permeable base materials.
- Intermittent inspection of placement, spreading, and compaction operations.
- Intermittent review of contractor's quality control program including quality control test results.
- Benchmark inspection of finished surface grading plane.

4-2905 Quality Control

4-2905
Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Ensure the contractor is actively performing quality control on treated permeable base materials throughout production operations by reviewing copies of quality control records, including quality control test results.
- The quality control plan must include, but is not limited to:
    - Frequency of quality control sampling and testing that meets or exceeds specification requirements as listed in Section 29-2.01D(2)(b) and 29-3.01D(2)(b), "Quality Control Testing," of the *Standard Specifications*.
    - Time and frequency of submitting test results.
    - Action and suspension limits, and details of corrective action to be taken if any process is outside of those limits. Suspension limits must not exceed specified acceptance criteria.
- Responsibilities of subcontractors and testing laboratories.
- Quality control manager if the quantity of subbase or base exceeds the requirements listed in the "QC Manager Requirement" table of Section 23-1.01D(2)(a), "Quality Control," of the *Standard Specifications*.

4-2906 Payment

4-2906
Payment

For measurement and payment, review the plans and quantity calculations in the resident engineer's file to determine if there is sufficient detail and accuracy to be used in the project records. The payment for treated permeable base does not include quantity used for edge drains or to fill low areas of subgrade.

Section 30 Reclaimed Pavements

4-3001 General

This section provides guidelines for inspecting reclaimed pavements for work specified under Section 30, "Reclaimed Pavements," of the *Standard Specifications*, which includes pulverized roadbed; full depth reclamation—foamed asphalt; full depth reclamation—cement; and crack and seat.

This section addresses operations related to construction of pavement bases by using reclaimed pavement as base material. Pavement reclamations include operations for pulverized roadbed; full depth reclamation—foamed asphalt; full depth reclamation—cement; and crack and seat.

4-3002 Before Work Begins

Before work begins, take the following steps:

- Review the contract documents to determine the type of pavement reclamation and the locations where pavement will be reclaimed and placed as base material.
- At least 20 days before starting pavement reclamation work, obtain the contractor's quality control plan, which details the methods the contractor will use to ensure quality of work and conformance with the requirements of the *Standard Specifications*.
- Hold a preoperation meeting to discuss the quality control plan and contractor's method for performing each element of work affecting material quality, including acceptance testing priorities, lines of communication for test results, timeframes for reporting quality control and acceptance test results, and any contractual testing dispute resolution processes and mix design determination.
- Review the asphaltic emulsion submittals and verify that the asphaltic emulsions comply with Section 30-1.01C(2), "Asphaltic Emulsion," of *Standard Specifications*.
- Review mix design when applicable. If the contractor proposes a cement content different from specified, review the proposed mix design test results. Based on test results, and in consultation with the district materials engineer, decide whether the proposed percent of cement will produce the design strength in the finished product.
- Conduct field visits to verify surface is prepared for operation.

For crack and seat, take the following steps:

- Designate and mark a section of roadway for contractor to construct the test strip.
- Identify locations of core to be collected by the contractor from test strip.
- Use the collected core from test strip to evaluate the effectiveness of contractor cracking operation.

4-3003 During the Course of Work

During the work, take the following steps:

- 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, 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.
- Review the pavement reclamation test strip report for compliance before authorizing the contractor to start pavement reclamation activities. In the absence of the engineer's authorization, the contractor may start pavement reclamation at their own risk.
- Obtain and review contractor's daily quality control report for each lot.
- For acceptance of reclaimed pavement, conduct visual inspection to verify absence of defects such as segregation, tearing, scarring of surface, unevenness, and irregularity of compacted reclaimed pavement. Review the test result and verify the reclaimed pavement is compacted to specified relative compaction.

4-3004 Level of Inspection

Suggested levels of inspection for typical reclaimed pavement activities are:

- Intermittent inspection of materials produced from pavement reclamation.
- Benchmark inspection of compaction of pulverized roadbed, full depth reclamation—foamed asphalt, and full depth reclamation—cement.
- Intermittent inspection of seating of cracked pavement.

4-3005 Quality Control

Verify that the contractor is actively performing quality control on reclaimed, pavement-produced base throughout production operations by reviewing copies of quality control records, including quality control test results. Discuss the deficiencies and noncompliance with the contractor as soon as possible. Do not authorize pavement reclamation before all noncompliance is addressed.

Verify the reclaimed pavement compliance with the materials quality characteristics requirements, testing frequency, and sampling location for the type of reclaimed pavement.

4-3006 Payment

For measurement and payment, review the plans and quantity calculations in the resident engineer's file to determine if there is sufficient detail and accuracy to be used in the project records.

Issue a change order to cover ordered changes to the cement content for full depth reclamation—cement.

Section 36 Surfacing and Pavements—General

4-3601 General

Table 4-36.1 Additional Information for Surfacing and Pavements

4-3602 Before Work Begins

4-3602A Preconstruction Meetings

4-3602B Base Bond Breaker

4-3602C Pavement Smoothness

4-3603 During the Course of Work

4-3603A Base Bond Breaker

4-3603B Pavement Smoothness

4-3604 Level of Inspection

4-3604A Base Bond Breaker

4-3604B Pavement Smoothness

4-3605 Quality Control

4-3605A Base Bond Breaker

4-3605B Pavement Smoothness

4-3606 Payment

4-3606A Base Bond Breaker

4-3606B Pavement Smoothness

Section 36 Surfacing and Pavements—General

Section 36 Surfacing and Pavements—General

4-3601 General

4-3601 General

Section 36, "General," of the *Standard Specifications* includes general requirements for sections within Division V "Surfacings and Pavements" of the *Standard Specifications*.

This section provides general guidelines for preconstruction meetings and pavement smoothness. Refer to the sections listed in Table 4-36.1 of the *Standard Specifications* and this manual for additional information.

Table 4-36.1. Additional Information for Surfacing and Pavements

Section Title	Standard Specification Section	Construction Manual Section
Seal Coats	37	4-37
Asphalt Concrete	39	4-39
Concrete Pavement	40	4-40
Existing Concrete Pavement	41	4-41
Groove and Grind Concrete	42	4-42

This section also includes inspection guidelines for base bond breaker that is applied between a base and concrete pavement.

4-3602 Before Work Begins

4-3602 Before Work Begins

4-3602A Preconstruction Meetings

Hold a preconstruction meeting for the surfacing and or paving operation work a minimum of 3 business days before the start of the work. This meeting is specific to the surfacing or paving work and is not the same meeting as required in Section 8-1.03, "Preconstruction Conference," of the *Standard Specifications* and as described in Section 5-003 "Preconstruction Conference with the Contractor," of this manual. For preconstruction meetings under this section, discuss the specifications and process for producing materials and constructing the surfacing or pavement. Refer to Section 36-1.01D(2), "Preconstruction Meetings," of the *Standard Specifications* for a list of topics to include in the meeting. Review the applicable specification section for additional items that are required to be covered in this preconstruction meeting.

Caltrans staff at this preconstruction meeting must include the resident engineer, principal assistants, material sampling and testing staff, and other key personnel.

Refer to Section 36-1.01D(2), "Preconstruction Meetings," of the *Standard Specifications* for the list of contractor personnel that are required to attend. Ensure the contractor also includes:

1. For seal coats, the emulsion and binder suppliers.

2. For hot mix asphalt using a warm mix asphalt additive technology, the technical representative for the warm mix asphalt technology.
3. For individual slab replacement with rapid strength concrete, the concrete plant inspectors and personnel performing saw-cutting and joint sealing.

Do not allow placement of the trial slabs, construction of test strips, or paving to start until the required personnel have attended the preconstruction meeting.

4-3602B Base Bond Breaker

Before work on the base bond breaker begins, do the following:

- Review the contractor's proposed base bond breaker to ensure it meets the requirements for the type of base it is being placed over.

4-3602C Pavement Smoothness

Before work begins, take the following steps:

- Review the contract and determine which portions of new pavement will be subject to inertial profiler requirements and which portions will be subject to straightedge requirements.
- In advance of the contractor's start of surfacing or paving operations, ensure project staff are trained and knowledgeable in the use of ProVAL computer software. ProVAL is used to view and analyze raw profile data as well as review and generate PDF reports. ProVAL is on Caltrans' Approved Software List and online training is available for Caltrans employees at:

  http://onramp.dot.ca.gov/hq/maint/pavement/Asphalt_Pavement.shtml

  ProVAL software is available at:

  http://www.roadprofile.com/
- Ensure the contractor submits certifications for the inertial profilers and operators and that certifications are not more than 12 months old.
- Discuss pavement smoothness requirements at the preconstruction meeting required for the surfacing or pavement operation. Include the following items in the discussion:
- The contractor is required to register with Caltrans' electronic file sharing system at least 15 days prior to profiling. To start the registration process, the contractor must send an email that includes contact information to smoothness@dot.ca.gov.
- Within 2 business days after each profiling, the contractor must submit the profile information to the engineer and to Caltrans' file sharing system. Refer to Section 4-3603, "During the Course of Work," of this manual for more specific details of what is required in each submittal.
- After submitting the profile information to Caltrans' file sharing system, the contractor must also send a notification to the engineer and to the above electronic mailbox.
- Failure to submit profile information within prescribed time frames is subject to progress payment withholds specified in Section 9-1.16E(3), "Performance Failure

Withholds," of the *Standard Specifications*. Refer to Section 3-906F (2), "Performance Failure Withholds," of this manual.

- All bridge approach slabs, bridges, and culverts visible on the roadway surface and at grade intersections must be recorded in the raw inertial profile data.
- Contractor must mark beginning and ending stationing of contractor profiles so the engineer may verify final acceptance profiles. Lack of beginning and ending station markings on shoulder may delay the engineer's validation profiles and acceptance.

4-3603 During the Course of Work

4-3603 During the Course of Work

4-3603A Base Bond Breaker

During the base bond breaker work, take the following steps:

- Ensure contractor submits a certificate of compliance for each shipment of base bond breaker material delivered.
- Ensure base material is free of any foreign and loose materials and the base is cured prior to applying base bond breaker.
- Ensure the base bond breaker used is specified for the type of base it is covering.
- Ensure base bond breaker is paved over within 72 hours of placing base bond breaker.
- Ensure base bond breaker is applied in accordance with the specifications.

4-3603B Pavement Smoothness

During the pavement smoothness work, take the following steps:

- At locations not requiring pavement smoothness testing using an inertial profiler:
    1. Ensure the contractor tests areas for smoothness using a 12-foot straightedge. After testing, ensure the contractor submits a list of areas that require correction. Ensure each area is identified by size and location as required by the specifications.
    2. Ensure follow-up acceptance testing with a straightedge is performed to confirm contractors list is complete. If the area was measured using an inertial profiler, consider using the ProVAL Rolling Straightedge module to help identify locations that should be manually checked with the straightedge.
- Ensure the inertial profiler displays a current certification. Both the left and right accelerometers are to have a Caltrans-issued decal indicating the date the certification expires.
- In the Engineer's presence, ensure the contractor performs:
    1. The required calibration and verification tests of the inertial profiler before each day's operation.
    2. The cross-correlation verification test at least once per project and at least once per year on each pavement surface type.
- Ensure the inertial profiler operator has a current Caltrans-issued certificate. Ensure the certificate covers the model of the certified inertial profiler.

- Ensure the contractor marks the beginning and ending station on the pavement shoulder. When stationing is covered by additional surfacing or pavement, ensure markings are transferred to the next surface and display the same stationing. Prior to running verification tests, ensure the beginning and end station are still clearly marked, and that Caltrans' inertial profiler operator uses the same stationing as the contractor.
- Ensure the contractor submits pavement smoothness data in compliance with the current pavement smoothness requirements.
- To assist in gathering pavement smoothness information and pavement smoothness data files, promote the use of data collection forms. Pavement smoothness forms are available at:

  http://www.dot.ca.gov/hq/construc/forms.htm

These forms include:

- Form CEM-3736, "Pavement Smoothness Inertial Profiler Submittal Record," is a checklist to review the completeness of submittals of inertial profiler data files, reports, and calibration information. This form should be used for both hot mix asphalt and concrete pavements.
- Forms CEM-3736AC, "Asphalt Concrete Pavement Smoothness Corrections Information," and CEM-3736C, "Concrete Pavement Smoothness Corrections Information," provide information on pavement smoothness corrections made by contractors. The information collected on these forms will be used by Caltrans to help determine if improvements to the Caltrans pavement smoothness specifications are required. These forms should be completed by the contractor and submitted to the resident engineer and the smoothness electronic mailbox address.
- After each inertial profiling by the contractor, review the inertial profiles for accuracy and contract compliance.
- Upon receipt of the contractor's inertial profiles proposed for acceptance, review the raw profile data file, and the two ride quality reports using the guidelines described in items 1, 2, and 3. Carefully review the submittals to ensure:

  1. All listed leave-outs meet the requirements for the contract.
  2. The ride-quality analysis report for International Roughness Index indicates no locations where short continuous roughness exceeds the established specification limit for areas of localized roughness.
  3. On the ride-quality analysis report for mean roughness index, where full 0.10-mile fixed increments are indicated, all mean roughness index values do not exceed the maximum mean roughness index provided for the contract. Where partial fixed increments are shown (fixed increments less than 0.10 mile), evaluate compliance against the contract requirements after adjusting the calculated mean roughness index for the partial section as described in the specification.
- After reviewing and accepting the contractor's profiles proposed for acceptance, request Caltrans' inertial profile be run. Include a copy of the contractor's raw data file. Prior to submitting the request, ensure the contractor's beginning and ending

stationing locations are still clearly marked on the shoulder. Caltrans should use the same stationing. This allows both files to be simultaneously loaded in ProVAL and compared for differences.

- Upon receipt of Caltrans' verification inertial profile runs, evaluate and validate the contractor's profiles when each contractor's mean roughness index value is within 10 percent of Caltrans'.

4-3604 Level of Inspection

4-3604
Level of Inspection

4-3604A Base Bond Breaker

- Benchmark inspection of the existing base material to ensure it is free of any foreign or loose material, and base has fully cured prior to applying base bond breaker.
- Intermittent inspection of the application of the base bond breaker to ensure it meets the requirements

4-3604B Pavement Smoothness

- Intermittent inspection to assure inertial profiler and operator certifications are current.
- Intermittent inspection to assure beginning and ending stationing of inertial profiler runs are marked on the shoulder, and correctly transferred to subsequent lifts when necessary.
- Intermittent inspection of submitted inertial profile submittals to ensure they meet the contractual requirements.
- Benchmark inspection of contractor's final "corrected" inertial profiles to ensure they meet the requirements for pavement smoothness, including ensuring they are within 10 percent of Caltrans' International Roughness Index values for each 0.1-mile section.

4-3605 Quality Control

4-3605
Quality Control

4-3605A Base Bond Breaker

- Ensure contractor submits a certificate of compliance for each delivery of base bond breaker material.

4-3605B Pavement Smoothness

- Ensure contractor has current certifications for inertial profiler and its operator.

4-3606 Payment

4-3606
Payment

4-3606A Base Bond Breaker

- Measure and pay for base bond breaker where shown on the plans. Do not include any quantity for overlap.
- If performance grade asphalt binder is used as a base bond breaker, determine its weight in accordance with the Section 92-1.04, "Payment," of the *Standard Specifications*. Make any adjustments in accordance with Section 9-1.07, "Payment Adjustments for Price Index Fluctuations," of the *Standard*

Specifications. Do not include the weight of the asphalt binder used for base bond breaker in any other payment item.

4-3606B Pavement Smoothness

- Payment for pavement smoothness is included in bid item covering the pavement being placed. If the contractor fails to submit required pavement smoothness submittals within the specified time, withhold from the next progress payment in accordance with Section 9-1.16E(3), "Performance Failure Withholds," of the *Standard Specifications.*
- During each progress payment, estimate the cost to correct smoothness on final surfaces that were constructed during the previous estimate period and apply an equivalent reduction in the corresponding pavement item pay quantities for incomplete work.

Section 37 Seal Coats

4-3701 General

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4-3703 Slurry Seal

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4-3704 Micro-Surfacing

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4-3705 Fog Seals and Flush Coats

4-3705A Before Work Begins
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4-3706 Parking Area Seal

4-3706A Before Work Begins
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4-3707 Crack Treatment

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Section 37 Seal Coats

Section 37
Seal Coats

4-3701 General

4-3701
General

This section provides guidelines for inspecting work for applying seal coats as specified under Section 37, "Seal Coats," of the *Standard Specifications*, which includes chip seals, slurry seals, micro-surfacing, fog seals, flush coats, parking area seals, and crack treatments.

Chip seal is an application of bituminous material followed by a layer of aggregate screenings (for example, chips) and rolling. Chip seals include: asphaltic emulsion chip seals, polymer modified asphaltic emulsion chip seals, scrub seals, asphalt rubber binder chip seals, stress absorbing membrane interlayers (SAMI), and modified asphalt binder chip seals.

Asphaltic emulsion chip seals and polymer modified asphaltic emulsion chip seals placed in two layers are referred to as double chip seals.

Chip seals that use a hot asphalt binder (for example, asphalt rubber binder chip seal and modified asphalt binder) are often referred to as "hot applied chip seal." Chip seals that use an emulsion are often referred to as a "cold applied chip seal." Hot applied chip seals can be placed at night.

Scrub seal is a more advanced and aggressive multi-step chip seal process that uses a specialized emulsion as an asphalt concrete rejuvenator and chip binder in conjunction with a mechanized scrub broom that forces the optimum amount of emulsion into existing pavement surface cracks.

SAMI is a chip seal in which a modified binder (normally asphalt rubber) is applied at a much higher rate than used for a conventional chip seal. A SAMI is placed beneath a new overlay to retard reflection cracking.

Slurry seal is an application of a slurry mixture of water, asphaltic emulsion or polymer modified asphaltic emulsion, fine aggregate, and set-control additives applied to a pavement surface. Slurry seals are applied with a specialized vehicle with separate compartments for the ingredients and an on-board mixer. The slurry mixture flows onto the pavement within the confines of a distributor box attached to the rear of the vehicle. The box distributes the slurry mixture over the pavement to the approximate thickness of the largest aggregate (1/4- to 3/8-inch). Workers with squeegees assist in spreading the mixture, correcting areas not properly covered, and preventing the mixture from flowing to areas that are not intended to be covered. Slurry seals can only be applied in one layer.

Micro-surfacing is similar to a slurry seal except it requires a more advanced polymer modified asphaltic emulsion, a more durable fine aggregate, and a chemical additive. The major difference between slurry seal and micro-surfacing is in how they break or harden. Slurry seal relies on evaporation of the water in the asphaltic emulsion. The chemical additive in a micro-surfacing allows it to break without relying on sun or heat for evaporation. The hardening rate of a micro-surfacing allows it to be used where a slurry seal cannot be used. Micro-surfacing is applied with more advanced equipment

than a slurry seal. It can be applied thicker than the largest aggregate and applied in multiple layers to address surface irregularities including rutting.

Fog seal is an application of a diluted slow-setting asphaltic emulsion or quick setting asphaltic emulsion applied over the existing pavement or a chip seal.

Flush coat is the application of a fog seal followed by the application of sand. To eliminate further aggregate loss and improve durability, flush coats are always specified to be placed over chip seals and SAMIs prior to opening pavement to traffic.

Parking area seal is the application of a mixture of asphaltic emulsion, aggregate, polymer, and water to parking areas.

Crack treatment is the cleaning, preparation, and sealing of existing cracks in asphalt concrete pavement.

Seal coats are primarily used to maintain existing asphalt concrete pavement. Seal coats on new work are generally limited to fog seal on areas of hot mix asphalt that have been ground for smoothness corrections, asphalt concrete dikes, miscellaneous areas, and shoulders.

For additional guidance on seal coats, refer to the *Maintenance Technical Advisory Guide*, Vol. 1., *Flexible Pavement Preservation* at:

http://www.dot.ca.gov/hq/maint/MTA_GuideVolume1Flexible.html

4-3702 Chip Seals

4-3702 Chip Seals

The following covers the duties required throughout each phase of the project for chip seals.

4-3702A Before Work Begins

Before work begins, take the following steps:

- A minimum of 15 days before starting placement of chip seal, ensure the contractor submits:
  1. Samples of the uncoated aggregate.
  2. Depending on the type of chip seal, samples of asphaltic emulsion, polymer modified asphaltic emulsion, or asphalt rubber binder.
  3. Binder data for asphaltic emulsion, polymer modified asphaltic emulsion, asphalt binder or asphalt rubber binder.
  4. Contractor's aggregate test results.
  5. Contractor's Vialit test for aggregate retention in chip seals test results.
- Test the uncoated aggregate, asphaltic emulsion, polymer modified asphaltic emulsion, or asphalt rubber binder asphalt binder for all of the quality characteristics. Advise the contractor of test results.
- A minimum of 10 days before starting chip seal activities, ensure the contractor submits the names of proposed authorized laboratories for quality control testing. Authorize the laboratories based on the requirements of Section 37-1.01D, "Quality Assurance," of the *Standard Specifications*.
- A minimum of 10 days prior to the preconstruction meeting, ensure the contractor submits a list of participants in the preconstruction meeting, including the

participants' names, employer, title, and role in the production and placement of the chip seal.

- Hold the preconstruction meeting a minimum of 5 days before the start of the chip seal work. At the preconstruction meeting discuss the contractor's quality control program and method for performing each element of work affecting material quality including:

  1. Frequency of quality control sampling and testing that meets or exceeds specification requirements listed in the quality control sections of the *Standard Specifications*.
  2. Time and frequency of submitting test results.
  3. Responsibilities of quality control laboratories.

- Ensure contractor posts "No Parking—Tow Away" signs a minimum of 24 hours prior to placing chip seal if chip seal affects public parking.
- Examine the surface to be sealed. Prepare a change order to provide for any necessary corrective action such as sealing cracks and repairing failed areas. At this stage, a review with the maintenance region manager or area superintendent would be helpful.
- A minimum of 7 days prior to starting placement of the chip seal, ensure contractor submits a written list of areas deemed defective, for example, those that have rutting in excess of 3/8 inch or are exhibiting flushing. Provide a written response indicating your agreement or disagreement with each of the areas. Caltrans acceptance does not apply to areas where you agree the existing pavement is defective prior to placement of the chip seal.
- When the chip seal includes pre-coated aggregate, ensure the contractor's central mixing plant has been authorized under Caltrans' *Material Plant Quality Program (MPQP)*. For additional information refer to Section 3-902E, "Weighing Equipment and Procedures," of this manual.
- Review the contract to determine the type of seal coat required. Note the particular type of bituminous binder to be used, and the requirements for aggregates. Decide whether any conditions have changed from those upon which the design engineer based the requirements, and propose any necessary changes.
- For asphalt rubber seal coats, verify that the contractor has submitted the permits issued by the local air quality agency for asphalt rubber binder field blending and application equipment.
- If an air quality permit is not required by the local air quality agency for producing asphalt rubber binder or spray applying asphalt rubber binder, ensure the contractor submits verification from the local air quality agency that an air quality permit is not required for the contract.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes seal coat materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Ensure the aggregate material source complies with Section 7-103H (2), "Surface Mining and Reclamation Act," of this manual.

- Review the project to determine all requirements for handling traffic. Review required traffic control system and traffic control devices with the contractor.
- Ensure contractor submits an aggregate spread rate and bituminous binder spread rate. Review the spread rates and authorize if rates are within the specified allowable range.
- For the type of chip seal specified, review the contract documents to determine the specifications related to weather (The success of a chip seal is highly dependent on weather related conditions). Following are limits that may apply to the specified type of chip seal:
    1. Minimum ambient air temperature during placement
    2. Maximum ambient air temperature during placement
    3. Minimum pavement surface temperature during placement
    4. Maximum pavement surface temperature during placement
    5. Minimum ambient air temperatures for the first 24 hours after placement
    6. Placement within 24 hours of rain
    7. Placement within 24 hours of forecast rain
    8. Placement within 24 hours of freezing temperatures
    9. Pavement dampness during placement
    10. High wind conditions during placement
- Review the latest weather reports, daily weather forecasts, existing pavement surface temperatures, and ambient air temperatures during the planned shift hours. Document these conditions in your daily report. 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 and discuss conditions forecast for the following workday. Strive to reach mutual agreement on whether work should proceed the following workday. Provide a nonworking day for those days when weather prevents work from proceeding.
- 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:

- Review the weather reports, daily weather forecasts, existing pavement surface temperatures, and ambient air temperatures during the shift hours. Document these conditions on your daily report.
- For the type of chip seal specified, review the contract documents to determine the specifications related to weather. Ensure the contractor places chip seal only under specified weather conditions.

- 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.
- Ensure both acceptance testing and reporting to the contractor are performed at frequencies listed in Chapter 6-1, "Sample Types and Frequencies," of this manual.
- For chip seals that use a crumb rubber modifier, ensure contractor submits a Form CEM-4410, "Crumb Rubber Usage Report," monthly and at the end of the project.
- Obtain samples of the asphaltic emulsion in accordance with the frequency tables in Section 6-1, "Sample Types and Frequencies," of this 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 how many parts of water were added to how many parts of emulsion.
- From the delivered aggregate 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 on source documents, if volumetric measurements are to be used to determine pay quantities.
- Just before spreading, review contractor's proposed aggregate and bituminous material spread rates against previously authorized spread rates. If different, but within the contract required range of spread rates, document the contractor's reasoning in the daily report and re-authorize the spread rates.
- For diluted asphaltic emulsion, determine the required spray rate necessary to achieve the residual rate. Refer to Section 4-9403, "During the Course of Work," for an example of how to determine the spray rate required to achieve a specified residual binder rate. Compare to and document the contractor's equipment spray rate setting in the daily report.
- Obtain the weighmaster certificate 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, read the tank gauge on the distributor truck and record. Apply materials at the established width and rate for 1,000 feet (or shorter distance if necessary). Monitor the mat over 1,000 feet watching for ridging, plugged tips, and chip density. Read the tank gauge at the end of the 1,000 feet. 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 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; 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 quantity of asphalt and void required to correctly embed the aggregate.



Correct asphalt quantity, voids 50% to 70% filled



Insufficient asphalt, screenings not firmly held



Excess asphalt submerges chips and causes bleeding

- 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 does not spread the binder and screenings more than 2,500 feet ahead of the initial rolling.
- Ensure the contractor performs the rolling in the specified order and required number of roller coverages.
- Ensure the contractor adjusts 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.
- 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. Ensure the contractor maintains the chip seal surface for 4 consecutive days after the day aggregate is applied. 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.
- Review the completed chip seal to determine if it meets the requirements of Section 37-2.01A(4)(c) "Department Acceptance," of the *Standard Specifications*.
- 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 Level of Inspection

Suggested levels of field inspection for typical chip seal activities are:

- Intermittent inspection of sampling and testing of materials.
- Benchmark inspection of equipment to ensure it conforms to the specifications.
- Intermittent inspection to ensure "No Parking—Tow Away" signs are posted 24 hours prior to chip seal if affecting public parking.
- Intermittent inspection of existing ambient and pavement temperatures.
- Benchmark inspection of existing facilities, such as, manholes, valve covers, grates, to ensure all are covered and referenced to relocate after to placing chip seal.
- Benchmark inspection of surface preparation of existing pavement surface.
- Intermittent inspection of certificates of compliance for each delivery of asphaltic emulsion or asphalt binder.
- Intermittent inspection of binder application to ensure uniformity of application and spread rate.
- Intermittent inspection of aggregate spreading operation to ensure uniform application within 10 percent of pre-determined rate.
- Intermittent inspection of finishing operations to ensure repair of any ridges, bumps, streaks, or depressions in existing surface.
- Intermittent inspection to verify that required sweeping is performed the day of the chip seal.
- Intermittent inspection to ensure chip sealed areas are maintained for 4 consecutive days and excess aggregate is removed after 4 consecutive days.
- Benchmark inspection of the completed surface to ensure it meets the requirements for visual acceptance.

- Benchmark inspection 10 days after completion of maintenance sweeping of the chip seal, to ensure permanent traffic stripes and pavement markings are complete.

4-3702D Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- For chip seals, ensure the contractor performs the quality control sampling and testing at the specified frequency, and reporting within the specified time frame.
- Ensure the contractor submits a copy of the American Association of State Highway and Transportation Officials (AASHTO) accreditation for the laboratory performing the testing of the aggregate screenings and asphaltic emulsion or asphalt binder.
- Ensure the contractor's authorized laboratory performs the required quality control material sampling and testing at the specified frequency.
- Ensure the contractor submits quality control test results within the specified reporting time.

4-3702E Payment

For measurement and payment, do the following:

- Withhold 50 percent of the estimated value of chip seal work if the contractor fails to place permanent traffic stripes and pavement markings within the specified time.
- Collect weighmaster certificates from each truck as it delivers screenings to the chip spreader. When screenings are stockpiled before spreading, obtain weighmaster certificates 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 weighmaster certificates 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.

For compensation adjustment for price index fluctuations for asphaltic emulsion, refer to Section 9-1.07, "Payment Adjustments for Price Index Fluctuations," of the *Standard Specifications* and perform the following:

- Verify that the contractor has not opted out of payment adjustments for price index fluctuation at the time of bid.
- Process a change order to allow for payment increases and decreases.
- Calculate on a monthly basis the amount of asphalt used in asphaltic emulsion or polymer modified emulsion including flush coat.
- Calculate a paving asphalt adjustment if the California Statewide Crude Oil Index for the current month has fluctuated more than the specified amount from the same index for the month the bid opening occurred. Include the asphalt price adjustment in the monthly estimate.

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:

- A minimum of 10 days before starting slurry seal activities, ensure the contractor submits the names of proposed authorized laboratories for quality control testing. Authorize the laboratories based on the requirements of Section 37-1.01D, "Quality Assurance," of the *Standard Specifications*. Authorized laboratories must be able to perform International Slurry Surfacing Association tests and mix design.
- A minimum of 15 days before starting placement of slurry seal, ensure the contractor submits:
    1. Samples of the aggregate.
    2. Samples of asphaltic emulsion or polymer modified asphaltic emulsion.
    3. Asphaltic emulsion or polymer modified asphaltic emulsion data.
    4. Contractor's aggregate test results.
- A minimum of 10 days prior to the preconstruction meeting, ensure contractor submits a list of participants in the preconstruction meeting, including the participants' names, employer, titles, and roles in the production and placement of the chip seal. Hold the preconstruction meeting a minimum of 5 days before the start of the chip seal work.
- Hold the preconstruction meeting a minimum of 5 days before the start of the slurry seal. At the preconstruction meeting, discuss the contractor's quality control program and method for performing each element of work affecting material quality. The following items should be discussed:
    1. Frequency of quality control sampling and testing that meets or exceeds specification requirements listed Section 37-1.01D, "Quality Assurance," of the *Standard Specifications*.
    2. Time and frequency of submitting test results.
    3. Responsibilities of quality control laboratories.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes slurry seal materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- A minimum of 10 days before starting slurry seal, ensure the contractor submits laboratory report of test results and the proposed mix design signed by an authorized laboratory.
- Review the mix design and laboratory tests from the contractor. After determining that the mix design and test results conform to the requirements in Section 37-3.02B(5), "Slurry Seal Mix Design," of the *Standard Specifications*, authorize the mix design.

- Ensure the aggregate material source complies with Section 7-103H (2), "Surface Mining and Reclamation Act," of this manual.
- Obtain the name of the laboratory authorized to perform International Slurry Surfacing Association tests and mix design.
- Obtain initial samples of the aggregate and test the aggregate for the specified quality characteristics. Advise the contractor of the test results.
- Examine the surface to be sealed. Prepare a 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 the Caltrans *MPQP*. 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.
- Review weather reports, daily weather forecasts, existing pavement surface temperatures, and ambient air temperatures during the planned shift hours. Document the temperatures in the daily report. Review existing and forecast conditions to ensure slurry seals are placed when:
    1. The pavement and air temperatures are at least 50 degrees Fahrenheit or more.
    2. The expected high temperature within the 24 hours following placement will be at least 65 degrees Fahrenheit and not below 36 degrees Fahrenheit.
    3. Rain is not imminent.
- Have a means established for making contact with the contractor's authorized representative near the end of the work shift on the day before the intended workday and discuss conditions forecast for the following workday. Strive to reach mutual agreement whether planned work should proceed for the following workday. Agree on a nonworking day when weather prevents work from proceeding.
- 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 determine all requirements for handling traffic. Review with the contractor the required traffic control system and traffic control devices.
- Review the contractor's proposed application rates.
- Ensure contractor covers manholes, valve and monument covers, grates, and other exposed facilities within the area of application using plastic or oil-resistant construction paper secured by tape or adhesive to the facility being covered. Reference the covered facilities with enough control points to relocate the facilities after application of the slurry seal.
- Ensure contractor posts "No Parking—Tow Away" signing a minimum of 24 hours prior to placing chip seal if chip seal affects public parking.

4-3703B During the Course of Work

Once work begins, take the following steps:

- Ensure both acceptance testing and reporting to the contractor are performed at frequencies listed in Section 6-1, "Sample Types and Frequencies," of this manual.
- 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 deduction based on the amount of material represented by the failing test result, 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.
- 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.
- Review the completed slurry seal to determine if it meets the requirements of Section 37-3.01A(4)(c), "Department Acceptance," of the *Standard Specifications*.

4-3703C Level of Inspection

Suggested levels of field inspection for typical slurry seal activities are:

- Intermittent inspection to ensure slurry seal ingredients are proportioned in compliance with the authorized mix design.
- Benchmark inspection to ensure truck mounted spreader or continuous self-loading mixer spreader have been calibrated and comply with the *MPQP*.
- Intermittent inspection to ensure that when truck mounted spreaders are used, a minimum of two operational spreaders are at the job site during placement.
- Intermittent inspection including sampling and testing of materials.

- Intermittent inspection to ensure "No Parking—Tow Away" signs are posted 24 hours prior to slurry seal if public parking will be affected.
- Benchmark inspection of existing surface immediately prior to placing slurry seal to ensure it meets the surface preparation requirements.
- Benchmark inspection to ensure all existing facilities are covered and referenced prior to placing slurry seal.
- Intermittent inspection of existing ambient temperature, pavement temperature, and 24 hour weather forecasts for imminent rain or temperatures below 36 degrees Farenheit.
- Intermittent inspection to ensure each delivery of asphaltic emulsion or polymer modified asphaltic emulsion has a certificate of compliance.
- Intermittent inspection to ensure that within 4 hours of placement, slurry seal has set enough to allow traffic on it without exhibiting distress.
- Intermittent inspection of the completed slurry seal application to ensure irregularities such as scratch or tear marks do not exceed allowable amount.
- Benchmark inspection of the completed surface to ensure it meets the requirements for visual acceptance.
- Intermittent inspection to ensure slurry seal areas are swept 24 hours after placement without damaging the surface, and that sweeping continues for the 4 days afterward, unless deemed not necessary by the engineer.
- Benchmark inspection of slurry seal area 15 days after placement to ensure any areas with bleeding, raveling, separation, or other distresses are repaired.

4-3703D Quality Control

Guidance for quality control activities for slurry seals is summarized as follows:

- For slurry seals, ensure the contractor performs the quality control sampling and testing at the specified frequency and reporting within the specified time frame.
- Ensure the contractor submits a copy of the AASHTO accreditation for the laboratory performing the testing of the aggregate and asphaltic emulsion.
- Ensure the contractor's authorized laboratory performs the required quality control material sampling and testing at the specified frequency.
- Ensure contractor submits quality control test results within the specified maximum reporting time.

4-3703E 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 to determine the pay quantity.
- As necessary to determine pay quantities, collect weighmaster certificates for aggregate and asphaltic emulsion. 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.

For compensation adjustment for price index fluctuations for slurry seal refer to Section 9-1.07, "Payment Adjustments for Price Index Fluctuations," of the *Standard Specifications* and perform the following:

- Verify that the contractor has not opted out of payment adjustments for price index fluctuation at the time of bid.
- Process a change order to allow for payment increases and decreases.
- Calculate on a monthly basis the amount of asphalt used in slurry seal polymer modified emulsion.
- Calculate a paving asphalt adjustment if the California Statewide Crude Oil Index for the current month has fluctuated more than the specified amount from the same index for the month the bid opening occurred. Include the asphalt price adjustment in the monthly estimate.

4-3704 Micro-Surfacing

4-3704 Micro-Surfacing

The following sections cover the duties required throughout each phase of the project for micro-surfacing.

4-3704A Before Work Begins

Before work begins, take the following steps:

- A minimum of 10 days before starting micro-surfacing activities, ensure the contractor submits the names of proposed authorized laboratories for quality control testing. Authorize the laboratories based on the requirements of Section 37-1.01D, "Quality Assurance," of the *Standard Specifications*.
- A minimum of 15 days before starting placement of micro-surfacing, ensure the contractor submits:
  1. Samples of the aggregate.
  2. Samples of polymer modified asphaltic emulsion.
  3. Polymer modified asphaltic emulsion data.
  4. Contractor's aggregate test results.
- A minimum of 10 days prior to the preconstruction meeting, ensure contractor submits a list of participants in the preconstruction meeting, including the participants' names, employer, title, and role in the production and placement of the micro-surfacing.
- Hold the preconstruction meeting a minimum of 5 days before the start of the micro-surfacing work. At the preconstruction meeting discuss the contractor's quality control program and method for performing each element of work affecting material quality. The following items should be discussed:
  1. Frequency of quality control sampling and testing that meets or exceeds specification requirements listed in the quality control sections of the *Standard Specifications*.

2. Time and frequency of submitting test results.

3. Responsibilities of quality control laboratories.

- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes micro-surfacing materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Obtain the name of the laboratory authorized to perform International Slurry Surfacing Association tests for mix design.
- Review the mix design and laboratory tests submitted by the contractor before start of the placement. The mix design report should include comparison of each material's test result to the specification requirements. If the mix design and test results conform to the requirements in Section 37-3.03B(5), "Micro-Surfacing Mix Designs" of the *Standard Specifications*, authorize the mix design.
- Ensure the aggregate material source complies with Section 7-103H (2), "Surface Mining and Reclamation Act," of this manual.
- Obtain the name of the authorized laboratory in charge of laboratory report and mix design testing.
- Obtain initial samples of the aggregate, and test for the specified quality characteristics. Advise the contractor of the test results.
- Obtain the name of the contractor's authorized representative responsible for communicating about unsuitable weather that prevents micro-surfacing operations.
- Examine the surface to be sealed. Prepare a 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 the Caltrans *MPQP*. Verify equipment *MPQP* certification or 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.

4-3704B During the Course of Work

Once work begins, take the following steps:

- Ensure both acceptance testing and reporting to the contractor are performed at frequencies listed in Section 6-1, "Sample Types and Frequencies," of this manual.

- Obtain the required test report for each truckload of micro-surfacing 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 micro-surfacing 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. A decision to allow the material to remain in place must be based on the results of a physical examination of the micro-surfacing. Look for evidence of bleeding, raveling, stripping, or other deficiencies. Notify the contractor in writing of the decision. Also, if the material is allowed to remain in place, calculate the deduction based on the amount of material represented by the test result, 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 micro-surfacing at the ordered rate.
- Review the completed micro-surfacing to determine if it meets the requirements of Section 37-3.03A(4)(c), "Department Acceptance," of the *Standard Specifications*.

4-3704C Level of Inspection

Suggested levels of field inspection for typical micro-surfacing activities are:

- Benchmark inspection to ensure a required test strip is constructed if the micro-surfacing placement will require more than 1 day to complete.
- Intermittent inspection to ensure micro-surfacing ingredients are proportioned in compliance with the authorized mix design.
- Benchmark inspection to ensure truck mounted spreader or continuous self-loading mixer spreader have been calibrated and comply with the *MPQP*.
- Intermittent inspection to ensure that when truck mounted spreaders are used, that a minimum of two operational spreaders are at the jobsite during placement.
- Intermittent inspection including sampling and testing of materials.
- Intermittent inspection to ensure "No Parking—Tow Away" signs are posted 24 hours prior to micro-surfacing if public parking will be affected.
- Intermittent inspection of existing surface immediately prior to placing micro-surfacing to ensure it meets the surface preparation requirements.
- If there is a bid item for tack coat, benchmark inspection to ensure tack coat is applied at the authorized rate for micro-surfacing.
- Benchmark inspection to ensure all existing facilities are covered and referenced prior to placing micro-surfacing.

- Intermittent inspection of existing ambient temperature, pavement temperature, and 24-hour weather forecasts of imminent rain or temperatures below 36 degrees Fahrenheit.
- Intermittent inspection to ensure all deliveries of micro-surfacing emulsion have a certificate of compliance.
- Intermittent inspection to ensure that within 2 hours of placement, micro-surfacing has set enough to allow traffic on it without exhibiting distress.
- Benchmark inspection of the completed surface to ensure it meets the requirements for visual acceptance.
- Intermittent inspection to ensure micro-surfacing areas are swept 24 hours after placement without damaging the surface, and that sweeping continues for the 4 days after, unless deemed not necessary by the engineer.
- Benchmark inspection of slurry seal area 15 days after placement to ensure any areas with bleeding, raveling, separation, or other distresses are repaired.

4-3704D Quality Control

Guidance for quality control activities for micro-surfacing are summarized as follows:

- For micro-surfacing, ensure the contractor performs the quality control sampling and testing at the specified frequency and reports results within the specified time frame.
- Ensure the contractor submits a copy of the AASHTO accreditation for the laboratory performing the testing of the aggregate and asphaltic emulsion.
- Ensure the contractor's authorized laboratory performs the required quality control material sampling and testing at the specified frequency.
- Ensure contractor submits quality control test results within the specified maximum reporting time.

4-3704E Payment

For measurement and payment, do the following:

- The quantity of micro-surfacing 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 micro-surfacing operation, it is usually impossible to weigh both components together. Separately determine the mass of asphaltic emulsion and aggregate, and add the two results to determine the pay quantity.
- As necessary to determine pay quantities, collect weighmaster certificates 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 micro-surfacing is allowed to remain in place even though it failed the grading or sand equivalent tests, make the appropriate administrative deduction.

For compensation adjustment for price index fluctuations for micro-surfacing seal refer to Section 9-1.07, "Payment Adjustments for Price Index Fluctuations," of the *Standard Specifications* and perform the following:

- Verify that the contractor has not opted out of payment adjustments for price index fluctuation at the time of bid.
- Process a change order to allow for payment increases and decreases.
- Calculate on a monthly basis the amount of asphalt used in micro-surfacing emulsion.
- Calculate a paving asphalt adjustment if the California Statewide Crude Oil Index for the current month has fluctuated more than the specified amount from the same index for the month the bid opening occurred. Include the asphalt price adjustment in the monthly estimate.

4-3705 Fog Seals and Flush Coats

4-3705 Fog Seals and Flush Coats

The following sections cover the duties required throughout each phase of the project for fog seals and flush coats.

4-3705A Before Work Begins

- A minimum of 10 days before starting fog seal or flush coat activities, ensure the contractor submits the names of proposed authorized laboratories for quality control testing. Authorize the laboratories based on the requirements of Section 37-1.01D, "Quality Assurance," of the *Standard Specifications*.
- A minimum of 15 days before starting placement of fog seal ensure contractor submits either items 1 and 2 for fog seals or items 1 through 4 for flush coats:
    1. Samples of asphaltic emulsion.
    2. Asphaltic emulsion supplier, type and grade of asphaltic emulsion and copies of specified test results for asphaltic emulsion.
    3. Proposed target *x* values for sand gradation.
    4. Gradation test results for sand.
- A minimum of 10 days prior to the preconstruction meeting, ensure the contractor submits a list of participants in the preconstruction meeting, including the participants' names, employer, title, and role in the production and placement of the fog seal or flush coat.
- Hold the preconstruction meeting a minimum of 5 days before the start of the fog seal or flush coat. At the preconstruction meeting discuss the contractor's quality control program and method for performing each element of work affecting material quality. The following items should be discussed:
    1. Frequency of quality control sampling and testing that meets or exceeds specification requirements listed in the quality control sections of the *Standard Specifications*.
    2. Time and frequency of submitting test results.
    3. Responsibilities of quality control laboratories.

4-3705B During the Course of Work

- Ensure both acceptance testing and reporting to the contractor are performed at frequencies listed in Section 6-1, "Sample Types and Frequencies," of this manual.
- Review weather reports, daily weather forecasts, existing pavement surface temperatures, and ambient air temperatures during the shift hours. Document conditions in the daily report.
- Ensure "No Parking—Tow Away" signs are posted 24 hours prior to placing fog seal or flush coat if public parking will be affected.
- Review the contract documents to determine the specifications related to weather. Ensure the contractor places fog seal or flush coat only under specified weather conditions.
- For fog seal or flush coat, the contractor decides the grade of slow setting or quick setting emulsion and on the dilution rate. The quantity of water added for dilution must be based on the judgment and experience of field personnel, but in all cases must result in a residual rate within the specified range. When determining the application rate, take into account the permeability of the surface to be sealed, climatic conditions anticipated at the time of application, traffic, cross slope and profile grade. Based on the delivered state of the asphaltic emulsion binder (diluted or undiluted), determine the spray rates required to achieve both the specified minimum and maximum residual rates. Ensure the contractor sprays within that range of rates. Refer to Section 4-9403, "During the Course of Work," of this manual for examples of how to determine the spray rate required to achieve a specified residual rate.
- For flush coat, authorize contactors sand application rate when it falls within the specified range.
- For flush coat, ensure contractor spreads sand using a mechanical device immediately after application of the emulsion using a mechanical device that spreads at a uniform rate over the full width of a traffic lane in a single application.
- For flush coat, ensure contractor sweeps loose sand material remaining on the surface 24 hours after application.
- Review the completed fog seal to determine if it meets the requirements of Section 37-4.02A(4)(c), "Department Acceptance," of the *Standard Specifications*.
- Review the completed flush coat to determine if it meets the requirements of Section 37-4.03A(4)(c), "Department Acceptance," of the *Standard Specifications*.

4-3705C Level of Inspection

Suggested levels of field inspection for typical fog seal and flush coat activities are:

- Intermittent inspection including sampling and testing of materials.
- Intermittent inspection to ensure "No Parking—Tow Away" signs are posted 24 hours prior to fog seal or flush coat if public parking is affected.
- Benchmark inspection of existing surface immediately prior to placing fog seal or flush coat to ensure it meets the surface preparation requirements.

- Intermittent inspection of existing temperature and weather conditions to ensure placement of fog seal or flush coat occurs only above minimum pavement and ambient temperature requirements.
- Intermittent inspection to ensure fog seal or flush coat placement does not occur within 24 hours of rain, or within 24 hours of predicted rain or freezing temperatures.
- Intermittent inspection of certificates of compliance for each delivery of asphaltic emulsion.
- Intermittent inspection to ensure asphaltic emulsion for fog seal or flush coat is applied within the specified residual range and asphaltic emulsion for fog seal is not diluted with more than 1 part water to 1 part original emulsion.
- Intermittent inspection to ensure asphaltic emulsion for fog seal or flush coat is applied with uniform coverage.
- Intermittent inspection to ensure that sand for flush coat is applied within the specified range and immediately after application of asphaltic emulsion.
- Benchmark inspection to ensure loose sand is swept from flush coat areas 24 hours after application.
- Benchmark inspection of the completed surface to ensure it meets the requirements for visual acceptance.

4-3705D Quality Control

Guidance for quality control activities for fog seal and flush coat are summarized as follows:

- For fog seal and flush coat, ensure the contractor performs the quality control sampling and testing at the specified frequency and reports results within the specified time frame.
- Ensure the contractor submits a copy of the AASHTO accreditation for the laboratory performing the testing of the aggregate and asphaltic emulsion.
- Ensure the contractor's authorized laboratory performs the required quality control material sampling and testing at the specified frequency.
- Ensure contractor submits quality control test results within the specified maximum reporting time.
- Ensure the contractor's authorized laboratory performs the required quality control material sampling and testing at the specified frequency.

4-3705E Payment

- For flush coats, collect weighmaster certificates from each delivery of sand. Determine the weight of unused sand so that the weight of unused material may be deducted from the delivered weight. For the weight of sand to be paid for, do not deduct the weight of sand swept from the roadway.
- For fog seals and flush coats, collect weighmaster certificates and "weigh-back" slips for trucks delivering asphaltic emulsion. 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.

- For flush coats, collect weighmaster certificates from each delivery of sand. Determine the weight of unused sand remaining in stockpiles so that the weight of unused material may be deducted from the delivered weight. From the weight of sand to be paid for, do not deduct the weight of excess screenings removed from the roadway and disposed of.

For compensation adjustment for price index fluctuations of asphaltic emulsion, refer to Section 9-1.07, "Payment Adjustments for Price Index Fluctuations," of the *Standard Specifications* and perform the following:

- Verify that the contractor has not opted out of payment adjustments for price index fluctuation at the time of bid.
- Process a change order to allow for payment increases and decreases.
- Calculate on a monthly basis the amount of asphalt used in asphaltic emulsion or polymer modified emulsion including flush coat.
- Calculate a paving asphalt adjustment if the California Statewide Crude Oil Index for the current month has fluctuated more than the specified amount from the same index for the month the bid opening occurred. Include the asphalt price adjustment in the monthly estimate.

4-3706 Parking Area Seal

4-3706 Parking Area Seal

The following covers the duties required throughout each phase of the project for parking area seal.

4-3706A Before Work Begins

Before work begins, take the following steps:

- A minimum of 15 days before starting parking area seal, ensure contractor submits a 20-pound sample of the aggregate to be used.
- A minimum of 10 days before starting parking area seal, ensure the contractor submits:
  1. The name of proposed laboratory to perform mix design.
  2. For both new and substitute mix designs, laboratory report of test results and proposed mix design. Ensure report of test results include the specific materials to be used and show a comparison of test results and specifications.
  3. Ensure the mix design report includes the quantity of water that may be added at the job site.
  4. Manufacturer's data for oil seal and polymer.
  5. Ensure the test reports are signed by an authorized laboratory.
- A minimum of 10 days prior to the preconstruction meeting, ensure contractor submits a list of participants in the preconstruction meeting, including the participants' names, employer, title, and role in the production and placement of the parking area seal.

- Hold the preconstruction meeting a minimum of 5 days before the start of the parking area seal. At the preconstruction meeting, discuss the contractor's quality control program and method for performing each element of work affecting material quality. The following items should be discussed:

    1. Frequency of quality control sampling and testing that meets or exceeds specification requirements listed in the quality control sections of the *Standard Specifications*.
    2. Time and frequency of submitting test results.
    3. Responsibilities of quality control laboratories.

- Obtain the name of the authorized laboratory in charge of testing at least 10 days before the start of the placement.
- Obtain initial samples of the aggregate samples 15 days before starting the placement.
- Obtain test results and mix design at least 7 days before the placement.
- Review the mix design and laboratory tests submitted by the contractor before start of the placement. The mix design report should include comparison of each material's test result to the specification requirements. If the mix design and test results conform to the requirements in Section 37-5.02, "Materials" of the *Standard Specifications*, authorize the mix design.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes seal materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Examine the surface to be sealed. Prepare a 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.
- 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.
- Ensure all the utility inlets are covered with heavy paper or roofing felt adhered to the surface of the inlet.
- Review the project to ascertain all requirements for handling traffic. Review with the contractor the required traffic control system and traffic control devices.

4-3706B During the Course of Work

During the course of work, take the following steps:

- Obtain the required test report for each truckload of parking area seal. Compare the report with the specifications. Do not permit the seal to be used before testing unless a certificate of compliance accompanies it.
- Ensure the pavement surface to be treated has been dampened.

- Verify that a certificate of compliance accompanies each load of parking area seal.
- To determine the bitumen ratio and uniformity of mixing, submit samples of the undiluted parking area seal material to the district laboratory. Place samples in tightly closed containers to prevent moisture loss before testing.
- Ensure acceptance testing and reporting to the contractor are performed at frequencies listed in Section 6-1, "Sample Types and Frequencies," of this manual.

4-3706C Level of Inspection

Suggested levels of field inspection for parking area seal activities are:

- Benchmark inspection to ensure parking area seal mixture conforms to the approved mix design.
- Intermittent inspection including sampling and testing of materials.
- Intermittent inspection to ensure "No Parking—Tow Away" signs are posted 24 hours prior to parking area seal if public parking will be affected.
- Intermittent inspection to ensure that any irrigation systems adjacent the parking area seal have been shut off for 24 hours after placement of the seal.
- Intermittent inspection of existing surface immediately prior to placing parking area seal to ensure it meets the surface preparation requirements, including the sealing of any oil and grease spots that remain after cleaning.
- Intermittent inspection of certificates of compliance for each delivery of asphaltic emulsion used in the parking area seal mixture.
- Intermittent inspection to ensure parking area seal is applied uniformly and smoothly, and free of ridges or uncoated areas.
- Intermittent inspection to ensure that water added to the parking area seal mixture conforms to the manufacturer's recommendations, and that added water does not exceed by 15 percent the volume of undiluted emulsion.
- Intermittent inspection to ensure that if placing in multiple applications, the previous application has thoroughly dried before repeating the application.
- Intermittent inspection to ensure contractor keeps traffic off parking area seals for at least 24 hours.
- Intermittent inspection to ensure striping or pavement markings are only applied when the surface is dry.
- Benchmark inspection of the completed surface to ensure it meets the requirements for visual acceptance.

4-3706D Quality Control

Guidance for quality control activities for parking area seal is summarized as follows:

- For parking area seal, ensure the contractor preforms the quality control sampling and testing at the specified frequency and reports results within the specified time frame.
- Ensure the contractor submits a copy of the AASHTO accreditation for the laboratory performing the testing.

- Ensure the contractor's authorized laboratory performs the required quality control material sampling and testing at the specified frequency.
- Ensure the contractor submits quality control test results within the specified maximum reporting time.

4-3706E Payment

For measurement and payment, do the following:

- The quantity of parking seal to be paid for is the combined weight of asphaltic emulsion and aggregate without added water and set-control additive. Because the materials are mixed at a plant, it is important to have a proportioning record from the plant.
- As necessary to determine pay quantities, collect weighmaster certificates 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.

For compensation adjustment for price index fluctuations for parking area seal, refer to Section 9-1.07, "Payment Adjustments for Price Index Fluctuations," of the *Standard Specifications*, and perform the following:

- Verify that the contractor has not opted out of payment adjustments for price index fluctuation at the time of bid.
- Process a change order to allow for payment increases and decreases.
- Calculate on a monthly basis the amount of asphalt used in the asphaltic emulsion in the parking area seal.
- Calculate a paving asphalt adjustment if the California Statewide Crude Oil Index for the current month has fluctuated more than the specified amount from the same index for the month the bid opening occurred. Include the asphalt price adjustment in the monthly estimate.

4-3707 Crack Treatment

4-3707 Crack Treatment

The following covers the duties required throughout each phase of the project for crack treatment.

4-3707A Before Work Begins

Before work begins, take the following steps:

- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes crack treatment materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Verify the receipt of a certificate of compliance for each load of crack treatment material if it is on the Authorized Material List. If the crack treatment material is not on the Authorized Material List, obtain samples and authorized laboratory test results 20 days before use.
- Obtain the name of the laboratory authorized to perform material testing.

- Review laboratory tests from the contractor and determine if the material test results conform to the requirements in Section 37-5.02, "Materials," of the *Standard Specifications*. Advise the contractor of the test results.
- Examine the proposed equipment to ensure compliance with the specifications and discuss with the contractor the proposed operation.
- Determine whether the crack to be treated is clean and dry. Ensure the contractor cleans the cracks 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.

4-3707B During the Course of Work

During the course of work, take the following steps:

- Verify the receipt of a certificate of compliance for each load of crack treatment material if it is on the Authorized Material List. Ensure the certificate of compliance includes all required items.
- If crack treatment material is not on the Authorized Material List, ensure contractor submits test results and samples 20 days before use.
- Ensure each delivery of material includes manufacturer's heating and application instructions, safety data sheet, and manufacturer's recommended detackifying agent.
- Ensure acceptance testing is performed at frequencies listed in Section 6-1, "Sample Types and Frequencies," of this manual.
- For contracts specifying to fill the crack recessed ¼ inch or flush, ensure the contractor removes crack material that is spilled or deposited on the pavement surface.
- For contracts specifying to fill the crack with overband not more than 3 inches wide, ensure the contractor removed crack material that is spilled or deposited on the pavement surface outside the 3-inch wide overband limit.
- Observe the application of crack treatment material using approved equipment.
- If the crack treatment is tacky before opening to traffic have the contractor apply sand or the manufacturer's recommended detackifying agent.

4-3707C Level of Inspection

Suggested levels of field inspection for crack treatment activities are:

- Intermittent inspection including sampling and testing of materials.
- Intermittent inspection of certificates of compliance for crack treatment material if listed on the Authorized Material List.
- Intermittent inspection to ensure "No Parking—Tow Away" signs are posted 24 hours prior to parking area seal if public parking will be affected.
- Intermittent inspection to ensure existing cracks have been cleaned with oil-free compressed air at a minimum of 90 pounds per square inch.

- Intermittent inspection to ensure cracks are clean and dry before treating and pavement surface temperature is at least 40 degrees Fahrenheit. If cracks containing moisture are being heated or dried with a hot air lance, ensure the flame is not applied directly to the pavement adjacent to the crack.
- Intermittent inspection to ensure hot-applied crack treatment material is applied in accordance with the manufacturer's instructions.
- Intermittent inspection to ensure that cold-applied crack treatment material applied using a distributor kettle meets the requirements.
- Intermittent inspection to ensure contractor treats tacky crack treatment material with sand or manufacturer's recommended detackifying agent prior to opening to traffic.
- Intermittent inspection to ensure contract treats cracks on shoulders adjacent to lanes.
- Benchmark inspection of the completed surface to ensure it meets the requirements for visual acceptance.

4-3707D Payment

Crack treatment is paid for by lane mile measured along the edge of each paved lane parallel to the pavement centerline and includes crack treatment of the adjacent shoulder.

Section 39 Asphalt Concrete

4-3901 General

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Section 39 Asphalt Concrete

Section 39
Asphalt Concrete

4-3901 General

4-3901
General

Section 39, "Asphalt Concrete," of the *Standard Specifications* provides material and construction requirements for hot mix asphalt (HMA) including Type A, rubberized hot mix asphalt-gap graded (RHMA-G), open-graded friction course (OGFC), minor HMA, and hot mix asphalt with warm mix asphalt (WMA) additive technology. Unless WMA is specified, the term "hot mix asphalt" refers to all mixtures of aggregate and asphalt regardless of the mixing or placing temperature. Section 39 also provides construction requirements for work on existing asphalt concrete facilities.

All requirements in Section 39, (except 39-3, "Existing Asphalt Concrete") of the *Standard Specifications*, including smoothness requirements, apply to all types of HMA.

Construction of Hot Mix Asphalt Pavements (Manual Series No. 22), published by the Asphalt Institute, contains information on the uses of various types of asphalts and the design and production of HMA. All personnel responsible for HMA should familiarize themselves with this publication.

4-3901A Warm Mix Asphalt

WMA technologies allow production plants to produce HMA at temperatures 45°F to 85°F below the traditional mixing temperature. Reductions in mixing temperature have the benefits of cutting fuel consumption and decreasing the production of greenhouse gases, with engineering benefits of better compaction on the road, the ability to haul paving mix for longer distances, and extending the paving season by being able to pave at lower temperatures.

WMA technologies are divided into two categories—additive technology and water injection technology (foaming). At this time, Caltrans' focus is on better handling and compaction achieved by using any of the approved technologies. HMA with WMA technology is defined as HMA produced at a temperature greater than 240ºF for projects with density testing, using an approved technology, and greater than 260ºF for projects using method compaction. The contract allows that both categories of WMA technology may be used for Type A HMA, RHMA-G, and OGFC. The contract may include special provisions that require the use of WMA additive technology.

4-3901B Rubberized Hot Mix Asphalt

Rubberized hot mix asphalt (RHMA) is produced by mixing asphalt rubber and aggregate. Asphalt rubber is specified to include 18-22 percent crumb rubber modifier (CRM) by total mass of the asphalt rubber blend. The CRM must also include 25 percent (±2 percent) high natural rubber content scrap rubber by mass of the CRM that may come from scrap tires or other sources. Caltrans requires use of extender oil as an asphalt modifier in asphalt rubber. RHMA includes RHMA-G (gap graded), RHMA-O (open-graded), and RHMA-O-HB (open-graded high binder).

4-3901C Paving Personnel

Producing HMA pavement requires a partnership among Caltrans, the plant producing the HMA, and the contractor placing the HMA. The resident engineer must clearly communicate assignments of responsibility and commensurate authority for all Caltrans personnel, both at the job site and at the plant.

Plant inspection and testing is essential to ensure quality HMA. A plant inspector at the HMA plant usually performs the inspection and testing duties for the resident engineer. However, the resident engineer is responsible for enforcing contract specifications at the plant. The resident engineer must be kept informed of test results in a timely manner so appropriate contract administration action can be taken.

The paving inspector should have completed both "Hot Mix Asphalt Basics" and "Hot Mix Asphalt Inspection" training courses before assignment as the HMA paving inspector. In addition, if the paving inspector is sampling material, they must also be qualified on California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections," Appendix D, "Bituminous Materials."

4-3901D Hot Mix Asphalt Quality Assurance

HMA is placed using a specified quality assurance process. The process requires the contractor to perform quality control testing and Caltrans to perform acceptance testing and inspection.

For most quality control characteristics, the contractor samples and tests at a minimum frequency of once per 750 tons of produced HMA. For Caltrans acceptance sampling and testing, test at the frequency shown in Section 6-1, "Sample Types and Frequencies," of this manual. For most tests, test a minimum of every fifth sample, but not less than once per day.

The contractor is responsible for providing a Quality Control Plan (QCP). Review the QCP and verify that it includes the required elements and sufficiently describes the contractor's proposed quality control processes. Verify that the contractor follows the QCP, and when required, ensure that the contractor expeditiously makes changes necessary to control quality. Ensure that the contractor promptly reports quality control measures and test results to Caltrans personnel. The contractor is not required to have quality control inspectors onsite during placement operations. Caltrans performs all on-site inspection.

4-3902 Before Work Begins

4-3902 Before Work Begins

Ensure that the contractor submits a job mix formula and a QCP for HMA production and placement for all types of HMA. Job mix formula and QCP submittals are not required for HMA that is used for miscellaneous areas and dikes.

The contractor's laboratories used for testing aggregate and HMA qualities for determining the job mix formula and the independent third-party laboratory performing dispute resolution testing must be qualified under the American Association of State Highway and Transportation Officials (AASHTO), Materials Reference Laboratory (AMRL) program and the Caltrans' Independent Assurance Program (IAP). The contractor's quality control laboratory is not required to be certified by AMRL or IAP because the tests are not being used for acceptance.

Caltrans laboratories performing acceptance testing must be qualified under the AMRL and IAP. Caltrans' field laboratories meet the AMRL requirements when Caltrans' central materials laboratory meets the requirement. HMA plants must comply with the *Material Plant Quality Program* (*MPQP*) manual guidelines.

https://onramp.dot.ca.gov/ct/manuals-and-guides

4-3902A General

Before the work begins, the resident engineer will:

- Determine the type of HMA specified for the project and review the plans and the special provisions. The special provisions specify the type of HMA, aggregate size, and asphalt binder grade.
- Review the project specifications' measurement and payment clauses and determine what records must be kept.

4-3902B Job Mix Formula Submittal

Review the documents in the contractor's job mix formula submittal information to ensure they are complete. Notify the contractor immediately if the submittal is incomplete. Include:

- Form CEM-3511, "Contractor Job Mix Formula Proposal," which documents target values for aggregate sieves, percent of asphalt binder, and source information for all HMA component materials. If applicable, Form CEM-3511 will also include the percentage of reclaimed asphalt pavement and antistrip treatment method.
- Form CEM-3512, "Contractor Hot Mix Asphalt Design Data," which documents the testing data developed by the mix design laboratory. If Form CEM-3513, "Caltrans Hot Mix Asphalt Verification," is not attached, the completed mix design data Form CEM-3512 must have been dated within the past 12 months.
- Form CEM-3513, "Caltrans Hot Mix Asphalt Verification," which, if submitted, documents Caltrans' verification test results for the proposed job mix formula. Form CEM-3513 must have been signed by an engineer, preferably the district materials engineer, within 12 months of the start of planned HMA production.
- Safety Data Sheets in accordance with Section 39-2.01A(3)(b), "Job Mix Formula," of the *Standard Specifications*.

4-3902C Job Mix Formula Review

The resident engineer must:

- Review the contractor's proposed job mix formula submitted on Form CEM-3511 for compliance with Section 39-2, "Hot Mix Asphalt," of the *Standard Specifications* and additional requirements in the special provisions. Notify the contractor immediately if the proposed job mix formula does not comply with the specifications.
- Review the contractor's proposed job mix formula submitted on Form CEM-3511 and verify the asphalt binder supplier is on the Caltrans list of approved suppliers at:

  http://www.dot.ca.gov/hq/esc/Translab/ormt/fpmcoc.htm

If the asphalt binder supplier is not on Caltrans' list of approved suppliers, notify the contractor that asphalt binder supplied for the project must comply with Section Q, "Requirements for Suppliers Supplying Asphalt Without a Certificate of Compliance," in the *Certification Program for Suppliers of Asphalt* at:

http://www.dot.ca.gov/hq/esc/Translab/ormt/pdf/CaltransCertificationProgramforSuppliersofAsphalt_ProgramGuidelin.pdf

- Verify that the WMA technology (additive or water injection foam) is on the Caltrans Authorized Material List at:

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

- If the submitted job mix formula proposal complies with the specifications, notify the contractor within 5 days of submittal that:

  1. The job mix formula is accepted if Form CEM-3513 was issued within 12 months of proposed HMA production. The resident engineer signs and returns Form CEM-3511.
  2. The job mix formula must be verified if Form CEM-3513 was not issued within 12 months of proposed HMA production. The resident engineer requests that the contractor give notice for when HMA will be produced for verification and notifies the district materials engineer.
  3. For open-graded friction course HMA, if Form CEM-3513 was not issued within 12 months of proposed HMA production, the resident engineer requests that the contractor give notice for sampling of aggregate, binder, and additives.

4-3902D Job Mix Formula Verification

4-3902D (1) General

The contractor takes the following steps related to job mix formula verification for all types of mixes.

If the proposed job mix formula has not been verified within 12 months of production, the contractor must furnish material samples in accordance with Section 39-2.01A(3)(b), "Job Mix Formula," of the *Standard Specifications*, including:

- Coarse, fine, and supplemental aggregate from stockpiles, cold feed belts, or hot bins. Samples must include at least 120 pounds for each coarse aggregate, 80 pounds for each fine aggregate, and 10 pounds for each type of supplemental fines.
- Reclaimed asphalt pavement from stockpiles or reclaimed asphalt pavement system (if used). Samples must be at least 60 pounds.
- Asphalt binder from the binder supplier. Samples must be in two 1-quart cylindrical shaped cans with open top friction lids.
- Asphalt rubber binder with the components blended in the proportions to be used. Samples must be in four 1-quart cylindrical cans with open top friction lids.
- Antistrip additives if used.

The resident engineer's verification process includes:

- Receiving notification from the contractor at least 2 business days before sampling material so that an inspector may be present during the sampling.

- Witnessing the contractor sampling HMA and component materials.
- Shipping the samples immediately to the district materials laboratory. They will be processed according to the instructions included on Form TL-0101, "Sample Identification Card." The TL-0101 should be marked "Priority" and include "Job Mix Formula Verification Sample" under "Remarks."
- Providing job mix formula verification results to the contractor on Form CEM-3513 within 20 days of receiving all samples.

4-3902D (2) Verification Process for Open-Graded Friction Course

For samples of aggregate, asphalt binder, and additives, if applicable:

- Request that the district materials lab determine if the aggregates comply with the contract quality requirements.
- Request that the district materials laboratory determine asphalt binder content under California Test 368, "Method of Test for Optimum Bitumen Content (OBC) for Open Graded Friction Course."
- Within 20 days of material sampling, Caltrans will determine asphalt binder content and provide the contractor with Form CEM-3513.
- Within 20 days of receipt of a complete job mix formula submittal and material sampling, the resident engineer signs and returns the accepted or rejected job mix formula on Form CEM-3511, "Contractor Job Mix Formula," with Form CEM-3513 attached, to the contractor immediately following receipt of Form CEM-3513 from the district materials laboratory.

4-3902D (3) Verification Process for Type A and Rubberized Hot Mix Asphalt-Gap Graded

If the contractor's job mix formula proposal has not been verified, the contractor must provide aggregate and HMA verification samples from the plant that will be used for the project. The contractor samples in accordance with California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections."

Samples are obtained at the following locations:

- Aggregates are sampled from cold feed belts or hot bins.
- Reclaimed asphalt pavement, if used, is sampled from the reclaimed asphalt pavement system.
- HMA is sampled at the plant, in a truck, from a windrow, the paver hopper, or on the mat behind a paver.

Test verification samples for compliance with the specifications. Refer to Section 39-2.01A(4)(b), "Job Mix Formula Verification," of the *Standard Specifications*.

Ensure that the proposed job mix formula is verified by the district materials laboratory within 20 days of sampling HMA or when requested in writing by the contractor within 3 business days for rubberized HMA. Verification is done when the district materials engineer completes and returns Form CEM-3513 to the resident engineer. Form CEM-3511 must also be completed by the resident engineer and returned to the contractor along with Form CEM-3513 within this time frame.

For HMA using WMA technology:

- Obtain the result and a tested sample set for AASHTO T 324, "Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA)," from the contractor.
- Verify the HMA compliance with the mix design requirements for both AASHTO T 324 and AASHTO T 324 (Modified).
- Verify RHMA-G-WMA quality requirements within 5 business days.

4-3902D (4) Unverified Proposed Job Mix Formula

If the district materials laboratory does not verify the proposed job mix formula:

- The resident engineer notifies the contractor in writing on Form CEM-3511 of the rejected job mix formula, attaching Form CEM-3513, "Caltrans Hot Mix Asphalt Verification," with Caltrans verification test results.
- The contractor may submit a new job mix formula on Form CEM-3511 with a new Form CEM-3512, "Contractor Hot Mix Asphalt Design Data," or the contractor may adjust the job mix formula on Form CEM-3511 with allowable adjustments specified in Section 39-2.01A(4)(b), "Job Mix Formula Verification," of the *Standard Specifications*.
- If the contractor disputes Caltrans' verification test results, ensure that the contractor complies with Section 39-2.01A(4)(i)(iv), "Dispute Resolution," of the *Standard Specifications.*

4-3902D (5) Adjusted Job Mix Formula

The contractor may adjust the job mix formula to meet the specifications. Justification for any adjustments outside the target values shown on Form CEM-3512 must be listed on the modified Form CEM-3511.

If the adjusted job mix formula proposal complies with the specifications, arrange with the contractor a time to witness the sampling of plant produced HMA.

Ensure that the proposed job mix formula is verified by the district materials laboratory within 20 days of sampling HMA or when requested in writing by the contractor or within 3 days of sampling rubberized HMA. Verification is done when the district materials engineer completes and returns Form CEM-3513 to the resident engineer. Form CEM-3511 must also be completed by the resident engineer and returned to the contractor with Form CEM-3513 within 20 days of sampling HMA.

If the district materials laboratory does not verify the adjusted proposed job mix formula, notify the contractor in writing on Form CEM-3511 and attach Form CEM-3513 with Caltrans' verification test results.

If the adjustment failed to resolve the job mix formula verification problem, the contractor may propose a new job mix formula or dispute Caltrans test results in accordance with Section 39-2.01A(4)(i)(iv), "Dispute Resolution," of the *Standard Specifications*.

4-3902E Job Mix Formula Renewal

A verified job mix formula is good for only 12 months so the contractor may request a job mix formula renewal if the HMA production will be stopped for more than 30 days or the contractor wants to use the accepted job mix formula on another contract.

Verify that the contractor takes the following steps for job mix formula renewal:

- Submits the proposed job mix formula on Form CEM-3511, attaching the previously verified job mix formula on Form CEM-3513, and the mix design information for previously verified job mix formula on Form CEM-3512.
- Notifies the resident engineer prior to sampling materials.
- Samples materials at the locations and quantities shown in Section 4-3902D, "Job Mix Formula Verification," of this manual. HMA must be sampled at the location approved in writing by the resident engineer.
- Submits Form CEM-3514, "Contractor Job Mix Formula Renewal." Contractors use Form CEM-3514 to submit to the resident engineer their test results for renewal of HMA job mix formula.

The resident engineer's job mix formula renewal process includes:

- Reviewing the proposed job mix formula on Form CEM-3511. Refer to Section 4-3902C, "Job Mix Formula Review," of this manual. If the submitted job mix formula proposal complies with the specifications, the resident engineer notifies the contractor within 5 days that split sampled HMA and component materials must be provided.
- Witnessing the contractor sampling HMA and component materials. Take possession of the material samples and hold until receiving contractor test results.
- Reviewing the information on Form CEM-3514 to confirm that the contractor test results comply with the specifications. When the test results indicate that the sampled and tested HMA complies with the specification, request that the district materials laboratory perform HMA verification testing.
- Shipping material samples to the district materials laboratory if the contractor's test results on Form CEM-3514 comply with the specifications. They will be processed according to the instructions on Form TL-0101, "Sample Identification Card." The TL-0101 should include "Job Mix Formula Renewal Verification Sample" under "Remarks."
- Providing job mix formula verification results to the contractor on Form CEM-3513 within 30 days of receiving Form CEM-3514 from the contractor.

4-3902F Job Mix Formula Acceptance

Job mix formula acceptance requires the resident engineer to review and accept submitted Form CEM-3511, with Form CEM-3512 and an accepted Form CEM-3513 attached. Refer to Section 4-3902C "Job Mix Formula Review," of this manual for guidelines on reviewing Form CEM-3511.

4-3902G Plant Operations

HMA plants must be qualified under the *MPQP*. Refer to Section 3-902E, "Weighing Equipment and Procedures," of this manual for additional information.

Before production begins, take the following steps related to HMA plant operations:

- Verify with the district weights and measures coordinator that the proposed HMA plant is Caltrans-qualified under the *MPQP*. Batch HMA plants must be qualified annually, and continuous HMA plants must be qualified at least every 6 months, in accordance with Chapter 1, Section II-C, "Frequency," of the *MPQP* manual.

- If the HMA plant is not qualified, notify the contractor in writing and provide the contact information for the district weights and measures coordinator. The contractor must give the district weights and measures coordinator 5 business days' notice to schedule HMA plant qualification.
- Accept HMA for up to 14 days from a nonqualified plant if start-up approval has been granted in writing by the district weights and measures coordinator.

4-3902H Antistrip Treatment of Aggregates

HMA may be sensitive to moisture damage and require antistrip treatments. The treatment method can be either lime treatment (by dry lime, dry lime with marination, or lime slurry with marination) or liquid antistrip. Regardless of the type of antistrip treatment chosen by the contractor, the HMA must meet the requirements of AASHTO T 283, "Standard Method of Test for Resistance of Compacted Mixtures to Moisture-Induced Damage," and AASHTO T 324, "Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA)."

When the contractor chooses to use antistrip treatment of aggregate, the contractor must test the proposed HMA aggregate blend for plasticity index in accordance with California Test 204, "Method of Tests for Liquid Limit, Plastic Limit and Plasticity Index of Soils." When California Test 204 indicates clay is present in the aggregates, the plasticity index is used to determine the type of antistrip treatment. Refer to Section 39-2.01B(2)(b) "Hot Mix Asphalt Treatments," of the *Standard Specifications* for the treatment method allowed.

4-3902H (1) Lime Treatment of Aggregates

There are two methods for lime treatment of aggregates:

- Hot mix asphalt aggregate lime treatment—slurry method
- Hot mix asphalt aggregate lime treatment—dry lime method

Using the slurry method, treated aggregates are always marinated. Under the dry lime method, if the plasticity index is 4 through 10, aggregates must be marinated. When marination is required, the lime-treated aggregate must be stockpiled for 24 hours to 60 days before using in HMA.

Reclaimed asphalt pavement used in the production of HMA does not need to be lime treated.

Quality characteristic acceptance test limits for aggregate properties are based on untreated aggregates. Therefore, aggregate quality control and acceptance testing must be performed on aggregate samples taken before lime treatment.

During lime treatment, the sand equivalent test is used to signal a change in the presence of clays. If sand equivalent values decrease significantly, the plasticity index of the aggregate blend must be tested to ensure that it continues to be in the acceptable range listed in the special provisions.

If clays are present in the aggregate blend, both lime treatment methods must be followed by marination.

For lime-treated aggregates, before lime treatment begins, take the following steps:

- Verify with the district weights and measures coordinator that the proposed lime treatment plant is Caltrans-qualified under the *MPQP*.

- Verify the lime proportions for the fine and coarse aggregate or for the combined aggregates shown on the job mix formula.

During lime treatment, take the following steps:

- Obtain aggregate samples from stockpiles in accordance with California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections," to field test for moisture content and sand equivalent at the frequency shown in Table 6-1.13, "Materials Acceptance Sampling and Testing Requirements: Asphalt Concrete," in Section 6-1, "Sample Types and Frequencies," of this manual.
- Test aggregate samples for sand equivalent at the frequency shown in Table 6-1.13 of this manual. Combine aggregate from individual stockpiles in the job mix formula proportions to test for sand equivalent. If the sand equivalent test result exceeds the specified limits, immediately notify the resident engineer.
- It is good practice to test aggregate samples for moisture content in accordance with AASHTO T 255, "Standard Method of Test for Total Evaporable Moisture Content of Aggregate by Drying," or AASHTO T 329, "Standard Method of Test for Moisture Content of Hot-Mix Asphalt by Oven Method," because moisture influences proportioning. The plant inspector should confirm that the contractor is performing sampling and testing for moisture content at a frequency shown in Section 39-2.02A(4)(b)(ii), "Aggregates," of the *Standard Specifications*.
- Obtain aggregate samples from stockpiles or aggregate belts before lime treatment, in accordance with California Test 125. Sample aggregates at the frequency shown in Table 6-1.13 of this manual for aggregate acceptance testing.

  Label each aggregate sample with the contract number, date, type of mix, aggregate gradation (for example, 1/2 inch), aggregate source, HMA producer, and producer's mix identification number. Indicate the number of tons produced when the sample was taken.
- Test aggregate at the frequency shown in Table 6-1.13. For samples that will be shipped to the district material laboratory or field construction laboratory for testing, complete Form TL-0101, "Sample Identification Card." Follow the instructions printed in the form booklet and the information in Section 6-103, "Field Sampled Material Identification for Testing," of this manual. Record the type of mix, the HMA producer, and the producer's mix identification number. Check the acceptance tests box on the TL-0101. Under "Remarks," identify the tests to be performed:

  1. Los Angeles Rattler
  2. Percent of crushed particles coarse aggregate
  3. Percent of crushed particles fine aggregate
  4. Fine aggregate angularity
  5. Flat and elongated particles
  6. Other aggregate properties specified in the project special provisions, if applicable

  If any test results exceed the specified limits, the materials laboratory will immediately notify the resident engineer.

- Ensure that the aggregate treatment is adequate by witnessing contractor quality control testing, and be sure the contractor enters into a log the treatment data specified in the special provision.

  For each day of aggregate lime treatment, obtain the treatment data log in electronic format for the resident engineer's project files.

4-3902H (2) Marination of Lime-Treated Aggregates

Marination of the lime-treated aggregates must be done when required in the special provisions or when California Test 204, "Method of Tests for Liquid Limit, Plastic Limit and Plasticity Index of Soils," indicates that the plasticity index is 4 through 10.

Lime-treated aggregate must marinate at least 1 day and no more than 60 days before use in HMA production. If rain is anticipated during the marination period, the contractor must protect the stockpiles. If the lime-treated aggregate has been exposed to rain, inspect the stockpiles. If aggregate lime coating has been damaged significantly, reject the aggregate. If only the outside surface of the stockpile has been damaged, require that the contractor remix the piles to redistribute the lime.

4-3902H (3) Liquid Antistrip Treatment

This treatment process requires the addition of the liquid antistrip to asphalt binder during HMA production.

Before production begins, take the following steps related to liquid antistrip treatment:

- Verify with the district weights and measures coordinator that the proposed liquid antistrip metering device and storage tank are Caltrans-qualified under the *MPQP*.
- Verify that the liquid antistrip is the same type and brand as shown on the accepted job mix formula.

4-3902I Prepaving Conference

Before work begins, the resident engineer holds a prepaving conference with the contractor to discuss HMA production and placement:

- Review the accepted job mix formula and check that Form CEM-3513, "Caltrans Hot Mix Asphalt Verification," has been signed by Caltrans within the past 12 months.
- Confirm that the accepted job mix formula has not changed.
- Discuss with the contractor what atmospheric and pavement temperatures the contractor has chosen that would result in a notification to stop production of HMA at the plant.
- Discuss method of incorporating WMA technology.
- Discuss with the contractor pavement areas to receive tapered edge and construction methods to be used.
- Discuss with the contractor pavement areas to receive shoulder backing and construction methods to be used.
- Verify if the contractor intends to use a tapered notch wedge device to construct the longitudinal joint. The tapered notch wedge can be used only on a divided highway and when the special provisions do not include a requirement that

adjacent traveled-way lanes be squared up from 5 feet to 10 feet at the end of each work shift.

- Discuss the minimum taper requirements for temporary joint tapers when a transverse joint greater than 0.04 foot cannot be avoided before opening to traffic.
- Ensure that the type of spreading equipment proposed by the contractor has the necessary attributes for the project. Permit wing-type spreading equipment only for areas not requiring an asphalt paver, and then only for such widths, typically less than 5 feet, that will not adversely affect the surfacing on the traffic lane.
- Ensure that rollers have the specified attributes. For method process, ensure that the specified number of rollers will be used based on the type of HMA being placed.

  Determine the frequency for density core sampling, at least once every 5 business days.
- Discuss the contractor's method to produce smooth pavement that meets the specifications.
- If cold planing is required, discuss the requirement that the cold planer be equipped with automatic controls, such as a ski device or averaging system. Discuss what practices will be used to promote a smooth cold-planed surface. When plans call for cold planing to match existing cross slope grader to a fixed depth, encourage the contractor to use best cold planing practices for promoting smoothness, which includes operating the cold planer using automatic controls tied to a ski device or to an averaging system, rather than only using a joint matcher.
- Discuss how smoothness quality control will be accomplished.
- Discuss the requirements for submitting smoothness submittals to the secure file sharing system at smoothness@dot.ca.gov.
- If the contract includes prepaving grinding:
  - Emphasize that prepaving grinding work is only applicable to existing asphalt concrete surfacing that has not been cold planed or replaced.
  - Remind the contractor that replaced asphalt concrete surfacing must meet the 12-foot straightedge specification. Corrective grinding on replaced asphalt concrete surfacing is part of the replace asphalt concrete surfacing work, not part of the prepaving grinding work.
  - Discuss how correction locations will be determined, whether the contractor will be using ProVAL smoothness assurance module or some other method. Refer to Section 4-3602C, "Pavement Smoothness," of this manual, for additional information on ProVAL computer software.
  - Discuss how locations identified in inertial profiles will be located in the field. Will the contractor be laying out locations using distance measurement instrumentation (DMI) tied to the beginning of the project, DMI measurement from intermediate fixed locations tied to "events" in the inertial profile, inertial profile stationing converted to GPS coordinates, or a combination of GPS and DMI methods?
  - Determine if the contractor plans to perform inertial profiling early as a means to control quality of smoothness or when the paving is completed.

- In areas where smoothness must meet the 12-foot straightedge requirement, discuss if the contractor will have a straightedge available, and who on the paving crew is responsible for using it.
- Suggest use of a rolling straightedge device for comparison in ProVAL, which will assist in identifying locations that should physically be checked with a 12-foot straightedge.
- Discuss contingency plans to minimize or eliminate delamination of cold-planed surfaces. Discuss what criteria and methods will be used to identify and record locations where the contractor and Engineer mutually agree may reflect through to the final surface.
- Discuss the contractor's plans for determining where corrective grinding will occur on the final surface.

- Discuss the contractor's plans for scheduling paving after cold planing to meet the time requirements specified in Section 39-3.04, "Cold Planing Asphalt Concrete Pavement," of the *Standard Specifications.*
- Discuss the contractor's plans for ensuring that material transfer vehicles (MTVs), or other types of heavy paving equipment that exceed the California Vehicle Code, Division 15, weight limits for vehicles on highways, are prevented from crossing a structure without written authorization. The authorization may be from the Transportation Permit Office or from the Engineer. Requests for authorization are subject to a 15-day review.
- Determine the type of tack coat the contractor has chosen to use, based on expected atmospheric conditions, tack coat material type availability, and local experience. Also, discuss the contractor's proposed application rates and how far in advance of the paving operation the tack coat will be placed. For additional information about tack coats and the website for *Tack Coat Guidelines*, refer to Section 4-3908A, "References," of this manual, and to the "Minimum Spray Application Rates of Original Undiluted and Diluted Emulsions" at:

  http://www.dot.ca.gov/hq/construc/hma/
- Emphasize that public traffic will not be allowed on pavement with tack coat and discuss how the contractor will apply additional tack coat to damaged areas immediately before placing HMA.
- Confirm that the trucks used for tack coat application have the specified attributes. For distributor attributes, refer to Section 93, "Liquid Asphalts," of the *Standard Specifications*.

Discuss:

- The contractor's quality control plan.
- The contractor's communication between the quality control manager and production and placement personnel.
- How the contractor will transmit required quality control testing reports.
- How the resident engineer will transmit required acceptance test results.

With the contractor, discuss who has responsibility in the field to:

- Monitor HMA temperatures

- Monitor atmospheric temperatures
- Monitor pavement temperatures
- Direct HMA truck drivers when loads must be tarped
- Define the length of windrow, if applicable
- Direct the HMA plant to slow down or stop loading trucks because of truck queuing
- Stop production when two consecutive quality control test results do not comply with the specifications

Discuss the type of action that will be taken by the contractor when:

- The HMA plant shuts down unexpectedly.
- The HMA paver breaks down.
- The HMA compaction equipment breaks down.
- Atmospheric or pavement temperature drops.

Ensure that the contractor has coordinated any necessary cold-planing operations; signs for construction area drop-offs, shoulder, and uneven pavement; and temporary pavement delineation, if applicable.

Review with the contractor the production start-up evaluation requirements for the first 750 tons of mix. Except for AASHTO T 324 (Modified), "Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA)," and AASHTO T 283, "Standard Method of Test for Resistance of Compacted Mixtures to Moisture-Induced Damage," test results, the contractor and Engineer must report test results within 5 business days of sampling, and for AASHTO T 324 (Modified) and AASHTO T 283 test results within 15 days of sampling.

4-3902J Paving Operations

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

- Review "Placing Hot-Mix Asphalt" in *Construction of Hot Mix Asphalt Pavements (Manual Series No. 22)*, published by the Asphalt Institute.
- Ensure that the subgrade has been prepared as specified. If any HMA leveling is required to smooth out an existing irregular surface, inform the contractor and determine the method of payment.
- Determine if crack sealing or digouts (removing and replacing existing pavement) is required to repair small areas. When contract items are not included, inform the contractor of any extra work for crack sealing or digouts. Refer to *Maintenance Technical Advisory Guide* for more information about crack sealing or digouts. The manual is available at:

  http://www.dot.ca.gov/hq/maint/MTA_GuideVolume1Flexible.html
- Review the accepted contractor's quality control plan.
- If resurfacing under structures will result in reduced clearance, follow the procedures in Section 3-703B, "Permanent Clearance and Bridge Permit Rating Changes," of this manual.

- Verify that personnel who will be taking mat acceptance samples and witnessing core sampling are qualified for California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections."
- Coordinate requests for authorization to cross a structure with a vehicle exceeding the weight limits established by California Vehicle Code, Division 15, through the project's structure representative. If the project has not been assigned a structure representative, coordinate the review through the bridge construction engineer. Structure construction personnel will review the overload proposal in accordance with the *Bridge Construction Records and Procedures* manual, Vol. 2, Bridge Construction Memo 150-1.0, "Weight Overload Guidelines for Bridges on Construction Projects."

4-3903 During the Course of Work

4-3903 During the Course of Work

4-3903A General

Quality production and placement of HMA requires a quality assurance process that consists of quality control by the contractor and acceptance by Caltrans. While some of these functions may seem redundant, each serves a separate purpose.

4-3903A (1) Quality Control

Quality control, sometimes called process control, is the testing performed by the contractor to ensure that the HMA being produced or placed meets the requirements of the specifications. Quality control testing of aggregates and HMA quality characteristics must be performed at a specified minimum frequency. Sampling should be performed at locations such as plant, windrow, or mat to ensure that quality control test results are not influenced by sampling location. Sampling must be random and must not be split samples of Caltrans' random acceptance samples.

The contractor will want to know early on how closely the contractor's quality control test results replicate the quality acceptance test results. The job mix formula verification and production start-up evaluation both offer early opportunities for the contractor to compare quality control test results with acceptance test results. Unlike the comparison of contractor's quality control and Caltrans' acceptance test results during production and placement, the verification and production start-up evaluation test results are on the same split samples. Therefore, the results are a direct measure of the variation between the laboratories.

The contractor performs quality control testing for asphalt rubber binder, gradation, and fabric content of crumb rubber modifier; aggregate and reclaimed asphalt pavement moisture; and reclaimed asphalt pavement gradation and binder contents.

4-3903A (1a) Hot Mix Asphalt Density

The contractor is required to conduct quality control testing on a regular basis. The specifications give required intervals in the quality control table of the specifications. If the total layer thickness is at least 0.15 foot, the contractor is required to conduct density testing. The contractor is required to perform quality control density testing using a nuclear gauge that has been calibrated to cores taken on the first day of production. If the total layer thickness is less than 0.15 foot, the contractor must follow the requirements of the method process listed in Section 39-2.01C(15)(b), "Method Compaction," and the "Construction" sections of the applicable type of HMA; 39-

2.02C for Type A, 39-2.03C for RHMA-G, or 39-2.04C for OGFC, of the *Standard Specifications*.

4-3903A (1b) Method Process

The contractor must comply with the specifications for placement such as temperature and roller requirements. Depending on the type of HMA, the minimum compaction's temperatures may be reduced when WMA additive technology is used, but not when WMA water injection technology is used. Caltrans' inspection process should include documenting and reporting surface temperatures and roller passes to ensure compaction operations meet the method specification requirements.

4-3903A (2) Department Acceptance

Department acceptance of HMA consists of material acceptance testing and both plant and paving inspection. The resident engineer is responsible for coordinating necessary field personnel and taking contract administration action when required. Ensure that Caltrans personnel who sample or test have met the requirements of the Caltrans Independent Assurance Program and are qualified to perform the sampling or testing.

Material acceptance sampling frequencies and material acceptance testing frequencies, shown in Table 6-1.13 of this manual, are not the same. Caltrans limited the risk to the contractor by specifying in Section 39, "Asphalt Concrete," of the *Standard Specifications* that no single test result may represent more than the smaller of 750 tons or one day's production, whichever is less, except AASHTO T 283 and AASHTO T 324 (Modified). Therefore, during the course of the work it is important to split all acceptance sample materials. Use one sample for acceptance testing and one for dispute resolution.

Test the samples in a field construction laboratory, or ship them to a district materials laboratory to be tested at the minimum testing frequency shown in Section 6-1, "Sample Types and Frequencies," of this manual. Store the remaining samples in case additional acceptance testing is necessary.

The contractor may request that the resident engineer split acceptance samples. If requested, split acceptance samples into four parts: test one, provide one to the contractor, and store two for dispute resolution.

Quality assurance must be performed regularly and the material acceptance test processed in a timely fashion. The resident engineer must make every effort to conduct the necessary inspection, ensure that sampling and testing staff are available, and have samples processed as quickly as possible so acceptance decisions can be made while there is time to make corrections.

Ship or transport acceptance samples to testing laboratories within the timeframes provided in Section 6-102C, "Acceptance Samples and Tests," of this manual. Ensure the proper chain of custody is maintained throughout the process, including delivery to and receipt from a commercial shipping service. Use Form CEM-3701, "Test Result Summary," to summarize acceptance test frequency and results on each material. Use this form to record the dates samples were taken, shipped to laboratory, test result received from laboratory, and the contractor notified of test results. Monitor timeliness of material testing turnaround against Table 6-1.2, "Time Required for Materials Acceptance Tests," of this manual and ensure corrective actions are taken and documented where deficiencies are encountered.

Notify contractor of all acceptance test results within 2 business days of receipt from laboratory.

Quality pavement is obtained by strictly enforcing the specifications and notifying the contractor of failed tests as soon as possible. When a single quality assurance test for a single quality characteristic indicates that material does not comply, follow guidance in Section 4-3904A (1) "Acceptance Test Results Outside Specified Limits."

Except for smoothness, when two consecutive acceptance tests for a single quality characteristic do not comply with the specifications:

- Immediately notify the contractor to stop production.
- Ensure that the contractor takes corrective action.

After the corrective action has been taken and the contractor has quality control test results showing conformance, witness the contractor taking and splitting samples (into four parts) for the resident engineer's tests. The contractor must test one part for compliance with the specifications and submit three parts to the resident engineer who tests one part for compliance with the specifications and stores two parts.

4-3903A (3) Dispute Process

A dispute resolution process for acceptance tests is specified in Section 39-2.01A(4)(i)(iv), "Dispute Resolution," of the *Standard Specifications*.

A contractor disputing the acceptance test results must notify the resident engineer within 5 business days of receiving a test result. Caltrans may also dispute the contractor's test results. To resolve disputed test results, the specifications require the use of an independent third party to perform referee testing. If the contractor disputes Caltrans' acceptance test results, and the resident engineer is satisfied with acceptance test results, before using the independent third party, suggest that the contractor test one of the split samples from the material in question. If the contractor agrees to perform this test, it would be good practice to have a tester or a district independent assurance representative witness the contractor's testing.

The specifications require the testing of split samples of disputed material. If split samples of the material tests being disputed are not available, the third party uses any available material representing the disputed HMA for evaluation. Caltrans must retain possession of the split samples. Caltrans may discard stored split samples 5 days after the contractor has received the associated acceptance test results.

4-3903B Production Start-Up Evaluation

Section 39-2.01A(4)(h)(v), "Production Start-Up Evaluation," of the *Standard Specifications* applies to all construction processes. The production start-up evaluation allows:

- The contractor to compare quality control test results against Caltrans acceptance test results on split sample material.
- Caltrans to verify early in the project that the aggregate properties and HMA comply with the job mix formula and specifications.
- Both parties to examine results of tests performed on split sample material.

Split samples are used only for job mix formula verification, for production start-up evaluation, and when the contractor is demonstrating compliance with the specifications if production has been stopped for out-of-specification material. In all

other circumstances, acceptance samples must always be taken independently of contractor's quality control samples.

4-3903C Plant Operations

Before shift production begins, the plant inspector generally takes the following steps related to HMA plant operations:

- Verifies that the security seal has not been tampered with. If tampering is suspected, contact the district weights and measures coordinator.
- Ensures that the portioning equipment is interlocked as specified in the *MPQP*.
- Ensures that the job mix formula being used by the contractor is specific to the project and that no changes have been made to:
    1. Target asphalt binder percentage
    2. Asphalt binder supplier
    3. Asphalt rubber binder supplier
    4. Component materials or percentage of any component material used in asphalt rubber binder
    5. Combined aggregate gradation
    6. Aggregate sources
    7. Substitution rate for reclaimed asphalt pavement aggregate of more than 5 percent
    8. Any material in the job mix formula
- Notifies the resident engineer if there are changes in the job mix formula and asks if a new job mix formula will be required from the contractor before production can be started.
- Makes certain that the asphalt binder supplier is on the Caltrans approved supplier list or that asphalt binder samples have been taken from each truckload and tested in accordance with Section Q, "Requirements For Suppliers Supplying Asphalt Without a Certificate of Compliance," in the *Certificate Program for Suppliers of Asphalt*. Notifies the contractor and resident engineer if asphalt binder testing has not been completed for a supplier not on the approved supplier list.
- Ensures that aggregate is stored separately, according to proposed sizes by comparing the material from each bin with Chapter 2, Section II-E, "Aggregate Storage," of the *MPQP* manual. If any segregation, degradation, or intermingling occurs, require that the contractor empty the storage facility and waste or re-screen the material.
- Ensures that supplemental fine aggregate remains dry and is stored separately as specified in *MPQP* guidelines.

During production, the plant inspector generally takes the following steps related to HMA plant operations:

- Records daily HMA plant production information on Form CEM-3501, "Hot Mix Asphalt Production Report."

- Documents on Form CEM-4601, "Assistant Resident Engineer's Daily Report," additional information about plant production, including instructions to contractor's personnel.

The plant inspector performs the following additional duties:

1. Ensures that contractor personnel who sample or witness the contractor sampling at the hot mix asphalt plant are qualified to perform California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections."
2. Obtains HMA samples for acceptance testing every 750 tons and tests at least once for every 5 samples or a minimum of once per day. Material samples must be split into two parts, one sample for potential acceptance testing and one for potential dispute resolution testing.
3. Samples for aggregate gradation at least once for every 750 tons, and tests at least once for every 5 samples or a minimum of once per day. Material samples must be split into two parts, one sample for potential acceptance testing and one for potential dispute resolution testing.
4. Monitors the contractor's HMA plant inspection for compliance with the contractor's quality control plan. Notifies the resident engineer of any noncompliance issues.

4-3903C (1) Antistrip Treatment of Aggregates and Hot Mix Asphalt

The HMA may be sensitive to moisture damage and may require one of the following antistrip treatments:

- Hot mix asphalt aggregate treatment—slurry method
- Hot mix asphalt aggregate treatment—dry lime method
- Liquid antistrip method

4-3903C (1a) Marinated Lime-Treated Aggregate

Aggregate that has been lime treated and stockpiled for marination is handled in the HMA production process in the same manner as untreated aggregates. Refer to Section 4-3902H (1), "Lime Treatment of Aggregates," of this manual for lime treatment plant operation requirements.

For aggregates that have been lime treated and stockpiled:

- Verify that aggregate quality characteristic acceptance samples and tests were performed and the aggregate meets the contract specifications.
- Do not perform sampling and testing for sand equivalent or aggregate quality characteristics as shown in Section 4-3903C (3), "Hot Mix Asphalt Production," of this manual.
- Ensure that the lime marination was performed within the past 60 days.

Reclaimed asphalt pavement used in the production of HMA does not need to be lime treated.

4-3903C (1b) Hot Mix Asphalt Aggregate Treatment—Slurry Method

If an HMA production facility is using this process without marination, contact the METS Office of Flexible Pavement for assistance.

4-3903C (1c) Hot Mix Asphalt Aggregate Treatment—Dry Lime Method

The quality characteristic acceptance test limits for aggregate properties are based on untreated aggregates. Aggregate testing must be performed on aggregate samples taken before lime treatment.

During lime treatment, the plant inspector takes the following steps:

- Obtain aggregate samples from stockpiles or from the aggregate belts before lime treatment for moisture content and sand equivalent testing at the frequency shown in Table 6-1.13 of this manual. Sample aggregate in accordance with California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections."
- Test aggregate samples for sand equivalent at the frequency shown in Table 6-1.13 of this manual. If the aggregates are not combined before sampling, combine aggregate from individual stockpiles or belts in the job mix formula proportions to test for sand equivalent.
- It is good practice to test aggregate samples for moisture content in accordance with AASHTO T 255, "Standard Method of Test for Total Evaporable Moisture Content of Aggregate by Drying," or AASHTO T 329, "Standard Method of Test for Moisture Content of Hot Mix Asphalt by Oven Method," because moisture influences proportioning. For lime slurry aggregate treatment, the plant inspector should confirm that the contractor is performing sampling and testing for moisture content at least once every 2 hours of treatment. For lime-treated aggregate, the plant inspector should confirm that the contractor is performing sampling and testing for moisture content at a frequency shown under the quality control section applicable to the type of HMA.

  Compare the contractor's aggregate moisture quality control test results against the Caltrans test results. Notify both the contractor and the resident engineer if the test results are significantly different.

  Verify that the contractor is adjusting the HMA plant controller based on the contractor's aggregate moisture quality control test results.
- Obtain aggregate samples from stockpiles or aggregate belts before lime treatment in accordance with California Test 125. Sample aggregates at the frequency shown in Table 6-1.13 of this manual for aggregate acceptance testing.
- Test aggregate for acceptance quality characteristics at the frequency shown in Table 6-1.13 of this manual for the following aggregate acceptance tests:
  1. Los Angeles Rattler
  2. Percent of crushed particles coarse aggregate
  3. Percent of crushed particles fine aggregate
  4. Fine aggregate angularity
  5. Flat and elongated particles
  6. Other aggregate properties specified in the project special provisions if applicable

If samples will be shipped to a district materials laboratory or to a construction laboratory, complete Form TL-0101, "Sample Identification Card," following the

instructions in the book and the information in Section 6-103, "Field Sampled Material Identification for Testing," of this manual. Record the type of mix, the HMA producer, and the producer mix identification number. Check the box on the sample TL-0101 for acceptance test. Ship the samples to the district materials laboratory or field construction laboratory for testing. If any test results exceed the specified limits, the testing laboratory will immediately notify the resident engineer.

Ensure that aggregate treatment is adequate by witnessing contractor quality control testing, and that the contractor enters the treatment data specified in the special provisions into a log. For each day of aggregate lime treatment, obtain the treatment data log electronically for the resident engineer's project file.

4-3903C (1d) Liquid Antistrip Treatment

Ensure that data required in the liquid antistrip treatment section of the special provisions is entered into the production unit's treatment data log and submitted in the required format.

For each day of antistrip treatment, obtain the treatment data log electronically for the resident engineer's project files.

4-3903C (2) Production Start-Up Evaluation

A production start-up evaluation occurs within the first 750 tons produced on the first day of HMA production. The evaluation is also required when production has stopped for more than 30 days and if a new job mix formula is being used.

The plant inspector generally takes the following steps related to a production start-up evaluation:

- During the first 750 tons of production, witnesses the contractor sampling aggregate, asphalt binder, and reclaimed asphalt pavement on the first day of production in accordance with Section 39-2.01A(4)(h)(v), "Production Start-Up Evaluation," of the *Standard Specifications* and California Test 125, "Sampling Highway Materials and Products Used in the Roadway Structural Sections." The inspector retains three split samples for testing and dispute resolution as described earlier.
- Labels each HMA sample with enough information to identify the exact location. Refer to Section 4-3903C (3), "Hot Mix Asphalt Production," of this manual.
- Ships one sample of asphalt binder to METS for testing as detailed in Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual, noting that it is a production start-up acceptance test.
- Immediately tests one aggregate sample for aggregate gradation and sand equivalent. If reclaimed asphalt pavement is used, tests reclaimed asphalt pavement sample and determines the aggregate gradation in accordance with Lab Procedure 9, "Hot Mix Asphalt (HMA) Using Up to 15% Reclaimed Asphalt Pavement (RAP)," notifying the contractor of test results. The procedure is found at:

  http://www.dot.ca.gov/hq/esc/Translab/ormt/fpmlab.htm

- When test results fall outside the specification limits, the inspector notifies the contractor, and requires and confirms that the contractor takes corrective action.

If aggregate gradation or sand equivalent test results fall outside the specification limits, notify the resident engineer immediately.

- Tests one aggregate sample for aggregate acceptance quality characteristics.

  For samples that will be shipped to the district material laboratory or field construction laboratory for testing, complete Form TL-0101, "Sample Identification Card," following the instructions printed in the form booklet and the information in Section 6-103, "Field Sampled Material Identification for Testing," of this manual. Record the type of mix, the HMA producer, the producer's mix identification number, and the production tonnage that this sample represents.

  Check the box on the sample TL-0101 for acceptance test, marked "Priority," and include "Production Start-Up Evaluation Test" under "Remarks." Under "Remarks," identify the tests to be performed:

  1. Los Angeles Rattler
  2. Percent of crushed particles coarse aggregate
  3. Percent of crushed particles fine aggregate
  4. Fine aggregate angularity
  5. Flat and elongated particles
  6. Other aggregate properties specified in the project special provisions, if applicable

  The specifications require 3 days for test result turnaround, so samples must be shipped immediately. If any tests results fall outside the specified limits, the testing laboratory will immediately notify the resident engineer.

4-3903C (3) Hot Mix Asphalt Production

During production, the plant inspector generally takes the following steps related to HMA plant operations:

- Observes the overall plant operation to ensure the contractor controls dust and smoke. Requests that the contractor corrects any obvious violation and ceases operation if necessary to prevent damage to HMA mixture.
- Obtains aggregate samples and performs AASHTO T 255, "Standard Method of Test for Total Evaporable Moisture Content of Aggregate by Drying," or AASHTO T 329, "Standard Method of Test for Moisture Content of Hot Mix Asphalt by Oven Method."
- Confirms that the contractor is performing sampling and testing for moisture content at the frequency shown under the quality control section of the *Standard Specifications* applicable to the type of HMA. Because moisture influences proportioning, it is good practice to test both aggregate and reclaimed asphalt pavement for moisture content.
- Compares the contractor's quality control test results with Caltrans test results and notifies both the contractor and resident engineer if the test results are significantly different.
- Verifies that the contractor is adjusting the HMA plant controller based on the contractor's aggregate moisture quality control testing.

- Obtains aggregate samples for field testing for aggregate grading and sand equivalent at the frequency shown in Table 6-1.13 of this manual. Tests aggregate samples before lime treatment for testing sand equivalent. (Reclaimed asphalt pavement does not need to be sampled for sand equivalent.) Do not use aggregate samplers that do not safely produce a manageable sized sample.
- Labels each aggregate sample with the contract number, date, type of mix, aggregate gradation (for example, 1/2 inch), aggregate source, HMA producer, and producer's mix identification number. Indicates the number of tons produced when the sample was taken.
- Tests aggregate samples for aggregate gradation and sand equivalent at the frequency shown in Table 6-1.13 of this manual. If reclaimed asphalt pavement is used, determines aggregate gradation in accordance with Lab Procedure 9, "Hot Mix Asphalt (HMA) Using Up to 15% Reclaimed Asphalt Pavement (RAP)." Lab Procedure 9 is available at:

  http://www.dot.ca.gov/hq/esc/Translab/ormt/fpmlab.htm
- Notifies the contractor of aggregate gradation and sand equivalent test results, and confirms that any required plant adjustment has been made to correct for out-of-specification aggregate gradation.
- If aggregate gradation or sand equivalent test results fall outside the specification limits, notifies the resident engineer immediately. If the contractor makes significant or numerous adjustments in bin aggregate proportions, increase the frequency of aggregate gradation testing.
- Obtains aggregate samples for aggregate acceptance quality characteristics at the sampling frequencies shown in Table 6-1.13 of this manual and sample in accordance with California Test 125. If lime-treated, aggregate samples must be taken before lime treatment for testing aggregate properties. Reclaimed asphalt pavement does not need to be sampled.
- Labels each aggregate sample with the contract number, date, type of mix, aggregate gradation, aggregate source, HMA producer, and producer's mix identification number. Indicate the number of tons produced when the sample was taken. Refer to the guidance in Section 4-3903D (5), "Sampling and Testing Hot Mix Asphalt," of this manual. Tests aggregate at the frequency shown in Table 6-1.13 of this manual. For samples that will be shipped to the district material laboratory or field construction laboratory for testing, completes Form TL-0101, "Sample Identification Card." Follows the instructions printed in the book that contains the form and the information in Section 6-103, "Field Sampled Material Identification for Testing," of this manual. Records the type of mix, the HMA producer, and the producer's mix identification number. Checks the acceptance tests box on the TL-0101. Under "Remarks," identifies the tests to be performed:

  1. Los Angeles Rattler
  2. Percent of crushed particles coarse aggregate
  3. Percent of crushed particles fine aggregate
  4. Fine aggregate angularity
  5. Flat and elongated particles

6. Other aggregate properties specified in the project special provisions, if applicable

If any test results exceed the specified limits, the materials laboratory will immediately notify the resident engineer.

If any single quality characteristic has two consecutive acceptance or quality control tests not in compliance with the specifications, ensure that before resuming production and placement of HMA on the project, the contractor:

1. Stops production
2. Notifies the resident engineer
3. Takes corrective action
4. Provides a split sample for the engineer's testing
5. Demonstrates compliance with the specifications before resuming production and placement of HMA on the project

- Samples asphalt binder at the frequencies shown in Section 6-1, "Sample Types and Frequencies," and in accordance with Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual, fills out Form TL-0101, before shipping samples to METS for testing.
- Ensures asphalt binder quality by following Section 4-92, "Asphalt Binders," of this manual.
- For asphalt rubber binder components:

  1. Collect certificates of compliance for each truckload of crumb rubber modifier and asphalt modifier.
  2. Collect a "Buy America" certificate for each truckload of crumb rubber modifier. Refer to Section 3-604, "Buy America," of this manual for more information.
  3. Sample asphalt modifier binder at the frequencies shown in Section 6-1, "Samples Types and Frequencies," of this manual. Ship to METS as detailed in Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual.

- Ensure that the temperatures of the asphalt binder, aggregate, and HMA do not exceed the limits specified in Section 39-2.01B(8), "Hot Mix Asphalt Production," of the *Standard Specifications*.
- Ensure that the batch size and feed rates do not exceed the mixing capacity range used during plant dynamic testing.
- HMA must be tested for mix moisture content from samples taken behind the paver in accordance with AASHTO T 329, "Standard Method of Test for Moisture Content of Hot Mix Asphalt by Oven Method." However, the HMA can be sampled and tested at the plant to determine if sampling and testing at the mat are necessary by performing the informal test described below. If HMA samples taken at the plant meet the mix moisture acceptance requirements, samples taken behind the paver will also meet the specification requirement.

  To perform an informal, quick moisture content check at the plant, use the following procedure:

1. Have the contractor take a shovelful of aggregate from the dryer's discharge chute
2. Notice any steaming or dark spots on the aggregate
3. Pass a cool, shiny, clean mirror, spatula, or 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 if moisture is seen

This informal method cannot be used for acceptance.

- Observe production to ensure the specified HMA mixture conforms to project specifications and the *MPQP*.

4-3903C (3a) Batch Plants

Do not approve a shorter mixing time than was used during the plant dynamic testing conducted for plant acceptance, in accordance with Chapter 3, Section II-B, "Dynamic Testing," of the *MPQP* manual.

Ensure that the automatic batching equipment functions within the limits specified in Chapter 2, Section II-F, "Batch Mixing HMA Plants," of the *MPQP* manual.

4-3903C (3b) Continuous Mixing Plants

For continuous mixing plants (dryer drum or dryer drum pugmill), ensure that the following are operating:

1. Vibrating unit on the fine bins
2. Low-level and no-flow interlock systems for aggregate and reclaimed asphalt pavement feeder bins
3. No-flow interlock system for asphalt binder storage and feed system
4. Automatic plant controller
5. Dust control systems
6. Segregation devices at HMA storage

The mixing time depends on the length of the mixing area and the rate of drop in the dryer drum during mixing. The most efficient pugmill mixing occurs when the material level remains at the top of the paddles along the length of the mixer. For best results, feeding must be continuous and uniform. Do not approve a production rate less or greater than the range of production used during the plant dynamic testing conducted for plant acceptance in accordance with Chapter 3, Section II-B, "Dynamic Testing," of the *MPQP* manual.

4-3903C (4) Plant Weighing Systems

Observe the operation of all weighing systems. Whenever scales and meters seem inaccurate, contact the district weights and measures coordinator for further assistance. Be aware of scale and meter security seals and set points.

For batch plants:

- Ensure that 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, such as a silo, is used for HMA, 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 binder scales frequently to ensure that they return to within zero tolerance limits and that the scale lever systems or load cells move freely.

When plants are used for only one project, the accuracy of meter-driven devices that proportion asphalt binder can be checked. To do so, compare meter totalizer readings with asphalt binder tank stabbings and, in conjunction with an onsite vehicle scale, with the combined aggregate totalizer readings. Take into account any wasted mix or individual ingredients wasted after proportioning.

4-3903C (5) Hot Mix Asphalt Storage

Ensure that HMA storage silos are in accordance with Chapter 2, Section II-J, "HMA Storage," of the *MPQP* manual.

4-3903C (6) Hot Mix Asphalt Transporting

Before the trucks are loaded, ensure the absence of an excessive amount of parting agent or other contaminating material. Such material is excessive when it forms pools. Diesel or other petroleum-based products are prohibited from being used as parting agents.

After the trucks are loaded, be sure the HMA mixture is uniform (that is, aggregate is coated with asphalt binder and load is not segregated). Notify the resident engineer if loads need to be rejected based on nonuniformity of HMA mixture.

Ensure that rubberized HMA gap-graded and open-graded friction course loads are completely covered with tarpaulins when the atmospheric temperature is below 70°F. Tarps are not required if the time from discharge to truck until transfer to the paver's hopper or to the pavement surface is less than 30 minutes. If the trucks are tarped, record that information on Form CEM-3501, "Hot Mix Asphalt Production Report."

4-3903D Paving Operations

During HMA placement, the paving inspector generally takes the following steps:

- Record daily HMA placement information on Form CEM-3502, "Hot Mix Asphalt Placement Report," and additional information, including instructions to contractor's personnel, on Form CEM-4601, "Assistant Resident Engineer's Daily Report."
- Refer to "Placing Hot-Mix Asphalt" in *Construction of Hot Mix Asphalt Pavements*, published by the Asphalt Institute, as guidance for best practices during HMA placement.

4-3903D (1) Atmospheric and Pavement Temperature

- Ensure that placement occurs within the specified temperature ranges by taking sufficient measurements of the atmosphere, pavement, and HMA. The temperature ranges vary based on the type of HMA being placed. For temperature range requirements, refer to Section 39-2.01C(1) "General," and 39-2.02C, "Construction," of the *Standard Specifications*.
- Record temperatures and the time taken on Form CEM-3502. Notify the contractor to stop HMA placement when temperatures are below specified limits.

4-3903D (2) Tack Coat

- Ensure that tack coat is applied to surfaces to be paved and at a high enough rate to meet the minimum residual rate specified. Use guidance in Section 4-9403, "During the Course of Work," of this manual to determine the minimum required spray rate. The contractor may request and the paving inspector authorize that the application of tack coat is waived between layers when both of the following conditions apply:

  1. The surface to be paved does not have a film of dust or clay
  2. The temperature of the surface to be paved is ≥140ºF

- If the contractor uses asphaltic emulsion that has not yet been tested by Caltrans, ensure each delivery of asphaltic emulsion includes a certificate of compliance that covers items described in Section 94-1.01C, "Submittals," of the *Standard Specifications*. Also, ensure each delivery includes a safety data sheet.

- Ensure that if asphaltic emulsion has been diluted, the contractor notifies the engineer of the dilution rate and includes the dilution information required by Section 39-2.01C(3)(f), "Tack Coat," of the *Standard Specifications*.

- For information on inspecting tack coat, refer to Section 4-3908A, "References," of this manual for the *Tack Coat Guidelines* website.

4-3903D (3) Transporting and Spreading

- Ensure that HMA delivery trucks have weighmaster certificates, and collect the certificates from the arriving trucks. If inspection resources are limited, collect weighmaster certificates on a daily basis. If HMA loads are rejected before placement, note on the back of the weighmaster certificate and Form CEM-4601, "Assistant Resident Engineer's Daily Report," why the HMA was rejected, such as cold mix, segregated mix, or contaminated mix.

- Watch for queuing of trucks to avoid excessive cooling of HMA mixture.

- Ensure the contractor uses a material transfer vehicle (MTV) when required. Section 39 of the *Standard Specifications* requires the use of an MTV on all types of HMA except Type A and minor HMA. The special provisions may require the use of MTVs for Type A.

- Ensure the contractor does not cross a structure with an MTV or other heavy paving equipment that exceeds the weight limits for a vehicle on highways as defined in California Vehicle Code, Division 15, without written authorization. Coordinate all requests for authorization with the project's structure representative. If the project has not been assigned a structure representative, coordinate the review through the bridge construction engineer.

- If windrowing is used, prevent overcooling of the HMA by not allowing excessive windrowing. When "method" compaction is used, ensure the windrow temperature does not fall below 260° or 250°F when WMA "additive" technology is used. In all cases, ensure the windrow length does not exceed 250 feet in front of the loading equipment.

  1. Windrow temperatures can be monitored with an infrared heat gun. Type A HMA may be rejected for not meeting minimum first coverage of breakdown surface temperature shown in Section 39-2.02C, "Construction," of the *Standard Specifications*. RHMA-G may be rejected for not meeting minimum

first coverage of breakdown surface temperature shown in Section 39-2.03C, "Construction," of the *Standard Specifications*.

2. When using a heat gun on a windrow, be aware that the instrument measures only surface temperature and that the interior of the windrow is hotter. When the HMA is run through the material transfer vehicle, paver, or both, the mat temperature may be above the minimum specified breakdown temperature.

3. If windrow temperatures are inadequate or visual inspection of the material in the windrow identifies segregation, poor mixing, or an over-rich mix, notify the contractor. If this material is incorporated into the paving, additional inspection and testing may be necessary to determine if the mix is acceptable.

- When HMA is placed against the edge of a longitudinal or transverse construction joint that is damaged or not placed in a neat line, ensure the contractor saw cuts or grinds the pavement straight and vertically along the joint and removes the extraneous material.
- Ensure that longitudinal joints between layers are offset 0.5 foot and that longitudinal joints on the finished surface correspond to the edge of traffic lanes.
- Ensure that the paver spreads the HMA at the required thickness and that lift thickness for Type A complies with Section 39-2.02C "Construction," of the *Standard Specifications*, and for HMA placed under method compaction specifications, the lift thickness does not exceed 0.25 foot.
- Ensure pavement thickness by comparing the HMA spread rate with the theoretical rate and, if necessary, order the contractor to make adjustments.

  Below is an example spread-rate calculation assuming 12 feet wide, 0.15-foot thickness, mix 150 pounds per cubic foot, and 16 tons shown on a weighmaster certificate.

  1. Calculate the weight of HMA 0.15-foot thick required for 1 square foot: 150 x 0.15 = 22.5 pounds per square foot
  2. Calculate the weight of HMA for 1 linear foot:

     22.5 x 12 = 270 pounds per linear foot
  3. Calculate the linear feet that can be covered by one truckload:

     (16 tons x 2,000 pounds per ton) ÷ 270 pounds per linear foot = 118.5 linear feet
  4. Calculate the linear feet covered by 1 ton of HMA: 2,000 pounds per ton ÷ 270 pounds per linear foot = 7.41 feet

  Check layer thickness and spread rate during placement, and check daily theoretical spread rate against the distance actually paved for the day. Note these on Form CEM-3502, "Hot Mix Asphalt Placement Report."

  Payment for HMA is based on the weight shown on the weighmaster certificate. Because of the high cost of HMA, it is important to monitor the spread rate so an excess of HMA is not placed and project funding is not exceeded.

4-3903D (4) Production Start-Up Evaluation Samples

Section 39-2.01A(4)(h)(v), "Production Start-Up Evaluation," of the *Standard Specification*s requires samples of HMA within the first 750 tons of production on the first day of production.

- Observe the contractor sampling from the mat behind the paver or other location approved by the resident engineer. The contractor must sample in accordance with California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections," and give the resident engineer three of the four split samples.
- Test the HMA production start-up evaluation sample for quality characteristics shown in Section 4-3903D (5), "Sampling and Testing Hot Mix Asphalt," of this manual.
- Test aggregate at the frequency shown in Table 6-1.13 of this manual. For samples that will be shipped to the district material laboratory or field construction laboratory for testing, complete Form TL-0101, "Sample Identification Card." Follow the instructions printed in the form booklet and the information in Section 6-103, "Field Sampled Material Identification for Testing," of this manual. Record the type of mix, the HMA producer, and the producer's mix identification number. Check the acceptance tests box on the TL-0101. Under "Remarks," identify the tests to be performed.

  Label each HMA sample with enough information to identify the exact location. Refer to the description in Section 4-3903D (5) of this manual.

  Check the box on TL-0101 for acceptance test marked "Priority," and include "Production Start-up Evaluation Test" under "Remarks." Also under "Remarks," list all required acceptance tests. The resident engineer must report the test results to the contractor within 5 business days of sampling. For AASHTO T 324 (Modified) and AASHTO T 283 test results, report test results within 15 days of sampling. To meet these timelines, ship samples immediately.

4-3903D (5) Sampling and Testing Hot Mix Asphalt

- Obtain split samples of HMA from the mat behind the paver or other location approved by the resident engineer, in accordance with California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections." Table 6-1.13 of this manual provides the frequency for sampling HMA mix.

  Label each HMA sample with the aggregate grading (for example, "1/2 inch"), asphalt binder target value, producer, and producer's mix identification number. Indicate both the stationing where the sample was taken and the area represented (for example, STA 100+50, NB, Lane 1, first layer). Also include the TL-0101 number if the sample is being shipped to the district material laboratory or field construction laboratory for testing. The label must have enough information to identify the exact location in the event the HMA is rejected and must be removed.
- Test aggregate at the frequency shown in Table 6-1.13 of this manual. For samples that will be shipped to the district material laboratory or field construction laboratory for testing, complete Form TL-0101, "Sample Identification Card." Follow the instructions printed in the form booklet and the information in Section 6-103, "Field Sampled Material Identification for Testing," of this manual. Record

the type of mix, the HMA producer, and the producer's mix identification number. Check the acceptance tests box on the TL-0101, and identify the acceptance tests to be performed under "Remarks." Include only the acceptance tests that you are requesting to meet the acceptance test frequency in Table 6-1.13 of this manual:

1. Asphalt binder content
2. Air voids content at N_{design}
3. Voids in mineral aggregate
4. Dust proportion (report only if an adjustment for asphalt binder content target value is less than ± 0.3 percent from optimum binder content).
5. Maximum theoretical density AASHTO T 209, Method A .
6. Hamburg Wheel Track (AASHTO T 324 (Modified)),
7. Moisture susceptibility (AASHTO T 283), both dry strength and wet strength.

If any single quality characteristic, except smoothness, has two consecutive acceptance or quality control tests not in compliance with the specifications, ensure that before resuming production and placement of HMA on the project, the contractor:

1. Stops production
2. Notifies the resident engineer
3. Takes corrective action
4. Provides a split sample for the engineer's testing
5. Demonstrates compliance with the specifications

4-3903D (6) Compaction

The contractor must comply with the method process in Section 39-2.01C(2)(c), "Method Compaction Equipment," and in Section 39-2.01C(15)(b), "Method Compaction," of the *Standard Specifications* if:

- The total paved thickness is less than 0.15 foot
- The HMA is used in:
  1. Asphalt concrete remove-and-replace areas (digout)
  2. Leveling courses
  3. Detours not included in final roadway prism
  4. Areas the resident engineer determines that conventional compaction and compaction measurement methods are impeded

4-3903D (6a) Method Process Compaction

For the method process HMA compaction:

- Use the MultiCool 3 program as a guide for determining the length of time available for achieving compaction, based on layer thickness, HMA temperature, existing pavement temperature, and atmospheric temperature. The MultiCool 3 program is available at:

  http://www.dot.ca.gov/hq/construc/hma/

- Ensure that:
    1. Specified equipment performs the compaction in the specified order.
    2. A required number of coverages is made for each compaction type (first coverage, breakdown, and finish).
    3. The HMA compaction is completed above the specified minimum temperature for each compaction type (first coverage, breakdown, and finish).
    4. The speed of the vibratory roller in miles per hour does not exceed the vibrations per minute divided by 1,000 when a vibratory roller is specified for compaction. When the HMA layer thickness is less than 0.08 foot, the vibratory roller must be in the off mode.
    5. The speed does not exceed 5 miles per hour when a pneumatic-tired roller is specified for compaction.
- Inspect the finished HMA surface for marks, tearing, and irregular texture that may be caused by segregated mix. Notify the contractor of noncompliant areas.

4-3903D (6b) Compaction Determination by Cores

When the total paved thickness is at least 0.15 foot:

- The contractor will determine the number of rollers and sequence necessary to meet the compaction requirements of the specifications.
- For quality control testing, the contractor must use nuclear gauges calibrated to cores under California Test 375, "Determining the In-Place Density and Relative Compaction of Hot Mix Asphalt Pavement Using Nuclear Gages," to determine the relative compaction.
- The contractor will obtain the cores for the resident engineer within 5 days of HMA placement. The resident engineer will use the cores to determine relative compaction.
    1. Randomly select core locations for every 250 tons of hot mix asphalt placed according to Part 3, "Section B, "Test Site Location," of California Test 375, "Determining the In-Place Density and Relative Compaction of Hot Mix Asphalt Pavement Using Nuclear Gages."
    2. Witness the contractor taking the cores, mark each core, and place the cores in a protective container before taking possession of the cores.
    3. Complete Form TL-0101, "Sample Identification Card,'' following the instructions printed in the form's book and the information in Section 6-103, "Field Sampled Material Identification for Testing," of this manual. Identify the stationing where they were taken and the area they represent, for example, "lane #1, first layer." Label the samples with enough information that the exact location HMA was placed can be identified if it is rejected and has to be removed. On Form TL-0101, check the box for acceptance test.
    4. Transport the cores to the district materials laboratory or construction field laboratory where they will be tested for in-place density (California Test 375), except the density of each core will be determined using AASHTO T 275, Method A, and the theoretical maximum density of the mix will be determined using AASHTO T 209, Method A.

4-3903D (7) Smoothness

Except for areas that must be tested for smoothness using a 12-foot straightedge, ensure the contractor tests all finish surfaces of HMA and the surface OGFC is being placed on, with an inertial profiler.

Refer to Section 36-3.01D(3)(b) "Smoothness," and Section 39-2.01A(4)(h)(ix) "Pavement Smoothness," of the *Standard Specifications* for surfaces that are to be measured with a 12-foot straightedge.

Where a total thickness of 0.20 foot or less of HMA is overlaid on an existing or replaced asphalt concrete surface, prior to overlaying, ensure the surface being overlaid meets the following:

1. Where existing asphalt concrete that has been cold planed, the 12-foot straightedge tolerance required by Section 39-3.04C(2) "Grade Control and Surface Smoothness," of the *Standard Specifications*.
2. Where existing asphalt concrete surfacing has been replaced, the 12-foot straightedge tolerance as required by Section 36-3.01D(4) "Department Acceptance," of the *Standard Specifications*.
3. Where existing asphalt concrete surfacing has not been cold planed or replaced, the inertial profile specification required by Section 39-2.01C(3)(e) "Prepaving Grinding," of the *Standard Specifications*.

   If notified by the contractor that an existing asphalt concrete surface, that has not been cold planed or replaced, cannot be corrected by grinding, respond within 5 business days with agreement or disagreement. Formulate the response based on field review of the defined locations and the inertial profile data.

- If in agreement that the contractor-defined areas cannot be corrected by grinding, ensure the response defines the lane, direction, and stationing limits where the 12-foot straightedge will be used in place of the inertial profiles to evaluate smoothness on the final HMA surface. The stationing in the response should correspond to the stationing in the contractor's inertial profile data file. Upon completion of the final HMA surface, use these stations to define "leave-out sections" in the profile data file covering the final HMA surface. It is recommended that in a duplicate inertial profile data file, these "leave-out sections" are converted to "generic sections." Use the ProVAL "rolling straightedge" comparison tool to assist in determining areas within the sections that should be checked with a 12-foot straightedge.
- If determined that the contractor-defined areas can be corrected by prepaving grinding, ensure the response defines the reasoning. The reasoning should include a ProVAL grind plan that demonstrates grinding can be performed to meet the requirements in Section 39-2.01C(3)(e), "Prepaving Grinding," of the *Standard Specifications*.

  If the project has inadequate funds to cover "prepaving grinding," contact the project manager to determine if additional funds are available to cover the additional work.

When HMA is placed within 3 feet of a permanent longitudinal construction joint, and there is no shoulder, the inertial profile of the adjacent wheel path should be measured, but inertial profile smoothness specifications on the wheel path are not to be enforced. Omission of this wheel path prevents the area of localized roughness of that wheel

path, and the mean roughness index of that portion of lane from being enforced. The area of localized roughness on the opposite wheel path is enforced. The smoothness of the wheel path located 3 feet from the longitudinal construction joint is enforced using the 12-foot straightedge specification. Measuring this wheel path with the inertial profiler allows ProVAL "rolling straightedge" comparison tool to be used to assist in locating areas that should be checked using a 12-foot straightedge.

Where testing with a 12-foot straightedge is required, the paving inspector checks pavement smoothness for acceptance by daily use of a straightedge to determine whether the finished surface complies with the tolerances specified in Section 36-3.01D(4), "Department Acceptance," of the *Standard Specifications*. These checks are in addition to checks the contractor is required to make and report in accordance with Section 36-3.01C(4) "Straightedge Measurements" of the *Standard Specifications.*

The paving inspector records straightedge measurements on Form CEM-4601, "Assistant Resident Engineer's Daily Report," and notifies the contractor of all out-of-specification areas.

Where smoothness is to be measured with an inertial profiler, the contractor must measure smoothness with an inertial profiler that meets the requirements of Section 36-3, "Pavement Smoothness," of the *Standard Specifications.* Follow the guidelines in Section 4-36, "Surfacing and Pavements—General," of this manual to ensure the inertial profiler, inertial profiler operator, submittals, and measurements meet the requirements of Section 36-3, "Pavement Smoothness," of the *Standard Specifications.*

Review Section 39, "Asphalt Concrete," of the *Standard Specifications* for the specified smoothness acceptance requirements. Analyze the contractor's inertial profiles using ProVAL software.

- Ensure prepaving grinding is performed only on existing asphalt concrete surfaces. Do not perform prepaving grinding work on existing asphalt concrete surfaces that are designated to be cold planed for mill and fill type paving, or in areas where existing asphalt concrete is designated to be replaced, or has been replaced, such as digouts. Corrective grinding work on replaced asphalt concrete surfacing is considered part of the replace asphalt concrete surfacing work and is not prepaving grinding work.
- Only perform prepaving grinding work when there is an existing bid item.
- Ensure the contractor's prepaving inertial profiles are used to determine where prepaving grinding work is required. Do not use profiles provided with the bid documents.
- Monitor the contractor's planning for prepaving grinding. Document any concerns you have regarding their methodology to achieve smoothness on an existing surface.
- After making prepaving grinding corrections, ensure the contractor takes and submits the corresponding inertial profiles. Require the contractor to repeat prepaving grinding and inertial profile submittal process, if necessary.
- Ensure the profile data file covering the surface of the completed prepaving grinding work defines lane sections where the final pavement surface will and will not have the smoothness specifications applied to it.

- Unless authorized by a change order, reject any HMA placed over an existing asphalt concrete surface that is required to, but does not meet the prepaving grinding smoothness requirements.
- Ensure prepaving profiles are taken before cold planing, and after replacing asphalt concrete surfacing.
- Once it has been determined that the contractor's prepaving grinding profiles meet the requirements, request Caltrans' inertial profiler be run to verify the profiles within 10 percent.

Ensure the final HMA surface meets the smoothness requirements.

When OGFC is being placed atop HMA, ensure the HMA surface meets the smoothness requirements prior to placing OGFC.

Retain one copy of profile information in ".ppf" ProVAL format.

4-3903D (8) Miscellaneous Areas and Dikes

The contractor must place HMA at miscellaneous areas and place dikes where shown on the plans and in accordance with Section 39-2.01B(11), "Miscellaneous Areas and Dikes," of the *Standard Specifications.*

4-3903D (9) Fog Seal Coat

The contractor applies fog seal coat to rumble strip ground areas and ground areas caused by smoothness correction grinding. If smoothness correction grinding is excessive, contact the Division of Maintenance, Office of Asphalt Pavements before allowing the contractor to fog seal within the traveled way.

The contract item for "fog seal coat" is used when fog seal must be applied to shoulders, miscellaneous areas, and dikes. Prohibit the contractor from applying fog seal coat to the traveled way.

Fog seal coat applied to ground in rumble strips and smoothness correction areas is not paid separately. Refer to Section 4-37, "Seal Coats," of this manual for additional information.

4-3903D (10) Open to Traffic

Do not allow traffic on new HMA until its mid-depth temperature is below 160ºF. The contractor may request in writing and the resident engineer authorize cooling of HMA Type A with water when rolling is complete.

For rubberized HMA, the contractor must spread sand at a rate of 1 to 2 pounds per square yard before opening to public traffic.

Temporary construction signing and temporary pavement delineation must be in place before opening to public traffic.

4-3903D (11) Temporary Transverse Joint Taper

Ensure that the contractor constructs a temporary joint taper between the existing pavement and any newly placed paving or cold planing area when a transverse joint greater than 0.04 foot cannot be avoided before opening to traffic.

Ensure the taper transition rates meet the requirements of Section 7-1.03, "Public Convenience," of the *Standard Specifications.*

Ensure the temporary joint taper surface is uniform and there is no more than a 0.02 foot gap from the lower edge of a 12-foot straightedge and the taper surface when placed parallel and perpendicular to traffic.

4-3903D (12) Existing Asphalt Concrete

Ensure the contractor makes a 2-inch deep saw cut along limits where asphalt is designated to be removed.

Ensure that the contractor schedules cold planing and placement of HMA in accordance with the timeline requirements covered by Section 39-3.04, "Cold Planing Asphalt Concrete Pavement," of the *Standard Specifications*.

Ensure cold planing equipment is equipped with automatic controls for the longitudinal grade and transverse slope of the cutter head. When cold planing, document contractor's methods to control grades of the cold planer.

Inspect the cold planed surface to ensure the planing operations result in a neat and uniform surface. Ensure the contractor replaces broken, missing, or worn teeth if the surface pattern indicates the surface is not uniform.

Inspect the cold planed surface for signs of delamination. To minimize the potential for differential compaction, if necessary provide direction to make minor adjustments or second passes to the cold planer to decrease potential for delamination. Document any locations you feel may cause smoothness issues if left unaddressed. Document any locations where you and the contractor disagree that delamination may be significant enough to cause differential compaction. Documentation should include high-resolution digital photographs or movies.

4-3904 Contract Administration

4-3904 Contract Administration

The resident engineer must review the notice of materials to be used, review and accept the job mix formula for HMA, review and accept the contractor's quality control plan when applicable, and verify Caltrans inspection reports and acceptance testing results for contract compliance. The resident engineer makes decisions regarding noncompliant materials and placement.

The Federal Highway Administration requires Caltrans to have a quality assurance program. As part of that program, this chapter defines quality assurance and contract administration requirements for HMA. Caltrans requires that these same quality assurance standards be met for state-funded projects. If the requirements are not met, there is a risk that federal funds will be withheld or withdrawn. The resident engineer takes the following steps for HMA contract administration:

- Verifying that Form CEM-3101, "Notice of Materials to Be Used," includes all component materials and materials sources used in HMA. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for details.
- Ensuring that the job mix formula for the project is verified and accepted before placement of HMA.
- Ensuring that the contractor's quality control plan is submitted and complies with the requirements of Section 39-2.01A(3)(c) "Quality Control Plan," of the *Standard Specifications*. The quality control plan must describe the organization and procedures used by the contractor to control HMA quality, sampling, implementing and maintaining quality, when corrective actions are needed based

on the contractor's action limit, implementing corrective actions, and method used to backfill core locations.

The submitted quality control plan must also address the following elements affecting HMA quality: aggregate, asphalt binder, additives, and production paving.

4-3904A Acceptance Testing and Evaluation

The resident engineer ensures that acceptance testing is performed at least at the minimum frequency shown in Table 6-1.13 of this manual. Record test results on Form CEM-3701, "Test Result Summary," so that minimum acceptance testing frequency is easily verified and documented.

The resident engineer ensures acceptance samples are shipped or transported to testing laboratories within the timeframes specified in Table 6-1.2 of this manual, except where specific sampling or test method requirements preclude doing so, for example, curing of specimens prior to transport. Test within 1 business day from sampling for projects within 50 miles of the testing laboratory or within 2 business days from sampling for projects more than 50 miles from the testing laboratory. Ensure the proper chain of custody is maintained throughout the process, including delivery to and receipt from a commercial shipping service. Use Form CEM-3701, "Test Result Summary," to summarize acceptance test frequency and results on each material. Use this form to record dates for sampling, shipping to laboratory, receiving test results from laboratory, and notifying the contractor of test results. Monitor timeliness of material testing turnaround against Table 6-1.2 of this manual and ensure corrective actions are taken and document where deficiencies are encountered. Notify contractor of all acceptance test results within 2 business days of receipt from laboratory. Advise the contractor that all test results are available for inspection and provide copies of these test results upon request. Maintain copies of the test results within the project files.

The resident engineer ensures that final inertial profile submittals meet the requirements for mean roughness index and areas of localized roughness. Use 4-3603B, "Pavement Smoothness," of this manual as a guide in reviewing submittals.

The resident engineer compares the contractor's and Caltrans' International Roughness Index values over each 0.1-mile section of lane. The resident engineer uses the contractor's final inertial profiles for acceptance when they are within 10 percent of Caltrans' values.

The resident engineer ensures that production start-up evaluation testing is completed and recorded on Form CEM-3703, "Caltrans Production Start-Up Evaluation," and that the contractor is provided with a copy of the completed form.

4-3904A (1) Acceptance Test Results Outside Specified Limits

If any acceptance test result, except smoothness, is outside the limits specified, notify the contractor in writing that the material represented by the tests is noncompliant, and include a statement that the noncompliant material is rejected and must be removed or remedied in accordance with Section 5-1.30, "Noncompliant and Unauthorized Work," of the *Standard Specifications*. Attach a copy of the acceptance test result.

Ask the contractor if any corrective action has been taken based on quality control test data for the period when the acceptance sample was taken.

For every in-place density test failure notify the contractor in writing that the material represented by the failed in-place density test is noncompliant, and include the following statements:

> "The noncompliant material is rejected and must be removed or remedied in accordance with Section 5-1.30, 'Noncompliant and Unauthorized Work,' of the *Standard Specifications*.
>
> At the Engineer's option, noncompliant material may be accepted based on the Engineer's evaluation of the effectiveness of your corrective actions. If the Engineer decides to accept the noncompliant material, payment will be based on the table "Reduced Payment Factors for Percent of Maximum Theoretical Density," in Section 3-2.01A(4)(i)(ii), 'In-Place Density,' of the *Standard Specifications*."

For two consecutive density test failures, follow guidance in Section 4-3904A (2) "Two Consecutive Acceptance Test Results Outside of Specification Limits," of this manual.

If acceptance test results are disputed within the period specified in Section 39-2.01A(4)(i)(iv), "Dispute Resolution," of the *Standard Specifications,* try to resolve these issues at the project level before involving the independent third party.

If an acceptance test is outside the acceptance specification limits, immediately direct the field construction lab, district materials lab, or METS to test the most recent acceptance sample for compliance with the specifications. There may be additional samples that have not been tested. Always test the most recently pulled sample first. Designate this sample for priority testing.

If the most recent sample fails, follow guidance in Section 4-3904A (2) "Two Consecutive Acceptance Test Results Outside of Specification Limits," of this manual

If the most recent sample passes, test the samples immediately before and after the initial failed sample. At a minimum, continue testing samples taken before and after the initial failed sample until a sample passes. If during this testing there are two consecutive failures, and there are passing results after these failures that indicate necessary corrective actions were already implemented, do not follow the guidance in Section 4-3904A (2) "Two Consecutive Acceptance Test Results Outside of Specification Limits," of this manual.

4-3904A (2) Two Consecutive Acceptance Test Results Outside Specification Limits

If two consecutive acceptance test results do not comply with the specifications:

- Immediately inform the contractor to stop production both verbally and in writing.
- Inform the contractor in writing that the material represented by the two out-of specification acceptance tests is noncompliant, and include a statement that the noncompliant material is rejected and must be removed or remedied in accordance with Section 5-1.30 "Noncompliant and Unauthorized Work," of the *Standard Specifications*. Attach copies of both test results that indicate the material is outside specification limits.
- Submit any samples taken between the two failed tests to the appropriate lab for priority testing to define the amount of material not in compliance with the specifications.

1. Notify the appropriate lab that two consecutive acceptance tests are outside the acceptance specification limits.
2. Direct the testing labs to test all samples between the first and second out-of-specification acceptance tests and any remaining samples immediately before or after any failure. Use their test results to define the quantity of hot mix asphalt that will be rejected.

- Notify the contractor in writing of results of all additional acceptance tests conducted to determine the extent of the out-of-specification material. In the notice, include language that the material represented by out-of-specification material is noncompliant and rejected and must be removed or remedied to comply with Section 5-1.30, "Noncompliant and Unauthorized Work," of the *Standard Specifications*.
- Require the contractor to:
  1. Take corrective action to remedy the cause of out-of-specification material.
  2. Provide written documentation of corrective action taken.
  3. Demonstrate compliance by providing quality control testing of material produced but not delivered to the project.
  4. Provide samples of HMA for both the resident engineer and contractor to test. The contractor samples this material in the engineer's presence and splits the samples into four parts.
  5. Test one part of the split sample to verify that the corrective action taken by the contractor was successful.

If both Caltrans' and the contractor's test results are within specifications, the contractor has demonstrated compliance with the specifications and may resume production.

Since the samples tested by the contractor and resident engineer are from a split sample, the test results should not be significantly different. If there is a significant difference, the resident engineer and the contractor should investigate the reason for the discrepancy. Contractors can choose to begin production during this investigation but proceed at their own risk.

- The contractor may dispute any out-of-specification acceptance test result within the specified number of days of receiving the test result by notifying the resident engineer in writing in accordance with Section 39-2.01A(4)(i)(iv), "Dispute Resolution," of the *Standard Specifications*. Try to resolve testing or sampling issues at the project level before involving the independent third party.

4-3904A (3) Contractor Requests for Accepting Noncompliant Work

If the contractor agrees that the HMA placed is noncompliant, the contractor may propose to the resident engineer in writing that the noncompliant material will be remedied or that the noncompliant material will be left in place for reduced compensation. Consult with district materials engineer and either the Division of Maintenance, Office of Asphalt Pavements, or the district's construction field coordinator, or both, about acceptance of the contractor's proposal. Document material remediation or reduced pay by issuing a contractor-requested change order. Document all noncompliant materials test results including the action taken on the final Project

Materials Certification. Refer to Section 6-106, "Project Materials Certification," of this manual for documentation requirements.

4-3904B Testing for Significant Difference

The resident engineer should compare the contractor's test results against Caltrans' test results to determine if they are significantly different. Compare the test results in one of two ways:

1. A one-to-one comparison of the test results of a single split sample (job mix formula verification and production startup).
2. The comparison of groups of test results (that is, the average of all acceptance tests compared to the average of all quality control tests).

The resident engineer should always examine the differences between contractor and Caltrans test results for job mix formula verification, production start-up, and dispute resolution based on a one-to-one comparison of the test results. For job mix formula verification and production start-up evaluation, the test result comparison will show whether the contractor and Caltrans can test properly sampled and split samples for aggregate and HMA and get reasonably close test results. If a significant difference exists, the resident engineer should notify the contractor. Then both the resident engineer and contractor should examine what is causing the difference and try to find a way to bring their results closer.

The resident engineer should never consider a one-to-one comparison of two test results from different samples—that is, Caltrans' acceptance result of a sample taken in the morning compared to a contractor's quality control test result of a sample taken in the afternoon. If examination of the contractor's and Caltrans' test results shows large differences, compare the test result groups to determine if the results are significantly different. Compare the average of all acceptance test results to the average of the contractor's quality control test results, and use Table 4-39.1, "Precision Index," to determine if the difference between the test results is reasonable or significantly different. If the comparison between the test results indicates a significant difference, notify the contractor. Then both the resident engineer and contractor should examine and investigate the cause of test result differences.

Use the reasonable testing difference values in Table 4-39.1 to evaluate whether a significant testing difference exists.

Table 4-39.1. Precision Index

Quality Characteristic	Test Method	Reasonable Testing Differences	
		Single Results	Averages
Sand equivalent	AASHTO T 176	6	2
Theoretical maximum specific gravity (see Note 1)	CT 375	0.05	0.02
Percentage of maximum specific gravity (see Note 1)		3% (see Note 2)	1% (see Note 3)
		2% (see Note 4)	
Design air voids content (see Note 1)	MS-2 Asphalt Mix Design Methods	2.8%	4.5%
Asphalt binder content	AASHTO T 308, Method A	0.3% 0.5%	0.1% 0.2%
Aggregate gradation	AASHTO T 27		
3/4" or 1/2"		3%	1%
3/8"		3%	1%
No. 4		3%	1%
No. 8		3%	1%
No. 30		3%	1%
No. 200		3%	1%

NOTES:
1. Examine the AASHTO T 209, Method A values for theoretical maximum density also. Determine whether resolution of AASHTO T 209, Method A is necessary and sufficient to resolve issues with percent MTD or design air void content.
2. Comparing one core to the average of quality control test results within the same 250 tons.
3. Comparing the average of Caltrans' cores to the average of quality control test results for the same volume of HMA or the same area.
4. Comparing the average of three of Caltrans' cores in 3 lots of 250 tons each to the average of quality control test results for the same 3 lots of HMA.

4-3904C Certificates of Compliance

The resident engineer obtains certificates of compliance for each delivery of asphalt binder (attach bill of lading), crumb rubber modifier, tack coat, and fog seal.

Keep track of total quantity of material delivered and ensure that inspectors have obtained an adequate number of certificates of compliance to cover the quantity of material received.

In addition, perform the following contract administration reviews for certificates of compliance:

- Refer to the *Certification Program for Suppliers of Asphalt* to determine what information must be shown on the certificate of compliance for asphalt binders.
- Obtain "Buy America" certification for each shipment of crumb rubber modifier.

Ensure that asphalt binder contract administration requirements are met by following Section 4-92, "Asphalt Binders," of this manual.

4-3905 Level of Inspection

4-3905 Level of Inspection

Suggested levels of field inspection for typical concrete pavement activities are:

- Benchmark inspection of subgrade for compaction and elevation requirements
- Intermittent inspection of HMA production operations
- Continuous inspection of HMA delivery, placement
- Continuous inspection of HMA compaction operation using "method" compaction specifications
- Benchmark inspection of HMA compaction operation using the "core density" compaction specifications
- Continuous acceptance sampling and testing of HMA
- Intermittent monitoring of the contractor's adherence to their quality control plan
- Benchmark evaluation of pavement surfacing for signs of segregation, raveling, or other distresses
- Benchmark inspection for smoothness

4-3906 Quality Control

4-3906 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Review contractor's quality control plan.
- Ensure the contractor submits a copy of the AASHTO Materials Reference Laboratory (AMRL) accreditation for the laboratory performing the mix design. A current list of AMRL accredited labs is available at:

  http://aashtoresource.org/aap/accreditation-directory

- Review the contractor's quality control test results to ensure testing meets the specifications for Caltrans acceptance. For most quality control characteristics, the contractor samples and tests at a minimum frequency of once per 750 tons of produced HMA.
- Ensure that, when any quality characteristic is beyond the action limits shown in the quality control plan, the contractor is taking corrective action. The contractor must document the corrective action in accordance with Section 39-2.01A(4)(h), "Quality Control," of the *Standard Specifications*.
- Ensure that the contractor is complying with the minimum quality control testing frequencies specified in Section 39-2.01 "General," of the *Standard Specifications*, and the frequencies specified under "Quality Control" for the type of HMA being produced.
- Ensure the contractor stops production when two consecutive quality control or acceptance tests are out specification, notifies the resident engineer, takes corrective action, and demonstrates compliance with the specifications before resuming production and placement of HMA.

- Ensure certifications for the inertial profiler and operator have not expired. The corresponding expiration dates is available at:

  http://www.dot.ca.gov/hq/maint/Pavement/Offices/Pavement_Engineering/Smoother_Pavements.html

- Review the contractor's monitoring of best paving practices that promote smoothness. Encourage the contractor to monitor and record locations where paving practices commonly known to negatively affect smoothness occur, then to follow up and compare those locations to the localized roughness reports of the corresponding International Roughness Index values. Examples of common occurrences are: paver stops, excessive screed angle adjustments, excessive variation in head of material in front of screed (paving width adjustments, poor controls), variations in paving speed, poor or lack of automated grade controls using a ski or averaging system, or poor roller practices.

- Prior to paving, use MultiCool 3 to estimate how rapidly a freshly placed HMA mat will cool as a function of the mix properties and site conditions. The MultiCool 3 program is available at:

  http://www.dot.ca.gov/hq/construc/hma/

  A MultiCool application is also available for smartphones using either the Android or iOS operating systems.

- Prior to placing tack coat, ensure contractor plans to spray tack coat at a rate required to achieve the minimum residual rate. Rates vary based on the application and the dilution rate. To determine the minimum rate, calculate your own rate as shown in the example at 4-9403, "During the Course of Work," of this manual or use the "Minimum Tack Coat Spray Rates" table at:

  http://www.dot.ca.gov/hq/construc/hma/

4-3907 Payment

4-3907 Payment

For details of payment, review the applicable, "Payment" subsection of Section 39 "Asphalt Concrete," of the *Standard Specifications*.

For guidelines on how to weigh HMA, refer to Section 3-902E, "Weighing Equipment and Procedures," of this manual.

For measuring asphalts, liquid asphalts, and asphaltic emulsions used as tack coat, refer to Sections 4-92, "Asphalt Binders"; and 4-94, "Asphaltic Emulsions," of this manual.

4-3907A Payment Adjustment for Core Density

Determine if a deduction is required for cores outside specification limits for the percent of maximum theoretical density. Use the table, "Reduced Payment Factors for Percent of Maximum Theoretical Density," in Section 39-2.01A(4)(i)(ii), "In-Place Density," of the *Standard Specifications*. The core density (compaction) deduction should be taken on the next monthly estimate as an administrative deduction.

4-3907B Compensation Adjustment for Price Index Fluctuation

For compensation adjustments for price index fluctuation for asphalt binder, use the guidance provided in Section 4-9205A "Compensation Adjustments for Price Index Fluctuations" of this manual.

4-3907C Payment After Dispute Resolution for Independent Third Parties

If applicable, when the dispute resolution process determines the contractor's test results are correct, Caltrans pays the independent third party testing costs and adjusts the contract time. The resident engineer adjusts payment and contract time in accordance with Section 8-1.07, "Delays," of the *Standard Specifications* and processes a change order to allow for payment and adjustment.

4-3907D Compensation and Contract Time for Delays

When failing to comply with the specified times to return test results to the contractor, the resident engineer must adjust payment and contract time under Section 8-1.07, "Delays," of the *Standard Specifications*:

- Within 20 days of sampling for job mix formula verification
- Within 3 days of rubberized HMA production sampling for job mix formula verification
- Within 3 days of sampling for production start-up evaluation

Make compensation and contract time adjustments only when work completion is delayed.

4-3908 References and Resources

4-3908 References and Resources

The following provide construction personnel with additional sources of information:

4-3908A References

- California Test Methods, METS:

  http://www.dot.ca.gov/hq/esc/ctms/index.html

- Certification Program for Suppliers of Asphalt, METS:

  http://www.dot.ca.gov/hq/esc/Translab/ormt/pdf/CaltransCertificationProgramforSuppliersofAsphalt_ProgramGuidelin.pdf

- CEM forms, Division of Construction:

  http://www.dot.ca.gov/hq/construc/forms.htm

- *Independent Assurance Manual*, Procedures for Accreditation of Laboratories and Qualification of Testers, METS:

  http://www.dot.ca.gov/hq/esc/Translab/ormt/IA_reports/index.htm

- METS, Caltrans:

  http://www.dot.ca.gov/hq/esc/Translab/ormt/fpmlab.htm

- *Maintenance Technical Advisory Guide*, Vol. 1 – Flexible Pavement Preservation, Office of Pavement Preservation, Division of Maintenance:

  http://www.dot.ca.gov/hq/maint/MTA_GuideVolume1Flexible.html

- Material Plant Quality Program, Division of Construction:

  http://www.dot.ca.gov/hq/construc/hma/

- *Principles of Construction of Hot Mix Asphalt Pavements*, Asphalt Institute.
- *Quality Control Manual for Hot Mix Asphalt*, Division of Construction:

http://www.dot.ca.gov/hq/construc/publications/qcqaman1.pdf

- *Standard Specifications*, Caltrans:

  http://www.dot.ca.gov/hq/esc/oe/construction_standards.html

- *Tack Coat Guidelines*, Division of Construction:

  http://www.dot.ca.gov/hq/construc/publicationlist.htm

- *Minimum Tack Coat Spray Rates*, Division of Construction

  http://dot.ca.gov/hq/construc/hma/

4-3908B Resources

Use available experts within your district or region to resolve issues and obtain additional information about HMA production and placement. Contact the construction engineer and Division of Construction coordinator for issues about contract administration related to HMA specifications. Contact the district materials engineer for issues about materials and the district independent assurance coordinator for issues concerning testing.

When questions about Section 39, "Asphalt Concrete," of the *Standard Specifications* or related special provisions cannot be addressed by district or region experts, or the construction engineer refers the resident engineer to the Division of Construction or Engineering Services for assistance, contact the following:

For materials or testing issues:

Chief, Office of Roadway Materials Testing
Materials Engineering and Testing Services and Geotechnical Services
California Department of Transportation

For contract administration, measurement or payment issues:

Chief, Office of Construction Standards
Division of Construction
California Department of Transportation

Section 40 Concrete Pavement

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4-4003E (1) Location of Primary Cores

Table 4-40.1 Calculation Factors to Locate Cores

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4-4003E (3) Thickness Variation

4-4003F Calculation of Deductions in Payment to the Contractor for Deficient Thickness

4-4003F (1) When None of the Primary Cores are Deficient in Thickness by More Than 0.05 Foot

4-4003F (2) When One or More of the Primary Cores are Deficient in Thickness by More Than 0.05 Foot

Figure 4-40.1 Primary Cores

Figure 4-40.2 Secondary Cores

4-4003F (3) Contractor's Requests for Additional Thickness Measurements

4-4003G Handling of Skips in the Original Day's Pour and Secondary Areas to Be Removed and Replaced

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4-4003I Administration

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Section 40 Concrete Pavement

4-4001 General

This section covers concrete pavement including:

- Preparation of concrete pavement subgrade
- Production of the concrete
- Concrete pavement equipment requirements
- Placing, finishing, and curing of the concrete pavement
- Construction of joints
- Protection of the pavement
- Noncompliant pavement work

Plant inspection specialists and testing personnel usually perform inspection and testing duties at the concrete batch plant. However, in addition to onsite inspection, mix design authorization and plant inspection are part of the resident engineer's responsibility. Good communication between plant and inspection specialists and assistant resident engineers is essential. Inspectors and assistants must inform the resident engineer of test results in a timely manner.

This section covers mostly onsite inspection duties. For information on producing and transporting concrete, refer to Section 4-90, "Concrete," of this manual.

4-4002 Before Work Begins

4-4002A General

- Review the plans and specifications to determine the requirements for concrete pavement, including submittals, quality assurance, materials, construction, and payment provisions.
- Coordinate and hold a preconstruction meeting with the specified contractor's personnel prior to paving activities, including any test strips, refer to Section 36-1.01D(2), "Preconstruction Meetings," of the *Standard Specifications*. Discuss the contractor's methods for performing each element of the work, including those identified in the quality control plan. For jointed plain concrete pavements, include discussions on the contractor's methods for ensuring proper dowel and tie bar placement relative to constructed contraction joints and their early age crack mitigation system.
- Decide if crossings will be necessary for the convenience of public traffic and whether rapid strength concrete should be used for such crossings. Advise the contractor accordingly.
- When long hauls are involved, review the contractor's proposed placement method to ensure that adequate time will be available.

- Discuss pavement areas to receive tapered edge with the contractor and construction methods to be utilized.
- For concrete pavement widenings placed adjacent to existing pavements, ensure the existing pavement lane or shoulder is ground before new concrete is placed. New concrete pavement must match the ground existing surfaces and meet specified smoothness requirements.
- Arrange for plant inspection and testing personnel to be present at the plant before startup.

4-4002B Submittals

- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes concrete pavement materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Review the contractor's proposed concrete mix design for conformance with specification requirements. The contractor's mix design submittal is to include a copy of their American Association of State Highway and Transportation Officials (AASHTO) accreditation for their laboratory determining the mix proportions and laboratory test reports including modulus of rupture information and shrinkage test data. AASHTO laboratory accreditation can be verified at AASHTO Materials Reference Laboratory website:

  http://www.amrl.net/Amrlsitefinity/default/aap/r18labs.aspx
- Determine the pavement climate region for your project by reviewing the pavement design information located on the typical cross section sheet as this designation may trigger additional concrete mix requirements such as required air entrainment. Refer to Section 4-90, "Concrete," of this manual for information on concrete mix designs. Assistance with the concrete mix design review may be obtained from the district materials engineer.
- Ensure the aggregate material source complies with Section 7-103H (2), "Surface Mining and Reclamation Act," of this manual.
- Obtain the contractor's quality control plan that details the methods the contractor will use to ensure the quality of the work. Review the quality control plan for conformance with specification requirements. Ensure that the quality control plan has met or exceeded the quality control testing requirements specified in the contract. Ensure individual suspension limits do not exceed specified acceptance criteria. If requested by the contractor or desired by the resident engineer, hold a separate meeting to discuss the quality control plan which addresses each element affecting pavement quality including those specified in Section 40-1.01D(3), "Quality Control Plan," of the *Standard Specifications*. For jointed plain concrete pavements, pay extra attention to the contractor's plan for ensuring proper placement of contraction joints, dowel bars, and tie bars, as well as their planned early age crack mitigation system. The district materials engineer may be available to provide subject matter expertise at this meeting.
- When just-in-time (JIT) training is specified, obtain the contractor's JIT training submittal containing the instructor's name and qualifications, training location, course syllabus, handouts, and presentation materials. You may wave JIT training

requirements for individuals who have attended equivalent JIT training within the last 12 months and have provided certification of completion documentation.

- Obtain certificates of compliance when tie bars, threaded tie bar splice couplers, dowel bars, tie bar baskets, dowel bar baskets, joint filler material, and epoxy powder coating items are to be used in concrete pavement.
- For jointed plain concrete pavements, ensure the early age crack mitigation system information is provided a minimum of 24 hours in advance of each paving shift and based on forecasted weather conditions for the site, including wind speed, ambient temperatures, humidity, and cloud cover. The system assists the contractor in predicting concrete stresses and strength during the initial 72 hours after paving for constructing contraction joints, cure application, and crack mitigation. Ensure the contractor employs the specified portable weather station at the paving site to monitor, update, and report predictions.
- Obtain calibration documentation and operational guidelines for frequency measuring devices for concrete consolidation vibrators.
- For cold weather conditions, obtain contractor's plan for protecting concrete pavement.
- Obtain the name of the contractor's independent third-party air content testing laboratory when the project is located in a pavement climate region requiring air entrainment (that is, freeze-thaw area).
- Obtain manufacturer's recommendations and instructions for storage and installation when threaded tie bar splice couplers and joint filler material items are to be used in concrete pavement.
- For continuously reinforced concrete pavements, obtain a plastic chair submittal and plastic chair sample if their use is proposed by the contractor. Refer to Section 40-2.01C, "Submittals," of the *Standard Specifications* for additional information.
- Obtain physical specimens used for the contractor's testing of coefficient of thermal expansion. Ensure the contractor provides test data at field qualification and throughout production as specified. The contractor is also required to submit this test data electronically to the specified website. Note that for continuously reinforced concrete pavements there is specified acceptance criterion for coefficient of thermal expansion at field qualification; otherwise this is provided for information only.

4-4002C Training

Ensure that JIT training is conducted in conformance with contract provisions.

4-4002D Concrete Field Qualification and Pavement Test Strip

- Ensure that field qualification of proposed mix proportions is performed by an ACI-certified "Concrete Laboratory Technician, Grade 1." Obtain copies of certifications for project records. Review concrete field qualification data and certified test reports for conformance with contract requirements.
- Ensure that the contractor performs coefficient of thermal expansion sampling, specimen fabrication, and testing as specified. For continuously reinforced concrete pavements, ensure the coefficient of thermal expansion test values meet

acceptance criterion as a condition of qualification. Contractor submitted test specimens may be used to verify test results.

- For projects with concrete pavement volumes exceeding 2000 cubic yards, ensure a test strip is constructed for evaluating compliance with specification acceptance criteria including smoothness; dowel bar and tie bar placement for jointed plain concrete pavements; vertical and lateral stability of reinforcement; and plastic chairs (if proposed) for continuously reinforced concrete pavements, thickness, and final finishing. Test strips not meeting requirements are rejected. Ensure an authorized test strip has been constructed prior to production paving. Additional test strips are required if the contractor changes the intended method of placement or concrete mix proportions or where a test strip has been rejected. Ensure arrangements are made to evaluate the test strip within 3 business days of placement. Requests to eliminate the test strip should only be considered when the contractor can fully document that the same personnel and equipment have been successful in completing the same concrete pavement type within the last 12 months on a Caltrans project.

4-4003 During the Course of Work

4-4003 During the Course of Work

4-4003A Prepaving

- 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 requirements. Ensure loose and extraneous materials are removed prior to paving. Ensure that any low areas are identified in a way 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 and payment (refer to the applicable specifications for cement-treated base, lean concrete base, and treated permeable bases). Note these areas in daily reports with stationing and offset information.
- 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. General practice is to limit any such adjustment so that the planned finished grade does not change more than 0.04 foot in 60 feet longitudinally.
- When slip-form pavers are used, inspect the grade on 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 that the wire is tensioned sufficiently to prevent measurable sag between supporting stakes. If you anticipate any problems, advise the contractor. Keep in mind that the contractor is responsible for the thickness and smoothness of the pavement.
- Identify where the contractor will post quality control charts.
- Ensure any specified bond breaker material, curing seal, or other required treatment has been applied and maintained on the underlying material in

conformance with contract requirements. Refer to Section 36-2, "Base Bond Breaker," of the *Standard Specifications* and Section 4-36, "Surfacing and Pavements—General," of this manual for additional information on base bond breakers. These materials may also be helpful for determining pavement thicknesses when examining pavement cores.

- Examine the equipment or tools to be used. When obvious inadequacies exist, advise the contractor and record the details in the daily report. Do the following in examining equipment or tools:

  1. For side-form construction:

     a. Examine the forms to ensure specified attributes, including those for composition, weight, dimensions, and rigidity. Ensure that the forms are cleaned and oiled before each use.

     b. Ensure that installation of the forms complies with 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.

  3. Regardless of which method of construction is used, ensure that the contractor uses proper consolidation techniques that produce uniform concrete without segregation. Where vibrators are used, ensure they are operated in conformance with contract requirements.

  4. To ensure compliance with the requirements for protecting pavement, examine all equipment that will bear on previously completed pavement.

- Ensure a sufficient water supply has been developed for the work.
- Before concrete placement, ensure that the subgrade is uniformly moist, but free from standing or flowing water.
- Based on the concrete pavement climate region, verify the types of reinforcement, tie bars, dowel bars, tie bar baskets, and dowel bar baskets to be used within the concrete pavement, refer to Section 40-1.02C, "Reinforcement, Bars, and Baskets," of the *Standard Specifications*. For continuously reinforced concrete pavements, spot check reinforcement for size, spacing, vertical positioning, clearance, and stability. For jointed plain concrete pavements using dowel bar or tie bar baskets, spot check their anchorage to the base material. If dowel bar or tie bar inserters are used, ensure the contractor is checking inserter alignment prior to the pour. Ensure specified dowel bar lubricant has been properly applied. Ensure the contractor's quality control methods for properly locating contraction joints, dowel bars, and tie bars are being applied.
- Ensure that equipment for constructing joints is onsite and that it conforms to specifications.
- For jointed plain concrete pavement, verify that the contractor has updated their early age crack mitigation system with the most current weather forecast information and field conditions (for example, grade and concrete temperatures). Discuss any adjustment in their construction operations (for example, cure application, contraction joint sawing time, and so on) as a result thereof.

- Determine the curing method the contractor proposes to use. When a curing compound will be used, discuss the labeling and packaging requirements for acceptance of the compound with the contractor. Obtain a certificate of compliance, including required test results, for each batch of curing compound.
- Ensure that equipment and materials meeting the requirements of Section 90-1.03B(3), "Curing Compound Method," or Section 90-1.03B(4), "Waterproof Membrane Method," of the *Standard Specifications* are onsite.
- If paving or finishing operations will extend beyond daylight hours, ensure that adequate lighting facilities are on the project before paving begins.

4-4003B Paving

- Maintain good communication between field personnel inspecting the placing portion of the paving operation and plant inspection personnel, so that problems related to mixing or hauling may be addressed and corrected effectively.
- Refer to Section 4-90, "Concrete," of this manual for a discussion of transporting concrete and receiving weighmaster certificates at the delivery point.
- Ensure that the contractor furnishes the required tachometer. Also, be sure the contractor does the vibrating at the locations and in the frequencies and amplitudes specified. Be alert for inoperative units, and ensure they are replaced immediately.
- Observe the concrete as it is placed for improper proportions or inadequate mixing. In the daily report, record the reasons for any concrete rejection and the approximate amount involved.
- Observe the operation of equipment on existing pavements to ensure that no cracking or other damage occurs. If damage occurs, order immediate corrective action.
- At the start of each day's work, ensure that the specified date stamp is used to mark the new pavement.
- Ensure acceptance testing is performed on concrete pavement in accordance with Section 40-1.01D(8), "Department Acceptance" of the *Standard Specifications* and Section 6-1, "Sample Types and Frequencies," of this manual for the identified quality characteristics.
- For California Test 523, "Method of Test for Flexural Strength of Concrete," select a location to store concrete beams. A good location is one 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 also to supply labor for assistance with transporting and burying the beams. Note the safety precautions in the test method.
- Ensure sufficient beam samples are molded for modulus of rupture acceptance testing based on lot size and age strength requirements. Make additional sets of beams to determine acceptable flexural strength when pavement crossings will be open to public traffic or to job traffic earlier than normally permitted. Ensure fabricated beams are properly handled, cured, and transported prior to testing.
- Where air entraining admixtures are required by the project's pavement climate region (refer to Section 40-1.02B(4), "Air Entrainment," of the *Standard Specifications*), perform verification testing and use quality control testing for acceptance for air content of concrete pavement. Follow the contractual procedure

specified in Section 40-1.01D(8)(b)(ii), "Air Content" of the *Standard Specifications*.

- Monitor the contractor's conformance with their quality control plan. Ensure control charts for required quality control tests are being updated on each day of paving and adhere to the quality control plan, including action and suspension limits. When deficiencies are observed, notify the contractor and document in the daily report. When deficiencies are not resolved or continue to occur, suspend the contractor's pavement operations until the contractor provides satisfactory assurances and written documentation of their corrective plans. Where appreciable differences are encountered between the quality control tests and acceptance tests, investigate and resolve these concerns with aid of the district materials engineer as necessary.
- Verify that the contractor performs coefficient of thermal expansion sampling and specimen fabrication, and submits test results and specimens as specified.
- For jointed plain concrete pavements, ensure that dowel bar baskets, tie bar baskets, and the bars themselves are not being displaced during the concrete placement and paving operations. Ensure the contractor is properly identifying and constructing contraction joints relative to pavement references and bar centroids in conformance with the contract requirements and the contractor's quality control plan.
- For jointed plain concrete pavements, monitor the contractor's timelines from concrete placement to curing application and contraction joint sawing in comparison to their planned schedule from their early age crack mitigation system. Notify the contractor promptly of any deviations and record this information in the daily report along with the location of the work.
- When joints are to be formed rather than sawed, be sure joint material is placed as specified.
- Ensure that the contractor constructs a transverse construction joint if the time interval between two successive concrete loads is greater than the specification allowance. Ensure such joints are constructed at permissible contraction joint locations.
- Caution the contractor to construct the pavement so it will meet requirements for inertial profile, straightedge, and edge slump before final finishing to minimize corrective work. Inconsistent delivery and nonuniformity of concrete can impact paver performance and have negative effects on the paved surface. Where encountered, document these locations in the field and within the daily record.
- Measure the pavement's width at the beginning of and periodically after paving. While the required width applies to both upper and lower surfaces, the bottom width can be greater than specified to reduce edge slump.
- Ensure that end anchors are constructed at all required locations and to the dimensions shown on the plans. Be sure 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.

4-4003C Finishing Pavement

- Ensure that the contractor performs preliminary finishing according to specifications and in a way that imparts the desired surface characteristics.
- During concrete finishing observations, consider the following information:
    1. Pavement can be durable with inadequate texture or be well textured and not have enough durability to retain the texture.
    2. Mixing water with surface mortar during finishing reduces surface durability. This mixture may result from "bleed" water that had not evaporated, water that was added to the surface to make finishing easier, or water that was 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 the unacceptable practice include the following:
        a. Soupy mortar during finishing.
        b. Excess laitance.
        c. Small scallops in the slab's edge.
        d. Areas still soft and wet in the finished surface 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, complete preliminary finishing before bleeding progresses to this degree.
    5. Water applied for the convenience of finishing, not otherwise needed to produce the specified product, is contrary to specifications regarding water use for retempering.
- Ensure that the contractor performs the final finishing as specified and in a way that results in a finished surface with the desired characteristics.
- When sufficient rain may fall to damage fresh pavement, stop pavement placement or ensure that other steps are taken (such as placing a covering) to prevent damage.
- Before texturing, ensure that the contractor rounds the pavement edges to specified radii. Observe texturing for compliance with requirements. Ensure the contractor performs initial texturing with a broom or burlap drag so as to produce striations parallel to the centerline.
- Ensure that burlap drags are used as specified and kept sufficiently clean to avoid unsightly irregularities in the texture. Brooms used must also be kept sufficiently clean to avoid significant irregularities. Final texturing must be done with spring-steel tines that produce grooves parallel to the centerline. Grooves not straight and parallel to the centerline are unacceptable. Grooves are to be constructed over the entire pavement width with the exception of within 3 inches of pavement edges and longitudinal joints. Ensure that the cross section of the steel tines complies with specifications. Inspect the pavement surface to ensure that grooves meet the specified depth.
- Before and after the application of curing seal, ensure that the contractor keeps the pavement surface moist as specified.

- Ensure the contractor uses either the waterproof membrane method or curing compound method specified in Section 90-1.03B, "Curing Concrete," of the *Standard Specifications*. During observations, also note the following:

    1. Waterproof membrane:

        a. Ensure the contractor sprays the concrete with a mist of water until the concrete has set before placing the membrane. Ensure water does not flow over or wash the concrete surface.

        b. Examine the waterproof membrane to see that it meets specifications. For assistance, consult the district materials engineer.

        c. Ensure that membrane material is placed and secured and that any damaged sheeting is repaired as the specifications require.

        d. If polyethylene sheeting is used, monitor maximum concrete temperatures during curing, ensuring the maximum allowable is not exceeded.

        e. Make sure that the contractor adheres to the specified curing period.

    2. Curing compound:

        a. Ensure that the contractor applies the curing compound uniformly after tining. See that sawed cuts or other disturbed areas receive additional curing compound. Your inspection should ensure the following attributes for the compound:

            (1) It is not contaminated, diluted, or altered 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.

        b. Perform measurements and calculations for the curing seal's application rate. To determine the rate, you may use California Test 535, "Determining the Application Rates of Concrete Curing Compounds in the Field." Record the measurements in the daily report.

- Ensure concrete pavement joints are constructed in conformance with Section 40-1.03B, "Joints" of the *Standard Specifications*; the contractor's quality control plan; and the contractor's early age crack mitigation system for jointed plain concrete pavements. Longitudinal and transverse contraction joints must be sawed before cracking occurs and after the concrete is hard enough to saw without spalling, raveling, or tearing. The contractor is responsible for determining the exact time of sawing. Ensure that concrete debris, water residue, and paste are immediately removed during saw cutting operations and that slurry from the sawing operation is immediately washed from the joint and removed. Where spalling, raveling, and tearing are observed, ensure the contractor performs repairs in conformance with Section 40-1.03N(2), "Spall and Ravel Repair," of the *Standard Specifications*.

- Ensure concrete pavement temperature is maintained above 40 degrees Fahrenheit during the initial 72 hours after placement.

4-4003D Post-Paving

- Identify where core locations are to be taken by the contractor. Obtain core submittals throughout pavement operations for determining pavement thickness and air entrainment (required where contractor's quality control air entrainment test results are not verified by Caltrans testing). For jointed plain concrete pavements, obtain cores for evaluating dowel and tie bar placement and concrete consolidation in these areas. Verify specified placement tolerances have not been exceeded relative to constructed contraction joints and orientation of pavement edges.
- For jointed plain concrete pavements, visually examine concrete pavement surfaces once the cure period is complete. If necessary, order the contractor to obtain concrete cores to further evaluate. Ensure partial depth cracks are treated with a high molecular weight methacrylate resin in accordance with Section 40-1.03N(3), "Crack Repair," and Section 41-3, "Crack Treatment," of the *Standard Specifications*. Ensure working cracks within 0.5 foot of either side of a planned contraction joint and the adjacent unformed contraction joint are treated in accordance with Section 40-1.03N(3), "Crack Repair," of the *Standard Specifications*. Pavement slabs with full depth cracks other than working cracks require the removal and replacement of slab or slab portions. Spall or ravel areas larger than specified allowance must be repaired under Section 41-4, "Spall Repair," of the *Standard Specifications*. Slabs with combined raveled areas greater than 5 percent of the slab area or with a single area of more than 4 square feet must be removed and replaced.
- For continuously reinforced concrete pavements (CRCP), examine pavement surfaces for cracking and raveling. Any full-depth cracking with faulting exceeding specified limits will require repair in conformance with Section 40-2.03E(3), "Full-Depth Repair," of the *Standard Specifications*. High molecular weight methacrylate is not to be applied to any cracks in CRCP. Any raveled areas of specified size must be repaired in conformance with Section 40-2.03E(2), "Partial Depth Repair," of the *Standard Specifications*.
- Ensure the contractor performs inertial profiling on specified areas. Refer to Section 36-3, "Pavement Smoothness," of the *Standard Specifications* and Section 4-36, "Surfacing and Pavements—General," of this manual for additional information. Areas requiring correction for smoothness may be ground under Section 42-3, "Grinding," of the *Standard Specifications*, subject to meeting minimum pavement thickness requirements. Alternatively, these noncompliant areas may be removed and replaced. Once corrective work has been performed and the contractor's corrective inertial profile shows compliance, arrange for inertial profile acceptance testing for pavement smoothness through the district. Pavement areas not subject to inertial profiling requirements must meet specified straightedge requirements.
- Obtain contractor's inertial profiler information and reports for each day of inertial profiling of concrete pavement. Refer to Section 36-3, "Pavement Smoothness," of the *Standard Specifications* and Section 4-36, "Surfacing and Pavements—General," of this manual for additional information.
- With the district materials engineer, arrange to measure the coefficient of friction (California Test 342, "Surface Skid Resistance with the California Portable Skid

Tester"). Do not open pavement to traffic unless the coefficient of friction has been obtained.

- Note the following for coefficient of friction:

  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 delineate areas that must be corrected.

  2. Tests made at temperatures below 40 degrees Fahrenheit 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 below 40 degrees Fahrenheit.

  3. To determine if 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 7 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 an operation that could reduce the friction factor from the one originally determined, retest such areas before opening them to public traffic.

  4. Areas not meeting coefficient of friction requirements must be corrected by grooving or grinding in conformance with Section 42, "Groove and Grind Concrete," of the *Standard Specifications*. Retest the corrected sections as necessary to verify the coefficient of friction value has been met.

- After any required corrective grinding, determine locations where coring for thickness will be performed by the contractor. Observe coring operations and obtain drilled corings in properly identified plastic bags from the contractor. Use cores to determine acceptance of concrete pavement thickness. Do not allow coring machines on fresh concrete while any danger exists of damaging the concrete. Wait at least 72 hours.

- Ensure any required rumble strips are ground into the concrete pavement after the minimum specified time and strength have been obtained. Ensure the completed rumble strip conforms to the tolerances for alignment, spacing, depth, length, and width. Ensure equipment noise restrictions are met. Refer to Section 84-8, "Rumble Strips," of the *Standard Specifications* for additional information concerning rumble strips.

- Obtain contractor's plan if repair or replacement of noncompliant concrete pavement is required.

- Use the following procedure for determining pavement thickness and any applicable deductions:

4-4003E Measurement of Pavement Thickness

Cores taken in each primary unit of pavement at the minimum specified rate and 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. These cores and those 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.
- 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 unauthorized deviations from planned pavement thickness occurred.

4-4003E (1) Location of Primary Cores

Do the following to locate primary cores:

- For each pavement thickness on each day's paving, determine the net area, in square yards, of pavement placed, excluding the area of structures and other areas on which pavement is not placed during that day. The resulting measurement is the area of the primary unit. Divide the area of the primary unit by 1200 square yards and take the next highest whole number. The resulting number is the number of primary cores to be taken, unless the contractor requests additional ones.
- Divide the net length of the primary unit by the number of primary cores to be taken in that unit. The resulting distance is 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 a lane at random. Select any factor from the longitudinal factors shown in Table 4-40.1, "Calculation Factors to Locate Cores," and multiply the factor by the primary coring interval. The result is 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 (Feet)
0.6	6
0.1	10
0.2	2
0.9	9
0.5	5
0.7	7
0.4	4
0.8	8
0.3	3

- 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 as 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 1 foot laterally.

4-4003E (2) Location of Secondary Cores

To determine the limits of secondary units, locate cores in approximately the center of each adjacent panel. Note that for continuously reinforced concrete pavements, panel lengths are defined as 15 feet for this purpose.

4-4003E (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 determined by California Test 531, "Method of Test for Length of Drilled Concrete Cores." Record excess thickness by using a plus sign and deficient thickness by using a minus sign.

4-4003F Calculation of Deductions in Payment to the Contractor for Deficient Thickness

Take these steps when calculating deductions based on deficient thickness:

4-4003F (1) When None of the Primary Cores are Deficient in Thickness by More Than 0.05 Foot

When no primary cores are deficient in thickness by more than 0.05 foot, make an adjustment as follows:

- 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 0.01 foot. If the average thickness deficiency is less than 0.01 foot, make no deficiency adjustment. If the average thickness deficiency is more than 0.01 foot, continue with the steps below.

- To obtain the deficiency adjustment in dollars per square yard, use the table in Section 40-1.01D(8)(c)(iv), "Thickness," of the *Standard Specifications*. The average thickness value is to be rounded to the nearest hundredth of a foot for averages from 0.01 foot to 0.05 foot when using the pay adjustment table.
- To obtain the total amount of payment to deduct for the primary unit, multiply the deficiency adjustment by the total area of the primary unit in square yards.

4-4003F (2) When One or More of the Primary Cores are Deficient in Thickness by More Than 0.05 Foot

When one or more cores are deficient in thickness by more than 0.05 foot, determine the limits of the deficiency by taking a secondary core in adjacent panels. Continue taking a secondary core in adjacent panels, expanding as necessary, until the deficient area is bounded by panels with deficient thickness of 0.05 foot or less. The bounded area is referred to as a secondary unit. Reject the secondary unit area for noncompliance pursuant to Section 5-1.30, "Noncompliant and Unauthorized Work," of the *Standard Specifications*. Exclude the secondary unit areas from payment and deduction calculations. In the calculation to determine average thickness of the primary unit, use the average thickness of all secondary cores outside the secondary unit to replace the thickness of the initial primary 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 titled "Deduction for Thickness Deficiency" within Section 40-1.01D(8)(c)(iv), "Thickness," of the *Standard Specifications*.

To determine the total deduction, add the deductions for primary units and the cost of all secondary cores, including those taken outside secondary unit areas.

Below 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 40-1.01D(8)(c)(iv), "Thickness," of the *Standard Specifications.*

Assume the following:

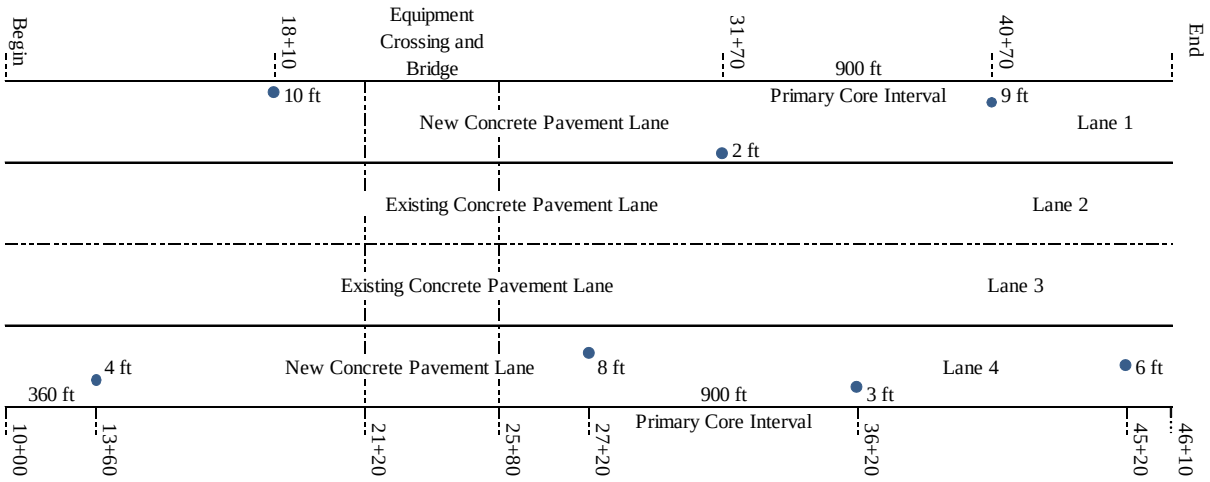
The contractor paved two lanes (1 and 4) from Station 10+00 to Station 46+10. An equipment crossing and a bridge within the limits of the day's run caused "skips" in the length paved totaling 460 feet (from Station 21+20 to Station 25+80). The actual length paved was 6300 feet (3150 feet x 2 lanes). The total area paved on this date was 8400 square yards.

The engineer calculated the number of cores required for thickness measurements in the primary unit (8400/1200 = 7) and the core interval (6300/7 = 900). To determine the location of the first core, the engineer chose the outside lane (4), at random and used the seventh set of numbers at random, from Table 4-40.1, "Calculation Factors to Locate Cores." The first core was taken at a longitudinal distance of 360 feet from the beginning and at a lateral distance of 4 feet from the right edge of the lane. Subsequent cores were taken at a core interval of 900 feet, excluding skip areas, proceeding from lane 4 to lane 1. Figure 4-40.1, "Primary Cores," illustrates the primary unit and the locations of all the primary cores.

Figure 4-40.1. Primary Cores

The core thickness variations for the respective numbered cores were determined as follows:

Core Number	Stationing and Lane	Core Offset	Thickness Variation



a. Length of primary unit = 6300 ft {[(4610-1000) - (2580-2120)]*2}
b. Number of cores = Area/Core Frequency = (6300 ft x 12 ft x 1 sqyd/ 9 sf) / (1200 sqyd/core) = 7 cores
c. Primary core interval = 6300 ft / 7 cores = 900 ft/core
d. Location of the first primary core:
In this example the outside lane (4) is chosen (at random), and the seventh set of numbers (at random) from Table 4-40.1 is used. The first core is taken at a longitudinal distance from the beginning of 360 ft (0.4 x 900 ft). The first core is taken 4 ft from the right edge of the lane.

1.	Sta. 13+60 Lane 4	4 ft off right edge	-0.03 ft
2.	Sta. 27+20 Lane 4	8 ft off right edge	+0.02 ft
3.	Sta. 36+20 Lane 4	3 ft off right edge	+0.03 ft (use +0.02 ft)
4.	Sta. 45+20 Lane 4	6 ft off right edge	-0.03 ft
5.	Sta. 18+10 Lane 1	10 ft off right edge	-0.04 ft
6.	Sta 31+70 Lane 1	2 ft off right edge	-0.00 ft
7.	Sta 40+70 Lane 1	9 ft off right edge	-0.07 ft

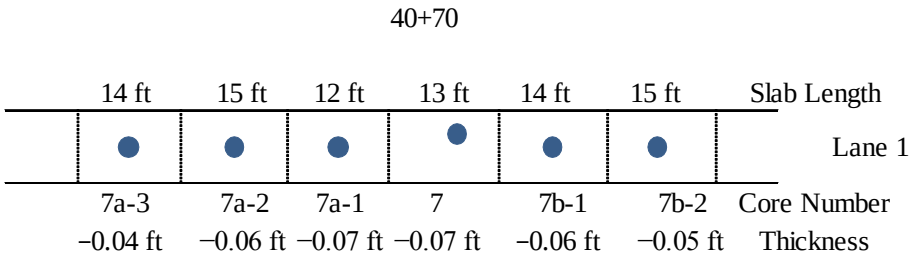
Core 3 is more than 0.02 foot greater than the specified thickness, so + 0.02 foot was used in the calculation to determine thickness deficiency in the primary unit in accordance with Section 40-1.01D(8)(c)(iv), "Thickness," of the *Standard Specifications*.

Core 7 was deficient by more than 0.05 foot. Because of this deficiency, the next step was to determine the dimensions of the secondary unit from secondary thickness measurements.

To determine the limits of the secondary unit, the resident engineer ordered secondary thickness measurements in the panels adjacent to the panel where Core 7 was taken. Subsequent thickness measurements were in panels adjacent to panels with thickness deficiencies of more than 0.05 foot. This process continued until the secondary unit was bounded by panels in which the secondary measurements were deficient in thickness by 0.05 foot or less. Cores in each of these panels were taken in the center of the panel.

Figure 4-40.2, "Secondary Cores," illustrates the thicknesses of the secondary cores taken.

Figure 4-40.2. Secondary Cores



Core Number	Thickness Variation
7a-1	-0.07 ft
7a-2	-0.06 ft
7a-3	-0.04 ft
7b-1	-0.06 ft
7b-2	-0.05 ft

The panels in the secondary unit area represented by cores 7, 7a-1, 7a-2 and 7b-1 were measured and found to be 54 feet in length and represent 72 square yards.

The engineer averaged thickness variations of the secondary thickness measurements outside the secondary unit area. The resulting value was used in the calculation in lieu of the thickness variation for Core 7 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-3	-0.4 ft
7b-2	-0.5 ft

The average of the thickness variations in the preceding table is -0.045 feet. This average was rounded to -0.05 foot, and used for the thickness variation for Core 7 in the primary unit.

Using -0.05 foot for the Core 7 thickness deficiency, the engineer calculated the average thickness deficiency (cores 1 through 7) for the primary area to be -0.016 foot. This average was rounded to -0.02 foot and 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:

8,400 - 72 = 8,328 square yards.

The deduction from payment to the contractor for thickness deficiency in the primary area in accordance with Section 40-1.01D(8)(c)(iv), "Thickness," of the *Standard Specifications* was calculated as follows:

8,328 square yards x $2.30/square yard = $19,154.40

The secondary unit area was later removed, reworked, and replaced. A single core was then taken to determine thickness variation and found to be -0.01 foot. A deduction was then taken on the remedied secondary unit as follows:

72 square yards x $0.90/square yard = $64.80

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-3, 7b-1 through 7b-2, and 7c-1 (core taken after replacement of secondary unit).

4-4003F (3) Contractor's Requests for Additional Thickness Measurements

If, after the primary coring is performed, the contractor requests additional thickness measurements in any primary unit, treat the 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 0.05 foot. Instead, include these cores with the original primary cores. If additional cores are deficient in thickness by more than 0.05 foot, determine the limits of the secondary areas.

Do not grant permission to a 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 600 feet of traffic lane rather than one core for each 900 feet. The request will have the effect of increasing, not necessarily doubling the number of cores.

Deduct from the payment to the contractor the cost of 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.

4-4003G 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) are ultimately 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 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.

4-4003H 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.

4-4003I Administration

Notify the contractor in writing of the date and place where coring will be performed. Follow up orally, if necessary, to be certain 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 payment for the concrete pavement, usually after the contractor returns the proposed final estimate.

The personnel who measure core thickness prepare the coring records, which include information about core location (include sketches) and measured thickness. The original records and one copy are given to the resident engineer, who retains the original and forwards the copy to the contractor. Personnel from the district materials laboratory will keep one copy; another copy goes to METS in Sacramento.

Separate reports should be prepared and identified for secondary area measurements. These reports will help determine the cost to the contractor for secondary coring and provide a clear record of secondary areas. Follow the same distribution of copies described in the previous paragraph for primary unit reports.

Coring for determining acceptance of dowel bars and tie bar placement is to be conducted in a similar manner as that of thickness, except use revised lot sizes based on the specified frequencies. If dowel or tie bars are placed outside the specified tolerances or cores show air voids around the bars, obtain additional cores to determine the limits of unacceptable work. Determine the areas that will require removal as specified in Section 40-1.03N, "Correcting Noncompliant Pavement Work," and Section 40-4.03B, "Correcting Noncompliant Pavement Work," of the *Standard Specifications*.

4-4004 Level of Inspection

4-4004 Level of Inspection

Suggested levels of field inspection for typical concrete pavement activities are:

- Benchmark inspection of subgrade for compaction and elevation requirements.
- Benchmark inspection of forms and paving equipment.
- Intermittent inspection of reinforcement, dowel bars, tie bars, dowel bar baskets, and tie bar baskets.

- Benchmark inspection of the contractor's early age crack mitigation system for jointed plain concrete pavements.
- Continuous inspection of concrete delivery, placement, finishing, curing, and contraction joint operations.
- Continuous acceptance sampling and testing of fresh concrete.
- Intermittent monitoring of the contractor's adherence to their quality control plan.
- Benchmark evaluation of pavement for cracking, faulting, spalling, and raveling.
- Benchmark inspection of dowel and tie bar placement through coring.
- Benchmark inspection for coefficient of friction, smoothness, and thickness.

4-4005 Quality Control

4-4005 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Review contractor's quality control plan.
- Ensure the contractor submits a copy of the AASHTO accreditation for the laboratory performing the mix design.
- Review control charts, verify results for quality characteristics are in compliance, and ensure that copies of control charts are posted at designated location.
- For jointed plain concrete pavements, ensure that the contractor performs quality control methods to properly locate contraction joints, dowel bars, and tie bars.
- For jointed plain concrete pavements, review the contractor's early age crack mitigation analysis. As necessary, verify contractor's analysis by performing an independent simulation using high performance concrete paving software.

4-4006 Payment

4-4006 Payment

Using the dimensions shown on the plans, calculate the quantity of concrete pavement to be paid for. Use curve corrections to make sure that calculations account for curves in alignment.

Make deductions from contract payments for deficient pavement thickness.

Section 41 Existing Concrete Pavement

4-4101 General

4-4102 Before Work Begins

4-4102A General
4-4102B Pavement Subsealing or Jacking
4-4102C Joint Seals
4-4102D Dowel Bar Retrofit
4-4102E Individual Slab Replacement with Rapid Strength Concrete

4-4103 During the Course of Work

4-4103A Pavement Subsealing or Jacking
4-4103B Spall Repair
4-4103C Joint Seals
4-4103D Pavement Transition Taper
4-4103E Dowel Bar Retrofit
4-4103F Individual Slab Replacement With Rapid Strength Concrete

4-4104 Level of Inspection

4-4105 Quality Control

4-4106 Payment

Section 41 Existing Concrete Pavement

Section 41
Existing Concrete
Pavement

4-4101 General

4-4101
General

This section provides guidelines for inspecting existing concrete pavement repair for work specified under Section 41, "Existing Concrete Pavement," of the *Standard Specifications*.

Multiple strategies are used to repair existing concrete pavements. The following common types of concrete pavement repair are covered in this section:

- Pavement subsealing consists of filling voids under the pavement without disturbing the elevation of the finished surface by drilling holes through the pavement and underlying base, cleaning the holes, injecting grout, and filling holes with mortar.
- Pavement jacking consists of filling voids under the pavement and raising the pavement's surface to a desired elevation by drilling holes through the pavement and underlying base, cleaning the holes, injecting grout, and filling holes with mortar.
- Spall repair consists of removing unsound or damaged concrete, filling the area with polyester concrete, and replacing existing joint seals.
- Sealing concrete pavement joints consists of constructing or replacing joint seals at transverse, longitudinal, or isolation joints with silicone, asphalt rubber, or preformed compression joint seal.
- Pavement transition taper may consist of grinding, removing, and replacing existing concrete pavement, or placing temporary hot mix asphalt.
- Dowel bar retrofit consists of placing dowel bars at transverse joints and cracks in existing concrete pavement.
- Individual slab replacement with rapid strength concrete consists of removing the existing concrete pavement and replacing it with rapid strength concrete. Replacing deteriorated underlying base with rapid strength concrete or lean concrete base rapid setting may be required.

The Bid Item List and plans will specify which concrete pavement repairs are to be performed.

- Additional background information concerning concrete pavement repairs may be found in the *Concrete Pavement Guide* at:

  http://www.dot.ca.gov/hq/maint/Pavement/Offices/Pavement_Engineering/Concrete_Pavement_Guide.shtml

4-4102 Before Work Begins

4-4102A General

Include the following steps in the preliminary review and inspections:

- Verify that the water pollution control plan is authorized.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes all materials to be used. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Verify that the materials the contractor plans to use comply with Section 41-1.02, "Materials," of the *Standard Specifications*. Where specified, ensure that the proposed products are on the current Authorized Material List or laboratory test data is submitted.
- Require certificates of compliance for fly ash, admixtures, cement, joint sealant, dowel bars, chemical adhesive, compression seal, backer rods, joint filler materials, and epoxy powder coating.
- Ensure the contractor follows the manufacturer's instructions for materials.
- 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. Refer to Sections 4-12, "Temporary Traffic Control," and 2-2, "Traffic," of this manual for a discussion of traffic handling devices and lane closure procedures.
- Check the existing condition of the pavement, and note areas to receive concrete repair as needed.
- Check for the presence of traffic loop detectors to prevent damage.
- Verify that the atmospheric and subgrade temperatures are above the specified minimums and that weather conditions are suitable before beginning concrete repairs.

4-4102B Pavement Subsealing or Jacking

- Check the plans for the pattern and location of injection holes.
- Check the contractor's actual layout of injection hole locations to see that it conforms to the planned pattern.
- Establish vertical control for monitoring pavement grades during subsealing or jacking operations.

4-4102C Joint Seals

- Confirm that a training class on joint seals placement techniques is attended by appropriate personnel.

- Inspect that pavement repairs, grinding, and grooving have been completed by the contractor before sealing joint work begins.

4-4102D Dowel Bar Retrofit

- Discuss dowel bar retrofit methods at the preconstruction meeting with personnel who perform the work.
- Ensure that a training class on dowel bar placement techniques is attended by appropriate personnel or that the contractor has provided written verification of prior acceptable work experience and training involving dowel bar retrofit of existing concrete pavement.
- Evaluate dowel bar alignment, placement, and concrete consolidation of the required test section to ensure conformance with the specification.
- Before slot cutting, survey the existing traffic striping, pavement markings, and pavement markers and determine where delineation repairs will be required.

4-4102E Individual Slab Replacement with Rapid Strength Concrete

For individual slab replacement with rapid strength concrete, do the following:

- Ensure contractor's quality control plan, which details the methods the contractor will use to ensure quality of work, is submitted. Review the quality control plan for conformance with the *Standard Specifications* requirements.
- Verify that manufacturer's instructions for storage and installation of specified materials are submitted.
- Ensure samples of cement from each proposed lot and proposed admixtures are submitted.
- Ensure submittal of mix design for rapid strength concrete including opening age, aggregate gradations, proportions of constituents, maximum time allowance between batching and placing, range of ambient temperatures over which mix design is effective, final set time, and any special requirements such as water temperature. Note that each mix design has a specified maximum ambient temperature range that may result in multiple mix designs for a single project. Modulus of rupture development data is required for each mix design and must include the following minimum age tests: 1 hour before opening age, opening age, 1 hour after opening age; and 24 hours, 3 days, 7 days, and 28 days after placement.
- Ensure quality control plan and methods of performing each item of the work are discussed with the specified personnel at the preconstruction meeting. Items to be discussed include processes for production, transportation, placement, replacing pavement, protecting the pavement before opening to traffic, contingency plan, sampling, and testing.
- Ensure the contractor successfully constructs trial slabs for each mix design. Ensure the contractor is capable of constructing slab replacement in compliance with the specifications within the specified time periods, including delivery, placement, finishing, and curing times, and under similar atmospheric and temperature conditions expected during replacement operations. Additional time for pavement removal, base removal, base replacement, bond breaker, and dowel bar installation as required, must be factored into specified time periods. Trial slabs

are not to be placed on the roadway or within the project limits. During trial slab construction, obtain a split sample of aggregate from the contractor for grading, cleanness value, and sand equivalent testing. Ensure the contractor fabricates test beams in accordance with specification requirements for determining early age and 3-day modulus of rupture values. Verify the contractor's method for curing beams for early age testing. Verify the contractor's means to monitor and record internal temperatures of trial slabs and early age beams. Reject trial slabs not meeting early age and 3-day modulus of rupture requirements. Require the contractor to dispose of trial slabs.

- Ensure contingency plan equipment, materials, and personnel for temporary roadway pavement are at the job site during individual slab replacement operations.
- For projects with larger individual slab replacement quantities, the special provisions may include requirements covering just-in-time training, materials, construction, and payment. Be sure to review these requirements well in advance of the intended work.

4-4103 During the Course of Work

4-4103 During the Course of Work

During the course of the work, do the following for each type of concrete pavement repair strategy:

4-4103A Pavement Subsealing or Jacking

- Verify that the colloidal mixer operates within the specified revolutions per minute.
- Verify that the pump can sustain the specified gauge pressure.
- Verify that the washing device contains the specified number of jets and that the contractor operates it as the specifications require.
- Ensure the contractor performs California Test 541, "Flow of Grout Mixtures (Flow Cone Method)," to ensure that the efflux time is within the required range during grouting operations.
- Ensure the contractor performs California Test 551, "Determining Suitability of Materials for Overlayment and Repair of Portland Cement Concrete Pavements and Structures," as specified.
- Monitor the slab for movement during subsealing.
- Monitor the contractor's string lines during jacking to verify slab has been raised to the established grade.
- Monitor grout mixing so that grout not used within the specified time is disposed of properly.
- Ensure grinding of noncompliant pavement surface conforms to Section 42, "Groove and Grind Concrete," of the *Standard Specifications*.
- Ensure that removal and replacement of noncompliant pavement conforms to Section 41-9, "Individual Slab Replacement With Rapid Strength Concrete," of the *Standard Specifications*.

4-4103B Spall Repair

- Verify that concrete removal is preceded by sawcutting at the required depth along the rectangular areas to be removed. Ensure that any contractor-damaged concrete outside the designated limits of repair is repaired at the contractor's cost and note these areas and quantities in the daily reports.
- Verify that exposed concrete surfaces are cleaned with equipment conforming to specification requirements.
- Prior to spall repair material placement, observe joint form board installation and ensure any bonding agent is mixed in accordance with manufacturer's instructions and applied to concrete surfaces.
- Ensure spall repair material is mixed, placed, cured, and protected in accordance with specification requirements.
- Ensure removed or damaged joint sealant is repaired at spall locations in accordance with Section 41-5, "Joint Seals," of the *Standard Specifications*.

4-4103C Joint Seals

- Ensure removal of existing joint sealant material does not damage the existing sealant reservoir or pavement.
- Where joint sealant reservoirs are constructed, ensure concrete residue from sawing operations is collected, contained, and disposed of properly.
- Prior to backer rod installation, ensure sealant reservoir is free of debris, dried, sandblasted, air blasted, and vacuumed in accordance with the specifications.
- Ensure backer rod installation does not leave a residue or film on the reservoir walls that will later receive sealant.
- Ensure sealant is prepared and installed in accordance with manufacturer's instructions and specification requirements.
- Prior to opening to traffic, ensure the sealant is tack free and firm enough to prevent embedding of roadway debris into the sealant.

4-4103D Pavement Transition Taper

- Verify that removal operations do not damage concrete pavement to remain in place and do not create flying debris.
- Ensure that grinding concrete pavement complies with Section 42-3, "Grinding," of the *Standard Specifications*.
- Ensure that concrete replacement complies with Section 41-9, "Individual Slab Replacement With Rapid Strength Concrete," of the *Standard Specifications*.

If placing temporary hot mix asphalt is required, comply with Section 39-2.07, "Minor Hot Mix Asphalt," of the *Standard Specifications*.

4-4103E Dowel Bar Retrofit

- Ensure polyester concrete and joint sealants are stored and installed in accordance with manufacturer's instructions.

- Ensure saw cut equipment conforms to requirements in the specifications and that saw cuts meet specified tolerances. Verify that concrete debris, water residue, and paste are immediately removed during saw cutting operations.
- Prior to concrete removal operations, verify that the contractor has sufficient temporary backfill material on hand in accordance with the specifications.
- Ensure concrete removal operations do not damage concrete pavement to remain in place. Verify that contractor's removal equipment does not exceed the class specified.
- Ensure the contractor has scheduled work shifts so removal of concrete for dowel bar slots, placement of dowel bars, and placement of polyester concrete with required cure time will occur prior to opening to traffic. Use of temporary backfill material is a back-up plan if anticipated production is not achieved. Subsequent work shift operations should be adjusted in consideration of actual production rates.
- Ensure dowel bar slots are constructed and cleaned in accordance with specification requirements.
- Verify transverse joints are sealed with caulking filler material meeting specifications.
- Ensure dowel bars are clean prior to application of dowel bar lubricant. Ensure proper clearance is provided between the dowel bar and pavement surface and placement tolerances are maintained. Verify that expansion caps have been placed on dowel bars and will provide at least the minimum specified joint movement at each end of the bar.
- To ensure proper performance of the dowel bars, pay particular attention to the foam core insert, which, when properly installed, helps isolate adjacent slabs. Leakage or displacement of the foam core insert during placement of polyester concrete may damage concrete pavement and shorten design life. Likewise, dowel bar support chairs must securely hold dowel bars during placement and consolidation of polyester concrete or future problems may arise.
- Ensure polyester concrete is mixed in accordance with manufacturer's instructions. Ensure containers and tools are appropriate for mixing polyester concrete.
- Polyester concrete is to be placed while plastic and immediately consolidated with a small handheld vibrator that thoroughly consolidates the polyester concrete material. Retempering of polyester concrete is not allowed. Finishing tools should be dried thoroughly prior to use.
- Verify that the polyester concrete is cured under the manufacturer's instructions.
- The contractor grinds concrete pavement under Section 42, "Groove and Grind Concrete," of the *Standard Specifications* within 30 days from the initial saw cutting for the dowel bar slots and at least 12 hours after placing polyester concrete. Grinding is to be performed prior to any sawing and sealing of joints within the retrofit lanes. Ensure the contractor complies with pavement smoothness and finishing requirements.
- The contractor must perform random cores to ensure proper alignment of dowel bars as specified in Section 41-8.03F, "Placing Dowel Bars," of the standard special provisions. If cores indicate dowel bars were installed incorrectly, stop

dowel bar retrofit activities until the contractor has demonstrated that the problem causing the improper positioning has been corrected. Ensure that dowel bars identified as damaged or misaligned are replaced.

- Ensure that pavement delineation removed or damaged due to dowel bar retrofit is repaired in accordance with Section 81, "Miscellaneous Traffic Control Devices," and Section 84, "Markings," of the *Standard Specifications*.

4-4103F Individual Slab Replacement With Rapid Strength Concrete

- Verify that contingency plan equipment, materials, and personnel for temporary roadway pavement structure are present at the job site.
- Ensure that saw cutting is done no more than 2 days before removing pavement. Saw cutting is perpendicular to the travelled way, but the contractor is allowed to saw cut parallel or diagonal to the travelled way if saw cutting and removing pavement is done during the same work shift.
- Prior to concrete removal, dowel bars and tie bars must be sawn. Ensure the contractor does not impact the surface within 18 inches of the pavement remaining in place.
- Verify that removal of the pavement and base does not damage pavement or base remaining in place. Ensure removed materials are disposed of by the contractor.
- Verify contractor prepares the finished surface of the remaining material in accordance with the specification requirements and to the established grade. Any over-excavated areas are to be filled with base replacement material, in the same operation as the base replacement, at the contractor's cost.
- Examine base replacement layer to verify it has a smooth surface free of voids, porous areas, and projections such as mortar ridges.
- Prior to placing bond breaker, ensure any foreign or loose materials are removed from the base surface. Ensure bond breaker is placed in accordance with specification requirements.
- Ensure installation of dowel bars at transverse construction joints conforms to specification requirements and manufacturer's instructions. Dowel bars must be supported during the chemical adhesive minimum cure time.
- Where rapid strength concrete will be placed against existing concrete, ensure joint filler is placed along the existing transverse and longitudinal joint faces and extending to the full depth, in accordance with the specifications. Depending on existing transverse joint spacing in adjacent lanes, additional transverse contraction joints may require construction as specified.
- Coordinate inspection of rapid strength concrete with plant inspection personnel. Ensure lines of communication are maintained between the plant and the field so contingencies can be used appropriately. Rapid strength concrete must conform to Section 90-3, "Rapid Strength Concrete," of the *Standard Specifications*.
- Spreading, compacting, shaping, and protecting rapid strength concrete must conform to specified requirements.
- Ensure the contractor samples and fabricates beam specimens to determine modulus of rupture at opening age and 3 days, which are used for contract acceptance and payment determination. The modulus of rupture value is

determined under California Test 524, "Flexural Strength of Rapid Strength Concrete," by testing three beam specimens for each age. No single test represents more than that day's production or 130 cubic yards, whichever is less. Split samples for Caltrans' 3 days modulus of rupture testing.

- Ensure that rapid strength concrete surface is finished in accordance with specification requirements. Inspect final texturing of concrete pavement for compliance with coefficient of friction requirements. Schedule coefficient of friction testing on questionable areas. Where friction requirements have not been met, the contractor must groove or grind the pavement in accordance with Section 42, "Groove and Grind Concrete," of the *Standard Specifications*.
- Check concrete pavement smoothness using a 12-foot straightedge placed parallel with and perpendicular to the centerline in accordance with the specifications. Ensure the contractor corrects pavement smoothness that is out of compliance.
- When needed, ensure temporary roadway pavement structure is placed, maintained, removed, and disposed of in accordance with specification requirements.

4-4104 Level of Inspection

4-4104 Level of Inspection

Suggested levels of inspection for typical existing concrete pavement repair work activities are:

- Benchmark inspection of base.
- Intermittent sampling and testing of concrete pavement repair materials.
- Intermittent review and monitoring of contractor's quality control program including quality control test results.
- Continuous inspection of concrete delivery, placement, finishing, curing, and joint operations.
- Benchmark inspection of pavement smoothness.
- Benchmark inspection of finished surface texture.

4-4105 Quality Control

4-4105 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Ensure the contractor is actively performing quality control on concrete pavement repair materials throughout production operations by reviewing copies of quality control records, including quality control test results.
- The quality control plan must include, but not be limited to:
    - Frequency of quality control sampling and testing that meets or exceeds specification requirements in "Quality Control Testing," of the *Standard Specifications*, as follows:
        - Section 41-2.01D(2), "Quality Control," for subsealing and jacking
        - Section 41-9.01D(2), "Just-in-Time Training," for individual slab replacement with rapid strength concrete
    - Time and frequency of submitting test results.

4-4106 Payment

4-4106
Payment

For measurement and payment, review the plans and quantity calculations in the resident engineer's file to determine if there is sufficient detail and accuracy to be used in the project records. Deduct for any areas that were repaired due to contractor's damage.

For subsealing and jacking, 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.

Count bags of packaged fly ash and cement to determine pay quantities for grout by dry weight. During counting, ensure that duplication or omission does not occur. Collect weighmaster certificates for materials delivered in bulk, and remember to deduct quantities of materials not used or wasted. There are no unit price adjustments for an increase and decrease in subsealing and jacking quantity.

For spall repair, payment is measured by the authorized saw cut area. There are no unit price adjustments for an increase and decrease in spall repair quantity.

For sealing concrete pavement joints, measure the actual length of joints installed for seal/replace concrete pavement joint quantity.

For pavement transition tapers, payment is measured from dimensions shown. No additional compensation is made when temporary hot mix asphalt is used.

For dowel bar retrofit, quantify the number of dowel bar retrofits performed. Do not pay extra for replacing noncompliant dowel bars. Payment for grinding pavement is not included.

For individual slab replacement, payment is based on field measurements. Drill and bond dowel bars and replacing base are not included in payment for individual slab replacement. Specified pay factor adjustments are applicable for low modulus of rupture of rapid strength concrete at 3 days. Rapid strength concrete not meeting the minimum opening age modulus of rupture is to be replaced at the contractor's expense.

Section 42 Groove and Grind Concrete

4-4201 General
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4-4203 During the Course of Work
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4-4203B Grooving
4-4203C Grinding
4-4204 Level of Inspection
4-4205 Quality Control
4-4206 Payment

Section 42 Groove and Grind Concrete

Section 42
Groove and
Grind Concrete

4-4201 General

4-4201
General

This section provides guidelines for inspecting groove and grind concrete roadway surfaces for work specified under Section 42, "Groove and Grind Concrete," of the *Standard Specifications*.

The *Concrete Pavement Guide* discusses groove and grind strategies of concrete pavements and is available at:

http://www.dot.ca.gov/hq/maint/Pavement/Offices/Pavement_Engineering/Concrete_Pavement_Guide.shtml

Grooving is usually performed to reduce wet weather accidents on existing concrete pavements or as friction correction on new concrete pavements.

Grinding is usually performed to improve the ride quality and texture on existing concrete pavements or for smoothness and friction correction on new concrete pavements.

4-4202 Before Work Begins

4-4202
Before Work
Begins

Include the following in the preliminary review and inspections:

- If the contract specifies inertial profiler measurements, discuss pavement smoothness requirements with the contractor, including existing smoothness information, submittals, and any contractual testing dispute resolution processes. Refer to Section 4-36, "Surfacing and pavements—General," of this manual for pavement smoothness procedures. Remind the contractor that failure to achieve compliance will require corrective action or removal and replacement, refer to Section 5-1.30, "Noncompliant and Unauthorized Work," of the *Standard Specifications*.
- Discuss traffic handling with the contractor and review the contractor's plan for lane closures. For traffic handling devices and lane closure procedures, refer to Sections 4-12, "Temporary Traffic Control," and 2-2, "Traffic," of this manual.
- Ensure the contractor's equipment meets specified requirements.
- Locate loop detectors to prevent damage to the loop detectors' sealant. If loop detectors are not visible, consult with the district Traffic Unit.
- Check local noise ordinances and review specified noise requirements.
- In areas to be grooved and ground, see if the contract requires yellow stripe and pavement marking removal prior to grooving and grinding. If yellow striping and marking must be removed prior to grooving and grinding, refer to Section 7-107E, "Removing Yellow Traffic Stripe and Pavement Markings with Hazardous Waste Residue," of this manual.
- Verify the existence of a water pollution control plan.

- The contract may show locations for on-site drying of concrete grooving and grinding residue before disposal. Verify that temporary storage materials for this purpose conform to WM-8, "Concrete Waste Management," in the *Construction Site Best Management Practices (BMPs) Manual* or Section 13-9.02, "Materials," of the *Standard Specifications*.
- The contract or materials information handout may identify locations within the right-of-way for final disposal of concrete grinding and grooving residue. The resident engineer must verify that a Regional Water Quality Control Board permit or approval is included in the materials information handout or resident engineer file. If the permit or approval has not been included, contact your environmental-construction liaison for assistance in obtaining these documents. Refer to the contract special provisions to obtain information about offsite disposal facilities for concrete grooving and grinding residue.
- When the contract documents do not allow final disposal of grooving and grinding residue within the right-of-way, obtain from the contractor the name and location of the disposal facility that will receive the concrete grooving and grinding residues, in accordance with Sections 5-1.20B(4), "Contractor-Property Owner Agreement," and 13-4.03E(7), "Paving, Sealing, Saw Cutting, Grooving, and Grinding Activities," of the *Standard Specifications*. Obtain a copy of the facility's water quality or other applicable agency permit or written approval; or applicable local, state, or federal agency permits for disposal sites outside of California. Also ensure the following:

    1. The disposal facility is permitted by the California Environmental Protection Agency (Cal/EPA) to accept concrete residue. Oral confirmation from the facility operator and documentation in the resident engineer's daily report are sufficient verification of the permit status of commercial disposal facilities on this list.
    2. The contractor provides a copy of the Cal/EPA permit for disposal of the liquid concrete residue if choosing the noncommercial offsite disposal facility.
    3. If the disposal site is outside of California, the contractor must provide to the resident engineer a copy of the permit issued by the state agency having jurisdiction over the site. The permit must be provided before disposal.

4-4203 During the Course of Work

4-4203 During the Course of Work

During the course of the work, do the following:

4-4203A Grooving and Grinding Operations

The following apply 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.
- Ensure that a vacuum device picks up the concrete residue and that the residue does not flow across the pavement or enter storm drain inlets.

- For projects that temporarily store concrete residue in washout facilities, ensure that the plastic liner seams are installed in accordance with manufacturer requirements. Regularly inspect the liners during installation and operations to ensure that they are free of holes, tears, or other defects that will compromise the impermeability of the liner. Inspect washout facilities to ensure that adequate holding capacity and minimum freeboard are maintained.
- When the operation is complete, and offsite disposal is specified, obtain from the contractor, final proof of delivery of the residue to the off-site disposal facility.

4-4203B Grooving

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 Grinding

When grinding is specified:

- Unless specified otherwise, test for pavement smoothness under Sections 36-3, "Pavement Smoothness," and 40, "Concrete Pavement," of the *Standard Specifications*.
- Determine if any abnormally depressed areas must be excluded from testing with the inertial profiler and the 12-foot straightedge.
- Ensure the inertial profiler uses a minimum 4-inch line laser to obtain profile measurements for concrete pavements.
- Ensure the contractor submits inertial profile information to smoothness@dot.ca.gov under Section 36-3, "Pavement Smoothness," of the *Standard Specifications*.
- Ensure ground areas on structures, approach slabs, and 50 feet of approach pavement meet the smoothness and cover requirements in Section 51-1.01D(3)(b), "Testing Concrete Surfaces," of the *Standard Specifications*.
- In accordance with California Test 342, "Method of Test for Surface Skid Resistance with the California Portable Skid Tester," determine the coefficient of friction for surfaces that have been ground and do not open lanes to traffic unless requirements are met.

4-4204 Level of Inspection

4-4204 Level of Inspection

Suggested levels of inspection for grooving and grinding activities are:

- Intermittent review of pavement smoothness.
- Benchmark review of coefficient of friction.

4-4205 Quality Control

4-4205 Quality Control

Ensure the contractor is actively performing quality control on pavement smoothness throughout the grinding operations by reviewing inertial profile data.

4-4206 Payment

4-4206 Payment

For measurement and payment, do the following:

- Review the plans and quantity calculations in the resident engineer's file to determine if there is sufficient detail and accuracy to be used in the project records.
- 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.
- Where grinding has begun on an area that is then replaced by concrete pavement, do not pay for the original grinding area. Instead, measure the area of replaced concrete pavement and pay under the item for grind existing concrete pavement. Do not pay for grinding replacement concrete pavement or for additional grinding to comply with smoothness requirements.

Section 46 Ground Anchors and Soil Nails

Section 46 Ground Anchors and Soil Nails

4-4601 General

4-4601 General

For guidance on Ground Anchors, refer to Appendix K6, "Ground Anchor Wall Construction Checklist," of Structure Construction's *Foundation Manual*.

For guidance on Soil Nails, refer to Appendix K7, "Soil Nail Wall Construction Checklist," of Structure Construction's *Foundation Manual*:

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

4-4602 Payment

4-4602 Payment

Calculate the quantities for soil nails, including verification and test soil nails, from the lengths shown on the plans or ordered.

Section 47 Earth Retaining Systems

Section 47
Earth Retaining
Systems

4-4701 General

4-4701
General

Earth retaining systems include mechanically stabilized embankments, reinforced concrete crib walls, Type 6 retaining walls, and alternative earth retaining systems. For guidance on earth retaining systems, refer to *Bridge Construction Records and Procedures* manual. For guidance specific to mechanically stabilized embankments, refer to Bridge Construction memo 145-8.0, "Mechanically Stabilized Embankment Wall Construction Checklist," in Structure Construction's *Bridge Construction Records and Procedures* manual, Vol. 2, available at:

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

4-4702 Payment

4-4702
Payment

For the basis of measurement and payment, refer to the appropriate sections of the special provisions and *Standard Specifications*.

Section 48 Temporary Structures

Section 48 Temporary Structures

4-4801 General

4-4801 General

Temporary structures includes falsework, temporary supports for existing structures, temporary decking for joint or deck reconstruction, and jacking support systems for lowering bridge superstructure. For guidance on temporary structures, refer to Structure Construction's *Bridge Construction Records and Procedures* manual, *Bridge Deck Construction Manual*, and *Falsework Manual* at:

www.dot.ca.gov/hq/esc/construction/manuals/

For guidance specific to falsework and temporary supports for existing structures, refer to Bridge Construction memo 120-0.0, "Falsework" in *Bridge Construction Records and Procedures* manual, Vol. 2, and the *Falsework Manual*.

For guidance specific to temporary decking for joint or deck reconstruction, refer to Bridge Construction memo 135-2.0, "Bridge Deck Expansion Joints and Joint Seals," in *Bridge Construction Records and Procedures* manual, Vol. 2, and the *Bridge Deck Construction Manual*.

4-4802 Payment

4-4802 Payment

For the basis of measurement and payment, refer to the appropriate sections of the special provisions and *Standard Specifications*.

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, refer to Section 130, "Foundations," of Structure Construction's *Bridge Construction Records and Procedures* manual, Vol. 2 and the *Foundation Manual*:

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

4-4902 Before Work Begins

4-4902
Before Work
Begins

Before work begins, do the following:

- Review the project plans with the contractor to determine the locations where piling will be installed adjacent to traffic lanes open to the public. Require the contractor to submit for authorization a work plan for those locations where the distance from the pile driving area to the nearest traffic lane open to the public is less than the length of piles to be handled or installed. Review and authorize the plan before allowing the contractor to start piling operations adjacent to traffic lanes open to the public.
- 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 project delays.
- Verify that Form CEM-3101, "Notice of Materials to Be Used" includes piling materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- For instructions on preparing pile records to be kept during piling operations, review Bridge Construction Memo 3-7.0, "Pile Records," of Structure Construction's *Bridge Construction Records and Procedures* manual, Vol. 1.

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

4-4903 During the Course of Work

4-4903
During the
Course of Work

Piling operations are dangerous. The *Foundation Manual* contains safety information for various types of piling operations. In addition, Structure Construction's *Code of Safe Practices* contains guidelines to follow for various piling operations. Before the contractor's operations begin, review both sources of information and the contractor's work plan, if required, in a tailgate safety meeting.

Record drilling and driving information required in Bridge Construction Memo 3-7.0, "Pile Records." At the completion of the piling operation, forward the piling information to Structure Construction's headquarters in Sacramento.

4-4904 Quality Control

4-4904 Quality Control

Guidance for quality control activities for steel pipe piles is summarized as follows:

- Review and authorize the contractor's shop drawings.
- Review and authorize the contractor's welding quality control plan.
- Verify that steel pipe piles are fabricated at a plant on Caltrans' authorized facility audit list.
- Ensure nondestructive weld testing is performed and verify that test results comply with the requirements of Section 49-2.02A(4)(b)(iii), "Nondestructive Testing," of the *Standard Specifications*.

Guidance for quality control activities for cast-in-place concrete piles placed is summarized as follows:

- Review and authorize the pile installation plan.
- When concrete is to be placed under slurry:
  - Verify concrete test batch is produced and transported under the same conditions anticipated during pile construction.
  - Ensure that the contractor does not vibrate or agitate the concrete test batch during the set period.
  - Coordinate slump testing for Caltrans acceptance.
- Review the contractor's concrete placement log.

4-4905 Payment

4-4905 Payment

Furnished and cast-in-place concrete piles are measured by the foot the longest side from the tip of the pile to the plane of pile cutoff. Driven piles include an added item for driving each pile. Record information about drilling, driving, and measurements in accordance with Bridge Construction Memo 3-7.0, "Pile Records," of Structure Construction's *Bridge Construction Records and Procedures* manual, Vol. 1.

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, refer to Section 160, "Prestressed Concrete," of Structure Construction's *Bridge Construction Records and Procedures* manual, Vol. 2 and *Prestress Manual*:

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

4-5002 Before Work Begins

4-5002
Before Work
Begins

To comply with Section 5-1.23, "Submittals," of the *Standard Specifications*, the contractor must submit for authorization the shop drawings of the proposed prestressing system. The shop drawings are submitted directly to Structure Design's Documents Unit, as specified in Section 50, "Prestressing Concrete," of the *Standard Specifications*. The review of the working drawings is a coordinated effort between Structure Design and Structure Construction. Structure Design has the primary responsibility for authorizing the shop drawings.

Before work begins, take the following steps:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," and make sure it includes information on prestressing materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Review the *Prestress Manual* for instructions on prestressing records to keep during prestressing operations.
- Before the contractor's operations begin, review both sources of information in a tailgate safety meeting.

4-5003 During the Course of Work

4-5003
During the Course
of Work

Prestressing operations are dangerous. The *Prestress Manual* contains safety information for prestressing operations. Additional safety information can be found in Structure Construction's *Code of Safe Practices* and is available by clicking on the Safety tab at:

http://des.onramp.dot.ca.gov/structure-construction

After completing the work for each structure, the contractor must electronically submit corrected as-built drawings to the resident engineer for transmittal to Structure Design's Documents Unit. Remind the contractor that final contract acceptance will not occur until the corrected as-built drawings have been submitted.

4-5004 Quality Control

4-5004 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Verify that the contractor is complying with the authorized grouting plan and they are submitting daily grouting reports.
- Verify that the contractor has calibrated their jacking equipment within a year of use or after repair.
- Verify that the contractor has pressure tested the ducts for post-tensioned concrete bridges.
- Verify the qualifications of contractor's personnel performing post-tensioning.
- Witness the contractor's demonstration that prestressing steel in ducts is unbonded or that ducts are unobstructed if prestressing steel has not yet been installed.
- Witness the contractor's voids investigation of grouted ducts.

4-5005 Payment

4-5005 Payment

The contract price for furnishing precast members includes payment for prestressing precast concrete members. Prestressing cast-in-place concrete is paid for as a lump sum price. For guidelines for making monthly progress payments for prestressing cast-in-place concrete, refer to Bridge Construction Memo 6-4.0, "Partial Payments," of Structure Construction's *Bridge Construction Records and Procedures* manual, Vol. 1:

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

Section 51 Concrete Structures

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4-5103 During the Course of Work
4-5103A Placing Concrete
4-5103B Concrete Placed 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 Quality Control
4-5105 Payment

Section 51 Concrete Structures

Section 51
Concrete
Structures

4-5101 General

4-5101
General

This section covers items related to constructing concrete structures. Section 51, "Concrete Structures," of the *Standard Specifications* provides requirements for constructing concrete structures. Concrete structures include concrete bridges, 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 other major structures and are covered in detail in Structure Construction's *Bridge Construction Records and Procedures* manual at:

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

Additional reference material can be found in the *Foundation Manual*, the *Prestress Manual*, and the *Bridge Deck Construction Manual* at the website.

Section 3-703, "Public Safety," of this 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 cementitious material content and compressive strength of the concrete to be used. Review Section 4-90, "Concrete," of this manual, which covers the mix design review, authorization, 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 which tests will be performed, and the frequency and location of such testing, and assign the duties accordingly. For guidelines, refer to Chapter 6, "Sampling and Testing," of this manual.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes concrete structure materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

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 placed 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 placement order. 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, verify 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. Check for 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 experience with various concrete mixes. In general, subsidence has occurred when bleed water at the surface has disappeared.

4-5103B Concrete Placed Under Water

Ensure the contractor meets all specifications related to Section 51-1.03D(3), "Concrete Placed 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 as well as 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, refer to 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.
- Verify that form bolts and fasteners are the types specified.
- Before concrete placement, 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 in accordance with 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 other major structures, refer to the *Bridge Construction Records and Procedures* manual.

Ensure that joints are constructed as specified. 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, and 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. 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 or bonding and places the grout or bonding material and dowels as specified.
- When mortar is used, ensure the contractor proportions, places, and cures the mortar as specified.
- Ensure water stops are installed as specified and where shown on the plans. During concrete placement, make sufficient observations to ensure the water stops 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, refer to the *Bridge Construction Records and Procedures* manual.

4-5104 Quality Control

4-5104 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Verify that the contractor's quality control records are submitted timely and that results comply with contract requirements.
- If rapid strength concrete (RSC) is used, ensure the contractor prequalifies RSC before use.
- If test panels are specified, ensure that concrete test panels and slabs are constructed at authorized locations and that test results comply with contract requirements before starting work.
- Verify that material and lubricant-adhesive is tested.
- For joint seal assemblies with a movement rating of more than 4 inches, ensure that a manufacturer technical representative is present during installation.
- For asphaltic plug joint seals, verify binder material is tested.
- Witness the contractor's proof testing of structural load bearings.
- If using RSC to construct approach slabs, ensure the contractor constructs trial slab for each concrete mix design. Verify trial slabs are constructed in compliance with finish, cure, and compressive strength requirements as specified in Section 51-5.01D(2)(b),"Rapid Strength Concrete," of the *Standard Specifications*.
- Ensure that temperature monitoring and data recording is done for mass concrete elements and verify that recorded temperatures comply with the specified requirements.

4-5105 Payment

4-5105
Payment

Take the following steps:

- In conformance with the dimensions shown on the plans, measure the quantity of concrete in structures by the cubic yard 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

4-5201 General

Section 52, "Reinforcement," of the *Standard Specifications* provides requirements for fabricating and placing reinforcement. Items used for reinforcement include bars, welded wire, and wire. For details about reinforcement, refer to Structure Construction's *Bridge Construction Records and Procedures* manual at:

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

Refer to the contract specifications, Sections 3-606, "Certificates of Compliance," and 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual regarding Buy America requirements. Requirements for mandatory use of domestic materials are found in Section 6-1.04, "Buy America," of the *Standard Specifications*.

4-5202 Before Work Begins

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 of reinforcement delivered to the job site.

Before work begins, do the following:

- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes reinforcement materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- For each lot of material delivered to the project, require the contractor to conform to Section 6-2.03C, "Certificates of Compliance," of the *Standard Specifications*.
- Inspect hook details to ensure they conform to specifications. Refer to the *Bridge Construction Records and Procedures* manual, Vol. 2, Section 165, for hook details. 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 cleanness, ensuring it does not have mortar, oil, dirt, excessive mill scale, scabby rust, or other harmful coatings. Decide whether such harmful coatings will destroy or reduce bonding. 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 52-2.02, "Epoxy-Coated Reinforcement," of the *Standard Specifications*, require repair or replacement of damaged epoxy-coated, bar reinforcing steel.

- Note the following:

  1. The contractor may substitute welded wire reinforcement for bar reinforcement in certain concrete work as specified in the *Standard Specifications*; however, welded wire may not be substituted for epoxy-coated reinforcement. The *Bridge Construction Records and Procedures* manual, Vol. 2, Section 165, contains information that may be used to determine equivalent areas of the steel.
  2. 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, "Reinforcement," of the *Standard Specifications*.
  3. 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.
  4. Before allowing butt welding to splice bar reinforcement, refer to the contract documents and the *Bridge Construction Records and Procedures* manual, Vol. 2, Section 180.
  5. Before allowing mechanical splicing of bar reinforcing steel, refer to the contract documents and the *Bridge Construction Records and Procedures* manual, Vol. 2, Section 165.

4-5203 During the Course of Work

4-5203 During the Course of Work

During the course of work, do the following:

- 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, Vol. 2, 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 Caltrans reviews and authorizes. Use the authorized 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 welded wire 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 harmful coating 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.
- Note the following:

  1. Vibrators used to consolidate concrete containing epoxy-coated reinforcing steel must have a resilient covering to prevent damage to the epoxy coating.
  2. Epoxy-coated prefabricated reinforcement (purple or gray in color) is cut to size and bent to shape before the coating is applied. Epoxy-coated prefabricated reinforcement must not be bent or rebent after coating application.
  3. 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, Vol. 2, Section 180, for guidelines.
- Bar reinforcing steel is spliced by lapping bars, by butt welding bars, or by using mechanical couplers. Welded wire 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. Note 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 welded wire reinforcement must be tied securely with wire to prevent distortion.
- Verify that all mechanical butt splices, butt welds, and lap welds on epoxy-coated reinforcing steel are protected from corrosion with a corrosion protection system that is on the METS Authorized Material List for corrosion protection coverings. The METS Authorized Material List is available at:

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

- The corrosion protective system must be used in accordance with manufacturer and Caltrans requirements. Ensure the cover is installed as a continuous piece with sufficient diameter and length to achieve an adequate seal and bond length. The cover must be free of dirt, grease, sharp edges, tears, or pinholes. After the cover is heated as specified, ensure it extends a minimum of 2 inches onto the epoxy-coated reinforcing steel.

4-5204 Payment

4-5204 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 placed in the structure. Also, calculate any changes that result in increases or decreases in quantities of reinforcement.

Section 53 Shotcrete

4-5301 General

This section provides guidelines for inspection of shotcrete placement under Section 53, "Shotcrete," of the *Standard Specifications*. Shotcrete is concrete that is pneumatically projected onto a surface. Shotcrete is used for facing of soil nail walls. Shotcrete may be used for lining ditches and channels, paving slopes, constructing warped sections, and structural elements. Shotcrete may also be used for structural repairs.

4-5302 Before Work Begins

Before work begins, do the following:

- Review the contract to determine the areas and conditions in which shotcrete could be used. Determine whether the contractor intends to use shotcrete for structural elements and that it is provided for in the special provisions or Section 51-1.03B, "Methods and Equipment" of the *Standard Specifications*.
- Review and become familiar with Sections 46-3, "Soil Nails"; 53, "Shotcrete"; 72-5, "Concrete Slope Protection, Gutter Lining, Ditch Lining, and Channel Lining"; and 72-11, "Slope Paving," of the *Standard Specifications*.
- Authorize the contractor's quality control plan, witness the construction and demolition of preconstruction test panels, and obtain compressive strength results for sampled cores.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes cement and aggregate. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

4-5303 During the Course of Work

The following guidelines are for nonstructural and structural applications of shotcrete:

- Examine the foundation that will receive the shotcrete and 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 cementitious material and aggregate, and test them for all specified attributes. Ship the samples to the district Materials Unit for testing at the frequency shown in Section 6-1, "Sample Types and Frequencies," of this 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 cementitious material and aggregate.
- Take measurements and keep records to support payment for the work.
- Limit the placing of shotcrete to the specified lifts or layers.
- 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 cementitious material 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.

Follow these additional instructions for structural shotcrete applications:

- For locations where shotcrete can be used, refer to the special provisions and plans.
- Ensure the proper mix is delivered by checking the mix design number and the concrete mix design proportions on the concrete batch delivery ticket from the first truck and by verifying the concrete batch delivery tickets periodically throughout the day.
- Ensure that the nozzle person and the blowpipe operator work together and that the nozzle person does not get ahead of the blowpipe operator.
- Ensure the finishers rake away any loose material the blowpipe could not remove.
- Watch vertical surfaces and ensure no slough-off occurs because of mix that is too wet. Reference any areas that do slough off so they can be carefully inspected to ensure the integrity and soundness of the concrete after it has hardened. Any wet mix that does slough off should be removed and then reshot.
- Ensure that the nozzle person provides complete encasement of the reinforcement. Where there are double mats of reinforcement, the nozzle person needs to place the nozzle through the front mat of the reinforcement and shoot both sides of large bars.
- On occasion, rake out areas of congested reinforcement to verify that shotcrete fully encases the 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 Structure Construction.
- Verify that the surface finish matches the one demonstrated in the preconstruction test 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 Quality Control

4-5304 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Review and authorize structural concrete quality control plans.
- Ensure the nozzle person's experience conforms to the requirements for applying shotcrete in the intended location.
- Witness the construction and demolition of test panels. After demolition, inspect test panels for laminations and sand pockets, and verify the bar reinforcement and other obstructions are completely encased. For unreinforced test panels, confirm coring for compressive strength testing.
- Review concrete compressive strength results and inspect concrete cores.
- During field quality control ensure that the contractor obtains cores at four locations for every 50 cubic yards of production shotcrete. Select additional locations when the cores contain bar reinforcing.
- Inspect the cores to see that the concrete is dense and free of laminations and sand pockets, and confirm compressive strength is acceptable.
- Verify that the cored holes are patched with mortar.

4-5305 Payment

4-5305 Payment

Measure shotcrete by the cubic yard, 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. Payment for bar reinforcing steel is not included in the payment for structural concrete.

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

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, dampproofing, preformed membrane waterproofing, deck seals, and slurry leveling courses. Other types of waterproofing may be specified in the special provisions.

4-5402 Before Work Begins

Before work starts, do the following:

- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes waterproofing materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products" of this manual for additional information.
- Upon delivery of the waterproofing materials, note whether they are identified by marks or inspection tags.
- You may accept preformed membrane sheets on the basis of a certificate of compliance. Complete Form CEM-4102, "Material Inspected and Released on Job."

4-5403 During the Course of Work

During the course of work, do the following:

- Sample waterproofing materials in accordance with Section 6-1, "Sample Types and Frequencies," of this manual.
- Ensure the contractor prepares surfaces as specified.
- Ensure weather conditions meet the specifications before applying primer or asphalt.
- Ensure the temperature of waterproofing asphalt is within the specified range.
- Inspect the operation to ensure the contractor applies materials as specified.

4-5404 Quality Control

While specific levels of quality control sampling and testing for waterproofing are not included in Section 54 of the *Standard Specifications*, the contractor is responsible for providing quality control under Sections 5-1.01, "General," and 6-2.02, "Quality Control," of the *Standard Specifications*. Ensure the contractor is actively performing quality control on materials for waterproofing treatment throughout production operations by reviewing copies of quality control records, including quality control test results.

4-5405 Payment

Field-measure areas unless the quantities are designated as final pay quantities.

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, refer to Sections 170, "Structural Steel," and 180, "Welding," of Structure Construction's *Bridge Construction Records and Procedures* manual, Vol. 2, available at:

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

4-5502 Before Work Begins

4-5502
Before Work
Begins

The contractor must submit for authorization the shop drawings for structural steel in accordance with Section 5-1.23, "Submittals," of the *Standard Specifications*. The shop drawings are submitted directly to the Structure Design Documents Unit. The review of the shop drawings is a coordinated effort between Structure Design, Materials Engineering and Testing Services (METS), and Structure Construction. Structure Design has the primary responsibility for authorizing the shop drawings.

If any welding must be performed, the contractor must submit a quality control plan for the work. For guidelines in authorizing the submittal, refer to Section 180, "Welding," of the *Bridge Construction Records and Procedures* manual, Vol. 2.

- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes structural steel materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

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 before installation. 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.
- For guidelines on welded connections, refer to Section 180, "Welding," of the *Bridge Construction Records and Procedures* manual, Vol. 2.
- After the completion of the work for each structure, the contractor must submit corrected shop drawings to the resident engineer for transmittal to Structure Design's Documents Unit. Remind the contractor that final acceptance of the contract will not occur until the corrected drawings have been submitted.

4-5504 Quality Control

4-5504 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Verify that the fabrication facility is authorized in accordance with Section 6-2, "Quality Assurance" of the *Standard Specifications*.
- Verify that welding is authorized in accordance with Section 11, "Welding" of the *Standard Specifications*.
- Verify that torque wrenches are calibrated.
- Witness the contractor's verification of minimum tension as required by the specifications. Record the data in the project files.
- Ensure that the contractor's quality control records are submitted timely and that the results comply with contract requirements.

4-5505 Payment

4-5505 Payment

Refer to the appropriate sections of the special provisions and *Standard Specifications* for the basis of measurement and payment.

Apply administrative deductions to source inspections outside the State of California in accordance with 6-2.01E "Material Source Inspection and Testing."

Section 56 Overhead Sign Structures, Standards, and Poles

4-5601 General
4-5602 Before Work Begins
4-5603 During the Course of Work
4-5603A Overhead Sign Structures
4-5603B Standards
4-5604 Quality Control
4-5605 Payment

Section 56 Overhead Sign Structures, Standards, and Poles

Section 56 Overhead Sign Structures, Standards, and Poles

4-5601 General

4-5601 General

This section provides inspection guidelines for items associated with constructing overhead sign structures and fabricating and installing standards and poles. Section 56, "Overhead Sign Structures, Standards, and Poles," of the *Standard Specifications* provides requirements for doing this work.

Overhead sign structures vary from simple trusses to complicated sign bridges containing changeable message signs.

The majority of overhead sign structures fit into one of six categories:

1. Truss
2. Lightweight
3. Tubular
4. Lightweight Extinguishable Message Sign (EMS)
5. Changeable Message Sign (CMS)
6. Bridge Mounted Sign (BMS)

Technical and administrative guidance regarding sign structures is covered in detail in Structure Construction's *Bridge Construction Records and Procedures* manual at:

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

The *Overhead Sign Structures Guide* provides additional guidance for activities such as reviewing shop drawings, inspection, and testing. The manual is available at:

http://des.onramp.dot.ca.gov/structure-construction/structure-construction-technical-manuals

Section 3-703, "Public Safety," of this manual contains guidelines for work that temporarily impairs horizontal and vertical bridge clearance.

Refer to the contract specifications, Sections 3-606, "Certificates of Compliance," and 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual regarding Buy America requirements. Requirements for mandatory use of domestic materials are found in Section 6-1.04, "Buy America," of the *Standard Specifications.*

The resident engineer, district construction personnel, and structure construction personnel must apply the correct inspection to ensure the contractor installs sign structures, standards, and poles to function properly.

Structure Construction is responsible for reviewing and authorizing all sign structure shop drawings on contracts administered by Caltrans. The district area construction manager will contact the local structure construction area manager or senior bridge engineer before the preconstruction meeting to arrange for the review of the sign

structure shop drawings submitted by the contractor. Structure construction personnel review shop drawings for standard sign structures and coordinate, when needed, with the appropriate structure design engineer for review of shop drawings for nonstandard sign structures.

The Division of Engineering Services provides technical support to structure construction personnel upon request. Send a copy of the shop drawings to Structure Policy and Innovation if technical assistance is needed. Section 168, "Signs," of the *Bridge Construction Records and Procedures* manual, Vol. 2, and the *Overhead Sign Structures Guide* provide guidance for reviewing shop drawings.

4-5602 Before Work Begins

4-5602 Before Work Begins

Before work begins, do the following:

- Review the project plans, specifications, and standard plan details to determine the types of sign structures, standards, and poles to be installed and any special requirements included in the contract. Obtain and review as-built drawings for the structures to be modified. 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 a pole schedule, it can be useful to indicate foundation sizes, bolt sizes, and bolt circles.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes applicable components of sign structures, standards, and poles. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- If required, before the manufacturers furnish the materials, obtain from Materials Engineering and Testing Services (METS) an approval of foreign manufacturers. Refer to Section 6-1.04C, "Steel and Iron Materials," of the *Standard Specifications*, which covers the use of foreign materials.
- Refer to the contract specifications and Section 3-604, "Buy America," of this manual regarding provisions of the Buy America requirements.
- Obtain shop 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 shop drawings and authorize them if they comply with the contract. After review (and correction if necessary), return one set of the shop drawings to the contractor with the following statement: "The plans are authorized pursuant to Section 5-1.23, "Submittals," of the *Standard Specifications*."
- Do a field review of all sign structure locations, and check for possible conflicts with other structures, electrical and irrigation lines, and underground and overhead utilities. Verify that existing structures to be modified agree with as-built drawings. Ensure adequate horizontal and vertical sight distance. Trees or other landscape features may need to be trimmed or removed to obtain adequate sight distance. Advise the contractor of any changes and, if necessary, prepare 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 3 inches 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, verify that the structure representative has given 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 change order. However, allow sufficient lead time for the normal distribution of change orders. If changes are underway based on a "prior authorization," the resident engineer (through the structure representative) may need to send the revised specifications or drawings directly to METS in advance of the approved change order. Resident engineers should call METS to confirm receipt of the changes.
- Review the contract for any requirements for Department-furnished material. Resident engineers must ensure that Department-furnished sign materials have been ordered and will be ready for timely delivery. Make a physical inspection and inventory to confirm that all Department-furnished sign materials are delivered in good condition. After delivery, the contractor is responsible for any damage to Department-furnished materials.

4-5603 During the Course of Work

4-5603 During the Course of Work

During the work, do the following:

- Inspect sign structures, standards, and poles.
- Inspect underground work while it is underway because when the work is complete an inspection cannot be done without extensive rework. Include in the inspection the excavation, placement of conduit, and placement of concrete for signal standards, pole bases, and similar items.
- 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.

4-5603A Overhead Sign Structures

For sign structures, do the following:

Sign structures often involve details that are critical to the structure's permanence. Maintaining sign structures is expensive. Attention to detail during construction can mitigate future problems.

The resident engineer has final responsibility for ensuring that 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 Sections 168-1.0, "Bolted Connections for Overhead Sign Structures," and 170, "Structural Steel," of the *Bridge Construction Records and Procedures* manual, Vol. 2, will provide the information.

Construction inspectors should check the following items or perform the following:

- 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." Refer to Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," 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 ensuring the use of the proper materials. For 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 75-1.02B, "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," of the *Bridge Construction Records and Procedures* manual, Vol. 2.
- 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," of the *Bridge Construction Records and Procedures* manual, Vol. 2, 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, check for visible 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 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.
- 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 Structure Design for assistance with changeable message signs.
- Report any temporary or permanent changes to horizontal and vertical clearances to the Transportation Permits Branch in accordance with Section 3-703A (2), "Temporary Clearance and Bridge Permit Rating Changes," of this manual.

- Ensure adherence to the public safety requirements of the special provisions regarding permanent obstacles that are temporarily unprotected.

4-5603B 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.
- When standards are laid out, ensure no obstructions will prevent vehicular or pedestrian traffic from seeing signal faces. Standards with push buttons must be no more than 5 feet from crosswalks and the push buttons must be on the side of the standard nearest the crosswalk.

  When the standards are set, ensure that washers are used between the bottom and top, and on both sides of slip-base plates. Before standards are erected, ensure that all leveling and top nuts are properly torqued. When using slip-base inserts, ensure that the contractor assembles the top and bottom plates and torques 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 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 5 feet from expansion joints. This practice prevents extra stresses from the electrolier at these critical structural locations.
- A slight rake of the standard about 3 degrees from the roadway prevents the impression that the standard is leaning toward the highway. If the rake is not correct, ensure that the contractor rakes the standard by plumbing the side of the tapered standard from the road.
- Before accepting a project, ensure that the grounding of standards complies with specified methods.

4-5604 Quality Control

4-5604 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Review the contractor's quality control program submittal for sign structures.
- Verify that the contractor's quality control records are submitted timely and that results comply with contract requirements.
- Ensure that the contractor does required nondestructive testing and that you select the random locations for nondestructive testing when specified.

4-5605 Payment

4-5605 Payment

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

Refer to Section 6-2.01E, "Material Source Inspection and Testing," of the *Standard Specifications*, for information about standard deductions taken for Caltrans doing inspection or testing at material sources.

Section 57 Wood and Plastic Lumber Structures

4-5701 General

This section provides guidelines for inspecting construction of wood and plastic lumber structures for work specified under Section 57, "Wood and Plastic Lumber Structures," of the *Standard Specifications*.

The work covered in this section also includes treating wood materials to prevent decay from moisture, bacteria, or insects.

4-5702 Before Work Begins

Before work begins, do the following:

- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes lumber materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products" of this manual for additional information.
- Occasionally, lead times to procure hardware and wood materials requiring preservative treatment can be longer than a contractor anticipates. Early in the project, determine when materials will arrive at the job site.
- Upon delivery of treated wood materials, note whether they are identified by marks or inspection tags. Inspection and release of treated wood materials by Materials Engineering and Testing Services (METS) will ensure that specified preservative treatment meets specifications.
- If the wood or plastic lumber structure requires painting, review Sections 4-78, "Incidental Construction," and 4-91, "Paint," of this manual.
- Inspect the material in accordance with Table 6-2.1, "Inspection of Fabricated and Manufactured Materials," in Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual.

4-5703 During the Course of Work

During the work, take the following steps:

- To verify that METS has inspected and released the materials to be used, retrieve their inspection release tags from the materials as they are delivered to the job 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 lumber materials.
- Verify that lumber delivered to the job site complies with the grading specifications.
- Ensure the lumber materials and hardware conform to the plans and specifications.

- Ensure that any damage during handling and installation does not reduce the preservative treatment's effectiveness. No further inspection of the treatment is needed.

4-5704 Quality Control

4-5704 Quality Control

Verify that lumber delivered to the job site complies with the grading specifications.

For plastic lumber, ensure that stiffness tests are performed in the presence of the METS inspector.

4-5705 Payment

4-5705 Payment

For the basis of measurement and payment, refer to appropriate sections of the special provisions and *Standard Specifications*.

The payment for preservative treatment is included in the contract prices paid for the various wood materials that are treated.

Section 58 Sound Walls

Section 58
Sound Walls

4-5801 General

4-5801
General

This section provides guidelines for inspecting construction of sound walls for work specified under Section 58, "Sound Walls," of the *Standard Specifications*. Sound wall types include masonry block, precast concrete panels, and alternative sound wall systems.

4-5802 Before Work Begins

4-5802
Before Work
Begins

Before work begins, do the following:

- Review the plans and specifications covering sound walls. Ensure that all required submittals are provided by the contractor and processed as specified. Determine the compressive strength requirements of materials such as masonry block and grout.
- Review and discuss with the contractor plans for placing sound wall components. Also discuss and evaluate project specific conditions for safely placing sound wall components, such as the handling of public traffic and avoiding conflicts with utilities.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes sound wall materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Verify that aesthetic requirements described in the plans and specifications are adhered to. For example, concrete masonry units must have a uniform color and texture, and must be supplied from a single source and a single manufacturer. Mortar ingredients, such as cement, lime, and aggregate, must have a uniform quality, including color, and must be supplied from a single source, producer, or manufacturer. If there are questions regarding proposed materials, colors, patterns, or designs complying with aesthetic requirements, contact the district landscape architect.
- Upon delivery of sound wall materials, note whether they are identified by inspection tags. Inspection and release of sound wall materials by Materials Engineering and Testing Services will ensure that materials intended for use in the work meet specifications.
- Inspect the material in accordance with Table 6-2.1, "Inspection of Fabricated and Manufactured Materials," in Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual.
- Verify and document that planned sound wall width, length, and height are correct for the field conditions, and that the foundation will be uniform.
- Verify that all environmental permit conditions will be met, and that erosion and sediment control devices are installed before excavation begins.

4-5803 During the Course of Work

During the course of work, do the following:

- Before placement of bedding and forms, check foundation and grades for conformance with the plans and specifications. If the foundation is questionable, contact the district materials engineer.
- Inspect and document any pile driving or drilling operations. Verify that proper splicing methods are being used.
- Before placement of concrete, check and document line, grade, elevation, dimensions, condition of forms, bracing, ties, and location of reinforcement. Ensure concrete is placed in accordance with the plans and specifications. Ensure uniform backfill compaction.
- Ensure that construction of sound walls and sound wall barriers conforms to contract documents and authorized shop drawings.
- Verify and document alignment, height, and spacing of posts and panels. If any sound wall settlement or misalignment occurs during or after construction, ensure that the defect is corrected.

4-5804 Quality Control

Ensure that all specified preconstruction sampling, testing, and inspection are performed. Verify that preconstruction testing is done at an authorized laboratory qualified to perform the tests and that material test results comply with the specifications.

For masonry block sound walls, ensure that the contractor has a certified special inspector and authorized laboratory to do required sampling, testing, and inspection. The special inspector must be an International Code Council certified structural masonry special inspector. The special inspector must prepare daily reports and perform the inspections required in Section 1705A.4, "Masonry Construction," of the 2016 California Building Code.

4-5805 Payment

Refer to appropriate sections of the special provisions and *Standard Specifications* for the basis of measurement and payment. Depending on the unit basis for payment, you may need to keep records of the installation of sound wall components, such as piles and reinforcement. Also, calculate any changes that result in increases or decreases in quantities.

Section 59 Structural Steel Coatings

4-5901 General

This section provides guidelines for inspecting structural steel coatings for work specified under Section 59, "Structural Steel Coatings," of the *Standard Specifications*. For more information regarding painting steel structures, refer to Section 155, "Paint," of Structure Construction's *Bridge Construction Records and Procedures* manual, Vol. 2.

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

4-5902 Before Work Begins

Review Sections 4-91, "Paint," and 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual.

After the prepainting meeting, obtain and review the contractor's painting quality work plan for structural steel painting or paint removal.

4-5903 During the Course of Work

Refer to Section 155, "Paint," of Structure Construction's *Bridge Construction Records and Procedures* manual for guidelines on inspecting surface preparation, paint application, thickness of paint film, and protective measures. Included in this section is a bridge painting checklist that will aid with verification of contract compliance.

Take the following steps:

- Ensure that surfaces have been prepared as the specifications require.
- Allow application of paint only to thoroughly dry surfaces and only during periods of favorable weather.

4-5904 Quality Control

Department acceptance for structural steel painting consists of verification inspection that validates the contractor's quality control sampling and testing program. This verification inspection consists of witnessing the contractor's quality control to ensure that the contractor measures coating thickness, coating adhesion, and soluble salt levels at the frequency specified and at locations determined by the resident engineer.

4-5905 Payment

For the basis of measurement and payment, refer to the appropriate sections of the special provisions and *Standard Specifications*.

Section 60 Existing Structures

4-6001 General
4-6002 Before Work Begins
4-6003 During the Course of Work
4-6003A Removing Concrete
4-6003B Removing Bridges
4-6003C Polyester Concrete Overlays
4-6004 Quality Control
4-6005 Payment

Section 60 Existing Structures

4-6001 General

Section 60, "Existing Structures," of the *Standard Specifications* provides requirements for structure removal, structure rehabilitation, modifying structures, abandoning structures, and abandoning pedestrian undercrossings.

For guidance on existing structures, refer to Structure Construction's *Bridge Construction Records and Procedures* manual, *Bridge Deck Construction Manual*, and *Falsework Manual* at:

www.dot.ca.gov/hq/esc/construction/manuals/

For guidance specific to removal or demolition of existing structures, refer to Bridge Construction memos 124-2, "Demolition Plan Review," and 124-3, "Demolition Over and/or Adjacent to Union Pacific Railroad Company Tracks," in *Bridge Construction Records and Procedures* manual, Vol. 2.

For guidance specific to structure joint rehabilitation, refer to Bridge Construction memo 135-2, "Bridge Deck Expansion Joints and Joint Seals," in *Bridge Construction Records and Procedures* manual, Vol. 2, and the *Bridge Deck Construction Manual*.

4-6002 Before Work Begins

Before work begins, do the following:

- Inspect existing structures that are to be removed, rehabilitated, modified, or abandoned. Document existing conditions with photos or video.
- When structures to be removed belong to a city, county, or other agency, check with the applicable agency before disturbing the structure.
- The district Maintenance Unit maintains existing highway facilities. Keep the maintenance area supervisor or area superintendent informed of specific needs or changes to structures.
- Discuss the requirements to ensure consistent practices of placing and maintaining a longitudinal temporary joint taper when a transverse joint greater than 0.4 foot cannot be avoided before opening to traffic. Refer to Section 7-1.03, "Public Convenience," of the *Standard Specifications* for requirements that vary based on height of taper and length of time the longitudinal temporary joint taper will be in place.

4-6003 During the Course of Work

During the work, take the following steps for removing concrete and structures.

4-6003A 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. Record your observations in the daily report and note that the minimum depth requirements have been met.
- Disposal into adjacent embankments. Refer to Section 19-6, "Embankment Construction," of the *Standard Specifications*. Verify and note that both lateral and vertical limitations are met. Include disposal locations on the as-built plans.
- Breakage of floors of concrete basements, pits, and structures to prevent entrapment of water. Note the inspections in the daily report.

4-6003B Removing Bridges

Do the following for removing bridges:

- The contractor must submit bridge removal work plans. Structure Construction's representative on the project has complete responsibility and authority for reviewing and authorizing bridge removal work plans and overseeing bridge removal work. On projects that do not have a structure representative, consult with the structure construction area manager or senior bridge engineer assigned to the area. Further information on bridge removal oversight is contained in Bridge Construction Bulletins 124-2, "Demolition Plan Review," and 124-3, "Demolition Over and/or Adjacent to Union Pacific Railroad Company Tracks," in *Bridge Construction Records and Procedures* manual, Vol. 2.
- When bridge removal occurs over or adjacent to public traffic or railroad property, review the contractor's submittal of bridge removal and handling of traffic around or through the area. Refer to the requirements in Section 60-2, "Structure Removal," of the *Standard Specifications* and the contract special provisions.
- Verify 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. Verify the contractor has addressed this requirement in planning the operation.

4-6003C Polyester Concrete Overlays

Ensure that the contractor constructs temporary joint tapers on bridge decks and approach slabs using polyester concrete under Section 60-3.04B, "Polyester Concrete Overlays," of the *Standard Specifications*. Check the constructed temporary joint taper surface with a 12-foot straightedge to ensure that the surface is uniform and meets the straightedge requirements specified.

4-6004 Quality Control

4-6004
Quality Control

For bridge removal work, verify the registered engineer that signed the bridge removal work plan does the following in compliance with the specifications:

- Is present at all times during bridge removal activities.
- Prepares a daily inspection report for removal activities that is available at the job site.

4-6005 Payment

4-6005
Payment

Review the payment clauses for removing existing structures. Determine whether necessary measurements must be taken before or during removal.

Section 61 Drainage Facilities—General

4-6101 General

4-6102 Before Work Begins

4-6102A Culvert and Drainage Pipe Joints

4-6102B Concrete Backfill for Pipe Trenches

4-6102C Temporary Culverts

4-6103 During the Course of Work

4-6103A Culvert and Drainage Pipe Joints

4-6103B Concrete Backfill for Pipe Trenches

4-6104 Quality Control

4-6105 Level of Inspection

4-6106 Payment

Section 61 Drainage Facilities—General

Section 61 Drainage Facilities—General

4-6101 General

4-6101 General

The requirements in Section 61, "General," of the *Standard Specifications* include general specifications for constructing drainage facilities. These requirements and the guidance in this section apply to other drainage sections of this manual. This section provides inspection guidelines for:

- Culvert and Drainage Pipe Joints
- Alternative Culverts
- Alternative Slotted Pipe
- Concrete Backfill for Pipe Trenches
- Temporary Culverts

When the Bid Item List includes items for alternative pipe culvert, the contractor chooses from the list in Section 61-3, "Alternative Culverts," of the *Standard Specifications*.

Refer to the following sections of this manual for inspection guidelines of the culvert type selected by the contractor:

- Section 4-51, "Concrete Structures," for reinforced box culverts.
- Section 4-64, "Plastic Pipe," for high-density polyethylene or plastic pipe.
- Section 4-65, "Concrete Pipe," for reinforced concrete pipe.
- Section 4-66, "Corrugated Metal Pipe," for corrugated steel pipe and pipe arches; or corrugated aluminum pipe and pipe arches.
- Section 4-67, "Structural Plate Culverts," for structural steel pipe, arches, and pipe arches; or aluminum plate pipe, arches, and pipe arches.

When the Bid Item List includes items for alternative slotted pipe, the contractor chooses from the following types:

- As shown in Section 64-3, "Slotted Plastic Pipe," of the *Standard Specifications*, or equal.
- Slotted corrugated pipe.

For inspection guidelines for slotted plastic pipe, refer to Section 4-64, "Plastic Pipe," of this manual. For inspection guidelines for corrugated pipe, refer to Section 4-66, "Corrugated Metal Pipe," of this manual.

4-6102 Before Work Begins

Before work begins, 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.
- Review the special provisions and contract plans to determine the different types of slotted pipe that may be used and the locations where alternative slotted pipe may be installed. Do not mix different types of slotted pipe.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes all materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

4-6102A Culvert and Drainage Pipe Joints

Ensure the contractor submits test results or a mathematical analysis of the joint materials for joint systems specified as watertight.

4-6102B Concrete Backfill for Pipe Trenches

Concrete backfill for pipe trenches must comply with specifications for minor concrete, except the concrete must contain at least 380 pounds of cementitious material per cubic yard.

When rapid strength concrete is to be used as concrete backfill, ensure that the contractor submits the mix design and test data at least 10 days before excavation of the pipe trench. Review the mix design, test data, and cure time required for the concrete mix to attain 500 psi (pounds per square inch) compressive strength.

4-6102C Temporary Culverts

In consultation with district hydraulics, verify that the type of temporary culvert proposed by the contractor has acceptable strength to sustain the intended load and has the intended discharge capacity.

4-6103 During the Course of Work

Refer to the various sections of this manual for guidance on inspecting the types of culvert, drainage pipe, and slotted pipe to be placed. Ensure that the correct types of joints or couplers are used.

4-6103A Culvert and Drainage Pipe Joints

Review contract requirements for designated culverts and drainage structures that will require field leakage testing. Where field leakage testing is shown, ensure the contractor submits test procedure, leakage calculations for exfiltration and infiltration tests, and repair procedures for sections that fail testing.

4-6103B Concrete Backfill for Pipe Trenches

- Ensure unsuitable materials are removed as specified when placing plastic pipe.
- Verify concrete is consolidated with high-frequency vibrators.
- Ensure contractor removes foreign material that falls into trench before and during concrete placement.

- When hot mix asphalt is to be placed on top of concrete backfill, ensure contractor provides a uniformly rough broom finish to the surface.
- Ensure concrete is cured as specified before placement of next material layer.

4-6104 Quality Control

4-6104 Quality Control

Guidance for managing the contractor's quality control activities for this section is summarized as follows:

- When joint systems and couplers conforming to the provisions in Section 61-2, "Culvert and Drainage Pipe Joints," of the *Standard Specifications* are selected, the contractor must provide test results or a mathematical analysis of the joint materials.
- Verify manufacturer's watertightness tests of joints.
- Ensure contractor performs field leakage testing.

4-6105 Level of Inspection

4-6105 Level of Inspection

Suggested levels of inspection for typical stabilization work activities are:

- Benchmark inspection of field leakage testing for culvert and drainage pipe joints
- Intermittent inspection of concrete backfill for pipe trenches

4-6106 Payment

4-6106 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.

Quantities for field leakage testing includes the length of pipe that has passed field leakage tests and includes elbows, tees, and other fittings.

Concrete collars, concrete tees, and reinforcement for connecting new pipe to existing pipe or facilities is included in the contract prices paid for the various types and sizes of alternative culverts.

Section 64 Plastic Pipe

4-6401 General

4-6402 Before Work Begins

4-6402A Plastic Pipe

4-6402B Slotted Plastic Pipe

4-6403 During the Course of Work

4-6403A Plastic Pipe

4-6403B Slotted Plastic Pipe

4-6404 Level of Inspection

4-6405 Quality Control

4-6406 Payment

Section 64 Plastic Pipe

Section 64
Plastic Pipe

4-6401 General

4-6401
General

This section provides guidelines for inspecting plastic pipe and slotted plastic pipe for work specified under Section 64, "Plastic Pipe," of the *Standard Specifications*. Plastic pipe must be either Type C or Type S corrugated polyethylene pipe, or corrugated polyvinyl chloride (PVC) pipe with smooth interior. Slotted plastic pipe must be polyethylene.

4-6402 Before Work Begins

4-6402
Before Work
Begins

4-6402A Plastic Pipe

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 change order.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes plastic pipe and plastic slotted pipe. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Obtain a certificate of compliance for plastic pipe, including the average pipe stiffness, resin material cell classification, and date of manufacture. For corrugated polyethylene pipe, the contractor must also provide a manufacturer's copy of plant audits and test results from the National Transportation Product Evaluation Program for the current cycle of testing for each pipe diameter furnished.

4-6402B Slotted Plastic Pipe

Verify that the manufacturer and model of the contractor-selected slotted plastic pipe is one of the allowable alternatives listed in the *Standard Specifications*. If the contractor proposes an "or equal" alternative, consult with Division of Design Drainage Unit to evaluate if the proposed slotted plastic pipe system is acceptable.

4-6403 During the Course of Work

During the course of work, do the following:

4-6403A Plastic Pipe

- 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.
- Verify the final acceptability of the pipes following the guidelines in Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual. The following problems with pipe are unacceptable:
    1. Pipe walls with cracks, holes, blisters, voids, foreign inclusions, or other defects affecting the pipe wall integrity or visible to the naked eye.
    2. Pipes or fittings with abrasions or scratches deeper than 10 percent of the wall thickness.
    3. Gaskets that are cracked or split.
    4. Rough surfaces, ridges, fractures, cracks, or imperfections at joint surfaces where gaskets will bear.
- During the onsite storage of PVC pipes, verify that pipes are protected from long-term exposure to sunlight, or brittleness may result. Ensure that pipes are protected from damage throughout all operations.
- Verify that pipes of the specified size, type, and class are placed in the proper locations.
- Verify pipe joints are installed as specified.
- Require methods of handling and storage that will not damage the pipes.
- When atmospheric temperature is 40°F or less, ensure PVC installation methods using mechanical assistance do not damage 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.
- Pay particular attention to pipe joint requirements including any specified testing for watertightness.
- Before construction loads are allowed over culverts, require that culverts meet the minimum fill conditions as shown on *Standard Plan* Sheet D88.

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.

4-6403B Slotted Plastic Pipe

- Ensure that the contractor covers grate slots during placement of concrete backfill and paving to prevent material entering the slots.
- Verify sections of pipe are secured to prevent separation.

- Ensure concrete backfill surface is textured and cured as required.

4-6404 Level of Inspection

4-6404
Level of Inspection

Suggested levels of inspection for typical work activities are:

- Intermittent inspection of trench excavation
- Benchmark inspection of bedding and pipe installation
- Intermittent inspection of backfill
- Intermittent inspection of sampling and testing of materials, compaction, and applying curing seal

4-6405 Quality Control

4-6405
Quality Control

While specific levels of quality control sampling and testing for plastic pipe and slotted plastic pipe are not included in Section 64, "Plastic Pipe," of the *Standard Specifications*, the contractor is responsible for providing quality control under Sections 5-1.01, "General," and 6-2.02, "Quality Control," of the *Standard Specifications*.

4-6406 Payment

4-6406
Payment

Refer to Sections 64-2.04, "Payment," and 64-3.04, "Payment," of the *Standard Specifications* for payment information for plastic pipe and slotted plastic pipe, respectively.

Section 65 Concrete Pipe

4-6501 General
4-6502 Before Work Begins
4-6503 During the Course of Work
4-6504 Level of Inspection
4-6505 Quality Control
4-6506 Payment
4-6506A Case I
4-6506B Case II
4-6506C Case III

Section 65 Concrete Pipe

4-6501 General

This section provides guidelines for inspecting concrete pipe for work specified under Section 65, "Concrete Pipe," of the *Standard Specifications*. Concrete pipe includes circular reinforced concrete pipe, oval-shaped reinforced concrete pipe, reinforced concrete pipe arch, and nonreinforced concrete pipe. The contractor selects the class of pipe and method of backfill shown in *Standard Plan* A62D unless the Bid Item List specifies the class or method. 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

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 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 change order.
- Obtain from the contractor the selected class of reinforced concrete pipe and method of backfill to be used for each length of culvert. Also obtain from the contractor culverts that are to be manufactured using the direct design method or nonreinforced pipe where allowed by the specifications and *Standard Plans*.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes concrete pipe of the type and class specified. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

4-6503 During the Course of Work

During the course of work, 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 or Fabricated Materials and Products," of this 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 1/100 inch 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 1/8 inch 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 cement mortar, rubber gaskets, or resilient materials. Reject gaskets that have cracks or splits.
- Check the aggregate and the proportioning of 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 pipe and 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 is used, observe carefully and ensure the pipe is not displaced or floated by uneven or too rapid placement. For rapid strength concrete or rapid strength slurry cement backfill, allow only nonchloride admixtures to accelerate the setting time.
- 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 Level of Inspection

4-6504 Level of Inspection

Suggested levels of inspection for typical work activities are:

- Intermittent inspection of trench excavation
- Benchmark inspection of bedding and pipe installation
- Intermittent inspection of backfill
- Intermittent inspection of sampling and testing of materials, compaction, and applying curing seal

4-6505 Quality Control

4-6505 Quality Control

Witness the specified hydrostatic tests for siphons and low-head conduits. Verify hydrostatic test results and leakage calculations. Refer to Section 65-2.01D(2), "Field Testing of Siphon and Pressure Pipe," of the *Standard Specifications*.

4-6506 Payment

4-6506 Payment

The length of pipe to be paid for is the slope length designated by the resident engineer. This slope length is the length shown on the plans, plus or minus any changes the resident 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 2-foot 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 resident engineer.

4-6506A 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 nearest 2-foot 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 = 62.33 ft

Individual lengths of pipe placed total 60.08 ft, 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 64 ft

Example 2:

Centerline length between inside faces not on a skew = 60.75 ft

Lengths of pipe placed total 64.25 ft

Therefore:

Pay for 62 ft

4-6506B 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 = 145.5 ft
- Individual lengths of pipe placed total 144 ft, plus additional length made up in joints or forming out from one structure, or both.

Therefore:

Pay for 145.5 ft

4-6506C 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 = 145 ft
- Laid pipe = 146 ft, 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 145 ft

Under the following circumstances, you may use field measurements in lieu of calculations or you may supplement calculations:

1. A pipe 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 pipe is properly staked, you may use field measurements between stakes referenced to the ends of the pipe 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

This section provides guidelines for inspecting corrugated metal pipe for work specified under Section 66, "Corrugated Pipe," of the *Standard Specifications*. Corrugated metal pipe, designated by pipe diameter or dimension, type, and metal thickness, 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

Before work begins, take the following steps:

- 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.
- Modify plans when necessary to fit field conditions. Prepare 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 change order.
- After determining final locations and lengths, give the contractor a revised pipe list, including those pipes added or altered by change order.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes all fabricated materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- METS inspector will inspect and test corrugated pipe and joint material as necessary before arrival at the job site.

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 damage that may have occurred 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 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, refer to Section 4-19, "Earthwork," of this manual. Corrugated metal pipe can be displaced or damaged during backfill. Therefore, insist on precautions to prevent damage.

- For slotted corrugated steel pipe, ensure installation does not start until after paving has been completed on traffic lanes adjacent to the pipe. Ensure materials are prevented from entering pipe slots during backfilling and paving activities.
- For information about concrete backfill and slurry cement backfill, refer to Section 4-61, "Drainage Facilities—General," of this manual.
- Be particularly alert to ensure the required type and thickness of pipe at each location. To avoid galvanic corrosion, do not allow 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.
- 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 Level of Inspection

Suggested levels of inspection for typical work activities are:

- Intermittent inspection of trench excavation
- Benchmark inspection of bedding and pipe installation
- Benchmark inspection of repairs to damaged galvanizing
- Benchmark inspection of end finish requirements for helically corrugated steel pipe. Refer to Section 66-1.02E(3), "End Finish," of the *Standard Specifications*
- Intermittent inspection of backfill
- Intermittent inspection of sampling and testing of materials and compaction

4-6605 Quality Control

When siphons or watertight joints are installed, witness the required field leakage and hydrostatic tests.

4-6606 Payment

Refer to Section 66-1.04, "Payment," of the *Standard Specifications* for payment of corrugated metal pipe and pipe reducers.

Section 67 Structural Plate Culverts

4-6701 General
4-6702 Before Work Begins
4-6703 During the Course of Work
4-6704 Level of Inspection
4-6704A Structural Metal Plate Pipe
4-6704B Metal Liner Plate Pipe
4-6705 Quality Control
4-6706 Payment

Section 67 Structural Plate Culverts

Section 67
Structural Plate
Culverts

4-6701 General

4-6701
General

This section provides guidelines for inspecting structural plate culverts for work specified under Section 67, "Structural Plate Culverts," of the *Standard Specifications*. This work includes fabricating and constructing structural plate culverts as pipe, arches, and pipe arches that are assembled in the field from structural steel or structural aluminum plates. 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 and make necessary changes by change order.
- As soon as final locations and lengths are determined, furnish the contractor a revised pipe list.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes all fabricated materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- 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

During the course of work, do the following:

- Upon delivery of the structural plate materials, note whether it is identified by marks or inspection tags (Form TL-0624, "Inspection Release Tag"). Check the materials for damage that may have occurred after inspection at the source.
- Also, upon delivery, note the condition of the pipe. Require the repair of minor damage to galvanizing or bituminous coatings. Do not accept 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 thickness of pipe at each location.

- If mastic for protective coating will be field applied, ensure an inspector from 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 67-2.03, "Construction," 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, are 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.
- Refer to Section 4-19, "Earthwork," of this manual for instructions on inspecting backfill. Refer to Section 4-61, "Drainage Facilities—General," of this manual regarding slurry cement backfill.
- Throughout the progress of the work, periodically inspect installed pipes and arches. If any structural deficiencies are discovered, ensure these are corrected before the start of base or surfacing, where pipes or arches underlie pavements.
- Before recommending acceptance of the contract or making a recommendation to grant relief from maintenance, require the contractor to clean all pipes and arches if necessary.

4-6704 Level of Inspection

4-6704 Level of Inspection

Suggested levels of inspection for typical structural plate culvert work are:

4-6704A Structural Metal Plate Pipe

- Intermittent inspection of assembly
- Benchmark inspection of strut placement and removal

- Continuous inspection of bolt tightening to specified torque
- Benchmark inspection of repair to damaged galvanizing
- Intermittent inspection of application of protective coating
- Benchmark inspection of repairs to protective coating
- Benchmark inspection of connection to inlet or outlet structures to ensure ends of pipe are cut flush with the structure face

4-6704B Metal Liner Plate Pipe

- Intermittent inspection of excavation, assembly, and grouting
- Benchmark inspection of repair to coating
- Continuous inspection of bolt tightening to specified torque

4-6705 Quality Control

4-6705 Quality Control

While specific levels of quality control sampling and testing for structural plate culverts are not included in Section 67 of the *Standard Specifications*, the contractor is responsible for providing quality control under Sections 5-1.01, "General," and 6-2.02, "Quality Control," of the *Standard Specifications*.

4-6706 Payment

4-6706 Payment

Refer to Sections 67-2.04, "Payment," and 67-3.04, "Payment," of the *Standard Specifications* for payment information on structural metal plate pipe and metal liner plate pipe, respectively.

Section 68 Subsurface Drains

4-6801 General

4-6801A Underdrains
4-6801B Horizontal Drains
4-6801C Edge Drains
4-6801D Geocomposite Drain Systems

4-6802 Before Work Begins

4-6802A Underdrains
4-6802B Horizontal Drains
4-6802C Edge Drains
4-6802D Geocomposite Drain Systems

4-6803 During the Course of Work

4-6803A Underdrains
4-6803B Horizontal Drains
4-6803C Edge Drains
4-6803D Geocomposite Drain Systems

4-6804 Level of Inspection

4-6804A Underdrains and Edge Drains
4-6804B Horizontal Drains
4-6804C Geocomposite Drain Systems

4-6805 Quality Control

4-6806 Payment

Section 68 Subsurface Drains

Section 68
Subsurface
Drains

4-6801 General

4-6801
General

This section provides guidelines for inspecting subsurface drains as specified under Section 68, "Subsurface Drains," of the *Standard Specifications*. Subsurface drains include underdrains, horizontal drains, edge drains, and geocomposite drain systems.

Subsurface drains remove groundwater from the pavement structure, underlying foundation materials, or adjacent soil and rock formations. The drains are intended to intercept groundwater or lower its level before it adversely affects 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 aquifers near slopes or at the grade.

If problem groundwater is found, it may be necessary to issue a change order to add subsurface drains.

Request assistance from the district materials engineer or the district geologist for subsurface investigations.

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 1-1/2-inch 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, for most situations, vertical wells may not be necessary, since it is obvious that groundwater requires drainage by horizontal drains because of signs of distress or saturation at the surface. Where vertical wells are not needed, 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

Edge drains are installed beneath a paved shoulder, just out from the edge of the 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.

4-6801D Geocomposite Drain Systems

Geocomposite drain systems are most commonly used as structure approach drainage systems, which consist of geocomposite drain, filter fabric, plastic pipe, treated permeable base, and drainage pads.

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 that Form CEM-3101, "Notice of Materials to Be Used," includes all fabricated materials. Refer to Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Ensure the contractor has provided a certificate of compliance for each type of subsurface drain. The certificate of compliance must cover the pipe, tubing, fittings, and specified materials to be used. Generally, there will be no Form TL-0624, "Inspection Release Tag," for these materials with the exception of coatings or fasteners used with subsurface drains.
- 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

- Refer to Section 4-29, "Treated Permeable Bases," of this manual for guidelines for the production of treated permeable material.
- Verify planned quantities.
- Review sheets P50, P51, and P52 in the *Standard Plans* for edge drain details.

4-6802D Geocomposite Drain Systems

- Obtain a certificate of compliance for geocomposite drain and accompanying flow capability graph with authorized laboratory verification. Geocomposite drain material must conform to Section 96-1.02C, "Geocomposite Wall Drain," of the *Standard Specifications* unless otherwise specified.
- Review project plan sheets for structure approach drainage details with geocomposite drain systems. Project plan sheets may also identify "Weep Hole and Geocomposite Drain" alternatives, which contractors may choose to use.

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

- Ensure that the contractor places only one type of alternative pipe at an installation.
- Immediately before placing the filter fabric, examine the condition of the trench. Require the contractor to remove any loose material and 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 68-2.03, "Construction," 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 elevations so that they become part of 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; 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 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 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 allow 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.

4-6803D Geocomposite Drain Systems

- Ensure that the geocomposite drain is installed with the filter fabric side facing the embankment and oriented so that corrugations are placed perpendicular to the drainage collection system.
- Ensure that joints in the geocomposite drain have the required overlaps and positioning is maintained throughout subsequent operations.
- Ensure that exterior edges are wrapped with filter fabric to prevent soil migration from these areas.
- Require any tears or punctures in the fabric of the gecomposite drain be replaced with new fabric or repaired as specified.

4-6804 Level of Inspection

4-6804 Level of Inspection

Suggested levels of inspection for typical stabilization work activities are:

4-6804A Underdrains and Edge Drains

- Intermittent inspection of trench excavation
- Benchmark inspection of trench surfaces prior to installation of filter fabric
- Intermittent inspection of filter fabric placement
- Benchmark inspection of repairs to filter fabric and pipe installation
- Intermittent inspection of backfill with permeable material for underdrains, treated permeable material for edge drains, or with specified material
- Intermittent inspection of sampling and testing of materials
- Intermittent inspection of curing of cement treated permeable material when used as backfill for edge drains

4-6804B Horizontal Drains

- Continuous inspection during drilling operations
- Intermittent inspection of installation of collector system
- Intermittent inspection of backfill around pipe at end of drilled hole and connection to collector system
- Benchmark inspection of identification marking at each horizontal drain

4-6804C Geocomposite Drain Systems

- Intermittent inspection of geocomposite drain placement and replacement of damaged material
- Benchmark inspection of repairs

4-6805 Quality Control

4-6805 Quality Control

- Ensure that the contractor submits a certificate of compliance for geocomposite drain including a flow capability graph for the geocomposite drain.
- While specific levels of quality control sampling and testing for subsurface drains are not included in Section 68, "Subsurface Drains," of the *Standard Specifications*, the contractor is responsible for providing quality control under Sections 5-1.01, "General," and 6-2.02, "Quality Control," of the *Standard*

Specifications. Ensure the contractor is actively performing quality control on subsurface drain materials throughout production operations by reviewing copies of quality control records, including quality control test results.

4-6806 Payment

4-6806 Payment

Measurement and payment must conform to the special provisions, *Standard Specifications*, or both.

Underdrains, horizontal drains, edge drains, and geocomposite drains each have different measurement and payment clauses.

For underdrains and edge drains, refer to Section 4-65, "Concrete Pipe," in this manual for a discussion of slope length designated by the engineer. Note that in Sections 68-2, "Underdrains," and 68-4, "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. Pay for exploratory work, furnishing, and installing collector systems as change order work.

Payment for geocomposite drains is included in related items of work unless specifically excluded.

Section 69 Overside Drains

Section 69
Overside Drains

4-6901 General

4-6901
General

This section provides guidelines for inspecting overside drain work specified under Section 69, "Overside Drains," of the *Standard Specifications*. Overside drains consist of various 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 D87A, D87B, D87C, and D87D in the *Standard Plans* for information on downdrains and overside drains.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes all fabricated materials. Refer to Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Ensure the contractor has provided a certificate of compliance for steel, aluminum, and plastic materials used in overside drains. Generally, there will be no Form TL-0624, "Inspection Release Tag," for these materials with the exception of coatings used with overside drains.
- Check the condition of the materials for damage that may have occurred during shipping and handling. Require the repair of minor damage to coatings or galvanizing. Refer to Sections 66-1.02C, "Protective Coatings, Linings, and Paving," and 75-1.02B, "Galvanizing," of the *Standard Specifications*. If satisfactory repair cannot be achieved, require unacceptable materials to be removed from the project.
- Inspectors from Materials Engineering and Testing Services (METS) will inspect and test any coating materials.
- Review any planned installations of metal beam guardrail. If overside drains are in a metal beam guardrail area, consider using long span nested guard rail. Refer to the *Traffic Manual*, Chapter 7-03.6, "Guardrail Design Considerations" and Figure 7.9, "Long Span Nested Guardrail."
- Review plans and planned overside drain locations by verifying design with field surveys. Make any necessary changes and give the contractor a revised list of lengths.
- A suggested method to determine the location of overside drains in an area where the grade is flat, is to have a water truck dump part of its load in the gutter and cut the dike where the water ponds.

4-6903 During the Course of Work

During work, take the following steps:

- Where alternative pipe downdrains are allowed, ensure that the contractor places only one type of alternative pipe downdrain.
- Where plastic pipe downdrain is allowed, ensure that the pipe is from the same manufacturer.
- To avoid galvanic corrosion, do not allow the combination of steel and aluminum in any installation.
- Determine that pipe sections have watertight joints and are properly installed.
- As specified in Section 19, "Earthwork," 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.

4-6904 Level of Inspection

Suggested level of inspection for overside drain work activities is intermittent inspection.

4-6905 Quality Control

While specific levels of quality control sampling and testing for overside drains are not included in Section 69, "Overside Drains," of the *Standard Specifications*, the contractor is responsible for providing quality control under Sections 5-1.01, "General," and 6-2.02, "Quality Control," of the *Standard Specifications*. Ensure the contractor is actively performing quality control on overside drain materials throughout production operations by reviewing copies of quality control records, including quality control test results.

4-6906 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 deems 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, refer to the discussion on measuring pipe in Section 4-65, "Concrete Pipe," of this manual.

Section 70 Miscellaneous Drainage Facilities

Section 70 Miscellaneous Drainage Facilities

4-7001 General

4-7001 General

This section provides guidelines for inspecting items in miscellaneous drainage facilities for work specified under Section 70, "Miscellaneous Drainage Facilities," of the *Standard Specifications*. Items covered under this section are related to water drainage facilities and water transmission pipelines.

For information about casings for bridges, refer to Structure Construction's *Bridge Construction Records and Procedures* manuals, Vol. 1 and 2:

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

4-7002 Before Work Begins

4-7002 Before Work Begins

Before work begins, take the following steps:

- When the Bid Item List includes items for alternative drainage components, the contractor can choose from components shown in the contract documents. Do not mix different types of the same component. Alternative flared end sections must be the same material as the drainage facility to which it is attached.
- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes drainage facilities and appurtenances. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Before the contractor places orders, notify the contractor of any changes affecting quantities of miscellaneous drainage facilities.
- For welded steel pipe drainage facilities, determine the finish color from the color options provided by the contractor.
- Allow use of metal flared end sections as an alternative to precast concrete or plastic flared end sections.

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 Materials Engineering and Testing Services has released the materials for shipment. Also, inspect the materials in accordance with Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual. Pay particular attention to precast concrete facilities and linings and coatings.
- Require the repair of minor damage to coatings. If breaks in the coating exceed the allowable area for repair, reject the pipe section. Ensure repairs are made under Section 66-1.02C, "Protective Coatings, Linings, and Paving," of the *Standard Specifications*.

- Ensure electrically insulated connections are provided if welded steel pipe is connected to public utility lines or other metal pipe.
- Ensure sand shield is installed if backfill material for welded steel pipe contains rock or highly expansive clay soils.
- 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.
- Before allowing the construction of pipe manholes or inlets to the final grade, require that new pavement or surfacing be completed immediately adjacent to the structure.
- For concrete inlet depressions near concrete pavement, oversee placement of concrete pavement before constructing concrete inlet depressions.
- Ensure installation of grated line drains and joints comply with the manufacturer's instructions.

4-7004 Level of Inspection

4-7004 Level of Inspection

Suggested levels of inspection for typical work activities are:

- Intermediate inspection of excavation and backfill for installation of welded steel pipe
- Benchmark inspection of installed precast concrete pipe drainage facilities
- Benchmark inspection of installed drainage appurtenances except inlet depressions
- Benchmark inspection and testing of underlying base for inlet depressions
- Intermediate inspection of inlet depression construction including broom finish and curing of concrete inlet depressions
- Intermediate inspection of excavation and backfill for installation of grated line drains

4-7005 Quality Control

4-7005 Quality Control

Ensure the contractor performs pressure testing of welded steel pipe. Observe and record the results.

4-7006 Payment

4-7006 Payment

No adjustment in length is made when pipe is cut to fit a structure.

To properly measure and pay for the various items covered in this section, carefully read the payment clauses in the *Standard Specifications*. Payment for excavation and backfill is included in the payment for the type of miscellaneous drainage facility work involved.

Section 71 Existing Drainage Facilities

4-7101 General
4-7101A Rehabilitating Drainage Facilities
4-7102 Before Work Begins
4-7102A Rehabilitating Drainage Facilities
4-7103 During the Course of Work
4-7103A Removing Drainage Facilities
4-7103B Rehabilitating Drainage Facilities
4-7103C Modifying Drainage Structures
4-7103D Adjusting Drainage Facilities
4-7103E Abandoning Drainage Facilities
4-7104 Level of Inspection
4-7105 Quality Control
4-7106 Measurement and Payment

Section 71 Existing Drainage Facilities

Section 71 Existing Drainage Facilities

4-7101 General

4-7101 General

This section provides guidelines for inspecting existing drainage facilities for work specified under Section 71, "Existing Drainage Facilities," of the *Standard Specifications*.

4-7101A Rehabilitating Drainage Facilities

Culvert rehabilitation is the practice of extending or restoring the service life of a culvert without removal of the existing culvert and typically involves placement of a smaller diameter pipe (liner) into a larger diameter host pipe. The liner may be a culvert or a product specifically manufactured for culvert rehabilitation. The annular space between the new pipe and the host pipe is grouted.

When the Bid Item List includes items for alternative drainage rehabilitation components, the contractor chooses from the type shown in the project plans or specified in the special provisions.

4-7102 Before Work Begins

4-7102 Before Work Begins

Before work begins, do the following:

- Inspect existing drainage facilities that are to be removed, rehabilitated, repaired, modified, adjusted, or abandoned. Document existing conditions with photos or video.
- When drainage structures to be removed belong to a city, county, or other agency, check with the applicable agency before disturbing the drainage facility.
- The district Maintenance Unit maintains existing highway facilities. Keep the maintenance area supervisor or area superintendent informed of specific needs or changes to drainage structures.

4-7102A Rehabilitating Drainage Facilities

- Hold preconstruction meetings (prerehabilitation and pregrouting) to discuss the contractor's quality control program and method for performing each element of work including the contractor's sampling and testing of materials and inspection of the work. Remind the contractor to notify you before the start of each step identified under Section 71-3.01C(1) "General," of the *Standard Specifications*.
- Verify that machine spiral wound polyvinyl chloride (PVC) pipeliners are marked as required under Section 71-3.09A(2), "Materials," of the *Standard Specifications*.

4-7103 During the Course of Work

During the work, do the following:

Ensure contractor backfills trenches, holes, depressions, and pits resulting from work on existing drainage facilities. Backfill in surfaced areas should match the thickness and quality of the roadway section.

4-7103A Removing Drainage Facilities

Require removal to the specified minimum depth below finished grade. Record your observations in the daily report and note that the minimum depth requirements have been met.

4-7103B Rehabilitating Drainage Facilities

- Verify culvert is cleaned before the start of culvert inspection.
- Ensure contractor performs prerehabilitation inspections.
- Ensure culvert structural repair or concrete invert paving, where shown or ordered, is placed and concrete has attained a compressive strength of 2,500 pounds per square inch (psi) before start of grouting.
- Ensure contractor restores the lateral pipe and all openings and drainage connections within 72 hours of installing a pipeliner.
- Ensure contractor performs postrehabilitation inspections.
- Ensure installation of machine spiral wound PVC pipeliners comply with the appropriate American Society for Testing and Materials International (ASTM) specification. Refer to Section 6-305, "Test Methods," of this manual for information on how to obtain these ASTM standards. Ensure markings are visible from the inside of the completed pipeliner.

4-7103C Modifying Drainage Structures

- For existing headwalls or end walls to be removed or moved, ensure that pipe is cut so that the pipe edges are smooth.
- Verify capping of inlets, manholes, and risers with minor concrete that contains at least 590 pounds of cementitious material per cubic yard.

4-7103D Adjusting Drainage Structures

- Ensure contractor lowers frames, covers, grates, and manholes before cold planing and raising after paving is completed to finish grade.
- For adjusting manholes, ensure that the contractor removes the existing manhole to a depth of at least 3.5 feet.
- For unstable manholes under traffic, review and authorize the material to be used to adjust the manhole cover seat.
- Verify inlets are adjusted with minor concrete that contains at least 590 pounds of cementitious material per cubic yard. Ensure contractor protects grate of adjusted inlets during paving operations as required.

4-7103E Abandoning Drainage Structures

Ensure bases of manholes or drainage facilities are broken to prevent water from collecting in the abandoned structure. Ensure pipes entering the abandoned facility are plugged as specified.

4-7104 Level of Inspection

4-7104
Level of Inspection

Suggested levels of inspection for typical work activities are:

- Intermediate inspection where concrete placement is required.
- Benchmark inspection to remove, modify, adjust, abandon, and salvage work before start of backfill.
- Intermediate inspection during backfill.
- Benchmark inspection of cleaning and preparation of host culvert.
- Intermediate inspection of structural repairs or invert paving.
- Continuous inspection of sampling and field testing of grout materials for start of grouting work that can be reduced to intermittent inspection if test results consistently meet specified requirements and the grouting operation is uniform.

4-7105 Quality Control

4-7105
Quality Control

Witness contractor sampling and testing of grout density and viscosity. Verify results meet the required density and strength values.

Verify that the contractor is monitoring grout pump pressure gauge recorder printout to ensure grout pump pressure compliance with manufacturer's instructions.

Ensure the contractor performs culvert inspection by closed-circuit video recording or photography and that the quality of those records is appropriate to confirm compliance with cleaning of host culvert and installation of pipeliner.

Review the contractor's inspection and evaluation report. Prepare change order for ordered repairs.

Witness the contractor's deflection testing of pipeliner where required. Reject pipeliner that exceeds the specified deflection requirement.

4-7106 Payment

4-7106
Payment

Payment for removing and reusing frames, grates, and covers is included in the payment of the various items of work.

Pipeliner is measured along the flow line of the existing culvert. No payment is made for culvert rehabilitation reinspection due to low quality recordings and cleaning. Prepare a change order where repair work or concrete invert paving for culvert rehabilitation is ordered. Deduct 20 percent of the bid amount for pipeliner 8 percent or less of the nominal pipeliner dimension that is over-deflected and is not replaced. Deduct quantity of slurry cement backfill that is wasted, or disposed of or otherwise not used in the work.

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 Concreted-Rock Slope Protection
4-7203C Small-Rock Slope Protection
4-7203D Concrete Slope Protection
4-7203E Broken-Concrete Slope Protection
4-7203F Slope Paving
4-7203G Gabions
4-7204 Level of Inspection
4-7205 Quality Control
4-7206 Payment

Section 72 Slope Protection

4-7201 General

This section provides guidelines for inspecting slope protection for work specified under Section 72, "Slope Protection," of the *Standard Specifications*. The following common types of slope protection are covered in this section:

- Rock slope protection
- Concreted-rock slope protection
- Small-rock slope protection
- Concrete slope protection
- Broken-concrete slope protection
- Slope paving
- Gabions

Other protective devices are used in conjunction with highway construction, and when used, they are included in the contract's special provisions. The Bid Item List and plans will specify which type of slope protection is to be performed.

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 Bank and Shore Protection Committee."

Resident engineers should be familiar with the material contained in the publication, *California Bank and Shore Rock Slope Protection Design,* and Chapter 870, "Bank Protection—Erosion Control," of the *Highway Design Manual.*

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
- Capability of adjacent soil types to resist 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. Take pictures to document existing conditions and verify that Form CEM-3101, "Notice of Materials to Be Used," includes the materials for slope protection. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and

Products," of this manual for additional information. Obtain initial samples and have them tested for the specified attributes.

4-7203 During the Course of Work

4-7203 During the Course of Work

Take the following steps when inspecting the work and materials for slope protection:

- Obtain rock samples for acceptance tests. The samples will be crushed in the laboratory to sizes needed to perform 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. The plans indicate the minimum depths of foundations. When evidence exists that the foundation depth is inadequate, obtain both the design and hydraulics engineers' concurrence with a change order to deepen the foundation. Of the various types of instability problems, foundation failures are the most serious and most common.
- 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, ensure the contractor paints tonnage on large rocks used in foundation construction.
- Verify the types of measurements and records necessary to support payment for the work. Keep records up to date.
- Ensure existing shrubs and trees are protected 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. Refer to Section 4-96,

"Geosynthetics," 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 Concreted-Rock Slope Protection

The concreted-rock slope protection 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 finish surface must be roughened by brushing to expose rocks. 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, "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.

Inspect the rock to ensure it has been cleaned of any adhering dirt and clay and is moistened before concrete placement.

Ensure concrete is cured by one of the specified methods.

4-7203C Small-Rock Slope Protection

The small-rock slope protection method consists of excavating and backfilling the footing trench, placing rock slope protection fabric as shown, and placing small rocks on the slope.

There are three material gradation requirements based on required rock layer thicknesses. The contract plans will designate the required rock layer thickness for each location.

Ensure that the contractor places the fabric before placing the rock slope protection. Refer to Section 4-96, "Geosynthetics," of this manual for guidelines on inspecting and accepting rock slope protection fabric. Observe closely during rock placement to detect any damage to the fabric.

Ensure the equipment used during spreading does not crack the rock.

4-7203D Concrete Slope Protection

The concrete slope protection 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, "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 Broken-Concrete Slope Protection

Broken-concrete slope protection consists of placing broken concrete from job site locations identified within the contract.

Before placement of the broken concrete, inspect the material and be sure the reinforcement has been removed flush to the surface of concrete.

The method for placing rock will either be Method A or Method B, whichever the contract designates, as discussed in Section 4-7203A, "Rock Slope Protection," of this manual.

4-7203F Slope Paving

Slope paving is a broader term that covers a variety of methods for paving slopes, including colored slope paving, exposed aggregate slope paving, and slope paving with concrete pavers. The plans will designate which type applies at each location.

Test panels may be specified in the special provisions.

For details about concrete production, review Section 4-90, "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.

When exposed aggregate slope paving is specified, ensure any concrete set retarders are used in accordance with manufacturer instructions.

When slope paving with concrete pavers is specified, ensure the special provision requirements are met.

4-7203G Gabions

The gabion method consists of placing wire mesh box-shaped baskets filled onsite 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 weight of the gabions to ensure it meets specifications. If you have any questions about the consistency of the gabions, you may also order the unit weight to be verified during the course of the work.

4-7204 Level of Inspection

4-7204
Level of Inspection

Suggested levels of inspection for slope protection activities are:

- Benchmark inspection of sampling and testing of rocks.
- Intermittent inspection of placement of slope protection, slope paving, and fabric operations.

4-7205 Quality Control

4-7205
Quality Control

Ensure the contractor is actively performing quality control on placing slope protection and slope paving throughout the operations.

Review contractor's verification of unit weight of rock-filled gabions.

4-7206 Payment

4-7206
Payment

For measurement and payment, do the following:

- When slope protection is paid by weight, refer to the discussion of weighing and metering procedures in Section 3-902E, "Weighing Equipment and Procedures," of this manual.
- When slope protection is paid by volume, review the plans and quantity calculations in the resident engineer's file to determine if there is sufficient detail and accuracy to be used in the project records.
- For measuring concrete or shotcrete, refer to Sections 4-90, "Concrete," or 4-53, "Shotcrete," of this manual.

Section 73 Concrete Curbs and Sidewalks

4-7301 General

This section provides guidelines for inspecting concrete curbs, sidewalks, and their appurtenances, such as gutter depressions, island paving, curb ramps, and driveways. For specifications about the construction of concrete curbs and sidewalks, refer to Section 73, "Concrete Curbs and Sidewalks," of the *Standard Specifications*.

For information on the production and transportation of concrete, refer to Section 4-90, "Concrete," of this manual.

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 A87A, 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. Note that Design Information Bulletin (DIB) 82, "Pedestrian Accessibility Guidelines for Highway Projects," includes Americans with Disabilities Act (ADA) design guidance on these facilities. Ensure curbs, gutters, or sidewalks:
  1. Conform to the current policy of replacing existing facilities.
  2. Comply with agreements such as Maintenance Agreements.
  3. Provide proper drainage.
- During the preconstruction conference, include a discussion on temporary and permanent pedestrian access facilities such as sidewalks and curb ramps, stressing contract compliance of these features (such as dimensioning, slopes) to ensure conformance with ADA design and legal requirements. Discuss the importance for contractor quality control on construction operations for these elements during forming and concrete placement operations to ensure compliance. Note that the contractor is required to check forms prior to placing concrete to ensure dimensioning and slope requirements will be met. Remind the contractor that failure to achieve compliance will require corrective action or removal and replacement, refer to Section 5-1.30, "Noncompliant and Unauthorized Work," of the *Standard Specifications*.
- Discuss the construction operation with the contractor. Review any project-specific traffic handling plans. Determine whether the contractor has considered the public's convenience, a consideration required by Section 7-1.03, "Public Convenience," of the *Standard Specifications* and by applicable sections of the special provisions. For information on public convenience, refer to Section 3-

702A, "Convenience of the Public and Public Traffic," of this manual. Advise the contractor of any necessary modifications to the operation.

- Discuss survey staking requests with the district Survey Unit, including the positional accuracy of stakes necessary to construct these facilities and any special staking needs. Make a general check of the layout as staked, including the location of gutter depressions, curb ramps, and driveways. Also review the stakes for accuracy. Ensure grades will accommodate finished slope requirements. If layout and grades will not meet requirements, process a change order to correct the problem in consultation with the designer and district ADA engineer as needed to ensure ADA compliance.
- Where the contract includes a preconstruction and post-construction survey bid item, ensure the contractor's licensed preconstruction survey has been completed and that no conflicts in achieving design dimensioning and slope requirements have been identified. If layout or grades will not meet requirements, process a change order to correct the problem in consultation with the designer and district ADA engineer as needed to ensure ADA compliance.
- Ensure that an approved gradation 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 best management practices 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. They 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. They are coated with form oil as specified.
5. They have the specified full depth.
6. They 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 provided dimensions and slope requirements are achieved. In some limited instances, constraints may prevent strict compliance in the conforming area for example, areas joining new curb ramp landings to existing sidewalks. In these instances, the conforming area is to meet ADA requirements to the extent practicable within the scope of the project.

- 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 any construction staging specified in the contract.
- 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.
- Ensure the contractor does not place concrete on frozen or ice-coated material.
- 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 weighmaster certificates, 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 10-foot 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 curing complies with one of the specified methods.
- Ensure the contractor protects the concrete after placement according to the specifications.
- Ensure detectable warning surfaces are on the Authorized Material List and comply with required color. Ensure prefabricated detectable warning surfaces are installed according to manufacturer recommendations and obtain the 5-year manufacturer warranty of replacement for defects.
- Ensure the finishing meets specifications and measure the finished product to ensure it conforms to contract requirements for slope and dimensions.
- Ensure the contractor complies with temporary pedestrian facility requirements under Sections 7-1.02A, "General"; 7-1.04, "Public Safety"; 12, "Temporary Traffic Control"; and 16-2.02 "Temporary Pedestrian Facilities," of the *Standard Specifications*. Also, refer to Section 2-216D, "Temporary Facilities," of this manual for additional guidance.
- For slope checks of pedestrian facilities, use smart levels with a minimum sensor accuracy of 0.1 degree for measuring slopes parallel and perpendicular to the pedestrian travelled way. Ensure the smart level is calibrated in accordance with the manufacturer's recommendations prior to taking measurements. A 4-foot smart level should be used on dimensions greater than 4 feet. Use a 2-foot smart level at other locations. For each slope check, take three readings equally dispersed across the surface to be measured. Do not average the readings. Record all slope measurements to the nearest 0.1 percent. Due to smart level accuracies, measured slopes may exceed maximum slopes by 0.2 percent for acceptance. Note that for parallel travelled way slope checks on curved ramps, smart levels should not be used for determining compliance and alternative means must be employed.
- For dimensional checks of pedestrian facilities, use a standard measuring tape. For each dimensional check, take three readings equally dispersed across the surface to be measured. Do not average the readings. Record reading to the nearest 1/8 inch. Due to measuring tape accuracies, measured dimensions may be less than minimum dimensions by 1/4 inch for acceptance.
- Record slope and dimensional checks of a pedestrian facility on an applicable compliance inspection report (for example, Form CEM-3673C, "Curb Ramp [Case A] Americans with Disabilities Act [ADA] Compliance Inspection Report.") or the plan's construction detail.
- Where the contract includes a post-construction survey requirement, ensure the contractor's licensed post-construction survey has been completed and shown dimensional and slope requirements have been achieved for the facility. Spot check the contractor's licensed post-construction survey for verification.
- File the completed documentation of pedestrian facilities in Category 46, "Assistant Resident Engineer's Daily Reports," of the project records.
- In the event dimensions and or slopes of the completed pedestrian facilities are noncompliant with contract requirements, contact the designer and district ADA engineer to determine if ADA compliance has been achieved. Any noncompliant work should be corrected or removed and replaced.

- Payment, acceptance, and certification of completed elements should only occur after verifying compliance.
- Contact the district ADA engineer in the event any of the project's planned pedestrian facilities are being considered for removal from the project's scope of work. The district ADA engineer helps manage the district's ADA transition plan and tracks delivery of pedestrian facilities.
- Complete your district's construction ADA certification procedures for pedestrian facilities prior to construction contract acceptance. Transmit the completed ADA inspection reports to ada.compliance.office@dot.ca.gov.

4-7304 Level of Inspection

4-7304 Level of Inspection

Suggested levels of inspection for typical concrete curbs and sidewalks work activities are:

- Benchmark inspection of layout once survey staking has been placed.
- Benchmark inspection of subgrade compaction and grades beneath the facilities to be constructed.
- Benchmark inspection of forms for line and grade prior to concrete placement.
- Intermittent inspection of concrete placement operations.
- Intermittent inspection of completed facilities prior to payment and acceptance.

4-7305 Quality Control

4-7305 Quality Control

When the contract includes an item for preconstruction and post-construction surveys of a pedestrian facility such as a curb ramp, ensure the contractor's surveys are submitted under seal of a properly licensed individual.

Prior to concrete placement, ensure the contractor verifies that the finished surface of the subgrade does not project into the concrete section.

Prior to concrete placement for sidewalks, gutter depressions, island paving, curb ramps, and driveways, ensure the contractor verifies the forms and site constraints will allow the required dimensioning and slopes shown in the contract documents.

When textured concrete or colored concrete surfaces are specified, ensure the contractor constructs test panels under Section 51-1.01D(2)(c), "Test Panels," of the *Standard Specifications*.

4-7306 Payment

4-7306 Payment

Measure concrete curbs and sidewalks by the cubic yard 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 yard, you may use the table for curb quantity factors (cubic yards/foot) in the *Standard Plans*.

Section 74 Pumping Equipment and Controls

Section 74 Pumping Equipment and Controls

4-7401 General

4-7401 General

Section 74, "Pumping Equipment and Controls" 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, refer to Section 161, "Pumping Plants," of the *Bridge Construction Records and Procedures* manual:

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

4-7402 Before Work Begins

4-7402 Before Work Begins

In accordance with Section 5-1.23, "Submittals," Sections 74-1.01C(2), "Shop Drawings," and 74-1.01C(3), "Product Data," of the *Standard Specifications*, the contractor must submit for review and approval shop drawings and a list of proposed materials. Confirm that copies of certificates of compliance material specified in Section 74-2.01C(3), "Certificates of Compliance," have been submitted to Structure Design, Documents Unit. Structure Design and Structure Construction have the primary responsibility for reviewing and approving the shop 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 Electrical, Mechanical, Water, and Wastewater Engineering of the upcoming tests so representatives from the office may be present to witness the testing.
- When the work nears completion and just before contract acceptance, coordinate the transfer of electrical service to Caltrans.
- At the end of the project, deliver the required contractor-submitted maintenance and operation manual to the district-designated maintenance personnel.

4-7404 Quality Control

4-7404 Quality Control

Ensure drainage pumps and electrical equipment have the specified certification.

Witness operational test of the completed pump plant.

Verify compliance with the performance testing work plan during performance testing and drainage pump final inspection.

Witness booster pump testing.

Verify that field quality control, by a factory-authorized representative, is performed on the pump controller.

Ensure compliance of training requirements as specified in Section 74-3.01D(5), "Training," of the *Standard Specifications*.

4-7405 Payment

4-7405 Payment

For the basis of measurement and payment, refer to the appropriate sections of the special provisions and *Standard Specifications*.

Section 75 Miscellaneous Metal

4-7501 General

This section provides guidelines for inspecting the installation of miscellaneous metal materials on the project. Miscellaneous metal materials include miscellaneous iron and steel, miscellaneous bridge metal, and metal work for pumping plants.

For information about concrete anchorage devices and high-strength bolts, refer to Structure Construction's *Bridge Construction Records and Procedures* manual, Vol. 2, in Sections 135, "Miscellaneous Construction Materials, and 170, "Structural Steel," respectively:

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

4-7502 Before Work Begins

Before the start of work, review the contract plans and note all the miscellaneous metal materials to be installed on the project. Review these items sufficiently in advance to help prevent scheduling conflicts and errors in ordering materials. During the preliminary review and inspections, the assistant resident engineer should also do the following:

- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes miscellaneous metal materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products" of this manual for additional information.
- Refer to Section 6-1.04C, "Steel and Iron Materials," of the *Standard Specifications*, and Sections 3-604, "Buy America," and 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual, which cover the use of foreign steel and iron.

4-7503 During the Course of Work

During work operations, the assistant resident engineer should do the following:

- Ensure that any welding of miscellaneous metal materials conforms to American Welding Society D 1.1. Refer to Section 4-11, "Welding," of this manual for additional information.
- METS inspects miscellaneous iron and steel, and miscellaneous bridge metal at the fabrication plant. When these miscellaneous metal items arrive at the job site, verify that they have been inspected and released by METS. Refer to Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Ensure that pairs of frames and grates, and pairs of frames and covers, are match marked.
- Ensure that any minor damage to galvanizing or coatings is repaired as specified in Section 75-1.02B, "Galvanizing," of the *Standard Specifications*.

- Ensure that deck drains and other grating openings are covered until final cleanup of the deck.
- Require testing of deck drains as specified.

4-7504 Quality Control

4-7504 Quality Control

While specific levels of quality control sampling and testing for miscellaneous metal are not included in Section 75 of the *Standard Specifications*, the contractor is responsible for providing quality control under Section 5-1.01, "General," and Section 11, "Welding," of the *Standard Specifications*; and Section 6-2.02, "Quality Control," of the *Standard Specifications*.

4-7505 Payment

4-7505 Payment

Require scale weights for miscellaneous metal materials that are paid by weight unless quantities are designated as final pay quantities. Make the specified deductions when materials are inspected or tested at the source, in accordance with Section 6-2.01E, "Material Source Inspection and Testing," of the *Standard Specifications*.

Section 78 Incidental Construction

4-7801 General

4-7802 Before Work Begins

4-7802A Survey Monuments
4-7802B Miscellaneous Coatings
4-7802C Parking Bumpers
4-7802D Resetting and Relocating Mailboxes
4-7802E Obliterating Roads and Detours

4-7803 During the Course of Work

4-7803A Survey Monuments
4-7803B Miscellaneous Coatings
4-7803C Parking Bumpers
4-7803D Resetting and Relocating Mailboxes
4-7803E Obliterating Roads and Detours

4-7804 Level of Inspection

4-7805 Payment

4-7805A Survey Monuments
4-7805B Resetting and Relocating Mailboxes

Section 78 Incidental Construction

4-7801 General

This section provides guidelines for inspecting incidental bid items that are not closely associated with other items of work.

Section 78-4, "Miscellaneous Coatings," of the *Standard Specifications* includes requirements for applying miscellaneous coatings to new and existing installations. For coating structural steel, refer to Section 59, "Structural Steel Coatings," of the *Standard Specifications*, and Section 4-59, "Structural Steel Coatings," of this manual. Also refer to Section 155, "Paint," of Structure Construction's *Bridge Construction Records and Procedures* manual, Vol. 2, at:

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

4-7802 Before Work Begins

Before work begins, take the following steps:

4-7802A Survey Monuments

- Obtain the contractor's written request for Department-furnished survey marker disks. Refer to Section 3-602, "Department-Furnished Materials," of this manual. Check with the district unit responsible for ordering the disks to ensure they will be available when the contractor requests them. Obtain a signed receipt from the contractor when the disks are delivered. Retain a copy of the receipt in the project file.
- Field inspect and release materials that are acceptable upon delivery of the materials to the job site. Complete Form CEM-4102, "Material Inspected and Released on Job."

4-7802B Miscellaneous Coatings

- Review Sections 4-91, "Paint," and 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual. Ensure that the contractor submits coating manufacturer's product data and application instructions at least 7 days before use.

4-7802C Parking Bumpers

- Obtain product data for parking bumpers from the contractor before the material is delivered to the job site.
- Visually inspect that the pavement is in good condition before placing the parking bumpers. If necessary, issue a change order for repairs to the pavement.

4-7802D Resetting and Relocating Mailboxes

- Before starting construction activities, document the existing conditions and locations of mailboxes and newspaper boxes. Count and record the number of mailboxes and newspaper boxes to be reset or relocated.

4-7802E Obliterating Roads and Detours

- If payment for this work is by area, measure the surface area of roads and detours before obliterating.

4-7803 During the Course of Work

During the work, do the following:

4-7803A Survey Monuments

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.

Check materials, dimensions, details, finish, and cure for compliance with specifications. If existing monuments are damaged, contact the district Surveys Unit to perform any resetting.

4-7803B Miscellaneous Coatings

Verify that Materials Engineering and Testing Services has inspected and released the paint to be used. Retrieve the "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 required by Section 59-5.01D(4), "Quality Control," of the *Standard Specifications*.

Allow application of paint only to thoroughly dry surfaces and only during periods of favorable weather.

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.

4-7803C Parking Bumpers

Verify that parking bumpers are installed in accordance with the manufacturer's instructions.

4-7803D Resetting and Relocating 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. Ensure the contractor maintains proper position and access to mailboxes.

Following are the procedures for mailboxes encountered on construction projects:

- If the mailbox is outside 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 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.

4-7803E Obliterating Roads and Detours

The objective of the *Standard Specifications* requirements for obliterating roads and detours 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 to reflect the new conditions.

4-7804 Level of Inspection

4-7804 Level of Inspection

Suggested levels of inspection for incidental construction work activities are:

- Benchmark inspection for typical survey monument, parking bumper, resetting and relocating mailboxes, and obliterating roads and detours work.
- Intermittent inspection for miscellaneous coatings work.

4-7805 Payment

4-7805 Payment

Be familiar with the payment clauses for incidental construction. Determine whether measurements must be taken before or during the work.

4-7805A Survey Monuments

Deduct costs for replacing monuments that are lost or damaged by the contractor's operations. Refer to Section 3-518, "Property and Facility Preservation," of this manual.

4-7805B Resetting and Relocating Mailboxes

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 is change order work.

Section 80 Fences

4-8001 General

This section describes the work for constructing barbed wire fence, wire mesh fence, and chain link fence. When a high-visibility temporary fence is specified, refer to Section 16-2.03, "High-Visibility Fences," of the *Standard Specifications*.

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. 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. Refer to Section 80-15.02, "Reconstruct Fences," 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.
- Fences may be constructed 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, ensure that for chain link fences certificates of compliance are submitted for protective coating system, posts, and braces. All other fencing materials must be field inspected and released by the engineer. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Arrange for necessary control staking when the contractor has submitted the required survey request.

4-8003 During the Course of Work

During work operations, take the following steps:

- Ensure that the areas where fence is to be placed have been graded and high points that may interfere with the placement of wire or mesh have been leveled. 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 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 on 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 Level of Inspection

4-8004 Level of Inspection

Suggested levels of inspection for typical fence and gate work activities are:

- Benchmark inspection of graded area prior to placing fence
- Intermittent inspection during placement of fence posts
- Benchmark inspection of alignment according to plans
- Benchmark inspection of completed sections of fence and gate

4-8005 Quality Control

4-8005 Quality Control

While specific levels of quality control sampling and testing for fences are not included in Section 80, "Fences," of the *Standard Specifications*, the contractor is responsible for providing quality control under Sections 5-1.01, "General," and 6-2.02, "Quality Control," of the *Standard Specifications*.

4-8006 Payment

4-8006 Payment

Keep records and make measurements of fence and gate construction sufficient to support both partial and final payment. Pay only for completed lengths and number of units, except withhold for incidental work as covered in Section 3-906A, "Bid Items," of this manual.

Consider using a tracking system to help prevent duplication or omissions of quantities.

Section 81 Miscellaneous Traffic Control Devices

4-8101 General

4-8102 Before Work Begins

4-8102A Delineators

4-8102B Pavement Markers

4-8103 During the Course of Work

4-8103A Delineators

4-8103B Pavement Markers

4-8103B (1) Hot Melt Bituminous Adhesive

4-8103B (2) Epoxy Adhesive

4-8103B (3) Pavement Recesses

4-8103C Existing Pavement Markers and Delineators

4-8104 Level of Inspection

4-8105 Quality Control

4-8106 Payment

4-8106A Delineators

4-8106B Pavement Markers

4-8106C Existing Facilities

Section 81 Miscellaneous Traffic Control Devices

Section 81 Miscellaneous Traffic Control Devices

4-8101 General

4-8101 General

This section describes the work for installing and placing miscellaneous traffic control devices, which include delineators and pavement markers.

Delineators are reflective devices installed in a series at the side of the roadway to indicate the roadway alignment. A delineator consists of a post and two target plates.

Pavement markers may be retroreflective, nonreflective, and retroreflective-recessed. When allowed, pavement markers may be placed using a moving lane closure to control traffic.

4-8102 Before Work Begins

4-8102 Before Work Begins

Before work begins, take the following steps:

- Refer to the "Pavement Markers and Traffic Lines, Typical Details" sheets of the *Standard Plans* for details about placing pavement markers.
- Refer to Section 95, "Epoxy," of the *Standard Specifications* for epoxy adhesive specifications.
- 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.
- Order and obtain the Department-furnished material identified in the specifications.
- Verify that delineators, pavement markers, and adhesive material are listed on Form CEM-3101, "Notice of Materials to Be Used."
- Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

4-8102A Delineators

Review the delineator list shown on the plans, and inform the contractor of any changes, preferably before material is ordered. The *California Manual of Uniform Traffic Control Devices (California MUTCD)*, Part 3, provides design details for delineators.

4-8102B Pavement Markers

- 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.

- 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.

4-8103 During the Course of Work

4-8103 During the Course of Work

During the work, take the steps listed within each of the three areas below.

4-8103A Delineators

- Ensure that the contractor provides and installs delineators at locations shown on the plans or where directed by you.
- Inspect the materials and method of installation according to the specifications.
- 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 that the contractor follows the method of placement specified.
- During the installation of target plates, check that the contractor has used washers and installed nuts and rivets properly.
- After installation, check for any damage to the installed material; document any rejections.
- Check posts for damage during the driving process. If ground conditions are such that the post cannot be driven without being damaged, ensure the contractor drills pilot holes.
- After the post is set, verify that any space around it is filled with rock-free earth and that it holds the post securely in position.
- Before contract acceptance, verify that any exposed areas where the paint is damaged are spot-painted and that any exposed areas that are soiled are cleaned.

4-8103B Pavement Markers

- Ensure that the contractor furnishes and places pavement markers at locations shown on the plans or where directed by you.
- Before placement of pavement markers, ensure that pavement has cured for the specified time.
- Before the contractor applies adhesives, ensure that the pavement is clean and the surface is dry.
- Check pavement and air temperatures.
- Verify that markers are placed using the correct adhesive.
- Only allow the use of a flexible bituminous adhesive for placement of pavement markers in pavement recesses.
- Do not allow the use of epoxy adhesive for placement of plastic nonreflective pavement markers.

- Determine that the contractor meets the time requirements between mixing adhesive and placing pavement markers.
- Check the contractor's layout work to ensure correct alignment and spacing.
- Determine that the patterns and types of pavement markers are placed correctly in accordance with the typical details on the plans. Verify that retroreflective pavement markers are placed such that each retroreflective face is perpendicular to a line parallel to the roadway centerline.
- After placement, determine that the pavement markers are not on longitudinal or transverse joints and that they are fully supported with adhesive.
- 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.
- Determine when the adhesive has set long enough for newly installed pavement markers to bear traffic.

4-8103B (1) Hot Melt Bituminous Adhesive

- If using hot melt bituminous adhesive for placement of pavement markers on asphalt concrete or a new seal coat, verify that the surface or seal coat has been open to traffic for at least 7 days.
- Verify that the application temperature of bituminous adhesive is within the specified range.
- Ensure that the contractor removes any adhesive from the marker's exposed lenses using a soft rag moistened with the manufacturer's instructed solvent.

4-8103B (2) Epoxy Adhesive

- If epoxy adhesive is used for placement of pavement markers on asphalt concrete or a new seal coat, verify that the surface or seal coat has been open to public traffic for at least 14 days and the pavement and ambient air temperatures comply with the epoxy adhesive manufacturer's instructions.
- Ensure that the contractor uses automatic mixing equipment for the application of epoxy adhesive.
- When the contractor uses epoxy adhesive, which comes in two separate components, check the mixing for specification compliance. Ensure that the proportions of the two components match the specifications. During the placing of pavement markers, observe the epoxy adhesive to ensure that 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.

4-8103B (3) Pavement Recesses

- Do not allow construction of recesses on existing structures.
- Ensure that the contractor removes residue with a vacuum before it is blown by traffic or wind.

4-8103C Existing Pavement Markers and Delineators

- Ensure that work performed on existing pavement markers and delineators complies with Section 81-8, "Existing Pavement Markers and Delineators" of the *Standard Specifications*.
- 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.

4-8104 Level of Inspection

4-8104 Level of Inspection

Suggested levels of inspection for typical stabilization work activities are:

- Intermittent inspection of epoxy adhesive mixing. At the start of each work shift, ensure the contractor checks the mixed epoxy adhesive ratio of the two components in your presence.
- Intermittent inspection of placing delineators and pavement markers.

4-8105 Quality Control

4-8105 Quality Control

Verify that delineators and pavement markers listed in Form CEM-3101 are on the Authorized Material List for signing and delineation at:

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

Collect the certificates of compliance for the materials and verify that materials are from the manufacturer listed in the approved Form CEM-3101.

4-8106 Payment

4-8106 Payment

4-8106A Delineators

Count delineators and record the counts to support partial and final payments.

4-8106B Pavement Markers

Measure the pavement markers according to the units specified. Record the 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 marker boxes used. Check this number against the theoretical number of markers to be placed.

4-8106C Existing Facilities

Familiarize yourself with the measurement and payment clauses for existing facilities to be removed. Determine whether the necessary measurements must be taken before or during removal.

Section 82 Signs and Markers

4-8201 General

4-8202 Before Work Begins

4-8202A Sign Panels

4-8202B Roadside Signs

4-8202C Markers

4-8202D Existing Roadside Signs and Markers

4-8203 During the Course of Work

4-8203A Sign Panels

4-8203B Roadside Signs

4-8203C Markers

4-8203D Existing Roadside Signs and Markers

4-8204 Level of Inspection

4-8205 Quality Control

4-8206 Payment

Section 82 Signs and Markers

4-8201 General

This section describes the work for providing and installing sign panels, roadside signs, sign overlays and markers; and work on existing roadside signs and markers at the locations shown on the plans or as directed by the resident engineer. Markers, except highway post markers, are used to mark obstructions within or adjacent to the roadbed, including paved shoulders.

4-8202 Before Work Begins

Before work begins, take the following steps:

- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes markers, sign panels, roadside sign posts, and sign overlays. Retroreflective sheeting (including reflectors for markers), and fiberglass-reinforced plastic panel and markers listed on Form CEM-3101 must be on the Authorized Material List for signing and delineation materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Review the contract for any requirements for materials furnished by Caltrans. Ensure furnished markers and sign materials have been ordered and will be ready for timely delivery. Inspect and inventory all Department-furnished materials to confirm they are delivered in good condition. After delivery, the contractor is responsible for any damage to Department-furnished materials.

4-8202A Sign Panels

Request a certificate of compliance for:

1. Aluminum sheeting.
2. Retroreflective sheeting.
3. Screened-process colors.
4. Nonreflective, opaque, black film.
5. Protective-overlay film.

Obtain and review as-built drawings for the structures requiring modified sign panels.

Inspect signs as they are delivered to the job site. Reject formed panel signs with holes that are slanted or incorrectly spaced. Reject damaged signs, defective signs, and signs with spelling errors.

4-8202B Roadside Signs

Review the plans and specifications to determine the types of signs to be installed and any special requirements included in the contract.

4-8202C Markers

Review the marker list shown on the plans, and inform the contractor of any changes, preferably before material is ordered or information is stenciled on the markers. The *California Manual on Uniform Traffic Control Devices,* Chapter 3, provides design details for markers.

Request a certificate of compliance for:

1. Metal target plates.
2. Enamel coating.
3. Retroreflective sheeting.

Examine markers and retroreflective sheeting to ensure they meet specification. Verify that they match the materials shown on Form CEM-3101.

If post mile values are not shown on the plans, provide the contractor with a list of post mile values to be stenciled on highway post markers.

4-8202D Existing Roadside Signs and Markers

Review Section 15 of the *Standard Specifications*.

Inspect existing roadside signs that are to be reset or relocated. If their condition has deteriorated sufficiently to prevent planned use, write a change order to provide for new materials. Inspect existing frames where new sign panels are to be installed.

Document existing conditions with photographs or video.

4-8203 During the Course of Work

4-8203 During the Course of Work

4-8203A Sign Panels

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.

Inspect sign panels for compliance with specified workmanship. Ensure sign panels are not chipped or bent.

Inspect signs after placement and notify the contractor to immediately replace sign panels exhibiting damage or flaws, including sheeting splices or a significant color difference between daytime and nighttime.

Ensure sign panels over lanes and lane arrows are correctly centered over the appropriate lanes.

4-8203B Roadside Signs

Review the location of postholes to ensure that the signs have the correct horizontal clearance and will not be obstructed by other objects or protrude into pedestrian facilities. Verify holes are excavated to the full depth and backfilled as specified.

Ensure the minimum vertical clearances to the bottom of the sign panels are as required by the *Standard Plans*.

Verify that wood posts have breakaway saw cuts and holes.

If posts are cut or drilled in the field, ensure the contractor treats the exposed areas with a preservative.

Verify the contractor treats wood block spacers with a preservative.

Ensure signs are attached to the posts according to the specifications.

Contact the district Traffic Unit for assistance with field review of sign staking and day and night observation of completed signage. Document any assistance received and changes made in the daily report.

4-8203C Markers

Inspect posts for damage during placement.

Ensure target plates and markers are installed after posts are set in place.

Verify letters and numerals on highway post markers are according to the specifications.

Inspect finished metal target plates for dents or defects. The maximum edge-to-edge surface deviation from a horizontal plane must not exceed 1/8 inch. Ensure all exposed areas are clean, and areas where the paint is damaged are spot painted.

4-8203D Existing Roadside Signs and Markers

Ensure the contractor protects all existing facilities that are to remain in place, temporarily or permanently, whether described in the contract or not. When existing facilities are damaged as a result of the contractor's operations, the contractor is responsible for repair or replacement. Caltrans is responsible for repair or replacement of existing facilities that are damaged by public traffic.

Ensure existing signs are not removed until the replacement signs are installed or when the existing signs are no longer needed.

4-8204 Level of Inspection

4-8204 Level of Inspection

Suggested levels of inspection for signs and markers are:

- Benchmark inspection of damaged or defective sign panels and markers when delivered to the job site and after installation.
- Intermittent inspection of installation of sign panels, roadside signs, and markers.
- Intermittent inspection of sign and marker posts.

4-8205 Quality Control

4-8205 Quality Control

Obtain the contractor's quality control plan for fabricating signs that details the materials and methods that the sign manufacturer will use to ensure the quality of the work. Coordinate with METS for review of the quality control plan and the requirement for test samples.

4-8206 Payment

4-8206 Payment

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

Refer to Section 6-2.01E, "Material Source Inspection and Testing," of the *Standard Specifications*, for information about standard deductions taken for Caltrans doing inspection or testing at material sources.

Section 83 Railings and Barriers

4-8301 General

4-8302 Before Work Begins

4-8302A Metal Beam Guard Railing, Thrie Beam Barrier, and Midwest Guardrail System

4-8302B Concrete Barriers

4-8303 During the Course of Work

4-8303A Metal Beam Guard Railing, Thrie Beam Barrier, and Midwest Guardrail System

4-8303B Guardrail End Terminals Inspection

4-8303C Pipe Handrailing, Steel Bridge Railing, Cable Railing, Metal Railing (Tubular), and Chain Link Railing

4-8303D Concrete Barriers and Railing

4-8304 Level of Inspection

4-8305 Quality Control

4-8306 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-the-road accidents, to prevent out-of-control vehicles from crossing the median, and to slow 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*:

http://www.dot.ca.gov/trafficops/safety-devices/tm-ch7.html

The following paragraphs discuss some of the details considered during design and construction. The details center on metal beam guard railing but can be applied to other types of railings and barriers. The district traffic safety device coordinator should be consulted if questions arise or changes are needed.

The design of guardrail contains many subtle details, the basis for which may not be readily apparent. Pay special attention to all connection details.

Guardrail must be anchored at both ends, in the same way a railing of rope would need to be anchored to function properly. Guardrail is normally anchored with a terminal system, an end anchor, such as a steel foundation tube or a buried post end anchor, or anchored to a structure using a transition detail.

Crash testing shows that the specified height of 30 to 32 inches for Midwest Guardrail System (MGS) is the optimal height to prevent errant vehicles from climbing over the guardrail. Spacing posts 6 feet 3 inches apart provides resistance to guardrail deflection on impact and lessens the tendency of the guardrail to form a pocket during impact.

If there is less than 4 feet, but at least 3 feet of clearance from the face of the guardrail to a fixed object, the strengthened rail section shown in the *Standard Plans* should be used. This detail uses a combination of longer, heavier posts and closer post spacing to stiffen the rail gradually to reduce the deflection of an impact. If there is less than 3 feet of clearance, concrete guardrail should be considered.

A block attached to the post adds space between the rail element and the post. As a result, the guardrail is farther from the post and decreases the possibility of a vehicle snagging on the post. 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 to wood posts prevents this rotation. Plastic blocks used with steel posts have tabs that don't allow the block to rotate and are not nailed.

Do not allow use of washers on the rail face unless otherwise shown. Without washers, bolts will pull through the rail element if a vehicle strikes, releasing the rail from the post, and allowing the rail to remain elevated as the post is pushed over.

Do not allow holes to be drilled in the rail elements in the field unless shown on the plans.

The *Standard Plans* show how to transition from metal beam guardrail to concrete guardrail or bridge rail, and have a thrie beam element on the nontraffic side of the transition posts. The metal box spacer on the nontraffic side of the transition is used to match the width of the barrier to the width of the transition.

Transitions to bridge rail generally have nested thrie beam elements, one thicker 10-gauge under a thinner 12-gauge element. The difference in thickness can be seen when side by side or when calipers are used to check the thickness.

Frequently, when guardrail ends within the clear recovery zone, the plans and special provisions specify use of a proprietary end terminal system. The allowable alternatives are shown in the project special provisions. When the terminal system is required, ensure the system is installed in accordance with the manufacturer's instructions. Ensure the contractor submits a certificate of compliance.

4-8302 Before Work Begins

4-8302 Before Work Begins

Before work begins, take the following steps:

- Carefully review the required details, and ensure that construction conforms to them. Review the locations in the field and decide whether changes are necessary. Contact the district traffic safety device coordinator and the design project engineer to concur with any changes.
- 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 that it meets specifications. Refer to Table 6-2.1, "Inspection of Fabricated and Manufactured Materials," of this manual.
- Look for the identification tags or markings that indicate Materials Engineering and Testing Services (METS) inspected the materials. If the materials are properly identified as 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. Refer to the Authorized Material List for signing and delineation materials:

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

4-8302A Metal Beam Guard Railing, Thrie Beam Barrier, and Midwest Guardrail System

- If drainage inlets or other underground obstructions conflict with the planned locations for guardrail posts, consider using long-span MGS to omit as many as three guardrail posts. This design uses breakaway posts on either side of the omitted posts to minimize pocketing of the rail. This design should not be used at fixed objects because it allows greater deflections of the rail. Refer to Chapter 7-03.6, "Guardrail Design Considerations," and Figure 7-10a, "Long Span MGS," of the *Traffic Manual*. If using metal beam guard railing, refer to Figure 7-10b, "Long Span Nested Guardrail," of the *Traffic Manual*. Consult with the district traffic

engineer for information. If the contract does not provide for long-span MGS or nested guardrail, a change order will be necessary.

- 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 with the Structures representative and Structure Construction for the review of shop plans for metal railing on structures.

4-8302B Concrete Barriers

- Ensure that all concrete mix designs have been approved before use.
- To avoid possible conflicts, verify scupper, side drain, pull box, and conduit locations.

4-8303 During the Course of Work

4-8303 During the Course of Work

Once work begins, take the steps below for each type of railing and barrier.

4-8303A Metal Beam Guard Railing, Thrie Beam Barrier, and Midwest Guardrail System

- Measure all post types at the job site to ensure that they conform to specifications.
- When required, ensure that bolt holes in treated posts are filled with grease. Note 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 *Traffic Manual* and the district traffic safety device coordinator for alternatives.
- Periodically measure the spacing of posts. The slots manufactured into the rail are spaced for standard spacing. Do not allow additional holes or slots to be cut in the rail at the job site. If a post must be moved to a location that does not have a slot, bolt only the block to the post, not the rail to the block.
- Ensure that wood blocks for metal beam guard railing are toenailed to timber posts. Wood blocks for steel posts are routered to set into the post to prevent rotation and do not require nails.
- Ensure that rail elements are lapped so that the exposed ends will not face approaching traffic. Check bolts for tightness, and check threaded rods for proper trimming. A light tap on the rail element with a hammer or wrench will reveal loose bolts, which will rattle or buzz as the rail is tapped.
- Measure the height of the guardrail and barrier above the ground or finished grade 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 markings on the bolts to ensure that they match specifications. When necessary, consult with district laboratory personnel about the proper markings.
- Ensure that anchor assemblies are constructed as specified and the cable clips installed in the proper direction and tightened to the required torque. When a sample cable is required for testing, the METS inspector will normally have

obtained one with swaged fitting. If cable is properly identified as previously inspected, there is no need to obtain a sample.

- When posts are installed in loose soil or near embankment edges, longer posts or some design modifications may be necessary to ensure a barrier with adequate strength. Refer to Sheet A77N3 in the *Standard Plans*. If longer posts are not specified for the project, a change order will be needed.
- 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.
- All anchor cables, including end anchors and terminal systems, must be tight to function properly. Cables should not be able to deflect more than 1 inch when pulled on by hand.
- Ensure that the contractor properly disposes of surplus material from excavation. Refer to Section 3-510B, "Contractor-Property Owner Agreement," of this manual. When traffic uses an adjacent lane, prohibit spoil piles or windrows of material from remaining in front of guardrail or median barriers. Such material alters the effective height of the railings and barriers. Also be sure that the disposal of material does not interfere with proper drainage.
- Ensure that asphalt concrete dikes are positioned under the guardrail as shown on the plans. Only 2-inch dike (Type C) is allowed in front of or 25 feet in advance of a terminal system.
- Bolts or threaded rods must be long enough so the nuts are completely threaded onto the bolt. Ensure that no more than 1/2 inch of thread is exposed on the traffic side of the guardrail as shown on the plans.
- Ensure that the construction of guardrail flares conforms to the plans. Maximum flare for metal beam guardrail and thrie beam guardrail is 15:1. Concrete guardrail cannot be flared at greater than 20:1.
- Longer posts may be needed if there is not enough distance from the post to the hinge point (check *Standard Plan* A77N3). If posts longer than the standard 6-foot length are installed, identify their location and record in the project records. Incorporate this information into the as-built drawings if different from shown.
- Any post not in a terminal or transition can be moved 1 foot in either direction along the guardrail to avoid an underground obstacle. If a post is moved and there is not a slot to bolt the rail to the post, do not drill a hole, just bolt the block to the post without going through the railing.
- There are other options for omitting or moving posts to avoid obstacles, such as adding posts, as long as the maximum spacing of 6 feet 3 inches is maintained. Also, two blocks can be used on a post or series of posts to space the post farther from an obstacle.
- Metal beam guard railing and MGS can use either 8-inch or 12-inch blocks. The project plans will specify which is to be used.
- When there is a grade break in front of guardrail, measure the height of guardrail based on the distance from grade break to adjust for trajectory. Extend the superelevation plane from the grade break to the face of rail and then measure the

height to that line if within 2 feet of the grade break. If the height of the rail must be more than 2 inches above the standard height, rub rail may be required. Contact your district safety devices coordinator if you have any questions.

- Grading must be completed before guardrail installation begins.

4-8303B Guardrail End Terminals Inspection

Conduct the following steps before and during the installation of in-line and flared end terminals:

- Prior to the beginning of work, the specifications require the contractor to submit a certificate of compliance for each type of end terminal to be installed.
- Before installation begins, identify the location shown for the terminal and verify the grading is adequate for the type of terminal to be installed. Verify that the layout shown on the plans will fit the actual field conditions. Identify any drainage features, dikes, or utilities that may interfere with the guardrail, terminal alignment, or post spacing. Post spacing within a terminal cannot be changed from that shown in the manufacturer's manual and drawing. Contact the district traffic safety device coordinator if changes are needed. The length or alignment of guardrail ahead of the terminal, the type of terminal, or the amount of flare may need to be adjusted to fit each location. Communicate any changes as soon as possible to the contractor.
- The flare or offset on most terminals can be varied to fit field conditions. Typically, an in-line terminal can be flared as much as 2 feet, while a flared terminal can be flared 2.5 feet to 4 feet. Flare design allows the impact head on an in-line terminal to be moved away from traffic to minimize nuisance hits. Check the manufacturer's manual for amount of allowable flare.
- Before installation begins, the ground where the end terminal will be installed must be graded and soil must be compacted in accordance with project specifications and contract plans.
- During installation, use the manufacturer's checklist to check end terminal components and details as recommended by the manufacturer. Notify the installer of any issues that do not conform to the manufacturer's recommendations.
- At completion of installation, conduct a thorough quality assurance review using the manufacturer's checklist and make sure all components are used as required by the manufacturer's recommendations.
- File a copy of the completed checklist in Category 46, "Assistant Resident Engineer's Daily Reports," of the project records.
- Photographs of the completed end terminal must be taken and placed in the project record.
- Information about the type of end terminal installed must be recorded on the project as-built plans.

4-8303C Pipe Handrailing, Steel Bridge Railing, Cable Railing, Metal Railing (Tubular), and Chain Link Railing

- Ensure that materials and methods used in anchorage and connections conform to the specifications and 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.

4-8303D Concrete Barriers and Railing

- Prohibit the placement of concrete barriers or railing on new structures until the falsework is released. 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 that forms comply with Section 51-1.03C(2), "Forms," of the *Standard Specifications*. For additional guidelines, refer to Section 4-51, "Concrete Structures," of this manual.
- When extrusion or slipform machines are used to construct concrete barriers, inspect the grade on which the machine will ride to determine if the grade is smooth enough to prevent foreseeable violations of specified tolerances. Check guide wires for obvious variations or measurable sags between supporting stakes.
- Ensure that the placing of bar reinforcing steel conforms to specified requirements and the details on the plans. For guidelines, refer to Section 4-52, "Reinforcement," of this manual.
- Review applicable specifications for producing, placing, finishing, and curing portland cement concrete to be used in concrete railing and barriers. For guidelines, refer to Sections 4-51, "Concrete Structures," and 4-90, "Concrete," of this manual.
- Require stripping the forms from Type 50 and Type 60 series barrier early enough so 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 require no hand finishing other than a light brush finish. The surface of the traffic side of the concrete median barrier should be as smooth as possible. Prohibit heavy brooming or 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 Level of Inspection

4-8304 Level of Inspection

Suggested levels of inspection for typical railing and barrier work activities are:

- Intermittent inspection of railing post depth and post spacing.
- Benchmark inspection of completed railing or concrete barrier for each location or for a day's production.
- Benchmark inspection of installed end terminal system using the manufacturer's checklist, to make sure there are no deviations from intended product use. Checklists are available at Traffic Operation's website:

  http://traffic.onramp.dot.ca.gov/safety-devices-approved-products

4-8305 Quality Control

4-8305
Quality Control

While specific levels of quality control sampling and testing for railings and barriers are not included in Section 83, "Railings and Barriers," of the *Standard Specifications*, the contractor is responsible for providing quality control under Sections 5-1.01, "General," and 6-2.02, "Quality Control," of the *Standard Specifications*. Ensure the contractor is actively performing quality control on railing and barrier materials throughout production operations by reviewing copies of quality control records, including quality control test results.

4-8306 Payment

4-8306
Payment

Measure railings, barriers, and terminal systems as specified and, where appropriate, to the limits shown on the plans. Also, count to determine the number of cable anchor assemblies and connections to be paid for. Keep adequate records and take sufficient measurements to support both partial and final payment.

Section 84 Markings

4-8401 General

4-8402 Before Work Begins

4-8402A Traffic Stripes and Pavement Markings

4-8403 During the Course of Work

4-8403A Traffic Stripes and Pavement Markings

4-8403B Rumble Strips

4-8403C Existing Markings

4-8403C (1) Removal of Traffic Stripes and Pavement Markings

4-8403C (2) Removal of Latent Traffic Stripes and Pavement Markings

4-8404 Level of Inspection

4-8405 Quality Control

4-8406 Payment

Section 84 Markings

4-8401 General

This section provides guidelines for inspecting markings for work specified under Section 84, "Markings," of the *Standard Specifications*. The work consists of applying painted and thermoplastic traffic stripes and pavement markings, constructing rumble strips, and removing existing markings. The special provisions may also allow the contractor to substitute traffic striping and pavement marking tape. Review the Bid Item List, special provisions, and the contract plans to determine where paint or thermoplastic is required.

4-8402 Before Work Begins

Before work begins, 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.

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 operations personnel if any changes appear to be necessary.

Verify that Form CEM-3101, "Notice of Materials to Be Used," includes striping tape, paint, thermoplastic material, and glass beads. All materials listed on Form CEM-3101 must be on the Authorized Material List for signing and delineation materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

4-8402A Traffic Stripes and Pavement Markings

Examine the material as it arrives on the project. Look for identification tags indicating that personnel from Materials Engineering and Testing Services (METS) inspected the material.

Obtain the certificate of compliance, METS notification letter, and safety data sheet for each lot or batch of thermoplastic, paint, and glass beads. Ensure that test results for beads used in drop-on applications include the EPA test method and that it can be traced to the specific test sample. Verify that the test for arsenic and lead content was performed by an independent laboratory.

Verify large-gradation glass beads are on the Authorized Material List for two-component traffic striping paints and large-gradation retroreflective glass beads.

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.

Discuss with the contractor the methods that will be used to remove existing markings to ensure there will be no "ghost line" left behind.

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.
- Measuring application temperatures of thermoplastic material.
- Measuring maximum temperatures of paint.

Ensure that the contractor's stencils will produce correctly dimensioned pavement markings.

4-8403 During the Course of Work

4-8403A Traffic Stripes and Pavement Markings

Check the contractor's layout work. Determine that traffic stripes and pavement markings will be correctly located. Where necessary, assist the contractor in matching existing striping cycles.

Ensure employees working around thermoplastic material wear suitable personal safety equipment, long-sleeved shirts, and eye protection.

Ensure the pavement is dry, clean, and the surface temperature is as specified before the contractor applies striping or markings.

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 the temperature gauges mounted on heating equipment for accuracy.

Before the contractor applies thermoplastic material, check and document the pavement temperature.

Ensure recesses for double traffic stripes are constructed in a single pass, are primed, and are kept dry and free of debris. Verify the thermoplastic traffic stripes and pavement markings are applied before the end of the same work shift.

Before the contractor applies paint, check and document the atmospheric temperature and expected weather conditions. Never allow the contractor to apply paint when rain, fog, or condensation could damage the freshly painted surface.

Verify that the paint temperatures do not exceed the specified maximums for solvent-borne or water-borne paints.

Ensure each coat of paint is applied in one pass of the striping machine.

When two coats of paint are required, verify the first coat of paint is dry before the second coat of paint is applied. The second coat of paint for centerline striping on 2-lane highways must be applied in the opposite direction of the first coat of paint.

Ensure the contractor uses two layers of glass beads for thermoplastic traffic stripes and pavement markings with enhanced wet-night visibility. The first layer must be high-performance glass beads and the second layer must be AASHTO glass beads.

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. Verify paint and glass beads are applied in the order specified for two-component painted traffic stripes and pavement markings. Ensure the striping machine does not travel faster than 10 miles per hour during the application.

Check thermoplastic markings for workmanship as the markings are applied. Do not permit bumps resulting from overlaps in extruded materials. Check complete thermoplastic traffic stripe or thermoplastic pavement marking to ensure it is free of runs, bubbles, craters, drag marks, stretch marks, and debris.

After application, look for any damage to striping or marking and document any rejections. Ask the contractor to remove and replace existing retroreflective pavement markers coated or damaged by work activities.

Conduct and document a nighttime drive-through visual inspection to verify the retroreflectivity of the installed material. Notify the contractor immediately of any areas with deficient retroreflectivity. Require the contractor to measure the retroreflectivity of those areas using a retroreflectometer and correct any deficiencies.

4-8403B Rumble Strips

Ensure rumble strips are not constructed:

- On structures, approach slabs, or concrete weigh-in-motion slabs.
- At intersections.
- Bordering two-way left turn lanes, driveways, or other high-volume turning areas.
- Within 6 inches of any concrete pavement joint.

Verify rumble strips comply with the dimension requirements and are within 2 inches of the alignment shown. If not compliant, have the contractor replace them.

Ensure rumble strips in concrete pavement are constructed after the specified requirements for the concrete pavement are met.

Verify rumble strips in asphalt concrete pavement are constructed on the top layer and a fog seal coat is applied to ground areas.

Ensure residue is removed from the roadbed.

4-8403C Existing Markings

Ensure existing markings are removed:

- Without removing pavement to depth of more than 1/8 inch.
- Such that the old message cannot be identified.
- In rectangular areas if the grinding method is used.

Verify all residue is swept or vacuumed. Yellow marking residue must be handled, removed, and disposed of according to the lead compliance plan.

Ensure the contractor repairs, at no cost, any damage to the pavement and surfacing that results from removing traffic stripes and pavement markings, in accordance with Section 5-1.36, "Property and Facility Preservation," of the *Standard Specifications*.

4-8403C (1) Removal of 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 would cover removal and disposal. However, if the special provisions do not identify special handling for removal of yellow striping, 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.

4-8403C (2) Removal of Latent Traffic Stripes and Pavement Markings

In the past, removal of existing traffic stripes and pavement markings was not always required on projects before placement of new pavement surfacing. Thus, on some stretches of highway, old traffic stripes and pavement markings exist under layers of pavement. On pavement rehabilitation projects, underlying latent stripes and markings may become exposed as the contractor removes layers of pavement by grinding or during cold planing of the existing surface.

If latent traffic stripes or pavement markings are exposed during removal of the existing pavement, consider those latent traffic stripes or pavement markings a differing site condition. Review Section 4-1.06, "Differing Site Conditions (23 CFR 635.109)," of the *Standard Specifications*.

Ensure the contractor repairs any pavement damage and depressions in the existing pavement caused by the removal of latent traffic stripes and pavement markings.

Removal of the latent stripes and markings and the repair of the pavement damaged by their removal will be paid as extra work in accordance with Section 4-1.05, "Changes and Extra Work," of the *Standard Specifications*. When the depressions are smaller than 0.05 foot and are filled with overlay material during its placement, pay for the additional material at contract unit price for the overlay material.

4-8404 Level of Inspection

4-8404 Level of Inspection

Suggested levels of inspection for pavement markings:

- Benchmark inspection of layouts, temperatures, and equipment during placement of pavement markings.
- Immediate nighttime visual inspection of pavement marking retroreflectivity.

4-8405 Quality Control

4-8405 Quality Control

Guidance for quality control activities included in this section is summarized as follows:

- Verify the contractor's testing of glass beads for arsenic and lead.

- Require that the contractor measure traffic stripe retroreflectivity for deficient areas identified during nighttime drive-through.
- Ensure the contractor calibrates the equipment for compliance with application rates for glass beads and paint.
- Witness the contractor's test section of two-component paint, 50 foot test stripe, and verify for homogeneous mixing of the two components, uniform bead distribution, wet film thickness, and curing time.

4-8406 Payment

4-8406 Payment

Measure the striping and markings according to the units and method specified in the *Standard Specifications* and the special provisions. Record the measurements in the daily reports and calculation sheets to support partial and final payments.

Measure the striping along the line of the traffic stripe without deductions for gaps. Use a measuring wheel or a vehicle-mounted electronic measuring device for these measurements.

Areas of the standard pavement markings shown in the *Standard Plans* may be used in the calculations to determine pay quantities. Make field measurements where the areas are variable, such as for limit lines of different lengths.

Rumble strips are paid by the length measured by the station along the length of the rumble strip without deductions for gaps between indentations.

Removal of traffic stripes is paid by the length with deductions for the gaps in broken traffic stripes and multiplied by a factor in accordance with Section 84-9.04, "Payment," of the *Standard Specifications*.

Section 86 Electrical Equipment and Materials

4-8601 General
4-8602 Before Work Begins
4-8603 Quality Assurance
4-8604 Payment

Section 86 Electrical Equipment and Materials

4-8601 General

This section provides guidelines for inspection of equipment and materials specified under Division X, "Electrical Work," Section 86, "General," of the *Standard Specifications*. Division X, "Electrical Work," includes electrical requirements and is divided into two sections:

1. Section 86, "General," includes general requirements for submittals and testing of electrical equipment and materials.
2. Section 87, "Electrical Systems," includes construction requirements for electrical systems and requirements for modifying and maintaining existing systems. This section also includes materials, testing, and construction requirements that apply to specific systems.

Electrical work requires specialized knowledge. The districts should retain qualified staff or train sufficient personnel to inspect electrical work.

Electrical work includes:

- Lighting systems.
- Sign illumination systems.
- Signal and lighting systems.
- Ramp metering systems.
- Traffic monitoring station systems.
- Flashing beacon systems.
- Closed circuit television systems.
- Changeable message sign systems.
- Roadway weather information systems.
- Temporary electrical systems.
- Existing electrical systems.
- Other electrical systems.

Electrical systems components continue to evolve and may lead to changes in material and construction requirements on successive projects. Ensure the contractor is aware of these changes because even experienced electrical contractors may not be familiar with all of the requirements in the current specifications.

Pay particular attention to the special provisions and maintain communication with the project designer, Maintenance, and Traffic Operations.

Transportation electrical engineers should be assigned as resident engineers on projects where electrical work is predominant. On projects where electrical work is not

predominant, qualified personnel with electrical expertise can be made available for assistance to inspect electrical work.

Smaller districts may use transportation electrical engineers in the district Traffic Unit and highway electricians in the Electrical Maintenance Unit for consultation.

4-8602 Before Work Begins

4-8602 Before Work Begins

Review Part 4, "Highway Traffic Signals," of the *California Manual on Uniform Traffic Control Devices*; California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 5, "Electrical Safety Orders"; and Sections 10-1.02, "Work Sequencing"; 56-3, "Standards and Poles"; 75-1.02B, "Galvanizing"; 86, "General"; and 87, "Electrical Systems," of the *Standard Specifications* and their related standard special provisions.

Within 15 days after contract approval, obtain from the contractor:

1. A list of proposed equipment and materials to be installed, before the equipment is shipped to the job site.
2. A schedule of values.

Obtain from the contractor confirmation of the vendor's acceptance of the order for the electrical equipment and materials.

Ensure Department-furnished materials have been ordered and will be ready for timely delivery. Make arrangements with all the necessary parties for pickup and delivery dates and locations. Inspect and inventory all Department-furnished materials to confirm they are delivered in good condition. After delivery, the contractor is responsible for any damage to Department-furnished materials.

Obtain a list of the equipment and materials the contractor proposes to install, as required by Section 86-1.01C, "Submittals," of the *Standard Specifications*. Verify that manufacturers' names, make and model numbers, lot and serial numbers, contract number, and other listings properly identify the materials. Have the Electrical Design Unit recheck the list of equipment and materials to prevent omissions or irregularities.

Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists electrical materials. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

Review Form TL-0028, "Notice of Material to Be Inspected," to determine materials assigned for release at the job site. Ensure the contractor delivers test results and the necessary certificates of compliance (including compliance with Buy America requirements) to the site. Release or reject the materials in accordance with Chapter 6, "Sampling and Testing," of this manual.

Consult with METS, Structure Design, and Electrical Design when the contractor submits a written request to make a substitution for a product. Obtain a recommendation as to the acceptability of the proposed product. Review Section 6-1.05, "Specific Brand or Trade Name and Substitution," of the *Standard Specifications.* Recommend approval or denial of a substitute for a specified product. Under no circumstances should the supplier or contractor be allowed to negotiate with others for proposed substitutes for products on projects under contract. Process substitutes for a specified product by change order, since it is a change in the specification requirements.

Ensure the contractor submits:

- Three sets of schematic wiring diagrams for each cabinet.
- The manufacturer's equipment maintenance and operations manuals.
- The shop drawings for service equipment enclosures.

Check the condition of electrical materials shown to be salvaged before the contractor arrives on the job site. Document the material's condition using photographs. Review Section 3-904A (4), "Surplus and Salvaged Material," of this manual.

4-8603 Quality Assurance

4-8603 Quality Assurance

Obtain the manufacturer's quality control test data for:

- LED luminaires.
- Low-pressure sodium luminaires.
- Signal heads.
- LED signal modules.
- Visors.
- LED countdown pedestrian signal face modules.
- Accessible pedestrian signals.

Collect certificates of compliance for:

- Signal heads.
- Visors.
- High mast lighting luminaires.

Request the manufacturer's installation instructions and the load-rating test reports for pullboxes.

Verify:

- LED luminaires are on the Authorized Material List for LED luminaires.
- Controller cabinets and battery backup system cabinets are on the Authorized Material List for traffic signal control equipment.
- LED signal modules are on the Authorized Material List for LED traffic signal modules.
- Conduit primers are on the Authorized Material List for organic zinc-rich primers.

Coordinate with METS to ensure service equipment enclosures and cabinets have been inspected and tested at the source.

4-8604 Payment

4-8604 Payment

Review the contractor's schedule of values breakdown for completeness and accuracy. Section 9-1.16, "Progress Payments," of the *Standard Specifications* provides details for a cost breakdown of lump sum bid items. Require the contractor to correct any unbalanced unit costs before approving the submittal. You can use this breakdown for progress payments and as a cost basis for change orders. Approve the cost breakdown before making partial payments on lump sum electrical items. For progress payment purposes, keep records of partial payments for each period.

On many projects, electrical systems equipment, and electrical hardware items are listed as eligible for payment as material on hand. On a monthly basis, check the contractor's submittals for materials on hand, and verify that materials incorporated into the work have been removed from the submittals. Refer to Section 3-906E, "Materials on Hand," of this manual for additional information.

Deduct the cost for source inspection of poles for electrical systems according to Section 6-201E, "Material Source Inspection and Testing" of the *Standard Specifications.*

Section 87 Electrical Systems

4-8701 General

4-8702 Before Work Begins

4-8703 During the Course of Work

4-8703A General

4-8703A (1) Conduit Installation

4-8703A (1a) Metal Conduit

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4-8703A (1c) Conduit Installation on Structures

4-8703A (1d) Conduit Installation Underground

4-8703A (1d) (1) Conduit Installation Under Paved Surfaces

4-8703A (1d) (2) Conduit Installation Methods

4-8703A (2) Installation of Pull Boxes

4-8703A (3) Excavating and Backfilling for Electrical Systems

4-8703A (3a) Trenching

4-8703A (3b) Concrete Pads, Foundations and Pedestals

4-8703A (4) Conductors and Cable Installations

4-8703A (4a) Detector Lead-In Cables

4-8703A (4b) Conductors Signal Cables

4-8703A (4c) Signal Interconnect Cable

4-8703A (4d) Inductive Loop Conductors

4-8703A (5) Equipment Identification Characters

4-8703A (6) Conductor and Cables Splices

4-8703A (7) Connectors and Terminals

4-8703A (8) Standards, Poles, Pedestals, and Posts

4-8703A (9) Utility Service

4-8703A (10) Photoelectric Controls

4-8703A (11) Fused Splice Connectors

4-8703A (12) Grounding Electrodes

4-8703A (13) Service Equipment Enclosures

4-8703A (14) Cabinets

4-8703A (15) Signal Heads

4-8703A (16) Pedestrian Signal Heads

4-8703A (17) Accessible Pedestrian Signals

4-8703A (18) Push Button Assemblies

4-8703A (19) Detectors

4-8703A (20) Sealants
4-8703A (21) Transformers
4-8703B Lighting Systems
4-8703C Sign Illumination Systems
4-8703D Signal and Lighting Systems
4-8703E Ramp Metering Systems
4-8703F Traffic Monitoring Station Systems
4-8703G Flashing Beacon Systems
4-8703H Changeable Message Sign Systems
4-8703I Interconnection Conduit and Cable
4-8703J Temporary Electrical Systems
4-8703K Existing Electrical Systems
4-8704 Level of Inspection
4-8705 Quality Control
4-8706 Payment
Example 4-87.1 Electrical Systems Sample Checklist

Section 87 Electrical Systems

Section 87
Electrical Systems

4-8701 General

4-8701
General

This section includes guidelines for the construction, installation, and inspection of electrical systems.

Review Part 4, "Highway Traffic Signals," of the *California Manual on Uniform Traffic Control Devices*; California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 5, "Electrical Safety Orders"; and Sections 10-1.02, "Work Sequencing"; 56-3, "Standards and Poles"; 75-1.02B, "Galvanizing"; 86, "General"; and 87, "Electrical Systems," of the *Standard Specifications* and their related standard special provisions.

The continuity and insulation resistance tests for each conductor and conductors within cables are performed with the electrical system completely disconnected from the electrical utility.

Usually, continuity is checked by attaching an ohmmeter between the two ends of the conductor. If the conductor ends are too far apart, connect two conductors together at one end and take the measurement for both conductors at the other end. The ohmmeter display should read zero ohms or close to zero. If the ohmmeter reads infinity, there is a break in the conductor. If the ohmmeter has a sound signal, turn on the sound signal and listen for a beep. The beep means there is continuity, no beep means there is a break in the conductor. If there is a break in the conductor, direct the contractor to replace the conductor or cable.

Insulation resistance is measured by attaching a megohmmeter between the conductor wire and the wire insulation. The megohmmeter is set to 500 volts and the test voltage is applied to the conductor for 1 minute. After 1 minute, the resistance value is read and recorded. If the insulation resistance is less than specified, ask the contractor to replace the conductor or cable.

Contact the district maintenance highway electrician, traffic operations engineers, or construction electrical engineers if assistance is needed to review the test results.

Verify the contractor performs a 5-business-day continuous operation test for each completed electrical system.

4-8702 Before Work Begins

4-8702
Before Work
Begins

Record on the plans any unusual items covered in the specifications but not shown on the plans. Indicate foundation sizes, bolt sizes, and bolt circles on the plan sheet containing the pole schedule.

Review the project with the traffic signal maintenance electricians, the Electrical Design Unit, and the district Traffic Unit, to determine if any changes or revisions are needed.

Electrical systems work often involves many agreements and requires the coordination of activities with outside agencies and utilities. Discuss the status of utility agreements

and relocations with the project engineer. Review the resident engineer's pending file and become familiar with the agreements.

Coordinate with utility companies and outside agencies. Notify utility companies and other agencies in advance so they can coordinate their work. Notices may include a request for electrical and telephone services. Coordinate with the district utility coordinator to submit an application and process payment to the utility companies.

Review the project with the contractor to determine where cranes and pile driving or other equipment will be used. Consult the utility company representatives for any clearance requirements necessary to accomplish the work. Determine any necessary relocations or adjustments as early as possible, to avoid project delays. Contact the district Right of Way Unit if utility facilities must be relocated because of the proposed work or if overhead wires for temporary electrical systems encroach on private property.

4-8703 During the Course of Work

4-8703 During the Course of Work

4-8703A General

To ensure all items are completed and not overlooked when accepting the work, prepare and print a checklist similar to the one shown at the end of this section.

Ensure adequate warnings and safeguards, such as signs, lights, barricades, and barriers, are set in place.

Inspect these activities when the work is underway:

- Conduit installations
- Conductor and cable installations
- Foundation excavations
- Concrete placement
- Detector installations
- Field wiring

Verify the contractor locates and field marks existing facilities within 10 feet of any excavation before performing any work that could damage or interfere with the existing facility.

If communication cables or utility lines are encountered during an excavation, contact the utility owner.

Verify that jacking pits, foundation holes, and excavations are covered according to the specifications, especially next to pedestrian facilities.

Check all metal components for proper bonding and grounding.

Before placing new systems into operation and opening to traffic, ensure all lights, signs, pavement delineation, and pavement markings are in place and working properly.

Ensure all necessary forms are completed and placed in the project files, including but not limited to the following:

- Notification to the appropriate district offices of dates electrical facilities were placed in 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 dates.

Record all changes into the as-built plans. Provide a copy of the as-built plans to the district electrical maintenance office and the district traffic operations office. Submit the original as-built plans to the district construction office.

4-8703A (1) Conduit Installation

Ensure conduit is installed using the methods specified in Section 87-1.03B, "Conduit Installation," of the *Standard Specifications*.

Verify the conduit used is the specified type and the same size between pull points. Do not allow the use of reducing couplings.

To prevent damage to conduit, do not allow placement of materials, or persons to stand, on top of the conduit during installation.

Ensure conduit of the same material is used when extending existing conduit. Conduits of different materials must be terminated in a pull box.

Verify that all exposed threads, field cut threads, and damaged surfaces receive a corrosion protection coat.

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 transformers.

Verify conduit ends are capped until the conductors or cables are to be installed.

Ensure that all conduit terminations (pull boxes, foundations, and so on) are provide with bushings before installing the conductors or cables.

Ensure conduit to remain empty has a pull tape with at least 2 feet of slack at each end and the pull tape is attached to the ends of the conduit.

Check all conduit for proper bonding and proper connections.

After installation, ensure the contractor takes precautions to prevent damage to the conduit when installing pull box markers, sign posts, and guardrail.

4-8703A (1a) Metal Conduit

Ensure that conduit ends are square and field cuts are made with a pipe cutter as specified.

Check the ends of factory-reamed conduit for burrs, and ensure field cuts are always reamed.

Prohibit the use of unthreaded connectors for conduit, because they do not have sufficient mechanical strength.

Verify 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, either the connection is not tight or the threads are crossed in the coupling. Conduit threads are not tapered.

Observe the joining of conduit during placement; otherwise, test with a wrench to ensure the joints are tight, but not overly tight. Over-tightening will cause belling of the conduit end inside the coupling that may damage the conductors during installation. If

the conduit is not in a straight line when assembled, the joints will not butt together even when tightened with a wrench.

Ensure the contractor uses only approved tools to make field bends. Do not allow bends made on the back of a truck, under a railroad track, or around a tree. A hydraulic bender is best and ensures 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. Do not allow field bends too close to a coupling, the stress created at the coupling may cause the conduit to fracture at the threads. This fracture may not be discernible at the time, but may cause trouble later. Verify the contractor keeps the number of bends to no more than 360 degrees between pull points.

Verify that installed bushings are insulated.

4-8703A (1b) Plastic Conduit

Verify the contractor thoroughly cleans the ends of plastic conduit and uses the right amount of solvent cement to obtain a good joint.

Ensure the contractor uses a soft nylon pull rope to pull conductor wire through plastic conduit.

4-8703A (1c) Conduit Installation on Structures

Ensure Type 1 exposed conduit is painted the same color as the structure.

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.

For new structures verify:

- Conduits leading to soffits, wall-mounted luminaires, other lights and fixtures located below the pull box grade are sealed and watertight.
- Expansion joints are placed in conduit passing through expansion joints in concrete structures. Ensure expansion joints are the type specified and are installed correctly.
- Conduit embedded in concrete structures is plugged flush to prevent breaking or bending it when forms are removed or when backfilling equipment operates close to the structure.
- For existing structures, ensure conduit is installed and supported according to the contract requirements.

4-8703A (1d) Conduit Installation Underground

Ensure conduit is installed at the correct depth.

Verify the contractor places a minimum of 2 inches of sand in the trench before installing Type 2 or Type 3 conduit and 4 inches over the conduit before backfilling the trench.

Ensure Type 1 or Type 2 conduit installed within a hazardous location is sealed with explosion-proof sealing fittings.

4-8703A (1d) 1 Conduit Installation Under Paved Surfaces

Do not allow the trench-in-pavement method for conduit installation under freeway lanes or freeway-to-freeway connector ramps.

4-8703A (1d) 2 Conduit Installation Methods

When conduit is being placed across existing roadways, take the following into account:

- Directional boring uses a locator and electronics located in the boring head, which allows the operator to control the direction and depth of the boring head. This method makes it possible to place the conduit in a precise location, within a fraction of an inch of the planned location.
- The air drill and fishtail bit should be used with the minimum amount of water possible. Too much water saturates the grade and can create voids that may cause the road surface to collapse and the pipe to drop excessively.
- When the air drill and fishtail bit are used in sandy soil, the water and sand 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. When rotary mud is used, ensure the contractor flushes the mud from the pipe and then removes all the mud from the drill pit before backfilling the drill pit. Failure to thoroughly remove the mud results in a spongy backfill.
- When a hydraulic jack and compressed air are used to push conduit through sand under the pavement, the smaller diameter pipe carries a jet of air. To prevent removing too much sand from under the road and leaving large voids, ensure the contractor restricts the amount of air used to jet out sandy material.

4-8703A (2) Installation of Pull Boxes

Ensure that pull boxes are installed in conduit runs and adjacent to poles, standards, enclosures, and cabinets. Verify pull boxes are spaced according to the contract requirements. Do not allow the installation of pull boxes within the boundaries of concrete pads, curb ramps, or driveways.

Verify pull boxes are placed away from any expansion joint. If pull boxes are improperly shown on the contract plans, provide an alternate location.

Ensure pull boxes are set over a layer of crushed rock, are grouted, and have a drain hole. Verify the grout is sloped towards the drain hole.

Ensure the contractor grouts around conduits installed through the sides of the pull box.

Verify that in paved areas, the top of the box is even with the surrounding grade. When the final grades are not established, it may be necessary for the contractor to set the pull boxes temporarily low and raise them to final grade as curbs and sidewalks are built.

Ensure that in unpaved areas, the top of the box is 1¼ inches above surrounding grade. On unpaved slopes, ensure the pull boxes are kept out of depressions so as not to collect water.

Ensure pull boxes are covered when no work is in progress.

For traffic pull boxes verify:

- Minor concrete is placed around and under a traffic pull box.

- The steel cover is bolted to the box when no work is in progress.
- The steel cover is bonded to the conduit.

4-8703A (3) Excavating and Backfilling for Electrical Systems

Ensure the contractor provides notification 72 hours before excavating.

Ensure excavations on a street or highway are restricted to 1 lane at a time, unless the closure charts allow additional lanes to be closed.

Ensure that backfill is properly placed around pull boxes and conduit.

Verify the contractor disposes of surplus excavated material according to the contract requirements. Refer to Section 3-510B, "Contractor-Property Owner Agreement," of this manual.

4-8703A (3a) Trenching

Do not allow excavations to take place until the contractor is ready to install the conduit or direct burial cable.

Verify that trench backfill is compacted to 90 or 95 percent relative compaction, as specified.

Ensure the contractor restores the sidewalks, pavement, and landscaping at the excavation location before excavating at another location.

4-8703A (3b) Concrete Pads, Foundations, and Pedestals

For the foundation requirements for standards, poles, metal pedestals, and posts refer to Section 56-3, "Standards and Poles," of the *Standard Specifications*.

The location of lighting standards is directly related to the gore point on exit ramps and to the lane width on entrance ramps. If necessary, revise the locations of the lighting standards accordingly. Review Sheet ES-11, "Electrical Systems (Foundation Installations)," of the *Standard Plans* for foundation details and locations.

For lighting standards with breakaway or slip bases, verify the top of the foundation is no higher than shown on the plans and the conduit end is below the slip plane.

Verify the foundation excavation is the proper size and depth.

When bar reinforcing steel is required, ensure that it is securely fastened and the required clearances are maintained.

Ensure that anchor bolts are the correct size and securely held in place in the required bolt pattern.

Verify that the concrete used meets the contract requirements. Ensure the contractor forms and finishes the exposed part of the foundations as specified. Review the *Standard Plans* for any monolithic pour and grout pads requirements.

Ensure foundations and concrete pads are constructed on firm ground.

Verify the top of the foundation and concrete pad are placed according to the contract requirements.

Ensure an ordinary surface finish is applied and a drain hole is provided, according to the contract requirements.

Verify that foundations are cured for 7 days before any equipment is installed.

4-8703A (4) Conductors and Cable Installations

Verify conductor and cable insulation is clearly and permanently marked according to the contract requirements.

Do not allow the painting of conductors or the use of colored tape on the ends of conductors to obtain the specified insulation colors.

When pulling conductors and cables, a wire trailer is desirable. Ensure the contractor pulls the conductors and cables from the reels in such a manner that traffic will not run over the conductors and cables, and pedestrians will not walk on them. Both events can damage conductors and cables.

Ensure the contractor cleans the conduit before pulling the conductors and cables.

Verify the contractor installs bushings or pulling bells on the conduit ends to prevent damage to the conductors or the conduit when pulling the conductors and cables.

Ensure conductors and cables are pulled by hand using a pull tape, to prevent damage to conductors by over-pulling. Do not allow the use of winches, trucks, or other mechanical aids. If the special provisions permit power pulling of large conductors, ensure tension measuring devices are used in accordance with the manufacturer's recommendations.

Verify the contractor uses an inert lubricant to prevent damage to the conductor and cable insulation caused by the friction created by pulling or slipping of conductors.

Ensure the contractor feeds the conductors and cables into the conduit as a unit, in a sequence determined by the length of the runs, to avoid the slipping of one conductor or cable past another in the conduit.

If additional conductors and cables are being installed in an existing conduit, verify that all existing conductors are removed, the conduit is cleaned with a mandrel or cylindrical wire brush, and the old and new conductors are pulled into the conduit as a unit. Prohibit slipping added conductors past existing ones.

Verify that when conductors from different service points occupy the same conduit or standard, the conductors from one service point are enclosed in flexible or rigid metal conduit.

Ensure conductors are identified in accordance with Section 87-1.03F, "Conductors and Cable Installations," of the *Standard Specifications*.

Verify conductors are wrapped and cables are secured to the end of the conduit and the conduit ends are sealed.

Ensure enough conductor and cable slack is provided in every pull box.

Verify that 3 spare conductors are installed in all conduits used for a ramp metering system and traffic signal system.

Ensure a separate conductor is installed for each push button and accessible pedestrian signal.

Prohibit the splicing of a pedestrian push-button neutral conductor into a signal or lighting neutral conductor.

Verify a Number 8 (minimum), insulated, grounding copper conductor is installed in conduits and that it is connected to all-metal components.

4-8703A (4a) Detector Lead-In Cables

Verify the ends of lead-in cables are waterproof before installing the cables in the conduit.

Do not allow splices in the lead-in cables, except at the pull box adjacent to the loops.

Ensure the loops are tested and operational before the contractor splices the loops to the lead-in cable.

Verify lead-in cables are identified and tagged with the detector designation at the cabinet and at the pull box adjacent to the loops.

4-8703A (4b) Conductors Signal Cables

Do not allow splicing of cables, except for 28-conductor cables.

Ensure each cable is identified at every pull box as specified.

Verify cable conductors are connected as specified.

Do not allow intermixing of neutral conductors from different cables, except at the controller cabinet.

4-8703A (4c) Signal Interconnect Cable

Prohibit splicing of the signal interconnect cable unless allowed by the special provisions.

4-8703A (4d) Inductive Loop Conductors

Prohibit splicing of inductive loop conductors, except at the pull box.

4-8703A (5) Equipment Identification Characters

If the equipment identification characters are not shown on the plans, contact the district's maintenance office and obtain a list of equipment identification characters. Provide the list to the contractor.

Verify the contractor places the equipment identification characters on a clean surface.

Ensure the contractor removes the existing characters from existing or relocated equipment, before placing the new characters.

4-8703A (6) Conductor and Cables Splices

Ensure conductor splices are soldered, tight, waterproof, and insulated according to the contract requirements.

Require the ends of unused conductors to be taped to form a watertight seal.

4-8703A (7) Connectors and Terminals

Ensure the contractor uses crimp-style terminal lugs on stranded conductors.

Verify Number 8 and smaller conductors are soldered to the connectors and terminal lugs.

4-8703A (8) Standards, Poles, Pedestals, and Posts

Review Section 56-3, "Standards and Poles," of the *Standard Specifications* for the requirements for standards, poles, pedestals, and posts.

Verify the location of standards complies with the Americans with Disabilities Act requirements.

Ensure standards and pull boxes are set to the top of the dikes in areas behind asphalt concrete dikes to be filled with dirt to the top of the dikes.

Verify signal standards are placed where the signal faces are not obstructed from the view of drivers and pedestrians. Standards with push buttons must be no more than 5 feet from crosswalks and the push button face must be parallel to the crosswalk to be used. Review Section 4E.08, "Pedestrian Detectors," of the *California MUTCD*.

For standards with a slip-base assembly, verify:

- Flat washers and heavy hex nuts are installed as shown on sheet ES-6F of the *Standard Plans*.
- The clamp bolts, nuts and upper slip base are installed and torqued as specified in Section 56-3, "Standards and Poles," of the *Standard Specifications*, when the standard is on the ground.
- The leveling and top nuts on the bottom slip base are tightened, after the standard is erected.

Verify bases for standards on structures are located:

- So that anchor bolts may be placed where the bridge rail gap will be.
- At least 5 feet from expansion joints, to prevent extra stresses at these critical structural locations.

Ensure the contractor rakes the standard by plumbing the back side of the tapered standard from the road. A slight rake of the standard about 3 degrees from the roadway prevents the impression that the standard is leaning toward the highway.

Ensure standards are bonded with a grounding wire and that the grounding wire is visible after installation according to the contract requirements.

4-8703A (9) Utility Service

Verify the contractor provides the service installations from the service point to the equipment according to the contract requirements.

Ensure the contractor furnishes all materials and service equipment for service installations on utility-owned poles.

4-8703A (10) Photoelectric Controls

Verify photoelectric controls are installed according to the contract requirements.

4-8703A (11) Fused Splice Connectors

Verify fused splice connectors, for luminaires mounted on standards, are installed in the pull box adjacent to the standard.

Ensure the connections are insulated and watertight.

4-8703A (12) Grounding Electrodes

Verify a grounding electrode and grounding conductor are installed at each cabinet, service equipment enclosure, and transformer.

4-8703A (13) Service Equipment Enclosures

Verify the location of the service equipment enclosure complies with the National Electric Code, Article 110.26, "Spaces About Electrical Equipment, (600 V, nominal

or less)," minimum clearance requirements.

Ensure circuit breakers are identified with a description engraved on a phenolic nameplate.

Verify the contractor bonds and grounds all metal conduits and uses a Number 6 or larger grounding conductor between the enclosure and the grounding electrode.

4-8703A (14) Cabinets

Ensure the area between the cabinet and the foundation is sealed.

Verify the contractor installs and solders the terminals on the conductors.

Ensure all conductors are neatly arranged and laced or enclosed in a plastic tubing or raceway.

Verify all the field conductors are connected to the correct terminal blocks in the cabinet.

Ensure telephone demarcation cabinets are installed with the back toward the nearest traffic lane.

4-8703A (15) Signal Heads

Ensure signal heads are covered or directed away from traffic until the system is ready for operation.

Verify all signal faces are the same brand and material at each location.

Ensure backplates are installed on all signal heads.

Verify signal mounting assemblies are arranged symmetrically and plumb or level. Ensure signal mounting assemblies are oriented to allow maximum horizontal clearance to the adjacent roadway.

Ensure exposed threads on brackets and bracket areas damaged during installation are cleaned and painted.

Verify conductors are connected to the terminals.

4-8703A (16) Pedestrian Signal Heads

Verify all pedestrian signal heads are the same brand and material at each location.

Ensure pedestrian signal heads are covered or directed away from traffic until the system is ready for operation.

Verify signal mounting assemblies are arranged symmetrically and plumb or level.

Ensure exposed threads on brackets and bracket areas damaged during installation are cleaned and painted.

Verify conductors are connected to the terminals.

4-8703A (17) Accessible Pedestrian Signals

Verify all accessible pedestrian signals are the same brand at each location.

Ensure the accessible pedestrian signals and the R10 series signs are installed on the crosswalk side of the standard.

Verify the arrow on the accessible pedestrian signal is pointing in the same direction as the corresponding crosswalk.

Ensure the accessible pedestrian signals are calibrated after installation.

Verify the accessible pedestrian signals are programmed with an audible message or tone according to the special provisions.

4-8703A (18) Push Button Assemblies

Ensure the push button assemblies and the R10 series signs are installed on the crosswalk side of the standard.

4-8703A (19) Detectors

Ensure the detectors are centered in the traffic lanes at the marked locations.

Verify the distance between the side of an inductive loop detector and a lead-in saw cut from an adjacent detector is at least 2 feet.

Ensure the detector conductors are the required type. Do not allow splices in the detector conductor.

Verify saw cuts are clean and dry before the detectors are installed. Ensure the residue is vacuumed from the roadway and disposed of away from the project.

Ensure the ends of Type 2 inductive loop conductors are waterproof before installation.

Verify that inductive loop detectors have the required number of turns.

Ensure adjacent inductive loop detectors to be connected on the same sensor unit channel are wound in opposite directions.

Verify that inductive loop conductors in the lead-in saw cut, between the loop and adjacent pull box, are twisted a minimum of 2 turns per foot. Do not allow more than 2 twisted pairs of conductors per lead-in saw cut.

Ensure the contractor places the loop conductors in the saw cut with a tool that will not damage the wire's insulation and holds the conductors in place at the bottom of the slot during placement of sealant.

Verify preformed inductive loop detectors are constructed and installed in accordance with Section 87-1.03V(3), "Preformed Inductive Loop Detectors," of the *Standard Specifications*.

Verify that the contractor tests each loop for continuity, circuit resistance, and insulation resistance before placing the sealant.

Verify there are 5 feet of conductor slack in the pull box.

Ensure the inductive loop conductors are banded together in pairs at the pull box and each pair is identified with the detector designation and loop number. Verify the start of the inductive loop conductor is identified with the letter "S" and the end with the letter "F".

Contact the district traffic operations office to test the loops using a reference bicycle if Type D loops are specified for the limit line detection.

If the work modifies more than 50 percent of the existing detectors, Type D loops are required for the limit line detection. Process a change order if necessary.

4-8703A (20) Sealants

Ensure sealants are applied as specified and at the required temperature.

4-8703A (21) Transformers

Ensure transformers are never picked up by the leads.

Verify transformers are wired for the correct voltage and the secondary circuit is grounded.

4-8703B Lighting Systems

Verify the contractor installs all the lighting system components as shown on the contract plans.

Ensure standards are set such that the mast arm is perpendicular to the centerline of the roadway.

Verify luminaires are installed and oriented as shown on the plans.

Ensure that conduit between soffit lights is secured and supported with concrete blocks to prevent damage to conduit joints.

Verify soffits are reset and securely fastened before concrete is poured to prevent floating during the pour.

Ensure all field-wired connections are tight and according to the contract plans.

Ensure the system is bonded according to the contract requirements.

Verify the contractor performs the conductor and operational tests for the system.

4-8703C Sign Illumination Systems

Verify the contractor installs all the sign illumination system components as shown on the contract plans.

Ensure all field-wired connections are tight and according to the contract plans.

Verify the contractor performs the conductor and operational tests for the system.

4-8703D Signal and Lighting Systems

Verify the contractor installs all the signal and lighting system components as shown on the contract plans.

Ensure signal and lighting systems are only shut down during normal working hours and that the local traffic enforcement agency is notified before the system is shut down.

Ensure standards are set such that the mast arm is perpendicular to the centerline of the roadway.

Verify signal and pedestrian signal heads are installed and oriented as shown on the plans.

Ensure that the number of conductors, their color coding, and size are correct. Each signal head needs 1 conductor per signal face; additionally, 1 neutral conductor is required in a pole. If a signal head with R, Y, and Arrow faces is to be installed, then 3 + l, or 4, conductors are needed in the pole. An additional R, Y, G facing at a right angle to the other head on the same pole requires three more conductors, a total of 7. If questions arise about conductor color coding, size, or installation method, consult the district traffic operations office or the electrical maintenance office.

Do not allow splicing of signal conductors; a single conductor must be run to the controller cabinet. Individual leads are needed for testing even if they are connected to

the same terminal in the controller cabinet. Only the neutral, pedestrian pushbutton, and lighting conductors can be spliced.

It is often best to attach the mast arm and luminaire to the pole and install the luminaire conductors inside the pole before erecting the pole, and complete the splicing in the pull box after erection.

Ensure all field-wired connections are tight and according to the contract plans, including terminal blocks in the controller cabinet, and signal and pedestrian signal heads.

Verify the contractor performs the conductor and operational tests for the system.

Notify the district traffic operations, the public information office, the electrical maintenance office, the local fire department, the police department, and schools, 2 weeks prior to the turn-on of a signal system.

Never allow a completed signal and lighting system to be placed in operation on a Friday or any day preceding a legal holiday. Before the system is turned on, ensure the traffic operations engineer verifies the signal timing and turns on the system.

4-8703E Ramp Metering Systems

Verify the contractor installs all the ramp metering system components as shown on the contract plans.

Verify signal heads are installed and oriented as shown on the plans.

Ensure all field-wired connections are tight and according to the contract plans, including terminal blocks in the controller cabinet and signal heads.

Verify the contractor performs the conductor and operational tests for the system.

4-8703F Traffic Monitoring Station Systems

Verify the contractor installs all the traffic monitoring station system components as shown on the contract plans.

Ensure all field-wired connections are tight and according to the contract plans.

Verify the contractor performs the conductor and operational tests for the system.

4-8703G Flashing Beacon Systems

Verify the contractor installs all the flashing beacon system components as shown on the contract plans.

Ensure all field-wired connections are tight and according to the contract plans.

Verify the contractor performs the conductor and operational tests for the system.

4-8703H Changeable Message Sign Systems

Verify the contractor installs all the changeable message sign system components as shown on the contract plans.

Ensure all field-wired connections are tight and according to the contract plans, including the terminal blocks in the controller cabinet and sign assembly.

Verify the contractor performs the conductor and operational tests for the system.

4-8703I Interconnection Conduit and Cable

Verify the contractor installs all the interconnection conduit and cable system components as shown on the contract plans.

Ensure all field-wired connections are tight and according to the contract plans, including the terminal blocks in the controller cabinet.

Verify the contractor performs the conductor test for the system.

4-8703J Temporary Electrical Systems

Review Sections 12-3.33, "Temporary Signal Systems," and 12-3.34, "Temporary Flashing Beacon Systems," of the *Standard Specifications* for power requirements.

Verify the contractor provides and installs all the temporary electrical system components as shown on the contract plans.

Verify the temporary electrical system operates according to the contract requirements. The contractor is responsible for the operation, maintenance, and removal of the temporary systems.

4-8703K Existing Electrical Systems

Review the contractor's work activities schedule so you can make arrangements to maintain existing electrical systems.

Ensure the contractor's activities do not damage or affect the operation of existing systems.

Ensure standards to be salvaged are completely disassembled.

If the project includes a bid item for maintaining existing traffic management system elements during construction, ensure the contractor conducts a preconstruction and post-construction operational status check of the existing electrical system's elements. Review Sections 4-1002A, "Work Sequencing," and 4-1003A, "Work Sequencing," of this manual.

If work on an existing signal and lighting system requires the detectors to be disconnected or the system to be turned off, notify the electrical maintenance superintendent in advance. When necessary, a Caltrans electrician will place the system temporarily on recall. If the signal must be turned off, provide a 24-hour notice to the appropriate law enforcement agency and arrange for traffic control if necessary.

Verify detectors damaged by the contractor's activities are replaced within 72 hours. Otherwise, have the district maintenance office replace the detectors and process a contract deduction.

Ensure modifications and removal of existing systems are done according to the contract requirements.

4-8704 Level of Inspection

4-8704 Level of Inspection

Suggested levels of inspection for typical work activities are:

- Benchmark inspection of preconstruction operational status check of the existing systems before starting any work activities.
- Intermittent inspection of conduit material and dimension.
- Intermittent inspection of conductor gauge, insulation, and color.

- Intermittent inspection of cable insulation and number of conductors, and conductor's gauge, insulation, and color.
- Intermittent inspection of trench's width and depth.
- Intermittent inspection of pull boxes installation, grouting, and leveling.
- Intermittent inspection of equipment installation and wiring.
- Benchmark inspection of post-construction operational status check of the existing systems before contract acceptance.

4-8705 Quality Control

4-8705
Quality Control

Coordinate with METS to ensure the contractor has submitted test samples of:

- Accessible pedestrian signals.
- LED countdown pedestrian signal face modules.
- LED signal modules.
- LED luminaires.

The contractor tests each conductor and conductors in cables for continuity and insulation resistance. Refer to Section 4-8701, "General," of this manual.

The contractor performs a 5-business-day continuous operation test for each completed electrical system.

4-8706 Payment

4-8706
Payment

Verify all the bid items and review the special provisions as to the method of payment and the condition of the item payments.

Review the contractor's schedule of values breakdown for completeness and accuracy. Section 9-1.16, "Progress Payments," of the *Standard Specifications* provides details for a cost breakdown of lump-sum bid items. Require the contractor to correct any unbalanced unit costs before approving the submittal. You can use this breakdown for progress payments and as a cost basis for change orders. Approve the cost breakdown before making partial payments on lump-sum electrical items.

For progress payment purposes, keep records of partial payments for each period.

On many projects, electrical systems equipment, and electrical hardware items are listed as eligible for payment as material on hand. On a monthly basis, check the contractor's submittals for materials on hand and verify that materials incorporated into the work have been removed from the submittals. Refer to Section 3-906E, "Materials on Hand," of this manual for additional information.

Deduct the cost for source inspection of poles for electrical systems in accordance with Section 6-2.01E, "Material Source Inspection and Testing" of the *Standard Specifications*.

Deduct the cost of any work performed by Caltrans maintenance crews on new or portions of existing system modified under the contract.

Example 4-87.1. Electrical Systems Sample Checklist

Check if satisfactory.

1.	Pull boxes to grade	
2.	Pull boxes correctly labeled	
3.	Ground bushings and connections tight	
4.	Conductor splices are soldered and water tight.	
5.	All metal components bonded and grounded	
6.	Vehicle detectors in proper lane, labeled, and tested	
7.	Pedestrian Count Down heads	
8.	Pedestrian signs correct at Accessible Pedestrian Signals or push buttons	
9.	Accessible Pedestrian Signals programmed correctly	
10.	Signal heads louvered when required	
11.	Heads correctly positioned and aimed at traffic	
12.	Pole base bolts checked for tightness	
13.	Poles checked for proper painting when required	
14.	Shield of telephone interconnect proper in controller cabinet	
15.	Lugs in controller cabinet checked for tightness	
16.	Conductors tested for continuity, resistance, and grounding	
17.	Operational tests for electrical systems	
18.		
	Inspected by_____	
Comments:		

Section 90 Concrete

4-9001 General

4-9001A Before Work Begins

4-9001A (1) Materials

4-9001A (1a) Cementitious Materials

4-9001A (1b) Aggregates

4-9001A (1c) Admixtures

4-9001A (2) Check of Mix Design

4-9001A (2a) Checking Proportions

4-9001A (2a) 1 Cementitious Material Content

4-9001A (2a) 2 Water Content

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4-9001A (2a) 4 Admixtures

4-9001A (2a) 5 Volume

4-9001A (3) Proportioning

4-9001A (4) Curing Concrete

4-9001A (5) Compressive Strength

4-9001B During the Course of Work

4-9001B (1) Proportioning and Mixing Operations

4-9001B (2) Mixing and Transporting

4-9001B (3) Curing Concrete

4-9001B (4) Protecting Concrete

4-9001C Level of Inspection

4-9001D Payment

4-9002 Minor Concrete

4-9003 Rapid Strength Concrete

4-9003A Before Work Begins

4-9003B During the Course of Work

4-9003C Payment

4-9004 Precast Concrete

4-9004A Before Work Begins

4-9004B During the Course of Work

4-9004C Payment

4-9005 Self-Consolidating Concrete

4-9005A Before Work Begins

4-9005B During the Course of Work

4-9006 Lightweight Concrete

4-9006A Before Work Begins

4-9006B During the Course of Work

Section 90 Concrete

4-9001 General

Section 90, "Concrete," of the *Standard Specifications* provides material requirements for concrete with the following descriptions:

- General
- Minor concrete
- Rapid strength concrete
- Precast concrete
- Self-consolidating concrete
- Lightweight Concrete

For a complete discussion on various items using concrete, refer to Sections 40, "Concrete Pavement"; 41, "Existing Concrete Pavement"; 50, "Prestressing Concrete"; 51, "Concrete Structures"; 72, "Slope Protection"; and 73, "Concrete Curbs and Sidewalks," among other sections of the *Standard Specifications*. Also, refer to the corresponding Sections 4-40, 4-41, 4-50, 4-51, 4-72, and 4-73 of this manual. The resident engineer should contact Materials Engineering and Testing Services (METS), and the district materials engineer for additional guidance on specialty concretes. Additional information on concrete is available in Structure Construction's *Concrete Technology Manual* and the *Bridge Construction Records and Procedures* manual:

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

Regardless of the type of concrete to be used, recycled concrete may not be used on Caltrans contracts unless specifically allowed by the specifications. Recycled concrete includes use of plastic concrete combined with fresh concrete, use of reclaimed concrete materials from unhardened concrete, and use of materials from crushed concrete.

4-9001A Before Work Begins

In general, the *Standard Specifications* require the contractor to determine the mix proportions for all concrete. To determine the various types of concrete that will be required, review the contract provisions. Pay particular attention to concrete information, such as "cementitious material content," "compressive strength," "minor concrete," "rapid strength concrete," "precast concrete," "self-consolidating concrete," or "lightweight concrete." Also, note the type of cement to be used and any special requirements for the aggregate and use of admixtures. Projects in corrosive environments or freeze-thaw areas will contain additional concrete requirements. 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. To avoid potential project delays and aid in the review process, 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 authorized copy of the mix design for the 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 use to avoid delays. Refer to Section 90-1.01D(5)(b), "Prequalification," of the *Standard Specifications* for additional information. Review the data and results for contract compliance.

Review the current certifications of Caltrans field staff who will perform acceptance sampling and testing of the concrete. Ensure that staff is certified for sampling and testing required for items of concrete work included in the project. Following are common test methods:

- California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections."
- California Test 504, "Method of Test for Determining Air Content of Freshly Mixed Concrete by the Pressure Method," if air entrainment in concrete is required.
- California Test 518, "Method of Test for Unit Weight of Fresh Concrete."
- California Test 521, "Method of Test for Compressive Strength of Molded Concrete Cylinders."
- California Test 523, "Method of Test for Flexural Strength of Concrete."
- California Test 524, "Method of Test for Flexural Strength of Rapid Strength Concrete," if using rapid strength concrete in pavement applications.
- California Test 533, "Method of Test for Ball Penetration in Fresh Portland Cement Concrete."
- ASTM C143, "Standard Test Method for Slump of Hydraulic-Cement Concrete," if specified in the applicable concrete application.
- California Test 539, "Method of Test for Sampling Fresh Concrete."
- California Test 540, "Method of Test for Making, Handling, and Storing Concrete Compressive Test Specimens in the Field."
- California Test 556, "Method of Test for Slump of Fresh Portland Cement Concrete."
- California Test 557, "Method of Test for Temperature of Freshly Mixed Portland Cement Concrete."

Review specifications for specific concrete acceptance sampling and testing requirements and determine if additional certifications will be required for field staff performing acceptance sampling and testing. Contact the district materials engineer for assistance in obtaining any specialty certifications.

4-9001A (1) Materials

Before work begins, verify that Form CEM-3101, "Notice of Materials to Be Used," includes concrete materials such as cement, fly ash, and aggregate. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

4-9001A (1a) Cementitious Materials

Cementitious materials are normally accepted based on certificate of compliance, so initial samples are not taken. Cementitious materials are required to be on the

Authorized Material List at the time of mix design submittal. Refer to:

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

If special requirements exist for the cementitious materials, initial testing should be considered. For more details about cementitious materials sampling and testing, refer to Chapter 6, "Sampling and Testing," of this manual.

4-9001A (1b) Aggregates

From the contractor, obtain in writing the primary aggregate nominal sizes to be furnished and their source pit locations. Ensure aggregate material sources comply with Section 7-103H (2), "Surface Mining and Reclamation Act," of this manual. Note that for concrete aggregate to be considered innocuous, both coarse aggregate and fine aggregate sources must be listed on the Authorized Material List. Refer to:

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

Aggregate sources not on this list will impact cementitious material calculations as discussed in Section 4-9001A (2a).1, "Cementitious Material Content."

- 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 aggregate test data is not available, obtain initial samples of aggregate to be used and have them tested for all specified attributes. For reference, refer to the table in Section 6-1 of this manual. Indicate whether oversized material will be crushed or if any special blends are contemplated. To prevent unnecessary expense and delay, send samples that can be evaluated against the specification gradation without further processing.

When the type or amount of concrete work doesn't require furnishing the proposed gradation, advise the contractor and note such a decision in the daily report.

4-9001A (1c) Admixtures

Before work begins, do the following for admixtures:

- Ensure admixtures are a type allowed by the *Standard Specifications* or special provisions. Admixtures must be on the Authorized Material List maintained by METS, available at:

  http://www.dot.ca.gov/hq/esc/approved_products_list/
- Accept admixtures by certificate of compliance from the admixture manufacturer.
- If more than one admixture is proposed for use, admixtures must be compatible with each other.
- Even when a contract specifically allows or requires admixtures, check the proposed dosage rate for each specific product other than air-entraining agents.
- Refer to "Concrete Admixtures," in Chapter 2 of Structure Construction's *Concrete Technology Manual* for additional information on admixtures.

4-9001A (2) Check of Mix Design

Before use of any concrete, the contractor is required to submit in writing a copy of their mix designs. Likewise, revisions in proportions of a previously authorized mix design will require a new mix design submittal. An integral part of quality assurance is the review of the submitted concrete mix designs for compliance with contract requirements. Attention must be paid to concrete requirements within the plans and specifications because, on most projects, there will be a need for multiple concrete mix designs for different uses, locations, and exposures. While it is the contractor's responsibility to design their concrete mixes using ingredients in compliance with contract requirements, it is critical that any submitted mix design that does not meet contract requirements be brought immediately to the contractor's attention. Once the submitted mix design, including required supporting documentation and qualifications, has been reviewed and determined to comply with contract requirements, notify the contractor of mix design authorization for the specific intended use. Ensure a copy of the authorization letter is filed in the project records.

For concrete in pavement, approach slabs, and bridge decks, or when other concrete shrinkage limitations are specified, ensure shrinkage test data under AASHTO T 160 is submitted and reviewed with the mix design.

Concrete mixes should generally 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.

4-9001A (2a) Checking Proportions

Structure Construction's *Concrete Technology Manual* contains multiple examples of concrete mix design reviews. The following narrative identifies key elements to consider during the mix design review process.

4-9001A (2a) 1 Cementitious Material Content

The cementitious material content is limited, and the design must conform to the specified limited amounts and requirements of Section 90-1.02B, "Cementitious Materials," of the *Standard Specifications*.

Cementitious material content minimums and maximums will generally be found in the specifications covering that item of work and not in Section 90. For example, Section 51-1.02B, "Concrete," of the *Standard Specifications* contains a table for general cementitious material content requirements for structures, though special provision requirements may modify these requirements for particular concrete structural elements.

Be aware that if the submitted mix design uses an authorized water-reducing admixture at the authorized dosage, the specified cementitious material content may be reduced up to 5 percent by weight under Section 90-1.02E(2), "Chemical Admixtures," of the *Standard Specifications*. This provision is not allowed for concrete pavements.

Once the mix design's cementitious material content has been verified, ensure that equations 1 and 2 of Section 90-1.02B(3), "Supplementary Cementitious Materials," of the *Standard Specifications* have been met. Note that in evaluating equation 1, for aggregate to be considered innocuous, all aggregates must be innocuous.

Also, note that concrete in certain exposure areas will have special cementitious material requirements that need to be verified. Examples of these areas include concrete in corrosive environments under Section 90-1.02H and concrete in freeze-thaw areas under Section 90-1.02I of the *Standard Specifications*. Concrete subject to these exposure areas will be designated in the contract.

4-9001A (2a) 2 Water Content

Section 90-1.02G(6), "Quantity of Water and Penetration or Slump," of the *Standard Specifications* provides the general requirements for maximum free water allowed in concrete mix designs. There may be specific provisions concerning water allowance for the contract item that will govern. When evaluating free water amounts, keep in mind that free water is defined as the amount of water in the mix excluding the amount of moisture in aggregates at their saturated surface dry condition. Note that if liquid admixtures are used in a cumulative amount of more than 1/2 gallon per cubic yard, the amount of liquid admixture is to be considered free water.

Nominal penetration and or slump requirements must also be considered during the mix design review. Concrete mixes requiring prequalification under Section 90-1.01D(5)(b) of the *Standard Specifications* require either certified test data or trial batch reports that include penetration or slump information. Use caution when reviewing and authorizing concrete mix designs that indicate maximum nominal penetration or slump values or have used the maximum amount of allowable free water within the mix design. Both cases leave little in the way of adjustment if problems are encountered and may result in significant delays if new mix designs are required.

Certain concrete or exposure areas may also specify water to cementitious material ratio requirements on the concrete. These are typically based on the weight of free water to the weight of cementitious materials in the mix. Ensure any such requirements are evaluated during the mix design review.

4-9001A (2a) 3 Aggregates

Aggregates for concrete must conform to Section 90-1.02C "Aggregates," of the *Standard Specifications* unless specified otherwise. These requirements include durability and cleanness testing requirements for coarse aggregates, and organic impurities and sand equivalent testing requirements for fine aggregates.

There are multiple gradation requirements (coarse aggregate, fine aggregate, and combined aggregate) that the mix design must be checked against. Note that the contractor controls a portion of the gradation requirements by proposing the "X" values within a specified allowable range for certain sieve sizes. These proposed "X" values complete the individual gradation limit requirements of Sections 90-1.02C(4)(b), "Coarse Aggregate Gradation," and 90-1.02C(4)(c), "Fine Aggregate Gradation," of the *Standard Specifications*. Verify that proposed "X" values are within allowable ranges for each sieve size. Check submitted gradations for coarse and fine aggregates and verify that gradations are within the specified operating range limits. Check additional individual gradation requirements at this time, including limitations on differences between total percentage passing adjacent sieve sizes.

Using a combined analysis of the gradations in the proportions of the mix design, determine if the combined gradation meets the gradation limits shown in Section 90-1.02C(4)(d), "Combined Aggregate Gradation," of the *Standard Specifications*.

4-9001A (2a) 4 Admixtures

Verify that dosage amounts for each admixture within the mix design are within those listed on the Authorized Material List.

Where more than one admixture is proposed in the mix design, remind the contractor that admixtures must be compatible with each other to realize effectiveness of the admixtures.

When chemical admixtures are used in combination with supplementary cementitious materials (SCM), the chemical admixture manufacturer's written instructions must include a statement of compatibility for the types and quantities of SCM being proposed.

4-9001A (2a) 5 Volume

Verify that individual mix design constituent volumes total to a cubic yard by using the weights and specific gravities of the constituents. For aggregates, use the specific gravity at saturated surface-dry condition.

4-9001A (3) 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 of aggregates conforms to specification requirements. 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 wood platform or hard surface, as specified in Section 90-1.02F(2), "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 mix design was based.
- As a part of the *Material Plant Quality Program* (*MPQP*), 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, "Methods of Test for 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, "*MPQP* Acceptance Sticker." The district weights and measures coordinator is responsible for the *MPQP* acceptance process. 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, refer to Section 3-902E, "Weighing Equipment and 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 Chapter 3, Section II, "Testing and Accepting Weighing and Measuring Devices," of the *MPQP* manual.

- Ensure that cementitious materials can be kept separate from the aggregate until they are 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. 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.
- Check the following when the concrete to be produced is for concrete pavement:

    1. Ensure that 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 that 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.

4-9001A (4) Curing Concrete

Review the various methods of curing concrete contained in Section 90-1.03B, "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 and equipment onsite. Such materials include rugs, a water supply, or acceptable curing compound. Do not allow hand spraying except as allowed under Section 90-1.03B(3)(d), "Application," of the *Standard Specifications.*

The curing compound must be of the type specified by the special provisions, *Standard Specifications*, or both. Obtain a certificate of compliance for the curing compound prior to its use.

4-9001A (5) Compressive Strength

If the 28-day compressive strength described is 3600 pounds per square inch (psi) or greater, the concrete is designated as compressive strength. When concrete has a described 28-day compressive strength greater than 3600 psi or a minimum concrete compressive strength is specified as a prerequisite to applying loads or stresses to a concrete structure or member or as specified, the contractor must prequalify the concrete before its use in the work. For additional details, refer to Section 6-305D (2), "Trial Batches," of this manual; the *Bridge Construction Records and Procedures*

manual; *Concrete Technology Manual;* and Section 90-1.01D(5), "Compressive Strength," of the *Standard Specifications*.

4-9001B 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, "Concrete," and item of work sections 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.
- Review concrete washout procedures as they apply to the water pollution control plan.

4-9001B (1) 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 certificates of compliance for cementitious materials are signed as specified.
- Observe the cementitious material storage facilities to ensure cementitious materials are protected from moisture.
- Obtain samples of the aggregate in accordance with California Test 125, "Methods of Test for 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 for during batching, may change the penetration of concrete as much as 3/4 inch and the compressive strength as much as 300 psi. You can use California Test 223, "Method of Test for 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 ensure the contractor takes any necessary corrective actions. When cementitious content designates the concrete, ensure the contractor adjusts the design to compensate for any significant differences within the nominal sizes the contractor proposed. When the concrete is designated by compressive strength, ensure the contractor takes 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 as shown on the authorized mix design and are dispensed in the specified manner. Obtain certificates of compliance for each admixture product.

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. Batch controllers that have the ability to provide an estimate of returned concrete for rebatching must have that feature disabled. Check that delivery trucks are completely empty, including washout water, prior to loading. Ready-mix trucks can be verified to be empty by spinning the mixing drum in reverse immediately prior to loading.
3. 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.
4. Check the batch size to ensure it does not exceed the specified capacity or the limit to which the scales were tested during the *MPQP*.
5. Check the mixer operation to ensure that the automatic timing device is interlocked as specified and that the mixing time is as specified.
6. Where allowed, 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, "Method of Test for Unit Weight of Fresh Concrete," to verify the unit weight, volume, and cementitious material content of concrete in accordance with the frequencies shown in Section 6-1, "Sample Types and Frequencies," of this manual. Notify the contractor 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 weighmaster certificate for each delivery load. 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, "Method of Test for 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.
- To determine the consistency of the concrete, perform California Test 533, "Method of Test for Ball Penetration in Fresh Portland Cement Concrete," or ASTM C143, "Standard Test Method for Slump of Hydraulic Cement Concrete," depending on the type of work identified in Section 90-1.02G(6), "Quantity of

Water and Penetration or Slump," of the *Standard Specifications*. When specified nominal values are exceeded, ensure the contractor makes adjustments. Concrete exceeding maximum specified values is not to be used in the work.

Use the results of California Test 533, ASTM C143, and California Test 529, "Method of Test for 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 weighmaster certificates for truck mixers or agitators to ensure that the required information is being entered, refer to Section 90-1.01C(7), "Concrete Delivery," of the *Standard Specifications*.
- 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. Ensure the contractor complies with their quality control plan where specified and review quality control information in a timely manner. When test results indicate, ensure the contractor makes corrections in the production operation. Where necessary, ensure the contractor revises the mix design and submits for approval. Revised mix designs must be approved prior to use.
- Reject (based on penetration or slump) excessively wet batches discharged from mixers and do not use 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 including a cross reference to weighmaster certificate's load number in the daily report.

4-9001B (2) Mixing and Transporting

During the work, do the following:

- Ensure that concrete is transported in accordance with the applicable specifications.
- Ensure that the proper mix design is being batched and arrives at the job site. The concrete must arrive with a weighmaster certificate that contains the specified information. Ensure certificates of compliance for cementitious materials and admixtures are provided. The weighmaster certificate must also show the actual scale weights (pounds) for the ingredients batched. Prohibit theoretical or target batch weights as substitutes for actual scale weights. Verify the specified information is actually on the weighmaster certificate. Use caution in authorizing submittal of this information in electronic media as access to this information is needed in the field as the material is delivered and placed.
- As the concrete is placed, ensure that it is homogeneous and thoroughly mixed and that no lumps or evidence of undispersed cementitious material exists.
- Check truck agitators to determine whether they are being operated at the speed designated by the manufacturer.

- Ensure that nonagitating hauling equipment does not leak and self-cleans during discharge.
- Ensure that concrete hauled in open-top vehicles is protected as specified.
- Verify the uniformity of the concrete under Section 90-1.02A, "General," of the *Standard Specifications* through California Test 533, ASTM C143, or California Test 529 as applicable for the use of concrete. Record the results on the daily report. If the concrete exceeds the nominal or maximum penetration or slump allowed under Section 90-1.02G(6), "Quantity of Water and Penetration or Slump," of the *Standard Specifications*, take appropriate action.
- When authorized, water withheld during batching can be added at the delivery point to truck mixers. Ensure that withheld water is mixed as specified. Do not allow water to be added after the start of concrete discharge. Also do not allow adding of water in excess of the amount listed in the approved mix design. Ensure the proportioning is corrected if constant mixing is necessary at the discharge point.
- When adverse or difficult conditions affect concrete placement, the contractor may request that the specified penetration and free-water content limitations be exceeded under Section 90-1.02G(6), "Quantity of Water and Penetration or Slump," of the *Standard Specifications*. Where such requests are authorized, ensure that the added water and cementitious materials do not exceed the specified ratio allowance.
- 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.
- Temperature requirements for specialty concrete may vary. Refer to the specifications for these requirements.
- When concrete is being hauled in truck mixers or agitators, ensure the discharge is completed within 1-1/2 hours or 250 revolutions after introducing the cementitious material to the aggregates. If the concrete temperature is 85 degrees F or above, determine the time (less than 1-1/2 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.
- When nonagitating equipment is used, ensure the discharge is completed within 1 hour as specified. If the concrete's temperature is 85 degrees F 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 mixer rpm 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," of this manual and specification requirements for acceptance sampling and testing.
- Do not allow trucks to exceed the weight limits, especially for bridges, given in Section 5-1.37B, "Load Limits," of the *Standard Specifications*, for additional information refer to Section 3-519B, "Load Limits," of this manual.

4-9001B (3) 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.

4-9001B (4) 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 or is anticipated.

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.

4-9001C Level of Inspection

Levels of inspection for concrete material operations are highly dependent upon the concrete element being constructed. Levels of field inspection of concrete elements should be addressed within the corresponding section of Chapter 4, "Construction Details," of this manual. When arranging for concrete plant inspection for these elements it is important to discuss both relative importance of the element and associated sampling and testing frequencies with the plant inspector. Levels of plant inspection may also vary depending on prior performance of the mix, weather conditions, and uniformity history of constituents.

4-9001D 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 and specification requirements. Take appropriate remedial action or deductions for failing results on acceptance tests.

4-9002 Minor Concrete

4-9002 Minor Concrete

The general provisions of Section 90-1, "General," of the *Standard Specifications* apply to minor concrete unless otherwise specified. Similarly, guidance contained in

Section 4-9001, "General," of this manual is applicable to minor concrete unless otherwise stated.

Ensure that the minor concrete mix design contains at least the minimum amount of cementitious materials specified.

Ensure that mix designs for minor concrete are submitted and authorized prior to use on the contract. When applicable, ensure compressive strength test results are submitted with the mix design as specified in Section 90-2.01C, "Submittals," of the *Standard Specifications*.

Ensure that the contractor submits a proposed combined aggregate gradation unless this requirement is waived by the resident engineer. Note that Section 90-2.02C, "Aggregate," of the *Standard Specifications* includes aggregate requirements for minor concrete and specifically excludes certain aggregate requirements in Section 90-1, "General," of the *Standard Specifications*.

Note that Section 90-2.02D, "Water," of the *Standard Specifications* includes water requirements for minor concrete and specifically excludes certain water requirements in Section 90-1, "General," of the *Standard Specifications*.

Production requirements for minor concrete are contained in Section 90-2.02E, "Production," of the *Standard Specifications*. Note that these requirements specifically exclude certain sections of proportioning, mixing, and transporting concrete requirements in Section 90-1, "General," of the *Standard Specifications*.

Ensure that a certificate of compliance is provided for minor concrete and that each load is accompanied by a weighmaster certificate with the specified information. Refer to Section 90-2, "Minor Concrete," of the *Standard Specifications* for additional information on minor concrete.

Be sure to review any contract item specifications that require minor concrete as they may have additional or modified concrete requirements.

4-9003 Rapid Strength Concrete

4-9003 Rapid Strength Concrete

The general provisions of Section 90-1, "General," of the *Standard Specifications* apply to rapid strength concrete (RSC) unless otherwise specified. Similarly, guidance contained in Section 4-9001, "General," of this manual is applicable to RSC unless otherwise stated.

If RSC is proportioned volumetrically, the following additional guidance will apply:

4-9003A Before Work Begins

- Ensure that each volumetric mixer is calibrated prior to beginning production work.
- Ensure that certificates of compliance are provided for each delivery of aggregate, cementitious material and admixtures used in calibration tests and that the material sources are the same as those that will be used for the planned work.

4-9003B During the Course of Work

- Ensure that weighmaster certificates are provided for cement as required in Section 90-3.01C(4), "Weighmaster Certificate," of the *Standard Specifications*.
- Ensure that aggregate moisture test results, log of production data and test samples of freshly mixed concrete for uniformity testing are submitted.

- Ensure that the contractor measures aggregate moisture under California Test 223, "Method of Test for Surface Moisture in Concrete Aggregates by the Displacement Method (Field Method)," every 2 hours during production and that the information is being submitted at the end of each production shift.
- Ensure that production data is provided at the end of each production shift in the format specified.
- Ensure that the contractor maintains a witness scale at the production site throughout the production period. When concerns arise, accuracy checks can be made using the witness scale. Recalibration of proportioning devices may also be performed with the witness scales. Contact the district's weights and measure coordinator to witness the accuracy checks, recalibrations, and spot calibrations (cement proportion system only).
- Ensure that volumetric mixers comply and operate with the requirements specified in Section 90-3.02B(3), "Mixer Requirements," of the *Standard Specifications*.
- Check for uniformity by measuring penetration with California Test 533, "Method of Test for Ball Penetration in Fresh Portland Cement Concrete." Ensure penetration comparisons are made on two test samples of mixed concrete from the same batch or volumetric mixer load. Any difference in readings must be within the specified tolerance.
- Ensure that RSC is properly cured. If using a cement other than portland cement, the RSC is to be cured as recommended by the cement manufacturer. The method of curing must be authorized before starting construction.

4-9003C Payment

Where volumetric mixer calibration is performed more than 100 miles from the project limits, ensure that the specified deduction amount is taken for each calibration session.

4-9004 Precast Concrete

4-9004 Precast Concrete

The general provisions of Section 90-1, "General," of the *Standard Specifications* apply to precast concrete unless otherwise specified. Similarly, guidance contained in Section 4-9001, "General," of this manual is applicable to precast concrete unless otherwise stated.

4-9004A Before Work Begins

- Review precast concrete specification requirements and note any special requirements including specified exceptions to those of general concrete.
- Identify the tier designations corresponding to the precast concrete members in the project, refer to Section 90-4.01D(1), "General," of the *Standard Specifications*. The tier designation will invoke specified requirements for those precast concrete elements.
- For tiers 1 and 2 precast concrete members, ensure the contractor submits a project-specific quality control plan for authorization prior to performance of any precast activities. Tier 1 and tier 2 members must be produced at an authorized facility and the quality control plan must supplement the information from the authorized facility audit. The structural materials representative (SMR) from the Office of Structural Materials within METS will assist with review of this quality control plan, be knowledgeable of the authorized facility audit, arrange any

inspections at the plant location, and monitor the contractor's compliance with their quality control plan. Once the precast quality control plan has been submitted and prior to production, hold a quality control meeting with the SMR and contractor to discuss. Refer to Sections 90-2.01C(3), "Precast Concrete Quality Control Plan," and 90-4.01D(2), "Quality Control," of the *Standard Specifications* for additional information as they pertain to tiers 1 and 2 precast concrete members.

- For tiers 3 and 4 precast concrete members, a project-specific quality control plan is not required.
- Ensure that expansion test data is submitted with the mix design when required under Section 90-4.02, "Materials," of the *Standard Specifications*. Specifications for shrinkage in Section 90-1.02A, "General," of the *Standard Specifications* are not applicable to precast concrete.
- When reviewing the mix design, ensure that the SCM content requirements for precast concrete meet those specified in Section 90-4.02, "Materials," of the *Standard Specifications*. Note that the SCM content requirements in Section 90-1.02B(3), "Supplementary Cementitious Materials," of the *Standard Specifications* do not apply to precast concrete.
- Ensure that a trial batch and prequalification of the materials, mix proportions, mixing equipment and procedures are performed if precast concrete is not manufactured at an established precast concrete plant.
- Review specifications and this manual concerning precast concrete items of work to determine method of acceptance. Pay particular attention to which precast items will receive source inspection as opposed to those which will be inspected in the field. If there are questions concerning Caltrans' acceptance of precast concrete members, contact the SMR.

4-9004B During the Course of Work

Ensure certificates of compliance, signed by the concrete manufacturer, are submitted for cementitious materials used in purchased precast concrete products. For tiers 1 and 2 members, the certificate is to be signed by the quality control manager. For tier 3 members, the certificate is to be signed by the quality control inspector. The SMR will typically verify this information for tiers 1 and 2 members.

4-9004C Payment

Review payment provisions within the specifications based on the contract item number of the precast concrete element. Associated guidance may be found in this manual in the corresponding section (for example, Section 4-51, "Concrete Structures," of this manual) or *Bridge Construction Records and Procedures* manual.

4-9005 Self-Consolidating Concrete

4-9005 Self-Consolidating Concrete

Self-consolidating concrete (SCC) is defined as flowing concrete that is capable of spreading to a level state without segregation and without the use of internal or external vibration.

The general provisions of Section 90-1, "General," of the *Standard Specifications* apply to self-consolidating concrete unless otherwise specified. Similarly, guidance contained in Section 4-9001, "General," of this manual is applicable to self-consolidating concrete unless otherwise stated.

SCC may only be used where the specifications allow, such as for precast concrete.

4-9005A Before Work Begins

- Ensure that placement procedures are included with the proposed mix design submittal before placement of SCC. Ensure a trial batch test report is submitted including test results for the tests specified in Section 90-5.01D(2)(c), "Prequalification of Mix Design," of the *Standard Specifications*.
- Ensure that the aggregate gradations to be used are provided as an informational submittal.
- Where the contract specifies, ensure that an acceptable mock-up is placed and evaluated in accordance with Section 90-5.01D(2)(d), "Mock-up," of the *Standard Specifications* prior to placing SCC for production work.

4-9005B During the Course of Work

- Ensure the contractor is performing specified quality control sampling and testing for the SCC throughout production operations.
- Perform acceptance testing of SCC in conformance with specified requirements.

4-9006 Lightweight Concrete

4-9006 Lightweight Concrete

The general provisions of Section 90-1, "General" of the *Standard Specifications* apply to lightweight concrete unless otherwise specified. Similarly, guidance contained in Section 4-9001, "General," of this manual is applicable to lightweight concrete unless otherwise stated.

4-9006A Before Work Begins

- Review contract requirements and determine which concrete elements require lightweight concrete.
- Ensure that prequalification data or reports and proposed mix design are submitted far in advance of placing lightweight concrete. Discuss these requirements with the contractor early in the contract.
- Ensure that test samples of lightweight aggregates for each gradation are taken and evaluated. The mix design submittal needs to include written verification that arrangements have been made for obtaining test samples of these aggregates. Coordinate aggregate sampling with the district materials engineer and METS.

4-9006B During the Course of Work

- Ensure that lightweight concrete acceptance sampling and testing are performed for penetration, air content, and compressive strength.
- Ensure that unit weight testing of lightweight concrete is performed as prescribed throughout production operations.

Section 91 Paint

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 *Standard Specifications* sections that require surfaces to be painted.

4-9102 Before Work Begins

Verify that Form CEM-3101, "Notice of Materials to Be Used," includes paint. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products" of this manual for additional information.

4-9103 During the Course of Work

- Ensure 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 or Fabricated Materials and Products," in this manual.
- Take samples of the paint in accordance with the tables in Sections 6-1, "Sample Types and Frequencies," and 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual.

4-9104 Payment

Payment clauses are included in the various *Standard Specification* sections or special provisions that discuss the application of paint.

Section 92 Asphalt Binders

4-9201 General

4-9201A Performance Grade Asphalt

4-9201B Asphalt Rubber Binder

4-9202 Before Work Begins

4-9202A Devices for Measuring Asphalt Volume

4-9202B Tack Coat

4-9203 During the Course of Work

4-9203A Plant Operations

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4-9204 Quality Control

4-9204A Acceptance Test Results

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4-9205 Payment

4-9205A Compensation Adjustments for Price Index Fluctuation

Section 92 Asphalt Binders

Section 92
Asphalt Binders

4-9201 General

4-9201
General

Asphalt binder and modified asphalt binder, as defined in Section 92, "Asphalt Binders," of the *Standard Specifications*, are also referred to as asphalt or paving asphalt. Modified asphalt binder is asphalt binder that has been modified with polymers, crumb rubber, or both. Asphalt binder is used in hot mix asphalt, in asphalt-treated permeable base, as pre-coating for aggregate used in seal coats, and as a tack coat. Modified asphalt binder is used in rubberized hot mix asphalt. At normal ambient temperatures, asphalt is a solid and must be heated before it is mixed with aggregates or is applied as tack coat.

A contract's special provisions may specify the type of asphalt to be used.

MS-22 Construction of Hot Mix Asphalt Pavements and *MS-2 Asphalt Mix Design Methods*, both published by the Asphalt Institute, contain information on the uses of various types of asphalts and the design and production of hot mix asphalt.

4-9201A Performance Grade Asphalt

Performance-grade asphalts and performance-grade polymer-modified asphalts are selected to meet expected climatic conditions as well as traffic speed and volume adjustments. Performance-grade asphalt binders and performance-grade polymer-modified asphalt binders are tested to meet physical properties directly related to field performance of the pavement at extreme temperatures. These tests and specifications are designed to address three specific pavement distress modes: permanent deformation (rutting), fatigue cracking, and low temperature cracking. An asphalt binder specified as performance grade PG 64-10 has the physical properties needed for field performance of pavement at an average 7-day maximum pavement temperature of 64 degrees Celsius and at a minimum pavement temperature of -10 degrees Celsius.

For "special conditions" that need additional attention due to heavy truck and bus traffic (over 10 million equivalent single axle loads for 20 years), truck and bus stopping areas, truck and bus climbing and descending lanes, the performance-grade binder specified for the climate region may be "bumped" a grade in conformance with the policy for "special conditions" included in Design Information Bulletin 86: "Selecting Asphalt Binder Type."

Performance-grade asphalt information including; the Pavement Climate Regions map and Design Information Bulletin 86 are available on the Office of Pavement Engineering website:

http://www.dot.ca.gov/hq/maint/Pavement/Offices/Pavement_Engineering/PG_Binder.html

4-9201B Asphalt Rubber Binder

Only two performance-grade asphalt binder grades are used as the base binder for asphalt rubber binder (ARB). Typically, the ARB base binder chosen for a project will

be an asphalt grade less than what is specified for a Caltrans pavement climate region because of the additional binder stiffness provided by the crumb rubber modifier.

4-9202 Before Work Begins

4-9202 Before Work Begins

Section 92, "Asphalt Binders," of the *Standard Specifications* requires the contractor to comply with the *Certification Program for Suppliers of Asphalt*. Refer to Section 6-203C (1), "Asphalt," of this manual for additional information. Perform the following before work begins:

- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes asphalt. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Verify that the asphalt binder supplier is on the Caltrans approved supplier list for the specified binder type. The current list is available at:

  http://www.dot.ca.gov/hq/esc/Translab/ormt/fpmcoc.htm

- If the asphalt supplier is not on the Caltrans approved supplier list, notify the contractor that before use, asphalt binder samples must be taken from each truckload and tested in accordance with Section Q, "Requirements for Suppliers Supplying Asphalt Without a Certificate of Compliance," of the *Certification Program for Suppliers of Asphalt.*

4-9202A Devices for Measuring Asphalt Volume

Ensure that the contractor properly equips delivery trucks, storage tanks, and hot mix asphalt plants with the specified devices for measuring asphalt volumes. Refer to the *Materials Plant Quality Program* for detailed requirements.

4-9202B Tack Coat

When asphalt is used for tack coat:

- Review *Tack Coat Guidelines* for information about application rates and general information. *Tack Coat Guidelines* are available at:

  http://www.dot.ca.gov/hq/construc/publicationlist.htm

- Ensure that the contractor will use a distributor truck that meets the requirements of Section 37-1.03B, "Equipment," of the *Standard Specifications*.
- When tack coat is a contract item, inform the contractor at the prepaving conference that measurement will be made by scale weights or, if the engineer allows, by volumetric measurement.
- Review the contract's measurement and payment clauses, and determine whether tack coat is included in other contract bid items or is paid separately

4-9203 During the Course of Work

4-9203 During the Course of Work

Sample and test asphalt, for the applicable type of work, at the frequencies shown in the tables under Section 6-1, "Sample Type and Frequencies," of this manual. Note that asphalt is included in several of the tables with differing sampling and testing frequencies. For asphalt acceptance sampling, the plant inspector and the hot mix asphalt paving inspector must be qualified on Appendix D, "Bituminous Materials," of California Test 125, "Method for Sampling Highway Materials and Products Used in the Roadway Structural Sections." Refer to the *Independent Assurance Manual:*

Procedures for Accreditation of Laboratories and Qualification of Testers for California Test 125 qualification.

Ship samples to Materials and Engineering Testing Services (METS) for acceptance testing, as shown in Section 6-1, and store the remaining samples in case additional acceptance testing is necessary.

The contractor may request that the engineer split acceptance samples. If requested, witness the contractor splitting samples into four parts. Test one, provide one to the contractor, and store two for dispute resolution.

Section 39-2.01A(4)(i)(iv), "Dispute Resolution," of the *Standard Specifications* contains a dispute resolution process for hot mix asphalt. The dispute resolution process allows the contractor to dispute any acceptance test result within 5 days of receiving the result. It is important to split sample materials and for Caltrans to take possession of and store the split samples. If a dispute occurs, the independent third party laboratory uses split samples of disputed material for evaluation. To be used by the independent third party, split samples must be in the possession of and stored by Caltrans. Stored split samples may be discarded 5 days after the contractor has received the associated acceptance test result.

4-9203A Plant Operations

The plant inspector takes the following steps related to asphalt used in hot mix asphalt:

- Ensures that the asphalt binder supplier is on the Caltrans approved supplier list or that asphalt binder samples have been taken from each truckload and tested in accordance with Section Q, "Requirements For Suppliers Supplying Asphalt Without A Certificate of Compliance," of the *Certification Program for Suppliers of Asphalt*.

  Notifies the contractor and engineer immediately if asphalt binder testing has not been completed for a supplier not on the approved suppliers list.

  Unless the resident engineer approves, does not allow use of asphalt from a nonapproved supplier before receiving Caltrans test results.
- Ensures that certificates of compliance are received with each truckload of asphalt binder delivered to the plant. Confirms that the source of asphalt is the same source as shown on Form CEM-3101, "Notice of Materials to Be Used," and for hot mix asphalt that the same source is shown on Form CEM-3511 "Contractor Job Mix Formula Proposal."
- Notifies the resident engineer immediately if there appears to be a change in the source of asphalt binder.
- Witnesses the contractor obtaining split samples of asphalt binder.
- Ensures that the contractor samples in accordance with California Test 125, "Methods for Sampling Highway Materials and Products Used in the Roadway Structural Sections."
- Ensures the contractor samples asphalt at the frequency shown in Section 6-1, "Sample Type and Frequencies," of this manual in the presence of the engineer and ensures that the sample is in the possession of and stored by Caltrans for proper chain-of-custody control.

- Completes Form TL-0101, "Sample Identification Card," for each sample of asphalt binder taken, following the directions for this form and as directed in Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual. Ships the random samples to METS for testing as detailed in the section.

4-9203B Paving Operations

The paving inspector takes the following steps related to asphalt used as tack coat:

- Ensures that the asphalt supplier is on the Caltrans approved supplier list or that asphalt samples have been taken from each truckload and tested in accordance with Section Q, "Requirements For Suppliers Supplying Asphalt Without a Certificate of Compliance," of the *Certification Program for Suppliers of Asphalt*. Notifies the contractor and resident engineer immediately if asphalt binder testing has not been completed for a supplier not on the approved suppliers list.

  Unless the resident engineer approves, does not allow use of asphalt from a nonapproved supplier before receiving Caltrans test results.

- Ensures that the distributor truck used for tack coat complies with the requirements in Section 37-1.03B "Equipment," of the *Standard Specifications*.

- When tack coat is a contract item, it is good practice to measure the volume and temperature of asphalt in the distributor truck before discharge and to make a volumetric and temperature measurement 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 weighmaster certificate for the unused asphalt.

- Ensures that tack coat is applied properly by following the application section in *Tack Coat Guidelines*:

  http://www.dot.ca.gov/hq/construc/publicationlist.htm

- Witnesses the contractor obtaining split samples of asphalt used as tack coat and ensures that the contractor samples in accordance with California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections."

- Ensures the contractor samples asphalt at the frequency shown in Section 6-1, "Sample Type and Frequencies," of this manual in the presence of the engineer and ensures the sample is in the possession of and stored by Caltrans for proper chain-of-custody control.

- Completes Form TL-0101, "Sample Identification Card," for each sample of tack coat taken, following the directions for this form and as directed in Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual. Ships the random samples to METS for testing as detailed in the section.

- Ensures that certificates of compliance are received with each truckload of tack coat used in the work. Confirms that the source of tack coat is the same source as shown on Form CEM-3101, "Notice of Materials to Be Used."

- Notifies the resident engineer immediately if there appears to be a change in the source of tack coat.

4-9204 Quality Control

The resident engineer ensures that the asphalt used in the work meets the specifications and that payment adjustments are made when required. The resident engineer performs the following quality assurance administration to ensure asphalt quality.

4-9204A Acceptance Test Results

Ensure acceptance testing is performed at the minimum frequencies shown in Section 6-1, "Sample Type and Frequencies," of this manual. Record test results on form CEM-3701 "Test Result Summary," so that minimum acceptance testing frequency is easily verified and documented.

- If any acceptance test result is outside the specified limits listed in Section 92-1.02, "Materials," of the *Standard Specifications*, notify the contractor in writing that the material may be defective. Ask the contractor if corrective action has been taken based on quality control test data for the time period the acceptance sample was taken. Attach a copy of the test result indicating that material is outside specification limits.
- For hot mix asphalt, the contractor may dispute an acceptance test result within 5 days of receiving the test result by notifying the engineer in writing, in accordance with Section 39-2.01A(4)(i)(iv), "Dispute Resolution," of the *Standard Specifications*. Try to resolve testing or sampling issues at the project level before involving an independent third party.
- If an acceptance test is outside the acceptance specification limits, verify that METS or Southern Regional Lab is testing the most recent acceptance sample for compliance with the specifications. When there are failing acceptance tests, do not follow minimum acceptance sample frequencies shown in Section 6-1, "Sample Type and Frequencies," of this manual for conducting the next acceptance test.

4-9204B Stop Production

- For hot mix asphalt (except smoothness), if two consecutive acceptance test results or any three acceptance test results for 1 day's production do not comply with the specifications, notify the contractor to stop hot mix asphalt production. Inform the contractor in writing that the material represented by the two out-of-specification acceptance tests is defective in accordance with Section 39-2.01A(4)(i), "Department Acceptance," of the *Standard Specifications*, and that the defective material is rejected and must be removed or remedied in accordance with Section 5-1.30, "Noncompliant and Unauthorized Work," of the *Standard Specifications*. Attach copies of the test results indicating that material is outside specification limits.
- When the work has been stopped because two consecutive acceptance test results do not comply with the specifications, require the contractor to:

    1. Provide written documentation of corrective action taken to correct the cause of out-of-specification material.
    2. Take samples in the engineer's presence, and split the samples into four parts. To avoid placing additional out-of-specification material, do not take samples on an active project.
    3. Test one part of the split sample for compliance with the specifications to verify that the corrective action taken by contractor has corrected any problem.

If both Caltrans and contractor's test results are within specifications and are not significantly different (that is, test results within multi-laboratory precision), the contractor has demonstrated compliance with the specifications and may resume production.

- As above, the contractor may dispute the second out-of-specification acceptance test result within 5 days of receiving the test result by notifying the engineer in writing in accordance with Section 39-2.01A(4)(i)(iv), "Dispute Resolution," of the *Standard Specifications*. Try to resolve testing or sampling issues at the project level before involving an independent third party.
- When two consecutive acceptance tests are outside the acceptance specification limits, notify METS to test all samples collected between the two out-of specification acceptance tests. Start testing samples backward from the first out-of-specification acceptance test until the test result obtained is within specification limits. Notify the contractor in writing of additional acceptance tests results conducted to ascertain the extent of the defective material. Tell the contractor that material represented by out-of-specification material is defective and rejected and must be removed or remedied in accordance with Section 5-1.30, "Noncompliant and Unauthorized Work," of the *Standard Specifications*.
- The contractor may notify the engineer in writing that defective material will be remedied or left in place at reduced compensation. Consult with the district materials engineer and the Pavement Program, Office of Asphalt Pavements about acceptance of the contractor-proposed remedy. Document material remediation or reduced pay by issuing a contractor-requested change order, including the action taken on final project materials certification. Refer to Section 6-106, "Project Materials Certification," of this manual for material certification and the requirement to list all nonconforming materials.

4-9204C Certificates of Compliance

For certificates of compliance for asphalt, each certificate of compliance must show:

1. Name and location of supplier.
2. Grade of the asphalt.
3. The date and time of shipment.
4. A unique shipment number, such as a bill of lading or manifest number.
5. A statement confirming that the transport vehicle was checked before loading and was found acceptable for the asphalt shipped.

The certificate of compliance must include the following wording:

"[*Supplier name*] hereby certifies that the asphalt product accompanying this certificate was produced in accordance with the California Department of Transportation's *Certification Program for Suppliers of Asphalt* and that this product complies with all requirements of the applicable specifications for the asphalt product identified on this document. I certify by my signature that I have the authority to represent the supplier providing the accompanying asphalt product."

- Verify that the source and grade of asphalt used as asphalt binder or tack coat have not changed during the course of the work, except with engineer's approval.

- Verify that the appropriate number of certificates of compliance have been received to cover the quantities of asphalt binder and tack coat used in the work. Calculate the tons of asphalt binder required based on the percentage of binder in the hot mix asphalt placed, and compare the result with the amount covered by the certificates of compliance. For tack coat, summarize the daily tons used and compare to the amount covered by the certificates of compliance.
- Document action taken on final project materials certification if certificates of compliance are missing. Refer to Section 6-106, "Project Materials Certification," of this manual for material certification and the requirement to list all nonconforming materials.

4-9205 Payment

Payment clauses for asphalt are found in the sections covering the work in which asphalt is used. For details on asphalt measurement, review Section 92-1.04 "Payment," of the *Standard Specifications.*

- When making volumetric measurements of asphalt used as a tack coat, measure the temperature, and apply the proper factors for converting volume to mass.
- If applicable, when asphalt is used in hot mix asphalt and dispute resolution determines the contractor's test results are correct, Caltrans pays the independent third party testing costs. When the contractor's test results are correct, the resident engineer adjusts payment and contract time under Section 8-1.07, "Delays," of the *Standard Specifications*.

4-9205A Compensation Adjustments for Price Index Fluctuation

If the contractor did not opt out of payment adjustments for price index fluctuations at the time of bid, perform the following for asphalt binder and asphalt used as tack coat:

- Process a change order to allow for payment adjustments—increase and decrease—based on total estimated potential payment adjustment. Including both a positive and negative payment method allows the progress payment system to accept both positive and negative monthly payment adjustments.
- During each progress estimate, calculate the amount of paving asphalt used monthly in hot mix asphalt and tack coat. Segregate the quantity based on the calendar month it was placed.
- If the crude oil index for the current month fluctuates by more than 5 percent from the crude oil index for the month in which the bid opening occurred, calculate the asphalt payment adjustment, including the adjustment on the monthly estimate. A tool to assist in making the monthly adjustments is available on the Division of Construction's Hot Mix Asphalt Construction website:

  http://www.dot.ca.gov/hq/construc/hma/

Section 94 Asphaltic Emulsions

4-9401 General

Asphaltic emulsions are described in Section 94, "Asphaltic Emulsions," of the *Standard Specifications*. They are used for seal coats and tack coat. 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*—Sections 18, 24, 27, 37, 39, 54, 66 and 86—covering work in which asphaltic emulsions are used.

Asphaltic emulsions are composed of a bituminous material uniformly emulsified with water and an emulsifying or a stabilizing agent. When asphaltic emulsions are used as a tack coat for asphalt concrete, the application rate is specified in terms of a residual rate. The residual rate is the amount of bituminous material that remains on the pavement after water and emulsifying or stabilizing agents evaporate; it is not the application rate from the distributor truck.

Slow setting and quick setting asphaltic emulsions used as a tack coat can be diluted up to 1 part added water to 1 part original emulsion. Dilution allows the material to be sprayed at a higher rate, promoting uniform coverage while still maintaining minimum residual rates. Rapid setting emulsions and polymer modified emulsions cannot be diluted.

Asphaltic emulsions (diluted or undiluted) used as a tack coat are typically applied at a rate of 0.05 to 0.15 gallons per square yard. Spray rates closer to 0.10 gallons per square yard promote uniform coverage.

For more information, refer to the Division of Construction's *Tack Coat Guidelines* and the "Minimum Spray Application Rates of Original Undiluted and Diluted Emulsions" table at:

http://www.dot.ca.gov/hq/construc/hma/

4-9402 Before Work Begins

Before work begins, take the following steps:

- Verify that Form CEM-3101, "Notice of Materials to Be Used," includes asphaltic emulsion. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.
- Examine the distributor truck to determine whether it meets the specified requirements.
- Dilution should be done by the manufacturer, not the contractor.
- Ensure the contractor properly equips delivery trucks, storage tanks, and spreading equipment with specified devices for measuring volumes of asphaltic emulsion.

- If the polymer content of polymer modified asphaltic emulsion is determined under California Test 401, verify that the contractor has submitted a sample to Materials Engineering and Testing Services.

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 Caltrans' sampling and testing is complete, obtain a certificate of compliance containing the specified information.
- Verify the receipt of a safety data sheet for each shipment of asphaltic emulsion to the job site.
- Check the temperature of the asphaltic emulsion to ensure it is within the specified range when applied.
- Before asphaltic emulsion is applied, check that 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.
- Sample asphaltic emulsion in accordance with Table 6-1.11, "Materials Acceptance Sampling and Testing Requirements: Seal Coats," Table 6-1.12, "Materials Acceptance Sampling and Testing Requirements: Asphalt Concrete, and the instructions in Section 6-203C, "Materials Accepted on the Basis of a Certificate of Compliance," of this manual. 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.
- Use Form CEM-3701 "Test Result Summary," to record the dates that samples were taken, shipped to the laboratory, test result was received from lab, and test result notification was sent to contractor. Ship samples within 1 business day when the laboratory is within 50 miles, or within 2 business days when the laboratory is farther than 50 miles.

For asphaltic emulsion used as a tack coat, determine the following:

- RRm—the minimum residual rate of the tack coat specified in Section 39, "Asphalt Concrete," of the *Standard Specifications.* Note the different residual rates required for the various hot mix asphalt types and open graded friction courses.
- PRDm—the minimum percent residue by distillation, for the type of undiluted asphaltic emulsion used, specified in Section 94, "Asphaltic Emulsions," of the *Standard Specifications.*
- POE—the diluted emulsions "percent original emulsion." For example:
  - If the emulsion was diluted with 1 part added water to 4 parts original emulsion, the "percent original emulsion" is 4/5 original emulsion, or 80 percent original emulsion. This is commonly referred to as (1:4) or 80/20.
  - If the emulsion has not been diluted, the "percent original emulsion" is 100 percent.
- Determine the minimum spray application rate of the emulsion based on its delivered state; diluted or undiluted. Use the table, "Minimum Spray Application Rates of Original Undiluted and Diluted Emulsions" at:

  http://www.dot.ca.gov/hq/construc/hma/

Or perform your own calculations:

minimum spray application rate (gal/sq yd) = RRm/[(PRDm/100) x (POE/100)]

Example:

Assume the following:

- Placing new hot mix asphalt over planed pavement.
- Contractor's distributor truck shows up with SS1h (slow setting, grade 1) emulsion that has been diluted with 1 part water to 4 parts original emulsion (that is; 1:4, or an 80/20).
- The diluted emulsion is now only 80 percent original emulsion.

Using these assumptions, calculate the minimum spray applications rate as follows:

1. From Section 39-2.01C(3)(f), "Tack Coat," RRm = 0.05 gal/sq yd
2. From Section 94-1.02B, "Anionic Asphaltic Emulsions," under Grade SS1h, PRDm = 57.
3. From the given information for this example, POE = 80.
4. Minimum spray application rate = 0.05/[(57/100) x (80/100)] = 0.1096 gal/sq yd
5. Rounded to the nearest 0.01 gal/sq yd, the minimum spray application rate is 0.11 gal/sq yd.

- Document that the contractor's planned spray rate is not less than the minimum spray application rate for the diluted or undiluted emulsion in the daily report.
- Check the application rate of asphaltic emulsion to verify the designated rate. After the first few hundred feet 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.

4-9404 Quality Control

4-9404
Quality Control

If the contractor uses the asphaltic emulsion before the sampling and testing is complete, ensure the contractor submits a certificate of compliance for each shipment to the job site.

Refer to the requirements for asphaltic emulsions in other sections of the *Standard Specifications* and the corresponding sections of this manual in which asphaltic emulsions are used.

4-9405 Payment

4-9405
Payment

Asphaltic emulsion is paid for as a separate bid item, unless specified as included as part of a separate item of work. Asphaltic emulsion is subject to adjustment for price index fluctuations under Section 9-1.07 of the *Standard Specifications*.

Obtain weighmaster certificates for deliveries of asphaltic emulsion. The specifications require the weighmaster certificates to break out the weight of water used to dilute the asphaltic emulsion. If weighmaster certificates are based on asphaltic emulsion that has been diluted, do not include the weight of the added water in the payment quantity. Pay only for the weight of the original undiluted emulsion covered by a certificate of compliance. Refer to Section 9-1.02B, "Weighing Equipment and Procedures," of the *Standard Specifications*.

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 weighmaster certificate for the unused asphaltic emulsion.

When the specifications provide for water to be mixed with asphaltic emulsion, it is necessary to determine the weight of asphaltic emulsion without the added water. Delivery weighmaster certificates will show the weight of the emulsion before water was added and the total weight of asphaltic emulsion with added water.

When making volumetric measurements, measure the temperature and apply the proper factors for converting volume to weight.

In a partial load using volumetric measurements, the procedure for determining the weight of asphaltic emulsion with added water is as follows:

- 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 tons of added water in the original load to gallons.
- Based on the final temperature reading, calculate the ratio of the volume of asphaltic emulsion to the total volume in the original load.
- Calculate the volume, at 60 degrees Fahrenheit of emulsion in the partial load.
- Determine the weight of emulsion remaining in the partial load.

Example:

Assume the following:

- Weighmaster certificate shows 10 tons of emulsion and 5 tons of added water. (Total = 15 tons) Temperature at the time of weighing was 131 degrees F.
- 534 gallons of emulsion with added water remain in the partial load. At the time of measuring, the temperature of the mixture is 131 degrees F.

Using these assumptions, calculate as follows:

1. Volume of emulsion at 131 degrees F in the original load:

   10 tons x 240 gal/ton at 60 degrees F ÷ 0.98225 (refer to the conversion table in Section 94-1.04, "Payment," of the *Standard Specifications*) = 2,443 gal
2. Volume of added water in the original load:

   (5 tons x 2,000 lbs.) / 8.33 lb./gal = 1,200 gal
3. Ratio of volume of emulsion at 131 degrees F to total volume in the original load:

   2,443/(2,443+1,200) = 0.671
4. Volume at 60 degrees F of emulsion in the partial load:

   0.671 x 534 x 0.98225 = 352 gal
5. Weight of emulsion in partial load:

   352 ÷ 240 = 1.46 tons
6. Emulsion used on the project:

   10.00 – 1.46 = 8.54 tons

Section 95 Epoxy

Section 95
Epoxy

4-9501 General

4-9501
General

Epoxies specified under Section 95 of the *Standard Specifications* are two-component adhesives used for a number of applications, including the following:

- As a binder to produce high strength epoxy concrete and epoxy mortar
- Pressure grouting cracks in concrete
- Bonding freshly mixed concrete to hardened concrete
- Bonding pavement markers to pavement
- Sealing inductive loops and leads in hot mix asphalt and concrete
- Pressure injection grouting of concrete pavement

Bridge Construction Memo 135-1.0, "Epoxy Adhesives," of *Bridge Construction Records and Procedures* manual contains additional information on epoxy selection, mixing, and placement.

4-9502 Before Work Begins

4-9502
Before Work
Begins

Verify that Form CEM-3101, "Notice of Materials to Be Used." includes epoxy. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for additional information.

4-9503 During the Course of Work

4-9503
During the Course
of Work

During the work, take the following steps:

- Determine that the epoxy used for application type is the material specified, and obtain necessary certificates of compliance.
- Make sure the epoxy is packaged and labeled as the specifications require for its intended use.
- Ensure epoxy components are being stored at temperatures greater than 35 degrees Fahrenheit.
- Ensure surfaces to receive epoxy are sound and have been properly prepared and cleaned of harmful materials, including rust, paint, grease, and laitance. Inadequate surface preparation or cleaning is often later identified as the reason for poor bonding performance of epoxy when problems occur.
- Ensure the epoxy is mixed and applied under the manufacturer's instructions and specification requirements. If epoxy components show evidence of crystallization, permanent increase in viscosity, noncorrectible settlement of pigments, or are older than the manufacturer's recommended expiration date, the material cannot be used. Ensure each individual component is being thoroughly mixed prior to mixing with other components. During mixing pay particular attention to the proportions being mixed and the thoroughness of the blending. Partial kits are not allowed as it is difficult to ensure proper proportioning will occur. Addition of solvents is not

allowed as their inclusion will affect epoxy performance. Monitor the time from mixing to placement and epoxy consistency, ensuring the epoxy does not exceed its working life for the temperature at which it is placed.

- Where placing epoxy concrete or mortar, the receiving surface is to be primed with epoxy immediately before placement operations.
- Where bonding freshly-mixed concrete to hardened concrete, epoxy is to be applied to the blast-cleaned surface using a brush or roller. Ensure the epoxy is applied without skips or holidays and the freshly-mixed concrete is placed while the epoxy is tacky. In the event the epoxy has set in advance of concrete placement, ensure a new coat of epoxy is applied.

4-9504 Payment

4-9504 Payment

Payment for epoxy is included in the contract unit price for items of work in which epoxy is specified.

Section 96 Geosynthetics

Section 96
Geosynthetics

4-9601 General

4-9601
General

Section 96, "Geosynthetics," of the *Standard Specifications* provides material requirements for various types of geosynthetics for use as geotechnical subsurface reinforcement, geocomposite wall drain, geosynthetic pavement interlayer, paving mat, paving grid, paving geocomposite grid, geocomposite strip membrane, filter fabric, subgrade enhancement geotextiles (SEG), biaxial geogrids, silt fence fabric, gravel-filled bags, sediment filter bags, and temporary cover for water pollution control.

Geosynthetic pavement interlayer 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 fabric is placed between RSP and the underlying foundation material. Geocomposite wall drains provide drainage in backfill applications on retaining walls and structure approaches. Geotechnical subsurface reinforcement stabilizes embankments. SEG are placed between the pavement and the subgrade providing filtration and separation of the base materials. Biaxial geogrids stabilize the subbase or the base aggregate by interlocking with the apertures in the geogrid.

The following sections of the *Standard Specifications* give geosynthetic placement requirements:

- Section 13, "Water Pollution Control," provides specifications for placing silt fence fabric, gravel filled bags, sediment filter bags, and temporary cover.
- Section 19, "Earthwork," details the requirements for placing subsurface reinforcement and SEG.
- Section 26, "Aggregate Bases," provides the placement requirements for biaxial geogrids.
- Section 39, "Asphalt Concrete," includes requirements for placing geosynthetic pavement interlayer.
- Section 68, "Subsurface Drains," provides requirements for placing filter fabric used with underdrains and edge drains, and placement of geocomposite wall drains.
- Section 72, "Slope Protection," provides specifications for placing RSP fabric.

4-9602 Before Work Begins

4-9602
Before Work
Begins

Before work begins, verify that Form CEM-3101, "Notice of Materials to Be Used," includes geosynthetics. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for details. Verify that geosynthetics listed on Form CEM-3101 are on the DataMine list of the National Transportation Product Evaluation Program website:

http://www.ntpep.org/Pages/default.aspx

4-9603
During the Course of Work

4-9603 During the Course of Work

Do not permit the use of geosynthetics until certificates of compliance covering the material have been submitted.

Ensure that certificates of compliance are received for each type of geosynthetic.

Ensure that geosynthetics are properly covered for protection against damage.

4-9604
Payment

4-9604 Payment

Payment clauses are included in the *Standard Specification* sections or special provisions providing for placement of the various types of engineering fabrics.

Chapter 5-
Contract Administration

Section 0 Conduct of the Work

5-001 Resident Engineer's Pending File
5-002 Preconstruction Conference With Caltrans Personnel
5-003 Preconstruction Conference With the Contractor
5-004 Resident Engineer's Daily Report
5-005 Assistant Resident Engineer's Daily Report
5-006 Maintenance Reviews
5-007 Federal Highway Administration Involvement in Contract Administration
5-007A Federal Highway Administration Involvement on Projects of Division Interest—N
5-007B Federal Highway Administration Involvement on Delegated Projects—E

Section 0 Conduct of the Work

Section 0
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, memorandums, and other data titled "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 Chapter 15, "Final Project Development Procedures," Section 2, "Construction," of the *Project Development Procedures Manual*. The file usually includes the following:

- Memorandums 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.
- Memorandums about materials from the Materials Engineering and Testing Services (METS) 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 Form FA-2134, "Utility Account Action Request," which the resident engineer will use for the installation and coordination of utility services. Forward this form to the Division of Accounting and the district signals and lighting coordinator. If there is no form and the plans have utilities, contact the district signals and lighting coordinator to ensure proper procedures are followed. This form is available on the Division of Accounting's intranet website.
- Copies of correspondence giving the background of any unusual project features.
- All pertinent engineering data previously prepared in connection with the project. This data should include the project engineer's quantity calculations.
- Copies of the project report, preliminary report, and materials reports.
- A copy of the "materials information" as given to prospective bidders.
- A copy of the environmental document, including any permits, agreements, and commitments.
- A separate summary of all environmental commitments, as well as any special instructions or explanations for meeting permit and other legal requirements and commitments to other agencies.
- A copy of the risk register that documents possible construction issues. More information can be obtained from the *Project Risk Management Handbook: A*

Scalable Approach, located at:

http://www.dot.ca.gov/hq/projmgmt/guidance_prmhb.htm

- The resident engineer must consult with the project engineer who forwarded the file if the file has any of the following problems:
  1. Information appears to conflict.
  2. Information appears to be missing.
  3. Additional information or explanations are required.

5-002 Preconstruction Conference With Caltrans Personnel

5-002 Preconstruction Conference With Caltrans Personnel

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

- Project manager
- Project engineer
- Right-of-way agent
- Hydraulics engineer
- Traffic engineer
- Materials engineer
- Maintenance superintendent
- Environmental construction liaison
- Construction stormwater coordinator
- Environmental planner
- Public information officer
- Landscape architect (if landscape work is included in the project)
- Local agencies and communities
- Affected utility companies
- Federal Highway Administration (FHWA) transportation engineer (only for projects of division interest)
- 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 are related to environmental commitments, the resident engineer must review the environmental commitment record and meet with the assigned environmental staff. At the same time, the resident engineer can reach agreement on both the assistance required from environmental specialists, and 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 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 road work 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, Structure Construction requires from the structure representative a written report on this categorization of the work.

5-003 Preconstruction Conference With the Contractor

5-003 Preconstruction Conference 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. Specialists should be included, too, such as the district labor compliance officer and the district safety coordinator. Alternatively, the resident engineer may cover the respective responsibilities.

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

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

- Work plans
- Contingency plans
- Equipment to be used

- Progress schedule
- Layout of job
- Labor compliance
- Equal employment opportunity
- Safety requirements
- Temporary pedestrian access routes
- Americans with Disabilities Act (ADA) requirements for permanent pedestrian facilities
- Environmental commitments and permits
- Water pollution control requirements
- Job-produced materials quality control and acceptance testing
- Buy America 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 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.

The list below presents guidelines for the preconstruction conference. These are reminders only. Items will be included if applicable 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; therefore, those 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 5-1.16 "Representative," of the *Standard Specifications*.
- Discuss the subcontracting requirements covered in Section 5-1.13, "Subcontracting," of the *Standard Specifications*.
- When required by the special provisions, discuss railroad insurance.
- 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 Department-furnished forms and posters.
- Review the contract's safety requirements.

- Discuss the requirements that pedestrian access must be provided when construction activities require the closure of an existing pedestrian route. The contractor must provide notice 5 business days prior to closing an existing pedestrian route and the temporary pedestrian access route must be inspected for compliance with ADA standards prior to allowing use. If the contact does not have a bid item for Temporary Pedestrian Access Route and existing pedestrian routes must be closed to perform the work, the contractor must submit a work plan for a temporary pedestrian access route.
- For pedestrian facilities, discuss that every pedestrian facility constructed on the project will be inspected and that dimensions and slopes of the completed facilities must meet those specified or the work may have to be removed and replaced. Also discuss the preconstruction and post construction survey requirements for pedestrian facilities when identified in the contract by a survey bid item.
- Advise the contractor that contract administration forms are available on the Division of Construction website.
- 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 communication of job-produced materials quality control testing and acceptance testing, including identification of high-priority tests, shipping of samples, lines of communication for test results, timeframes for reporting quality control and acceptance test results, and any contractual testing dispute resolution processes.
- 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. Refer to Section 3-801, "Schedule," of this manual.
- Discuss weighing procedures, weight limitations, and the Caltrans policy on overloads. For more information, refer to Section 3-519B, "Load Limits," of this manual.
- Advise the contractor of administrative procedures and deadlines for payment for material on hand, which must be submitted on 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 provisions about water pollution control. Discuss the contractor's water pollution control plan.
- Review the contract provisions and the environmental commitments record for environmental permits and agreements. Discuss the contractor's plan for implementing environmental commitments and environmental work windows.
- Remind the contractor to submit a program to control water pollution before beginning work.
- 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 and required submittal of completed CEM-6201D, "Initial Potential Claim Record"; CEM-6201E, "Supplemental Potential Claim Record"; and CEM-6201F, "Full and Final Potential Claim Record."
- Discuss the scheduling of utility work. For a discussion of utility preconstruction conferences, refer to Section 3-518C, "Nonhighway 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:

- For each day during the project's life, make a daily report on Form CEM-4501, "Resident Engineer's Daily Report or 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 important verbal instructions. Also refer to Section 5-4, "Disputes," of this manual.
    2. A general statement about the type of work done. Include the controlling operation and any facts concerning the work's progress.
    3. Weather conditions such as maximum and minimum temperatures and precipitation, among other items. Expand on exceptional weather conditions.
    4. Statements of any other important facts pertaining to the contract that are not specifically covered elsewhere in the contract records.
- Keep the report concise, yet include any important information. The report should not contain routine matters, such as quantities placed, that can be found in other records.
- Promptly send one copy of the daily report to the construction engineer, who will review the copy. After the review, the construction engineer may discard the copy or file it until the project's completion, in accordance with district policy. Retain the original copy with the project records.

5-005 Assistant Resident Engineer's Daily Report

5-005 Assistant Resident Engineer's Daily Report

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

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

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

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

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

- Extra work. For details, refer to Section 3-906C, "Extra Work," 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 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 *Labor Surcharge and Equipment Rental Rates* book is available on the Caltrans website at:

  http://www.dot.ca.gov/hq/construc/equipmnt.html
- 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 5-102, "Organization of Project Documents," of this manual.
- Distribute all other copies in accordance with district policy.

Refer to 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 2 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 3-519, "Maintenance and Protection," of this manual.
- Discuss complex construction activities that could affect adjacent maintenance operations.
- Discuss features requiring special attention.
- Discuss manufacturers' warranties and service instructions.
- Schedule regular reviews. When the contract work is 50 percent complete, schedule at least one review, unless both construction and maintenance representatives agree the review is unnecessary.

When the project nears 90 percent completion, invite the maintenance superintendent, supervisor, or both, for a final field review of the project. Ensure this review includes identifying all items necessary to comply with the construction National Pollutant Discharge Elimination System permit. A copy of the permit is available at the State Water Resources Control Board website:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/caltrans.shtml

During the 90 percent field review meeting, the resident engineer and maintenance superintendent or supervisor, or the district maintenance storm water coordinator will complete Form MTCE-0023, "Construction to Maintenance 90% BMP Completion Walkthrough." Form MTCE-0023 is available on Caltrans' Electronic Forms Management website:

http://cefs2.dot.ca.gov/jsp/forms.jsp.

Using this form will assist in identifying, discussing, and documenting the project elements such as structural treatment best management practices (BMPs), drainage systems, and permanent erosion and sediment controls, while noting their functionality and communicating any specific instruction related to maintaining them. This review should provide the resident engineer sufficient time to correct deficiencies prior to contract acceptance, and ensure elements such as structural treatment BMPs drainage systems, and permanent erosion and sediment controls are constructed in accordance with the project plans and specifications.

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.

Prior to construction contract acceptance and in accordance with Section 3-523, "Final Inspection and Contract Acceptance," of this manual, the resident engineer must schedule a final inspection with maintenance. During the final inspection, update Form MTCE-0023 to reflect changes and corrective actions implemented since the 90 percent walkthrough. Both the resident engineer and the maintenance representative must sign the form when they have completed their final inspection. File a copy of the

form in Category 63, "Project Completion Documents," and send copies to the district pollutant-discharge coordinator, district design stormwater coordinator, and district construction stormwater coordinator. The maintenance representative will maintain the original and is responsible for sending a copy to the maintenance regional manager.

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

5-007 Federal Highway Administration Involvement in Contract Administration

5-007 Federal Highway Administration Involvement in Contract Administration

When assigned the responsibility for a construction contract, the resident engineer first must determine if it is a federal-aid contract and, if so, the federal-aid classification for the contract. The resident engineer should review the construction contract and the resident engineer's pending file, and talk to the project manager to determine the project's federal-aid classification.

FHWA funded projects are classified as either projects of division interest or delegated projects to indicate their involvement in the project as stated in the stewardship agreement between FHWA and Caltrans. Information on this stewardship agreement can be found on the Division of Budgets website:

http://budgets.onramp.dot.ca.gov/fhwa-oversight

Caltrans assigns project numbers to federally funded projects, and Caltrans and FHWA jointly determine project classifications. Caltrans then adds a suffix "N" or "E" to the end of the project number. Projects with the suffix "N" are projects of division interest. Projects with the suffix "E" are delegated projects.

5-007A Federal Highway Administration Involvement on Projects of Division Interest—N

Caltrans and FHWA will jointly determine projects of division interest responsibilities on a project-by-project basis and usually as part of the project development team process. They will establish which project responsibilities will be retained by FHWA and which will be delegated to Caltrans in a project of division interest agreement. The resident engineer should receive a copy of the project of division interest agreement in the resident engineer's pending file or from the project manager. Before the start of construction, the construction senior engineer must review the agreement with the FHWA transportation engineer and discuss FHWA's involvement on the project.

The resident engineer is required to submit a copy of the CEM-6303, "Final Acceptance Checklist for Federal-Aid Projects of Division Interest (PODI)," to the FHWA transportation engineer along with a copy of the proposed final estimate. FHWA will document the project status and final voucher the project with these documents.

5-007B Federal Highway Administration Involvement on Delegated Projects—E

Caltrans is responsible for most federal approvals and oversight requirements on delegated projects. Resident engineers are not formally required to communicate with the FHWA transportation engineer except for Buy America requirements and when there are changes to the federal environmental requirements. FHWA has delegated to Caltrans some of FHWA's authority and responsibility for compliance with National

Environmental Policy Act and other environmental laws. Resident engineers should review the project environmental documents and discuss with the district environmental-construction liaison, to determine if FHWA involvement is necessary when there are changes to the environmental requirements for the project. Information on Buy America requirements and FHWA involvement can be found in Section 3-604, "Buy America," of this manual. Informal discussions with FHWA for technical guidance are encouraged.

Caltrans receives federal-aid funds indirectly from the California Office of Traffic Safety (OTS). Construction projects with a federal-aid number and OTS designation contain the same special provisions as delegated projects. The same procedures apply to OTS projects as delegated projects.

Chapter 5 Contract Administration

Section 1 Project Records and Reports

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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 (Construction Engineering Management) and a number that is related to the form's uniform filing system category. If an existing form no longer meets its intended purpose, refer to Section 1-004, "Changes," of this manual.

Complete Form CEM-9001, "Construction Manual Proposed Change," and send it to the Division of Construction Publications Unit. 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 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 Structure Construction is shown in Section 16, "Bridge Construction Forms," of the *Bridge Construction Records and Procedures* manual, Vol. 1.

5-101B Construction Forms

All Division of Construction forms are available online at:

http://www.dot.ca.gov/hq/construc/forms.htm

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 will use this form to provide 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 this form to recommend that the contractor be relieved from maintenance and responsibility in accordance with Section 5-1.38, "Maintenance and Protection Relief," of the *Standard Specifications*. For more information refer to Section 3-520, "Maintenance and Protection Relief," of this manual.

Form CEM-0601 Construction Safety Report

The resident engineer or the project safety coordinator uses this form to document periodic project safety reviews.

Form CEM-0602 Project Safety Program Statement

The resident engineer uses this form to list the sections of the *Code of Safe Practices* that 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 this form to report major construction incidents. Instructions for completion are included on the last page of the form.

Form CEM-0606 Construction Safety Checklists

The resident engineer uses this form to document the contractor's attention to safety procedures while performing the work. Choose the appropriate section of the form for the work being performed.

Form CEM-1201 Subcontracting Request

The contractor submits this form and the resident engineer uses the form to calculate the percentage of work to be performed by the contractor. Section 3-5, "Control of Work," of this manual describes the procedures. The resident engineer must sign this form before the contractor can begin on the applicable subcontracted work. Before approval, verify that subcontractors are not on the debarred contractors list on the California Department of Industrial Relations website:

http://www.dir.ca.gov/dlse/debar.html

Form CEM-1202A Contractor Action Request—Change of Name/Address

The contractor submits this form to the resident engineer to request a change in the contractor's name or address under the contract in accordance with Section 5-1.12, "Assignment," of the *Standard Specifications.*

Form CEM-1202B Contractor Action Request—Assignment of Contract Monies, Assignee Change of Name/Address

The contractor submits this form to the resident engineer to request an assignment of monies, or an assignee's change of name or address under the contract in accordance with Section 5-1.12, "Assignment," of the *Standard Specifications.*

Form CEM-1203 Contractor Action Request—Assignment of Contract Performance

The original contractor or the contractor's surety submits this form to the resident engineer in accordance with Section 5-1.12, "Assignment," of the *Standard Specifications.*

Form CEM-1901 Burial Location of Soil Containing Aerially Deposited Lead

The contractor submits this form to the resident engineer at ADL@dot.ca.gov within 5 business days of completing placement of the material. The resident engineer reviews the information and retains the form in the construction project records.

Form CEM-1902 *Burial Location of Soil Containing Naturally Occurring Asbestos*

The contractor submits this form to the resident engineer at NOA@dot.ca.gov within 5 business days of completing placement of the material. The resident engineer reviews the information and retains the form in the construction project records.

Form CEM-1903 *Burial Location of Soil Containing Aerially Deposited Lead (Topographic Survey)*

The contractor submits this form to the resident engineer and by email to ADL@dot.ca.gov within 5 business days after topographic survey of the top at each location. The resident engineer reviews the information, retains the form in the construction project records and forwards the form to the District ADL Coordinator.

Form CEM-2006 *Legally Responsible Person Authorization of Approved Signatory*

The district director submits this form and the resident engineer reviews the information for completeness and accuracy. File the form in the construction project records. Instructions are included on the last page of the form.

Form CEM-2006T *Legally Responsible Person Authorization of Approved Signatory—Lake Tahoe Hydrologic Unit*

The district director submits this form to the California Regional Water Quality Control Board, as required by the Caltrans NPDES permit. Instructions are included on the last page of the form.

Form CEM-2008 *SWPPP/WPCP Amendment Certification and Acceptance*

The resident engineer reviews this form for completeness and accuracy as submitted by the contractor, and files it in the construction project records. Instructions are included on the last page of the form.

Form CEM-2009 *SWPPP/WPCP Amendments Log*

The resident engineer reviews this form for completeness and accuracy as submitted by the contractor, and files it in the project files. Instructions are included on the last page of the form.

Form CEM-2023 *Stormwater Training Record*

The resident engineer reviews this form as submitted by the contractor, and files it in the project files. Instructions are included on the last page of the form.

Form CEM-2024 *Stormwater Training Log—Optional*

The resident engineer files this form, as filled out by the contractor, in the project files. Instructions are included on the last page of the form.

Form CEM-2030 *Stormwater Site Inspection Report*

The resident engineer fills out and files this form in the project records. Instructions are included on the last page of the form.

Form CEM-2031T *Daily Stormwater Site Inspection Report - Lake Tahoe Hydrologic Unit*

The water pollution control manager submits this form to the resident engineer as

required by the Lake Tahoe Hydrologic Unit Construction General Permit. Instructions are included on the last page of the form.

Form CEM-2032 Permanent Erosion Control Establishment (PECE) Report

The water pollution control manager submits this form to the resident engineer when a contract has a bid item for Permanent Erosion Control Establishment. The resident engineer reviews work descriptions, schedules, and associated change orders for compliance and payment. The resident engineer retains the form in the construction project records under the Storm Water Pollution Prevention Plan files.

Form CEM-2034 Monthly Stormwater Best Management Practices & Materials Inventory Report—Optional

The resident engineer files this form as filled out by the contractor, in the project files. Instructions are included on the form.

Form CEM-2035 Stormwater Corrective Actions Summary

The resident engineer files this form as filled out by the contractor, in the project files. Instructions are included on the last page of the form.

Form CEM-2035T Stormwater Corrective Actions Summary – Lake Tahoe Hydrologic Unit

The water pollution control manager submits this form to the resident engineer as required by the Lake Tahoe Hydrologic Unit Construction General Permit. Instructions are included on the last page of the form.

Form CEM-2045 Rain Event Action Plan

The resident engineer files this form, as filled out by the contractor, in the project files. Instructions are included within the pages of the form.

Form CEM-2045T Rain Event Action Plan—Lake Tahoe Hydrologic Unit

The resident engineer files this form, as filled out by the contractor, in the project files. Instructions are included within the pages of the form.

Form CEM-2051 Stormwater Sampling and Analysis Log–Optional

The resident engineer files this form, as filled out by the contractor, in the project files. Instructions are included on the last page of the form.

Form CEM-2052 Stormwater Sample Field Test Report/Receiving Water Monitoring Report

The resident engineer files this form, as filled out by the contractor, in the project files. Instructions are included on the last page of the form.

Form CEM-2058 Stormwater Meter Calibration Record—Specialty Meters

The resident engineer files this form, as filled out by the contractor, in the project files. Instructions are included on the last page of the form.

Form CEM-2061 Notice of Discharge Report

The resident engineer submits this form to the California Regional Water Quality Control Board, as required by the Caltrans NPDES permit. Instructions are included on the last page of the form.

Form CEM-2061T *Notice of Discharge Report—Lake Tahoe Hydrologic Unit Stormwater Sample Field Test Report/Receiving Water Monitoring Report*

This form is to be completed when the contractor, Caltrans, State Water Resources Control Board, or Regional Water Quality Control Board staff determines that stormwater discharges, authorized nonstormwater discharges, or nonauthorized, nonstormwater discharges will violate an applicable water quality standard. This form is submitted to the resident engineer. Instructions are included on the last page of the form.

Form CEM-2062 *Numeric Action Level Exceedance Report*

The resident engineer submits this form to the California Regional Water Quality Control Board, as required by the Caltrans NPDES permit. Instructions are included on the last page of the form.

Form CEM-2062T *Numeric Action Level Exceedance Report—Lake Tahoe Hydrologic Unit*

The resident engineer submits this form to the California Regional Water Quality Control Board, as required by the Caltrans NPDES permit. Instructions are included on the last page of the form.

Form CEM-2063 *Numeric Effluent Limitation Violation Report—ATS Discharges*

The resident engineer submits this form to the California Regional Water Quality Control Board, as required by the Caltrans NPDES permit. Instructions are included on the last page of the form.

Form CEM-2063T *Numeric Effluent Limitation Violation Report—Lake Tahoe Hydrologic Unit*

The resident engineer submits this form to the California Regional Water Quality Control Board, as required by the Caltrans NPDES permit. Instructions are included on the last page of the form.

Form CEM-2070 *SWPPP/WPCP Annual Certification of Compliance*

The resident engineer submits this form to the California Regional Water Quality Control Board, as required by the Caltrans NPDES permit. Instructions are included on the last page of the form.

Form CEM-2075 *Project Stormwater Annual Report*

This form is completed by the contractor and submitted to the resident engineer to document stormwater monitoring and training information required to prepare a Stormwater Annual Report each year for all SWPPP projects for more than three consecutive months. Instructions are included on the last page of the form.

Form CEM-2075T *Project Stormwater Annual Report–Lake Tahoe Hydrologic Unit*

This form is completed by the contractor and submitted to the resident engineer to document stormwater monitoring and training information required to prepare a Stormwater Annual Report each year for all enrolled projects in the Lake Tahoe Hydrologic Unit for the period of October 16 of the previous year through October 15 of the current year. Instructions are included on the last page of the form.

Form CEM-20CC *Attachment CC, Water Pollution Control Best Management Practices List*

The contractor's water pollution control manager completes the form at different phases of the construction project to document the type and quantity of best management practices planned to be implemented in the field to prevent water pollution. Information in this form helps the water pollution control manager mobilize labor and coordinate necessary supplies in an orderly and efficient manner. In addition, information in this form allows the stormwater inspector to fully understand the construction stage and anticipated quantity of best management practices in the field during the site visit.

Form CEM-20DAPP *Appendix D, Notification Log*

Subcontractors and material suppliers must be notified of their responsibilities on the construction job site related to stormwater runoff pollution prevention. This form documents the stormwater pollution prevention notifications given to each subcontractor and material supplier.

Form CEM-20DCON *SWPPP/WPCP Attachment D, Contractor Personnel Training Record*

Contractor personnel responsible for implementation of stormwater pollution prevention practices are required to be adequately trained in this field. Attachment D documents the training record of the contractor's personnel. This form is included in the stormwater pollution prevention plan (SWPPP) and is updated as necessary.

Form CEM-20DSUB *SWPPP/WPCP Attachment D, Subcontractor Personnel Stormwater Training Record*

Subcontractor personnel responsible for implementation of stormwater pollution prevention practices are required to be adequately trained in this field. Attachment D documents the training record of the subcontractor's personnel. This form is included in the SWPPP and is updated as necessary.

Form CEM-20EE *SWPPP Attachment EE, Stormwater Sampling Locations*

This form lists all potential water quality sampling locations within a project site during the course of construction. This form is prepared by the qualified SWPPP developer at the start of the project and is included in the SWPPP. During the course of construction, depending on the stage of construction and areas of disturbed soil activities, appropriate sampling locations from this list are selected for sampling of the stormwater runoff or discharge.

Form CEM-2101 *COZEEP Daily Report*

The California Highway Patrol and Caltrans jointly use this form to report highway patrol resources used for the Construction Zone Enhanced Enforcement Program (COZEEP). Chapter 2, "Safety and Traffic," of this manual further describes the use of the form.

Form CEM-2102 *COZEEP/MAZEEP Task Order*

The resident engineer uses this form to request highway patrol support for the Construction Zone Enhanced Enforcement Program. Additional use of this form is described in Chapter 2, "Safety and Traffic," of this manual.

Form CEM-2103 COZEEP/MAZEEP Cancellation Form

The resident engineer uses this form to cancel any previously requested highway patrol support for the Construction Zone Enhanced Enforcement Program. Additional use of this form is described in Chapter 2, "Safety and Traffic," of this manual.

Form CEM-2401 Substitution Report for Disadvantaged Business Enterprise (DBE) or Underutilized Disadvantaged Business Enterprise (UDBE)

The contractor fills out and provides this form to the resident engineer who uses the information to authorize DBE subcontractor substitutions. Sections 3-8, "Prosecution and Progress," and 8-3, "Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises," of this manual contain additional information on substituting subcontractors.

Form CEM-2402(F) Final Report—Utilization of Disadvantaged Business Enterprises (DBE), First-Tier Subcontractors

The contractor completes this form. The resident engineer certifies the form. It describes work performed and materials provided by disadvantaged business enterprise firms. Refer to Section 8-3, "Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises," of this manual for details.

Form CEM-2402(S) Final Report—Utilization of Disabled Veteran Business Enterprises (DVBE), State Funded Projects Only

The contractor fills out and certifies this form which describes work performed and materials provided by disabled veteran business enterprise firms. The resident engineer verifies the form. Refer to Section 8-3, "Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises," of this manual for details.

Form CEM-2403(F) Disadvantaged Business Enterprises (DBE) Certification Status Change

The contractor fills out and certifies this form. The resident engineer uses the 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. Refer to Section 8-3, "Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises," of this manual for details.

Form CEM-2404(F) Monthly DBE /UDBE Trucking Verification

The contractor must submit this form 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 used each month on the project. Instructions for filling out this form are on the last page of the form.

Form CEM-2405 Disabled Veteran Business Enterprise (DVBE) Substitution Request to the Department of General Services (DGS)

The resident engineer completes this form, attaches all DVBE substitution request documentation from the contractor, and sends to the headquarters Division of Construction labor compliance program manager. Instructions for filling out this form are on the last page of the form.

Form CEM-2406 Monthly Disadvantaged Business Enterprises (DBE) Payment

The contractor completes this form for labor compliance purposes on federally funded projects only. Refer to Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2501 Fringe Benefit Statement

The contractor completes this form for labor compliance purposes. Refer to Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2502 Contractor or Subcontractor Payroll

When it is requested, furnish this form to the contractor. It is used to fulfill the payroll submittal requirements of the contract. Refer to Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2503 Statement of Compliance

The contractor may use this form for the required statement of compliance with payroll submittals. Refer to Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2504 Employee Interview: Labor Compliance/EEO

Use this form to record information from interviews of contractors' employees. Directions for the interviewer are on the back of the form. Refer to Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2504 (Spanish), Entrevista de Empleado: Cumplimiento Laboral/IOE

Same as previous form, printed in Spanish.

Form CEM-2505 Owner-Operator Listing

If they do not include this data on their certified payrolls, contractors may use this form to report payments made to owner-operators. Refer to Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2506 Labor Compliance—Wage Violation

The district labor compliance officer uses this form to document labor compliance wage violations. Refer to Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2507 Labor Violation: Case Summary

The district labor compliance officer uses this form in conjunction with Form CEM-2506 to summarize labor violation cases. Refer to Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2508 Contractor Payroll Source Document Audit Summary

The district labor compliance officer uses this form to document the verification of the contractor's payroll source document audit. Refer to Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2509 Checklist—Source Document Audit

The district labor compliance officer uses this form during the contractor's payroll source

document audit. Refer to Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2510 Truck Owner-Operator Certification of Ownership

The truck owner-operator uses this form to identify the vehicle used and certify ownership or lease of the vehicle. The form should be submitted once per project to the district labor compliance office unless changes to the data would necessitate a new form. Refer to Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2601 Construction Progress Chart

The resident engineer maintains this form for each project. Refer to Section 3-8, "Prosecution and Progress," of this manual for details.

Form CEM-2701 Weekly Statement of Working Days

The resident engineer uses this form to track contract time on construction contracts. The last page 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 may use this form to grant time adjustments after contract time has elapsed. For more information refer to Section 3-8, "Prosecution and Progress," of this manual.

Form CEM-3101 Notice of Materials to Be Used

The contractor must use this form to list all materials to be used on the project. Refer to Section 6-2, "Acceptance of Manufactured or Fabricated Material and Products," of this manual for details on the use of the form. Instructions to the contractor are on the last page of the form.

Form CEM-3501 Hot Mix Asphalt Production Report

The plant inspector uses this form to document daily hot mix asphalt production processes and report any plant, material, and production deficiency to the resident engineer.

Form CEM-3502 Hot Mix Asphalt Placement Report

The paving inspector uses this form to document daily hot mix asphalt placement processes and report any material and construction deficiencies to the resident engineer.

Form CEM-3511 Contractor Job Mix Formula Proposal

The contractor uses this form to submit to the resident engineer, before the work begins, the hot mix asphalt mix formula tested for intended use on the project. The form states job mix formula target values for aggregate sieves and the percent of asphalt binder, as well as source information for all materials.

Form CEM-3512 Contractor Hot Mix Asphalt Design Data

The contractor uses this form to document the testing data developed by the mix design laboratory. Refer to Section 4-39, "Asphalt Concrete," of this manual for more information.

Form CEM-3513 Caltrans Hot Mix Asphalt Verification

Caltrans verifies that the proposed job mix formula complies with the specifications on

this form. The resident engineer signs and returns the form to the contractor. Refer to Section 4-39, "Asphalt Concrete," of this manual for more information.

Form CEM-3514 Contractor Job Mix Formula Renewal

The contractor submits test results for renewal of hot mix asphalt job mix formula on this form to the resident engineer. When the test results indicate that the sampled and tested hot mix asphalt complies with the specifications, the resident engineer requests the district materials laboratory perform hot mix asphalt verification testing. Refer to Section 4-39, "Asphalt Concrete," of this manual for more information.

Form CEM-3673A Americans with Disabilities Act (ADA) Compliance Inspection Report–Sidewalk

The resident engineer uses this form as a checklist for construction inspection of sidewalks. Refer to Section 4-73, "Concrete Curbs and Sidewalks," of this manual for details.

Form CEM-3673B Americans with Disabilities Act (ADA) Compliance Inspection Report—Sidewalk at Driveway

The resident engineer uses this form as a checklist for construction inspection of sidewalks at driveways. Refer to Section 4-73, "Concrete Curbs and Sidewalks," of this manual for details

Form CEM-3673C Curb Ramp (Case A) Americans with Disabilities Act (ADA) Compliance Inspection Report

The resident engineer uses this form as a checklist for construction inspection of *Standard Plans* curb ramps (Case A). Refer to Section 4-73, "Concrete Curbs and Sidewalks," of this manual for details.

Form CEM-3673D Curb Ramp (Case B) Americans with Disabilities Act (ADA) Compliance Inspection Report

The resident engineer uses this form as a checklist for construction inspection of *Standard Plans* curb ramps (Case B). Refer to Section 4-73, "Concrete Curbs and Sidewalks," of this manual for details.

Form CEM-3673E Curb Ramp (Case C) Americans with Disabilities Act (ADA) Compliance Inspection Report

The resident engineer uses this form as a checklist for construction inspection of *Standard Plans* curb ramps (Case C). Refer to Section 4-73, "Concrete Curbs and Sidewalks," of this manual for details.

Form CEM-3701 Test Result Summary

The resident engineer must use this form to summarize acceptance tests frequency and results on each material. The form is also used to record dates for sampling, date shipped to laboratory, test result transmission to the resident engineer, and contractor notification of test result. Refer to 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

The resident engineer may use this form to summarize compaction test results in the same manner that Form CEM-3701 is used for other tests.

Form CEM-3703 Caltrans Production Start-Up Evaluation

The resident engineer uses this form to record the testing results at the beginning of production. Refer to Section 4-39, "Asphalt Concrete," of this manual for more information.

Form CEM-3736 Pavement Smoothness Inertial Profiler Submittal Record

The quality control manager submits this form to the resident engineer and the Caltrans secure file sharing system along with specified profiling information within 2 business days of profiling. The resident engineer reviews the information and retains the form in the construction project records.

Form CEM-3736AC Asphalt Concrete Pavement Smoothness Corrections Information

The contractor submits this form to the resident engineer and the Caltrans secure file sharing system along with their final profiling information within 5 business days of profiling. The resident engineer reviews the information and retains the form in the construction project records.

Form CEM-3736C Concrete Pavement Smoothness Corrections Information

The contractor submits this form to the resident engineer and the Caltrans secure file sharing system along with their final profiling information within 5 business days of profiling. The resident engineer reviews the information and retains the form in the construction project records.

Form CEM-3801 Request for Assignment of Inspectors, Samplers, and Testers

The contractor uses this form to submit the names of quality control staff for hot mix asphalt projects using the quality control/quality assurance (QCQA) process. Refer to the *Quality Control Manual for Hot Mix Asphalt* for more information.

Form CEM-3802 Quality Control Inspector Affidavit of Proficiency

The contractor uses this form to document the hot mix asphalt experience and training of proposed hot mix asphalt quality control inspectors for projects using the QCQA process. Refer to the *Quality Control Manual for Hot Mix Asphalt* for additional information.

Form CEM-3803 Daily Summary of Quality Control Testing

The contractor uses this form to provide a summary of quality control test results for each day that hot mix asphalt is placed on a QCQA process project. Refer to the *Quality Control Manual for Hot Mix Asphalt* for more information.

Form CEM-3804 Hot Mix Asphalt Inspection and Testing Summary

The contractor uses this form to provide a checklist that shows the inspections and testing for each day that hot mix asphalt is placed on a QCQA process project. The contractor's quality control manager must document on this form deviations from the specifications or regular practices and certify that the information, tests, or calculations, comply with the contract specifications. Refer to the *Quality Control Manual for Hot Mix Asphalt* for more information.

Form CEM-4101 Materials Release Summary

The resident engineer uses this form to summarize the materials released by METS and

materials inspected at the job site.

Form CEM-4102 Material Inspected and Released on Job

The resident engineer uses this form to list certain materials that may arrive on the job site without a Form TL-0029, "Report of Inspection of Material." Refer to Section 6-3, "Field Tests," of this manual for details.

Form CEM-4202 Material Plant Safety Checklist

The materials plant inspector uses this form when checking a materials plant for safety.

Form CEM-4401 Solid Waste Disposal and Recycling Report

The contractor completes and certifies the information reported on this form. The resident engineer reviews then submits the authorized form to the district recycling coordinator with a copy to the statewide recycling coordinator in headquarters Division of Design. The use of this form is described in Section 7-109, "Solid Waste Disposal and Recycling Reporting," of this manual.

Form CEM-4410 Crumb Rubber Usage Report

The contractor submits this form monthly to the resident engineer and email address CRM@dot.ca.gov. The resident engineer reviews the information and verifies paid quantities and contractor submittal of form to email address. Instructions to the contractor and resident engineer are on the last pages of the form. Refer to Section 7-108, "Crumb Rubber Usage Reporting," of this manual for more information.

Form CEM-4501 Resident Engineer's Daily Report/Assistant Resident Engineer's Daily Report

The resident engineer and assistant resident engineers use this form to record project activities daily. For more information, refer to Section 5-0, "Conduct of the Work," of this manual.

Form CEM-4601 Assistant Resident Engineer's Daily Report

Assistant resident engineers use this form to record daily individual contract item activity. It is also used to record extra work activity and to verify contractor's personnel listed on payrolls. For more information refer to Section 5-0, "Conduct of the Work," of this manual.

Form CEM-4701 Drainage System Summary

The resident engineer and assistant resident engineers use this form to record progress and summarize activity on drainage contract items. Refer to Category 47, "Drainage Systems," in Section 5-102, "Organization of Project Documents," of this manual for details.

Form CEM-4801 Quantity Calculations

The resident engineer and assistant resident engineers use this form for the basic source document for most contract item quantity calculations.

Form CEM-4900 Change Order

The resident engineer uses this form for change orders. Refer to Section 5-3, "Change Orders," of this manual for information about change orders.

Form CEM-4901 Change Order Input

The resident engineer and assistant resident engineers use this form to input change orders for the project record and estimate data. Refer to Section 5-103D, "Change Orders," of this manual for details.

Form CEM-4902 Extra Work Bill (Short Form)

The contractor uses this form for billing extra work. Details for use are on the last page of the form and are included in Section 5-103E, "Change Order Billing," of this manual. The resident engineer may authorize contractor-designed forms. With prior approval from the Division of Construction, the contractor may submit change order bill data on a computer report identical to this form for all Caltrans projects.

Form CEM-4902A Extra Work Bill—Title Page

The contractor uses this form for billing extra work. It is the first page of the four-part changer order bill. It identifies the project, 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 last page of the form and are also included in Section 5-103E, "Change Order Billing," of this manual. The resident engineer may authorize contractor-designed forms. With prior approval from the Division of Construction, the contractor may submit change order bill data on a computer report identical to this form for all Caltrans projects.

Form CEM-4902B Extra Work Bill—Labor Charges

Contractors use this form for billing extra work. It is used to enter labor charges and other expense subject to labor markup. Details for use are on the last page of the form and are included in Section 5-103E, "Change Order Billing," of this manual. The resident engineer may authorize contractor-designed forms. With prior approval from the Division of Construction, the contractor may submit change order bill data on a computer report identical to this form for all Caltrans projects. This form is used with Form CEM-4902A, "Extra Work Bill—Title Page."

Form CEM-4902C Extra Work Bill—Equipment Charges

The contractor uses this form to enter equipment charges to the change order bill. Instructions for use are on the second page of the form and are included in Section 5-103E, "Change Order Billing," of this manual. The resident engineer may authorize contractor-designed forms. With prior approval from the Division of Construction, the contractor may submit change order bill data on a computer report identical to this form for all Caltrans projects. This form is used with Form CEM-4902A, "Extra Work Bill—Title Page."

Form CEM-4902D Extra Work Bill—Material Charges

The contractor uses this form for billing extra work. It is used to enter material charges to the change order bill. Details for use are on the last page of the form and are included in Section 5-103E, "Change Order Billing," of this manual. The resident engineer may authorize contractor-designed forms. With prior approval from the Division of Construction, the contractor may submit change order bill data on a computer report identical to this form for all Caltrans projects. This form is used with Form CEM-4902A, "Extra Work Bill—Title Page."

Form CEM-4903 Change Order Memorandum

The resident engineer uses this form in conjunction with Form CEM-4900, "Change

Order," to report the necessary engineering and administrative data relative to the change. Refer to Section 5-3, "Change Orders," of this manual for details.

Form CEM-4904 *Caltrans Authorization for Using Internet Extra Work Bill System*

The resident engineer completes this form, outlining contract markups and change order bill roles to authorize Caltrans staff access to the Caltrans Internet Extra Work Bill (iEWB) system. The resident engineer submits the form, along with completed Form CEM-4905 from the contractor, to the appropriate iEWB district administrator.

Form CEM-4905 *Contractor Authorization for Using Internet Extra Work Bill System*

The contractor furnishes the resident engineer with daily reports of any extra work as required in Section 5-1.27D, "Cost Accounting Records," of the *Standard Specifications*. The prime contractor completes this form for authority to use the internet to submit change order bills. The contractor submits this form, usually at the preconstruction meeting, to the resident engineer or to the managing partner if the contract is a joint venture. Required change order bill training and the iEWB website provide additional information at:

http://www.dot.ca.gov/hq/construc/iewb/

Form CEM-5101 *Request for Payment for Materials on Hand*

The contractor uses this form to request payment for materials on hand. Instructions for the form and administrative procedures are covered in Section 3-9, "Payment," of this manual.

Form CEM-5501 *Partnering Facilitator Evaluation—Kick-Off*

The resident engineer uses this form to gather project team evaluations of the partnering facilitator's performance following the kick-off partnering workshop when partnering is implemented on a Caltrans construction project.

Form CEM-5502 *Partnering Facilitator Evaluation—Close-Out*

The resident engineer uses this form to gather project team evaluations of the partnering facilitator's performance following the close-out partnering workshop.

Form CEM-6003 *Progress Pay—Estimate Project Initiation or Update*

The resident engineer uses this form to add new information or to change information in the Contract Administration System (CAS). For details refer to Section 5-103B, "Project Initiation and Update," of this manual.

Form CEM-6004 *Contract Transactions Input*

The resident engineer uses this form to input estimate data into CAS for the project record and estimate. Refer to Section 5-103C, "Contract Transactions," of this manual for details.

Form CEM-6101 *Project Record—Estimate Request*

The resident engineer uses this form to request that an estimate be run. Refer to Section 5-103F (1), "Procedure," of this manual for details.

Form CEM-6201 Notice of Potential Claim

The contractor uses this form to submit notices of potential claims to the resident engineer. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6201A Initial Notice of Potential Claim

The contractor uses this form to submit an early notice of a potential claim issue. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6201B Supplemental Notice of Potential Claim

The contractor uses this form to submit a detailed description along with the necessary attachments of the nature, circumstances, and estimated costs of a potential claim as a follow up to Form CEM-6201A, "Initial Notice of Potential Claim."

Form CEM-6201C Full and Final Documentation of Potential Claim

The contractor uses this form to submit a complete documentation of a potential claim after completion of the work for which Forms CEM-6201A and CEM-6201B have been submitted. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6201D Initial Potential Claim Record

The contractor uses this form to detail the nature and circumstances of the potential claim. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6201E Supplemental Potential Claim Record

The contractor uses this form to detail the potential claim and cost associated with the claim. For further details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6201F Full and Final Potential Claim Record

The resident engineer uses this form to document the circumstances and costs associated with the potential claim. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6202 Dispute Resolution Board Establishment Report

The resident engineer completes and submits this form to the Division of Construction after the initial Dispute Resolution Board meeting has been held. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6203 Dispute Review Board (DRB) Update Report

The resident engineer completes and submits this form to the Division of Construction yearly beginning on the anniversary of the contract first working day. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6204 Dispute Resolution Board Dispute Meeting Report

The resident engineer completes and submits this form to the Division of Construction when Caltrans has sent a response to DRB recommendation and the contractor's response has been received or has been accepted by default. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6205 Dispute Review Board (DRB) Completion Report

The resident engineer completes and submits this form to the Division of Construction 30 days after receipt of the contractor's exceptions to the proposed final estimate. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6206 Dispute Resolution Advisor—Establishment Report

The resident engineer completes and submits this form to the Division of Construction for selection of the dispute resolution advisor. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6207 Dispute Resolution Advisor—Dispute Meeting Report

The resident engineer completes and submits this form to the Division of Construction with Caltrans' response to the dispute resolution advisor's recommendations. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6208 Dispute Resolution Ladder Establishment

As an option, the resident engineer completes and submits this form to the Division of Construction to document the levels of authority consulted. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6209 Elevation of a Dispute

As an option, the resident engineer completes and submits this form to the Division of Construction to assist in defining the dispute prior to elevating it to the next level. For details on the use of this form, refer to Section 5-4, "Disputes," of this manual.

Form CEM-6301 Contract Acceptance

The resident engineer uses this form 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, refer to Section 3-523B, "Contract Acceptance," of this manual.

The district does not need to fax a copy of the contract acceptance form CEM-6301 to Division of Construction. If there is a federal number on the form, the district estimate desk makes a copy of the form and, at the end of each month, collects and sends these copies to the Caltrans Office of Federal Resources, MS-23.

Form CEM-6302 Final Materials Certification

The resident engineer uses this form to document that tests on acceptance samples indicate the materials incorporated in the construction work, and the construction operations controlled by sampling and testing, were in conformity with the authorized plans and specifications.

Form CEM-6303 Final Acceptance Checklist for Federal-Aid Projects of Division Interest (PODI)

The resident engineer uses this form to document project status for FHWA and to help with the final vouchering process once the final estimate is produced.

Form CEM-9001 Construction Manual Proposed Change

Caltrans personnel or external stakeholders may use this form to submit a recommendation for a change to the *Construction Manual*. Completed forms with attachments, if applicable, should be sent to the Division of Construction, Publications Unit email construction.publications@dot.ca.gov.

Form OFG-1 *Oversight Resident Engineer's Preconstruction Checklist*

The resident engineer uses this form to document contacts within the local agency where the work is being performed. For further details on use of this form, refer to Section 3.1.7, "Oversight Resident Engineer Files," of the *Oversight Resident Engineer Guidelines*.

Form OFG-2 *Local Agency and Oversight Resident Engineer Preconstruction Checklist*

The resident engineer uses this form to document general project conditions at the preconstruction meeting with the contractor. For details on use of this form, refer to Section 3.1.7, "Oversight Resident Engineer Files," of the *Oversight Resident Engineer Guidelines*.

Form OFG-3 *Local Agency Resident Engineer Contract Provisions Checklist*

The resident engineer uses this form to document state and federal requirements with the contractor. For details on use of this form, refer to Section 3.1.7, "Oversight Resident Engineer Files," of the *Oversight Resident Engineer Guidelines*.

Form OFG-4 *Oversight Resident Engineer's Construction Contract Administration Verification Checklist*

The resident engineer uses this form to document the contract administration activities required on the project. For details on use of this form, refer to Section 3.1.7, "Oversight Resident Engineer Files," of the *Oversight Resident Engineer Guidelines*.

Form OFG-5 *Federal-Aid Projects of Division Interest*

The resident engineer uses this form to document federal-aid requirements for the project. For details on use of this form, refer to Section 3.1.7, "Oversight Resident Engineer Files," of the *Oversight Resident Engineer Guidelines*.

Form OFG-6 *Final Acceptance Checklist for Caltrans Oversight Projects*

The resident engineer uses this form to document that all required procedures have been performed on the project. For details on use of this form, refer to Section 3.1.7, "Oversight Resident Engineer Files," of the *Oversight Resident Engineer Guidelines*.

5-101C Materials Engineering and Testing Services Forms

Structural Materials, under Materials Engineering and Testing Services (METS), is responsible for TL forms. Find forms under Engineering Services' Testing and Technology Services link at:

http://cefs2.dot.ca.gov/jsp/forms.jsp

Form MR-0518 *Job Cement Samples Record*

The resident engineer uses this form to submit cement samples for testing. Instructions for the use of this form are found in Section 6-2, "Acceptance of Manufactured or Fabricated Material and Products," of this manual.

Form TL-0015 *Quality Assurance—Nonconformance Report*

METS uses this form when METS personnel discover that structural material or quality control procedures do not meet specific contract requirements. METS sends a copy to the resident engineer.

Form TL-0016 Quality Assurance—Nonconformance Resolution

METS uses this form to document the resolution to an outstanding Form TL-0015. METS sends a copy to the resident engineer.

Form TL-0028 Notice of Materials to Be Inspected at Jobsite

METS uses this form to assign inspection duties. METS sends a copy to the resident engineer.

Form TL-0029 Report of Inspection of Material

METS uses this form to confirm that material has been inspected, and the inspector has attached inspection release tags or other means of identification. METS sends a copy to the resident engineer, who compares it with inspection tags or markings on delivered materials.

Form TL-0038 Inspection Request

METS uses this form to document requests by the vendor or fabricator for bid items that require inspection.

Form TL-0101 Sample Identification Card

The resident engineer uses this form 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

The resident engineer uses this form to submit compressive strength samples of concrete. Refer to Section 6-3, "Field Tests," of this manual for details on marking of samples.

Form TL-0608 Notice of Materials to be Furnished

METS uses this form to inform all parties that METS will inspect and release material before it's sent to the job site. TL-0038, "Inspection Request Form," is included with the TL-0608 that is sent to the vendor and fabricator.

Form TL-0649 Report of Materials on Hand

METS uses this form to verify that material has been inspected and is in acceptable condition. Refer to Section 3-9, "Payment," of this manual for details.

Form TL-6013 Toll Material Suitability Documentation Report

METS structural material representative, in consultation with the resident engineer and design staff as needed, completes this form as part of the blue tag process. The form documents the decision to release material that is tagged with TL-0625 and is listed in TL-6014.

Form TL-6014 Material Suitability Report

This form is completed by the METS quality assurance inspector and is used to list the material to be released with TL-0625. The report includes material description, blue tag number, and description of conformance.

Form TL-6037 Fabrication Progress Report

METS uses this form to notify resident engineers of progress being made on fabrication of various items. Refer to Section 3-9, "Payment," of this manual for details.

The following METS forms can be found at the Caltrans Electronic Forms System's intranet website:

http://cefs.dot.ca.gov/jsp/forms.jsp

5-101D Other State Forms

Following are state forms used in contract administration that are not issued by the Division of Construction or METS. They are available on the Caltrans Electronic Forms System's intranet website:

http://cefs.dot.ca.gov/jsp/forms.jsp

Form DPD-3013 *Request for Construction Staking*

The contractor uses this form 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 restaking. For information on construction surveys and use of the form, refer to Chapter 12, "Construction Surveys," of the *Caltrans Surveys Manual*.

Form LA-17 *Report of Chemical Spray Operations*

The contractor uses this form to submit the required weekly pesticide application report. Refer to Section 4-2002C (2), "Pesticides," of this manual for details.

5-101E Traffic Operations Forms

The following forms from the Division of Traffic Operations are used to change clearances or bridge weight rating, and are located at:

http://www.dot.ca.gov/hq/traffops/permits/

Form TR-0019 *Notice of Change in Clearance or Bridge Weight Rating*

The resident engineer uses this form to report permanent changes to vertical or horizontal clearance for vehicular traffic or permanent changes in bridge permit ratings on divided roadways. Refer to Section 3-703B, "Permanent Clearance and Bridge Permit Rating Changes," of this manual for details.

Form TR-0020 *Notice of Change in Vertical or Horizontal Clearance*

The resident engineer uses this form to report permanent changes to vertical or horizontal clearance for vehicular traffic. Refer to Section 3-703B, "Permanent Clearance and Bridge Permit Rating Changes," of this manual for details.

Form TR-0029 *Notice of Change in Clearance or Bridge Weight Rating*

The resident engineer uses this form to report permanent changes to vertical or horizontal clearance for vehicular traffic or permanent changes in bridge permit ratings on undivided roadways. Refer to Section 3-703B, "Permanent Clearance and Bridge Permit Rating Changes," of this manual for details.

Form TR-0405 *Certification of Compliance with Americans with Disabilities Act (ADA)*

The resident engineer uses this form to certify compliance with ADA standards prior to and after construction. Refer to Design Information Bulletin 82 at the website:

http://www.dot.ca.gov/hq/oppd/dib/dibprg.htm

5-101F Federal Forms

Following is a list of some federal forms that are used in contract administration. Obtain the forms from the U.S. Department of Transportation, Federal Highway Administration's website:

http://www.fhwa.dot.gov/

Form FHWA-1391 *Federal-Aid Highway Construction Contractors Annual EEO Report*

The contractor must submit this form on all federal-aid contracts over $10,000. All subcontractors on federal-aid projects whose subcontracts exceed $10,000 must also submit the form. Contractors and subcontractors report project employment data for the last full week of July on the form.

Form DOL SF-308 *Request for Wage Determination and Response to Request*

Request wage rate determinations for federal-aid contracts by using this U.S. Department of Labor form. Obtain the form from the U.S. Department of Transportation, Federal Highway Administration's website:

http://www.dol.gov/whd/programs/dbra/sf308.htm

5-102 Organization of Project Documents

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. Project records may be scanned and stored electronically. Maintain hard copy files as a backup prior to project completion.

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 the 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
- Overtime Requests and Authorizations
- Absence Requests
- Personnel Transfer Records
- Personnel Roster
- Travel Expense Claims and Records
- Individual Personnel File (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. Suggested subcategories are:

- PRSM (task management) reports
- Equipment cost reports

Category 4 Service Contracts

In this category, file documents related to the project office utilities and services. File requests for service 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
- Drinking water
- Overnight mail and shipping service
- 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 Total 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 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 change order in the change order category file.

File correspondence 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 change order to solve the problem. At this point, the resident engineer should transfer all of the correspondence related to the change order to the change order category file.

A letter might cover subjects in multiple 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 a different category.

The following are examples of subcategories in Category 5. The number of subcategories will depend on the volume of correspondence. Show all subcategories in the index.

- Request for information (RFI) and responses
- Request for clarification (RFC) and responses
- To district office
- From district office
- To Project Development
- From Project Development
- To Maintenance
- From Maintenance
- To Traffic
- From Traffic
- To contractor (letters, transmittals, faxes, memos, email)
- From contractor (letters, transmittals, faxes, memos, email)
- Property owners
- Utility companies

- Form CEM-0501, "Relief From Maintenance"
- 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:

- Employee safety
- Form CEM-0601, "Construction Safety Report"
- Form CEM-0602, "Project Safety Program Statement"
- Contract Documents Relating to Safety
- Correspondence with the Division of Occupational Safety and Health (Cal/ OSHA)
- Form CEM-0606, "Construction Safety Checklist"
- 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 DPD-3013, "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 currently 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. Create subcategories as necessary because of the volume of documents:

- Project Report
- Preliminary Report
- Project Expenditure Authorization (including Supplemental Allotments)
- Detail 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
- Encroachment Permits and Cooperative Agreements
- Bidder Inquiry Information

Category 12 Contractor

Use this category to file the 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 5-1.16, "Representative," 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 a more appropriate category.
- Falsework plans.
- Insurance documents, as required in Section 7-1.05, "Indemnification," and Section 7-1.06, "Insurance," of the *Standard Specifications*.

Category 13 Signs and Striping

In this category, file all documents related to signing, delineation, and handling public traffic during construction. Suggested subcategories are:

- Layout of Construction Signs
- Detour Design, Striping, and Signing
- Traffic Striping Diagrams

Category 14 Photo Records

File routine photos and their identification in this category. File photos relating to claims in Category 62, "Disputes." It is a good practice to take photos on a monthly basis to document the work during construction. Maintain video recordings and digital photo files in an organized manner. Note the location of these items in this category file.

Suggested subcategories 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 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 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 daily reports and receiving records of only 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 is 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:

- 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 change order number if the required work is being done by change order

Category 19 Hazardous Waste and Hazardous Materials

File any information regarding the discovery and removal of hazardous waste in this category.

To comply with the record retention requirements of the ADL Agreement (6 years minimum), the resident engineer must retain ADL-related records as follows:

- File all ADL-related correspondence, reports, data, and records in Category 19, "Hazardous Waste and Hazardous Materials" of the project records.
- File all ADL-related documents included with the resident engineer pending file in Category 19.

Category 20 Water Pollution Control Plan or Stormwater Pollution Prevention Plan

File all correspondence regarding water pollution control plans (WPCP) or stormwater pollution prevention plans (SWPPP) in this category. A list of suggested subcategories:

- Authorized WPCP or SWPPP
- Amendments to WPCP or SWPPP
- Notification of Construction
- Correspondence
- Inspections by Contractor
- Inspections by Caltrans
- Notices of Noncompliance
- Annual Certification of Compliance
- Notice of Completion of Construction

Category 21 Construction or Maintenance 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-2103, "COZEEP/MAZEEP Cancellation Form"
- Form CEM-2102, "COZEEP/MAZEEP Task Order"
- Form CEM-2101, "COZEEP Daily Report"

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 transportation management center
- Authorized 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 currently established categories. When used, enter the name of the category on the index sheet.

Category 24 Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises (DVBE)

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
- Form CEM-2402(F), "Final Report—Utilization of Disadvantaged Business Enterprises (DBE), First-Tier Subcontractors"
- Form CEM-2403(F), "Disadvantaged Business Enterprises (DBE) Certification Status Change"
- Form CEM-2404(F), "Monthly DBE/UDBE Trucking Verification"
- 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. Refer to 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
- 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-3101s that contain information for structure items available for use by the structure representative. Consider filing the Form CEM-3101 listing structure items in a separate subcategory of this category.

Category 32 Notice of Materials to Be Inspected at the Job Site

In this category, file Form TL-0028, "Notice of Materials to Be Inspected at Jobsite."

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 identifies the subcategory; 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 Hot Mix Asphalt

In this category, file documents related to hot mix asphalt, except those to be filed in other specific categories such as in 37 and 48. Following are suggested subcategories:

- Form CEM-3501, " Hot Mix Asphalt Production Report"
- Form CEM-3502, "Hot Mix Asphalt Placement Report"
- Form CEM-3511, "Contractor Job Mix Formula Proposal"

- Form CEM-3512, "Contractor Hot Mix Asphalt Design Data"
- Form CEM-3513, "Caltrans Hot Mix Asphalt Verification"
- Certificates of compliance for materials used in hot mix asphalt

Category 36 Concrete (other than structure items)

In this category, file documents related to concrete. Do not include documents that are to be filed in categories such as 37, 43, and 48. For structure items, the project documents are to be filed in Category 43, "Concrete and Reinforcing Steel." Refer to the *Bridge Construction Records and Procedures* manual for details. Following are suggested subcategories:

- 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 "Initial Tests and Acceptance Tests"; 21 is the contract item number of the material and identifies the subcategory; and 3 is the second level subcategory identifying the particular test result.

- Form CEM-3701, "Test Results Summary"
- Form CEM-3702, "Relative Compaction Summary"
- Form CEM-3703, "Caltrans Production Start-Up Evaluation"
- Form CEM-3736, "Pavement Smoothness Inertial Profiler Submittal Record"
- Form CEM-3736AC, Asphalt Concrete Pavement Smoothness Corrections Information"
- Form CEM- 3736C, "Concrete Pavement Smoothness Corrections Information"
- 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)

- Hot Mix Asphalt

37.31.1 Aggregate Gradation

37.31.2 Asphalt Binder Content

37.31.3 Maximum Theoretical Density (%)

37.31.4 Sand Equivalent (min)

37.31.5 Stabilometer Value (min)

37.31.6 Air Voids content

37.31.7 Crushed Particles

37.31.8 Moisture Content

37.31.9 Los Angeles Rattler

37.31.10 Fine Aggregate Angularity

37.31.11 Flat and Elongated Particle

37.31.12 Voids in Mineral Aggregate

37.31.13 Voids with Asphalt

37.31.14 Dust Proportion

37.31.15 Smoothness

37.31.16 Asphalt Binder

37.31.17 Asphalt Rubber Binder

37.31.18 Asphalt Modifier

37.31.19 Crumb Rubber Modifier

37.31.20 Certificates of Compliance for Materials Used in Hot Mix Asphalt

- 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

37.42.8 Coefficient of Friction

37.42.9 Other related items

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 Structure Construction personnel in this category in accordance with instructions contained in the *Bridge Construction Records and Procedures* manual.

Category 38 Quality Control

In this category, include all documents relating to quality control. Create a subcategory system to include the following:

- Forms CEM-3801, "Request for Assignment of Inspectors, Samplers, and Testers" and Form CEM-3802, "Quality Control Inspector Affidavit of Proficiency."
- Form CEM-3803, "Daily Summary of Quality Control Testing."
- Form CEM-3804, "Hot Mix Asphalt Inspection and Testing Summary."
- Copies of related correspondence.

Category 39 Materials Testing Qualification 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 by the project's materials tester. For more than one type of report, such as a report and a summary form, provide subcategories.

Category 41 Report of Inspection of Material

In this category, file the following forms:

- Form TL-0015, "Quality Assurance—Nonconformance Report"
- Form TL-0016, "Quality Assurance—Nonconformance Resolution"
- Form TL-0029, "Report of Inspection of Material"
- Form TL-6013, "Material Suitability Documentation Report"
- Form TL-6014, "Material Suitability Report"
- Form TL-0624, "Inspection Release Tag"
- Form TL-0625, "Material Suitability Tag"
- Form CEM-4101, "Materials Release Summary"
- Form CEM-4102, "Material Inspected and Released on Job"

Create subcategories within Category 41 for each contract item requiring inspection at the source by a METS inspector. Place a summary sheet (use Form CEM-4101, "Materials Release Summary") in each subcategory containing the date of inspection, quantity inspected, cumulative quantity, and lot numbers. The summary sheet documents that materials used in the work have been inspected.

Staple Form TL-0624, "Inspection Release Tag," removed from materials received on the project, to Form TL-0029, "Report of Inspection of Material," on a letter-size sheet of paper and file it in the appropriate subcategory. The sheet should include 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.

Form TL-0625, "Material Suitability Tag," should be attached to the TL-6014, "Material Suitability Report," received from METS and filed.

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, "Initial Tests and Acceptance Tests."

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 Recycle Materials and Diversion of Solid Waste

In this category, file a completed copy of Form CEM-4401, "Solid Waste Disposal and Recycling Report." The contractor completes Form CEM-4401 and the resident engineer reviews the form within the reporting time constraints. The use of this form is described in Section 7-109, "Solid Waste Disposal and Recycling Reporting," of this manual.

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.

   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 example below, set up a separate subcategory for each structure.

Category and Subcategory Number		Contract Items Involved in the Operation
46.1	Chronological	All
46.2	Clearing and Grubbing	5
46.3	Roadway Excavation, Ditch Excavation Aggregate Subbase	8,13,11,15,22
46.4	Salvage Fence, 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	Hot Mix Asphalt 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
46.12	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

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 change order bill report and approving payment, record the change order 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, "Change Orders."

   Change order 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

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 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."

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 Bid 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, "Bid Item Quantity Documents." Some drainage item quantity documents may be filed in Category 47.

Category 49 Change Orders

In this category, file 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, "Change Order," Form CEM-4903, "Change Order Memorandum," and any accompanying correspondence.
- Form CEM-4901, "Change Order Input."
- Daily change order 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)* books 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 change order is written, the supporting project documents may be transferred to the 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:

- Department-Furnished Material and Expenses

  In this subcategory, file the contractor's letters requesting delivery of Department-furnished materials. Also, file the receiving records or other records of material furnished by Caltrans. When Department-furnished material is received as evidenced by shipping and receiving records, file the related 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 that cover repair of damage to state property by third parties (refer to "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 (refer to Section 6, "Control of Materials," of the *Standard Specifications*).
- Engineering and inspection charged to the contractor (refer to Section 3-512, "Construction Surveys," 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 (refer to Section 3-906G, "Deductions," of this manual).
- Any other deductions (refer to Section 3-9, "Payment," of this manual).

Category 55 Partnering

This category is for filing all documents related to partnering meetings, workshops, and evaluations. Subcategories may include:

- Form CEM-5501, "Partnering Facilitator Evaluation—Kick-Off"
- Form CEM-5502, "Partnering Facilitator Evaluation—Close-Out"

Categories 56 through 58 Extra Category Numbers

Use one of these extra category numbers for project documents that do not fit in currently established categories. When used, enter the name and number of the category on the index sheet.

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 Contract Administration System Inputs and Reports

This category contains documents resulting from CAS. Possible subcategories are:

- Form CEM-6003, "Progress Pay—Estimate Project Initiation or Update"

- Form CEM-6004, "Contract Transactions Input"

The following CAS reports are cumulative. Only the most current results need to be retained.

- Status of Contract Items
- Project Record Item Sheets
- Status of Change Orders
- Change Order Master Listing

Category 61 Estimate and Project Status

In this category, file monthly Project Record-Estimate Request documents. The suggested subcategories of this category are:

- Project Contingency Fund Status
- Estimate

The following documents may be filed by estimate number in numeric order:

- Form CEM-6101, "Project Record—Estimate Request"
- Estimate Verification Form
- Progress Payment Voucher
- Estimate Processing Results
- Project Record-Estimate and Project Status

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 CEM-6302, "Final 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	Photo Records
15	Accidents
16	Utility Agreements
17	Utility Work Performed
18	Agreements
19	Hazardous Waste and Hazardous Materials
20	Water Pollution Control Plan or Stormwater 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 (DVBE)
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 at Jobsite (TL-0028)
33	Notice of Materials to be Furnished (TL-0608)
34	Treated Base
35	Hot Mix Asphalt
36	Concrete (other than structure items)

Category No.	Heading
37	Initial Tests and Acceptance Tests
38	Quality Control
39	Materials Testing Qualifications of Employees
40	Field Laboratory Assistant Reports to Resident Engineer
41	Report of Inspection of Material (TL-0029)
42	Material Plants
43	Concrete and Reinforcing Steel
44	Recycle Materials and Diversion of Solid Waste
45	Resident Engineer's Daily Reports
46	Assistant Resident Engineer's Daily Reports
47	Drainage Systems
48	Bid Item Quantity Documents
49	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	Partnering
56-58	(Extra category numbers)
59	Bridge Estimate Data
60	Contract Administration System Inputs and Reports
61	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
Assistant Resident Engineer's Daily Reports	46
Basement Soil Test Results	30
Bid Item Quantity Documents	48
Bridge Estimate Data	59
Change Orders	49
Charges to Total Contract Allotment	52

Heading	Category No.
Concrete and Reinforcing Steel	43
Concrete (other than structure items)	36
Construction Surveys	8
Construction Zone Enhanced Enforcement Program	21
Contract Administration System Inputs and Reports	60
Contractor	12
Credit to Contract	53
Daily Reports, Assistant Resident Engineer's	46
Daily Reports, Resident Engineer's	45
Deductions from Payment to Contractor	54
Disadvantaged Business Enterprises and Disabled Veterans Business Enterprises	24
Disputes	62
Drainage Systems	47
Estimate and Project Status	61
Equipment and Personnel Cost Reports	3
Extra Categories	10, 23, 56, 57, 58
Field Laboratory Assistant Reports to Resident Engineer	40
General Correspondence	5
Hazardous Waste and Hazardous Materials	19
Hot Mix Asphalt	35
Information Furnished at Start of Project	11
Initial Tests and Acceptance Tests	37
Labor Compliance and Equal Employment Opportunity	25
Materials on Hand	51
Material Plants	42
Materials Information and Preliminary Tests	29
Materials Testing Qualifications of Employees	39
Notice of Materials to be Furnished (Form TL-0608)	33
Notice of Materials to be Inspected at Jobsite (Form TL-0028)	32
Notice of Materials to Be Used (Form CEM-3101)	31
Partnering	55
Photo Records	14
Progress Schedule	26
Project Completion Documents	63
Project Office Equipment and Supplies	2
Project Personnel	1
Public Relations	7
Quality Control Quality Assurance	38

Heading	Category No.
Recycle Materials and Diversion of Solid Waste	44
Report of Inspection of Material (TL-0029)	41
Resident Engineer's Daily Reports	45
Safety	6
Service Contracts	4
Signs and Striping	13
Traffic Management Information	22
Treated Base	34
Utility Agreements	16
Utility Work Performed	17
Water Pollution Control Plan or Stormwater Pollution Prevention Plan	20
Weekly Newsletter	28
Weekly Statement of Working Days (Form CEM-2701)	27
Welding	9

5-103 The Contract Administration System

5-103 The Contract Administration System

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 the Division of 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 PISA subsystems that make up the primary computer system that Caltrans uses for tracking contract capital costs are: planning and design, bidding and award, and project construction. Each module of PISA passes data to the next module as a project progresses from conception to completion. Refer to Figure 5-1.1, "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.

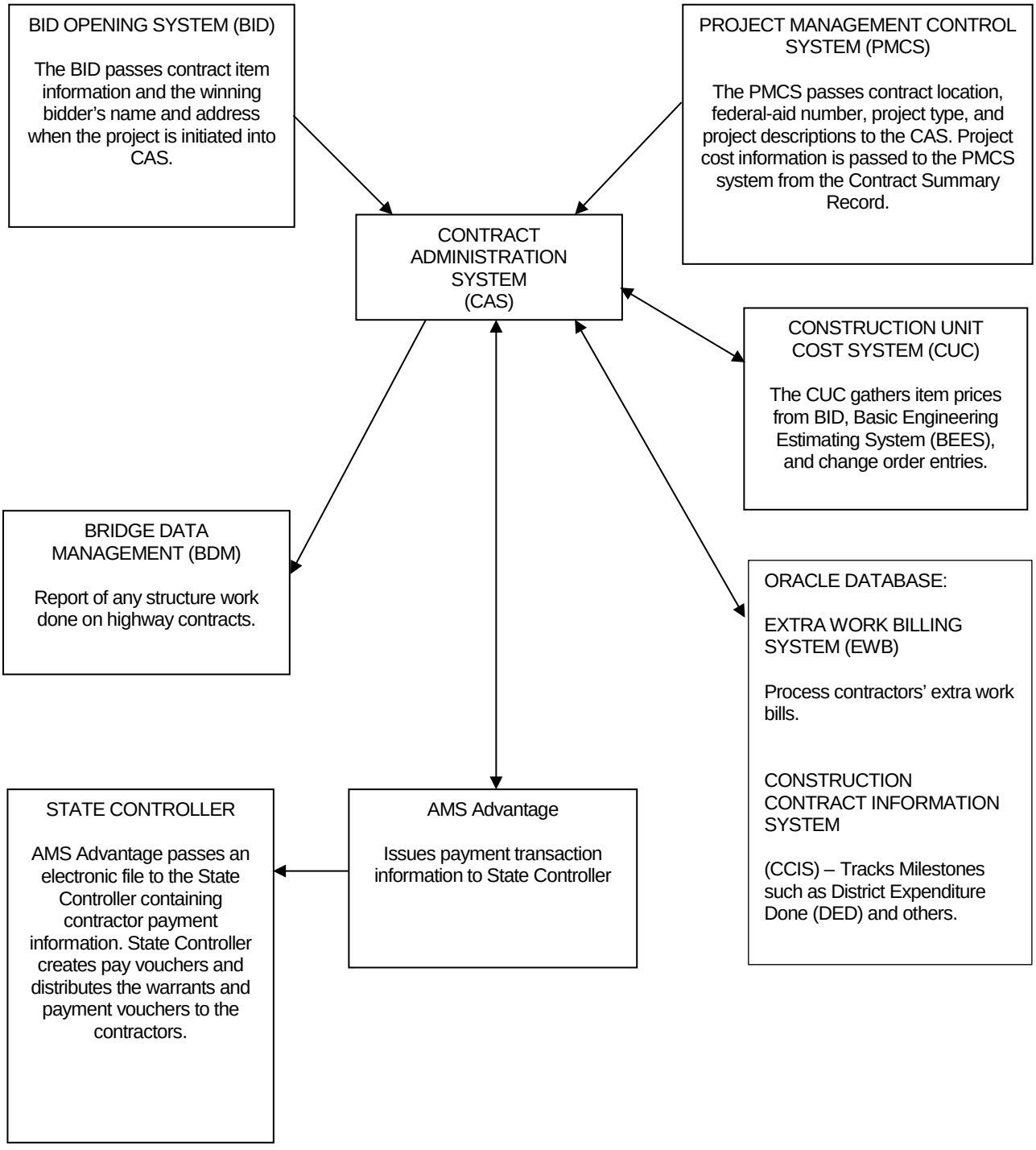
CAS is also composed of separate modules, each of which accomplishes a distinct function. The following are the most common of CAS' many modules:

- Project initiation and update
- Contract transactions
- 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

Figure 5-1.1. Contract Administration System, Systems Interface



5-103B Project Initiation and Update

5-103B (1) Major and Minor A Contracts

When Caltrans has determined the lowest responsible bidder, the 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 update the computer file by adding to or changing existing information. Items of work are tracked as either federally participating or nonparticipating.

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 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, "Progress Pay—Estimate Project Initiation or Update," which is explained in more detail in 5-103B (3), "Completing Form CEM-6003, 'Progress Pay—Estimate Project Initiation or Update.' "

After receipt of the contract award summary, progress pay may be initiated. Division of Construction progress pay desk verifies the contractor voucher name and address and enters project fund information into CAS from the contract award summary. The district estimate desk verifies the bid open date. Using the CAS data-entry screen, the district estimate desk enters the award, approval, completion, and acceptance dates; the number of working days; the plant establishment period; and time-related overhead information into CAS from the contract award summary, approval memo, and the form CEM-6301, "Contract Acceptance."

The result of the district's file update will be a dummy Form CEM-6101, "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 contractor may request a local address change or a legal name style address change. The district must maintain the accuracy of local address information in CAS using Form CEM-6003, "Progress Pay—Estimate Project Initiation or Update." The State Controller mails progress payment checks. Only the headquarters Division of Construction progress pay coordinator is authorized to make changes to the address from Form CEM-1202B, "Contractor Action Request—Assignment of Contract Monies, Assignee Change of Name/Address" verified by the resident engineer with the Division of Construction field coordinator's concurrence.

5-103B (2) Emergency Contracts in Excess of Minor B Limits

Payment for all emergency contracts estimated at greater than the Minor B contract limit in construction cost are to be paid through CAS. The Minor B limit is evaluated and re-established every 2 years and DPAC announces the new policy by issuing a DPAC Information Bulletin:

http://dpac.onramp.dot.ca.gov/bulletins-and-memos

The district performs the initial setup of emergency contracts in CAS using the *Emergency Force Account (EFA) Contract Initiation Instructions in CAS (Contract Administration System)*. The headquarters estimate desk performs the final setup steps. Entering the emergency contract in CAS is typically performed after the "Confirmation

of Verbal Agreement" has been issued, but prior to the contract being authorized. This allows the contractor and the engineer to begin processing change order billings using the iEWB system. Progress estimates are not to be requested until confirming the contract has been authorized and the E-FIS contract document has reached the final stage.

To establish a contract in CAS, a minimum of one contract item must be used. This is typically covered by establishing the one item for the amount of the contract payment bond. In order to process change order billings, CAS requires at least one change order be issued. The change order is administrative only, and issued for the total of the construction authorization, less the value of the bid item(s), less $15,000 (example; change order amount=total allotment-item(s)-$15,000). Establishing the change order for this amount provides protections to ensure change order billings are not authorized for more than the available funds.

5-103B (3) Completing Form CEM-6003, "Progress 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 (3a) Project Key

Enter the letter "U" under "FB," and in the remaining spaces, enter the district and contract number.

5-103B (3b) 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: Though the current financial system (E-FIS) now uses a 4-digit source unit value, enter the prior financial system (TRAMS) 3-digit source unit value. 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: If the project requires retentions be held at 5 percent for the contract's life, enter an "X" in the "PE" column. Current legislation prohibits retentions on all state and federally funded contracts through January 1, 2020.
- First Chargeable Working Day: 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 (3c) 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 (3d) Card Type C09 to C14

Only the headquarters Division of Construction progress pay coordinator can change the address in CAS.

To change the contractor's local address, 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 (3e) 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: Though the current financial system (E-FIS) now uses a 4-digit source unit value, enter the prior financial system (TRAMS) 3-digit source unit value. 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, 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 (4) 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.
- Change order transactions: These consist of three types of transactions that refer to change orders.

The Contract Transaction Processing Module processes this total of 12 transaction types. Together with the services that the change order and Daily Extra Work Report (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 change order. This will cause the authorized quantity to be adjusted automatically. Thus, you do not have to account for status changes due to 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 order. Indicate bridge items by entering "B" in the proper column. If you use the report titled *Bridge Quantities by Structure*, you will also need to enter the structure number in accordance with instructions in Section 6, "Estimates," of the *Bridge Construction Records and Procedures* manual, Vol. 1. Refer to Example 5-1.2, "Contract Transaction Input," Line 01 of this manual.
- Contract item quantity balance: You may adjust the authorized quantity, if necessary, by submitting quantity balances as line entries on Form CEM-6004, "Contract Transactions Input." 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 effect on the contingency balance. This transaction type adjusts the authorized final cost for your project, as

shown in the later discussion of progress pay estimates. Refer to Example 5-1.2, Line 02 of this manual.

- Contract item anticipated change: This transaction gives 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 the estimated final cost for the project. The effect of these transactions is cumulative. If additional work is authorized by change order, a reversing entry is necessary. Refer to Example 5-1.2, Line 03 of this manual.
- 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. Refer to Example 5-1.2, Lines 04 and 05 of this manual.
- 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. Refer to Example 5-1.2, Line 06 of this manual.

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 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. Refer to Example 5-1.2, Line 07 of this manual.

  These transactions are placed in the computer file, and their sum will appear on the next progress pay estimate that generates payment. If the next estimate is a supplemental progress pay estimate, only enter material on hand payment requests if the material on hand payment request was mistakenly omitted from the previously run progress pay estimate.
- For more information about materials on hand, refer to Section 3-9, "Payment," and Example 5-1.2, Line 08 of this manual.
- Department-furnished materials allotment transfer: Use this transaction to increase or decrease the value of the Department-furnished materials allotment for your contract. The construction allotment will automatically adjust. To increase the Department-furnished materials allotment, enter a positive number. (This type of entry will decrease the contingency balance.) Refer to Example 5-1.2, Line 09 of this manual.
- 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 Department-furnished materials allotment. Refer to Example 5-1.2, Line 10 of this manual.

5-103C (1c) Change Order Transactions

The three transaction types listed below comprise "change order transactions," the final category of contract transactions:

- Change order anticipated change: This transaction has the same effect as does the contract item anticipated change except that a change order is being changed. Refer to Example 5-1.2, Line 11 of this manual.
- Change order final balance: This transaction has the same effect as does a contract item balance. When work on a change order is finished, mark it "Complete" by entering this transaction. As with contract items, additional change order bills may be paid, and the system will continue to balance the change order. Refer to Example 5-1.2, Line 12 of this manual.
- Change order final balance ("Reopen"): This transaction allows you to reverse the status of the change order from "Complete" to "Active." Refer to Example 5-1.2, Line 13 of this manual.

5-103C (2) Completing Form CEM-6004, "Contract Transactions Input"

The resident engineer will use Form CEM-6004 more often than any other form in CAS. This section contains a completed sample of the form. Refer to Example 5-1.2, "Contract Transaction Input."

We cannot overemphasize the importance of legible entries. 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. Refer to 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. Refer to Example 5-1.2, Line 01 of this manual.
- Mark the structure field with the character "B" if this transaction concerns "structure work." Otherwise, leave the space blank. If you use the report titled *Bridge Quantities by Structure* you will also need to enter the structure number in accordance with the instructions in Section 6, "Estimates," of the *Bridge Construction Records and Procedures* manual, Vol. 1.

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 on 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.
- Department-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 Department-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) Change Order Transactions

The following are the rules for change order transactions:

- For the change order anticipated change, the new estimated final cost is computed for the change order and reported. The system does not do any checking.
- Change order final balance and final balance ("Reopen"):
    1. The change order status is set to "Complete," or "Active," respectively. The system does not do any checking.
    2. For a 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 titled "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, "Contract Transactions Input," 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. 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.

Example 5-1.1. Quantity Calculation

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION
QUANTITY CALCULATIONS
CEM-4801 (REV 11/1992) CT# 7541-3520-0

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: 400
Unit of Measure: linear feet
Unit Price: $25.00
75% = 300
125% = 500

Remarks or Other Calculations:

200 linear feet placed on 5-03-01 at Maple Street onramp ✓

Material Inspection/Release: Certificates of compliance obtained on 4-29-01

PAY THIS ESTIMATE: 200 ✓
PREVIOUS PAID: 100 ✓
TOTAL TO DATE: 300 ✓

POSTED BY	DATE	POSTED TO
Office Engineer	08/08/2008	CEM-6004, page 4, line 5

Example 5-1.2. Contract Transaction Input

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION
CONTRACT TRANSACTIONS INPUT
CEM-6004 (Rev. 10/1983) CT#7541-3515-0

DIST: 07 | CONTRACT NO.: 1381U4 | PASSWORD: | CASØAT | PAGE NO.: 004

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		1,273 000						Time	URW
02	05	19	MAIL BOX ON ELM ST		028		15 000	Q					Time	URW
03	05	19	ANT. ELIM. AC ON FL		038	-	1,500 000	A					Time	URW
04	05	19	BAL. COMPL. ITEM 6		006			F					Time	URW
05	05	19	48-8-2		008		152 400						Time	URW
06	05	19	RESTORE STATUS		039		REOPEN	F					Time	URW
07	05	19	REV GRADE FR2 LINE								15,000 00	ANT	Time	URW
08	05	19	51-4-2								2,174 37	MHS	Time	URW
09	05	19	52-4-1								2,000 00	SFM	Time	URW
10	05	19	11-3-1								315,000 00	TAC	Time	URW
11	05	19	DELET DRAINAGE						029		10,000 00	ACC	Time	URW
12	05	19	BAL. COMPL. CCO 18						018			BAL	Time	URW
13	05	19	RESTORE STATUS						005		REOPEN	BAL	Time	URW
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														

Refer to Section 5-103C(1) for a description of transaction types.

IN CASE OF QUESTION CONTACT: NAME _____ PHONE _____ VERIFY

93 95682

ADA Notice For individuals with sensory disabilities, this document is available in alternate formats. For information call (916) 654-6410 or TDD (916) 654-3880 or write Records and Forms Management, 1120 N Street, MS-89, Sacramento, CA 95814.

5-103C (3) Computer Processing

The contract item totals listed below are kept for contract work and 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.
- Authorized quantity: This item is the total of the bid quantity and the algebraic sum of the quantity changes due to change orders that have been filed.
- Authorized quantity: This item is the total of the authorized 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 Change Orders

CAS maintains separate records for each authorized change order on a project. As each change order is authorized, it must be entered into CAS through the use of Form CEM-4901, "Change Order Input."

The method of entering each change order into the system may vary from district to district, but can be done as follows:

- The resident engineer writes a change order and completes Form CEM-4901, "Change Order Input." For approval procedures, refer to Section 5-3, "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 change order will consist of a change order report and a disposition report.
- The resident engineer should review the 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 authorized quantity adjusted to reflect the change.
- Immediately after Form CEM-4901 has been processed, CAS will accept change order bills and anticipated changes that refer to the change order.
- When CAS processes a supplemental change order, the daily extra work reports in the holding file (due to insufficient funds in the original change order) will be made available for payment.

5-103D (1) Completing Form CEM-4901, "Change Order Input"

Use Form CEM-4901 to perform the following functions:

- File a new change order in the computer file.
- Update (change existing information) a change order in the computer file.

- Replace a filed change order with another change order.
- Delete a change order from the computer file.

Completing the form depends on which of the functions are desired.

5-103D (1a) File

Enter the contract and change order numbers at the top of the form. The original 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 change order was written with a deferred time adjustment clause. Enter a category code on every change order. Left-justify this code.

Card Type 2: If extra work or adjustment of compensation is not part of your 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 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 change order is structure work, enter the net dollar amount involved. This amount will contribute to the 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 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 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 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 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 change orders will replace the data stored in the computer file with the new 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 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 change order 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 change order bills to reduce payments below the authorized amount.
- Submit the replace request.
- After the change order has been replaced, reenter the change order bills that were reversed. When possible, use the update function instead of the replace function.

5-103D (1d) Delete

You can eliminate a change order from the computer file as follows:

- Enter the contract and change order numbers.
- Place the letter "D" in the function box at the top right of the form.

As with the replace function, a 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 change order must pass through before the system will accept it:

- The change order number and the change order supplement number must be filled in or the change order will be rejected.
- The change order description cannot be blank, or the 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 change order.
- The approval date must be after the bid opening date and less than or equal to "today's" date; otherwise, the 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 change order.
- If any payment method appears more than once on the input cards, the order will be rejected.
- If you enter any contract item change for a void item, the system will reject the change order.
- Lump sum items may appear on 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 change order as an increase and also as a decrease. If the item appears a third time, the system will reject the change order.
- If the contract item "mobilization" appears on a change order, the 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 change order must be greater than the sum of the negative changes and less than the sum of the positive changes, or the change order will be rejected.
- The net dollar change for the 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 change order will be rejected.
- If the change order is already on file, the system will reject this duplicate entry. Additionally, if this change order's number exceeds by five the largest change order number on file, or if the supplement's number is more than two above the latest supplement on file for this change order, the system will reject the 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 change order is entered for extra work at force account and accepted by the system.
- Subsequently, change order bill payments are recorded against the change order.
- A request is entered to delete the 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 change order. The system requires

that entries to correct change order 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 change order exist, the system makes similar demands.

At this point, the processing of the change order is complete. However, when a supplemental change order is processed, the daily extra work reports in the holding file (due to insufficient funds in the original 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 Change Order Billing

Change order billing is input, revised, corrected, and submitted for payment using the internet extra work billing system (iEWB) at:

http://www.dot.ca.gov/hq/construc/iewb/

Computer-based training for learning how to use the iEWB system is available at:

http://www.dot.ca.gov/hq/construc/iewb/EWB_CBT/index.html

or

http://www.dot.ca.gov/hq/construc/iewb/index.htm

The iEWB system allows authorized users to correct extra work bills that have been previously processed and paid. Change order bills or corrected approved extra work bills that need to be paid but have insufficient funds will not be rejected because of insufficient funds (subject to the limitations in Section 3-906C, "Extra Work," of this manual). Instead, the system will place these change order bills in a pending status to await the resident engineer's further action. If there are insufficient funds to pay the extra work bill, usually, the resident engineer must write a supplemental change order to provide additional funds; the supplemental change order will make the appropriate change order bills available for payment. Once additional funds are added by the supplemental change order in CAS, the iEWB system will automatically process and pay the extra work bills that have been previously approved and are in the pending funds status.

All standard contracts are required to use the iEWB system to process payments for change orders.

For contracts that are not in CAS and therefore are not using the iEWB system, the form CEM-4902, "Extra Work Bill (Short Form)," can be used. This form is only used on contracts that are not in CAS.

Use Form CEM-4902 to enter basic information related to extra work performed under a 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 change order 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, "Extra Work Bill–Title Page," CEM-4902B, "Extra Work Bill–Labor Charges," CEM-4092C, "Extra Work Bill–Equipment Charges," and CEM-4902D, "Extra Work Bill–Material Charges."

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 change order number: Right-hand justify this three-digit number; for instance, change order 1 is 001, 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 change order 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 change order 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 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 change order 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 change order 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 and 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 change order bill is for an invoice only, enter the name of the organization to which the invoice was addressed. Submit a separate daily change order 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 and Equipment Rental Rates (Cost of Equipment Ownership)* book. Make a copy of this publication available to the contractor. A listing of miscellaneous equipment, for equipment that is not shown in the *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* book is available from the Division of Construction's website.

- For equipment that is neither in *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* book nor available from the website's miscellaneous listing, the contractor must request a rate from the resident engineer. The resident engineer will obtain an authorized rate from the Division of Construction's rental rate engineer.
- Equipment for which a 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 (Short Form), lines 24–25, or Form CEM-4902D (Long Form), 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 and 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, "Extra Work Bill (short Form)," 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 Change Order 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 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 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 change order 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 change order bill and authorizes it for entry into CAS. When reviewing the submitted change order bill, the resident engineer must be guided by the policy contained in Section 3-9, "Payment," of this manual. The following explains how the system will process Form CEM-4902:

- Request that CAS print a copy of the change order 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, 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 change order 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 change order 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 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 change order 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 and one for the resident engineer.

5-103E (3) Corrections to Change Order Bills

You can make corrections to the change order bill after it has been entered into the system, but there is a limit of four corrections per change order bill. Refer to the *Entry of Extra Work Bills Manual (CASEWBM).*

5-103F Generating Estimates

CAS produces 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 includes the following steps:

- Preparing Form CEM-6101, "Project Record—Estimate Request," and verifying the estimate. Transmit these to the district office.
- Computer processes your estimate and prints 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-6101, "Project Record—Estimate Request"

To request an estimate, 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 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, and authorized time extension days (change order) in the three matching fields of the form. As of February 16, 2012, "Other day" time extensions are no longer allowed, therefore do not increase this value to more than

existed prior to this date. In most cases, this value should always be zero. 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 refer to the following item 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" or entered a number in percent time elapsed, enter a short explanation in the 25 spaces immediately below these fields on the form. Typical entries might be "change order 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-6101, "Project Record—Estimate Request." 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 $1,000.
- 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 $1,000.
- Liquidated damages deductions: Enter "LIQ" in the type field. Both plus and minus deductions are allowed. Plus deductions reverse earlier deductions. Only use this type of deduction when liquidated damages are being assessed. If during the course of the work, the contractor's progress is unsatisfactory and has progressed to a point where a reasonably accurate estimate of possible liquidated damages can be made, make a deduction in lieu of any retention for unsatisfactory progress using an ADM in the type field with the text "Antic.Liq.Damages." Reverse the ADM when the actual liquidated damages are being assessed by using LIQ in the type field. Refer to Sections 3-807, "Liquidated Damages," and 3-906G, "Deductions," of this manual for more detailed guidance.
- 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-6101, "Project Record—Estimate Request," 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-6101, "Project Record—Estimate Request," 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-6101, "Project Record—Estimate Request," has been entered into CAS, the system will do the following:

- Edit Form CEM-6101 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 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-6101, "Project Record —Estimate Request." 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 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-6101, "Project Record—Estimate Request."
    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.

- Make 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 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 the 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. 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.
- Change order processing: This lists any balancing of change orders by the system. Occasionally, the list also contains warning messages.
- Contract item processing: This part of the report does the same things as described in the bullet above, but for contract items instead of 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 in Section 5-103F, "Generating Estimates," of this manual 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 transactions: 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:

- Edit data input on Form CEM-6101, "Project Record—Estimate Request."
- Select from the computer file the change order 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 change orders.
- Process contract items.
- Process deductions.
- Conduct miscellaneous computations.
- Generate reports.

5-103G Approval of Estimates

The authorization of 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) Resident Engineer

After an estimate has been run, the resident engineer must authorize it before the process of payment is continued. To expedite payment, the resident engineer can authorize through a memo, form letter, or telephone call with subsequent written confirmation to the district office.

5-103G (2) District Director

At the time the estimate was produced, so was a 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 a payment voucher has been verified and authorized.

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 the Contract Administration System

CAS online reporting through CA-View is available at:

https://gogreen1.go-online.ca.gov/CADVweb.asp

CA-View user guide and tips are available at:

http://it.onramp.dot.ca.gov/information-about-cas

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 authorized
- 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) 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) 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-post mile
- 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 Structure Construction (Copies)

This report is for use by Structure Construction. For details, refer to Section 6, "Estimates," of the *Bridge Construction Records and Procedures* manual, Vol. 1.

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; 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

The district office requests this report monthly for all ongoing contracts. The report must be filed in Category 60, "Contract Administration System Inputs and Reports."

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 authorized quantity differs from the bid quantity, the project record item sheets describe, under the item number, any changes due to change orders.

When applicable, take particular care to flag an item "COMPLETE" (using the item final balance transaction on Form CEM-6101) 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

The district office requests this report monthly for all ongoing contracts. The report must be filed in Category 60, "Contract Administration System Inputs and Reports."

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 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.

This is a cumulative report. Do not retain previous issues of this report in the project files. However, one issue of the report, 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 Change Orders

Normally, the district office requests this report monthly for all ongoing contracts. The report must be filed in Category 60, "Contract Administration System Inputs and Reports."

This report is similar to the status of contract items, which allows the engineer to review each change order.

Use the report to determine when supplemental change orders will be necessary to complete the work. The report also facilitates a review of those change orders where a credit is due Caltrans.

When applicable, flag change orders "COMPLETE" (using the change order final balance transaction) so that an accurate project status can be produced. Similar to flagging a contract item, flagging a change order "COMPLETE" means only that you have commanded the system to keep the change order in balance at all times.

5-103H (9) Change Order 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 change orders stored in the computer file. It also contains the change order time extension and 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 change orders, must be retained in the project's files.

5-103H (10) Bridge Quantities by Structure

This report is for use by 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 Section 6, "Estimates," of the *Bridge Construction Records and Procedures* manual, Vol. 1.

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 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 change order bills that are in the holding file for all contracts in the district. If there are reports in the holding file, process supplemental change orders to provide additional funds. The bill must be re-approved in the iEWB system in order to be released for payment on the next estimate.

5-103H (17) Daily Extra Work Report

Copies of daily extra work reports are produced under the procedure outlined in Section 5-103E, "Change Order Billing," of this manual. You can obtain copies by using the second page of the report request form or receive reports directly from the iEWB system. Refer to the *iEWB User Guide* for details.

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 Structure Construction

In addition to the reports discussed above, CAS provides reports for Structure Construction. For details, refer to Section 6, "Estimates," of the *Bridge Construction Records and Procedures* manual, Vol. 1.

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

5-104A General

Construction project records consist of all material in the construction files, whether in the field office or the district construction office. This section contains guidelines for the disposition of construction project records after Caltrans makes the final payment to the contractor. 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. When the construction project is completed, the resident engineer initiates assembly of the project history file by transmitting designated records to the district Construction Unit for compilation. The project history file is stored in a secure, central file location within the district. For information about the project history file, refer to Chapter 7, "Uniform File System," of the *Project Development Procedures Manual.* The construction records retention schedule, Form STD 73, "Records Retention Schedule," lists records that are retained by the districts and Construction headquarters. For specific records stored in the project history file, refer to Section 5-104C, "Disposition of Construction Project Records," of this 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, refer to Section 7-1.02K(3), "Certified Payroll Records (California Labor Code, §1776)," 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.

District construction offices must follow the statewide procedure for handling project records. This procedure is in accordance with the statewide records retention schedule and achieves 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 in accordance with Table 5-1.1 of this manual and as follows:
    1. For projects that involve federal participation, retain the records for a minimum of 3 years after submission of the final federal voucher.
    2. For projects that do not involve federal participation, retain the records for a minimum of 3 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 3 years after settlement. The district construction office must send a memorandum to the district records officer to hold these records until further notice.

After records from the resident engineer's office are sent to the district construction office, eliminate duplicate records.

The construction project records retention schedule lists the length of time certain files must be retained, as well as files that must be kept permanently in the project history files in accordance with federal requirements.

Table 5-1.1. Construction Records Retention Schedule

Project Record Category	Project Records Retention Funding Type			
	Fed & State	Fed	State	Fed & State
	FE (See Note 1)	FFV+3 (See Notes 3 & 4)	FE+3 (See Note 2)	PHF (See Note 5)
1. Project Personnel	X			
2. Project Office Equipment and Supplies	X			
3. Equipment and Personnel Cost Reports	X			
4. Service Contracts	X			
5. General Correspondence		X	X	
6. Safety		X	X	
7. Public Relations	X			
8. Construction Surveys		X	X	
9. Welding		X	X	
10. (Extra category number)				
11. Information Furnished at Start of Project (except documents noted below)		X	X	
a. Detail Estimate of Project Cost				X
b. Notice of Award of Contract				X
c. Contract Special Provisions & Addendums				X
d. Notice of Approval of the Contract				X
e. Executed Contract				X
f. Bid Book				X
12. Contractor (except documents noted below)		X	X	
a. Contractor's Borrow Agreements				X
13. Signs and Striping		X	X	
14. Photo Records				X
15. Accidents		X	X	
16. Utility Agreements				X
17. Utility Work Performed		X	X	
18. Agreements (except documents noted below)		X	X	
a. Right of Way Agreements (with/without obligation)				X
b. Forest Service Agreements				X
c. Borrow Agreements (between state/owner)				X
d. Disposal Agreements (between state/owner)				X
e. Service Agreements (charged to contract allotment)				X
19. Hazardous Waste and Hazardous Materials				X

Table 5-1.1. Construction Records Retention Schedule (continued)

Project Record Category	Project Records Retention Funding Type			
	Fed & State	Fed	State	Fed & State
	FE (See Note 1)	FFV+3 (See Notes 3 & 4)	FE+3 (See Note 2)	PHF (See Note 5)
20. Water Pollution Control Plan or Stormwater Pollution Prevention Plan		X	X	
21. Construction or Maintenance Zone Enhanced Enforcement Program		X	X	
22. Traffic Management Information		X	X	
23. (Extra Category Number)				
24. Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises		X	X	
25. Labor Compliance and Equal Employment Opportunity		X	X	
26. Progress Schedule		X	X	
27. Weekly Statement of Working Days		X	X	
28. Weekly Newsletter	X			
29. Materials Information and Preliminary Tests		X	X	
30. Basement Soil Test Results		X	X	
31. Notice of Materials to Be Used		X	X	
32. Notice of Materials to Be Inspected at the Job Site		X	X	
33. Notice of Materials to Be Furnished		X	X	
34. Treated Base		X	X	
35. Hot Mix Asphalt		X	X	
36. Concrete (other than structure items)		X	X	
37. Initial Tests and Acceptance Tests		X	X	
38. Quality Control		X	X	
39. Materials Testing Qualifications of Employees		X	X	
40. Field Laboratory Assistant Reports to Resident Engineer		X	X	
41. Report of Inspection of Material		X	X	
42. Material Plants		X	X	
43. Concrete and Reinforcing Steel		X	X	
44. Recycle Materials and Diversion of Solid Waste		X	X	
45. Resident Engineer's Daily Reports		X	X	
46. Assistant Resident Engineer's Daily Reports		X	X	
47. Drainage Systems		X	X	
48. Bid Item Quantity Documents		X	X	

Table 5-1.1. Construction Records Retention Schedule (continued)

Project Record Category	Project Records Retention Funding Type			
	Fed & State	Fed	State	Fed & State
	FE (See Note 1)	FFV+3 (See Notes 3 & 4)	FE+3 (See Note 2)	PHF (See Note 5)
49. Change Orders (except documents noted below)		X	X	
a. Change Orders (no drafts)				X
b. Memorandums (no drafts)				X
50. Adjustment in Compensation Calculations		X	X	
51. Materials on Hand		X	X	
52. Charges to Total Contract Allotment		X	X	
53. Credit to Contract		X	X	
54. Deductions from Payment to Contractor		X	X	
55. Partnering		X	X	
56. (Extra category numbers)				
57. (Extra category numbers)				
58. (Extra category numbers)				
59. Bridge Estimate Data		X	X	
60. Contract Administration System Inputs and Reports		X	X	
61. Estimate and Project Status (except documents noted below)		X	X	
a. Final Estimate				X
b. Invoice & Receiving Records (if applicable)				X
62. Disputes		X	X	
63. Project Completion Documents (except documents noted below)		X	X	
a. Contract Acceptance				X
b. Final Materials Certification				X
c. Final Acceptance Checklist for Federal Aid High Profile Projects				X

Notes:
1. **FE:** Final Estimate for state-funded projects only
2. **FE + 3:** Final Estimate + 3 years
3. **FFV:** Federal Final Voucher for projects with some form of federal funding
4. **FFV + 3:** Final Federal Voucher + 3 years
5. **PHF:** Project History File (permanent)

Prepare a transmittal list specifying the contents of each box when records are sent from the district construction office to the State Record Center or to another district. In a separate file in the district construction office, retain a copy of the transmittal list. Files stored electronically must also be sent.

The *Bridge Construction Records and Procedures* manual should be referenced for structure-related records that are transmitted to 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 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 afterward 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:

- Change order number.
- Revisions in alignment and right-of-way.
- Grade revisions in excess of 0.1 foot.
- 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 plans:

- 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 to ensure compliance with the archiving of as-built plans, but no later than 90 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, refer to Chapter 15, "Final Project Development Procedures," of the *Project Development Procedures Manual*.

5-104D (2) Procedure on As-Built Plans for Bridges and Structures

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 Structure Design.
- The structure representative will make the as-built corrections to these prints and forward them to Sacramento 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, Sacramento Structure Construction must forward the prints directly to Structure Design, Documents Unit. All other projects must be forwarded to Structure Maintenance and Investigations, which determines which sheets should be microfilmed for the structure files.
- Those prints not identified for filing by Structure Maintenance and Investigations will be forwarded to the appropriate district office for the preparation of as-built plan sheets. Structure Design will make the as-built corrections on the original plan sheets. If the original plan sheet is not currently stored in Structure Design, it may be obtained from the district.

On state projects that do not have a representative from 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 Structure Construction in Sacramento. The procedure outlined above must then be followed.

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 Special Funded Projects' *Information and Procedures Guide* and the *Encroachment Permits Manual*.

For additional guidelines and details for completing structure as-built plans, refer to 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 desired, the district can make a copy of the plans for their own records before returning them to the local agencies.

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 Special Funded Projects, Structures Local Assistance, 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

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5-204A (1c) Local Funds for State Highway Projects (Cooperative Projects)

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: G-11 to allocate funds for emergency contracts and G-12 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. This section explains the processes for managing project funds and obtaining additional project funds. Refer to the "Dir Orders Guidelines" link on following website for additional details on the G-11 and G-12 processes for additional funds on emergency contracts:

http://onramp.dot.ca.gov/hq/maint/orway/ha23/index.htm

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, Department-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

the early discussions the district maintenance major damage coordinator or the district maintenance engineer respectively, and the funding program advisor.

5-203A G-12 Funds Request

If it is decided that the best alternative is to request additional funds, the construction engineer must then write a "Construction Phase Request for Supplemental G-12 Funds" memorandum to request additional funds and send it to the project manager. The memo must include sections titled "Potential Overrun Explanation, Justification, and Alternatives" and "Financial Status." The "Potential Overrun Explanation, Justification, and Alternatives" 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:

1. Why are additional funds needed?
2. What work will be performed with the additional funds?
3. What alternatives have been considered to mitigate the unforeseen expenses?

The construction engineer ensures that informational copies of the request are emailed to the construction field coordinator and the appropriate funding program advisor. For an example of the memorandum to Division of Budgets, refer to the Division of Construction intranet site at:

http://construction.onramp.dot.ca.gov/contract-administration/supplemental-funds

The project manager manages the project G-11 or G-12 funding capacity. The project manager completes the 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.

After the project manager coordinates getting the district signatures, the project manager emails the "Construction Phase Request for Supplemental G-12 Funds" or "Construction Phase Request for Supplemental G-11 Funds," whichever is applicable, to the G-11/G-12 mailbox:

G11.G12.Funds.Request@dot.ca.gov

The budget analyst in the Division of Budgets reviews and processes the request. Upon concurrence, the budget analyst forwards it to the Division of Construction change order engineer and informs the appropriate funding program advisor as needed. Rejected G-12 memos are returned to the project manager for revision.

The change order engineer reviews each G-12 memo for completeness, signature authority, compliance with policy, and ensures that it addresses the following issues:

- Existing and projected financial status.
- Justification for the G-12 funding.
- Clearly defined scope of work.
- Consideration of sufficient alternatives.

When the change order engineer concurs with the G-12 memo, it is sent to the construction field coordinator and the project management coordinator for review and approval. After the coordinators approve the request, a copy of the fully executed

request is kept in the change order engineer files and a copy is returned to the Division of Budgets. The budget analyst in the Division of Budgets adjusts the project allocation by supplementing the expenditure authorization, notifies the Division of Accounting to update AMS Advantage, and notifies the district construction office to update the contract administration system. When the updates are complete, the resident engineer can authorize performance of the work contemplated by the G-12 memo.

If rejected by the change order engineer, the budget analyst, or one of the coordinators, the change order engineer notifies the project manager of the rejection so that the district can consider alternatives. The project manager should work with the district construction staff, the construction coordinator, and the project management coordinator to develop a new funding strategy; or the project manager can appeal to the supplemental funds request (SFR) executive committee. The project manager ensures that preparation of the appeal follows district policy and emails it to the SFR executive committee at the G-11/G-12 mailbox.

Appeals for G-12 funds are directed to the Division of Transportation Programming, which facilitates the monthly SFR executive committee meeting. The SFR executive committee considers each G-12 funds request appeal. The district project manager and the construction and project management coordinators present their positions to the SFR executive committee. If the SFR executive committee approves the appeal, the Division of Budgets processes the G-12 funds request. If the SFR executive committee denies the G-12 funds request appeal, the project manager works with the district construction staff and construction field coordinator to develop a new project completion strategy.

5-203B California Transportation Commission Supplemental Funds Request

If G-12 authority is insufficient to cover the work contemplated, a California Transportation Commission vote will be necessary to obtain any additional funding.

The procedure for obtaining approval from the California Transportation Commission is described in Appendix A-2 of the funds request instructions on the Division of Transportation Programming internet site under Funds Request Forms & Instructions:

http://www.dot.ca.gov/hq/transprog/allocation_new.htm

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 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 Sections 9-1, "Construction Contract Administration for Projects Sponsored by Others," and 5-309, "Federal Segregation Determination on Change Orders," of this manual.

Construction projects may be funded from many different fund sources. These include the following state-administered sources:

- The Interregional Transportation Improvement Program
- The Regional Transportation Improvement Program

- The State Highway Operation and Protection Program and Minor Program

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 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

Following 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," of this manual, maintenance work, and work financed by others. Refer to Section 5-3, "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 detail 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 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 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 change orders or other items that altered the work.

Section 3 Change Orders

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Figure 5-3.1 Change Order Decision-Making Concept Flowchart

Section 3 Change Orders

Section 3
Change Orders

5-301 General

5-301
General

A change order is a legally binding document used to make changes to the contract. Form CEM-4900, "Change Order," is used for change orders. Form CEM-4903, "Change Order Memorandum," must be prepared for each change order.

This section describes the use of Forms CEM-4900 and CEM-4903, describes Caltrans policies for change orders, and provides guidelines for writing change orders and memorandums.

5-302 Change Order Policy

5-302
Change Order
Policy

The authority for Caltrans to make changes to a contract is located in Section 3-403, "Changes and Extra Work," of this manual. Work that is outside the scope of an existing contract should be done in a separate contract. However, in special situations it may be added to an existing contract if:

- A director's order has been approved for the new work in accordance with Deputy Directive 26-R2, "Use of Director's Orders," dated July 31, 2009, available at:

  https://onramp.dot.ca.gov/sw_policy/dd/dd_by_number.html

- The Division of Construction chief concurs with adding new work to the existing contract by co-signing the director's order.
- On all federal-aid projects, the Federal Highway Administration (FHWA) transportation engineer approves the change as outlined in Section 5-308, "Federal Highway Administration Change Order Requirements," of this manual.
- On locally funded state highway projects, the contributing agency agrees to the change as outlined in Section 5-310, "Locally Funded State Highway Projects," of this manual.
- The contractor agrees to the change.

District construction personnel should consider the following in determining if the proposed change is within the scope of the original contract. Answering "yes" to any of the following questions indicates that the new work may be outside the scope of the original contract:

- Is the type of work for the proposed change significantly different from other types of work within the original contract?
- Is it necessary for the prime contractor or a subcontractor to mobilize specialized forces and equipment to perform the work of the proposed change?
- Will the estimated cost of the proposed work, when combined with all other changes, be outside the approved contract allotment?
- Does the proposed change represent a significant deletion to the original contract?

- Does the proposed change significantly delay completion of the contract when compared to the number of original contract working days?
- Is the proposed change outside the original contract limits?
- Can the project be completed as contemplated at the time of bid without the proposed change?

Answering the previous questions assists in determining if a proposal is within the scope of the existing contract. However a complete analysis of all the facts and circumstances surrounding the proposed change or new work is required to make a final determination. When district construction is uncertain if the new work is within the scope of the original contract, the district construction deputy director must consult the appropriate Division of Construction field coordinator for determination.

When new work resulting from the director's order may be accomplished best by adding to an existing contract, the district submits a request to the Division of Construction chief to co-sign the order. After the director's order is approved, district personnel may process a change order incorporating the new work, in accordance with the procedures described in Section 5-311, "Change Order Approval Process," of this manual.

5-303 Purpose of Change Orders

5-303 Purpose of Change Orders

Use change orders to change any part of the original contract. In addition, change orders are used for administrative and other purposes. The following are some of the reasons for writing 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 payment adjustments.
- To implement a value engineering change proposal or a construction evaluated research proposal. Refer to Section 3-5, "Control of Work," of this manual for a discussion of value engineering change proposals.
- To clarify terms of the contract.
- To resolve disputes or potential claims prior to the proposed final estimate, or exceptions (claims) after the proposed final estimate, and to pay for contract claim determinations. For the use of change orders in the dispute resolution process, refer to Section 5-4, "Disputes," of this manual.

5-304 Initiation of Change Orders

5-304 Initiation of Change Orders

The resident engineer usually determines the need for and initiates a change order. However, the contractor, other Caltrans units, or outside agencies or individuals may request changes. Other Caltrans units requesting a change order must clearly document the need for the change and 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, "Change Order."

5-305 Preliminary Considerations

5-305 Preliminary Considerations

When preparing to write a change order, consider the following:

- Is the proposed 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? Refer to 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 adjusting 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 tend to extend the time of completion more 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 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 work-character change?
- If a payment adjustment resulting from a work-character change 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 extra work at agreed price and cost information for payment adjustments? Should you make cost estimates and determinations and present them to the contractor?
- Will the ordered change require a Cost Effectiveness/Public Interest Finding for the use of patented or proprietary materials or equipment; or mandatory use of a borrow or disposal site?
- 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 Change Order Content

5-306 Change Order Content

The 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 change order's effect on time of completion
- Method and amount of compensation

5-306A Specifications

The specifications for bid item work already included in the contract will apply to added bid item work. You do not need to repeat or reference specifications for added work that is clearly shown to be bid item work.

In the 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 change order.

The contract will include some supplemental work specifically designated as extra work. For an example, refer to Sections 12-1.01, "General," 12-1.03, "Construction," and 12-1.04, "Payment," of the *Standard Specifications*.

5-306B Description of Work

The 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 whether a written statement clearly defines the proposed change or if plans or drawings need to be included.

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 change order.

On plans attached to a 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-by-11 inch attachment is always preferable to a full-size contract plan sheet.

Section 6735, "Preparation, signing, and sealing of civil engineering documents," of the Professional Engineers Act, requires that all civil engineering plans and specifications that are permitted or that are to be released for construction shall bear the signature and seal or stamp of the licensee and the date of signing and sealing or stamping. All final civil engineering calculations and reports shall bear the signature and seal or stamp of the licensee, and the date of signing and sealing or stamping. Plans or specifications attached to a proposed change order must meet this requirement, with the exception that a licensed 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 licensed engineer.

Show the Caltrans contract number, sheet number, and change order number on plans or other documents made a part of a change order. Include all attachments with each distributed copy of a change order.

5-306C Methods of Payment

When writing a change order, the resident engineer often can choose the payment method for added or changed work. The following lists, in order of preference, the payment methods:

1. Bid item unit prices; refer to Section 5-306G, "Change Order Format," of this manual.
2. Bid item unit prices with a payment adjustment at agreed unit price or lump sum; refer to Sections 5-306C (2), "Payment Adjustment"; 5-306C (2a), "Adjustments for Increased or Decreased Quantities"; 5-306C (2b), "Adjustment Calculations Involving Hot Mix Asphalt Dikes and Miscellaneous Areas"; and 5-306C (2c), "Deferred Bid Item Adjustments," of this manual.
3. Payment adjustment at agreed unit price or lump sum; refer to Sections 5-306C (2e), "Adjustments for Work-Character Changes"; 5-306C (3), "Extra Work"; and 5-306C (3a), "Extra Work at Agreed Prices," of this manual.
4. Force account; refer to Section 5-306C (3b), "Extra Work at Force Account," of this manual.

When a bid item has a work-character change, the resident engineer may delete the entire bid item, or the portion of it affected by the change, and pay for the entire work at force account. A preferred choice is to determine a correct and equitable payment adjustment to the bid item unit price. A payment adjustment providing for increased or decreased costs due to the work-character change allows the contract price to remain unchanged. Before resorting to force account payment, resident engineers must make every effort to make payment adjustments or negotiate agreed prices.

Refer to Section 3-901, "General," of this manual for methods of payment. Section 3-904, "Payment Adjustments," of this manual describes how the various methods of payment are used in change orders.

5-306C (1) Increases and Decreases in Bid Items at Bid Item Unit Prices

Changes in planned work or adding or decreasing work will often result in increases or decreases in bid item quantities. Except for bid items designated in the Bid Item List as final pay quantities, show changes in bid item quantities as estimates on a change order. Calculate the estimated increases or decreases that will result from the work as changed by the change order. The actual quantity paid for each bid item will be determined by the method specified for measuring each bid item quantity. For guidelines on measuring bid item quantities, refer to Section 3-9, "Payment," of this manual.

Show changes in the quantity of bid items that are designated as final pay quantities as fixed amounts added to the quantity shown in the Bid Item List. If a portion of a final pay item quantity is eliminated, the final pay quantity will be revised in the amount represented by the eliminated portion of the item of work quantity. For a standard clause for revised final pay quantities, refer to "Change Order Standard Clauses" at:

http://www.dot.ca.gov/construction/change-order/standard-clauses.html

For the method of indicating changes in bid item quantities, refer to Section 5-306G, "Change Order Format," of this manual and the change order examples at:

http://www.dot.ca.gov/construction/change-order/examples.html

Increases and decreases or estimated increases or decreases in bid items at contract prices may be executed unilaterally or with the contractor's agreement.

5-306C (2) Payment Adjustment

For the definition of payment adjustments, refer to Section 3-904, "Payment Adjustments," of this manual. Section 3-4, "Scope of Work," of this manual discusses payment adjustments for increased or decreased quantities and for work-character changes.

Payment adjustments 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 9-1.05, "Extra Work Performed by Specialists," of the *Standard Specifications*, calculate the adjustment on this basis. Ensure the specialist rate or billing is in line with the firm's usual charges.

For bid item overrun and underrun adjustments, when the contractor does not furnish sufficient and timely cost information, issue a unilaterally approved change order adjusting the item. Base the adjustment on your cost determination. This approved change order establishes the time allowed for protest and helps avoid delays.

Even though the contractor may have agreed to pay a fixed price to others for an item of work, use a force account based adjustment of the item price. Use a force account cost determination even when the work is subcontracted unless the item of work was performed by a specialist, as defined in Section 9-1.05, "Extra Work Performed by Specialists," of the *Standard Specifications*.

For large and complex adjustments, request auditing assistance from the Division of Audits and Investigations through the Division of Construction. Refer to procedures in Section 5-410, "Audits," of this manual.

5-306C (2a) Adjustments for Increased or Decreased Quantities

As soon as it is known that a bid item quantity will vary from the Bid Item List 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 payment adjustments for increased or decreased quantities as soon as the contractor completes work on a bid item. Refer to Section 3-904, "Payment Adjustments," of this manual.

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.

Verify a contractor's records by comparing them with Caltrans records. Where more extensive auditing is required, request the assistance of the Division of Audits and Investigations. 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 the contractor's records, eliminate supervision and overhead costs and any 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 judgment 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 4-1.05B, "Work-Character Changes," of the *Standard Specifications*, may later become eligible for further adjustment under Section 9-1.06, "Changed Quantity Payment Adjustments," of the *Standard Specifications.* In making the quantity payment adjustment, deduct or add payments made in making the work-character change adjustment to determine the contractor's total cost of the work.

5-306C (2b) Adjustment Calculations Involving Hot Mix Asphalt Dikes and Miscellaneous Areas

The bid item "Place HMA (hot mix asphalt) Dike" is paid for by the ton of HMA and by the linear foot for HMA dike. The bid item "HMA (miscellaneous areas)" is paid for by the ton of HMA and by the square yard for HMA (miscellaneous areas). The specifications do not exactly separate the work covered under each bid item. Carefully separate the items when it is necessary to adjust either the HMA dike bid item or the HMA (miscellaneous areas) bid item.

The following is the recommended procedure to determine the costs for computing adjustments of HMA dike and HMA (miscellaneous areas):

1. Subtract the estimated normal haul and placing unit cost for HMA used in paving from the bid item unit price to determine the cost of manufacturing HMA. Also, consult the contractor for an accurate estimate for comparison purposes. For commercial plants, you may use published price lists to determine the cost of manufacturing HMA.
2. To obtain the total cost of manufacturing HMA used in dikes or miscellaneous areas, multiply the actual mass of HMA used for dikes or miscellaneous areas by the unit cost of manufacturing HMA as determined above.
3. To obtain the total force account cost of dikes or miscellaneous areas, add to the total cost of manufacturing HMA the total force account haul and placing costs for HMA used in dikes or miscellaneous areas.
4. Calculate the force account unit cost of the dike or miscellaneous areas item and proceed as with any bid item increase or decrease adjustment.

To some extent, this procedure constitutes an adjustment in the HMA item as well as in the items for HMA dike or HMA (miscellaneous areas) paid by linear foot or square yard. However, this statement is true only for the HMA used on that portion of the dike or miscellaneous areas in excess of 125 percent of the Bid Item List. Also, an overrun or underrun in HMA dike or HMA (miscellaneous areas) will usually have little effect on the overall quantity of HMA.

5-306C (2c) Deferred Bid Item Adjustments

Upon completion of the changed work, promptly resolve all deferred item adjustments.

If a bid item adjustment will not be made, you do not need to write a supplemental change order. In this case, a letter from the contractor is sufficient. File a copy of the contractor's letter with the original change order that deferred the adjustment.

5-306C (2d) Exemption from Adjustment

Unless requested in writing by the contractor, do not adjust a bid item when the total pay quantity is less than 75 percent of the Bid Item List. 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 $5,000, as shown in Section 9-1.06B, "Increases of More than 25 Percent," of the *Standard Specifications*. As soon as a final bid item quantity is known, decide whether to make the adjustment. Unless an obvious imbalance exists between the bid item unit price and actual cost, do not make the adjustment. Inform the contractor in writing whether Caltrans will adjust the bid item price.

5-306C (2e) Adjustments for Work-Character Changes

Section 3-403A, "Work-Character Changes" of this manual defines work-character changes.

Payment adjustments for work-character changes may be unit or lump sum adjustments. Normally, a lump sum adjustment is only applied to a lump sum bid item.

A work-character change payment adjustment requires 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 only a portion of the work has changed, separate the changed portion of the work from the unchanged portion. Perform a force account analysis of the cost of the changed portion, and make payment at the contract price plus a separate payment for the added work or credit for any deleted work.

Do not eliminate a bid 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.

There can be no work-character change unless there was an executed change order. At times, it will not be possible to come to an immediate agreement with the contractor regarding an adjustment in compensation. You may need to complete the entire item before adjusted costs can be determined. In such cases, provide for payment at bid item prices, and defer adjustment in the initial change order. Include an appropriate deferment clause.

5-306C (3) Extra Work

For the definition of extra work and guidelines for using extra work in change orders, refer to 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 bid item, a combination of bid items, or a bid item with a payment adjustment.

5-306C (3a) Extra Work at Agreed Prices

For guidelines for determining and paying for extra work at agreed price, refer to Section 3-9, "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 may include a statement that such calculations are on file in the project records.

When a subcontractor is to perform extra work at agreed price, include the subcontractor markup in the agreed price calculations. For subcontractor markup guidelines, refer to Section 3-9, "Payment," 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 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 agreement, process the 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 change order. Although the unit price remains fixed, the number of units paid 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 "specialist work," and the contractor should obtain three bids for the extra work. Determine the agreed price by taking the lowest bid and adding the markup, as described in Section 9-1.05, "Extra Work Performed by Specialists," 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 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. If the contractor or a subcontractor is capable of performing the extra work, the work is not considered "specialist work."

For examples of change orders with extra work at agreed price, refer to the change order examples for "Flagging Only (Extra Work at Agreed Unit Price)," and "Additional Work. Increase Bid Item Quantities (Clause for Final Pay Items and Extra Work at Agreed Price)" at:

http://www.dot.ca.gov/construction/change-order/examples.html

5-306C (3b) 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.

- When the contractor refuses to sign a change order.

For guidelines for paying for extra work at force account, refer to Section 3-9, "Payment," of this manual. For examples of change orders with extra work paid for on a force account basis, refer to the change order template "Flagging and Traffic Control (Extra Work at Force Account)," and change order example "Additional Work. Change Material Specifications. Increase in Bid Item Quantities (Work-Character Change Payment Adjustment and Extra Work at Force Account)" at:

http://www.dot.ca.gov/construction/change-order/examples.html

5-306D Adjustments to Time of Completion

For a discussion of time of completion and adjustments to time, refer to Section 3-804, "Time," of this manual.

A change order may specify a positive, negative, or no adjustment to time of completion.

Whenever you can estimate an adjustment to time with reasonable accuracy, try to reach agreement with the contractor. Enter the amount of the time adjustment on the change order (including when there is no adjustment). Regardless of the amount of time actually required to perform the changed work, the agreed adjustment becomes binding on both parties. File with the contract records the calculations and other data used to determine adjustments to time.

If you cannot determine or agree on an adjustment of time in the initial 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 change order.

As soon as the change order work is completed, determine the appropriate time adjustment. If you cannot reach agreement with the contractor, issue a unilaterally approved supplemental change order adjusting time.

On contracts with internal time limits or multiple time limits, ensure any change order that includes a time adjustment contains a statement that identifies the applicable time limits of the adjustment. If an internal milestone date will change, but total time remains unaffected, specify the new date in the change order and indicate there is no time adjustment due to the change.

Periodically during the progress of the change order work, resolve deferred time adjustments. Do so by issuing a supplemental change order covering time allowable. If it is an extensive deferment, resolve the time allowed to a current date, with part of the deferment continued for subsequent work. Your objective is to resolve deferred time adjustments as soon possible. Timely resolution of time deferments allows the contractor to efficiently schedule remaining work to complete the project within the time limits.

The resident engineer may not unilaterally decrease time unless this is permitted by the specifications. Otherwise, the contractor must agree to changes that reduce 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 change order with no time adjustment.

5-306E Change Order Standard Clauses

Information on change order standard clauses is available at:

http://www.dot.ca.gov/construction/change-order/standard-clauses.html

The examples show standard clauses for specific situations found in various types of change orders. Customize standard clauses to read what is appropriate for the change order being written.

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 for the change order. Also, describe the exact work to be performed.

Traditionally, Change Order No. 1 provides for extra work specified for public traffic and public convenience. This 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 change order template "Maintain Traffic" at:

http://www.dot.ca.gov/construction/change-order/templates.html

This change order indicates the method for incorporating specified extra work into a change order. Note that the change order template 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 change order template, "Flaggers," which provides for payment for flaggers at an agreed unit price. Payment for flaggers at an agreed price may be written as a separate change order or combined with the other traffic related work paid for as extra work at force account.

5-306G Change Order Format

The example change orders at the Division of Construction's website follow the generally accepted format for writing change orders. The following describes the format:

- Describe the work or change that will cause increases and decreases to bid item quantities. Refer to any attached drawings or documents (sheets __ and __ of __). If the bid 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 change order. The intent is that the change order clearly specifies the work paid for by each payment method.
- Show the increases and decreases in bid item quantities. Include the percent of the Bid Item List represented by this change. Also show the accumulated percent change to date from the original quantity in the Bid Item List.

- Write clauses for situations resulting from increases or decreases or estimated increases or decreases in bid item quantities (deferred adjustments or actual payment adjustments for overruns or underruns).
- Write clauses for adjustments or deferred payment adjustments due to any cause. Describe the work or change causing the adjustment or deferred adjustment. Show the amounts of adjustments if not deferred.
- Describe work to be paid for as extra work at agreed price. Show the price as 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 adjustment clauses.

5-307 Change Order Memorandum

5-307 Change Order Memorandum

Include with all change orders sufficient documentation to explain the scope and reasons for the change. For this purpose, use Form CEM-4903, "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 change order and understand the justification for the work, the reasonableness of the compensation, and the time adjustment provisions.

5-307A Contents of the Memorandum

Include the following in the memorandum:

- State what the change order provides. Supplemental change orders should also include a description of the original change order.
- Explain the need for the change, including the contractual basis of the change. 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 the reasons 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 the reasons the ordered change causes any change in the character of the work. To substantiate any additional compensation 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 specific discussions that would influence a decision for approval. Refer to Section 5-307C, "Coordination and Concurrence by Others," of this manual.
- 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 available to finance the change order. The resident engineer must ensure the available funds are not exceeded. For obtaining additional funds, refer to Section 5-2, "Funds," of this manual.

- Show the total authorized funds to date, as well as the dollar amount of a supplemental change order.
- Indicate when funds for supplemental work shown in the detail estimate of job cost are used in the change order.
- For major changes on federal high-profile projects, indicate the name and date of discussion and concurrence, if any, by the FHWA transportation engineer. Refer to Section 5-308, "Federal Highway Administration Change Order Requirements," of this manual. For details relating to federal funding to be shown on the change order memorandum, refer to Section 5-309, "Federal Segregation Determination on Change Orders," of this manual.
- For change orders involving participation by local agencies, identify the portion of the work that is applicable to the contributing agency.
- For a change order that is to be unilaterally approved, explain why the contractor will not sign or why the contractor's signature is not required. Attach a copy of any correspondence from the contractor regarding the change order.
- Include justification for a time adjustment. Describe the method used to determine time adjustments. State the controlling activity during the delay period. Whenever possible, and when resolving a previously deferred time adjustment, indicate the specific working days in which there were delays and represent the period of the time adjustment. By indicating the specific working days, you ensure other time adjustments do not cover the same time period.
- Indicate the cumulative time adjustments and total number of change orders with unreconciled deferred time.

5-307B Change Order Category Codes

The resident engineer is responsible for assigning a four-letter code to every change order to indicate the main reason for the change. Preferably, there should only be one issue per change order. For change orders with multiple distinct issues, assign the coding based on the one issue that has the greatest impact to the project. Assign the coding according to the reason for the change, not according to how the problem was corrected. To determine the code, the resident engineer may use the "CCO Code Generator" from the following Division of Construction intranet website:

http://construction.onramp.dot.ca.gov/contract-administration

The resident engineer should enter this code on Forms CEM-4903, "Change Order Memorandum," and CEM-4901, "Change Order Input."

The change order code will identify one or more discrete pieces of information about the change:

1. The type of change order (first character).
2. The specification that authorizes the change, or the physical asset affected by the change (second character).
3. The source document that led to the need for a change (third and fourth characters).
4. The disposition of a dispute resolution (third and fourth characters).

Administrative types of change orders (accelerations, and changes that are anticipated and authorized by existing administrative specifications) require only minimal coding information. Consequently, extra coding positions will be assigned a default character placeholder, the letter *Z*. Assign characters from left to right, as subsequent character code selection is dependent on the preceding characters.

Character 1: Change Order Type:

Use the codes in Table 5-3.1, "Change Order Type," to categorize the change order according to its general type, for example, administrative or dispute resolution. Coding for dispute resolution takes precedence over coding for any other potential scenario. After selecting the first character code, use the corresponding directions on Table 5-3.1 to complete the coding for the remaining three characters.

Character 2: Specification or Physical Asset:

Next, based on your selection for the first character code, and using the directions within Table 5-3.2, "Specification or Physical Asset," select the code that most accurately identifies the appropriate administrative specification, or the affected physical asset. Enter this code as the second character. In the case of a change order that is strictly for acceleration, with no physical change in the planned work (the first character code is a B); then the second character code is defaulted to a placeholder Z character.

Characters 3 and 4: Source Document or Dispute Disposition:

If the change order is needed to bring about a plan or specification change (the first character code is C or D), use Table 5-3.3, "Source Document," to identify the pair of character codes that together best describe the original document that created the need for the change order. The reason for the change may be from:

- Constructability issues, errors, conflicts, or inconsistencies.
- The introduction of improved products, means, or methods.
- Any other reason, provided that the change will affect some physical aspect of the planned work.

If the change order is for a dispute resolution (first character code from Table 5-3.1 is E, F, G, or H), use Table 5-3.4, "Dispute Disposition," to assign the third and fourth characters. Begin by selecting the code for the third character that most closely identifies the time frame *before* the dispute was resolved. The milestones for the third character are listed chronologically. For the fourth character, choose a code from Table 5-3.4 that most accurately explains how the dispute was resolved (entitlement, negotiated settlement, and arbitration award, full or partial resolution.)

If the change order type was administrative (first character code is either A or B), then the third and fourth character codes are defaulted to Zs.

General Examples:

Change orders that are strictly for constructive accelerations when there is no change to the final configuration of a planned permanent physical asset are all coded "BZZZ." No additional coding information is necessary.

When a change order resolves a dispute based on contract administration, and there was no change to the planned work on some permanent physical asset:

1. The first character will be either E or G (refer to Table 5-3.1).

2. The second character represents the disputed administrative specification. Choose this character from the upper portion of Table 5-3.2.
3. The third and fourth coding characters are selected depending on when and how the dispute was resolved. Choose these characters from Table 5-3.4, "Dispute Disposition."

When a change order is authorized by an administrative specification and there is no formalized dispute involved:

1. The first character will be A (refer to Table 5-3.1).
2. Select the second character from the upper portion of Table 5-3.2.
3. The third and fourth characters will both default to the placeholder letter Z. No other coding information is necessary in this particular example.

Table 5-3.1. Change Order Type (Character 1)

Change Order Type		Code	Description
Administrative	Contract or Supplemental Work	A	Change order used to pay for work or adjustments already authorized by specifications (supplemental work, quantity adjustments, and other). (Use only the specification codes from the upper portion of Table 5-3.2 for the second character, and *Z*s for the third and fourth characters.)
	Acceleration	B	Change order used to accelerate certain planned work. Describe the reason for acceleration in the transmittal memo (public convenience, staging coordination, delay mitigation, and other). (Use only *Z*s for subsequent code characters 2, 3, and 4.)
Plan or Specification Change	Non-VECP	C	Change order needed to change plans or specifications for reasons unrelated to a value engineering change proposal (VECP). (Use only the physical asset codes from Table 5-3.2 for the second character, and Table 5-3.3 for the third and fourth characters.)
	VECP-Related	D	Change order needed to change plans or specifications due to a VECP. (Use only the physical asset codes from Table 5-3.2 for the second character, and Table 5-3.3 for the third and fourth characters.)
Dispute Resolution	Potential Claim	E	Change order either fully or partially resolves certain potential claim records due to some dispute over contract administration. (Use the specification codes from the upper portion of Table 5-3.2 for the second character, and Table 5-3.4 for the third and fourth characters.)
		F	Change order either fully or partially resolves certain potential claim records due to a dispute over an ordered change that affected some physical asset. (Use either the physical asset codes from the lower portion of Table 5-3.2 for the second character, and Table 5-3.4 for the third and fourth characters.)
	Claim	G	Change order either fully or partially resolves certain contract claims due to some dispute over contract administration. (Use the specification codes from the upper portion of Table 5-3.2 for the second character, and Table 5-3.4 for the third and fourth characters.)
		H	Change order either fully or partially resolves certain contract claims due to a dispute over an ordered change that affected some physical asset. (Use the physical asset codes from the lower portion of Table 5-3.2 for the second character, and Table 5-3.4 for the third and fourth characters.)

Table 5-3.2. Specification or Physical Asset (Character 2)

	Code	Specification (use this portion of Table 5-3.2 only when the first character code is *A, E,* or *G*)	
Authorizing Specification *Standard Specifications* (No.) or Special Provision (SP)	A	9-1.06:	Changed Quantity Payment Adjustments
	B	7-1.04:	Public Safety
	C	4-1.06:	Differing Site Conditions (23 CFR 635.109)
	D	7-1.02K:	Labor Code
	E	7-1.03:	Public Convenience
	F	8-1.10:	Liquidated Damages
	G	8-1.07:	Delays
	H	5-1.36D:	Nonhighway Facilities
	I	9-1.17C:	Proposed Final Estimate
	J	12-1:	Temporary Traffic Control - General [Flagging Costs]
	K	80-15.02, 83-11.03B:	Reconstruct Fences, Reconstruct Metal Bridge Railings
	L	4-1.05B:	Work-Character Changes
	M	19-1.03B:	Unsuitable Material
	N	19-2.03F:	Slides and Slipouts
	O	20-1.03C:	Roadside Clearing
	P	10-6, 87-21.03B:	Watering, Maintaining Existing Electrical System
	Q	9-1.07:	Payment Adjustments for Price Index Fluctuations
	R	5-1.43E(1)(c):	Dispute Meetings
	S	9-1.03:	Payment Scope – Interest for late payments (unpaid and undisputed)
	T	4-1.07C:	Value Analysis Workshop
	U	5-1.09:	Partnering
	V	6-2.02 & 6-2.01:	Quality Control and Quality Assurance
	W	SP:	Other listed Supplemental Work (Describe in transmittal memo) (Use only if no other code describes this supplemental work)
	X	Other:	Other (Describe the “other” specification in transmittal memo)
	Z	Default:	(Use only when the first character is B)

	Code	Physical Asset (use this portion of Table 5-3.2 only when the first character code is *C, D, F,* or *H*)
Affected Permanent Physical Asset	A	Building (maintenance facilities, pump stations, etc.)
	B	Electrical (signals, lighting, communications, electrical systems, etc.)
	C	Drainage (culvert, subsurface, roadway drainage, gutters, lined ditches, etc.)
	D	Earthwork (excavation, embankment, soil stabilization, slope protection, erosion control, etc.)
	E	Landscaping (plants, irrigation, etc.)
	F	Materials (borrow or disposal sites, surplus, salvage, etc.)
	G	Property (fence, survey monument, easements, right-of-way obligations, etc.)
	H	Structure (vehicle or pedestrian)
	I	Base, subbase, shoulder backing
	J	Surfacing (pavement, pavement reinforcing, shoulders, sidewalks)
	K	Traffic control devices (barriers, railing, signing, delineation, etc.)
	L	Utility
	M	Wall (retaining, sound, aesthetic, etc.)
	X	Other (Describe the “other” affected permanent physical asset in transmittal memo)
	Z	Default (Use only when the first character is B)

Table 5-3.3. Source Document (Characters 3 and 4)
(Use **Table 5-3.3** only when the first character code is *C* or *D* from **Table 5-3.1**)

Character 3 (General)		Character 4 (Specific)	
A	Agreement	A	Cooperative
		B	Permit
		C	Right-of-Way Obligation
C	Certificate	A	Environmental Clearance
		B	Right-of-Way Clearance
G	Survey	A	Data/Control
		B	Detailed Cross-Sections
M	Materials	A	Log of Test Borings
		B	Information Handout, Brochure
P	Plan	A	Construction detail
		B	Contour grading
		C	Electrical
		D	Elevation view
		E	Environmental mitigation
		F	Erosion control
		G	Foundation
		H	General cross-sections
		I	Irrigation
		J	Layout/plan view
		K	Mechanical
		L	Pavement delineation
		M	Planting
		N	Profile
		O	Schedule of materials
		P	Signage
		Q	*Standard Plans*
		R	Substructure
		S	Superelevation
		T	Superstructure
		U	Typical section
		V	Utilities
S	Specification	A	Special Provision
		B	*Standard Specifications*
T	Temporary Plan	A	Construction area signs
		B	Construction easements
		C	Construction staging
		D	Electrical
		E	Erosion control
		F	Environmentally Sensitive Area (ESA)
		G	Lane closure chart
		H	*Standard Plans*
		I	Water Pollution Control/Prevention (WPCP or SWPPP)
		J	Traffic handling
		K	Traffic management plan
A,C,G,M, P,S,T	Any of Above	X	Other specific document (describe in transmittal memo)
X	Other	Y	Other (describe in transmittal memo)
Z	Default	Z	When the first character is either A or B

Table 5-3.4. Dispute Disposition (Characters 3 and 4)
(Use **Table 5-3.4** only when the first character code is *E, F, G,* or *H,* from **Table 5-3.1**, representing a Dispute Resolution)

Character 3 (Time Frame)		
Code		**Chronological Milestone**
Potential Claims (Use only when first character code from Table 5-3.1 is *E* or *F*)	A	Prior to a "Differing Site Condition Management Review Committee" (DSC-MRC) hearing
	B	Prior to a "Dispute Review Board" (DRB) hearing
	C	Prior to the "Construction Contract Acceptance" (CCA) date
	D	Prior to the Proposed Final Estimate (PFE) date
Claims (Use only when first character code from Table 5-3.1 is *G* or *H*)	E	Prior to a "Board of Review" (BOR) hearing
	F	Prior to an Arbitration Filing
	G	Prior to the Arbitration Hearing
	H	Prior to the Arbitrator's Decision
	I	After the Arbitrator's Decision

Character 4 (Resolution Authority)	
Code	**Description**
A	Entitlement, Partial Resolution (Describe unresolved issues in transmittal memo)
B	Entitlement, Full Resolution
C	Negotiated Settlement, Partial Resolution (Describe unresolved issues in transmittal memo)
D	Negotiated Settlement, Full Resolution
E	Arbitration Award, Partial Resolution (Describe unresolved issues in transmittal memo) (Use only with first character code from **Table 5-3.1** is *G* or *H*)
F	Arbitration Award, Full Resolution (Use only with first character code from **Table 5-3.1** is *G* or *H*)
X	Other (Describe in transmittal memo)

5-307C Coordination and Concurrence by Others

Secure recommendation or concurrence from affected functional units and other agencies. Concurrence is evidence of agreement but does not constitute approval of a change order. Process all change orders for approval as described in Section 5-311, "Change Order Approval Process."

Use district procedures for circulating change orders for concurrence. If contacted parties are unresponsive, in the change order memorandum, state the facts of the circulation process to ensure the proposed change is appropriate. Obtaining concurrence should not delay 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 change orders, including plan or specification changes and value engineering change 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 change orders, a continuous and informal "constructability review" process develops. Cooperation between design and construction personnel will result in better plans and specifications and fewer change orders. Cooperation may also reduce potential for construction delays, effects on the contractor, and claims.

5-307C (2) Project Management

For 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.
- Changes that may require a Cost Effectiveness/Public Interest Finding.

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

- Monitoring project costs.
- Expediting decisions by functional units as needed, so there is no delay or other adverse effect on the contractor's activities.

5-307C (3) Structures

Where changes are to be made that involve structures, 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 the change order for approval. The structure construction engineer and other personnel in the Division of Engineering Services may need to concur. For procedures for obtaining concurrence for structure change orders,

refer to Section 7-0.0, "Contract Change Orders," of the *Bridge Construction Records and Procedures* manual, Vol. 1.

5-307C (4) Materials

The district materials engineer, as well as the project engineer, must concur with all 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 change orders affecting traffic management plans, hours of work, detours, signing, delineation, highway lighting, traffic signals, illuminated signs, guardrail, barriers, 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 activities. Concurrence from the appropriate maintenance manager or engineer is required for all 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, permanent or temporary construction easements, or agreements.

The district utility coordinator must concur with all changes involving utility work. The district utility coordinator must also make proposed revisions to Form RW 13-14, "Notice to Owner." For information about coordinating utility work, refer to Section 3-518C, "Nonhighway Facilities," of this manual.

5-307C (8) Environmental

For environmental concerns and requirements, refer to Chapter 7, "Environmental Stewardship," 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
- Unforeseen 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," from the California Department of Fish and Wildlife
- Use of disposal sites not specified in the contract
- Revision to allowable work windows

5-307C (9) Locally Funded Projects

For guidelines for processing change orders on locally funded projects, refer to Section 5-310, "Locally Funded State Highway Projects," of this manual.

5-308 Federal Highway Administration Change Order Requirements

5-308 Federal Highway Administration Change Order Requirements

Change orders written for projects with federal funding participation must comply with the Code of Federal Regulations and FHWA contracting requirements.

5-308A Projects of Division Interest

Projects of Division Interest (PODI) are subject to full FHWA oversight requirements. Refer to the *Stewardship & Oversight Agreement*, available at:

http://www.dot.ca.gov/hq/oppd/stewardship/

Early and frequent communication with the FHWA transportation engineer is essential to ensure full compliance with all federal requirements.

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

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

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

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

Example: The change order revises aggregate to an HMA material.

- Change in proprietary or sole source materials for which specific or blanket approval has not been previously given.
- Waiver to the Buy America requirements, above the minimal amount that is allowed in Section 3-604, "Buy America," of this manual and the project special provisions.
- Value engineering change proposal.
- Experimental Work Plan.
- Change to federal environmental requirements such as:

  1. Environmental mitigation. Refer to the Mitigation Monitoring Reporting Record, if available.
  2. Permit conditions.
  3. Agreements with federal resource agencies.

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

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

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

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

5-308A (3) FHWA Denial

When FHWA declines participation in a change order, the district can proceed with the change order by justifying it in the change order memorandum. The project manager must concur with the change in funding.

5-308B Delegated Projects

Projects not meeting criteria for PODI are considered delegated projects from FHWA. Caltrans is delegated the authority to administer these contracts. Resident engineers are not required to coordinate with the FHWA transportation engineer except for those instances described in the *Stewardship and Oversight Agreement*. However, discussions for technical guidance are encouraged. For delegated projects, FHWA will verify compliance with federal regulations with annual program and process reviews.

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

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

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

- Changes to federal environmental requirements:
    1. Environmental Mitigation. Refer to the Mitigation Monitoring Reporting Record, if available.
    2. Permit conditions.
    3. Agreements with federal resource agencies.

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

- Introduction of new social, environmental, or economic issues that need to be addressed under applicable federal laws.
- Changes for mandatory disposal or borrow sites; Cost Effectiveness/Public Interest Finding and National Environmental Policy Act clearance may be needed.
- Waivers to Buy America requirements, above the minimal amount that is allowed in Section 3-604, "Buy America," of this manual and the project special provisions.
- Expansion of project limits beyond the limits set in the environmental document.

5-308C All Federally Funded Projects

For each example listed in Sections 5-308A (1), "Federal Highway Administration Approval Requirements–Major Change Orders," and 5-308A (2), "Federal Highway Administration Approval Requirements–Minor Change Orders," of this manual, the resident engineer contacts the FHWA transportation engineer and provides documents as necessary. In addition to the major change orders listed above for PODI and delegated projects, there are several other issues or events that may invoke the involvement of the FHWA. Refer to Section 5-007 "Federal Highway Administration Involvement in Contract Administration," of this manual.

For PODI, the FHWA transportation engineer should indicate concurrence on Form CEM-4903, "Change Order Memorandum," by signature in the appropriate box in the "Concurred By" section of the form or by providing signature on an FHWA

concurrence form. In the "Federal Participation" section, check the appropriate box and provide an explanation when required:

- Participating: Full federal participation.
- Participating in Part: Partial federal participation; provide explanation for this decision.
- None: No federal participation provided; not a federally funded project.
- Nonparticipating (Maintenance): Project Funded by Caltrans Maintenance; no federal participation provided.
- Nonparticipating: FHWA will not participate in the change order; provide explanation for this decision.

5-309 Federal Segregation Determination on Change Orders

5-309 Federal Segregation Determination on Change Orders

The resident engineer is responsible for managing project construction costs within the current construction allotment. Funds for a project may come from more than one source, such as from state highway funds, local funds, and federal funds. For a change order, the resident engineer must identify and segregate the funds required from each source. Show the proper distribution of change order funding on Form CEM-4903, "Change Order Memorandum." For more information on project funding, refer to Section 5-2, "Funds," of this manual.

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 federal eligibility. If you do not receive this detail estimate, contact the project manager. In some cases the FHWA transportation engineer has a color-coded plan title sheet for more complex multiple-funded projects.

Funding sources for a change order may be different from the funding sources indicated in the detail estimate for a particular project. If the change order funding percentages are the same as the detail estimate, simply mark the "Change Order Funded Per Contract" in the "Federal Segregation" section on Form CEM-4903.

A 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. In this case, mark the "Change Order Funded as Follows" box and indicate the percentage of each funding source's participation in the appropriate box. If this box is left blank or is incorrect, Caltrans may lose federal funds that should have been secured on this project. For additional information on nonparticipating cost items refer to Change Order Information at:

http://www.dot.ca.gov/construction/index.html

For example, a 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 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 percentage of participation by each funding source.

5-310 Locally Funded State Highway 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 project's unit) to have the agreement modified.

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

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

5-311 Change Order Approval Process

5-311 Change Order Approval Process

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

So that the contractor will execute the 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 change order for unilateral approval. Receipt by the contractor of an approved change order establishes a time for protest.

When the contractor does not agree with the method or amount of the payment and time adjustment, the resident engineer processes the change order using extra work at force account.

If the contractor disagrees with extra work at unit price, extra work at lump sum, or increase in contract items with a payment adjustment, the resident engineer writes the change order using extra work at force account. If the contractor declines to accept the change order within 7 working days, draft and process it unilaterally.

If the contractor agrees with the extra work unit of measurement and method of payment but disagrees with the effect on time proposed by the resident engineer, execute the change order using deferred time. Close out deferred time change orders within 21 working days of the completed change order work.

If the change order is not protested within the specified time, it is considered an executed change order. Refer to Section 5-1.06, "Protests," of the *Standard Specifications* and Section 3-403, "Changes and Extra Work," of this manual.

You may routinely submit for approval without the contractor's signature any supplemental change orders written solely to increase force account funds. However, should the extent or type of work covered in the supplemental change order differ from that included in the original, consider writing a separate change order instead of a supplemental change order. If it is decided to write a supplemental change order, submit it to the contractor for acceptance.

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

Before issuance of the proposed final estimate, resolving entitlement for potential claims is delegated according to Table 5-4.2, "Delegation of Authority," of this manual.

5-311A Division of Construction Approval

District construction personnel may approve all change orders, except those requiring Division of Construction approval. Division of Construction approval is required on the following types of change orders:

- Any change order that has a total absolute value exceeding $200,000.

  Example:

  A change order containing a $50,000 decrease of items, a $20,000 increase of items, and $150,000 of extra work at force account would require Division of Construction approval:

  |-$50,000| + |$20,000| + |$150,000| = |$220,000|

- Any change order that increases the cost of anticipated supplemental work listed in the detail estimate by more than $200,000.
- Once any of the above cost thresholds is reached, each associated supplemental change order will also require Division of Construction approval.
- Any change in the following:
  1. Method of payment
  2. Method of materials processing
  3. Type or quality of materials to be furnished, excluding those for minor changes to building facilities contracts
  4. Proprietary material for which specific or blanket approval has not been previously received
  5. Specifications, except as follows:
     a. "Lane Requirements and Hours of Work" charts
     b. Addition of approved standard special provisions
     c. Any editing of an approved standard special provision, in accordance with its instructions.
- Any change resulting in a time adjustment of more than 19 working days or 10 percent of original working days, whichever is greater.
- Any change order that compensates the contractor for field or home office overhead costs as the result of a final audit report issued by Division of Audits and Investigations.

Before the contractor is allowed to commence work included in a nondelegated change order, the Division of Construction must approve the change order or grant prior authorization to proceed with the associated work.

5-311A (1) Change Order Determinations

The Division of Construction sometimes receives requests from the districts to review and approve change orders that contradict policy, delegation, and change order approval criteria. These requests are sometimes received after the district has approved the change order and the contractor has performed the work or the contract has been accepted. In each situation, the Division of Construction change order engineer issues a review determination. Additional criteria include:

1. Change order work started without the Division of Construction's authorization to proceed.
2. Change order not initiated by the district before the work has been completed.
3. Deferred time change orders not processed in a timely manner.

The Division of Construction will track these change orders and report performance to the Division of Construction chief. This information may be used to re-evaluate the appropriate level of change order delegation of authority to the district.

These change orders are divided into two categories: "ratify post performance" and "unauthorized direction," and are shown in Table 5-3.5, "Division of Construction's Change Order Direction." This table explains scope and subsequent actions for change orders that require Division of Construction approval. This direction is communicated in a written Division of Construction telecopy addressed to the district change order desk: CCO.Desk.HQ@dot.ca.gov.

Table 5-3.5. Division of Construction's Change Order Direction

Direction	Direction Scope	District Action
To Proceed with the Work	Division of Construction authorization to proceed required for change order work authorized prior to full execution of the change order. This written work authorization by the engineer is to be used only in an extenuating circumstance exception basis. The authorization is complete and satisfactorily prepared by the district.	Authorize the change order work in writing in accordance with *Standard Specifications* Section 4-1.05, "Changes and Extra Work." Prepare change order and obtain Division of Construction issue and approve direction within 7 working days. Execute the change order as soon as possible; no later than 21 working days.
To Issue and Approve	Division of Construction approval granted on the basis of a satisfactorily prepared change order and change order transmittal memorandum.	Approve the change order in accordance with Division of Construction direction including any required minor revisions or conditions designated by the Division of Construction telecopy.
To Revise - Not Authorized	Changes are required before Division of Construction approval will be granted.	Revise the change order in accordance with the Division of Construction telecopy. Submit for reconsideration or elevate the issue for resolution to the district construction division chief and the assistant Division of Construction chief.
To Process in the District	Division of Construction approval for this change order is not required. Authority to approve the change order has been delegated to the district.	Approve the change order in the district.
Ratify Post Performance	District administration of the change order committed the Division of Construction to a course of action without required approvals.	Review internal change order procedures and implement measures to assure future transgressions are prevented.
Request for Information	Additional information is required for the Division of Construction to evaluate the change order.	Collect the requested information and transmit it to the Division of Construction. The district may elect to revise the change order and resubmit it when the additional information is provided.
Void	Changes that are authorized or executed by the district outside their delegated authority and that are fatally flawed; including provisions that violate state law or federal law.	Void the change order.
Change Order Approved in Headquarters	Division of Construction originated and approved a change order without district involvement. Often used to expedite arbitration or other payments to the contractor.	Process the change order by entering it in the contract administration system (CAS) and flagging the change order for payment.
Unauthorized	The district exercised authority outside of policy or delegation. The change order contradicts policy, delegation, or approval criteria. The contractor may have performed the work without authorization to proceed. The district may not have initiated the change order before the work was completed.	Review internal change order procedures and implement measures to ensure future transgressions are prevented
Other	Category used for all situations that cannot be classified above.	Division of Construction approval is not granted. District complies with instructions provided by the Division of Construction telecopy.

5-311B District Approval Limitations

Districts may not delegate below the level of construction manager the "Approval Recommended" signatures on Division of Construction-approved change orders.

Only a district construction deputy director may approve change orders for value engineering change proposals. Approval authority is determined by considering each element of the value engineering change proposal in the context of the delegation criteria listed above. Project engineer concurrence for all revisions of standard or project specific design elements is required prior to approving change orders to implement all value engineering change proposals.

District approval of the following types of change orders may not be delegated below the level of a region construction division chief or district construction deputy director:

- Project limit modifications
- Acceleration of the contract work through a decrease of contract time
- Order of work revisions
- Revision of the contract staging requirements

District approval of the following types of change orders may not be delegated below the level of construction manager:

- Those that include deferred time
- "Lane Requirements and Hours of Work" charts
- Addition of approved standard special provisions
- Any editing of an approved standard special provision, in accordance with its instructions

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

5-311C Prior Authorization to Proceed

A "prior authorization to proceed" with change order work should be issued only on an exception basis due to extenuating circumstances.

Whoever holds change order delegated authority as stated in this section must recommend approval for all change orders requiring prior authorization to proceed.

In addition to writing and dating the prior authorization to proceed, the engineer must include the following information:

- Change order number reserved for the work
- Estimated value of the work
- Proposed method of payment
- Estimated duration of the work
- Estimated contract time adjustment needed to perform the work
- Estimated time required to execute the associated change order

Document in the resident engineer's daily report the date, time, and name of the division change order engineer or whoever holds the district delegated authority who provided advance approval to issue the prior authorization to proceed. The change order that received the prior authorization to proceed should be submitted to the contractor for approval within 7 working days of the date of the prior authorization to proceed. If the contractor does not execute the change order within an additional 7 working days, a unilateral change order must be processed within 21 working days of the prior authorization to proceed.

The district should have procedures for prior authorization to proceed actions in accordance with this section. The district procedures should clearly designate the roles and responsibilities of the staff involved in preparing and approving change orders.

5-312 Substantiation

5-312
Substantiation

Each change order must be carefully considered, analyzed, and documented in the project records. For things to consider when preparing to write a change order, refer to Section 5-305, "Preliminary Considerations," of this manual.

5-312A Engineering Analysis

Conduct an engineering analysis for each change to the contract plans and specifications. Consider the impact of each change on the entire project and related facilities.

Change orders must meet all engineering and design standards unless a design exception is approved by the Division of Design. The project engineer who stamped the project plans is the engineer of record for the project and must concur with all engineered changes.

5-312B Contractual Analysis

Determine the contractual basis and authority to issue each change order. Include this information in the transmittal memorandum and change order. Use Figure 5-3.1, "Change Order Decision-Making Concept Flowchart," at the end of this section, to assist you in this determination.

5-312C Cost Analysis

Prepare an independent force account or bid item cost analysis for comparison with the contractor's estimated cost. Accept the contractor's estimated cost only if it is justified by this analysis. Do not include costs for disputed work. Include subcontractor markups in the cost estimate when a subcontractor will be performing extra work paid for by unit price, payment adjustment, or lump sum. For subcontractor markup guidelines, refer to Section 3-9, "Payment," of this manual.

File in the project records any calculations made to determine extra work at unit price, payment adjustment, or lump sum. These calculations substantiate and justify the amount paid for extra work and are therefore subject to audit. Either show these calculations in the change order memorandum or include a statement that the calculations are on file in the project records.

5-312D Time Impact Analysis

A time impact analysis (TIA) illustrates the impact of each change on the scheduled completion date or an internal milestone. The contractor submits a written TIA to the resident engineer with each time adjustment request. Review the TIA for logic and

duration impacts to determine the time adjustment or construct an independent TIA to determine the time adjustment. Refer to Section 8-1.02D (8), "Time Impact Analysis," of the *Standard Specifications* for more information regarding TIA submittals. For an example of a TIA reference on a Change Order Memorandum, refer to the example "Compensation for Critical Delay (Payment Adjustment)" at:

http://www.dot.ca.gov/construction/change-order/examples.html

5-313 Executed Change Order Copy Distribution

5-313 Executed Change Order Copy Distribution

For all contracts, one copy of each executed authorization to proceed, change order, and corresponding memorandum is electronically scanned and transmitted to the Division of Construction file server.

Combine each executed authorization to proceed or change order and change order memorandum for each contract change, supplemental change, and authorization to proceed into a single Adobe Acrobat file using the following filename convention:

Contract No. CCO No. or ATP No. Supplemental No. Approval Date

Examples:

04-012024 ATP 002 S00 11-20-06.pdf

04-012024 CCO 002 S02 11-27-06.pdf

Transmit the file directly to the Division of Construction file server using the centralized access provided to each district. Transmit approved change orders at least once a month.

Send an email notification to the change order engineer upon transfer of any information to the Division of Construction file server.

The *Desk Guide for the Electronic Distribution of Approved Contract Change Orders* to assist districts with this process is available on Division of Construction's intranet website:

http://construction.onramp.dot.ca.gov/contract-administration/change-orders

For PODI, districts are delegated authority to send one copy of each approved change order and corresponding change order memorandum directly to the FHWA field operations engineer delegated to the district or program administering the contract. The method of document transfer to the FHWA field operations engineer will be negotiated between the district and the FHWA field operations engineer on a case-by-case basis.

The FHWA field operations engineer:

- May issue a determination of funding ineligibility or modify the level of funding participation for any reviewed change order.
- Will communicate all funding eligibility findings by stamping the change order and returning it to the district.
- Will notify districts of all changes in federal participation prior to issuance of a final voucher.

Districts are responsible for updating CAS for federal participation information on change orders.

5-314 Value Engineering Change Proposals

5-314
Value Engineering
Change Proposals

For procedures for a value engineering change proposal, refer to Section 3-5, "Control of Work," of this manual.

Prepare value engineering change proposal change orders as a complete package, with no deferred time or deferred cost considerations.

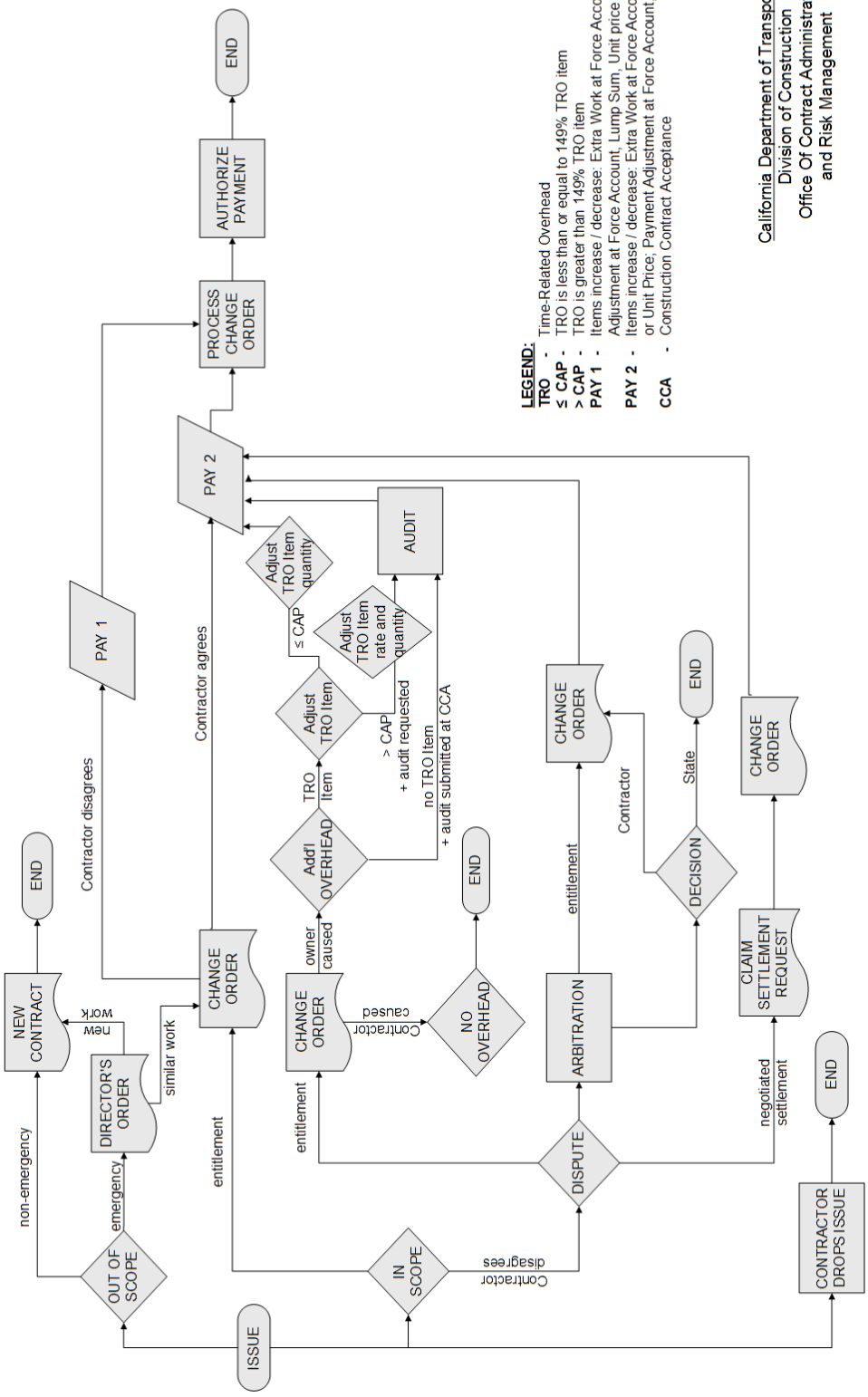
Give careful attention to the clauses in the change order covering payment. Value engineering change proposal change orders may involve any combination of bid item work, payment adjustments, and extra work at agreed price.

Prices for bid items might 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 payment adjustments to reflect the actual force account cost of increases and decreases in bid item quantities. Also, in the analysis of cost savings, consider adjustments based on a 25 percent overrun or underrun.

Value engineering change proposal change orders must include a payment adjustment that returns either 50 or 60 percent 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 bid items at bid item unit prices, payment adjustments including work-character change adjustments, and extra work at agreed price.
- Provide for a payment adjustment to pay the contractor either 50 or 60 percent of the total decrease as allowed by the specifications.

Figure 5-3.1. Change Order Decision-Making Concept Flowchart



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Section 4 Disputes

Section 4
Disputes

5-401 General

5-401
General

The objective of this section is to provide guidance to the contract administrative team to ensure that requests for information, protests, contract disputes, potential claims, and claims are addressed and resolved expeditiously and consistently. The contract administrative team includes the resident engineer, the construction engineer, and other Caltrans personnel with the responsibility to analyze and resolve disputes.

The resident engineer, with the support of the contract administrative team, administers the dispute resolution process. Subject matter experts are consulted to aid in the evaluation of the technical aspects of a dispute.

Contractors submit requests for information to the resident engineer when there is discrepancy or confusion in the contract, to ask for a time extension, or to protest the resident engineer's decision. The resident engineer responds to the request within the specified time. This may lead to a contract dispute when the contractor does not agree with the response.

A contract dispute is a disagreement between the contractor and Caltrans over the interpretation of plans, specifications, bid proposals, material handouts, and other documents. When this occurs, the contractor provides notice of the dispute using the three-part Potential Claim Record process. The resident engineer acknowledges receipt of the dispute and begins the process of analyzing and resolving it. Try to resolve disputes as early as possible, in accordance with the contract, and at the lowest responsible level. Determine the relevant facts and responsibilities. Compensate the contractor where merit exists, even in part, and deny compensation with clear reasons when no merit exists.

Take this action within your authority as described in Section 5-311, "Change Order Approval Process," and Table 5-4.2, "Delegation of Authority," of this manual.

If you lack the authority to resolve the dispute, discuss the issue with the rest of the contract administrative team and the Division of Construction field coordinator. Promptly issue and obtain approval of a change order for the portions of the dispute that have merit.

Disputes that have not been resolved prior to issuing the proposed final estimate may become claims if the contractor lists them in their exception to the proposed final estimate. Caltrans has 240 days from contract acceptance to review the contractor's claims and issue its final determination of claims. The contractor can initiate arbitration by filing a complaint with the Office of Administrative Hearings within 90 days of the receipt of the district director determination of claims letter or 240 days after contract acceptance if no district director determination of claims letter was issued. Caltrans Legal Division is the lead for defending Caltrans in arbitration. The districts and the Division of Construction support the Legal Division in arbitration proceedings. Refer to Section 5-411, "Arbitration" of this manual for additional information.

Provisions for contract claims are incorporated into Minor B contracts based on the

California Government Code. Resident engineers must follow Section 5-406I, "Minor B Contracts," of this manual, when resolving disputes on Minor B contracts.

5-402 Disputes and Claims Prevention

5-402 Disputes and Claims Prevention

There are many things that the contract administrative team can do to minimize the number and size of disputes and claims. Be proactive, professionally communicate with the contractor, and properly administer the contract. Partner with the contractor, within the confines of the contract, and maintain a respectful relationship through completion of the project. Be knowledgeable about the contract documents, policies, procedures, and federal and state laws applicable to the proper administration of the contract. Knowing the contractual responsibilities of each party will help in the timely resolution of the dispute.

Take the following actions to minimize claims:

- Partner with the contractor.
- Expeditiously investigate the situation.
- Consider the facts.
- Define the critical issues.
- Review the appropriate contract specifications.
- Communicate your position as soon as possible.
- Work within the contractual constraints.
- Document resolution and elevate, if appropriate.

5-403 Requests for Information and Potential Claim Records

5-403 Requests for Information and Potential Claim Records

The contractor can ask questions and make requests for additional compensation. Sections 5-1.42, "Requests for Information," and 5-1.43, "Potential Claims and Dispute Resolution," of the *Standard Specifications* include provisions and requirements for the contractor and the resident engineer to follow to document the request and move toward resolution should a dispute arise. The contract administrative team needs to respond without delay to the contractor's requests. Timeframes for the responses are included in these sections.

Requests for information must be submitted by the contractor to the resident engineer during the course of the project and up to receiving the proposed final estimate. The response may lead to a dispute if the contractor protests the response. Section 5-1.43, "Potential Claims and Dispute Resolution," of the *Standard Specifications* outlines the three-part potential claim record process, which includes an initial potential claim record, a supplemental potential claim record, and a full and final potential claim record. Note the date and time these documents were received and the name of the person who received them.

Disputes become claims when the contractor lists them as exceptions to the proposed final estimate.

5-403A Requests for Information

The contractor submits a request for information upon recognition of any event or question of fact arising under the contract in accordance with Section 5-1.42, "Requests for Information," of the *Standard Specifications*. Respond to requests for information within the time specified.

Make every effort to provide a complete response to the contractor's request. If it is unclear about what is being requested, ask the contractor to clarify the request. If more information is needed from the contractor, be specific about what is needed, ask them to provide it, and let them know that you cannot respond until it is received. Notify the contractor when unable to provide an answer because more information is forthcoming from other sources. Provide a date when the information will be available. For additional information, refer to Section 3-521, "Requests for Information and Potential Claim Records," of this manual.

5-403B Potential Claim Records

Section 5-1.43A, "Potential Claims and Dispute Resolution—General," of the *Standard Specifications* outlines the three-part potential claim record procedure and informs the contractor that failure to comply with it is a waiver of the potential claim, a waiver of the right to a corresponding claim for the disputed work in the administrative claims process, and is a bar to arbitration.

A unique identification number must be assigned to each potential claim and the nature and circumstances of the potential claim must not change throughout the submittal of all three potential claim record components:

- Initial Potential Claim Record
- Supplemental Potential Claim Record
- Full and Final Potential Claim Record

Make sure that the contractor is aware of and complies with the contractual responsibility to minimize and mitigate the effects of potentially claimed work or events.

5-403C Documentation

Place copies of all documents related to every dispute on the project in Category 62, "Disputes," of the project records. This information provides the basis for preparing position papers in the alternative dispute resolution process and preliminary construction claim findings. Follow the procedures outlined in Section 5-102, "Organization of Project Documents," of this manual for documenting claims. Refer to Section 3-521D, "Documentation Guidelines for Disputes," of this manual for more information.

5-404 Alternative Dispute Resolution

5-404 Alternative Dispute Resolution

The purpose of the alternative dispute resolution process is to provide a means for Caltrans and the contractor to resolve project disputes at the project level with the help of a neutral party who has no financial interest in the outcome of the dispute. The alternative dispute resolution process is not allowed for disputes solely between the contractor and a subcontractor because these disputes are outside of the scope of the contract that Caltrans has with the contractor. Additionally, the alternative dispute resolution process is not allowed for overhead-type disputes. Refer to Section 5-409, "Overhead Claims," of this manual for information regarding overhead-type disputes.

The contractor is required to use alternative dispute resolution in order to pursue a claim. Dispute resolution ladder (DRL), dispute resolution advisor (DRA), dispute resolution board (DRB), and partnering are different types of alternative dispute resolution processes available. Refer to Section 3-522, "Alternative Dispute Resolution Processes," of this manual for more information.

5-405 Claims

5-405 Claims

The contractor submits a written claim statement for each unresolved potential claim record, administrative issue, and overhead adjustment by listing them as exceptions to the proposed final estimate as described in Section 9-1.17D, "Final Payment and Claims," of the *Standard Specifications*.

All claims included in the exceptions to the proposed final estimate should be considered. Exceptions to the proposed final estimate that were not previously submitted in accordance with Section 5-1.43, "Potential Claims and Dispute Resolution," of the *Standard Specifications* are considered new claims. Exceptions for administrative or overhead claims are not considered new claims. Overhead claims are addressed in Section 9-1.07D(2)(b), "Overhead Claims," of the *Standard Specifications*. Refer to Section 5-409, "Overhead Claims," of this manual for information regarding overhead-type disputes.

Analyze the merit of new claims and document the claims as outlined in Section 3-521D, "Documentation Guidelines for Disputes," of this manual. Include the analysis in the preliminary construction claims findings.

5-406 Claims Resolution Process

5-406 Claims Resolution Process

The following claims processing milestones were established to ensure that the claims process is completed within the statutory requirement of 240 days after contract acceptance. The number of days is calculated from the date of contract acceptance.

Districts are responsible for populating and updating the Division of Construction's claims database with the actual milestone dates to ensure that milestones, events, and dates, are current and correct. Refer to Table 5-4.1, "Required Post Acceptance Event Codes and Dates," of this manual. Project claims information should be updated by the 15th of each month to maintain reliability of the data.

5-406A Issue Proposed Final Estimate—Target Day 40

The resident engineer issues a proposed final estimate within 40 days after contract acceptance. Issue the proposed final estimate with the understanding that the estimate represents the final payment to the contractor.

Do not postpone issuing the final estimate to await additional information from the contractor. Ensure that all quantity calculations and adjustments are completed in time to process the proposed final estimate within the target date. Send the proposed final estimate by certified mail with return receipt requested.

5-406B Proposed Final Estimate Returned—Target Day 70

The contractor has 30 days after receiving the proposed final estimate to review, sign, and respond either with or without a written statement of claims. Document the receipt of the contractor's response by postal receipt or written receipt if hand delivered.

Process the final estimate when the contractor returns the proposed final estimate indicating acceptance, or when the contractor does not return the proposed final estimate within the required 30-day period.

When the contractor returns the proposed final estimate with a written statement of claims within the 30-day period, district construction sends a copy of the contractor's claim package to the resident engineer, construction engineer, and district construction claims engineer.

If claims are submitted after the 30-day period, the entire submittal must be returned 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 requirements, and the final estimate must be processed.

5-406C Preliminary Construction Claim Findings Completed—Target Day 110

By target day 110, the resident engineer completes the preliminary construction claim findings. These include a compilation of the existing information and documents that are filed in Category 62, "Disputes," of the contract records. The construction engineer sends the preliminary construction claim findings to the deputy district director of construction. Refer to Section 5-412, "Preliminary Construction Claim Findings and Category 62 Preparation and Guidelines," of this manual for detailed format, content, and suggestions in preparing this document.

Review the contractor's statement of claims for conformance with procedural requirements. This review ensures that each claim is a continuation of a previously submitted potential claim. Overhead claims or administrative disputes that occur after issuance of the proposed final estimate do not need to be a continuation of a previously submitted potential claim. Document the contractor's failure to comply with the potential claim process and file the detailed findings in Category 62, "Disputes" of the project records. Summarize them in the preliminary construction claim findings for each claim. The detailed findings may include, but are not limited to:

- Failure to provide a statement of claims within the 30-day time period.
- Failure to provide the identification number corresponding to the supporting full and final documentation of the potential claim record and the final amount of requested additional compensation.
- Failure to provide documentation in support of the final amount of the claim if different from that stated in the full and final potential claim record.

If the contractor submits a claim without the corresponding identification number, or if there is a disparity in the identification number, notify the contractor of the omission or disparity. The contractor has 15 days after receiving the notification to correct the omission or disparity. Assign an identification number if the contractor fails to correct the omission or disparity.

If the contractor's statement of claims includes administrative disputes that occurred or were recognized after issuance of the proposed final estimate, include these items in the preliminary construction claim findings. Administrative disputes occurring or recognized after issuance of the proposed final estimate may include the following:

- Contract item quantity payments
- Changed quantity payment adjustments
- Administrative deductions and withholds
- Payments for extra work
- Resolution of disputed labor, equipment, and materials

If administrative claims have merit, payment is made through item payments, change orders, or by releasing withholdings. Accompany payment of these types of claims with a letter stating that the payment resolves the respective claim in its entirety. If the contractor does not accept the payment as full resolution, refer to Section 5-408, "Claim Payments," of this manual, for more information. The results of the attempted

resolution of these administrative disputes must be sent to the district construction claims engineer by day 200 for incorporation into the construction claim findings.

If the statement of claims includes claims for overhead, such as field or home office, and cost escalation associated with delays caused by Caltrans, these claims must be supported with an audit by an independent certified public accountant (CPA). Send these types of claims to the deputy district director of construction as part of the preliminary construction claim findings. The Division of Audits and Investigations may review the audit. For additional details, refer to Section 5-409, "Overhead Claims," of this manual.

5-406D District Construction Review of Preliminary Construction Claim Findings Completed—Target Day 130

The deputy district director of construction, or delegated authority, completes the review of the preliminary construction claim findings and segregates the claims into the following three categories:

- Claims with entitlement
- Claims to refer to a board of review
- Claims of an administrative nature

The district construction claims engineer finalizes the preliminary construction claim findings and authorizes payment for claims with entitlement.

By day 130, the deputy district director of construction reviews the preliminary construction claims findings and uses this information to prepare the "Review of Claims by Deputy District Director of Construction" notification letter. This notifies the contractor which claims are resolved, claims that are of an administrative nature returned to the resident engineer for further review, and which claims will or will not be heard at a board of review meeting. Refer to the example "Review of Claims by Deputy District Director of Construction Notification Letter" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

5-406E Board of Review Meeting—Target Day 160

The board of review convenes when the deputy district director of construction or a delegated authority decides that certain claims may warrant further analysis by a board of review. The target date to hold a board of review meeting is 160 calendar days after contract acceptance. The board of review secretary must notify the contractor of the date, time, and the location of the board of review meeting as soon as the board members have been selected and all the necessary arrangements have been made. In the "Board of Review" notification letter, state that both the contractor and Caltrans will be allowed to make only oral presentations in support of their previously submitted written information and that no additional written information will be accepted by the board of review. Refer to the example "Board of Review Notification Letter" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

The resident engineer, supported by Caltrans personnel discussed below, is responsible for preparing and delivering the presentation at the board of review meeting with support by other Caltrans personnel.

The board of review is an informal meeting allowing the contractor and Caltrans the opportunity to make presentations in support of previously submitted written

information for claims identified within the board of review notification letter to the contractor. The board of review listens to the presentations made by the contractor and Caltrans, and provides objective recommendations in the board of review report. The board of review report should be issued within 200 days after contract acceptance.

If requested, Caltrans personnel including district and structure personnel involved with the contract attend the board of review meeting to assist in presenting the claims under review by the board. Arrange to have other personnel involved in the project available to the board to answer questions during the meeting regarding complex claims or for firsthand knowledge of events.

5-406E (1) Board of Review Secretary

The district assigns a secretary for the board of review. Generally, the district construction claims engineer serves as the board secretary. Other personnel that have organizational and writing skills may also serve as board secretary. The secretary must do the following:

- Arrange the meeting date, time, and location and notify the contractor by certified mail at least 15 days before the meeting. In the notification letter to the contractor, request the contractor inform Caltrans of any intentions to have legal representation at the board of review meeting. If the contractor plans to have legal representation at the meeting, the district should consider having a legal representative attend as a legal advisor. A Legal Division representative is present only to advise and counsel the board on significant legal issues. Contact the Division of Construction field coordinator for advice on legal representation.
- Notify respective Caltrans staff of the meeting date, time and location, and verify their attendance.
- Verify the attendance of the contractor, subcontractors, district and structure personnel involved with the project, and any other Caltrans personnel before the meeting.
- Ensure board members have copies of the preliminary construction claim findings, review of claims by deputy district director of construction notification letter, board of review notification letter, project plans, and special provisions, two weeks before the meeting.

5-406E (2) Board of Review Member Selection

The deputy district director of construction is responsible for selecting the board of review members. The number of members of a board of review should be based on the following guidelines:

- Total claims up to, but not including $250,000, one or two members
- Total claims of $250,000 to $1,000,000, two members
- Total claims of more than $1,000,000, three members

Exceptions to these guidelines can be made depending on the complexity of claims. Discuss exceptions to the guidelines with Contract Administration in the Division of Construction. Board of review members must be selected based on the following criteria:

- The board of review members should not have been involved in the administration of the project under consideration.

- The board of review chairperson should be either the deputy district director of construction or a delegated manager at a supervising engineer level or above, with a minimum of 5 years of experience in construction. The chairperson should be assigned to the district in which the claim originated.
- The other two members of the board of review will either be a supervising engineer level or above with a minimum of 5 years of construction experience, or a senior engineer level with a minimum of 8 years of construction experience. The members may be from the project's district or selected from the statewide board of review member list.
- The expertise of each board of review member should be considered relative to the disputes under consideration.

The Division of Construction maintains and manages a statewide list of available board of review member candidates, and provides a project-specific, member-candidate list to the district upon request. Candidates on the board of review member list are construction managers, retired annuitants, Division of Construction field coordinators, or other Caltrans personnel meeting the minimum experience requirements.

5-406E (3) Board of Review Operation

The board of review will hear only those claims identified in the review of claims by deputy district director of construction notification letter sent to the contractor. The board will not hear or address other claims. Caltrans prohibits recording the meeting. The meeting is informal, allowing the contractor and the district personnel to present their positions, and for all parties to exchange questions and answers. All questions, except those of the chairperson, are directed to the chairperson first. The meeting attendees must recognize that the chairperson controls the meeting.

The members of the board of review must conduct the meeting as follows:

- The board of review chairperson informs the meeting attendees of the procedures and the format of the meeting.
- The chairperson states that the meeting is being conducted in accordance with Section 9-1.17D(3), "Final Determination of Claims," of the *Standard Specifications*, which allows a person or a board appointed by the district to review those claims that would benefit from further review by a board of review.
- Each claim issue begins with a district representative giving a brief description of the project and the subject of the claim.
- The contractor is given the opportunity to present the claim in detail as supported by previously submitted information and documentation.
- The district presents its detailed position as supported by the preliminary construction claim findings.
- After both the contractor and the district make their presentations, the board may allow rebuttals by both parties. Attendees must only respond when board members request a response.
- If the contractor attempts to submit new information regarding a claim, the board chairperson must inform the contractor that the board does not permit additional claims or additional information regarding claims.

If the contractor attempts to discuss a claim other than those to be heard by the board as stated in the "Review of Claims by Deputy District Director of Construction"

notification letter, the board chairperson informs the contractor that the board will not hear the issue and will not accept any additional information. Refer to the example "Review of Claims by Deputy District Director of Construction Notification Letter" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

The board of review will not make decisions on claims at the meeting. After the meeting, the board of review members and the secretary will discuss and review of the claims.

The board of review must make decisions on claims, after reviewing the preliminary construction claim findings and the information presented by both the contractor and the district personnel at the board of review meeting. The board secretary compiles the board of review report under the direction of the board chairperson, with suggestions from the other board members. For additional details, refer to Section 5-413, "Board of Review Report Preparation and Guidelines," of this manual. The board of review report will contain a determination of claims heard and the board's conclusions.

If the contractor did not attend a scheduled board of review meeting, the board of review report will be based on the information contained in the preliminary construction claim findings. Since the contractor did not attend the meeting, the claims cannot be filed in arbitration as stated in Section 10240.2, "Administrative Review," of the Public Contract Code. If this happens, attach a letter with the district director determination of claims explaining the situation, referencing the above noted section. For an example of the letter, refer to the example "District Director Determination of Claims—Board of Review Held, Not Attended by the Contractor" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

The board members and other Caltrans personnel involved in the claims resolution process must review drafts of the board of review report. Once all comments and corrections have been made, the board secretary will complete the board report and obtain the signatures of the board of review members. For complex claims with significant statewide impact, the board members must consult with the Division of Construction before sending the report to the district director.

5-406E (4) Board of Review Settlements

The board of review may decide that a negotiated settlement of the claims is appropriate. The board secretary prepares the claim settlement request memorandum. The board of review chairperson submits the claim settlement request memorandum directly to the Division of Construction for approval. Upon approval, negotiate settlement with the contractor in accordance with that approval. For roles, responsibilities, and information on preparing a claim settlement request memorandum, refer to Section 5-407A, "Claim Settlement Process," and Table 5-4.2, "Delegation of Authority," of this manual.

5-406F Board of Review Report Completed—Target Day 200

After the board members have signed the board of review report, the board secretary prepares a letter of transmittal and sends the report and the supporting documents to the district Claims Unit and the district director by target day 200.

5-406G Construction Claim Findings and Draft District Director Determination of Claims Completed—Target Day 220

The construction claim findings will name each of the contractor's claims in summary

form including the items below:

- References to the supporting documents
- Resolution of the administrative claims by the resident engineer
- Analysis of claims that were not heard by a board of review
- Board of review findings

For detailed information on preparing the construction claim findings, refer to Section 5-414, "Construction Claim Findings Preparation and Guidelines," of this manual.

In addition to preparing the construction claim findings, the district construction claims engineer prepares a draft district director determination of claims. For detailed information on preparing the draft district director determination of claims, refer to Section 5-415, "District Director Determination of Claims Preparation and Guidelines," of this manual.

Send the construction claim findings and the draft district director determination of claims to the deputy district director of construction by day 220.

The deputy district director of construction approves the construction claim findings, and then sends the findings and the draft determination of claims to the district director for signature.

Prepare and obtain approval of a change order compensating the contractor for claims found to have merit based on the construction claim findings. The change order must state that the payment is for full resolution of the claim specified. Refer to Section 5-3, "Change Orders," of this manual for more information.

Run a semifinal estimate to make payment and add any time for approved change orders.

5-406H District Director Determination of Claims—Target Day 230

The district director determination of claims is the final determination of claims and completes the claims resolution process. The determination concludes Caltrans' administrative claims process, triggers preparation of the final estimate, and opens the contractor's 90-day arbitration filing window.

The district director reviews and approves the determination of claims. The district construction claims engineer sends the approved determination of claims to the contractor within 230 days after contract acceptance. Refer to the example "District Director Determination of Claims—Major and Minor A Contracts" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

The district director signs all determinations that deny any portion of the contractor's claims. A regional district director may delegate signature authority to deny any portion of the contractor's claims to a district director. When all the claims are resolved, the district director may delegate signature authority for determination letters to the construction deputy district director who may further delegate this authority to the construction manager. Refer to the example "Determination Letter to Close Out Contracts With Completely Resolved Claims" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

After the district director determination is sent, do not have any further discussion of claims with the contractor.

District construction processes a final estimate within 30 days of sending the district director determination of claims. For information on the final estimate, refer to Section 3-907D, "Final Payment and Claims," of this manual.

Before submitting a request for the final estimate, ensure change order payment has been made for all claim determinations.

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 district director determination of claims has not been issued.

If the contractor files for arbitration and the final determination of claims has not yet been issued, the district must nevertheless send a final determination of claims letter to the contractor. The format of the final determination of claims may be similar to the example "District Director Determination of Claims—Major and Minor A Contracts" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

Consult the Division of Construction field coordinator and the designated attorney for guidance. Send a draft copy of the final determination of claims to the designated attorney for concurrence. After the designated attorney provides concurrence, the district director approves the final determination of claims and it is sent to the contractor. Do not have any further contact or discussion with the contractor concerning the merit of claims.

Do not try to resolve claims in the time between issuing the district director determination of claims notification letter and the contractor's filing for arbitration. After arbitration is filed, any request for claims settlement is initiated by Caltrans Legal Division with preparation of a request for arbitration settlement authority memorandum. Depending on the delegated settlement authority shown in Table 5-4.2, "Delegation of Authority," of this manual, the Division of Construction chief or the deputy director for project delivery approves the requests.

5-406I Minor B Contracts

By law, the contractor has a maximum of 1 year from contract acceptance to file a claim with the Department of General Services, Government Claims Program for Minor B contracts. If a contractor submits a potential claim record, alternative dispute resolution will help resolve disputes and mitigate damages. Use the concepts and levels of the dispute resolution ladder as described in Section 3-522B, "Dispute Resolution Ladder," of this manual to assist the potential claims record process.

5-406I (1) Contract Accepted—Target Day 0

When the contract is accepted, the resident engineer discusses and attempts to resolve any disputes. This will begin the dispute resolution process at Level 1.

5-406I (2) Claim and Invoice Submission—Target Day 30

Within 30 calendar days following acceptance of the contract, the contractor must submit a written claim for an unresolved dispute as part of the fully itemized invoice covering the actual work performed. Process payment to the contractor for the

undisputed portion of the invoice. Immediately request additional information for the unresolved claims. When the written claim is received, this ends Level 1 of the dispute resolution process. Elevate the unresolved claims to the construction engineer, beginning Level 2. Use Form CEM-6209, "Elevation of a Dispute," to define the unresolved claims when elevating to this level.

5-406I (3) Additional Information Received—Target Day 45

When the additional information is received for the unresolved claims, begin preparation of the preliminary construction claim findings (refer to Section 5-412, "Preliminary Construction Claim Findings and Category 62 Preparation and Guidelines" of this manual. Concurrently, the district construction claims engineer prepares a draft district director determination of claims (refer to Section 5-414, "Construction Claim Findings Preparation and Guidelines," of this manual).

5-406I (4) Preliminary Determination of Claims—Target Day 50

If the construction engineer cannot resolve the claims, finalize the construction claims findings and provide a copy to the contractor; this ends Level 2 of the dispute resolution process. This will serve as a preliminary determination of claims and notifies the contractor of the opportunity to present any unresolved claims within 30 days to the construction manager, or deputy district director of construction depending on the district's preference. This begins Level 3 of the dispute resolution process.

5-406I (5) Presentation of Unresolved Claims—Target Day 80

Any unresolved claims are presented, merits of the claims are discussed, and an attempt is made to resolve the claims by the respective representatives at Level 3.

5-406I (6) Final Determination of Claims—Target Day 85

The final determination of claims is completed by the district claims engineer and submitted to the deputy district director of construction for approval. The approved final determination of claims is sent to the contractor by day 85 and ends Level 3 of the dispute resolution process. The contractor can accept the district's decision, thereby ending the process, or continue the process through the Department of General Services, Government Claims Program or Superior Court, as applicable.

5-406I (7) Department of General Services, Government Claims Program and Superior Court

The Division of Construction arbitration engineer is responsible for coordinating Minor B claims with the Legal Division and for updating the database that includes tracking, monitoring, and reporting on all Minor B claims filed with the Department of General Services, Government Claims Program, Superior Court, or Division of Construction. The arbitration engineer is the point of contact regarding the status of and providing statistics for all Minor B claims filed with Department of General Services, Government Claims Program, Superior Court, or Division of Construction.

The contractor has 6 months to file a complaint in Superior Court after the Department of General Services, Government Claims Program or the chief of the Division of Construction rejects the contractor's claim. The Legal Division is responsible for representing Caltrans in court and expects district and headquarters construction staff to provide assistance upon request.

5-407 Claim Settlements

A negotiated claim 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, district management, the board of review, or Caltrans Legal Division will explore the possibility of settlement with the contractor.

All negotiated settlements must be approved by the Division of Construction chief or the deputy director for Project Delivery. Refer to Table 5-4.2, "Delegation of Authority," for the negotiated claim settlement authority and responsible parties.

No claim can be addressed between the district director determination of claims and the contractor's filing for arbitration.

5-407A Claim Settlement Process

When considering a decision to settle a claim, analyze Caltrans' exposure to help determine potential liability. This will serve as a guide for the settlement. The Division of Construction field coordinator provides assistance on all settlement analyses and should be consulted early in the process.

For consideration of settlements before arbitration, the field coordinator engages the Legal Division. The Legal Division will consult with the district or the board of review and provide direction for preparing a claim settlement request memorandum. For consideration of settlements during arbitration, the case attorney prepares this memorandum for approval.

The claim settlement request memorandum is an internal, confidential document protected under attorney-client communication privilege and must not be given to the contractor or included in the project files. The original claim settlement request memorandum will be kept in the Division of Construction's confidential files. The claim settlement request memorandum must be approved before entering into any negotiations with the contractor.

5-407A (1) Claim Settlement Request Memorandum

The claim settlement request memorandum must include the following items:

- Confidential attorney-client communication clause, ". . . prepared at the direction of and in consultation with the Legal Division."
- Project description.
- Chronology.
- Time extension summary.
- Description of claims.
- Summary of claims.
- Entitlement and settlement justification.
- Funding status.
- Consequences of not settling.

Refer to the example "Claim Settlement Request Memorandum" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

5-407A (2) Claim Settlement Agreement

A fully executed change order is considered the claim settlement agreement for claims settled before the district director determination of claims is issued. The change order must be written in sufficient detail so that it clearly describes the claims being settled, adjustments in contract time, disposition of liquidated damages, and compensation amount. Refer to Section 5-3, "Change Orders," of this manual for standard change order clauses. The change order memorandum must refer to the approved claim settlement request memorandum. Do not substitute a change order memorandum for a claim settlement request memorandum.

During arbitration, the Caltrans case attorney prepares and signs a claim settlement agreement. Agreement is reached when the opposing counsel signs the document. To complete the administrative process, the Division of Construction's arbitration engineer prepares a unilaterally approved change order for payment.

5-407B Contract Time Settlements

Time adjustments for reasons other than those specifically enumerated in the contract are considered contract time settlements. Defer contract time settlements until completion of the contract. Prepare a claim settlement request memorandum and settlement agreement as described above for contract time settlements. Attach CEM-2702, "Overrun in Contract Time," to the memorandum. Do not record these contract time settlements on the CEM-2701, "Weekly Statement of Working Days."

5-408 Claim Payments

5-408 Claim Payments

If adequate funding is available, make payment immediately when you reach agreement with the contractor or find entitlement on a claim. Prepare and process a supplemental funds request if there are insufficient funds for payment.

When a change order is necessary to make payment for disputed work and the contractor refuses to sign it, issue a unilaterally approved change order in accordance with Section 4-1.05, "Changes and Extra Work" of the *Standard Specifications* and Section 5-3, "Change Orders," of this manual.

Claim payments are made in accordance with Table 5-4.2, "Delegation of Authority." For detailed information on contract payments, refer to Section 3-9, "Payment," of this manual.

5-409 Overhead Claims

5-409 Overhead Claims

Overhead claims generally fall into two categories: home office overhead and field office overhead. Overhead claims generally occur when there have been delays to the completion of the contract. Delays caused by Caltrans to the controlling operation on contracts with a time-related overhead bid item are compensated through bid item quantity adjustments to the time related overhead item. Refer to Section 3-905, "Time-Related Overhead," of this manual.

All other overhead claims must be supported by an audit. The contractor must provide the required audit in accordance with Section 9-1.17D(2)(b), "Overhead Claims," of the *Standard Specifications*. Provide a written response regarding Caltrans' consideration of the overhead claim to the contractor before issuing the proposed final estimate. If the resident engineer determines that a compensable delay exists, evaluate the overhead claim through the audit process.

When a claim for overhead expenses is received without an independent CPA 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 requirements justifies denying the overhead claim.

5-409A Home Office Overhead

Home office overhead, or general and administrative expenses, consists 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.

5-409B 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.

5-409C Contractor Submitted Audits

The Division 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.

The Division of Audits and Investigations will perform an audit of contractor submitted audits if the following conditions exist:

- The deputy district director of construction and the Division of Construction field coordinator have made a determination that an audit is warranted.
- 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 9-1.17D, "Final Payment and Claims," of the *Standard Specifications.*

A systematic review of the contractor's claim and audit is required to decide if there is reason to proceed with a detailed analysis of the costs contained within the contractor submitted audit.

The audit process is initiated by the contractor's written request for a Caltrans audit review of home office overhead and field office overhead by submitting exceptions to the proposed final estimate.

If determination has been made to consider the overhead claim, verify that the contractor's claim for home office overhead or field office overhead is submitted along with a supporting independent CPA audit report in accordance with Section 9-1.17D, "Final Payment and Claims," of the *Standard Specifications* and with those policies contained within the *CPA Audit Desk Guide* available at the Division of Construction's intranet website. Unallowable expenses including those relating to other businesses of the contractor must be excluded from the claimed expenses for field office overhead and home office overhead. For typical unallowable expenses, refer to the Code of Federal Regulations, Title 48, Section 31.205, "Selected costs." The independent CPA audit report may be faxed to the Division of Audits and Investigations for assistance in these regards. Deny the audit request if the audit report does not comply with Section 9-1.17D, "Final Payment and Claims," of the *Standard Specifications*.

The Division of Construction field coordinator decides if the facts and circumstances warrant a detailed analysis requiring a state audit review. This determination may involve significant analysis of many variables including concurrent delays as evidenced by the Critical Path Method (CPM) schedule and time impact analyses. The Division of Construction field coordinator will inform the resident engineer to deny the claim and audit request if there is no justification.

If the audit report complies with Section 9-1.17D, "Final Payment and Claims," of the *Standard Specifications* and the Division of Construction field coordinator decides an audit request is warranted, draft the audit request memorandum. Refer to Section 5-410A, "Audit Request Procedure," of this manual for guidance on requesting an audit.

5-410 Audits

5-410 Audits

The Division of Audits and Investigations provides a service to Construction by performing audits. Their audit services include:

- Reviewing contractor submitted audits for overhead claims.
- Reviewing the contractor's project files.
- Auditing the contractor's records.
- Reviewing cost escalation claims.
- Reviewing costs for contract termination.
- Reviewing costs for complicated work-character changes.
- Reviewing costs for complicated item adjustments.
- Reviewing costs for differing site conditions.

5-410A Audit Request Procedure

When it is determined that an audit by the Division of Audits and Investigations is needed, the deputy district director of construction gets concurrence from the Division of Construction field coordinator and submits the audit request memorandum to the Division of Construction. For guidance, refer to the example "Audit Request Memorandum" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

The memo must include the following information, as appropriate:

- Contract number
- Contractor name
- District contact person's name, title, and phone number
- 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. If appropriate, the justification must be accompanied by a summary of delay-related claim descriptions, a chronology of events, and amounts. For a sample summary of delay-related claims, refer to the examples "Summary of Delay-Related Claims" and "General Contract Information and Contract Chronology" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

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 Audits and Investigations, requesting an audit. The policy of the Division of Audits and Investigations is to complete the audit within 90 days after receiving the audit request memorandum.

5-410B Construction Response to Audit Reports

The initiator of the request for the audit must provide an acceptable corrective action plan in response to audit findings and recommendations.

The Division of Construction is responsible for the corrective action plans for force account audits authorized under Section 5-1.27, "Records," of the *Standard Specifications*. Approval of the district corrective action plans may not be delegated below the level of district division chief of construction.

A corrective action plan must be submitted to the external audit chief for the Division of Audits and Investigations.

The district will use the final audit report or draft audit findings to decide if the contractor is due any payment adjustments. The final audit report is a matter of public record, and its distribution is not limited.

If compensation is due, the Division of Construction field coordinator will request that district construction processes a change order for payment in accordance with the overhead claim administration delegation of authority in Table 5-4.2, "Delegation of Authority." Note the name of the person authorizing the change order in the change order memorandum.

Other delay-related expenses besides overhead, such as escalated materials, equipment, and labor costs, may be included in the contractor's claim. The escalated costs may be included in the audit request if complex. Account for simple cases of escalated costs due to delays caused by Caltrans, unless they are easily combined into an audit for overhead. Unlike audits for overhead, escalated cost audits may be performed before receiving the contractor's written statement of claims. An independent CPA audit is not required to support escalated cost claims due to delays caused by Caltrans.

Force account markups are not included in any escalated cost calculation. Recovery of additional overhead incurred due to escalated costs requires submittal of an overhead claim with an independent CPA audit report.

5-411 Arbitration

5-411 Arbitration

The contractor is entitled by law to file a complaint in arbitration no later than 90 days after receipt of the written district director final determination of its claims. 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 if the district director determination of claims has not been issued. The arbitration process is initiated by filing a complaint with the Office of Administrative Hearing.

The Caltrans Legal Division handles all construction contract arbitrations. 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 other personnel involved with the contract, must assist in the arbitration process. This assistance may be in the form of preparing calculations, performing technical analysis, preparing documents, assisting in the discovery process,

or providing testimony. Keep project records at one location for ease of discovery by the Legal Division.

The arbitration payment process is a joint effort involving the Division of Construction, the Legal Division, the district, the Division of Budgets, and the Division of Accounting. The Division of Construction arbitration engineer is responsible for updating the database that includes tracking, monitoring, and reporting all arbitration cases. The Division of Construction arbitration engineer is the point of contact regarding status of ongoing arbitration cases, coordinating arbitration payments, and providing statistics on all arbitration cases.

5-412 Preliminary Construction Claim Findings and Category 62 Preparation and Guidelines

5-412 Preliminary Construction Claim Findings and Category 62 Preparation and Guidelines

Preparation of the preliminary construction claim findings can be completed quickly by incorporating documents contained in Category 62, "Disputes," of the project records. Complete the preliminary construction claim findings when you receive exceptions to the proposed final estimate from the contractor. Refer to the example "Construction Claim Findings" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

5-412A Preliminary Construction Claim Findings Format

The preliminary construction claim findings consists of the following sections:

- Title page
- Table of contents
- Project chronology
- General information
- List of claims
- Contractor's exceptions to the proposed final estimate
- Exhibits obtained from Category 62, "Disputes"

A well-organized Category 62, "Disputes," of the project records is imperative for preparing the construction claim findings. Refer to Section 5-102C, "Description of Categories," of this manual for more details about the file categories. For each claim, Category 62 should include:

- Claim checklist, refer to the example "Claim Checklist" at:

  http://www.dot.ca.gov/construction/claims/bor-examples.html
- Request for Information (RFI)
- Form CEM-6201D, "Initial Potential Claim Record" and Caltrans' response
- Form CEM-6201E, "Supplemental Potential Claim Record" and Caltrans' response
- Form CEM-6201F, "Full and Final Potential Claim Record" and Caltrans' response
- All correspondence
- District's position paper for the DRB
- Contractor's position paper for the DRB
- DRB recommendation

- Resident engineer diaries
- Assistant resident engineer diaries
- Applicable parts of plans and specifications
- Relevant change orders
- Photographs
- Calculations and analysis
- Weekly Statement of Working Days
- Critical path method schedules
- Other pertinent information

Refer to Section 5-406D, "District Construction Review of Preliminary Construction Claim Findings Competed—Target Day 130" of this manual for more information.

5-413 Board of Review Report Preparation and Guidelines

5-413 Board of Review Report Preparation and Guidelines

The district construction claims engineer and deputy district director of construction use the board of review report to complete the construction claim findings that are the basis of the district director determination of claims.

In preparing the board of review report, the board members should follow the guidelines below:

- State opinions, facts, positions, conclusions, determinations, and recommendations in the report. However, the important items to be presented 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 all items. 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 use tables within the board recommendations.
- Begin each individual claim on a new page.
- Do not include any language indicating that the report's findings comprise the final determination. For all claims, the district director makes the final determination.

The following establishes the format, content, and guidelines for writing the board of review report and the board of review recommendations. For a sample of a board of review report, contact the Office of Contract Administration in the Division of Construction

5-413A Format

A board of review report follows the general format below.

5-413A (1) Introduction

The board of review report will start with an introductory paragraph describing the board meeting attendees and date of occurrence.

5-413A (2) Items That Are Common to All Claims

List items such as the chronology and general information.

5-413A (3) Summary of Resolved Claims

Reference claims that were entirely or partially settled.

5-413A (4) Individual Claim Information

Reference each individual claim number, title, and the amount.

5-413A (5) General Description of the Claim

Briefly describe the nature of the claim.

5-413A (6) Contractor's Position

Quote directly from the contractor's RFI, potential claim records, or written statement of claims. Add any other pertinent information provided in other documentation.

5-413A (7) District's Position

The district's position must be compiled from the responses to potential claim records, and supported by exhibits that include related correspondence.

5-413A (8) Comments of the Board

In this section of the report, include the following:

- Any new material or 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 the board considers relevant to the issue.

The following are some examples of clauses that may be used in this section:

- "At the board of review meeting, the contractor informed the board . . ."
- "At the board of review meeting, the contractor submitted additional information to support the contractor's 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 . . ."

5-413A (9) Findings of the Board

Format this section of the board of review report as a series of bullets listing the board's conclusions and providing the board's findings. The bullets will convey the board's reasoning and follow a progression that illustrates what was required, what happened, and what the board concluded was relevant to its recommendation. The following are some examples of phrases that may be used in this section, beginning with the statement, "The board concluded that:

- The contract provided for . . .
- The work included . . .
- Based on bid item number [*xx*], description . . .
- The contract further provided . . .
- The contract time is subject to extensions for . . .

- Work began on [*date*].
- By correspondence dated [*date*] . . . the contractor directed the resident engineer's attention to . . .
- The contractor requested issuance of a change order to provide compensation for . . .
- On [*date*], the contractor submitted request for information, dated [*date*].
- On [*date*], the contractor submitted an initial potential claim record, dated [*date*].
- On [*date*], the contractor submitted a supplemental potential claim record, dated [*date*] . . . a claimed cost of $ [*value*] and a claimed delay of [*number*] days.
- On [*date*], the resident engineer responded to the contractor's supplemental potential claim record and directed the contractor's attention to Section [*xx*] of the *Standard Specifications*.
- On [*date*], the contractor submitted the full and final potential claim record, dated [*date*] . . . with the claimed cost of $ [*value*] and a claimed delay of [*number*] days.
- On [*date*], the resident engineer responded to the contractor's full and final potential claim record.
- With the return of the proposed final estimate, the contractor included a corresponding claim for $ [*value*] and a claimed delay of [*number*] days.
- The contractor has been compensated for the work of bid item number [*xx*] and that the contractor is not entitled to any additional compensation for that work.

For each claim, the conclusions will be ended with a recommendation statement such as, "Therefore, it is recommended that the claim be allowed [*or denied*] in the amount of $ [*value*]."

Facts and findings address what actually occurred, including only facts the board knows with certainty. Guesses or unverified information should not be used in the conclusion.

The board of review report should specifically address any prior dispute resolution advisor or dispute resolution board findings and recommendations pertaining to the claim, and provide its conclusions. Particular attention must be paid when the board of review's conclusion disagrees with those findings and recommendations.

5-414 Construction Claim Findings Preparation and Guidelines

5-414 Construction Claim Findings Preparation and Guidelines

The board of review report is incorporated as a part of the construction claim findings. The construction claim findings provide the basis for the district director determination of claims. The district construction claims engineer prepares the construction claim findings by refining the preliminary construction claim findings. Incorporate claims resolved and status, unresolved administrative claims addressed by the resident engineer, and claims addressed by the board of review. When preparing the construction claim findings document, consider that the document is used by a Caltrans attorney if claims are filed in arbitration.

Concurrently, the district construction claims engineer prepares the draft district director determination of claims. Refer to Section 5-415, "District Director Determination of Claims Preparation and Guidelines," of this manual.

The district construction claims engineer transmits the construction claim findings to the deputy district director of construction for approval.

The district construction claims engineer then transmits the construction claim findings and the final district director determination of claims to the district director for approval.

The following sections provide format, content, and guidelines for preparing the construction claim findings. For an illustrative sample of the format and content of construction claim findings, refer to the example "Construction Claim Findings" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

5-414A Format

Construction claim findings follow the format below:

5-414A (1) Title Page

The title page states the following:

- "Construction Claim Findings"
- Contract identification data such as contract number, district, county, route, post mile, and federal project number, if applicable
- Applicable *Standard Specifications* and *Standard Plans* sections
- Names of the contractor, resident engineer, and other personnel with significant involvement
- Date

5-414A (2) Table of Contents

Number all pages in the table of contents.

5-414A (3) Project Chronology

The project chronology includes the following:

- 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 (date and working day number)
- Change order time adjustment (number of days)
- Nonworking days (number of days)
- Working days not worked on controlling operation (number of days)
- Extended date for completion (date and working day number)
- Project completion date
- Contract acceptance date
- Overrun in contract time (number of working and calendar days)

5-414A (4) General Information

The general information section should be presented in a narrative format, and include

the following:

- Description of the work
- Contractor's bid amount
- Proposed final estimate amount
- Date the proposed final estimate was sent to the contractor
- Date the contractor returned the proposed final estimate with exceptions
- Total number and amount of claims submitted

5-414A (5) Summary of Claims

Provide the following information:

- Identification numbers and titles
- Claimed amounts
- Recommended payments
- Remaining amounts

5-414A (6) Claim Categories

Show the segregation of claims into the following categories:

- Administrative claims
- Claims heard by board of review
- Claims not heard by board of review

5-414A (7) Claim Number, Title, and Claim Amount

A boldfaced, underlined title bar will be used for each claim. In the left-hand column, place the claim number. In the middle column, position the claim title. In the right-hand column locate the claim amount, including days claimed.

5-414A (8) Description of the Claim

Provide the following information:

- An explanation of what caused the claim.
- Pertinent statements of facts related to the issue, not beliefs or opinions.
- A reference to the applicable specifications relating to the claim. You may include a separate section titled "Applicable Specifications," listing the section numbers and excerpts.
- The circumstances leading to each claim. Use facts supported with exhibits that include daily reports or letters.
- Relevant dates if the claim includes time considerations.
- A statement of actions and responses made by Caltrans and the contractor.
- The method and time of notification of the claim.

5-414A (9) Contractor's Position

Quote directly from the contractor's RFI, potential claim records, 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 the basis for the claim, note that the basis was not stated. State whether a cost analysis was submitted.

Provide the information in the following order:

- Full and Final Potential Claim Record
- Supplemental Potential Claim Record
- Initial Potential Claim Record
- Contractor's RFI pertaining to the claim
- Reference table to contractor's supporting exhibits

5-414A (10) District's Position

The district's position must be compiled from the responses to potential claim records, and supported by exhibits including related correspondence. Additional arguments supporting the district's position are not required. If the contractor provides reasons for changing the amount of requested additional compensation from that stated in the full and final documentation, additional opposing statements may be included.

Provide the information in the following order:

- Resident engineer's response to the Full and Final Potential Claim Record.
- Resident engineer's response to the Supplemental Potential Claim Record.
- Resident engineer's response to the RFI.
- A list of exhibits including change orders for partial resolution of the potential claim, photographs, CPM analysis, cost analysis, correspondence, and diaries.

Include a separate section stating deficiencies if the contractor has failed to comply with Section 9-1.17C, "Proposed Final Estimate," of the *Standard Specifications*.

5-414A (11) Findings and Recommendations

State the district's conclusions on the merit of the claim in bullets, following the format of the board of review report.

Briefly state the reason for the conclusions based on the information provided. Recommend denial if there is no merit, but do not deny the claim. Only the district director has the authority to deny the claim.

5-414A (12) Tabular Reference to Supporting Information

5-414A (13) Summary of Resolved Claims in Tabular Format for All Claims

5-414A (14) Deputy District Director of Construction Signature Block

5-414A (15) Exhibits

Include the following exhibits as appropriate:

- Copy of the contractor's written statement of claims
- Correspondence
- Cost data
- RFIs and potential claim records
- Detailed chronology of correspondence, other documents, or events
- CPM schedule, time impact analysis, or revised schedule
- Photographs

5-414B Helpful Hints

When preparing the construction claim findings, the following hints may be helpful:

- Identify specific references in the following manner: "Section [*xx*] of the special provisions requires . . ."
- Quote all excerpts. Avoid paraphrasing them.
- Include all pertinent correspondence.
- Include pertinent photographs.
- Identify the central issue, identify irrelevant contentions, and provide a response to every relevant contention that the contractor makes.
- Use exact dates and numbers.
- State whether days are working or nonworking.
- When referring to days, when applicable, include the month, day number, and year.

5-414C Things to Avoid

When preparing the construction claim findings, avoid the following:

- Using the words "denied," "rejected," or "determined." Only the district director can use these terms in the district director determination of claims.
- Including a copy of Sections 1 through 9 of the *Standard Specifications*.
- Making the background section of the district's position 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.

5-415 District Director Determination of Claims Preparation and Guidelines

5-415 District Director Determination of Claims Preparation and Guidelines

The district director makes the final determination of claims in consideration of the construction claim findings and supporting documents. The district director determination of claims is a stand-alone document and does not reference the board of review report, or construction claim findings. The district director determination is presented in a bulleted format, listing the construction claim findings.

For a sample district director determination of claims refer to the example "District Director Determination of Claims—Major and Minor A Contracts" at:

http://www.dot.ca.gov/construction/claims/bor-examples.html

Once the district director determination of claims is completed, send it to the contractor by hand delivery or deposit in the U.S. mail. Issue the final estimate in writing.

Once the district director determination of claims is submitted to the contractor, there should be no further contact or discussion concerning merits of claims. If the contractor pursues unresolved claims in arbitration, Caltrans' Legal Division coordinates any necessary responses.

5-416 Copy Distribution of Claim Documents

The district must process and distribute copies of claims documents produced during the claims resolution process. The district is also responsible for retaining copies in the project files.

Table 5-4.1. Required Post Acceptance Event Codes and Dates

Event Code	Definition	Applicable Date
ACD	Arbitration Case Determination	Use the date that the arbitrator's decision (determination) is made.
ACF	Arbitration Case Filed	Use the date that the contractor filed a complaint with the Office of Administrative Hearing.
ACH	Arbitration Case Hearing	Use the first hearing date that the parties meet with the arbitrator to present the facts of the case.
ACP	Arbitration Case Payment Processed	Use the date that the ACP was deposited in the U.S. Postal Service or that the ACP was hand-delivered to the contractor.
BORR	Board of Review Recommendation	Use the issuance date of the board of review recommendation report.
DCS	District Claim Settlement Memorandum Sent to Headquarters Construction	Use the date that the district sent the memorandum to Headquarters Construction.
DDD	District Director Determination Sent to Contractor	Use the date that the district sent the final district director determination of claims letter to the contractor, regardless of who signed the letter.
DDS	Review of Claims by the Deputy District Director of Construction Sent to the Contractor	Use the date that the district sent the letter to the contractor.
DED	District Expenditures Done	Input the date that all district expenditures were completed.
PFEAE	Proposed Final Estimate Returned with Administrative Exceptions, Including Item Work Exceptions, CCO Work, and Extra Work Bill Exceptions	Use the date that the contractor returned the PFE designated by the earliest date stamp by the mail room or resident engineer. Internal routing time is not considered in this event date code.
PFEC	Proposed Final Estimate Returned with Claims	Use the date that the contractor returned the PFE designated by the earliest date stamp by the mail room or resident engineer. Internal routing time is not considered in this event date code.
PFENE	Proposed Final Estimate Returned without Claims and Administrative Exceptions	Use the date that the contractor returned the PFE designated by the earliest date stamp by the mail room or resident engineer. Internal routing time is not considered in this event date code.
PFER	Proposed Final Estimate Received	Use the date that the contractor received the proposed final estimate.
PFES	Proposed Final Estimate Sent to the Contractor	Use the date that the contractor is sent the proposed final estimate by certified mail.

Table 5-4.2. Delegation of Authority (1 of 4)

Claims Resolution		
Period	**Item(s)**	**Entitlement Authority (See note 1)**
Before issuance of the proposed final estimate	Notices, protests, and potential claims	Authority to approve change orders resolving entitlement may be delegated under the authority to approve change orders. (See note 2).
From return of the proposed final estimate	Claims	Authority to approve change orders resolving entitlement may be delegated under the authority to approve change orders. (See Note 2).
		For change orders subject to district approval: Deputy district director of construction approves. Authority may be delegated to construction managers, but not to construction engineers. Send copy to the Division of Construction change order engineer. (Overhead claims) (See Note 3).
To deputy district director of construction's letter		For change orders subject to Division of Construction approval: Deputy district director of construction signs under "submitted by" on change order memorandum. (See Note 4). Division of Construction field coordinator provides signature of approval on change order memorandum. (See Note 4). (Overhead claims) (See Note 3).
From deputy district director of construction's letter	Claims	Approvals of change orders resolving entitlement are subject to the district director's determination and the delegation of authority for change orders. (See Note 2).
		For change orders subject to district approval: Deputy district director of construction approves. Authority may be delegated to construction managers, but not to construction engineers. Send copy to the Division of Construction change order engineer. (Overhead claims) (See Note 3).
To district director determination of claims		For change orders subject to Division of Construction approval: Deputy district director of construction signs under "submitted by" on change order memorandum. (See Note 4). Division of Construction field coordinator signs recommending approval on change order memorandum. (See Note 4). Division of Construction chief signs approval on change order memorandum. (See Note 4). (Overhead claims) (See Note 3).

Table 5-4.2. Delegation of Authority (2 of 4)

Claims Resolution				
Period	**Item(s)**	**Negotiated Settlement Authority (See note 6)**		
From start of work	Notices, protests, claims, and potential claims	Approval authority and responsibilities for a confidential claim settlement request depend on the settlement amount, as follows: (See Notes 2, 7, 11).		
		Settlement	**Responsible Party**	**Action**
		≤ $1.0M	District, in consultation with the Legal Division	Prepares request (See Note 8).
			Deputy district director of construction	Recommends approval
			Deputy district director of construction	Submits request for approval (See Note 4).
			Division of Construction field coordinator	Recommends approval.
			Division of Construction chief	Approves.
To deputy district director of construction's letter		> $1.0M	District, in consultation with the Legal Division	Prepares request (See Note 8).
			Deputy district director of construction	Recommends approval.
			District director	Recommends approval (See Note 9).
			District director	Submits request for approval
			Division of Construction field coordinator	Recommends approval.
			Division of Construction chief	Recommends approval.
			Project Delivery deputy director	Approves.
From deputy district director of construction's letter	Claims	Approval authority and responsibilities for a confidential claim settlement request depend on the settlement amount, as follows: (See Notes 2, 7, 11).		
		Settlement	**Responsible Party**	**Action**
		≤ $1.0M	District, in consultation with the Legal Division	Prepares request (See Note 8).
			Deputy district director of construction	Recommends approval.
			Deputy district director of construction	Submits request for approval (See Notes 9, 10).
			Division of Construction field coordinator	Recommends approval.
			Division of Construction chief	Approves.
To district director determination of claims (See Note10).		> $1.0M	District, in consultation with the Legal Division	Prepares request (See note 8).
			Deputy district director of construction	Recommends approval.
			District director	Recommends approval.
			District director	Submits request for approval (See Notes 9, 10).
			Division of Construction field coordinator	Recommends approval.
			Division of Construction chief	Recommends approval.
			Project Delivery deputy director	Approves.

Table 5-4.2. Delegation of Authority (3 of 4)

<table>
<tr><th colspan="4">Arbitration</th></tr>
<tr><th>Period</th><th>Item(s)</th><th colspan="2">Negotiated Settlement Authority (See Note 12).</th></tr>
<tr><td rowspan="2">From filing of arbitration

To arbitration hearing</td><td rowspan="2">Request for settlement</td><td colspan="2">Approval authority and responsibilities for the confidential Request for Settlement Authority memorandum resolving claims in arbitration depend on the settlement amount, as follows: (See Note 13).

<u>Settlement</u> — <u>Responsible Party</u> — <u>Action</u>
≤ $1.0M
Legal Division (See Note 14). — Prepares request.
Legal Division — Recommends approval.
Legal Division — Submits request for approval.
Deputy district director of construction — Recommends approval.
Division of Construction field coordinator — Recommends approval (See Note 15).
Division of Construction chief — Approves.</td></tr>
<tr><td colspan="2">> $1.0M
Legal Division (See Note 14). — Prepares request.
Legal Division — Recommends approval.
Legal Division — Submits request for approval.
Deputy district director of construction — Recommends approval.
Division of Construction field coordinator — Recommends approval.
District director — Recommends approval (See Note 15).
Division of Construction chief — Recommends approval (See Note 15).
Project Delivery deputy director — Approves.</td></tr>
<tr><td rowspan="3">Arbitration</td><td>Settlements reached before the arbitrator issues a decision</td><td colspan="2">Use negotiated settlement authority request for settlement item for the period from filing of arbitration to arbitration hearing (above).
Division of Construction issues the change order and notifies the district to process estimate.</td></tr>
<tr><td>Arbitrator issues a decision award to contractor</td><td colspan="2">Follow the same level of approval authority and memorandum preparation as for settlement shown above.
District processes request for additional funding, if required.
The Division of Construction issues the change order and notifies the district to process estimate.</td></tr>
<tr><td>Arbitrator issues a decision award to Caltrans</td><td colspan="2">Division of Construction establishes an accounts receivable with the Division of Accounting.
Division of Construction coordinates additional judicial remedies with the Legal Division, if required.</td></tr>
</table>

Notes:

1. Entitlement—merit, even partial, requiring compensation under Public Contract Code, section 10227 and Section 3-403, “Changes and Extra Work,” of this manual.
2. Section 5-311, “Change Order Approval Process,” of this manual.

Table 5-4.2. Delegation of Authority (4 of 4)

Notes (continued):

3. Approval authority on change order memorandum for overhead entitlement:

Field office overhead:	<$200K, Division of Construction's field coordinator $200K to $1.0M, Division of Construction chief >$1.0M, Project Delivery deputy director
Home office overhead:	≤$1.0M, Division of Construction chief >$1.0M, Project Delivery deputy director

4. Revise the change order memorandum as appropriate.
5. The District Director Determination (DDD) is Caltrans' final written decision of the claims. After the DDD is issued, no further discussion with the contractor regarding claims should occur.
6. Negotiated Settlement—according to California Public Contract Code, Section 9201 and Section 5-407, "Claim Settlements," of this manual.
7. Attach the change order and change order memorandum to the claim settlement request and submit it to the Division of Construction. Attach form CEM-2702, "Overrun in Contract Time," to the claim settlement request if recommending action related to time extensions, liquidated damages, or engineering and inspection costs. The Division of Construction change order engineer will provide authorization or notify the district to authorize approval. File the approved claim settlement request in the Division of Construction confidential files. Destroy all drafts.
8. The Division of Construction field coordinator, deputy district director of construction, Legal Division representative, Division of Construction chief, and FHWA transportation engineer meet to discuss the settlement offer. If the offer is greater than $1.0M, the Project Delivery deputy director may also attend.
9. The deputy district director of construction is responsible for obtaining FHWA concurrence with the settlement on high-profile and nondelegated projects.
10. The district, after obtaining approval from the Division of Construction field coordinator, negotiates the settlement and submits the settlement request to the district director.
11. The claim settlement request is the written decision of the claim. After the claim settlement request is approved, no further discussion with the contractor regarding the settled claim should occur.
12. Negotiated Settlement—according to California Public Contract Code, Section 9201 and Section 5-407, "Claim Settlements," of this manual.
13. Attach form CEM-2702, "Overrun in Contract Time," to the claim settlement request if recommending action related to time extensions, liquidated damages, or engineering and inspection costs.
14. The Division of Construction field coordinator, deputy district director of construction, Legal Division representative, Division of Construction chief, and FHWA transportation engineer meet to discuss the settlement offer. If the offer is greater than $1.0M, the Division of Project Delivery deputy director may also attend.
15. The Division of Construction field coordinator is responsible for obtaining FHWA concurrence with the settlement on high-profile and nondelegated project.

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

Section 5 Emergency Contract Administration

Section 5
Emergency
Contract
Administration

5-501 General

5-501
General

An emergency contract is a G-11 resolution that 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 the current Minor B contract limit. For emergency work exceeding this threshold amount, the director or delegated deputy director has approval authority.

For guidelines on director's orders, supplemental director's orders, and supplemental funds, refer to the Caltrans Division of Maintenance intranet site at:

http://onramp.dot.ca.gov/hq/maint/orway/ha23/index.htm

Deputy Directive 26, "Use of Director's Orders," also covers director's orders.

A number 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 procedures outlined in this manual.

This section provides guidelines to assist resident engineers in administering emergency force account (EFA) and emergency limited bid (ELB) contracts. The *EFA & ELB Desk Guide* is available to aid construction staff and is on the Division of Construction, Contract Administration intranet site:

http://construction.onramp.dot.ca.gov/contract-administration/emergency-contracting

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 Division of Procurement and Contracts (DPAC) 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 for Emergency Force Account Highway Projects," is the document that allows the contractor to begin work with verbal approval. The form is available at:

http://dpac.onramp.dot.ca.gov/non-it-service-contracts-efa-elb

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

The contract manager prior to the beginning of work will select the appropriate form depending on the federal funding status and if the project is an EFA or ELB. In the description portion of Form ADM-0366, 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 9-1.04, "Force Account," of the Caltrans *Standard Specifications* dated [*year*] as amended by the attached provisions."

Contact the Division of Procurement and Contracts for boilerplate contracts and sample provisions on emergency force account and emergency limited bid contracts.

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. The construction engineer must also expeditiously assign a resident engineer to be responsible for the site.

When structure work is necessary, use personnel from 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. If district construction staff are not reachable prior to selection and notification, and public safety demands an immediate response, Maintenance may act immediately without district construction's input. 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. 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

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

5-507 Tracking Costs

Form MTC-0130, "Director's Order Request Funds Request" allows the emergency contract work to proceed and funds the project. It describes the work's scope and limits of the work, funding allocation, and duration. The resident engineer is legally allowed to authorize fund expenditures up to the director's order amount.

On emergency force account contracts, daily costs can be significant. Resident engineers or other project staff 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.

During administration of an emergency force account or emergency limited bid contract, the resident engineer must ensure that the cost of work performed by the prime contractor and all subcontractors does not exceed available funding. For further details on cost tracking, refer to the *EFA & ELB Desk Guide* on the Division of Construction's intranet website:

http://construction.onramp.dot.ca.gov/contract-administration/emergency-contracting

The resident engineer authorizes only work within the general scope of the damage assessment form (USDOT/FHWA DAF) and forecasts expenditure of available funds to ensure work performed does not exceed funding of the director's order and any approved supplemental director's orders. Refer to Section 5-2, "Funds," of this manual for the G-11 additional funds process.

Use the extra work billing system to facilitate cost tracking. The project can be set up in Contract Administration System (CAS) after the approval of the confirmation of verbal agreement and prior to the contract approval, but progress pay estimates cannot be requested until the contract is approved in the Advantage financial system. EFA and ELB projects in CAS use the district and expenditure authorization rather than the DPAC contract number. Payment for all emergency contracts estimated at greater than the Minor B contract limit in construction cost go through CAS. Receiving records may be used to compensate emergency force account and emergency limited bid contract work for Minor B contracts. The existing procedure for use of receiving records (Form FA-1226A, "Receiver") remains the same.

The Division of Construction's intranet website includes links to emergency contracting information and to DPAC's and the Division of Maintenance's intranet websites:

http://construction.onramp.dot.ca.gov/contract-administration/emergency-contracting

The DPAC intranet website includes a progress tracking document named "EFA Status." The report shows progress of all EFA and ELB contracts, and includes the requisition number (RQS), EA, and DPAC contract numbers, as well as the name of the contract's analyst. The website also contains updated Form ADM-0366, emergency contract processing guidelines, and RQS number training:

http://admin.dot.ca.gov/pc/index.shtml

The Maintenance intranet website contains updated information about director's orders, supplemental director's orders, supplemental funds requests, damage assessment forms, and boilerplate state and federal emergency force account and emergency limited bid contracts:

http://onramp.dot.ca.gov/hq/maint/orway/ha23/index.htm

For additional information on force account billing and record keeping, refer to Section 3-9, "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 list contains items 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 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. Equipment and resources most appropriate for 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 that environmental mitigation, compliance requirements, and commitments are adhered to, always coordinate with your contractor selection coordinator, environmental-construction liaison, district or regional environmental office, and 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. Obtain this list from the Department of Conservation website:

  http://www.conservation.ca.gov/omr/SMARA%20Mines/ab_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 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 need 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.

Chapter 6-
Sampling and Testing

Chapter 6 Sampling and Testing

Section 1 Sample Types and Frequencies

6-101 General

6-101A References

6-102 Types of Sampling and Testing

6-102A Preliminary Samples and Tests

6-102B Initial Samples and Tests

Table 6-1.1 Time Required for Source Testing

6-102B (1) Unprocessed Soils and Aggregates

6-102B (1a) Stone from Ledges and Quarries

6-102C (1b) Material Sites of Sand, Gravel, or Soil

6-102B (2) Processed Aggregates

6-102C Acceptance Samples and Tests

Table 6-1.2 Time Required for Materials Acceptance Tests

Table 6-1.3 Time Required for Products Acceptance Tests

6-102D Dispute Resolution Samples

6-102E Investigation Samples and Tests

6-102F Research Samples and Tests

6-103 Field Sampled Material Identification for Testing

Example 6-1.1 Sample Cylinder Label

Example 6-1.2 Sample Cylinder Label

6-104 Shipping of Field Samples

6-105 Acceptance Records

6-106 Project Materials Certification

6-107 Materials Acceptance Sampling and Testing

Tables—"Materials Acceptance Sampling and Testing Requirements"

Table 6-1.4 Earthwork (*Standard Specifications* Section 19)

Table 6-1.5 Stabilized Soils (*Standard Specifications* Section 24)

Table 6-1.6 Aggregate Subbases (*Standard Specifications* Section 25)

Table 6-1.7 Aggregate Bases (*Standard Specifications* Section 26)

Table 6-1.8 Cement Treated Bases (*Standard Specifications* Section 27)

Table 6-1.9 Concrete Bases (*Standard Specifications* Section 28)

Table 6-1.10 Treated Permeable Bases (*Standard Specifications* Section 29)

Table 6-1.11 Reclaimed Pavement (*Standard Specifications* Section 30)

Table 6-1.12 Seal Coats (*Standard Specifications* Section 37)

Table 6-1.13 Asphalt Concrete (*Standard Specifications* Section 39)

Table 6-1.14 Concrete Pavement (*Standard Specifications* Section 40)

Table 6-1.15 Existing Concrete Pavement (*Standard Specifications* Section 41)

Table 6-1.16 Concrete Structures (*Standard Specifications* Section 51)

Table 6-1.17 Concrete (*Standard Specifications* Section 90)

Table 6-1.18 Miscellaneous Materials

Section 1 Sample Types and Frequencies

Section 1
Sample Types
and
Frequencies

6-101 General

6-101
General

Sampling and testing materials and products must be in accordance with contract specifications. Sampling and testing are of equal importance for assuring materials and products meet acceptance specifications.

Caltrans representatives must be familiar with materials handling and processing methods to assure representative samples are obtained. Caltrans representatives should be sufficiently knowledgeable about test methods to ensure compatibility between sample and test procedure.

Samples for acceptance must be taken in accordance with California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections," or sampling requirements in specifications. For California Tests, Caltrans representatives must be qualified testers in accordance with the *Independent Assurance Manual.*

It is the resident engineer's responsibility to ensure the safety of the Caltrans representative. In accordance with *Material Plant Quality Program* or California Test 109, "Method for Testing of Material Production Plants," the district weights and measures coordinator inspects material plants for safety in areas that the Caltrans representative will enter.

In certain situations, to ensure the Caltrans representative's safety, the contractor will take acceptance samples for Caltrans. The Caltrans representative must witness the contractor taking acceptance samples. The Caltrans representative must determine when the sample is taken and observe that the sample is taken in accordance with California Test 125, or sampling requirements in specifications. The Caltrans representative must take possession of the sample from the contractor and transport it to a Caltrans office or the testing laboratory. The Caltrans representative must properly fill out form TL-0101 "Sample Identification Card."

The resident engineer is responsible for the chain of custody for material acceptance samples. Material acceptance samples and dispute resolution samples must be in Caltrans' possession from the sampling point. Adequate sample storage facilities must be arranged for at construction field offices or other Caltrans facilities. The chain of custody for material samples is an important part of the Caltrans quality assurance program.

6-101A References

- *Independent Assurance Manual*, Division of Engineering Services, Materials Engineering and Testing Services (METS), Caltrans:

  http://www.dot.ca.gov/hq/esc/Translab/ormt/IA_reports/index.htm

- California Test Methods, METS, Caltrans, available at:

  http://www.dot.ca.gov/hq/esc/ctms/index.html

- American Association of State Highway and Transportation Officials (AASHTO), American Society for Testing and Materials (ASTM), and other test methods are available at the IHS Standards Expert intranet website, which can be accessed from METS website:

  http://des.onramp.dot.ca.gov/materials-engineering-and-testing-services-mets

- *Material Plant Quality Program*, Division of Construction, Caltrans, available at:

  http://www.dot.ca.gov/hq/construc/hma/

6-102 Types of Sampling and Testing

6-102 Types of Sampling and Testing

The following are the types of sampling and testing used by Caltrans.

6-102A Preliminary Samples and Tests

Preliminary samples and tests are made prior to award of a contract. Construction personnel rarely perform preliminary sampling and testing. The district materials engineer is responsible for preliminary sampling and testing. Such tests are used for design purposes, and 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 initial tests determine whether proposed materials sources, local materials, or products meet the specifications.

Construction personnel may sample potential sources. For soils and aggregate tests, send samples to the district materials laboratory. Tests may be performed by the district materials laboratory or METS, depending on their respective capabilities.

Sampling and testing potential local materials is not mandatory unless specified. Charge the contractor for the cost of sampling and testing potential local materials sources in accordance with Section 6, "Control of Materials," of the *Standard Specifications*.

The normal time required for testing initial source samples of potential local materials sources is shown in Table 6-1.1.

Table 6-1.1. Time Required for Source Testing

Material	Time
Aggregates for hot mix asphalt	2 weeks
Aggregates for cement treatment	4 weeks
Aggregates for concrete mixture	4 weeks
Aggregates for concrete pavement	60 days
Screenings for seal coats	2 weeks
Soils (R-Value)	3 weeks
Untreated base materials	3 weeks

6-102B (1) Unprocessed Soils and Aggregates

The following discussion is primarily applicable to preliminary and initial sampling, although the same precautions apply when sampling for specification compliance.

6-102B (1a) Stone from Ledges and Quarries

Inspect the ledge or quarry face to determine any variations in strata, or in 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.

6-102B (1b) Material Sites of Sand, Gravel, or Soil

Select samples representing the different materials 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 in 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 material in the sample 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.

Use test holes to sample deposits that have no open faces. 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 to make the required grading.

If possible, use a dozer or shovel to open up the pit before sampling rather than depending on test holes.

6-102B (2) Processed Aggregates

Sample processed aggregates from locations such as stockpiles, transportation units, conveyors, or windrows in accordance with California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections."

6-102C Acceptance Samples and Tests

Acceptance tests are generally performed on materials that will be incorporated into the work. Some acceptance tests are performed on materials already incorporated into the work. Acceptance sampling and testing should begin as soon as the material is delivered or in place.

Sample materials at the locations specified in the *Standard Specifications*, the special provisions, or as required by California Test 125. If the sampling location is not specified, sample at the location indicated in the materials acceptance sampling and testing requirements tables in Section 6-107, "Materials Acceptance Sampling and Testing" of this manual. Regardless of location, sample randomly and within the frequency specified to obtain representative samples of the material used in the work.

On Form TL-0101, "Sample Identification Card," use the "Priority" designation for the first few acceptance samples of each construction material. Use "Priority" for

verification tests for acceptance. Use the "Priority" designation for all samples if the material being supplied is of questionable quality or if the construction means and methods or source of materials changes. For "Priority" tests, indicate if there is a preference for telephoned, faxed, or emailed test results on Form TL-0101, "Sample Identification Card," along with the telephone number of the person who is to receive them.

For "Priority" and "Normal" processing times for acceptance tests of materials, refer to Table 6-1.2, "Time Required for Materials Acceptance Tests," of this manual.

The minimum time required for acceptance tests of products is shown in Table 6-1.2, of this manual.

Ensure acceptance samples are shipped or transported to testing laboratories within the following timeframes:

1. Within 1 business day from sampling for projects within 50 miles of the testing laboratory
2. Within 2 business days from sampling for projects more than 50 miles from the testing laboratory

The above timeframes are not applicable where specific sampling or test method requirements preclude doing so, for example, curing of specimens prior to transport.

Ensure proper chain of custody is maintained throughout the process, including delivery to and receipt from commercial shipping services.

Use Form CEM-3701, "Test Result Summary," to summarize acceptance test frequency and test results on each material. Use this form to record sampling and testing related dates and monitor timeliness of acceptance testing. Compare timeliness of material testing turnaround against Table 6-1.2, and ensure corrective actions are taken and documented where repeated deficiencies are detected.

Notify contractor of all acceptance test results within 2 business days of receipt from laboratory. Advise the contractor that all test results are available for their inspection, and provide copies of these test results upon their request. Maintain copies of the test results within the project files for ready accessibility.

Table 6-1.2. Time Required for Materials Acceptance Tests (1 of 4)

Material/Test	Sample to Lab (Note 1) (business days)	Lab Time Priority (Note 2) (business days)	Lab Time Normal (Note 2) (business days)	Reporting to Contractor (Note 3) (business days)	Total (business days)
SOILS					
Gradation (CT 202)	1 to 2	1	3	2	4 to 7
Sand Equivalent (CT 217)	1 to 2	1	3	2	4 to 7
Relative Compaction (CT 231/216)	1 to 2	1	2	2	4 to 6
Plasticity Index (Geosynthetic Reinforced Embankment)	1 to 2	3	7	2	6 to 11
pH (Geosynthetic Reinforced Embankment)	1 to 2	2	3	2	5 to 7
Percentage Crushed Particles (Shoulder Backing – CT 205)	1 to 2	2	5	2	5 to 9
Durability Index (Shoulder Backing – CT 229)	1 to 2	2	5	2	5 to 9
R-value (Imported Borrow – CT 301)	1 to 2	4	6	2	7 to 10
SUBBASES AND BASES					
Relative Compaction (CT 231/216)	1 to 2	1	2	2	4 to 6
Gradation (CT 202)	1 to 2	1	3	2	4 to 7
Sand Equivalent (CT 217)	1 to 2	1	3	2	4 to 7
R-value (CT 301)	1 to 2	4	6	2	7 to 10
Durability Index (CT 229)	1 to 2	2	5	2	5 to 9
Compressive Strength (CTB aggregate – CT 312)	-	Age based	Age based	2	Age +2
Compressive Strength (LCB–ASTM C39)	-	Age based	Age based	2	Age +2
Compressive Strength (LCB – rapid setting – CT 521)	-	Age based	Age based	2	Age +2
Modulus of Rupture (Concrete base – CT 523)	-	Age based	Age based	2	Age +2
Modulus of Rupture (Rapid strength concrete base – CT 524)	-	Age based	Age based	2	Age +2
Percentage of Crushed Particles (CT 205)	1 to 2	2	5	2	5 to 9
Los Angeles Rattler (CT 211)	1 to 2	2	4	2	5 to 8
Cleanness Value (CT 227)	1 to 2	2	3	2	5 to 7
Film Stripping (CT 302)	1 to 2	2	7	2	5 to 11
Asphalt Content (ATPB – CT 382)	1 to 2	1	5	2	4 to 9
Soundness (CTPB – CT 214)	1 to 2	8	10	2	11 to 14
SEAL COATS					
Los Angeles Rattler (CT 211)	1 to 2	2	4	2	5 to 8
Percentage of Crushed Particles (CT 205)	1 to 2	2	5	2	5 to 9
Film Stripping (CT 302)	1 to 2	2	7	2	5 to 11
Gradation (CT 202)	1 to 2	1	3	2	4 to 7
Gradation (ASTM C136)	1 to 2	1	3	2	4 to 7
Cleanness Value (CT 227)	1 to 2	2	3	2	5 to 7
Durability Index (CT 229)	1 to 2	2	5	2	5 to 9
Sand Equivalent (CT 217)	1 to 2	1	3	2	4 to 7
Viscosity (AASHTO T 59)	1 to 2	3	15	2	6 to 19
Viscosity (ASTM D7741)	1 to 2	3	15	2	6 to 19
Viscosity (ASTM D445)	1 to 2	3	15	2	6 to 19
Flash Point (ASTM D92)	1 to 2	3	15	2	6 to 19

Table 6-1.2. Time Required for Materials Acceptance Tests (2 of 4)

Material/Test	Sample to Lab (Note 1) (business days)	Lab Time Priority (Note 2) (business days)	Lab Time Normal (Note 2) (business days)	Reporting to Contractor (Note 3) (business days)	Total (business days)
SEAL COATS (Cont.)					
Asphaltene (ASTM D2007)	1 to 2	7	15	2	10 to 19
Aromatics (ASTM D2007)	1 to 2	7	15	2	10 to 19
Cone Penetration (ASTM D217)	1 to 2	3	15	2	6 to 19
Resilience (ASTM D5329)	1 to 2	3	15	2	6 to 19
Settlement (AASHTO T 59)	1 to 2	7	30	2	10 to 34
Sieve Test (AASHTO T 59)	1 to 2	3	15	2	6 to 19
Demulsibility (AASHTO T 59)	1 to 2	3	15	2	6 to 19
Torsional Recovery (CT 332)	1 to 2	3	15	2	6 to 19
Penetration (AASHTO T 49)	1 to 2	3	15	2	6 to 19
Ring and Ball Softening Point Temperature (AASHTO T 53)	1 to 2	3	15	2	6 to 19
Field Softening Point (ASTM D36)	1 to 2	3	15	2	6 to 19
Elastic Recovery (AASHTO T 301)	1 to 2	4	15	2	7 to 19
Ductility (AASHTO T 51)	1 to 2	4	15	2	7 to 19
BBR (AASHTO T 313)	1 to 2	5	8	2	8 to 12
HMA					
Gradation (AASHTO T 27)	1 to 2	1	3	2	4 to 7
Sand Equivalent (AASHTO T 176)	1 to 2	1	3	2	4 to 7
Los Angeles Rattler (AASHTO T 96)	1 to 2	2	4	2	5 to 8
Percent of Crushed Particles (Coarse) (AASHTO T 335)	1 to 2	2	5	2	5 to 9
Percent of Crushed Particles (Fine) (AASHTO T 335)	1 to 2	2	5	2	5 to 9
Flat and Elongated Particles (ASTM D4791)	1 to 2	2	4	2	5 to 8
Fine Aggregate Angularity (AASHTO T 304, Method A)	1 to 2	2	4	2	5 to 8
Asphalt Binder					
Flash Point (AASHTO T 48)	1 to 2	3	15	2	6 to 19
Solubility (AASHTO T 44)	1 to 2	3	15	2	6 to 19
Viscosity (AASHTO T 316)	1 to 2	3	15	2	6 to 19
Dynamic Shear – Original Phase (AASHTO T 315)	1 to 2	3	15	2	6 to 19
Dynamic Shear – RTFO Phase (AASHTO T 315)	1 to 2	4	15	2	7 to 19
Dynamic Shear – PAV Phase (AASHTO T 315)	1 to 2	5	15	2	8 to 19
RTFO Test (AASHTO T 240)	1 to 2	3	15	2	6 to 19
Ductility (AASHTO T 51)	1 to 2	3	15	2	6 to 19
Elastic Recovery (AASHTO T 301)	1 to 2	3	15	2	6 to 19
PAV (AASHTO R 28)	1 to 2	4	15	2	7 to 19
Creep and Stiffness (AASHTO T 313)	1 to 2	5	15	2	8 to 19
Binder Recovery (AASHTO T164 / ASTM D1856)	1 to 2	2	15	2	5 to 19
Binder Recovery (AASHTO R 59)	1 to 2	4	15	2	7 to 19

Table 6-1.2. Time Required for Materials Acceptance Tests (3 of 4)

Material/Test	Sample to Lab (Note 1) (business days)	Lab Time Priority (Note 2) (business days)	Lab Time Normal (Note 2) (business days)	Reporting to Contractor (Note 3) (business days)	Total (business days)
HMA (Cont.)					
Asphalt Rubber Binder					
Cone Penetration (ASTM D217)	1 to 2	4	15	2	7 to 19
Resilience (ASTM D5329)	1 to 2	4	15	2	7 to 19
Softening Point (ASTM D36)	1 to 2	3	15	2	6 to 19
Viscosity (ASTM D7741)	1 to 2	3	15	2	6 to 19
Asphalt Modifier Properties (ASTM D445, ASTM D92, ASTM D2007)	1 to 2	3	15	2	6 to 19
Crumb Rubber Modifier (CRM) properties (CT 208, CT 385, ASTM D297)	1 to 2	7	30	2	10 to 34
Hot Mix Asphalt Mix					
Moisture Content (AASHTO T 329)	1 to 2	2	5	2	5 to 9
Asphalt Binder Content (AASHTO T 308, Method A)	1 to 2	2	5	2	5 to 9
Hamburg Wheel Track (AASHTO T 324 [Modified])	1 to 2	7	30	2	10 to 34
Bulk Specific Gravity (AASHTO 275)	1 to 2	2	7	2	5 to 11
Maximum Theoretical Density (AASHTO T 209)	1 to 2	2	7	2	5 to 11
Field Softening Point (ASTM D36)	1 to 2	3	15	2	6 to 19
Elastic Recovery (AASHTO T 301)	1 to 2	4	15	2	7 to 19
Ductility (AASHTO T 51)	1 to 2	4	15	2	7 to 19
BBR (AASHTO T 313)	1 to 2	5	8	2	8 to 12
CONCRETE PAVEMENT					
Los Angeles Rattler (CT 211)	1 to 2	2	4	2	5 to 8
Cleanness Value (CT 227)	1 to 2	2	3	2	5 to 7
Gradation (CT 202)	1 to 2	1	3	2	4 to 7
Sand Equivalent (CT 217)	1 to 2	1	3	2	4 to 7
Modulus of Rupture (CT 523)	-	Age based	Age based	2	Age +2
Thickness (CT 531)	2	2	7	2	6 to 11
Dowel bar alignment and concrete consolidation	2	2	5	2	6 to 9
Tie bar alignment and concrete consolidation	2	2	5	2	6 to 9
Coefficient of Friction (CT 342)	7*	2	5	2	11 to 14
Inertial Profiler (AASHTO R 56 & R 57)	7*	3	7	2	12 to 16
CONCRETE STRUCTURES					
Los Angeles Rattler (CT 211)	1 to 2	2	4	2	5 to 8
Cleanness Value (CT 227)	1 to 2	2	3	2	5 to 7
Gradation (CT 202)	1 to 2	1	3	2	4 to 7
Sand Equivalent (CT 217)	1 to 2	1	3	2	4 to 7
Compressive Strength (CT 521)	-	Age based	Age based	2	Age +2

Table 6-1.2. Time Required for Materials Acceptance Tests (4 of 4)

Material/Test	Sample to Lab (Note 1) (business days)	Lab Time Priority (Note 2) (business days)	Lab Time Normal (Note 2) (business days)	Reporting to Contractor (Note 3) (business days)	Total (business days)
CONCRETE					
Gradation (CT 202)	1 to 2	1	3	2	4 to 7
Cement (Various)	1 to 2	35	60	2	38 to 64
Supplementary Cementitious Materials (Various)	1 to 2	35	60	2	38 to 64
Shrinkage (AASHTO T 160)	1 to 2	42	60	2	45 to 64

Notes:

1. Time to testing laboratory begins from time of sampling and includes any required field curing time and time required for transport to the testing laboratory.
2. Time in laboratory begins from time laboratory receives the sample and includes any required laboratory curing time prior to testing and time required to prioritize samples. This time also includes the lab manager's review of test results and the time to notify the resident engineer.
3. Reporting time is the time from when the test is provided to the resident engineer to when the contractor is notified of the test results.

* Days to schedule lab for testing

Table 6-1.3. Time Required for Products Acceptance Tests

Product	Minimum Time (Business 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 manufacturer test report)	3
Rubber (without test report)	14
Structural steel	10
Type B joint seal	7

6-102D Dispute Resolution Samples

Code of Federal Regulations, Title 23, Section 637.207, "Quality Assurance Program," paragraph (a)(1)(iii), states, "If the results from the quality control sampling and testing are used in the acceptance program, the STD (state transportation department) shall establish a dispute resolution system. The dispute resolution system shall address the resolution of discrepancies occurring between the verification sampling and testing and the quality control sampling and testing." When specified, the engineer must split acceptance test samples and store the split samples in case of a disputed test result. Caltrans requires split samples to be stored in a facility under state control in case they are needed for dispute resolution.

6-102E Investigation Samples and Tests

Specific materials or workmanship problems such as pavement failures, difficulty in achieving percent of maximum theoretical density, or inconsistent test results may require special samples and tests. When materials problems are encountered, contact the district materials engineer. The district materials engineer may request help from METS and the Division of Construction. METS will request all acceptance test results and contractor quality control test results along with material-specific additional samples and tests in order to conduct a forensic investigation.

6-102F Research Samples and Tests

Pilot projects usually have special requirements for sampling and testing of materials.

Projects developed around research needs usually require larger samples and more frequent testing than what is required by Caltrans' acceptance testing minimum frequencies. The unit that requested the research project will provide oversight for all of the special sampling and testing requirements.

6-103 Field Sampled Material Identification for Testing

6-103 Field Sampled Material Identification for Testing

Samples must be properly identified so the testing laboratory can function efficiently and report results to the project in a timely manner. In addition, accuracy in identifying where the material was placed in the project can be very useful if the material must be rejected by the engineer and then removed by the contractor.

For requesting faster processing of samples, use the "priority" designation as discussed in Section 6-102C, "Acceptance Samples and Tests," of this manual.

For field material samples, except for concrete cylinder compressive strength, use Form TL-0101, "Sample Identification Card." For concrete cylinder compressive strength, use Form TL-0502, "Field Sample of Portland Cement Concrete Sample Card."

In general, prepare Form TL-0101 as follows:

- Fill in every blank space with complete information, including the quantity and lot of material sampled.
- The "Location of Source" must clearly indicate the place (that is, behind paver, stockpile, cold feed belt) where the sample was taken.
- Indicate "Normal" for laboratory processing of sample or "Priority" if test result is needed quickly.
- If the sample was taken at the request of the contractor from local deposits as a potential source in accordance with Section 6-1.03, "Local Materials," of the *Standard Specifications*, note this under "Remarks." Request that the district materials laboratory provides the cost of testing so that Caltrans can be reimbursed by the contractor.
- To protect the sample identification card against moisture or stains, place it in a plastic bag or shipping label protector and tape it to the sample container.
- Distribute copies as shown on the form on the same day the sample is shipped.
- Prepare Form TL-0101 in accordance with the following details based on the type of material:
    - Aggregate sources must be in compliance with or not subject to the State Mining and Reclamation Act (SMARA). Ensure sources of aggregates are indicated and include the SMARA listing number. For additional information, refer to Section 7-103H (2), "Surface Mining and Reclamation Act," of this manual.
    - For hot mix asphalt (HMA) sample be sure to:
        1. Identify the HMA plant producing the material.
        2. Identify the job mix formula (JMF) producer identification number.
        3. Include the type of mix and aggregate grading specified.
        4. Under "Remarks," include the grade and source of the asphalt binder.
        5. Under "Remarks," include the percentage of asphalt binder designated in the JMF.
    - For asphalt binder sample be sure to:
        1. Identify the HMA plant using the material.
        2. Identify the source of asphalt binder.

        A list of approved asphalt suppliers is available at:

        http://www.dot.ca.gov/hq/esc/Translab/ormt/fpmcoc.htm

For nonapproved suppliers identify the refinery and shipment number for each truckload.

- For tack coat or asphalt emulsion samples be sure to:
  1. Identify the source of the asphalt binder or asphaltic emulsion.
  2. Under "Remarks" include the dilution rate (50/50 or 60/40) for asphaltic emulsions or enter "Not Diluted."
- If the specification has requirements based on the use of the material, include the intended use under "Remarks." This is especially important for electrical conductors, as the applicable specifications depend on where and how the conductor is used.

- Prepare Form TL-0502, "Field Sample of Portland Cement Concrete Sample Card," for each pair of cylinders shipped in the same carton as follows:
  - Fill in every blank space with complete information.
  - Indicate sources of aggregates and include the SMARA listing number. Aggregate sources must be in compliance with or not subject to SMARA. For additional information, refer to Section 7-103H (2), "Surface Mining and Reclamation Act," of this manual. Indicate in the space for water the total weight of water used per cubic yard of cementitious material in the mix based on actual weight (not design weight).
  - Under "Remarks," indicate the specified concrete strength.
  - Under "Remarks," indicate if the unit weight of the hardened concrete cylinders is required. The testing laboratory will not furnish unit weight data unless it is specifically requested.
  - To protect the sample card against moisture or stains, place it in a plastic bag or shipping label protector, and tape it to the sample container.
  - Distribute copies as shown on the form on the same day the sample is shipped.

A uniform system for 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 cylinders are to be tested; the cylinder number of the pair, or group of five, that is to be tested; and project coding. Use a flow pen to mark the cylinders.

Following are examples of the cylinder marking system.

Example 6-1.1. Sample Cylinder Label

Contract No. 03-100844

Sample No. 1-28-1/5_ _ _ _ _

Date Cast _____

For sample shown in Example 6-1.1:

- The first digit indicates method 1 storage for curing.
- The second two digits indicate that the cylinder is to be tested at 28 days.
- The 1/5 set indicates that it is the No. 1 cylinder of 5 cylinders. The No. 2 cylinder would be marked 2/5, and so on, for the remaining cylinders of the group.

- The last four spaces are reserved for any project coding consisting of numbers, letters, or a combination.

Note if only one sample card was made for two cylinders, the third symbol on the card would be 1,2/5.

Example 6-1.2. Sample Cylinder Label

Contract No. 03-100844

Sample No. 2-14-2/2_ _ _ _

Date Cast _____

For sample shown in Example 6-1.2:

- The first digit indicates method 2 storage for curing.
- The second two digits indicate that the cylinder is to be tested at 14 days.
- The 2/2 set indicates that it is the No. 2 cylinder of a group of 2 cylinders.
- The last four spaces are reserved for any project coding consisting of numbers, letters or a combination.

Note if one sample card is made for the two cylinders, the third symbol on the card would be 1,2/2.

6-104 Shipping of Field Samples

6-104 Shipping of Field Samples

Based on turnaround time needed to receive a test result, ship samples from the job site to the laboratory using the most economical mode of transportation available consistent with the time element involved. Do not accumulate samples at the project site to save transportation costs.

Concrete cylinders are shipped to the laboratory in accordance with California Test 540, "Method of Test for Making, Handling, and Storing Concrete Compressive Test Specimens in the Field." Cylinders are shipped without removing the mold and are packed in cardboard containers available at the district warehouse. Each carton holds two cylinders.

If the district laboratory is equipped to test concrete cylinders, they should be shipped there. Otherwise cylinders may be delivered either to the Southern Regional Lab at 13970 Victoria Street, Fontana, CA 92336, or METS at 5900 Folsom Boulevard, Sacramento, CA 95819, whichever is more convenient. Ship concrete cylinders within the time limits specified in California Test 540 or the test result cannot be used as an acceptance test.

Samples are not to be shipped c.o.d. (cash on delivery) to district materials laboratories, the Southern Regional Lab, or METS.

6-105 Acceptance Records

6-105 Acceptance Records

Keep records of all samples and tests in the project files as permanent job records. Monitor acceptance testing frequency, results, and timelines by using Form CEM-3701, "Test Result Summary." Corrective action or retesting of failing tests must be noted in the "Remarks" column of the form.

Documentation of the reason materials represented by failing tests were incorporated into the project must be included in the project files. 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.

6-106 Project Materials Certification

6-106 Project Materials Certification

When construction work on the project is complete, prepare Form CEM-6302, "Final Materials Certification." Use the form to certify that, other than for the exceptions listed on the form, the results of tests performed on acceptance samples show that the materials used in the work controlled by sampling and testing conform to the approved plans and specifications.

If exceptions exist, check the exceptions box and note all nonconforming materials on the form. The following are examples of nonconforming materials that must be noted as exceptions:

- Materials accepted by applying a specified pay factor or deficiency adjustment, such as for hot mix asphalt, concrete pavement, or rapid-strength concrete.
- Materials out of "operating range" but within "contract compliance" for which a specified payment deduction was made.
- Materials not in compliance with the as-bid contract plans or specifications for which a change order was approved to accept the material.
- Materials that require certificates of compliance but one or more have not been submitted.

Sign the form and put the original in the project files. Send a copy to district construction and, if the project is subject to Federal Highway Administration (FHWA) construction oversight activities, send another copy to the FHWA California division administrator. The name and address of the FHWA California division administrator is available at:

http://www.fhwa.dot.gov/cadiv/

6-107 Materials Acceptance Sampling and Testing

6-107 Materials Acceptance Sampling and Testing

Sampling and testing materials and products must be in accordance with contract specifications. Sampling and testing are of equal importance for assuring materials and products meet acceptance specifications.

The tables on the following pages contain Caltrans' minimum sampling and testing requirements for materials acceptance. The frequency of sampling and testing indicated in the tables is to be used under normal conditions. Materials that are marginal in meeting the specifications should be sampled and tested on a more frequent basis. Request "Priority" testing for samples taken on potentially marginal materials.

When shown in the tables that testing frequencies may be adjusted, document any adjustment through a "Memo to File." Place the "Memo to File" in the appropriate part of Category 37, "Initial Tests and Acceptance Tests," of the project files.

Adherence to the sample size requirements shown in the tables will prevent unnecessary delays and expense of obtaining supplementary samples to complete tests.

Refer to Section 6-105 "Acceptance Records," of this manual for documenting acceptance tests results. For more information on procedures to follow in the case of failing tests, refer to Section 3-6, "Control of Materials," of this manual.

Table 6-1.4. Materials Acceptance Sampling and Testing Requirements: Earthwork (*Standard Specifications* Section 19) (1 of 3)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
STRUCTURE BACKFILL (Section 19-3.02C)					
Sieve Analysis	California Test 202	50 lb	Materials site or stockpile	1 every 3,000 tons or 2,000 cu yd; see Remarks	If material is uniform and well within specification limits, test frequency may be decreased to 1 per day
Sand Equivalent	California Test 217				
Relative Compaction	California Test 231	Sample for California Test 216	Project site in accordance with California Test 231	1 every 2,000 sq yd and test compaction at every 8 in. of thickness, see Remarks	Relative compaction test is required at each location structure backfill is placed
Maximum Wet Density	California Test 216	35 lb	Relative compaction test site locations	1 every relative compaction test, see Remarks	Wet common-composite test maximum value may be used in accordance with California Test 231
PERVIOUS BACKFILL MATERIAL (Section 19-3.02D)					
Sieve Analysis	California Test 202	50 lb	Stockpile	1 every 3,000 tons or 2,000 cu yd; see Remarks	If material is uniform and well within specification limits, test frequency may be decreased to 1 per day
BASEMENT MATERIAL (Section 19-5)					
R-Value	California Test 301	50 lb	Project site	Test to verify R-value if differing site conditions are encountered, see Remarks	R-value used in project designs are usually conservative and do not need to be field verified; if R-value testing in the materials report is incomplete because of preproject conditions, then additional R-value testing should be done to verify design R-value
Relative Compaction	California Test 231	Sample for California Test 216	California Test 216	1 every 2,000 sq yd	
Maximum Wet Density	California Test 216	35 lb	Relative compaction test site locations	1 every relative compaction test	

Table 6-1.4. Materials Acceptance Sampling and Testing Requirements: Earthwork (*Standard Specifications* Section 19) (2 of 3)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
EMBANKMENT CONSTRUCTION (Section 19-6)					
Relative Compaction	California Test 231	Sample for California Test 216	Project site in accordance with California Test 231	1 every 2,000 sq yd and test compaction at every 8 in. of thickness	
Maximum Wet Density	California Test 216	35 lb	Relative compaction test site locations	1 every relative compaction test, see Remarks	Wet common-composite test maximum value may be used in accordance with California Test 231
GEOSYNTHETIC REINFORCED EMBANKMENT (Section 19-6.02B)					
Plasticity Index	California Test 204	50 lb	Materials site or stockpile	1 per source prior to use	
pH	California Test 643		Materials site or stockpile	1 per source prior to use	
Sieve Analysis	California Test 202	50 lb	Stockpile	Prior to use, 1 every 3,000 tons or 2,000 cu yd, see Remarks	If material is uniform and well within specification limits, the test frequency may be decreased to 1 per day
BORROW MATERIAL (Section 19-7)					
R-Value	California Test 301	50 lb	Import borrow source	1 per source, see Remarks	Test for R-value only when an R-value is specified for import borrow in the special provisions; if material at import borrow source is not uniform, increase testing frequency

Table 6-1.4. Materials Acceptance Sampling and Testing Requirements: Earthwork (*Standard Specifications* Section 19) (3 of 3)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
SHOULDER BACKING (Section 19-9)					
Crushed Particles	California Test 205	50 lb	Materials site or stockpile	1 per project prior to use	
Durability	California Test 229		Materials site or stockpile	1 per project prior to use	
Unit Weight	California Test 212 Rodding Method		Materials site or stockpile	1 per project prior to use	
Sieve Analysis	California Test 202	50 lb	Materials site or stockpile	1 every 3,000 tons or 2,000 cu yd, see Remarks	If material is uniform and well within specification limits, test frequency may be decreased to 1 per day
Sand Equivalent	California Test 217				

Note:
1. Refer to California Test 125 for sampling procedures.

Table 6-1.5. Materials Acceptance Sampling and Testing Requirements: Stabilized Soils (*Standard Specifications* Section 24) (1 of 2)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
LIME (Section 24-2.02)					
Various properties	See *Standard Specifications* Section 24-2.02	One 10-lb sample for each type and source of lime; use a 2-qt airtight container	Initial sample provided by contractor; subsequent sampling from mid-point of delivery	Each 100 tons of lime, 2 per day maximum; see Remarks	Must be on an Authorized Material List and certificate of compliance must accompany each shipment; recommend 1 acceptance test per 5 samples of lime
LIME TREATMENT					
DETERMINATION OF LIME APPLICATION RATE (Section 24-2.01D)					
Unconfined Compressive Strength	California Test 373	100 lb	Native soils; test each type of material to be treated	Prior to soil stabilization work and if source of lime changes; see Remarks	To determine appropriate lime content
Optimum Moisture Content	California Test 373			Prior to soil stabilization work	
VERIFICATION OF LIME APPLICATION RATE AND STABILIZED SOIL MIXTURE (Section 24-2.01D)					
Lime Application (Dry Form)	Calibrated tray method or equal	Building paper or pan of known area	Surface receiving lime	Each 40,000 sq ft, 2 per day minimum; see Remarks.	To determine if application rate is within ± 5% of ordered application rate
Lime Application (Slurry Form)	Volumetric measurement that is then reduced to lime weight	Determined over known area	Slurry holding tank	Each 40,000 sq ft, 2 per day minimum; see Remarks	To determine if application rate is within ± 5% of ordered application rate
Uniformity of Mixed Stabilized Soil	Phenolphthalein alcohol indicator solution spray	N/A	Representative areas	Each day at five separate locations; see Remarks	Taken after completion of initial mixing
Moisture Content of Mixed Stabilized Soil	California Test 226	0.25 lb each sample	Representative areas at mid depth	Each day at five separate locations to verify contractor's quality control tests; see Remarks	Taken during mellowing period
Gradation of Mixed Stabilized Soil	California Test 202	25 lb	Representative areas	1 every 4,000 sq yd, 1 per day minimum; see Remarks	Taken prior to compaction

Table 6-1.5. Materials Acceptance Sampling and Testing Requirements: Stabilized Soils (*Standard Specifications* Section 24) (2 of 2)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
MIXED STABILIZED SOIL (Sections 24-2.01 and 24-2.03)					
Relative Compaction	California Test 231	Sample for California Test 216	Project site in accordance with California Test 231	1 every 2,000 sq yd and test compaction at every 6 in. of thickness	
Maximum Wet Density	California Test 216	35 lb	Relative compaction test site locations	1 every relative compaction test; see Remarks	Wet common-composite test maximum value may be used in accordance with California Test 231
Dimensions	Measurement	N/A	Random locations in place after compaction	As necessary for verification of stabilized soil thickness and surface grades	
CURING SEAL-ASPHALTIC EMULSION (Section 24-1.02C)					
Various properties based on asphaltic emulsion type used; see *Standard Specifications* Section 94	Based on asphaltic emulsion type used; see *Standard Specifications* Section 94	1/2-gal plastic jug with screw-on lid	Sampling line leading to the spray bar	1 each shipment; see Remarks	Each shipment must be accompanied by a certificate of compliance; recommend 1 random test from samples taken

Note:
1. Refer to California Test 125 for sampling procedures.

Table 6-1.6. Materials Acceptance Sampling and Testing Requirements: Aggregate Subbases (*Standard Specifications* Section 25)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
AGGREGATE SUBBASE					
Gradation (Sieve Analysis)	California Test 202	50 lb	Windrow or roadway	Every 3,000 tons or 2,000 cu yd; see Remarks and Note 2	If material is uniform and well within specification limits, frequency may be decreased to 1 test per day
Sand Equivalent	California Test 217			Every 3,000 tons or 2,000 cu yd; see Remarks and Note 2	If material is uniform and well within specification limits, frequency may be decreased to 1 test per day
R-Value	California Test 301	50 lb	Windrow or roadway	Every 3,000 tons or 2,000 cu yd; see Remarks	R-value testing may be reduced to minimum 1 acceptance test per project when test records demonstrate that material from the same source, and having comparable grading and sand equivalent values, meets minimum R-value requirements
Relative Compaction	California Test 231	Sample for California Test 216	Roadway in accordance with California Test 231	Every 2,000 sq yd	
Maximum Wet Density	California Test 216	35 lb	Relative compaction test site locations	Every 2,000 sq yd; see Remarks	Wet common-composite test maximum value may be used in accordance with California Test 231
Dimensions	N/A	N/A	Random locations	As necessary for acceptance	Verify thickness of aggregate subbase

Notes:
1. Refer to California Test 125 for sampling procedures.
2. If material is outside the specification limits, sample and test representative material every 500 cu yd so that deductions may be taken for noncompliant material.

Table 6-1.7. Materials Acceptance Sampling and Testing Requirements: Aggregate Bases (*Standard Specifications* Section 26)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
AGGREGATE BASES					
Gradation (Sieve Analysis)	California Test 202	50 lb	Windrow or roadway	Every 3,000 tons or 2,000 cu yd; see Remarks and Note 2	If material is uniform and well within specification limits, frequency may be decreased to 1 test per day
Sand Equivalent	California Test 217			Every 3,000 tons or 2,000 cu yd; see Remarks and Note 2	If material is uniform and well within specification limits, frequency may be decreased to 1 test per day
R-Value	California Test 301	50 lb	Windrow or roadway	Every 3,000 tons or 2,000 cu yd; see Remarks	R-value testing may reduced to minimum 1 acceptance test per project when test records demonstrate that material from the same source, and having comparable grading and sand equivalent values, meets minimum R-value requirements
Durability Index	California Test 229	50 lb	Windrow or roadway	1 per project; see Remarks	Durability test not required for Class 3 aggregate base
Moisture	California Test 226	25 lb	Materials site or stockpile	2 daily when aggregate base is paid for by weight	
Relative Compaction	California Test 231	Sample for California Test 216	Roadway in accordance with California Test 231	Every 2,000 sq yd	
Maximum Wet Density	California Test 216	35 lb	Relative compaction test site locations	Every 2,000 sq yd, see Remarks	Wet common-composite test maximum value may be used in accordance with California Test 231
Dimensions	N/A	N/A	Random locations	As necessary for acceptance	Verify thickness of aggregate base

Notes:
1. Refer to California Test 125 for sampling procedures.
2. If material is outside the specification limits, sample and test representative material every 500 cu yd so that deductions may be taken for noncompliant material.

Table 6-1.8. Materials Acceptance Sampling and Testing Requirements: Cement Treated Bases (*Standard Specifications* Section 27) (1 of 2)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
CEMENT TREATED BASE Class A or Class B					
AGGREGATE					
Gradation (Sieve Analysis)	California Test 202, California Test 105	40 lb	Plant, truck, windrow, or roadway	1 every 3,000 tons or 2,000 cu yd, minimum 1 per day of production	
Sand Equivalent	California Test 217				
AGGREGATE Class B					
R-Value (with and without cement)	California Test 301	100 lb for aggregate qualification	Windrow or roadway	Prior to production	
CEMENT Type II Portland Cement					
Various Properties Must comply with *Standard Specifications* Section 90-1.02B(2)	See *Standard Specifications* Section 90-1.02B(2)	8 lb	CTB plant or cement spreader	1 each 100 tons of cement, 2 per day maximum; see Remarks	Recommend 1 acceptance test per project for cement from approved suppliers and certificate of compliance with each shipment
WATER					
Chlorides	California Test 422	Clean 2-qt plastic jug with lined, sealed lid	At point of use	1 per source; see Remarks	Water supplies for domestic use do not need to be tested
Sulfates	California Test 417				
COMPLETED MIX Class A					
Compressive Strength	California Test 312	See California Test 312, Part II	Windrow or roadway prior to compaction	1 per day; see Remarks	If first 3 days of production test records demonstrate materials are in compliance, recommend test every 5 days of production
COMPLETED MIX Class B					
R-Value	California Test 301	50 lb	Windrow or roadway prior to compaction	1 every 3,000 tons or 2,000 cu yd; see Remarks	Recommend R-value testing be reduced to 1 every 10,000 cu yd when test records demonstrate that material from the same source, and having comparable grading and sand equivalent values, meets the minimum R-value requirements

Table 6-1.8. Materials Acceptance Sampling and Testing Requirements: Cement Treated Bases (*Standard Specifications* Section 27) (2 of 2)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
COMPLETED MIX Class A and Class B					
Cement Content	California Test 338	See California Test 338, Part I	Windrow or roadway prior to compaction	1 every 1,500 tons or 1,000 cu yd, minimum 1 per day of production	
Optimum Moisture	California Test 312	See California Test 312	Windrow or roadway	Prior to production	
Moisture Content	California Test 226	10 lb in sealed container	Roadway prior to compaction	2 daily	
Relative Compaction	California Test 312 or 231	Sample for California Test 216	Roadway in accordance with California Test 231	1 every 2,000 sq yd	
Maximum Wet Density	California Test 216, California Test 312	35 lb	Relative compaction test site locations	1 every 2,000 sq yd; see Remarks	Wet common-composite test maximum value may be used in accordance with California Test 231
Dimensions	N/A	N/A	Random locations	As necessary for acceptance	Verify thickness of CTB

Note:
1. Refer to California Test 125 for sampling procedures.

Table 6-1.9. Materials Acceptance Sampling and Testing Requirements: Concrete Bases (*Standard Specifications* Section 28)

Lean Concrete Base

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
LEAN CONCRETE BASES					
Compressive strength (7-days)	ASTM C39	2 cylinders - 6x12 inches	Concrete truck discharge chute	1,000 cu yd or 1 day's production if less than 1,000 cu yd	
RAPID STRENGTH CONCRETE BASE					
Modulus of rupture (7-days)	California Test 524	3 beams - 6x6x20 inches	Concrete truck discharge chute	1 per 500 cu yd or 1 day's production if less than 500 cu yd.	
LEAN CONCRETE BASE RAPID SETTING					
Compressive strength (7-days)	California Test 521	2 cylinders - 6x12 inches	Concrete truck discharge chute	1 per 500 cu yd or 1 day's production if less than 500 cu yd.	
CONCRETE BASE					
Modulus of rupture (7-days)	California Test 523	2 beams of 6x6x32 in. for centerpoint loading or 6x6x20 in. for third-point loading	Concrete truck discharge chute	1,000 cu yd or 1 day's production if less than 1,000 cu yd	
Dimensions	N/A	N/A	Random locations	As necessary for acceptance	Verify thickness of base

Note:
1. Refer to California Test 125 for sampling procedures.

Table 6-1.10. Materials Acceptance Sampling and Testing Requirements: Treated Permeable Bases (*Standard Specifications* Section 29)

Asphalt Treated Permeable Base (ATPB) (1 of 2)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
AGGREGATE					
Percentage Crushed Particles	California Test 205	Combined two 40-lb canvas bags (see Note 2) or Batch 160 lb (proportioned per bin percentages)	Plant	Prior to production and minimum 1 random for every 50,000 tons or less of paving	
Los Angeles Rattler (at 500 revolutions)	California Test 211				
Film Stripping	California Test 302				
Gradation (Sieve Analysis)	California Test 202	Combined two 20-lb canvas bags (see Note 3) or Batch 40 lb (proportioned per bin percentages)	Plant	1 for every 4 hours of production	
Cleanness Value	California Test 227			1 for every 4 hours of production	Recommend 1 acceptance test per day if 3 consecutive results exceed 62
ASPHALT					
Various properties based on asphalt type used; see *Standard Specification* Section 92	Based on asphalt type used; see *Standard Specifications* Section 92	1-qt can	Asphalt feed line connecting plant storage tanks	1 per day	Certificate of compliance required for each shipment; if asphalt binder source is not on approved list, sample and test asphalt before use
COMPLETED MIX					
Asphalt Content	California Test 382	40 lb in metal containers	Plant, truck, windrow, or roadbed	1 for every 4 hours of production	
AGGREGATE					
Los Angeles Rattler (loss at 500 revolutions)	California Test 211	50 lb	Plant	Prior to production and minimum 1 random for every 25,000 cu yd	
Soundness	California Test 214	50 lb	Plant		
Sieve Analysis (Gradation)	California Test 202	40 lb	Plant	1 for every 4 hours of production; (see Note 4)	

Table 6-1.10. Materials Acceptance Sampling and Testing Requirements: Treated Permeable Bases (*Standard Specifications* Section 29)

Asphalt Treated Permeable Base (ATPB) (2 of 2)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
AGGREGATE (Cont.)					
Cleanness Value	California Test 227				
CEMENT					
Cement, various properties; must comply with *Standard Specifications* Section 90-1.02B(2)	Must comply with *Standard Specifications* Section 90-1.02B(2)	8 lb	Concrete plant	1 for each 100 tons, 2 per day max; see Remarks	Recommend 1 acceptance test per project for cement from approved suppliers with certificate of compliance
WATER					
Chlorides	California Test 422	Clean 2-qt plastic jug with lined, sealed lid	At point of use; see Remarks	1 per source; see Remarks	Water supplies for domestic use do not need to be tested
Sulfates	California Test 417				
Setting Time	ASTM C 191 or ASTM C 266	Contact METS for required quantity of water sample	At point of use; see Remarks	1 per source; see Remarks	Water supplies for domestic use do not need to be tested
Mortar Compressive Strength	ASTM C109				
Coloring Agents	Must comply with *Standard Specifications* Section 90-1.02D				
Alkalis					
Specific Gravity					

Notes:
1. Refer to California Test 125 for sampling procedures.
2. Store one 40-lb canvas bag for dispute resolution.
3. Store one 20-lb. canvas bag for dispute resolution.
4. If test records determine that aggregate gradation or cleanness value is close to specification limit or outside the specification limits, sample and test concrete every 300 cu yd so that deductions may be taken for noncompliant material.

Table 6-1.11. Materials Acceptance Sampling and Testing Requirements: Reclaimed Pavement (*Standard Specifications* Section 30)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
PULVERIZED ROADBED (Section 30-2)					
Thickness	Thickness- Field Measurement	Field Measurement	Random location	3 random locations per lot	
Relative Compaction (% min)	California Test 231	Sample for California Test 216	Project site in accordance with California Test 231	1 every 2,000 sq yd and test compaction at every 6 in. of thickness	
FULL DEPTH RECLAMATION–FOAMED ASPHALT (Section 30-3)					
Relative Compaction (% min)	California Test 231	Sample for California Test 216	Project site in accordance with California Test 231	1 every 2,000 sq yd and test compaction at every 6 in. of thickness	
Thickness	Thickness	California Test 531. 4- or 6-in.-diameter core, full thickness	3 random location per lot	See Section 4-4004 of this manual	
FULL DEPTH RECLAMATION—Cement (Section 30-4)					
Thickness	Thickness- Core thickness measurement	California Test 531, 4- or 6-in.-diameter core, full thickness	3 random locations per lot	See Section 4-4004 of this manual	
Cement application rate	Calibrated tray or equal	Building paper or pan of known area	Surface receiving cement	Each 40,000 sq ft, 2 per day minimum	To determine if application rate is within ± 5% of mix design rate
Relative Compaction (% min)	California Test 231	Sample for California Test 216	Project site in accordance with California Test 231	1 every 2,000 sq yd and test compaction at every 6 in. of thickness	

Notes:
1. Refer to California Test 125 for sampling procedures.

Table 6-1.12. Materials Acceptance Sampling and Testing Requirements: Seal Coats (*Standard Specifications* Section 37) (1 of 4)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
ASPHALTIC EMULSION AND ASPHALTIC EMULSION FOR FLUSH COAT					
Various properties in accordance with Section 37 of *Standard Specifications*	See Section 37-2.02A(4)(b)(ii) of *Standard Specifications*	1/2-gal plastic jug with screw-on lid	Transport tanker	Each shipment	Certificate of compliance required with each shipment
Asphaltic emulsion spread rate	CT 339	Per test method	Full width of boot truck	Once per project	
POLYMER MODIFIED ASPHALTIC EMULSION					
Viscosity	AASHTO T 59	1-qt wide-mouth plastic jar with screw-on lid	Transport tanker	Each shipment	Certificate of compliance required with each shipment
Sieve Test	AASHTO T 59				
Demulsibility	AASHTO T 59				
Torsional Recovery	California Test 332				
Penetration	AASHTO T 49				
Ring and Ball	AASHTO T 53				
ASPHALT MODIFIER FOR ASPHALT RUBBER BINDER					
Viscosity	ASTM D445	1-qt round wide-mouth can with friction top lid or 1-qt rectangular can with screw-on lid	Sample port on tanker truck	1 random per project	
Flash Point	ASTM D92				
Molecular Analysis	ASTM D2007				
CRUMB RUBBER MODIFIER FOR ASPHALT RUBBER BINDER					
Wire in CRM (max %)	CT 385	CRM scrap tire: Two 2.5 lb in gallon zip-lock bags CRM high natural: Two 2.5 lb in gallon zip-lock bags	CRM bulk bag	Minimum 1 random per project	
Fabric in CRM (max %)	CT 385				
CRM particle length	---				

Table 6-1.12. Materials Acceptance Sampling and Testing Requirements: Seal Coats (*Standard Specifications* Section 37) (2 of 4)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
CRM specific gravity	CT 208				
Natural rubber content in high nature CRM (%)	ASTM D297				
ASPHALT RUBBER BINDER OR MODIFIED ASPHALT BINDER					
Cone Penetration		1-qt round wide-mouth can with friction top lid	Asphalt feed line connecting to the HMA plant	Production start-up evaluation and 1 random per 5 samples	Certificate of compliance required with each shipment
Resilience					
Softening point					
Asphalt Rubber Binder Viscosity	ASTM D7741	Five 1-qt round wide-mouth cans with friction top lids	Asphalt storage tank	The greater of 1 every 5 lots or once a day, see Remarks	For safety, engineer may witness contractor perform test
Base Asphalt Binder Properties	See *Standard Specification* Section 92	Five 1-qt round wide-mouth cans with friction top lids	Asphalt storage tank	The greater of 1 every 5 lots or once a day, see Remarks	Certificate of compliance required for each shipment; if asphalt binder source is not on approved list, sample and test asphalt before use
SCREENINGS/AGGREGATE FOR CHIP SEALS					
LA Rattler	California Test 211	50 lb in canvas bags or 5-gal buckets	Stockpile	Once per project	
% Crushed Particles	AASHTO T 335				
Film Stripping	California Test 302				
Sieve Analysis	California Test 202	30 lb	Stockpile	Twice daily	
Cleanness Value	California Test 227			Once daily	
SAND FOR FLUSH COAT					
Sieve Analysis	California Test 202	25 lb	Stockpile	Once per project	

Table 6-1.12. Materials Acceptance Sampling and Testing Requirements: Seal Coats (*Standard Specifications* Section 37) (3 of 4)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
CRACK TREATMENTS					
Crack Treatment Material					
Softening point	ASTM D36	2 each 3-lb minimum samples in silicone release boxes	From crack treatment material dispensing wand	Once per project	Indicate the specified type of crack treatment material on the TL-0101
Cone penetration	ASTM D5329				
Resilience					
Tensile adhesion					
Asphalt compatibility					
Flexibility	ASTM D3111				
Specific gravity	ASTM D70				
Sieve test	See note in Section 37-6.01D(3) "Department Acceptance" of the *Standard Specifications*				
SAND FOR CRACK TREATMENT					
Sieve Analysis	California Test 202	25 lb	Stockpile	Once per project	
SLURRY SEAL AGGREGATE					
Los Angeles Rattler (loss at 500 revolutions)	California Test 211	50 lb	Stockpile	Once per project	
Percentage of Crushed Particles	California Test 205				
Film Stripping	California Test 302				
Durability Index	California Test 229				
Sieve Analysis	California Test 202, California Test 105	30 lb	Stockpile	Once daily	
Sand Equivalent	California Test 217				
MICRO-SURFACING AGGREGATES					
Los Angeles Rattler (loss at 500 revolutions)	California Test 211	50 lb	Stockpile	Once per project	
Percentage of Crushed Particles	California Test 205				
Durability Index	California Test 302				

Table 6-1.12. Materials Acceptance Sampling and Testing Requirements: Seal Coats (*Standard Specifications* Section 37) (4 of 4)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
Sieve Analysis	California Test 202	30 lb	Stockpile	Once daily	
Sand Equivalent	California Test 217				

Note:
1. Refer to California Test 125 for sampling procedures.

Table 6-1.13. Materials Acceptance Sampling and Testing Requirements: Asphalt Concrete (*Standard Specifications* Section 39) (1 of 6)

Test	Test Method	Sample Size & Container Type	Sampling Location (See Note 1)	Sampling Frequency	Acceptance Test Frequency	Remarks
AGGREGATE: All Types of HMA						
Gradation (Sieve Analysis) (see Note 2)	AASHTO T 27, California Test 105, California Test 384	Combined six 20-lb canvas bags (see Note 3) or Batch 30 lb (proportioned per bin percentages)	HMA plant	1 for each 750 tons, 1 per day minimum	Production start-up evaluation. Minimum 1 per day of paving	
Sand Equivalent	AASHTO T 176		HMA plant or before lime treatment	1 for each 750 tons, 1 per day minimum	Production start-up evaluation. Minimum 1 per day of paving	Not required for OGFC (open graded friction course)
Percent Crushed Particles (Coarse)	AASHTO T 335		HMA plant or before lime treatment	1 for each 750 tons, 1 per day minimum	Production start-up evaluation, and minimum 1 random for every 25,000 tons or less of paving	
Percent Crushed Particles (Fine)	AASHTO T 335		HMA plant or before lime treatment	1 for each 750 tons, 1 per day minimum	Production start-up evaluation, and minimum 1 random for every 25,000 tons or less of paving	
LA Rattler (500 Revolutions)	AASHTO T 96		HMA plant or before lime treatment	1 for each 750 tons, 1 per day minimum	Production start-up evaluation, and minimum 1 random for every 50,000 tons or less of paving	
LA Rattler (100 Revolutions)	AASHTO T 96		HMA plant or before lime treatment	1 for each 750 tons, 1 per day minimum	Production start-up evaluation, and minimum 1 random for every 50,000 tons or less of paving	
Fine Aggregate Angularity	AASHTO T 304, Method A		HMA plant or before lime treatment	1 for each 750 tons, 1 per day minimum	Production start-up evaluation, and minimum 1 random for every 50,000 tons or less of paving	Not required for OGFC or Minor HMA
Flat and Elongated Particles	ASTM D4791		HMA plant or before lime treatment	1 for each 750 tons, 1 per day minimum	Production start-up evaluation, and minimum 1 random for every 50,000 tons or less of paving	Not required for Minor HMA
ASPHALT BINDER						
Various properties based on asphalt type used (see *Standard Specifications* Section 92)	See *Standard Specifica-tions* Section 92	1-qt round wide-mouth can with friction top lid	Asphalt feed line connecting the plant storage tanks	1 per day of HMA production	1 random for every 5 samples	Certificate of compliance required for each shipment; if asphalt binder source is not on approved list, sample and test asphalt before use

Table 6-1.13. Materials Acceptance Sampling and Testing Requirements: Asphalt Concrete (*Standard Specifications* Section 39) (2 of 6)

Test	Test Method	Sample Size & Container Type	Sampling Location (See Note 1)	Sampling Frequency	Acceptance Test Frequency	Remarks
ASPHALT RUBBER BINDER						
Asphalt Rubber Binder Properties	See *Standard Specifications* Section 39-2.03A(4)(e)(ii)	1-qt round wide-mouth can with friction top lid	Asphalt rubber feed line connecting to the HMA plant	1 every lot	Production start-up evaluation and 1 random per 5 samples	Certificate of compliance required for each lot
Asphalt Rubber Binder Viscosity	ASTM D7741	1-qt round wide-mouth can with friction top lid	Asphalt rubber feed line connecting to the HMA plant	1 every lot	1 every lot; see Remarks	For safety, engineer may witness contractor perform test
Base Asphalt Binder Properties	See *Standard Specifications* Section 92	1-qt round wide-mouth can with friction top lid	Asphalt storage tank	Each shipment	Production start-up evaluation and 1 random per 5 samples	Certificate of compliance required for each shipment; if asphalt binder source is not on approved list, sample and test asphalt before use
Asphalt Modifier Properties	ASTM D445 ASTM D92 ASTM D2007	1-qt round wide-mouth can with friction top lid. or 1-qt rectangular can with screw-on lid	Sample port on tanker truck	Each shipment	1 random per project	
Crumb Rubber Modifier (CRM) Properties	California Test 208, California Test 385, ASTM D297	CRM scrap tire: Two 2.5 lb in gallon zip-lock bags; CRM high natural: Two 2.5 lb in gallon zip-lock bags	CRM bulk bag	Each shipment	1 random per project	

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Table 6-1.13. Materials Acceptance Sampling and Testing Requirements: Asphalt Concrete (*Standard Specifications* Section 39) (3 of 6)

Test	Test Method	Sample Size & Container Type	Sampling Location (See Note 1)	Sampling Frequency	Acceptance Test Frequency	Remarks
HOT MIX ASPHALT: Type A						
Moisture Content	AASHTO T 329	10 lb, sealed metal container	Loose mix from behind the paver (see Note 4)	Production start-up evaluation, and minimum 1 per project	Production start-up evaluation, and minimum 1 per project during paving	Test within 1 hour of sampling
Asphalt Binder Content	AASHTO T 308, Method A	60 lb (see Note 5) (8x8x3=8 boxes, 8x8x4=6 boxes, 8½x8½x4½=4 boxes) (see Note 5)	Loose mix from behind the paver (see Note 4)	1 for each 750 tons, 1 per day minimum	Production start-up evaluation; minimum 1 per day of paving	
Maximum Theoretical Density	AASHTO T 209		Loose mix from behind the paver (see Note 4)	1 for each 750 tons, 1 per day minimum	Production start-up evaluation. 1 random test per day of paving	
Air Void Content	AASHTO T 269	100 lb (see Note 5) (8x8x3=12 boxes, 8x8x4=10 boxes, 8½x8½x4½=8 boxes)	Loose mix from behind the paver (see Note 4)	Production start-up evaluation, 1 every 25,000 tons of paving	Production start-up evaluation, and minimum 1 random for every 25,000 tons of paving	
Voids in Mineral Aggregate	SP-2 Asphalt Mixture Volumetrics		Loose mix from behind the paver (see Note 4)	Production start-up evaluation, 1 every 25,000 tons of paving	Production start-up evaluation, and minimum 1 random for every 25,000 tons of paving	
Dust Proportion	SP-2 Asphalt Mixture Volumetrics		Loose mix from behind the paver (see Note 4)	Production start-up evaluation, 1 every 25,000 tons of paving	Production start-up evaluation, and minimum 1 random for every 25,000 tons of paving	
Hamburg Wheel Tracker	AASHTO T 324 (Modified)	70 lb (see Note 5) (8x8x3=9 boxes, 8x8x4=7 boxes, 8½x8½x4½=6 boxes)	Loose mix at plant, truck, or windrow	Production start-up evaluation, 1 every 10,000 tons of paving	Production start-up evaluation, and minimum 1 random for every 10,000 tons or less of paving	Not required for Minor HMA
Moisture Susceptibility	AASHTO T 283	140 lb (see Notes 5 & 6) (8x8x3=18 boxes, 8x8x4=15 boxes, 8½x8½x4½=12 boxes)	Loose mix at plant, truck, or windrow	Production start-up evaluation, 1 every 50,000 tons of paving	Production start-up evaluation, and minimum 1 random test for every 50,000 tons of paving	Test for dry strength and wet strength; not required for Minor HMA

Table 6-1.13. Materials Acceptance Sampling and Testing Requirements: Asphalt Concrete (*Standard Specifications* Section 39) (4 of 6)

Test	Test Method	Sample Size & Container Type	Sampling (See Note 1)	Sampling Frequency	Acceptance Test Frequency	Remarks
HOT MIX ASPHALT: With RAP/RAS						
Binder Recovery	AASHTO T 164 ASTM D1856	10 lb (8x8x3=1 box, 8x8x4=1 box, 8½x8½x4½ =1 box)	Loose mix from behind the paver (see Note 4)	Production start-up evaluation, 1 every 25,000 tons of paving	1 random for every 25,000 tons or less of paving	
RUBBERIZED HOT MIX ASPHALT: Gap Graded						
Moisture Content	AASHTO T 329	10 lb, sealed metal container	Loose mix from behind the paver (see Note 4)	Production start-up evaluation, and minimum 1 per project	Production start-up evaluation, and minimum 1 per project during paving	Test within 1 hour of sampling
Asphalt Binder Content	AASHTO T 308, Method A	60 lb (see Note 5) (8x8x3=8 boxes, 8x8x4=6 boxes, 8½x8½x4½ =4 boxes)	Loose mix from behind the paver (see Note 4)	1 for each 750 tons, 1 per day minimum	Production start-up evaluation; 1 random test per day of paving	
Maximum Theoretical Density	AASHTO T 209		Loose mix from behind the paver (see Note 4)	1 for each 750 tons, 1 per day minimum	Production start-up evaluation; minimum 1 per day of paving	
Air Void Content	AASHTO T 269	100 lb (see Note 5) (8x8x3=12 boxes, 8x8x4=10 boxes, 8½x8½x4½ =8 boxes)	Loose mix from behind the paver (see Note 4)	Production start-up evaluation, 1 every 25,000 tons of paving	Production start-up evaluation, and minimum 1 random test for every 25,000 tons of paving	
Voids in Mineral Aggregate	SP-2 Asphalt Mixture Volumetrics		Loose mix from behind the paver (see Note 4)	Production start-up evaluation, 1 every 25,000 tons of paving	Production start-up evaluation, and minimum 1 random test for every 25,000 tons of paving	
Dust Proportion	SP-2 Asphalt Mixture Volumetrics		Loose mix from behind the paver (see Note 4)	Production start-up evaluation, 1 every 25,000 tons of paving	Production start-up evaluation, and minimum 1 random test for every 25,000 tons of paving	
Hamburg Wheel Track	AASHTO T 324 (Modified)	75 lb (see Note 5) (8x8x3=9 boxes, 8x8x4=7 boxes, 8½x8½x4½ =6 boxes)	Loose mix at plant, truck, or windrow	Production start-up evaluation, 1 every 10,000 tons of paving	Production start-up evaluation, and minimum 1 random test for every 10,000 tons or less of paving	

Table 6-1.13. Materials Acceptance Sampling and Testing Requirements: Asphalt Concrete (*Standard Specifications* Section 39) (5 of 6)

Test	Test Method	Sample Size & Container Type	Sampling (See Note 1)	Sampling Frequency	Acceptance Test Frequency	Remarks
RUBBERIZED HOT MIX ASPHALT: Gap Graded (continued)						
Moisture Susceptibility	AASHTO T 283	75 lb (see Notes 5 & 6) (8x8x3=18 boxes, 8x8x4=15 boxes, 8½x8½x4½ =12 boxes)	Loose mix at plant, truck, or windrow	Production start-up evaluation, 1 every 50,000 tons of paving	Production start-up evaluation, and minimum 1 random test for every 50,000 tons of paving	Test for dry strength and wet strength
OPEN GRADED FRICTION COURSE (OGFC)						
Asphalt Binder Content	AASHTO T 308, Method A	20 lb (see Note 5) 4, 1-gal metal containers with friction lids	Loose mix from behind the paver (see Note 4)	1 for each 750 tons, 1 per day minimum	Production start-up evaluation; minimum 1 per day of paving	
Moisture Content	AASHTO T 329	10 lb, sealed metal container	Loose mix from behind the paver (see Note 4)	Production start-up evaluation, and minimum 1 per project	Production start-up evaluation, and minimum 1 per project during paving	Test within 1 hour of sampling
BONDED WEARING COURSE: Gap Graded (BWC-G) (See Note 7)						
Asphalt Binder Content	AASHTO T 308, Method A	20 lb (see Note 5) 4, 1-gal metal containers with friction lids	Loose mix at plant	1 for each 750 tons, 1 per day minimum	Production start-up evaluation. Minimum 1 per day of paving	
Moisture Content	AASHTO T 329	10 lb sealed metal container	Loose mix at plant	Production start-up evaluation, and minimum 1 per project	Production start-up evaluation, and minimum 1 per project during paving	Samples should be tested within 1 hour of sampling
PAVEMENT DENSITY						
Density of cores (% of maximum theoretical density) (see Note 8)	California Test 375	4- or 6–in cores	Final layer, cored to the specified total paved thickness	1 for each 250 tons	1 for each 250 tons	Density applies to HMA thickness of 0.15 ft or greater

Table 6-1.13. Materials Acceptance Sampling and Testing Requirements: Asphalt Concrete (*Standard Specifications* Section 39) (6 of 6)

Test	Test Method	Sample Size & Container Type	Sampling Location (See Note 1)	Sampling Frequency	Acceptance Test Frequency	Remarks
PAVEMENT SMOOTHNESS						
Straightedge	N/A	N/A	Pavement surface; see Note 9	Entire final surface; see Remarks	Entire final surface; see Remarks	Areas exempt from Inertial Profiler
Inertial Profiler for Mean Roughness Index and Areas of Localized Roughness	California Test 387 AASHTO R 56 & AASHTO R 57	Each 0.1 mile	Pavement surface	Entire final surface	Entire final surface; see Remarks	Entire final surface excluding areas requiring straightedge; use contractor-furnished profiles for IRI values within 10% of Caltrans' IRI values
TACK COAT						
Asphalt Binder	Based on asphalt type used (see *Standard Specifications* Section 92)	1-qt round wide-mouth can with friction top lid	Spray bar on asphalt distributor truck	Each truck load	1 random per project	
Asphaltic Emulsion	Based on emulsion type used (see *Standard Specifications* Section 94)	1/2-gal plastic jug with screw-on lid	Spray bar on emulsion distributor truck	Each truck load	1 random per project	
Spread Rate	California Test 339	N/A	Pavement	N/A	As necessary for verification of tack coat spread rate	Verify tack coat spray rate is sufficient to meet the minimum specified residual rate. (see example in Section 4-9403, "During the Course of Work," in this manual)

Notes:
1. Refer to California Test 125 for sampling procedures.
2. When using RAP, RAS or RAP/RAS, adjust gradation by the correction factor determined under California Test 384.
3. Store three 20-lb canvas bags for dispute resolution.
4. Sampling HMA behind the paver is the preferred location. You may also take samples from the windrow, production plant, or truck.
5. Sample sizes are based on split samples—one sample for acceptance testing, and one for dispute resolution. Store one-half of the boxes or cans for dispute resolution.
6. Contractor ships directly to district material laboratory.

7. For BWC using RHMA-G, RHMA-O, or HMA-O, sampling and testing must comply with requirements for RHMA-G, RHMA-O, or HMA-O.
8. Determine percent of theoretical maximum density under California Test 375, except use AASHTO T 275 to determine in-place density of each core and AASHTO T 209, Method A to determine theoretical maximum density instead of calculating maximum density.
9. May use Inertial Profiler data and ProVAL Smoothness Assurance "Rolling Straightedge Comparison Tool" to assist in determining where to check with 12-foot straightedge.

Table 6-1.14. Materials Acceptance Sampling and Testing Requirements:
Concrete Pavement (*Standard Specifications* Section 40) See Table 6-1.17 for concrete materials

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
CONCRETE					
Modulus of Rupture (28-days)	California Test 523	2 beams of 6x6x32 in. for centerpoint loading or 6x6x20 in. for third-point loading	Concrete truck discharge chute	1 set per age for each 1,000 cu yd, 1 per day minimum; see Remarks and Note 2	Recommend frequency of every 2,000 cu yd if after 10 sets all tests are in compliance
Air Content	California Test 504	See test method	Concrete truck discharge chute	1 every day of production; see Remarks	Only test when air entrainment is specified
PAVEMENT					
Thickness	California Test 531	4-in. diameter core, full thickness of pavement	See Section 4-4004, "Level of Inspection," of this manual	1 every 1,200 sq yd	
Dowel Bar Alignment and Concrete Consolidation	Measurement and Inspection	4-in. diameter core size	Transverse pavement joints	1 test every 700 sq yd; see Remarks	Each test consists of 2 cores, one on each end of dowel bar
Tie Bar Alignment and Concrete Consolidation	Measurement and Inspection	4-in. diameter core size	Longitudinal pavement joints	1 test every 4,000 sq yd; see Remarks	Each test consists of 2 cores, one on each end of tie bar
Coefficient of Friction	California Test 342	N/A	Pavement surface	1 test for each day of paving; see Remarks	Each test consists of 5 measurements
Smoothness - Straightedge	Measurement with 12-ft straightedge	N/A	Pavement surface	Entire final surface requiring straightedge	
Smoothness - Inertial Profiler for Mean Profile Index and Areas of Localized Roughness	AASHTO R 56, AASHTO R 57, and California Test 387	0.1 mile	Pavement surface	Entire final surface; see Remarks	Entire final surface excluding specified areas

Notes:
1. Refer to California Test 125 for sampling procedures.
2. If concrete modulus of rupture is close to specification limit or outside the specification limits, sample and test concrete every 1,000 cu yd so that deductions may be taken for noncompliant material.

Table 6-1.15. Materials Acceptance Sampling and Testing Requirements: Existing Concrete Pavement (*Standard Specifications* Section 41)

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
INDIVIDUAL SLAB REPLACEMENT WITH RAPID STRENGTH CONCRETE (Section 41-9)					
Coefficient of Friction	California Test 342	N/A	Pavement surface	1 every 1,200 sq yd; see Remarks	Each test consists of 5 measurements
Smoothness - Straightedge	Measurement with 12-ft straightedge	N/A	Pavement surface	Entire final surface; see Remarks	Areas exempt from Inertial Profiler
Modulus of rupture (3-days)	California Test 524	3 beams of 6x6x20 inches	Concrete truck discharge chute	1 per shift	

Notes:
1. Refer to California Test 125 for sampling procedures.

Table 6-1.16. Materials Acceptance Sampling and Testing Requirements: Concrete Structures (*Standard Specifications* Section 51) See Table 6-1.17 for concrete materials

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
JOINT SEALS TYPE B (Section 51-2.02C(2))					
Various properties; must comply with *Standard Specifications* Section 51-2.02C(2)	See *Standard Specifications* Section 51-2.02(C)	1 piece, 3 ft	Job site	Each lot; see Remarks	Certificate of compliance and certified test report required for each lot; test report must include the seal movement rating, manufacturer minimum uncompressed width and test results; submit samples at least 30 days before use
JOINT SEALS Type A and Type AL (Section 51-2.02B)					
Various properties; must comply with *Standard Specifications* Section 51-2.02B(2)	See *Standard Specifications* Section 51-2.02B(2)	1 qt of each component and primer	Job site	1 sample from each component of each batch	Certificate of compliance required for each batch of sealant; submit samples at least 30 days prior to use

Notes:
1. Refer to California Test 125 for sampling procedures.

Table 6-1.17. Materials Acceptance Sampling and Testing Requirements: Concrete (*Standard Specifications* Section 90) (1 of 6)

Concrete, Except Minor Concrete and Rapid Strength Concrete

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
AGGREGATE: Coarse Aggregate					
Los Angeles Rattler (loss at 500 revolutions)	California Test 211	See Note 2	Stockpile	Prior to production and minimum 1 random test for every 25,000 cu yd; see Remarks	1 for every 4,000 cu yd, if initial test shows abrasion loss greater than 40%
Cleanness Value	California Test 227	25 lb	Stockpile	Prior to production and minimum 1 for every 600 cu yd, 1 per day minimum; see Remarks	Recommend 1 acceptance test per day if 3 consecutive results exceed 80; increase sampling to 1 for every 300 cu yd (deductive lot) with engineer's authorization
Sieve Analysis	California Test 202	50 lb	Belt Feed	Prior to production and minimum 1 for every 600 cu yd, 1 per day minimum; see Remarks	Recommend 1 acceptance test per day if 3 consecutive results are within operating range; increase sampling to 1 for every 300 cu yd (deductive lot) with engineer's authorization
AGGREGATE: Fine Aggregate					
Organic Impurities	California Test 213	See Note 2	Stockpile	Prior to production or when contamination is suspected	
Durability	California Test 229	See Note 2	Stockpile	Prior to production	
Sand Equivalent	California Test 217	25 lb	Stockpile	Prior to production and minimum 1 for every 600 cu yd, 1 per day minimum; see Remarks	Recommend 1 acceptance test per day if 3 consecutive results exceed 80; increase sampling to 1 for every 300 cu yd (deductive lot) with engineer's authorization
Sieve Analysis	California Test 202	50 lb	Belt feed	Prior to production and minimum 1 for every 600 cu yd, 1 per day minimum; see Remarks	Recommend 1 acceptance test per day if 3 consecutive results are within operating range; increase sampling to 1 for every 300 cu yd (deductive lot) with engineer's authorization

Table 6-1.17. Materials Acceptance Sampling and Testing Requirements: Concrete (*Standard Specifications* Section 90) (2 of 6)

Concrete, Except Minor Concrete and Rapid Strength Concrete

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
AGGREGATE: **Coarse & Fine Aggregate**					
Specific Gravity and Absorption	California Test 206, California Test 207	See Note 2	Stockpile	Prior to production and when aggregate source changes	
Soundness	California Test 214	See Note 2	Stockpile	Prior to production	Soundness for fine aggregate waived if durability is ≥ 60
Sieve Analysis (combined gradation determined with fine and coarse aggregate sieve analyses)	California Test 202		N/A	Prior to production and minimum 1 for every 600 cu yd, 1 per day minimum; see Remarks	Recommend 1 acceptance test per day if 3 consecutive results are within operating range. Increase sampling to 1 for every 300 cu yd (deductive lot) with engineer's authorization
CEMENTITIOUS MATERIALS					
Cement, various properties; must comply with *Standard Specifications* Section 90-1.02B(2)	See *Standard Specifications* Section 90-1.02B(2)	8 lb	Concrete plant	Sample each 100 tons of cement, 2 per day maximum; see Remarks	Cement must be on Authorized Material List; cement accepted based on certificate of compliance with each shipment; recommend 1 verification test per 5 samples
Supplementary Cementitious Materials (SCM), various properties; must comply with *Standard Specifications* Section 90-1.02B(3)	See *Standard Specifications* Section 90-1.02B(3)	8 lb	Concrete plant	Sample each 100 tons of SCM, 2 per day maximum; see Remarks	SCMs must be on Authorized Material List; SCM accepted based on certificate of compliance with each shipment; recommend 1 verification test per 5 samples

Table 6-1.17. Materials Acceptance Sampling and Testing Requirements: Concrete (*Standard Specifications* Section 90) (3 of 6)

Concrete, Except Minor Concrete and Rapid Strength Concrete

Test	Test Method	Sample Size & Container Size	Sampling Location (See Note 1)	Acceptance Test Frequency	Remarks
WATER					
Chlorides	California Test 422	Clean 2-qt plastic jug with lined, sealed lid	At point of use	1 per source; see Remarks	Water supplies for domestic use do not need to be tested
Sulfates	California Test 417				
Setting Time	ASTM C 191 or ASTM C 266	Contact METS for required quantity of water sample	At point of use	1 per source; see Remarks	Water supplies for domestic use do not need to be tested
Mortar Compressive Strength	ASTM C109				
Coloring Agents	Must comply with *Standard Specifications* Section 90-1.02D				
Alkalis					
Specific Gravity					
ADMIXTURES: Air Entraining Agent					
Air entraining properties Must comply with *Standard Specifications* Section 90-1.02E	See *Standard Specifications* Section 90-1.02E	1-qt can or plastic bottle of liquid, 2 lb of powder	Concrete plant	Sample each shipment; see Remarks	Must be on Authorized Material List and certificate of compliance must accompany each shipment; recommend 1 verification test per 5 samples
CHEMICAL ADMIXTURE: Water Reducers or Set Retarders					
Claimed properties, chloride identification	ASTM C494 Type A, B, D, F or Type G California Test 415	1-qt can of liquid, 2 lb of powder	Concrete plant	Sample each shipment; see Remarks	Must be on Authorized Material List and certificate of compliance must accompany each shipment; recommend 1 verification test per 5 samples
CONCRETE for Pavement and Structures					
Shrinkage	AASHTO T 160 Modified See *Standard Specifications* Section 90-1.01D(3)	Set of three: 4x4x11¼ in.	During mix design process	Prior to production; see Remarks	Engineer may use contractor-provided test result for acceptance; test results must be within 3 years of contract authorization date

Table 6-1.17. Materials Acceptance Sampling and Testing Requirements: Concrete (*Standard Specifications* Section 90) (4 of 6)

Concrete, Except Minor Concrete and Rapid Strength Concrete

Test	Test Method	Sample Size & Container Size	Sampling Location	Acceptance Test Frequency	Remarks
CONCRETE Designated Compressive Strength 3600 psi or Greater					
Yield	California Test 518	See test method	Concrete truck discharge chute; see Note 3	As necessary to assure accuracy of mix design; minimum 2 per each mix design	No deductions for cement content will be made based on the results of California Test 518
Concrete Uniformity	ASTM C143, California Test 533	See test method	Concrete truck discharge chute; see Note 3	When compressive test specimen is fabricated and when consistency or uniformity is questionable, minimum 2 per day	
Concrete Uniformity	California Test 529	100 lb	Concrete truck discharge chute; see Note 3	When uniformity is questionable	
Compressive Strength	ASTM C172, California Test 540	1 set of 2 cylinders 6x12 in. for each test	Concrete truck discharge chute; see Note 3	1 set per age for every 300 cu yd concrete or as required for acceptance, minimum 1 set per project; see Remarks	For trial batches, see *Standard Specifications* or job special provisions and Section 6-3, "Field Tests," of this manual
Air Content	California Test 504	See test method	Concrete truck discharge chute; see Note 3	1 every 4 hours of production and when test specimens are fabricated; see Remarks	Where air is specified for freeze-thaw resistance, a minimum of 1 every 30 cu yd
CONCRETE WITH COMPRESSIVE STRENGTH LESS THAN 3,600 psi					
Concrete Uniformity	ASTM C143, California Test 533	See test method	Concrete truck discharge chute; see Note 3	When compressive test specimen is fabricated and when uniformity is questionable	
Concrete Uniformity	California Test 529	100 lb	Concrete truck discharge chute; see Note 3	When uniformity is questionable	
Compressive Strength	California Test 540, California Test 521	1 set of 2 cylinders, 6x12 in., for each test	Concrete truck discharge chute; see Note 3	1 set per age for every 300 cu yd, minimum 1 set per project	
Air Content	California Test 504	See test method	Concrete truck discharge chute; see Note 3	When compressive test specimens are fabricated; see Remarks	Where air is specified for freeze-thaw resistance, a minimum of 1 every 100 cu yd

Table 6-1.17. Materials Acceptance Sampling and Testing Requirements: Concrete (*Standard Specifications* Section 90) (5 of 6)

Concrete, Except Minor Concrete and Rapid Strength Concrete

Test	Test Method	Sample Size & Container Size	Sampling Location	Acceptance Test Frequency	Remarks
CURING COMPOUND					
Curing Compound; must comply with *Standard Specifications* Section 90-1.03B(3)	ASTM C309	1-qt can	At time of use; see Note 1	1 every shipment; see Remarks	Each shipment must have certificate of compliance that includes: 1. Test results for tests specified in Section 90-1.01D(6) of *Standard Specifications* 2. Certification that material was tested within 12 months before use
CEMENTITIOUS MATERIALS					
Cement, various properties; must comply with *Standard Specifications* Section 90-1.02B(2)	See *Standard Specifications* Section 90-1.02B(2)	8 lb	Concrete plant	Sample and test if cement quality is questionable; see Remarks	Cement source must be shown on Authorized Material List; certificate of compliance must accompany each cement shipment
Supplementary Cementitious Materials (SCM), various properties; must comply with *Standard Specifications* Section 90-1.02B(3)	See *Standard Specifications* Section 90-1.02B(3)	8 lb	Concrete plant	Sample and test if SCM quality is questionable; see Remarks	SCM source must be shown on Authorized Material List; certificate of compliance must accompany each SCM shipment
ADMIXTURES: Air Entraining Agent					
Air entraining properties; must comply with *Standard Specifications* Section 90-1.02E	See *Standard Specifications* Section 90-1.02E	N/A	N/A	See Remarks	Must be on Authorized Material List and certificate of compliance must accompany each shipment
CHEMICAL ADMIXTURES: Water Reducers or Set Retarders					
Claimed properties, chloride identification	ASTM C494 Type A, B, D, F or Type G California Test 415	N/A	N/A	See Remarks	Must be on Authorized Material List and certificate of compliance must accompany each shipment

Table 6-1.17. Materials Acceptance Sampling and Testing Requirements: Concrete (*Standard Specifications* Section 90) (6 of 6)

Minor Concrete

Test	Test Method	Sample Size & Container Size	Sampling Location	Acceptance Test Frequency	Remarks
CONCRETE					
Yield	California Test 518	See test method	Concrete truck discharge chute; see Note 3	As necessary to assure accuracy of mix design; minimum 1 per each mix design; see Remarks	No deductions for cement content will be made based on the results of California Test 518
Compressive Strength	California Test 540, California Test 521	1 set of 2 cylinders, 6x12 in., for each test	Concrete truck discharge chute; see Note 3	Sample and test if concrete quality is questionable; minimum 1 per mix design; see Remarks	Minor concrete must have the strength described or 2,500 psi, whichever is greater; see *Standard Specifications* Section 90-1.02A
Air Content	California Test 504	See test method	Concrete truck discharge chute; see Note 3	Where air is specified for freeze-thaw resistance, a minimum of 1 every 100 cu yd	Where air is specified for freeze-thaw resistance, a minimum of 1 every 100 cu yd
CURING COMPOUND					
Curing Compound; must comply with *Standard Specifications* Section 90-1.03B(3)	ASTM C309	1-qt can	At time of use; see Note 1	1 every shipment; see Remarks	Each shipment must have certificate of compliance that includes: 1. Results for tests specified in Section 90-1.01D(6) of *Standard Specifications* 2. Certification that material was tested within 12 months before use

Notes:
1. Refer to California Test 125 for sampling procedures.
2. For initial testing, provide 100 lb of 1-1/2 in. x 3/4 in., 75 lb of 3/4 in. x No. 4, 75 lb of pea gravel, and 50 lb of sand. Use this material for California Test 202, 206, 207, 211, 213, 214, 217, 227 and 229.
3 Refer to California Test 539 for method of sampling fresh concrete.

Table 6-1.18. Materials Acceptance Sampling and Testing Requirements: Miscellaneous Materials (1 of 4)

Test	Test Method	Sample Size & Container Size	Sampling Location	Acceptance Test Frequency	Remarks
BARBED WIRE AND WIRE MESH FENCES (Section 80-2)					
Barbed Wire, various properties; must comply with *Standard Specifications* Section 80-2.02D	ASTM A121	1 yd length	Job site	As necessary for verification if quality is questionable	
BOLTS AND HARDWARE (Section 75)					
		2 samples each diameter		Each lot	Sample and test if not previously inspected at the source
CHAIN LINK FENCES (Section 80-3)					
Wire Mesh, various properties; must comply with *Standard Specifications* Section 80	ASTM A116, Class 1	2 ft width	Job site	Each lot for verification if quality is questionable; see Remarks	Certificate of compliance required for vinyl clad fencing
CONCRETE PIPE (Section 65)					
Compliance with specifications		Contact METS for instructions		Contact METS for instructions	Sample and test if not previously inspected at source
CONDUIT (Section 86-1.02B)					
Conduit, various properties; must comply with *Standard Specifications* Section 86-1.02B	See *Standard Specifications* Section 86-1.02B	2 ft. long from center of length, 2 samples each size	Job site	As necessary for verification if quality is questionable	
ELECTRICAL CONDUCTORS AND CABLES (Section 86-1.02F)					
Electrical Conductors and Cables, various properties; must comply with *Standard Specifications* Section 86-1.02F	See *Standard Specifications* Section 86	2 ft. long, include markings, 2 samples per gauge	Job site	Each lot for verification if quality is questionable	

Table 6-1.18. Materials Acceptance Sampling and Testing Requirements: Miscellaneous Materials (2 of 4)

Test	Test Method	Sample Size & Container Size	Sampling Location	Acceptance Test Frequency	Remarks
EXPANSION JOINT FILLER					
Compliance with specifications		6 in. long, full width of sheet		Each 1,000 sq ft not less than 2 per shipment	
GEOSYNTHETICS (Section 96)					
Various properties; must comply with *Standard Specifications* Section 96	See *Standard Specifications* Section 96	1 piece, 3 ft x full width of roll	Job site	Each lot for verification if quality is questionable. See Remarks	Certificate of compliance required for each lot; unroll at least 1 circumference before sampling
PAINT (Section 91)					
Paint, various properties; must comply with *Standard Specifications* Section 91	See *Standard Specifications* Section 91	For miscellaneous painting, 1 qt (see Section 6-2 of this manual)	Job site	Each batch; see Remarks	If less than 20 gallons, testing not required and resident engineer must field release. Zinc-rich primer must be on the Authorized Material List
PAVEMENT MARKERS (Section 81-3)					
Pavement Markers, various properties; must comply with *Standard Specifications* Section 81-3	See *Standard Specifications* Section 81-3	20 markers	Job site	As necessary for verification if quality is questionable; see Remarks	Each shipment must have certificate of compliance
PERMEABLE MATERIALS: (Section 68-2.02F)					
Durability Index	California Test 229	50 lb	Stockpile	Prior to use	
Sieve Analysis	California Test 202	50 lb	Stockpile	Prior to use,1 every day	
PERMEABLE MATERIALS: Class 3 (Section 68-2.02F)					
Crushed Faces	California Test 205	50 lb	Stockpile	Prior to use	
PRESTRESSED TENDON GROUT (Section 50)					
Efflux time	California Test 541	One 6x12 in. 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; see Remarks	Repeat acceptance tests whenever source of material is changed

Table 6-1.18. Materials Acceptance Sampling and Testing Requirements: Miscellaneous Materials (3 of 4)

Test	Test Method	Sample Size & Container Size	Sampling Location	Acceptance Test Frequency	Remarks
RAISED BARS (PRECAST)					
Compliance with specifications		1 unit or full size bar		Each lot	Sample and test if not previously inspected at the source
REINFORCING STEEL (Section 52)					
Reinforcing Steel, various properties	See *Standard Specifications* Section 52	2 samples, 30 in., except 40 in. for No. 14 and No. 18	Job site	As necessary for verification if quality is questionable; see Remarks	Each shipment must be accompanied by a certificate of compliance
SLOPE PROTECTION (Section 72)					
Size	N/A		Quarry or stockpile	As required for acceptance; see Remarks	Adequate size of slope protection documented by measuring or weighing the material
Apparent Specific Gravity	California Test 206	75 lb	Quarry or stockpile	Prior to use	
Absorption	California Test 206				
Durability Index	California Test 229				
STEEL PRODUCTS					
		Contact METS for instructions		Contact METS for instructions	
STRUCTURAL STEEL AND MISCELLANEOUS METAL (Sections 55 & 75)					
		2 samples, 30-in., cut parallel to direction of rolling		Each heat or melt or 10 tons or fraction	Sample and test if not previously inspected at the source
STRUCTURAL STEEL COATINGS (Section 59)					
Paint, various properties; must comply with *Standard Specifications* Section 59	See *Standard Specifications* Section 59	For bridge or major structure, send an unopened 5-gal can	Job site	Each batch; see Remarks	Unused portion of 5-gal sample will be returned to job; see Section 6-2, "Acceptance of Manufactured or Fabricated Materials and Products," of this manual

Table 6-1.18. Materials Acceptance Sampling and Testing Requirements: Miscellaneous Materials (4 of 4)

Test	Test Method	Sample Size & Container Size	Sampling Location	Acceptance Test Frequency	Remarks
WATER-PROOFING MATERIALS (Section 54)					
Glass Fiber	ASTM D1668, Type 1	9 sq ft of asphalt saturated cotton fabric	Job site	1 sample from each lot	
Asphalt	ASTM D449	5 lb of asphalt	Job site	1 sample from each lot	
Primer	ASTM D41	1 qt of asphalt primer	Job site	1 sample from each lot	
WELDED WIRE REINFORCEMENT (Section 52-1.02C)					
Welded Wire Reinforcing Steel, must comply with *Standard Specifications* Section 52-1.02C	ASTM A 1064/A 1064M	9 sq ft	Job site	As necessary for verification if quality is questionable; see Remarks	Each shipment must be accompanied by a certificate of compliance

Section 2 Acceptance of Manufactured or Fabricated Materials and Products

6-201 General

6-201A References

6-202 Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products

6-202A Contractor

6-202A (1) Notice of Materials to Be Used

6-202A (2) Certificates of Compliance, Mill Test Reports, and Buy America Requirements

6-202A (3) Shop Drawings

6-202A (4) Quality Control Plans

6-202B Resident Engineer

6-202B (1) Notice of Materials to Be Used

6-202B (2) Job Site Materials Inspection

6-202B (3) Authorized Facilities Audit List

6-202B (4) Materials Production Plants

6-202C Materials Engineering and Testing Services

Figure 6-2.1 Inspection and Release Flowchart—Source Inspection

6-202C (1) Processing Form CEM-3101

6-202C (2) Form TL-0028, "Notice of Materials to Be Inspected at Jobsite"

6-202C (3) Form TL-0608, "Notice of Materials to Be Furnished"

6-202C (4) Form TL-0038, "Inspection Request"

6-202D Assignment to Resident Engineer

6-203 Manufactured or Fabricated Materials and Products Acceptance

6-203A Source Inspection

Figure 6-2.2 Source Inspection Flowchart

6-203A (1) Inspection Requests and Dispatching

6-203A (2) Material Inspection—Sampling and Release

6-203A (3) Nonconforming Materials at the Source

6-203A (4) Source Inspection Expense Deductions

6-203A (5) Source Inspected Materials Acceptance

Table 6-2.1 Inspection of Fabricated and Manufactured Materials

6-203A (6) Materials Manufactured to Caltrans-Specified Formulation

6-203B Materials Accepted on the Basis of Authorized Material List

Table 6-2.2 Materials Acceptance Based on Authorized Material List

6-203C Materials Accepted on the Basis of a Certificate of Compliance

Table 6-2.3 Materials Accepted by Certificate of Compliance

6-203C (1) Asphalt
6-203C (2) Asphalt Rubber Latex Joint Filler
6-203C (3) Two-Component Joint Sealing Compounds
6-203C (4) Cement
6-203C (5) Paint
6-203C (6) Pavement Traffic Stripe and Marking Materials
6-203C (7) Reinforcement
6-203D Field Inspection and Release by the Resident Engineer
Figure 6-2.3 Inspection and Release Flowchart—Inspection at Job Site

Section 2 Acceptance of Manufactured or Fabricated Materials and Products

Section 2
Acceptance of Manufactured or Fabricated Materials and Products

6-201 General

6-201
General

This section describes procedures for acceptance of manufactured or fabricated materials and products. This section also describes the types of materials that are considered manufactured materials and provides guidelines for sampling these materials.

Sampling and testing materials and products must be done in accordance with contract specifications. Sampling and testing are of equal importance for assuring materials and products meet acceptance specifications.

The contractor is responsible for notifying the resident engineer of the need for inspection and acceptance testing of manufactured materials and products by submitting Form CEM-3101, "Notice of Materials to Be Used," early in the project. Refer to Section 6-202, "Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products," of this manual for details on completing and submitting this form.

The resident engineer needs to be knowledgeable about acceptance methods used for different manufactured or fabricated materials and products, including:

Source inspection and testing.

- Manufacturer certificate of compliance.
- Manufacturer certificate of compliance with additional attachments.
- Field release of material.
- Field samples of manufactured materials or products.

When field sampling of manufactured or fabricated materials or products is required, the resident engineer is responsible for the "chain of custody" for material and product acceptance samples. Material acceptance samples must be under the control of Caltrans from the sampling point to when the sample is tested. The chain of custody for material and product samples is an important part of the Caltrans quality assurance program.

6-201A References

- *Independent Assurance Manual*, Materials Engineering and Testing Services (METS), Caltrans:

  http://www.dot.ca.gov/hq/esc/Translab/ormt/IA_reports/index.htm

- *Bridge Construction Records and Procedures* manual, Vol. 2, Structure Construction:

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

- California Test, METS, Caltrans:

  http://www.dot.ca.gov/hq/esc/ctms/index.html

- AASHTO, ASTM, and other test methods are available at IHS Standards Expert website (by clicking on IHS Spec's and Standards Search), accessible by Caltrans staff at:

  http://des.onramp.dot.ca.gov/materials-engineering-and-testing-services-mets

- J2 Database, METS, Structural Materials electronic materials management database where each project's test results and CEM-3101 responses are captured along with other METS project-related information and accessible by Caltrans staff:

  http://onramp.dot.ca.gov/hq/esc/mets/structure_materials/

- *Material Plant Quality Program (MPQP),* Division of Construction:

  http://www.dot.ca.gov/hq/construc/hma/

- *Quality Manual,* METS, Structural Materials, methods and procedures to provide consistent quality assurance and source inspection:

  http://onramp.dot.ca.gov/hq/esc/mets/structure_materials/restrictedosm/osmsmrdataspry.php?tab=21

- *Overhead Sign Structures Guide,* Design and Technical Services, accessible to Caltrans staff:

  http://des.onramp.dot.ca.gov/structure-policy-innovation/signs-overhead-structures

6-202 Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products

6-202 Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products

The following describe the responsibilities for acceptance of manufactured or fabricated materials and products.

6-202A Contractor

The contractor is responsible for providing materials that comply with the contract specifications. The contractor is responsible for the quality of materials and, where required by the specifications, must provide a notice of materials to be used, shop drawings, certificates of compliance, mill test reports, quality control plans, and quality control test results. The contractor must use materials from the Authorized Material List, provide fabricated materials from audited facilities, and use materials that comply with Buy America requirements.

6-202A (1) Notice of Materials to Be Used

The contractor is responsible for submitting Form CEM-3101, "Notice of Materials to Be Used," to the resident engineer for all materials to be used on the project. The contractor must provide sufficient notification to the resident engineer on the source and location of materials to be inspected and tested so that the work will not be delayed. Section 6, "Control of Materials," of the *Standard Specifications* requires the contractor to list on Form CEM-3101 all sources of materials and locations where these

materials are available for inspection. Receiving this form in a timely manner is critical to the success of the materials management process.

Form CEM-3101, which includes detailed instructions, is available at:

http://www.dot.ca.gov/hq/construc/forms.htm

6-202A (2) Certificates of Compliance, Mill Test Reports, and Buy America Requirements

The *Standard Specifications* requires the contractor to submit a certificate of compliance for various materials before they are incorporated into the work. Section 6-2.03C, "Certificates of Compliance," of the *Standard Specifications* states that when a certificate of compliance is required it must:

- Be submitted for each lot of material and clearly indicate which lot is included in the certificate.
- Be signed by the producer of the material stating that it complies with the contract.

The intent of the certificate of compliance is to communicate to Caltrans that the contractor has accepted the material and is confident that it complies with the contract specifications. The contractor is responsible for providing the certificate of compliance prior to incorporating material into the project. The certificate of compliance and any supporting documentation must accompany the material to the job site when materials are delivered.

Table 6-2.3, "Materials Accepted by Certificate of Compliance," in Section 6-203C, "Materials Accepted on the Basis of a Certificate of Compliance," of this manual provides a list of materials requiring a certificate of compliance, as well as any additional documents.

The *Standard Specifications* requires the contractor to provide certified test reports along with the certificate of compliance for various materials. For steel, this test data is commonly known as a mill test report. A certified mill test report is required for each heat and must contain physical and chemical analysis of the material. The requirements for the mill test report vary depending on the section of the *Standard Specifications* the material falls under.

Section 6-1.04, "Buy America," of the *Standard Specifications* provides detailed information on Buy America requirements. Refer to Section 3-604, "Buy America," of this manual for additional information. The following are examples of acceptable language included in the certificate of compliance to verify Buy America compliance:

"All melting and manufacturing processes for the product occurred in U.S."

"100% melted and manufactured in the U.S.A."

6-202A (3) Shop Drawings

The *Standard Specifications* requires the contractor to submit shop drawings for review by Caltrans for certain structures such as structural steel and structural precast concrete. The shop drawings must include both shop details and erection plans. For more information on submittal and authorization of shop details and erection plans, refer to the *Standard Specifications*.

Contractors must submit shop drawings for overhead sign structures. For more information on submittal and authorization of shop drawings, refer to the *Overhead*

Sign Structures Guide. Section 4-56, "Overhead Sign Structures, Standards, and Poles," of this manual contains additional information.

Prior to Caltrans performing any source inspection, the contractor is required to have a copy of the authorized shop drawings at the location of inspection.

6-202A (4) Quality Control Plans

The *Standard Specifications* requires the contractor to submit a quality control plan for certain types of production. Information on quality control plans for those production types is provided in the *Standard Specifications*:

- Section 11-2, "Welding Quality Control." METS also has information on quality control plan requirements for welding:

  http://www.dot.ca.gov/hq/esc/Translab/OSM/smbresources.htm

- Section 39-2: "Hot Mix Asphalt." The Division of Construction also offers guidance on quality control issues:

  http://www.dot.ca.gov/hq/construc/hma/

- Section 40-1: "Concrete Pavement"
- Section 41-9: "Individual Slab Replacement with Rapid Strength Concrete"
- Section 56-2: "Overhead Sign Structures"
- Section 59-2: "Painting Structural Steel"
- Section 59-5: "Thermal Spray Coat Structural Steel"
- Section 90-4: "Precast Concrete"

The resident engineer does not allow work to begin until the quality control plan is authorized for that production. For more information on the contents of quality control plans, refer to the *Standard Specifications*.

Specifications for welded products usually require the contractor to submit the fabricator's welding quality control plan to the resident engineer for authorization prior to manufacturing any products for Caltrans. For details on quality control plans for welding, refer to Section 180, "Welding," of *Bridge Construction Records and Procedures*, Vol. 2:

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

6-202B Resident Engineer

The resident engineer must ensure that materials entering the work comply with the requirements in the contract specifications.

6-202B (1) Notice of Materials to be Used

The resident engineer must ensure that the contractor submits Form CEM-3101, "Notice of Materials to Be Used," for all materials. If the contractor does not submit Form CEM-3101 before the preconstruction conference, provide a list to the contractor during the preconstruction meeting of materials that are required to be listed on Form CEM-3101.

If the sources of all materials are not known, the contractor may submit a partial list of materials sources on Form CEM-3101 and submit Form CEM-3101 supplements as soon as other sources are known.

METS developed the J2 database for tracking project materials requirements, Form CEM-3101 processing, materials test results, and source inspection. Entering the contract number at the top of the database in the "Projects" box opens that project's main page. Clicking on the "3101 Report" tab opens a list of all the bid items requiring CEM-3101s for the project and which CEM-3101s have been received. The list shows the name and address of the supplier and the date the CEM-3101 was received.

Assistance in developing a list of project materials that require Form CEM-3101 and in navigating the J2 database is available from the structural materials representative for the project:

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

The contractor's submitted Form CEM-3101 must include the following information:

- The contract number and the contract items for which the material will be used. If the contractor uses a project number (different from the Caltrans contract number), include that number.
- The name, address, and telephone number of the manufacturer.
- 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 Form CEM-3101 for the required information and for completeness. To ensure that all structural materials are listed, a list of materials necessary based on contract bid item is available at:

http://www.dot.ca.gov/hq/esc/Translab/OSM/j2_item_categories.php

If the contractor's Form CEM-3101 is incomplete or incorrect, require the contractor to complete the form. When the contractor's Form CEM-3101 has been reviewed and is complete, promptly distribute Form CEM-3101 copies, including one to METS. The resident engineer sends Form CEM-3101 to the materials administrator using one of the following methods:

- Email: MaterialsAdministratorMETS@dot.ca.gov
- Fax: (916) 227-7084
- Postal mail:

  Materials Administrator, Mail Station #5
  Materials Engineering and Testing Services
  5900 Folsom Blvd, Room 517
  Sacramento, CA 95819

METS will make required assignments for sampling, testing, and inspection of materials as noted in Section 6-202C, "Materials Engineering and Testing Services," of this manual.

6-202B (2) Job Site Materials Inspection

Based on assignment of materials inspection from METS to the resident engineer and the information shown on Form CEM-3101, the resident engineer must identify the appropriate district samplers, testers, and inspectors. Following is a partial list of those who may need to be notified to perform material acceptance:

- District staff who will be obtaining samples and tests on each material.
- District staff who will be obtaining samples for each material accepted on the basis of a certificate of compliance. Testing is normally done by METS.
- Structure Construction for reviewing and authorizing shop drawings for overhead sign structures.
- District weights and measures coordinator for inspecting materials plants in accordance with the *MPQP*.

6-202B (3) Authorized Facilities Audit List

Some structural materials such as structural precast concrete, overhead signs and poles, and steel pipe piling must be fabricated at a facility on the authorized facility audit list of fabricators who have successfully completed Caltrans' facility audit. If these materials are included in the scope of work, ensure that the contractor is aware of these requirements. Information on the authorized facility audit list is available at:

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

6-202B (4) Materials Production Plants

The resident engineer must ensure materials production plants meet specifications prior to producing material for Caltrans. Request assistance from the district weights and measures coordinator for inspecting materials plants including:

- Hot mix asphalt plants
- Concrete plants
- Volumetric proportioning plants (rapid strength concrete, polyester concrete, and pavement seal coats)

Section 9-1.02 , "Measurement," of the *Standard Specifications* indicates the general requirements for weighing, measuring, or metering devices and the requirement to place security seals on material plant controllers. The district weights and measures coordinator will follow the *MPQP* and the contract specifications for material plant authorization.

6-202C Materials Engineering and Testing Services

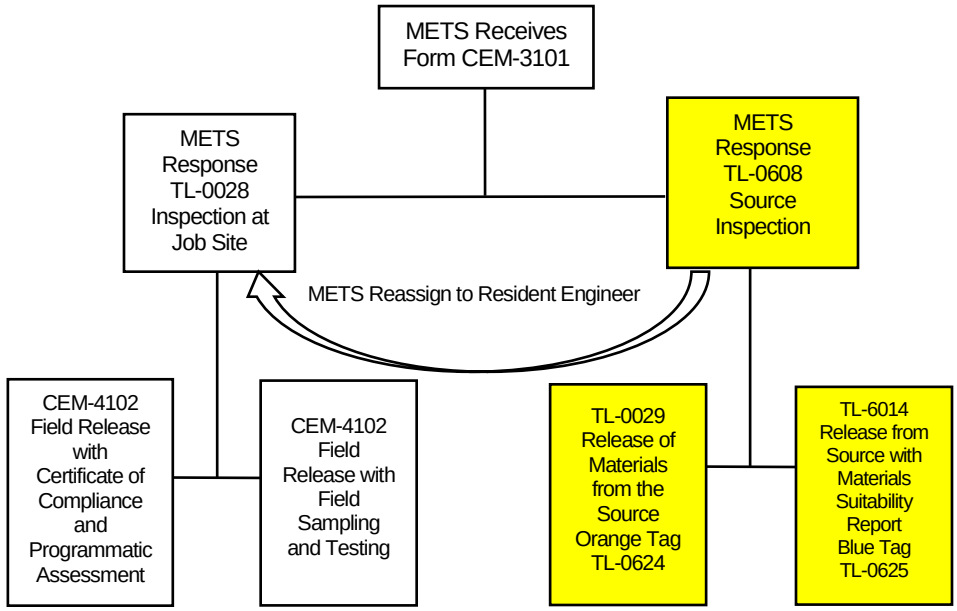
METS assigns personnel for sampling, testing, and inspecting manufactured materials and products, usually at the source of supply. Manufactured materials and products shown in Table 6-2.3, "Materials Accepted by Certificate of Compliance," in Section 6-203C, "Materials Accepted on the Basis of a Certificate of Compliance," of this manual, are the responsibility of METS but have been delegated to the resident engineer for inspection.

METS assigns the responsibility for sampling, testing, and inspecting manufactured materials and products based on the information submitted on Form CEM-3101.

METS offices in Sacramento, San Francisco Bay Area, or Los Angeles conduct most of the inspections. METS may assign sampling, testing, and inspecting of manufactured materials and products to the district materials engineer, resident engineer, or a commercial laboratory.

The METS process for inspecting and releasing manufactured or fabricated materials or products is shown in Figure 6-2.1, "Inspection and Release Flowchart—Source Inspection."

Figure 6-2.1 Inspection and Release Flowchart—Source Inspection



6-202C (1) Processing Form CEM-3101

Once Form CEM-3101 is received by the materials administrator, it is routed to the appropriate METS office for processing. Any questions regarding Form CEM-3101 processing by METS may be routed to the project structural materials representative. Structural materials listed on Form CEM-3101 are processed by the quality assurance and source inspection (QASI) office assigned to that project.

6-202C (2) Form TL-0028, "Notice Of Materials to Be Inspected at Jobsite"

If it is determined that the material does not require source inspection, METS will assign inspection to the job site by completing Form TL-0028 for that material item. This form indicates that the material item does not require source inspection from Caltrans at this time. METS will send Form TL-0028 to the resident engineer, prime contractor, and suppliers to inform them that source inspection is not required prior to shipment to the job site.

The resident engineer will release these materials at the job site using Form CEM-4102, "Materials Inspected and Released on Job." Section 6-3, "Field Tests," of this manual contains details on testing that occurs at the job site. Depending on the material, the resident engineer bases the field material acceptance on various methods. Refer to

Section 6-203D, "Field Inspection and Release by the Resident Engineer," of this manual for the field inspection and release procedures.

6-202C (3) Form TL-0608, "Notice Of Materials to Be Furnished"

If it is determined that the material requires source inspection prior to shipment to the job site, METS will issue Form TL-0608 to the resident engineer, contractor, and supplier. A hard copy of Form TL-0038, "Inspection Request," is mailed with Form TL-0608 to the supplier. The inspection request form is to be used by the contractor or any subcontractors to inform METS when the material is ready for inspection.

Source inspection by Caltrans is described in Section 6-202C, "Materials Engineering and Testing Services," of this manual and is detailed in the *QASI Manual*:

http://onramp.dot.ca.gov/hq/esc/mets/structure_materials/restrictedosm/osmsmrdataspry.php?tab=21

6-202C (4) Form TL-0038, "Inspection Request"

Form TL-0038 is used by the contractor or supplier to inform Caltrans that material located away from the job site is ready for inspection. If the contractor has received a Form TL-0608 for an item, Caltrans will be expecting a Form TL-0038 to initiate the source inspection.

Form TL-0038 and instructions for submitting the request are available at:

http://www.dot.ca.gov/hq/esc/Translab/OSM/smbforms.htm

It is important to remind the contractor that, in accordance with Section 6-2.01E, "Material Source Inspection and Testing," of the *Standard Specifications*, the inspection request must be submitted:

- At least 3 business days before the requested inspection date for a material source within California.
- At least 5 business days before the requested inspection date for a material source outside California but within the U.S.
- Fifty days before the planned production start for a material source outside the U.S. and notify the resident engineer at least 20 days before the actual start.

The resident engineer may also use Form TL-0038 to request field inspection by METS for structural items such as field welding.

6-202D Assignment to Resident Engineer

METS may assign inspection of manufactured or fabricated materials and products for which they have acceptance responsibility back to the resident engineer. Refer to Section 6-203D, "Field Inspection and Release by the Resident Engineer," of this manual for details on inspection and release.

6-203 Manufactured or Fabricated Materials and Products Acceptance

6-203 Manufactured or Fabricated Materials and Products Acceptance

The resident engineer must ensure that materials entering the work meet the contract specifications acceptance criteria. Materials acceptance can be based on:

- Source inspection.

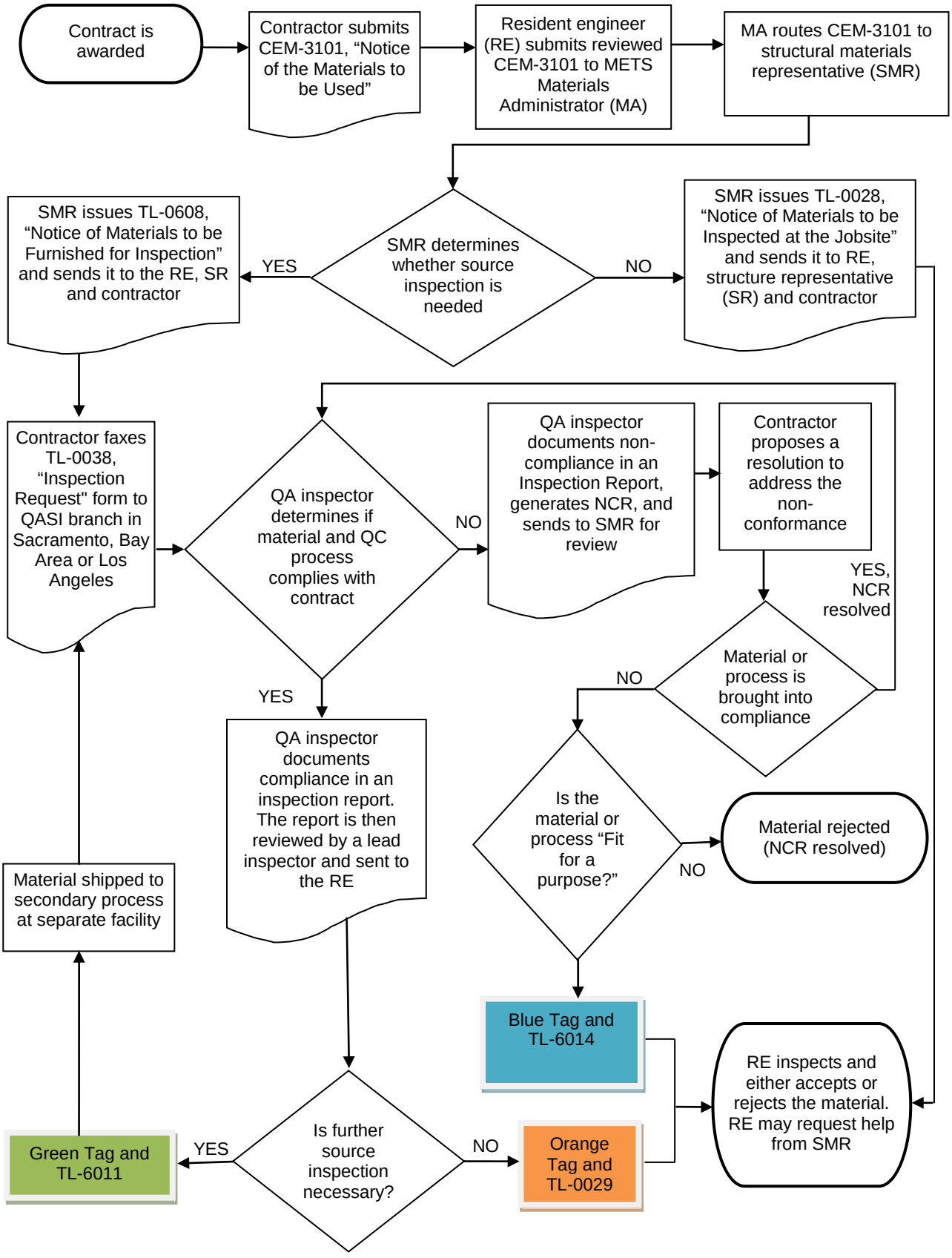
- Product on Authorized Material List.
- Certificate of compliance.
- Certificate of compliance with accompanying documents.
- Field inspection and release by the resident engineer.

If the material delivered to the job site lacks proper identification, 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.

6-203A Source Inspection

METS is responsible for the source inspection process shown in Figure 6-2.2, "Source Inspection Flowchart." The flowchart includes information on what happens when a material is not in compliance with the specifications.

Figure 6-2.2. Source Inspection Flowchart



When a material listed on Form CEM-3101 is assigned a Form TL-0608, source inspection is required prior to shipment of the material to the job site and final acceptance. Table 6-2.1, "Inspection of Fabricated and Manufactured Materials," provides a list of common materials on Caltrans projects and some of the primary source inspection activities. Table 6-2.1, "Inspection of Fabricated and Manufactured Materials," follows Section 6-203A (5), "Source Inspected Materials Acceptance," of this manual.

A METS inspector will travel to the source of the material and perform inspection, sampling, verification testing, and material release as necessary. Complex fabrication, such as with precast prestressed concrete members and structural steel, typically requires inspection during fabrication (in-process inspection).

METS must receive all information that could affect materials that are source inspected. Forward all copies of authorized shop drawings as well as notification of approved change orders to the structural materials representative for the project. Forward to METS copies of approved shop drawings without established distributions (for example, buildings or small structures) and notification of approvals (such as paint color) or change orders. METS should receive copies of all correspondence with contractors or suppliers that may affect the fabrication.

Some inspections require out-of-state travel. It is important for METS to receive all documents before travel to ensure timely inspection and release. For instance, light poles are manufactured at various suppliers throughout the U.S.; therefore, it is crucial that authorized shop drawings are available for the METS inspector in time for inspection and release. The travel time for such inspections is significant. Coordination between resident engineer and METS is crucial for timely release of the poles.

In addition to source inspection, METS performs sampling and testing for certain materials for conformance with associated standards as a part of the quality assurance program. The list of additional tests performed by METS is available in detail in the *QASI Manual*.

The main point of contact for the resident engineer for anything related to source inspection is the structural materials representative assigned to the project. A list of structural materials representatives is available at:

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

6-203A (1) Inspection Requests and Dispatching

The contractor is responsible for submitting Form TL-0038, "Inspection Request," to the appropriate METS QASI office with sufficient notice as described in Section 6-2.01E, "Material Source Inspection and Testing," of the *Standard Specifications*. The appropriate office to send Form TL-0038 is available at the METS website:

http://www.dot.ca.gov/hq/esc/Translab/OSM/smbforms.htm

This website allows the contractor to determine the appropriate QASI office by selecting the county in which the project is located from a list. The TL-0038 can come from the contractor or subcontractors.

Each QASI office has a dispatcher who receives the TL-0038s and schedules inspections accordingly.

6-203A (2) Material Inspection—Sampling and Release

The structural materials representative assists the resident engineer with management of source-inspected materials. The METS inspector acts as the eyes and ears of the structural materials representative and resident engineer at the material's source. Inspected materials are identified with a unique inspector lot number that correlates the material with reports and release tags.

The METS inspector assesses the source's quality control methods and reviews the certificates of compliance and any additional documentation such as mill test reports. The METS inspector also performs random visual inspection of the material and any other required inspections such as nondestructive testing. For more information on the types of inspection required for common materials, refer to Table 6-2.1, "Inspection of Fabricated and Manufactured Materials," of this manual and the *QASI Manual*.

If sampling of the material is required at the source, the METS inspector will randomly sample the material at the required frequency and fill out a TL-0101, "Sample Identification Card," to accompany the material to the Transportation Laboratory. Sampling may be performed in the field by either the METS inspector or field construction staff. The material's certificate of compliance and any additional documents must be sent with the material to the lab as well. If the material is undergoing mechanical testing, the resident engineer can track the testing progress by using the J2 database and clicking on the "SMTL Test Reports" tab for the project.

If the material is found to be acceptable, the inspector identifies it with Form TL-0624, "Inspection Release Tag," commonly known as an orange tag. METS inspectors will not necessarily tag every bundle and piece in a shipment. If there are many components going out in one shipment, it is common that a single orange tag will be placed on the load. The orange tag will correlate to the certificate of compliance and bill of materials with the inspector's unique lot number. This tells the resident engineer what material the tag covers.

After the material is orange-tagged for release, the METS inspector enters the lot number, a description, and quantity of materials inspected on Form TL-0029, "Report of Inspection of Material." A completed copy of Form TL-0029 is sent to the resident engineer for the project records.

Certain materials are included in the METS authorization-to-deliver program. Source inspection for these materials is different from typical procedures in that it includes a recurring audit at a prescribed frequency, with material sampling and testing. If the facility is approved to be in the authorization-to-deliver program, it is authorized to ship material to the job site without receiving a physical tag for the material. A TL-0029AD, "Report of Inspection of Material (Authorization to Deliver)," is produced by METS and sent to the resident engineer and the supplier notifying them that the material is acceptable to be shipped. The resident engineer should not expect to obtain a tag from the material if a TL-0029AD report was received. However, the resident engineer should match the TL-0029AD report with the actual shipped material quantities and certificate of compliance to ensure that the material arrives within a reasonable timeframe.

When source-inspected materials arrive on the job site, the attached Form TL-0624 informs the resident engineer to permit use of the materials. The attached form shows the identifying lot number, the inspector's initials, and the date of inspection. If the item does not lend itself to 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. METS inspectors will not necessarily tag every bundle and piece in a shipment (with the exception of reinforced concrete pipe).

It is important to note that the resident engineer must inspect the materials for damage that may have occurred during shipping or storage and for general workmanship and conformance to planned shape or dimensions. Table 6-2.1 of this manual provides examples of types of field inspections for common materials.

The resident engineer may not receive the completed Form TL-0029 until after the materials have arrived at the job site. The resident engineer must ensure the correct material was shipped to the job site by verifying that the lot number and quantity of material shown on Form TL-0029 matches the identifying information, such as Form TL-0624, that was attached to or marked on the materials. Notify the project structural materials representative of any discrepancies so that an investigation can be conducted.

The resident engineer must inform the assigned METS inspection office if Form TL-0029 is not received within 15 days after receipt of materials.

For in-process inspections, METS will produce an inspection report, unique to the type of inspection, and distribute it to the resident engineer for review and incorporation into the project files. More information on the various types of inspection reports is in the *QASI Manual*.

6-203A (3) Nonconforming Materials at the Source

If the inspector observes that the material does not comply with the specifications at the requested time of release, the manufacturer or fabricator is notified and allowed one work shift to correct. If the material cannot be brought into conformance within the time period, METS will send a TL-0015, "Quality Assurance Nonconformance Report," (NCR) to the resident engineer within 24 hours of the observation. The resident engineer then notifies, in writing, the contractor of the NCR and requests a written response to resolve the issue.

The purpose of the NCR is to formally document the reason the material does not meet the specifications and to prompt the contractor to propose resolution and prevention measures in the response letter. This report is entered into the J2 database under the "Issues" tab so that the information is available to Caltrans staff outside the project to help avoid future issues statewide.

When the resolution letter is submitted by the contractor, the resident engineer and METS will perform a review. If the resolution is insufficient, the contractor will be notified and allowed to revise the letter and resubmit. If the resident engineer decides that the material is not suitable for the project, it will be rejected and prohibited from incorporation into the project.

If the letter is found to be acceptable, METS will issue a TL-0016, "Quality Assurance-Nonconformance Resolution," to the resident engineer recommending a resolution and closure of the issue. In some cases, the material is found to be suitable for the intended purpose by the resident engineer, METS, and the engineer of record for project design, but it does not meet the contract specifications. In this case, METS will produce a TL-6013, "Material Suitability Documentation Report," to document the engineering judgment used to determine the material to be suitable and concurrence from the resident engineer, METS, and engineer of record for project design. Once

authorized, the material can be released by the inspector by placing a TL-0625, "Material Suitability Tag," (blue tag) onto the material in a similar fashion as with an orange tag. A TL-6014, "Material Suitability Report," is written in place of a TL-0029 and sent to the resident engineer.

- When METS and the resident engineer disagree about whether the material is suitable or unsuitable, the METS Structural Materials senior engineer and the construction engineer discuss and resolve the disagreement. When consensus is not achieved at this level, the issue must be elevated to the appropriate supervisors and a mutual solution reached.
- The blue tag is only a release of the material from the source. The resident engineer may need to prepare a change order to address acceptance of the material. Section 5-303, "Purpose of Change Orders," of this manual includes guidance for deciding whether a change order is needed. When a change order is needed, it must be approved prior to incorporating the material into the work. The resident engineer sends METS copies of approved change orders addressing blue tag issues. The project's materials certification memorandum must include material that is approved for use but does not meet original contract specifications.

6-203A (4) Source Inspection Expense Deductions

Due to the costs incurred by Caltrans when traveling for source inspection to material sources that are far from the job site, Section 6-2.01E, "Material Source Inspection and Testing," of the *Standard Specifications* provides the details for deductions to be taken when applicable. To determine where inspections have taken place for a project, the resident engineer can review the inspection reports that provide inspection locations.

6-203A (5) Source Inspected Materials Acceptance

The resident engineer and METS share the responsibility for inspection of materials at the source. The resident engineer has the sole responsibility for acceptance of material and may determine that materials are not acceptable for a project based on any of the following reasons:

- Damaged materials: The material may be damaged in shipment or installation.
- Material defects: It is not always practical for METS to make a 100 percent 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.
- Incorrect wall thickness of metal culvert pipe: 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. Fit of band couplers should also be checked at the job site.
- Incorrect reinforced concrete pipe wall thickness: Some contracts require special wall thickness of reinforced concrete pipe at certain locations in the project, and the METS inspector would not know the specific job site location of that particular pipe when the pipe is released. The inspector can only determine that it fits one of the types specified.

- Specifications and change orders: The specifications may be difficult to interpret or the source inspector is not aware of a change order.

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.

Table 6-2.1 lists manufactured or fabricated materials and products that are usually inspected at the site of manufacture or fabrication and indicates items that are checked by the inspector at the source. Table 6-2.1 also includes items that must be checked or rechecked at the job site to ensure that the materials are acceptable. The table does not cover all manufactured or fabricated materials and products but provides typical examples. Verification at the source of fabrication does not preclude acceptance by the resident engineer at the job site. For more details on the inspection procedures, refer to Section 6-3, "Field Tests," of this manual and the *QASI Manual*.

Table 6-2.1. Inspection of Fabricated and Manufactured Materials (1 of 3)

Product	Items Inspected and Tested by METS	Items to Check at Job Site
Bolts, nuts, and washers	Material sampling and testing including galvanizing, visual inspection.	Visible defects, dimensions, threads, galvanizing, marking for correct type fit of nuts. Make sure high-strength bolts and nuts are used where specified and nuts are lubricated properly. (Refer to *Bridge Construction Records and Procedures*.)
Curing compound (chlorinated rubber type)	Material tests by batch or lot, check marking. (Other types accepted at job site if properly packaged and labeled.)	Proper mixing, marking, check sample. Check for specified type of container and correct marking.
Bearing, elastomeric bearing pads - steel reinforced, PTFE bearing	Material sampling and specified tests, visual and dimensional inspection certification.	Damage, defects, uniformity, dimensions.
Electrical items: controllers, luminaries, signal heads, conductors	Controllers: complete tests and inspection. Luminaries: random tests, visual inspection. Signal heads, switches; visual inspection plans, type, operational check. Conductors: random tests.	Shipping damage, defects, conformance to plans, type, operational check. Check loop detectors for operation under field conditions inspection. See that all conductors are correct type and size.
Epoxy	Materials sampling and specified tests, markings, packaging.	Proper material for intended use, excessive thickening or crystallization, proper mixing.
Forgings, steel	METS inspection and tests upon request from resident engineer. Material tests, visual and dimensional inspection.	Size, uniformity, surface defects, warping (permit no repairs).
Girders, precast prestressed concrete	Material verification, in-process inspection of fabrication (such as forms, steel placement, stressing, concrete) workmanship, dimensions, conformance to plans.	Damage, workmanship, exposed steel dimensions, finish, cracks, or other defects.
Girders, structural steel	Material verification, check sample testing, qualifications of welders, inspection during fabrication, nondestructive testing, preparation and painting in the shop, conformance to plans and authorized shop drawings, proper joint preparation for shop-bolted connections.	Damage to members or paint: defects in steel, camber condition of paint, dimensions, condition of holes, straightness and squareness of members.
Joint sealant, Type A field mixed polyurethane or silicone sealant	Material sampling and testing by batch or lot.	Proper components, proper mixing, marking. Damage, workmanship, correct movement rating (from test report), size and type, lot and batch identification. (Refer to *Bridge Construction Records and Procedures*.)
Joint seal, Type B preformed elastomeric joint seal	Material sampling and testing.	Damage, workmanship, correct movement rating (from test report), size and type.
Markers, pavement	Tests of each batch or lot, random inspection.	Damage, surface defects.
Mechanical equipment, scales, pump truck inspection stations, roadside rests	Inspection usually assigned to resident engineer. Consult with Structure Design, Office of Electrical, Mechanical, Water & Wastewater Engineering, for assistance if required. http://des.onramp.dot.ca.gov/des-structure-design/office-electrical-mechanical-water-and-wastewater-engineering-emww	Damage, installation details, workmanship.

Table 6-2.1. Inspection of Fabricated and Manufactured Materials (2 of 3)

Product	Items Inspected and Tested by METS	Items to Check at Job Site
Metal beam guard rail	METS inspection and testing of galvanizing upon request by resident engineer.	Damage to rail or galvanizing, workmanship of rail and galvanizing, dimensions, conditions of holes, and so on.
Metal crib wall	METS inspection and testing of galvanizing upon request by resident engineer.	Dimensions, workmanship, galvanizing, specified bolts.
Miscellaneous iron and steel, miscellaneous bridge metal, bearing assemblies, rings and covers, frames and grates	Materials sampling and testing as specified, qualification of welders, inspection of fabrication, galvanizing, dimensions.	Damage, welding or fabrication defects, conformance to drawings, galvanizing defects, grinding specified coating.
Paint	Materials sampling and testing by batch or lot.	Lumps, hard setting, color, marking of cans, adherence, surface preparation, lot numbers (same as on inspection report).
Piling, precast prestressed concrete	Material verification, in-process inspection of fabrication (such as forms, steel placement, stressing, concrete) workmanship, dimensions, conformance to plans.	Damage, workmanship (such as cracks, spalling), painting of strand ends, straightness.
Piling, steel pipe	Material verification, weld inspection of welding if field splices are necessary.	Damage to members, overlooked fabrication details, dimensions.
Pipe, galvanized	Material sampling and testing. Check galvanizing thickness.	Size, uniformity, surface defects (permit no repairs).
Poles, lighting	Material verification, inspection and review of welding and galvanizing, visual and dimensional inspection.	Dimensions, welds, workmanship, galvanizing type.
Prestressing strand	Material sampling and testing, package and storage, visual inspection when possible.	Check strand for rust, damage, surface defects. Check tags for stressing information.
Reinforced concrete pipe	Material verification, witness testing, visual inspection, dimensions, elliptical steel markings. Only for reinforced concrete pipe with diameter greater than 60 inches, unless requested by resident engineer.	Damage, defects, exposed steel, dimensions (specific locations per plans), straightness, concentricity.
Railings, barriers Bridge railing, barrier	Material tests, welder qualifications, welding and fabrication, galvanizing.	Damage to rail or galvanizing; fabrication or galvanizing defect, fit of sleeves, dimensions; types of bolts or nuts furnished.
Reinforcement splices: welded or mechanical couplers	METS sampling and testing, material verification.	Refer to Bridge Construction Records and Procedures.
Sign structures	Material verification, qualification of welders, inspection during and after fabrication, dimensions, cleaning and painting or galvanizing.	Damage, general workmanship, general conformance to requirements, position of sign panels, final check of electrical equipment for illuminated signs, proper nuts and bolts, properly torqued.

Table 6-2.1. Inspection of Fabricated and Manufactured Materials (3 of 3)

Product	Items Inspected and Tested by METS	Items to Check at Job Site
Signs, changeable message	Fabrication, operation, workmanship.	Refer to Section 4-56, "Overhead Sign Structures, Standards, and Poles" of this manual.
Steel, flooring and grating	METS inspection and tests upon request from resident engineer.	Workmanship, dimensions.
Structural steel	Material verification, qualifications of welders, inspection during fabrication, nondestructive testing, preparation and painting in the shop, conformance to plans and authorized shop drawings, proper joint preparation for shop-bolted connections.	Damage to members or paint: defects in steel or in welds; overlooked fabrication details; camber condition of paint; dimensions; condition of holes; proper bolts and nut markings; proper torquing; straightness and squareness of members.
Welded steel pipe	METS inspection and testing upon request of the resident engineer. Material tests, welder qualifications, welding inspection; and spark testing, marking, dimensions.	Shipping damage, visible defects in pipe or coating marking, dimensions.
Wire mesh reinforcing	Materials sampling and testing.	Rust and broken welds.

6-203A (6) Materials Manufactured to Caltrans-Specified Formulation

The *Standard Specifications* requires that certain products be manufactured to state specifications. Occasionally, composition of the specified formulation is changed and the newer specification results in an equal or better product. 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 change orders unless specifically advised to the contrary. State specification numbers for manufacturer materials are shown in the *Standard Specifications* or special provisions.

Paint manufactured under state specifications is sampled at the factory, tested by METS, and identified by lot numbers before shipment to the project.

6-203B Materials Accepted on the Basis of Authorized Material List

The *Standard Specifications* identifies materials that must be on an Authorized Material List. The list is available at:

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

The engineer must ensure materials or products listed in Table 6-2.2, "Materials Acceptance Based on Authorized Material List," are shown on the appropriate Authorized Material List before the material is used on the project. Materials shown on the Authorized Material List may also require a certificate of compliance or sampling and testing for acceptance.

Table 6-2.2. Materials Acceptance Based on Authorized Material List (1 of 2)

Material or Product	Authorized Material List
Alternative sound wall system	
Channelizers	Signing and delineation materials
Chemical adhesive Drilling and bonding dowels	Chemical adhesives / cartridge epoxies
Crack sealant	Flexible pavement crack treatment material
Concrete admixtures	Chemical admixtures for concrete
Concrete Cementitious material	Cementitious material
Concrete Innocuous aggregate	Innocuous aggregates for concrete
Concrete anchorage devices	Concrete inserts
Corrosion protection system	Corrosion protective coverings
Corrosion protection covering for splices	Corrosion protective coverings
Delineators	Signing and delineation materials
Detectable warning surface	Detectable warning surface
Earth retaining system	Earth retaining systems
Electrical Battery backup external cabinet	External battery backup system cabinet
Electrical LED signal modules	LED traffic signals
Epoxy powder	Fusion-bonded epoxy powder
Markers	Signing and delineation materials
Mechanical couplers	Steel reinforcing couplers
Organic zinc-rich primer	Organic zinc-rich primer list
Pavement markers	Signing and delineation materials
Pavement traffic stripe and marking tape	Signing and delineation materials
Plastic blocks	

Table 6-2.2. Materials Acceptance Based on Authorized Material List (2 of 2)

Material or Product	Authorized Material List
Post-tensioning prestressing system	Pre-approved systems (full list and details)
Precast portland-cement-based repair material	Precast portland-cement-based repair material
Reflectors	Signing and delineation materials
Reinforcement Headed bar	Headed bar reinforcement
Reinforcement Resistance-butt-welded splices	
Retroreflective • Retroreflective sheeting for barricades • Retroreflective bands for portable delineators • Retroreflective sheeting for construction area signs • Retroreflective sheeting for channelizers • Reflectors for Type K temporary railing • Retroreflective cone sleeves • White and orange-colored retroreflective stripes for plastic traffic drums • Portable signs Type VI, retroreflective, elastomeric roll-up fabric	Signing and delineation materials
Signs Retroreflective sheeting	Signing and delineation materials
Signs Fiberglass-reinforced plastic panels	Signing and delineation materials
Silane waterproofing	Silane reactive penetrating sealers
Temporary crash cushion Sand-filled	Highway safety features
Temporary traffic control devices Category 2	Acceptable, crashworthy Category 2 hardware for work zones
Temporary traffic control devices Category 3	Highway safety features
Thread locking systems	Anaerobic thread locking systems
Undercoating for ungalvanized sign structures	
Warm mix asphalt	Warm mix asphalt—approved technologies

6-203C Materials Accepted on the Basis of a Certificate of Compliance

In accordance with Section 6-2.03C, "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.

Acceptance based on certificates of compliance is used for products for which the industry has demonstrated a high degree of reliability in meeting specifications. METS performs a programmatic assessment on a periodic basis of materials that do not receive source inspection.

METS notifies the resident engineer when material from any producer is not acceptable on the basis of a certificate of compliance. The resident engineer must notify the contractor when material cannot be accepted based on a certificate of compliance and require submittal of samples for testing prior to use on the project.

Certificates of compliance should contain the following information:

- Name of company.
- Lot number traceable to a specific 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.

Materials accepted based on a certificate of compliance arrive on the job site without inspection by METS and Form TL-0029, "Report of Inspection of Material." When required by the *Standard Specifications* or the special provisions, ensure that these materials have a certificate of compliance and any required additional backup documentation, such as mill test reports for steel, pressure treating reports for timber, and concrete test reports, to show that the materials comply with the specifications. Table 6-2.3 shows materials in the *Standard Specifications* that are accepted based on a certificate of compliance.

In addition to the materials listed in Table 6-2.3, in accordance with Section 6-2.03C, "Certificates of Compliance," of the *Standard Specifications*, a certificate of compliance is required for material produced outside the United States.

Contact the project structural materials representative regarding any feedback or additional detail for programmatic assessment or systematic concerns regarding certain materials types

Table 6-2.3. Materials Accepted by Certificate of Compliance (1 of 8)

Material/Product	Remarks (Including Requirements for Additional Backup Information Required with Certificate of Compliance)
Alternative earth retaining systems	Must state that the supplied material complies with the index criteria for the system at the time of prequalification.
Asphalt	Certificates of compliance must include the following: 1. Name and location of the supplier. 2. Grade of the asphalt. 3. The date and time of shipment. 4. A unique shipment number, such as a bill of lading number or manifest number. 5. A statement confirming that the transport vehicle was checked before loading and was found acceptable for the asphalt shipped. 6. The following wording: *" (Supplier name) hereby certifies that the asphalt product accompanying this certification was produced in accordance with the California Department of Transportation's Certification Program for Suppliers of Asphalt, and that this product complies in all respects with the requirements of the applicable specifications for the asphalt product identified on this document.* *I hereby certify by my signature that I have the authority to represent the supplier providing the accompanying asphalt product."*
Asphaltic emulsion	Certificate of compliance must include the following: 1. Shipment number and shipment date. 2. Source refinery, consignee, and destination. 3. Type and description of material with specific gravity and quantity. 4. Contract or purchase order number. 5. Signature by the manufacturer of the material and a statement that the material complies with the contract.
Asbestos cement pipe	
Asbestos sheet packing	
Asphalt modifier	Test results required with each truckload.
Asphalt rubber joint sealant	A certified test report of the results for the required tests performed within 12 months before the proposed use.
Backer rods	Must include manufacturer's statement of compatibility with the joint sealant to be used.
Barbed wire	
Blast cleaning material	
Bonding agent for repairing spalled surface area	Submittal of certificate of compliance required for contracts of less than 60 working days.
Bonding material	
Brick	
Cable-type restrainers Lock nuts	Certificate of compliance must be submitted with a copy of each required test report.
Cast iron pipe	
Cast iron manhole rings and covers	

Table 6-2.3. Materials Accepted by Certificate of Compliance (2 of 8)

Material/Product	Remarks (Including Requirements for Additional Backup Information Required with Certificate of Compliance)
Chemical adhesive for bonding tie bars and dowel bars in concrete pavement	
Chemical adhesive for structures	Certificate of compliance must state compliance with ICBO AC 58 and Caltrans. Augmentation/Revisions to ICBO AC 58.
Concrete Admixture	Certificate of compliance from the manufacturer must certify that the admixture furnished is the same as that previously authorized for the Authorized Material List.
Concrete Cementitious material	Certificate of compliance must include the source name and location. If the cementitious material is delivered directly to the job site, the certificate of compliance must be signed by the cementitious material supplier. If the cementitious material is used in ready-mixed concrete, the certificate of compliance must be signed by the concrete manufacturer. If blended cement is used, the certificate of compliance must include a statement signed by the blended cement supplier that shows the actual percentage of supplementary cementitious material, by weight, in the blend.
Concrete Curing compound	Certificate of compliance must include: 1. Test results for the tests specified in Section 90-1.01D(6), "Curing Compound," of the *Standard Specifications*. 2. Certification that the material was tested within 12 months before use.
Concrete Minor concrete	Before placing minor concrete from a source not previously used on the contract, a certificate of compliance stating that the minor concrete to be furnished complies with the contract requirements, including the specified minimum cementitious material content.
Ceramic tile	
Chain link fencing and railing	Certificate required for protective coating system.
Concrete anchorage devices	
Concrete pipe Circular reinforced direct design method, less than 60 inches in diameter	Certificate of compliance must: 1. Be signed by the manufacturer's quality control representative. 2. State that all materials and workmanship comply with the specifications and authorized shop drawings.
Copper pipe	
Corrugated metal pipe	
Crack sealant	Certificate of compliance must include: 1. Manufacturer's name 2. Production location 3. Product brand or trade name 4. Product designation 5. Batch or lot number 6. Crack treatment material type 7. Contractor or subcontractor name 8. Contract number 9. Lot size 10. Shipment date 11. Manufacturer's signature
Crash cushions	
Crumb rubber modifier	Test results required with each truckload.

Table 6-2.3. Materials Accepted by Certificate of Compliance (3 of 8)

Material/Product	Remarks (Including Requirements for Additional Backup Information Required with Certificate of Compliance)
Culvert markers	
Delineators	Certificate of compliance required for: • Metal target plates • Enamel coating • Retroreflective sheeting
Dowel bar baskets	
Drop inlet grates and frames	
Drain tile	
Drip irrigation line	
Elastomeric bearing pads Plain	Certified test results for the elastomer. METS samples and tests bearing pads.
Elastomeric bearing pads Steel-reinforced	Certified test results. METS samples and tests bearing pads.
Electrical Battery backup system	Certificates of compliance are required for: • External cabinet • Batteries
Electrical Conductor	
Electrical Conduit (galvanized and plastic)	
Electrical Equipment	
Electrical Pull boxes (concrete and plastic)	
Electrical Service cabinets	
Epoxy	
Epoxy powder coating for dowel bars and tie bars	METS samples and tests epoxy coating.
Erosion control	Certificate of compliance is required for: • Straw • Fiber • Rolled erosion control product • Fasteners Certificate of compliance with attachments is required for: • Tackifier • Bonded fiber matrix • Polymer-stabilized fiber matrix

Table 6-2.3. Materials Accepted by Certificate of Compliance (4 of 8)

Material/Product	Remarks (Including Requirements for Additional Backup Information Required with Certificate of Compliance)
Erosion control (continued)	Certificates of compliance attachments include: 1. Safety Data Sheet. 2. Product label. 3. List of applicable, nonvisible pollutant indicators for soil amendment and stabilization products as shown in the table "Pollutant Testing Guidance Table" in the Caltrans *Construction Site Monitoring Program Guidance Manual.* 4. Report of acute and chronic toxicity tests on aquatic organisms conforming to EPA methods. 5. List of ingredients, including chemical formulation. 6. Properties of polyacrylamide in tackifier including: (1) percent purity by weight, (2) percent active content, (3) average molecular weight, and (4) charge density.
Expansion joint filler	
Fiberglass pipe	Certificate of compliance must be submitted with laboratory test results.
Filler material for repairing spalled surface areas	Submittal of certificate of compliance required for contracts of less than 60 working days.
Gabions	If PVC coating is shown, a suitable UV resistant additive must be blended with the PVC and the additive must be shown on the certificate of compliance.
Geocomposite drain	Certificate of compliance must certify that the drain produces the specified flow rate. The certificate must be accompanied by a flow capability graph for the geocomposite drain showing flow rates and the externally applied pressures and hydraulic gradients. Verification must be by an authorized laboratory for the flow capability graph.
Geosynthetics	Test sample representing each lot and minimum average roll value.
Glass beads	
Glue laminated timbers and decking	
Guide markers	
Irrigation hose	
Irrigation pipe	Certificate of compliance required for: • Polyethylene pipe. • Plastic pipe supply line for pipe with wall thickness of the bell less than the specified minimum wall thickness of the pipe.
Joint filler material	
Joint seals (Type A and AL)	Certified test report for each batch of sealant.
Joint seal (Type B)	Certificate of compliance required for: • Elastomeric joint seal • Lubricant-adhesive Certificate of compliance must be submitted with certified test report for each lot of elastomeric joint seal and lubricant-adhesive. Test reports must include the seal movement rating, the manufacturer's minimum uncompressed width, and test results. METS samples and tests joint seal.

Table 6-2.3. Materials Accepted by Certificate of Compliance (5 of 8)

Material/Product	Remarks (Including Requirements for Additional Backup Information Required with Certificate of Compliance)
Joint seal Alternate joint seal assemblies	For alternative joint seal assemblies, a certificate of compliance must be submitted for each shipment of joint seal materials. The certificate must state that the materials and fabrication involved comply with the specifications and the data submitted in obtaining the authorization for the alternative joint seal assembly. METS samples and tests joint seal assemblies.
Joint seal Joint seal assemblies	METS samples and tests joint seal assemblies.
Lime	Certificate of compliance must include a statement certifying the lime furnished is the same as on the Authorized Material List.
Machine spiral wound PVC pipeliners	Certificate of compliance for each reel of PVC strip must include: 1. Name of manufacturer 2. Plant location 3. Date of manufacture and shift 4. Cell classification 5. Unit mass 6. Average pipeliner stiffness and profile type
Markers	Certificate of compliance required for: • Metal target plates • Enamel coating • Retroreflective sheeting
Masonry block	Certificate of compliance required for: • Concrete masonry units • Aggregate for grout • Grout
Micro surfacing emulsion	
Mulch	
Open steel flooring and grating	
Overside drains	Certificate of compliance based on steel materials, aluminum materials or plastic materials.
Parking area seal material	
Pavement markers	
Pavement marking Paint or thermoplastic	
Plastic lumber	Certificate of compliance for each shipment of plastic lumber, that must be accompanied by a laboratory test report.
Plastic traffic drums	
Plastic pipe for drainage	Certificate of compliance must include average pipe stiffness, resin material cell classification, and date of manufacture. For corrugated polyethylene pipe, manufacturer's copy of plant audits and test results from the National Transportation Products Evaluation Program for the current cycle of testing for each pipe diameter furnished.
Portable changeable message sign	

Table 6-2.3. Materials Accepted by Certificate of Compliance (6 of 8)

Material/Product	Remarks (Including Requirements for Additional Backup Information Required with Certificate of Compliance)
Precast concrete Cementitious material used in precast concrete products	Certificate of compliance must be signed by the precast concrete product manufacturer.
Precast concrete Box culverts	Certificate of compliance must signed by the manufacturer's quality control representative for each shipment.
Precast concrete members	Certificate of compliance is for materials and workmanship incorporated in the work, and for testing and inspections that have been performed.
Precast raised traffic bars	
Preformed compression seal for concrete pavement	
Preformed membrane sheet	Must include type of sheet and the conditioner or primer application rates.
PTFE bearing materials	
Rapid strength concrete	Certificate of compliance is required for each delivery of aggregate, cementitious material, and admixtures used for calibration tests. The certificate of compliance must state that the source of the materials used for the calibration tests is the same source as to be used for the planned work.
Reinforcement	You may request that the contractor submits with certificate of compliance: 1. Copy of the certified mill test report for each heat and size of reinforcing steel showing physical and chemical analysis. 2. Two copies of a list of all reinforcement before starting reinforcement placement.
Reinforcement Epoxy-coated	Certificate of compliance for each shipment of epoxy-coated reinforcement must be submitted with: 1. Certification that the coated reinforcement complies with ASTM A 775/A 775M for bar reinforcement or ASTM A 884/A 884M, Class A, Type 1, for wire reinforcement. 2. All certifications specified in ASTM A 775/A 775M for bar reinforcement or ASTM A 884/A 884M for wire reinforcement. METS samples and tests epoxy coating.
Reinforcement Epoxy-coated prefabricated reinforcement	Certificate of compliance for each shipment of epoxy-coated prefabricated reinforcement must be submitted with: 1. Certification that the coated reinforcement complies with ASTM A 934/A 934M for bar reinforcement or ASTM A 884/A 884M Class A, Type 2 for wire reinforcement. 2. All certifications specified in ASTM A 934/A 934M for bar reinforcement or ASTM A 884/A 884M for wire reinforcement. METS samples and tests epoxy coating.
Reinforcement Epoxy-coating patching materials	Certificate of compliance for the patching material must include certification that the patching material is compatible with the epoxy powder to be used.
Reinforcement Headed bar	Certificate of compliance for each shipment of headed bar reinforcement must be submitted with: 1. Mill test reports for the: 1.1. Bar reinforcement 1.2. Head material 2. Production test reports 3. Daily production logs METS samples and tests headed bar.

Table 6-2.3. Materials Accepted by Certificate of Compliance (7 of 8)

Material/Product	Remarks (Including Requirements for Additional Backup Information Required with Certificate of Compliance)
Reinforcement Splice material	Certificate of compliance for each shipment of splice material must be submitted with: 1. Type or series identification of the splice material, including tracking information for traceability. 2. Grade and size number of reinforcement to be spliced. 3. Statement that the splice material complies with the type of mechanical splice on the Authorized Material List. 4. For resistance-butt-welded material: 4.1. Heat number 4.2. Lot number 4.3. Mill certificates METS samples and tests reinforcement splices.
Sheet metal	
Sign panels	Certificates of compliance required for: • Aluminum sheeting • Retroreflective sheeting • Screened-process colors • Nonreflective, opaque, black film • Protective-overlay film
Silicone joint sealant	A certified test report of the results for the required tests performed within 12 months before the proposed use.
Slotted edge drain	
Snow poles	
Snow plow deflectors polyethylene material	
Soil amendment	
Steel crib wall	
Steel pipe piles	The certificate of compliance must be signed by the plant's quality control representative. The quality control representative must be on record with Structural Materials. Certificate of compliance must include: 1. Statement that all materials and workmanship incorporated in the work and all required tests and inspections of this work have been performed as described. 2. Certified mill test reports for each heat number of steel used in pipe piles being furnished. 3. Test reports for tensile, chemical, and any specified nondestructive test must be based on test samples taken from the base metal, steel, coil, or from the manufactured or fabricated piles. 4. Calculated carbon equivalent. The carbon equivalent may be shown on the mill test report.
Structural plate culverts	Certificate of compliance required for: • Structural metal plate pipe • Arches • Pipe arches • Metal liner plate pipe
Structural shape steel piles	Certificate of compliance must include a statement that all materials and workmanship incorporated in the work and all required tests and inspections of this work have been performed as described.
Structural composite lumber used in falsework	

Table 6-2.3. Materials Accepted by Certificate of Compliance (8 of 8)

Material/Product	Remarks (Including Requirements for Additional Backup Information Required with Certificate of Compliance)
Structural steel thermal spray coat Wire feedstock	
Styrofoam filler	
Subsurface drain	
Temporary concrete washout	Certificate of compliance required for: • Gravel-filled bag • Plastic liner
Temporary fence (Type ESA)	Certificate of compliance required for: • High visibility fabric • Safety caps for metal posts
Temporary linear sediment barrier	Certificate of compliance required for: • Fiber roll • Safety cap for metal posts • Silt fence fabric • Sediment filter bag • Foam barrier • Gravel-filled bag fabric
Temporary railing (Type K)	
Thermoplastic	
Tie bars	METS samples and tests epoxy coating.
Tie bar baskets	METS samples and tests epoxy coating.
Timber products (treated and untreated)	Certificate of compliance for timber and lumber must state the species of the material to be shipped and include a certified grading report. If treated, certified treating report.
Threaded tie bar splice couplers	
Traffic stripe Paint or thermoplastic	
Turf sod	
Underdrains	Certificate of compliance required for: • Type of pipe • Tubing • Fitting
Waterproofing fabric	
Waterstop	Certificate of compliance for waterstop material must state compliance with paragraph 6 of Army Corps of Engineers CRD-C 572.
Welded wire fabric	
Wire mesh fencing	
Wood Structures	Certificate of compliance for timber and lumber stating the species of the material to be shipped and including a certified grading report. If timber is treated, include a certified treating report. Certificate of compliance for glued laminated timbers and glued laminated decking.

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 certificate of compliance vary depending on the material. Following are some details covering the sampling of materials accepted by certificate of compliance.

6-203C (1) Asphalt

Certification for asphalt must comply with Caltrans' *Certification Program for Suppliers of Asphalt*. Program requirements, procedures, and a list of approved suppliers, are available on the METS website:

http://www.dot.ca.gov/hq/esc/Translab/ormt/fpmcoc.htm

When asphalt arrives at the job site or at the plant accompanied by a certificate of compliance, accept the shipment for use and sample and test for acceptance during use. When shipments of asphalt arrive without certificates of compliance, sample the asphalt and do not allow use prior to receiving acceptance test results.

All samples of asphalt, along with the necessary forms and tickets, are sent to METS at Engineering Services. 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 shown in the tables in Section 6-1, "Sample Types and Frequencies," of this manual.

Asphalt is very hot; therefore, for safety reasons, the acceptance samples must be sampled by the contractor. The resident engineer must witness the contractor taking acceptance samples. The resident engineer must determine when the sample is to be taken and then observe that the sample is taken in accordance with California Test 125, "Methods of Test for Sampling Highway Materials and Products Used in the Roadway Structural Sections," or sampling requirements specified in contract special provisions. Take possession of the sample from the contractor and transport it to a Caltrans office or the testing laboratory.

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.

6-203C (2) Asphalt Rubber Latex Joint Filler

Submit samples in 1-quart 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.

6-203C (3) Two-Component Joint Sealing Compounds

This material is usually in 2-gallon pails. Each pail requires a manufacturer's lot number. Before sampling, stir thoroughly. Samples should be taken in the amount and frequency shown in the tables in Section 6-1, "Sample Types and Frequencies," of this manual.

6-203C (4) Cement

For cement delivered directly to the job site 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 yards 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 job site. 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, "Method of Test for 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 8 pounds 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 MR-0518, "Job Cement Samples Record." Form MR-0518 should show the certificate of compliance serial number, cement brand and type, name of mill or vendor, date, time sampled, and contract number.

After identification, box the cement samples in corrugated cartons designed to hold single, 8-pound 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 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 nonroutine conditions, submit special samples with instructions that they be tested and reported for the specific project.

6-203C (5) Paint

Sample all paint in the field, except paint specified as commercial quality, and send the samples to METS 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 paint samples from the field to METS as soon as it is received on the project. During the progress of the job, take special check samples when the paint exhibits hard settling or potential contamination of paint is suspected.

Proper sampling to obtain a representative portion of the paint is mandatory.

Use the following sampling methods:

- For bridges and other major structures, or whenever large quantities are involved, send an unopened 5-gallon bucket 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 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 gallon sample immediately.

Send all samples to METS, along with all pertinent information. Use Form TL-0101, "Sample Identification Card."

When the paint is Department-furnished, check samples will not be required.

6-203C (6) Pavement Traffic Stripe and Marking Materials

California Test 406, "Method of Test for Field-Sampling of Pavement Marking Materials," describes procedures for obtaining samples of pavement-marking materials from a factory-sealed bag, bulk container, or stripe-application equipment. Circumstances at the job site often affect where to gather the sample. Field-striping inspectors must follow the procedures in California Test 406 to ensure that representative samples are taken of pavement-marking materials.

Field sampling must be initiated by the striping inspector or the resident engineer under the following conditions:

- The material is more than 1 year old (based on the date of manufacture).
- Product tampering or adulteration is suspected.
- Adequate proof that the product has been pretested and approved is not provided (for example, missing batch approval paperwork or other product/batch number discrepancies on containers or paperwork).

Where large quantities of pavement-marking materials are being applied, random quality assurance sampling of these materials is advisable.

Samples of pavement-marking materials in unopened factory-sealed bags are preferred. Factory-sealed bags are labeled with the manufacturer's name and batch number, which makes identification easier. When sampling glass beads and thermoplastic, collect the following sample quantity to ensure a representative sample:

- One unopened 50-pound bag of glass beads of the same manufacturer and lot number being used in the striping operation.
- One unopened 50-pound bag of thermoplastic of the same manufacturer and lot number being used in the striping operation.

For paint, bulk containers can be sampled only when the material is first homogeneously mixed using appropriately sized mixing equipment. For bulk containers of paint, obtain a 1-quart sample. Multiple samples are necessary when sampling paint directly from the application equipment to ensure that the product is homogeneously mixed. Each grab sample must be approximately 1 quart and submitted separately.

Label samples of pavement-marking materials according to where and how they were gathered at the job site. Include pertinent information on Form TL-0101, "Sample Identification Card," and send samples to METS for testing.

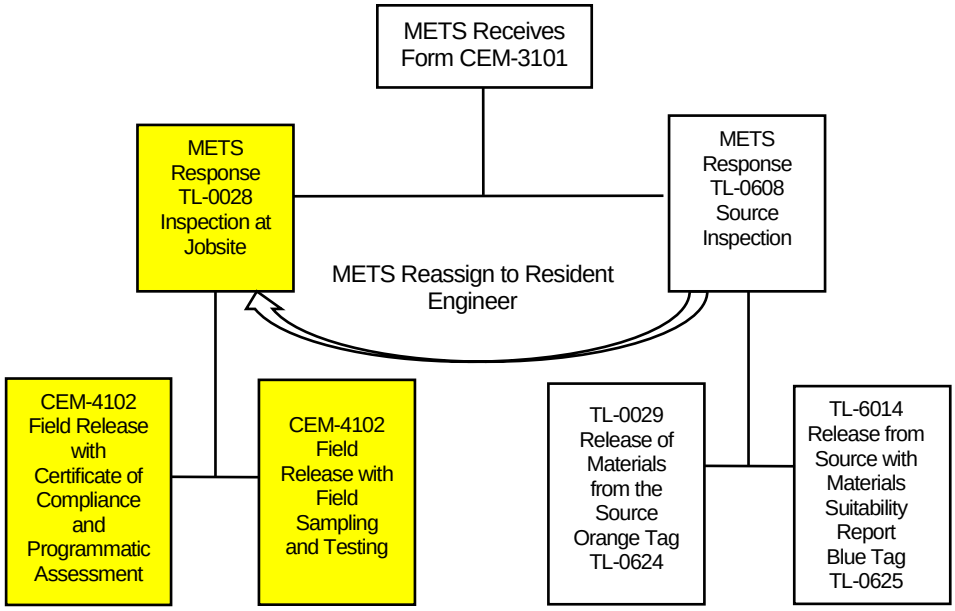
6-203C (7) Reinforcement

Refer to Section 4-52, "Reinforcement," of this manual for details.

6-203D Field Inspection and Release by the Resident Engineer

METS may assign inspection of manufactured or fabricated materials and products for which they have acceptance responsibility back to the resident engineer. The process to be followed for inspection at the job site is shown in Figure 6-2.3, "Inspection and Release Flowchart—Inspection at Job Site."

Figure 6-2.3. Inspection and Release Flowchart—Inspection at Job Site



METS assigns inspection responsibility to the resident engineer using Form TL-0028, "Notice of Materials to Be Inspected at Jobsite."

Upon receipt of Form TL-0028, the resident engineer should inform the contractor that the material will be inspected, and if required, sampled, on the job site. When testing of material is required, inform the contractor of the approximate testing turnaround time so that the contractor can obtain the material to allow for sampling and testing before the work begins.

Materials may be accepted based on 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 certificate of compliance should accompany the material to the job site and be retained in the project files. Sample materials in accordance with the tables at the end of Section 6-1, "Sample Types and Frequencies," of this manual, or as requested by METS.

Field inspect and release materials assigned by METS at the job site using Form CEM-4102, "Materials Inspected and Released on Job." Refer to Section 6-3, "Field Tests," of this manual for details.

Section 3 Field Tests

6-301 General

6-301A References

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6-303 Field Laboratory

6-304 Field Testing Equipment

6-304A Scales and Balances

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6-305 Test Methods

6-305A Method of Determining Approximate Grading of Mineral Aggregate by Dry Sieve Analysis

6-305B Fabrication of Cement Treated Base Specimens

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6-305D Portland Cement Concrete

6-305D (1) Number of Cylinders Required for a "Test"

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6-305E Relative Compaction Using Nuclear Gauges

6-306 Material Plants

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. Refer to Section 3-608, "Testing," of this manual.

Perform field inspection of material and testing in accordance with the guidelines in this chapter. Sampling and testing frequencies for materials acceptance are shown in the tables included in Section 6-107, "Materials Acceptance Sampling and Testing," of this manual. 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.

6-301A References

Unless specified, references are Caltrans guides and manuals.

California Test guidance, Materials Engineering and Testing Services (METS):

http://www.dot.ca.gov/hq/esc/ctms/index.html

American Association of State Highway and Transportation Officials (AASHTO), American Society for Testing and Materials (ASTM), and other test methods are available at IHS Standards Expert website accessible to Caltrans staff:

http://des.onramp.dot.ca.gov/materials-engineering-and-testing-services-mets

Material Plant Quality Program (MPQP), Division of Construction:

http://www.dot.ca.gov/hq/construc/publicationlist.htm

Laboratory Safety Manual:

http://des.onramp.dot.ca.gov/des-safety-meeting-information

6-302 Field Inspection and Release of Materials

6-302
Field Inspection and Release of Materials

When materials or products listed in Table 6-2.3, "Materials Accepted by Certificate of Compliance," of this manual arrive on the job site, or where METS assigns inspection of products for which they normally have responsibility back to the resident engineer, use the following procedure:

- Ensure that METS has sent Form TL-0028, "Notice of Materials to Be Inspected at Jobsite." If a material does not have a corresponding TL-0028, contact the project's structural materials representative.
- Ensure that the material meets the requirements of the specification and is undamaged by shipping and handling.
- 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. Refer to Section 3-604, "Buy America." of this manual for Buy America information.

- 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 to assess multiple construction projects in the immediate area.

Field laboratories must comply with the *Laboratory Safety Manual*. The *Laboratory Safety Manual* is required under California Code of Regulations Title 8, Section 5191. The *Laboratory Safety Manual* guidelines and procedures shall be implemented and enforced at all materials testing laboratories in Caltrans, including field construction laboratories.

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 materials acceptance testing. Testing equipment must be in proper operating condition and calibrated 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. Acceptance samplers and testers should verify that field testing equipment is in good condition and 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 affected in any way that would alter calibration.

6-304A Scales and Balances

All scales and balances used in field testing must be periodically recalibrated. 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 6 kilograms.
- A torsion balance of 500-gram capacity, accurate to 0.10 gram.

When the volume of work is large, an automatic digital scale 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, "Method of Test for Determining Sieve Analysis of Fine and Coarse Aggregates."

6-304C Portland Cement Concrete Air Meters

Data sheets accompanying newly purchased meters contain operation and calibration information. Supplemental sheets are available through METS.

California Test 504, "Method of Test for 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, "Method of Calibration of Pressure Type Air Meters," covers calibration of these two meters.

6-304D Compaction Tubes

California Test 110, "Method of Calibration of Compaction Test Equipment," outlines the procedure for both calibration and repair.

6-304E Cement-Treated Base Compressive Strength Apparatus

District materials laboratories can check the calibration of the hydraulic jacks used with the apparatus. If a jack requires repair, contact the METS machine shop in Sacramento to make the necessary arrangements for repair.

6-305 Test Methods

6-305 Test Methods

Whenever a reference is made in the specifications to a test method by number, it means the test in effect on the day the "Notice to Bidders" 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 be qualified to conduct the proper tests methods as indicated by the contract. The resident engineer must ensure that the correct versions of test methods are used. The latest revisions of the test methods are available on the METS website:

http://www.dot.ca.gov/hq/esc/ctms/index.html

Use the following guidelines for some of the tests performed in the field.

6-305A Method of Determining Approximate Grading of Mineral Aggregate by Dry Sieve Analysis

California Test 202, "Method of Test for Determining 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. Any material subject to rejection because of excessive material retained on any sieve by the approximate method must be retested using the basic 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 of Classes 'A' and 'B' Cement Treated Bases."

6-305C Determination of Cement or Lime Content

Refer to 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 perform 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

Concrete samples are taken in accordance with California Test 539, "Method of Test for Sampling Fresh Concrete."

For penetration, test in accordance with California Test 533, "Method of Test for Ball Penetration in Fresh Portland Cement Concrete," each batch of concrete from which strength specimens are made.

For slump, test in accordance with ASTM C 143 each batch of concrete from which strength specimens are made.

If air-entrained concrete is used, test the concrete using California Test 504, "Method of Test for 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 California Test 543, "Method of Test for Determining Air Content of Freshly Mixed Concrete by the Volumetric Method."

If the cement content is being checked by California Test 518, "Method of Test for Unit Weight of Fresh Concrete," determine the cement content for each batch from which strength tests are made.

Review California Test 540, "Method of Test for 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. District Materials Lab, Southern Regional Lab, or METS performs California Test 521, "Method of Test for Compressive Strength of Molded Concrete Cylinders" or ASTM C39, "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens," and reports results to the resident engineer. The resident engineer evaluates the test results for compliance with the contract specifications.

The "2 cylinders = 1 test" concept applies to all concrete cylinder tests except trial batches.

6-305D (2) Trial Batches

Specifications state that for concrete designated by compressive strength greater than 3,600 pounds per square inch, or if prequalification is specified, the concrete must be prequalified by trial batches or certified test data before it is placed.

Make and test cylinders to prequalify the concrete. The test results must meet the contract specifications before the concrete designated by compressive strength may be considered as prequalified by trial batch.

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.

6-305E Relative Compaction Using Nuclear Gauges

California Test 231, "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates Using Nuclear Gage," provides the procedures for determining relative compaction by using 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. California Test 121 includes supervision and operator requirements for nuclear gauges, as well as requirements for nuclear gauge storage and transportation. For nuclear gauges, refer to the district radiation safety officer for any questions concerning operation, storage, and administrative requirements.

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.

6-306 Material Plants

6-306 Material Plants

Determining the accuracy and suitability of scales and meters used to proportion materials in material processing plants is important to ensure uniformity and quality of materials. Plants producing construction materials for Caltrans must be approved under the *MPQP*. Material plants used for producing materials under Sections 27, "Cement Treated Bases"; 28, "Concrete Bases"; 30, "Reclaimed Pavement"; 37, "Seal Coats"; 39-2, "Hot Mix Asphalt"; 60-3.04 "Deck Overlays"; and 90, "Concrete," of the *Standard Specifications* must comply with the *MPQP*. Refer to Section 3-9, "Payment," of this manual for weighing and metering procedures.

The *MPQP* covers these topics for materials plant weighing and measuring devices: inspection, calibration, dynamic testing, and approval. Chapter 2 of the *MPQP*, "Plant Equipment," is directed to the material producer and specifies the equipment requirements for material plants. Chapter 3, "Material Plant Calibration and Dynamic Testing," is directed to the user of the calibration and approval process and specifies the calibration and approval of plant proportioning systems.

The plant approval process must be performed when weighing or measuring devices are newly installed, repaired, or adjusted, or when the plant is relocated. The resident engineer may order that the approval process be performed to ensure accurate proportioning at any time on any type of plant. The maximum interval for retesting proportioning equipment is as follows:

- Hot mix asphalt and portland cement concrete batch plants—1 year.
- Hot mix asphalt continuous mixing plants—6 months.
- Slurry seal mixer-spreader trucks—6 months or when aggregate sources are changed.
- Concrete volumetric mixers—every 30 days for pavement and 90 days for structures or when there is any change in ingredient sources.

The district weights and measures coordinator is responsible for material plant approval based on:

- Plant equipment safety inspection.
- Type approval of measurement elements, except continuous conveyor scales, by the California Department of Food and Agriculture, Division of Measurement Standards.
- Type approval of measurement elements outside the Division of Measurement Standards area of responsibility by the district weights and measures coordinator.
- Device calibration.
- Dynamic testing of the plant during operation.

Do not allow material production for Caltrans projects until plant approval is received.

The district weights and measures coordinator maintains a list of approved material plants and equipment currently in compliance with the *MPQP*.

Chapter 7-Environmental Stewardship

Chapter 7 Environmental Stewardship

Section 1 Environmental Rules and Requirements

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Figure 7-1.1 Unknown Hazards Procedure

7-110 Certificate of Environmental Compliance

Chapter 7 Environmental Stewardship

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 construction contracts.

The district construction deputy director is responsible for ensuring that environmental permit, license, agreement, and certification (PLAC) requirements are enforced. Within district construction, stormwater coordinators are appointed. Within either the district environmental or district Construction Unit, environmental construction liaisons are appointed. The environmental construction liaisons must have appropriate training, background, and experience to facilitate effective communications necessary to carry out the responsibilities of both district construction and the district Environmental Unit. To meet legal requirements, district construction staff must coordinate and communicate with environmental staff, possess appropriate skills, receive appropriate training, and understand their role in successfully carrying out environmental commitments, including PLACs, within the contract requirements.

7-102 Environmental Commitments Record

7-102
Environmental
Commitments
Record

Caltrans established the Environmental Commitments Record (ECR) in a memo dated June 5, 2005, from the chief engineer to ensure that Caltrans meets its environmental commitments for each project by:

- Documenting all environmental commitments including PLACs.
- Specifying how each commitment will be met.
- Documenting the completion of each commitment.

The ECR contains all relevant environmental compliance information and PLAC requirements; basic project information, including each environmental commitment, person, or unit responsible for commitment completion; timing and manner of implementation; location; and a commitment reference document and other commitment requirements. The ECR is part of the resident engineer's pending file and is necessary to oversee and track the project environmental commitments. It is used to prepare the Certificate of Environmental Compliance (CEC) during contract acceptance.

The resident engineer will review the ECR with the environmental construction liaison or district Environmental Unit during the preconstruction meeting with Caltrans personnel before meeting with the contractor. The environmental construction liaison or district Environmental Unit can assist with discussing the requirements at the preconstruction meeting. The resident engineer monitors the progress of all construction-related environmental commitments on an ongoing basis throughout the life of the contract and ensures their implementation. Commitments completed during construction should be tracked on the ECR.

The following are necessary for meeting environmental commitments during construction as required by Caltrans policy and law. Refer to Sections 7-103 through 7-108 of this manual for additional requirements specific to:

- Environmental resources
- Air, noise, and water pollution control
- Permits, licenses, agreements, and certifications (PLACs)
- Hazardous materials
- Hazardous waste and contamination
- Solid waste disposal and recycling reporting

7-102A Resident Engineer Responsibilities

The resident engineer uses all available assistance and expertise to understand and meet the commitments listed in the ECR. This assistance may come from the environmental construction liaison, stormwater coordinators, project biologist, or other functional areas in the district or region (such as design, cultural resources, hazardous waste, paleontology, hydraulics, or public information office).

Before work begins, the resident engineer must do the following:

- Ensure the resident engineer's pending file contains the ECR. An ECR is required for every project; if it is missing, contact the project engineer to obtain it.
- Review the resident engineer's pending file, ECR, PLACs, construction contract, and Sections 13, "Water Pollution Control," and 14, "Environmental Stewardship," of the *Standard Specifications* for commitments.
- Identify notices and required approvals and actions necessary to meet regulatory requirements and stewardship goals.
- Meet with the environmental construction liaison, district construction stormwater coordinator, project biologist, and appropriate environmental and engineering experts in the district to ensure a full understanding of the contract requirements and commitments listed in the ECR.
- Depending on the project's size and complexity, an additional preconstruction meeting may be used exclusively for discussing environmental commitments and requirements.
- Review Sections 10-1.03, "Time Constraints," 13, "Water Pollution Control," and 14 "Environmental Stewardship," of the *Standard Specifications* and the special provisions for water pollution control and environmental time constraints. Ensure those time constraints are reflected in the critical path method baseline schedule, including submittal review times.

During the course of work, the resident engineer must do the following:

- Periodically meet with the environmental construction liaison to review the ECR and confirm that environmental commitments required by the contract will be met.
- Inspect the contractor's operations for compliance with the specifications and the PLACs.
- Before submitting a change order or an authorization to proceed with change order work, review the change order work with the environmental construction liaison to

confirm that the proposed change does not adversely affect environmental commitments.

- Ensure the contractor notifies and obtains the resident engineer's approval in advance for each new activity as required. Ensure the contractor's schedule is coordinated with necessary environmental activities.
- Direct the contractor to correct any identified deficiencies in environmental compliance efforts.
- Should noncompliance occur, initiate contractual enforcement procedures appropriate to the nature and severity of the situation.

Before accepting the contract, the resident engineer must do the following:

- Ensure that all environmental commitments required by the PLACs and by the contract have been met.
- Require the contractor to remove temporary best management practices (BMP) measures, such as environmentally sensitive area (ESA) fences or other measures unless the BMP measures are part of permanent measures or requested to be left in place by the district Maintenance Unit.
- Conduct a final walk-through of the project area with the environmental construction liaison.

7-103 Protection of Environmental Resources

7-103 Protection of Environmental Resources

This section contains guidelines for protecting and preserving environmental resources, such as biological, cultural, Native American, or paleontological items, and administering the contract's environmental resource requirements during construction as required by Caltrans policy and law.

7-103A Biological Resources and Species Protection

Both state and federal laws protect designated plant and animal species and their respective habitats. Strict prohibitions exist on certain types of work, work during certain times of the year, or work at specific locations. Even inadvertently affecting protected species can result in fines or jail sentences and may result in significant project delays. The PLACs and species protection measures in the contract will specify the necessary protection measures and restrictions, and the plans will show ESAs. However, during construction, project staff or personnel from regulatory agencies 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 environmental construction liaison, project biologist, or district Environmental Unit.

The Migratory Bird Treaty Act and the California Fish and Game Code make it illegal to harm migratory birds, nongame birds, and their occupied nests. Activities that are most likely to encounter migratory birds, nongame birds, and their occupied nests include clearing and grubbing; and bridge demolition, maintenance, and retrofit work. Bird protection is a subset of species protection. Species protection responsibilities apply to bird protection. PLACs and the bird protection or species protection measures in the contract will specify the necessary protection measures and restrictions, and the plans will show any ESAs.

When occupied nests are found within the project area, the resident engineer will evaluate, with the assistance of the environmental construction liaison or project biologist, whether work in the area can continue or if suspension of work is necessary.

The resident engineer will immediately contact the environmental construction liaison or district Environmental Unit for assistance in this evaluation.

7-103A (1) Resident Engineer Responsibilities

The resident engineer uses all available assistance and expertise to protect natural resources. This assistance may come from the environmental construction liaison, contractor-supplied biologist, project biologist or other state-furnished biologist, or other functional areas in the district, such as design, cultural resources, stormwater, hazardous waste, paleontology, and hydraulics.

Before work begins, the resident engineer must do the following:

- When the contract specifies a contractor-supplied biologist, regulatory agency approvals may be required prior to accepting the contractor-supplied biologist. Do not accept submittals from the contractor-supplied biologist until approval is obtained. Understand that a contractor-supplied biologist works for the contractor and does not speak for Caltrans.
- Meet with the environmental construction liaison, project biologist, and appropriate environmental and engineering experts in the district to ensure a full understanding of the contract requirements for species and natural resource protection.
- If an ECR-required Biological Resource Information Program (BRIP) has been prepared by Caltrans, supply a copy to the contractor. If the specifications require the contractor to prepare a BRIP, coordinate a review with the environmental construction liaison or project biologist. Only accept the BRIP if it complies with the PLACs and provisions of the contract.
- If there is a bid item for Natural Resource Protection Plan, Section 14-6.03D(2), "Natural Resource Protection Plan," of the *Standard Specifications* will apply. Coordinate review of the contractor's Natural Resources Protection Plan with the environmental construction liaison or project biologist. Note that the specifications prohibit any work that has the potential to adversely affect protected species and their habitat without permission from regulatory agencies.
- Before earthwork or clearing and grubbing begins, request that required preconstruction biological surveys be completed and results be provided to understand regulatory requirements that may delay activities.
- When work occurs in water, or where vibrations or sounds from construction or other project-related activities may pass into waters, review hydroacoustic requirements for the protection of water-dependent species and ensure that necessary protections, approvals, monitoring activities, and reports are complete or active as required.
- Designate appropriate staff to assist in preventing adverse effects to biological resources as needed.

During the course of work, the resident engineer must do the following:

- If required by the specifications or PLACs, maintain a copy of the BRIP on the project site and ensure that staff completes required training.
- Inspect the contractor's operations for compliance with the specifications and the PLACs, the biological provisions, and the accepted natural resource protection plan, when required.

- Ensure the contractor adheres to the monitoring or survey schedule set forth in the PLACs, the biological provisions, and the accepted natural resource protection plan, and provides written reports of these inspections on schedule.
- Ensure the contractor maintains species protection measures so that they will function as planned.
- Ensure the contractor has the necessary staff and materials on hand to inspect and maintain species protection measures.
- Ensure the contractor notifies and obtains the resident engineer's approval in advance for each new activity, as required. Ensure that the contractor's schedule is forwarded to the environmental construction liaison or project biologist and coordinated with necessary resource monitoring.
- Ensure that construction does not result in new barriers to aquatic species passage or create issues with maintenance of existing passages.
- Immediately notify the environmental construction liaison and project biologist when protected resources are affected or may be affected by project activities. The project biologist will determine what action is necessary and will advise the resident engineer.
- If necessary, meet with personnel from regulatory agencies, such as the U.S. Fish and Wildlife Service; U.S. Environmental Protection Agency (U.S. EPA); U.S. Army Corps of Engineers; National Oceanographic and Atmospheric Agency, National Marine Fisheries Service (NOAA Fisheries); and the California Department of Fish and Wildlife, to discuss protected natural resources and measures to protect resources. The environmental construction liaison or project biologist will assist in discussions and negotiations.

Before accepting the contract, the resident engineer must do the following:

- As required by the PLACs and by the contract, determine that all biological requirements are complete.
- Ensure that the project has not maintained or created barriers to aquatic organism passage.
- Conduct a final walk-through of the project area with the project biologist.

7-103A (2) Contractor Inspections

The PLACs and special provisions for species protection may require the contractor to inspect the job site periodically for the proper implementation, performance, and maintenance of species protection measures. The contractor must follow the species protection measures specified in the PLACs, special provisions, and natural resource protection plan, and may be required to report on activities.

If any situation constitutes potential noncompliance with the permit, the resident engineer must conduct a verification inspection, and, if a noncompliant condition exists, report it to the environmental construction liaison or project biologist. The environmental construction liaison or project biologist will coordinate with the district environmental office to determine the actions required, including timely reporting to regulatory agencies and necessary options for compliance. The resident engineer must require the contractor to amend the natural resource protection plan, if necessary, and to install additional species protection measures to achieve compliance.

7-103A (3) Project Files

The resident engineer must keep copies of all applicable documents related to species protection measures as required in PLACs, special provisions, BRIP, and the natural resource protection plan, and retain copies in Category 18, "Agreements," of the project files. Retain all the required documents for at least 3 years after contract completion, or longer if required in the PLACs. Provide specific disposition instructions in Category 18 when retention beyond 3 years is required. These documents include the following:

- Periodic reports and photographs related to species protection as required.
- Take notification documentation of regulated species as required by PLACs.
- All correspondence related to species protection, including notices of noncompliance.
- Inspection, survey, and monitoring reports supplied by the contractor, environmental construction liaison or project biologist.
- Inspection reports from the resident engineer and assistant resident engineer.
- Copies of the approvals and certifications required by the specifications.

7-103B Environmentally Sensitive Area

The ESA is shown on the plans and creates a secure area within the plan boundaries enclosed by a temporary fence (Type ESA). If the area is breached, immediately secure it, stop all operations within 60 feet of the boundary, and ensure the contractor follows the directions in Section 14-1.02, "Environmentally Sensitive Area," of the *Standard Specifications*. The resident engineer will consult with the environmental construction liaison, project biologist, or project cultural specialist prior to approving entry into an ESA and when identifying or assessing damage. If the ESA is damaged, document the damage and, through consultation with the environmental construction liaison or district Environmental Unit, determine the necessary remediation including the party to perform the remediation work. Take an administrative deduction for the cost of the work when applicable, as covered by Sections 3-906G, "Deductions," and 5-103F (1c), "Deductions," of this manual.

7-103C Cultural 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. Seek assistance from the project manager, environmental construction liaison, project cultural specialist, or district Environmental Unit. For more information, refer to the *Standard Environmental Reference,* Vol. 2.

7-103D Community Impacts and Environmental Justice

Mitigating project impact on communities during construction may require actions in the community. These requirements may be included as part of the contract, including change orders, but can also be listed as an item on the ECR. Also, refer to Section 8-2, "Equal Employment Opportunity," of this manual regarding Title VI and environmental justice.

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," directs federal agencies to achieve environmental justice by identifying and addressing disproportionately high and adverse human health and environmental effects, including the interrelated social and economic effects of their programs, policies, and activities on minority and low-income populations in the United States.

7-103E Native American Concerns

These requirements are placed to alleviate concerns of the Native American community. If resources of concern to Native Americans, human remains, or previously unknown associated artifacts are unearthed, suspend work in the vicinity until the concern can be evaluated and properly resolved. Seek assistance from the project manager, environmental construction liaison, project cultural specialist, or district Environmental Unit. For more information, refer to the *Standard Environmental Reference*, Vol. 2.

http://www.dot.ca.gov/ser/

7-103F Aesthetics

Aesthetics are considered during the planning, design, and construction of transportation projects to adequately address a transportation project's visual effects and to help integrate the facility into the surrounding context. Aesthetic features included in the construction documents are the result of commitments included in the environmental document or made to the community to address scenic, aesthetic, historic, cultural, environmental, and recreational values. The integration and construction of these aesthetic features on a project is critical to fulfilling the aesthetic commitments.

Proposed changes to the plans and specifications that affect the aesthetic features must be coordinated with and approved by the district landscape architect to ensure that Caltrans' aesthetic commitments are accomplished as intended.

7-103G Paleontological Resources

Paleontological resources are evidence of ancient life, not including human life, preserved as fossils in sediments and rock. In geologically diverse California, vertebrate, invertebrate, and plant fossils are found throughout the state. Paleontological resources have unique scientific value and as a result must be protected. Refer to Chapter 8 of the *Standard Environmental Reference* Vol. 1, for information about applicable laws.

Paleontological resources may be encountered when a project includes invasive activities such as excavation or drilling of previously undisturbed sediments and rock. If paleontological resources are anticipated, the contract should include special provisions in accordance with Section 14-7, "Paleontological Resources," of the *Standard Specifications*. Protection of paleontological resources usually includes preservation of scientific information through monitoring, and fossil and data recovery. This work is normally performed by a consultant working directly for Caltrans, not the construction contractor. In these cases, the resident engineer must ensure the coordination and cooperation of the construction contractor with the paleontological consultant. This is accomplished by including the paleontological consultant in preconstruction meetings, providing the paleontological consultant with an accurate and updated schedule of subsurface disturbing activities, and, when required, ensuring

that the contractor's staff attends paleontological awareness training presented by the paleontological consultant.

In most cases, paleontological monitoring and fossil and data recovery can be performed with minimal impact to construction activities. However, when large specimens or fossil-rich areas are encountered, excavation activities may need to be temporarily diverted while the paleontological team stabilizes and removes them. In these cases, the resident engineer must facilitate coordination and cooperation between the paleontological monitoring team and the construction contractor.

If unanticipated paleontological resources are encountered, the construction contractor is directed to stop work within a 60-foot radius of the discovery and contact the resident engineer. The resident engineer must contact the environmental construction liaison who will enlist the assistance of the appropriate technical staff to investigate the discovery. Work in the area of discovery cannot resume until the find has been properly evaluated and recovery activities completed as necessary. The remaining construction activities must be evaluated in context of the discovery and monitoring may be required. If monitoring is required, it may be accomplished through either a separate contract (preferred) or a subcontract through the prime construction contractor. In either case, assistance from the environmental construction liaison or district Environmental Unit will be necessary.

After excavation is complete, a paleontological mitigation report will be prepared by the paleontological consultant. After receiving the report, the resident engineer must coordinate with the environmental construction liaison or district Environmental Unit to update the ECR. If fossils are recovered from the project, they will be properly curated. The resident engineer must coordinate with the environmental construction liaison or district Environmental Unit to ensure that funding is made available to pay for reporting and curation activities performed by the consultant.

7-103H Disposal, Staging, and Borrow Sites

Caltrans construction projects often require contractors to make use of either state-owned or private off-site lands and facilities for the disposal of excess materials; the acquisition of necessary borrow materials; and to stage equipment, store supplies, and house their offices. Contract documents generally require the contractor to show that construction activities on these sites comply with all local, state, and federal environmental and permitted use regulations. However, in some geographic locations there have been issues regarding final compliance responsibility. To resolve these issues and to foster better cooperation with regulatory agencies, the option of designating disposal, staging, and borrow (DSB) sites has been facilitated.

Those construction projects that cannot accommodate the needs of the project within the right-of-way may have designated sites outside the project limits. However, even when such sites are made available, the contractor will continue to have the flexibility of using alternative sites. Alternative sites selected by the contractor require the contractor to prepare a submittal to the resident engineer for approval. Requirements for this submittal are outlined in the following section, and additional guidance is available at:

http://www.dot.ca.gov/hq/oppd/dib/dibprg.htm

The need for identifying and obtaining environmental approvals for a designated DSB site will generally have been made by the project engineer on a case-by-case basis, considering historical and geographical issues and practices, project design

requirements, environmental concerns, economic factors, and other aspects specific to projects and their locale. During project development, the project engineer should have considered and identified sites readily available for use by the contractor. These sites would have included, but not be limited to, commercial dumpsites, recycling plants, private property, and other local sites. If it was deemed necessary that one or more DSB sites needed to be designated, the project engineer would have proposed sites evaluated during the environmental review process and, as necessary, included them in the environmental compliance documentation. To ensure their availability to the contractor, right-of-way agreements would have been obtained for private sites selected as designated DSB sites. Any necessary permits would have been included among those obtained during the plans, specifications, and estimate development. Information or documents regarding arrangements made by Caltrans to ensure the availability of designated sites are provided to prospective bidders or contractors in a materials information handout.

Summaries are provided below for the minimum items expected in: 1) a DSB site submittal for a site designated by Caltrans; and 2) a summary of the minimum items expected in a DSB site submittal for a contractor to get approval for the use of an alternate site. The submittal and support documents are then filed in the project files.

7-103H (1) Caltrans- and Contractor-Designated Disposal, Staging, and Borrow Sites

For Caltrans-designated sites:

- Caltrans will:
    1. Provide a general site plan, including site limits and access roads.
    2. Obtain temporary property owner agreements as necessary to "reserve" property.
    3. Prepare California Environmental Quality Act or National Environmental Policy Act documentation, as needed, in consultation with the Environmental Unit.
    4. Verify the existence of or obtain the necessary PLACs to satisfy regulatory agencies and ensure site availability in consultation with the Environmental Unit.
    5. Review and accept the contractor's submittal.
- The contractor will:
    1. Prepare a final grading plan in conformance with the *Standard Specifications*.
    2. Provide a release of liability.
    3. Provide final property owner agreements (refer to Section 3-603, "Local Materials," of this manual).
    4. Submit a written plan for water pollution prevention in conformance with the *Standard Specifications*.

For alternative sites selected by the contractor:

- Caltrans will review and accept the contractor's submittal.

- The contractor will:

    1. For borrow sites, demonstrate that the site is either not subject to or is in compliance with the Surface Mining and Reclamation Act (SMARA). If the borrow site is not subject to SMARA, confer with the environmental construction liaison or district Environmental Unit t to ensure that the borrow site is not a potential contamination source.
    2. For all DSB sites:
        - Provide a site plan, including site limits and access roads.
        - Obtain and provide property owner agreements (refer to Section 3-603, "Local Materials," of this manual).
        - Provide a release of liability.
        - Provide environmental documentation prepared by appropriately qualified environmental specialists.
        - Obtain or update all necessary PLACs.
        - Determine the final grading plan in conformance with the *Standard Specifications*.
        - Submit a written plan for water pollution prevention in conformance with the *Standard Specifications*.

7-103H (2) Surface Mining and Reclamation Act

Section 10295.5 of the Public Contract Code requires that Caltrans buy or accept sand, gravel, aggregates, or other mined materials (including imported borrow) from mining operations in that are compliance with or not subject to SMARA. The resident engineer can use the list of mining operations in compliance with SMARA, also called the "AB 3098 List," to verify which mining operations are in compliance. The current list may be obtained from the Department of Conservation website:

http://www.conservation.ca.gov/omr/SMARA%20Mines/ab_3098_list

Mining operations that meet the following criteria are not subject to SMARA and are not required to be on the AB 3098 List:

- A total amount of mined materials less than 1,000 cubic yards in any one location of 1 acre or less.
- Onsite excavations and onsite earth-moving activities on a Caltrans construction project that are an integral and necessary part of the project.
- Materials mined from federal lands, except for lands that the Bureau of Land Management and U.S. Forest Service regulate.
- Materials mined from tribal lands, when mined by a tribal mining operator.
- Materials mined from outside of California.

Review contractor-proposed sources and verify that the source is on the current AB 3098 List. If the contactor proposes to use mined material from a mining operation not on the AB 3098 List, obtain from the contractor proof that the operation is not subject to SMARA, in accordance with the criteria above, and confirm with the Department of Conservation. Contact the Office of Mine Reclamation, Reporting and Records Unit, at: OMR@conservation.ca.gov or (916) 323-9198.

SMARA allows the State Mining and Geology Board to exempt certain mining operations or construction projects. Caltrans can accept material from exempted sources if the contractor provides proof of the board-granted exemption.

If the proposed site is not on the AB 3098 List, and the contractor cannot demonstrate that the site is not subject to SMARA or that an exemption has been granted, the resident engineer must not accept the contractor's submittal. Refer challenges to the acceptance of materials to the Division of Construction field coordinator.

7-103I Other Contractor Uses of the State Right-of-Way

The contractor's use of Caltrans-owned parcels that are outside of the project limits will be contingent upon approval by the resident engineer, based on:

- The DSB site submittal
- Execution of a fair market rental agreement with Caltrans
- Execution of an encroachment permit by the district permit engineer

The resident engineer should consult with the project engineer and environmental construction liaison or district Environmental Unit before approving the DSB site submittal. For more information, refer to Section 3-516, "Areas for Use," of this manual.

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 Pollution Control

7-104A (1) Air Quality

Section 7-1.02C "Emissions Reduction," of the *Standard Specifications* states that the contractor, by executing the contract, is aware of California Air Resources Board (ARB) regulations and will comply with those regulations before starting work and throughout the duration of the contract.

The resident engineer does not need to verify that the contractor's equipment complies with ARB regulations. The local air quality control district or air quality management district, commonly referred to as the "air district," is responsible for enforcing air quality regulations. If complaints are brought to the resident engineer's attention, the resident engineer should direct the complainant to file the complaint with the local air district.

If the complaining party insists that Caltrans handle the situation, the resident engineer should forward the complaint to the local air quality control district, based on project location, and send the contractor a copy of the complaint filed.

A list of local air quality control districts, contacts, and addresses is available at:

https://www.arb.ca.gov/capcoa/roster.htm

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.

7-104A (2) Dust Control

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. Refer to Sections 4-10, "General Construction," and 4-18, "Dust Palliatives," of this manual for additional guidance related to dust control.

During the preliminary inspection, before work begins, take the following steps:

- Determine whether a planned method to control dust is included in the contractor's accepted plan for water pollution prevention.
- Whenever it is proposed to handle temporary traffic changes on an unpaved roadway, anticipate the necessity for dust control. 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 8-1.06, "Suspensions," of the *Standard Specifications*.

7-104B Water Pollution Control

To ensure the control of pollutants in discharges of stormwater runoff, Caltrans construction projects may be subject to federal law under the Clean Water Act and state law under the California Water Code. All Caltrans construction projects are subject to the Caltrans National Pollutant Discharge Elimination System (NPDES) permit issued by the State Water Resources Control Board (SWRCB) and one of the following NPDES permit requirements: the statewide Construction General Permit (CGP) issued by the SWRCB, the Lake Tahoe CGP issued by the Lahonton Regional Water Quality Control Board (RWQCB), or the federal CGP issued by the U.S. EPA. The project specifications should identify which permits apply to the project.

For each construction project, the contractor must prepare either a stormwater pollution prevention plan (SWPPP) or a water pollution control program (WPCP) in accordance with Section 13, "Water Pollution Control," of the *Standard Specifications*, Caltrans' *Stormwater 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 United States. The resident engineer must authorize all such preventive measures, and then the contractor's forces must implement and maintain the measures.

Successfully protecting water resources (streams, waterways, and other bodies of water) and protected water-dependent species from pollution is critical to the project's success. These waters must be protected from chemical pollutants, including petroleum products, paint residues, and curing compounds, and from sediment in stormwater runoff. To ensure this, Caltrans has developed an evaluation plan to review the contractor's water pollution control program and to evaluate construction projects for overall adequacy in implementing stormwater pollution prevention measures. The Construction Compliance Evaluation Plan provides a process for evaluating the potential threat to water quality that is sensitive to forecasted storm events and contractor preparedness. The plan also separates water quality compliance from stormwater contract administration.

For projects covered by the statewide or Lake Tahoe CGP, permit registration documents and other permit-related compliance documents must be filed electronically with the SWRCB through the Storm Water Multiple Application and Report Tracking System (SMARTS) at:

https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.xhtml

All requests to start construction, Notices of Intent, requests for termination of a project, Notices of Termination, and interim reporting are made through SMARTS.

To set up a SMARTS profile, the CGP and SMARTS require establishment of certain responsibilities, including:

- The legally responsible person (LRP).
- The approved signatory.
- A data entry person.

For Caltrans, the LRP is the district director, although as many as three backups may be designated to perform the same duties, with responsibility for permit compliance and designating the approved signatory for the project. Assignment of an approved signatory is accomplished by the linking process in SMARTS as detailed in the *SMARTS User's Manual*. The manual is posted on the Division of Construction stormwater training website:

http://www.dot.ca.gov/hq/construc/stormwater/swppp_training.html

A project can have more than one approved signatory. The resident engineer is responsible for the project data submitted in SMARTS and must be designated an approved signatory. The LRP may link other approved signatories to the project as necessary to support project delivery. Documentation for SMARTS submittals comes from various members of a project development team; however, the approved signatory is responsible for submitting permit registration documents, the Notice of Intent, discharge reports, annual reports, ad-hoc reporting, and Notice of Termination certification.

A data entry person may be any Caltrans staff member or contractor's personnel designated by the LRP or approved signatory to input information into SMARTS.

The Notice of Intent provides the RWQCBs with details about the project and is a request for coverage under the CGP. The process involves filing project-related information and the project SWPPP. Obtain information necessary to complete the SMARTS Notice of Intent from the project "Storm Water Data Report Attachment for SMARTS Input."

Reporting in SMARTS is accomplished by entering data into specific tabs or by uploading documents. For example, the Notice of Intent is created by entering data in the fields under the Notice of Intent tab, whereas the project SWPPP and its amendments are uploaded into the system. There are also screens for discharge reporting, annual reports, and other permit-related project reports. The approved signatory may certify submittals in SMARTS and, when applicable, will need to provide the qualified SWPPP developer's certification. Hard copies of these documents must be maintained in the project files.

Section II.D, "Conditions for Termination of Coverage," of the CGP details when a project is complete and a Notice of Termination is appropriate. Consult with the project engineer to ensure the conditions have been satisfied. For additional guidance, refer to:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/caltrans.shtml

7-104B (1) District Construction Stormwater Coordinator Responsibilities

District construction must have at least one designated district construction stormwater coordinator who will carry out necessary administrative functions to prevent water pollution. This coordinator reviews the contractor's SWPPP or WPCP, visits projects, and acts as technical advisor to the resident engineer. The coordinator evaluates projects for potential threats to water quality and the effectiveness of stormwater contract administration. The district construction stormwater coordinator works with other functional areas in the district, assists resident engineers to ensure compliance, and ensures that field construction personnel are appropriately trained.

7-104B (2) Resident Engineer Responsibilities

The resident engineer uses all available assistance and expertise in preventing water pollution. This assistance may come from the district construction stormwater coordinator, environmental construction liaison, or other functional areas in the district, such as landscape architecture, environmental, and hydraulics.

Before work begins, the resident engineer must do the following:

- Designate appropriate staff as stormwater inspectors to assist in preventing stormwater pollution.
- Review the construction contract and the resident engineer's file for instructions and commitments.
- Ensure that permit registration documents are submitted into SMARTS.
- Ensure that all proper forms have been filed with the 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 stormwater measures and requirements. Depending on the project's size and complexity, this preconstruction meeting may be used exclusively for discussing water pollution prevention or the topic may be included in a general preconstruction meeting.
- Provide the contractor with a copy of the district Design Unit's conceptual SWPPP for the project, if one has been prepared.
- Review and authorize the contractor's SWPPP or WPCP as required by the specifications. The district construction stormwater coordinator may assist in the review. Note that before the resident engineer has authorized the plan, the specifications prohibit any job site activities. If a RWQCB requires review of the authorized SWPPP, job site activities are prohibited until the board reviews and comments on the authorized SWPPP.
- Before any job site activities begin, ensure the contractor deploys any stormwater measures called for in the SWPPP or WPCP.

During the course of work, the resident engineer must do the following:

- Maintain a copy of the authorized SWPPP or WPCP on the project site.
- Inspect the contractor's operations for compliance with the specifications and the authorized SWPPP or WPCP, including deployment of best management practices measures.
- 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 prepares and submits Form CEM-2045, "Rain Event Action Plan," or Form CEM-2045T "Rain Event Action Plan—Lake Tahoe Hydrologic Unit" if applicable, for risk levels 2 and 3 on SWPPP projects.
- Ensure the contractor prepares and submits project annual reports.
- Ensure the contractor deploys stormwater and nonstormwater best management practices measures whenever associated construction activities are taking place.
- Ensure the contractor maintains best management practices measures so that they will function as planned.
- Ensure the contractor has the necessary materials on hand to deploy any necessary additional measures 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 any 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 authorization in advance for each first-time nonstormwater 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's water pollution protection plan addresses avoiding water quality impacts related to pre-nesting season removal of existing bird nests on bridges and other structures over or near water.
- Direct the contractor to correct any deficiencies in compliance efforts identified in the contractor's or district construction stormwater coordinator's project evaluation reports.
- If any pollutants are discharged into the waters of the United States, notify the district construction stormwater coordinator immediately. Review the NPDES permit and *Statewide Stormwater Management Plan* to determine the appropriate reporting timeframe, and provide a draft report of noncompliance to the district NPDES stormwater coordinator. Unless otherwise indicated in the district or regional work plans, the district NPDES stormwater coordinator will then forward the report to the RWQCB. For SWPPP projects, require the contractor to prepare Form CEM-2061, "Notice of Discharge Report," or Form CEM-2061T "Notice of Discharge Report—Lake Tahoe Hydrologic Unit Stormwater Sample Field Test Report/ Receiving Water Monitoring Report" if applicable.

- Report to the district construction stormwater coordinator any illegal discharges or illicit connections. Require the contractor to prepare Form CEM-2061, "Notice of Discharge Report," or Form CEM-2061T "Notice of Discharge Report—Lake Tahoe Hydrologic Unit Stormwater Sample Field Test Report/ Receiving Water Monitoring Report" if applicable, as specified in the SWPPP.
- Should noncompliance occur, initiate contractual enforcement procedures commensurate with the nature and severity of the noncompliance. Contract enforcement may 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 best management practices measures.
- Meet with personnel from regulatory agencies, such as the U.S. EPA, RWQCB, or SWRCB to discuss stormwater issues and measures.
- Ensure the contractor submits an annual certification of compliance, Form CEM-2070, "SWPPP/WPCP Annual Certification of Compliance," as specified. Sign, date, and file this certification in the project files.
- At 90 percent construction completion, conduct a field review with the maintenance superintendent or supervisor, or the district maintenance stormwater coordinator, and complete Form MTCE-0023, "Construction to Maintenance 90% BMP Completion Walkthrough."

Before accepting the contract, the resident engineer must do the following:

- Determine that all slopes are stabilized, as required by the contract.
- Require the contractor to remove temporary BMP 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. During the final inspection, update Form MTCE-0023 to reflect changes and corrective actions implemented since the 90 percent construction completion field review with maintenance.

7-104B (3) Stormwater Inspector Responsibilities

The resident engineer may assign an assistant resident engineer as the stormwater inspector. The stormwater inspector will assist the resident engineer in carrying out the work described above, as determined by the resident engineer. Typically, the stormwater inspector will do the following:

- Review and become familiar with the *Standard Specifications* and project special provisions pertaining to water pollution control.
- Review and become familiar with the authorized WPCP or SWPPP.
- Conduct site inspections. Verify that BMP measures are properly installed and meet the requirements in the Caltrans *Stormwater Quality Handbooks* and the contract specifications. Look for areas that may require BMP measures 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 daily reports on stormwater pollution prevention. Record all stormwater management activities, or inactivity, and conversations with the contractor regarding stormwater pollution prevention.
- Document site visits from regulatory agencies, such as the SWRCB, the RWQCB, or U.S. EPA, and any inspections the agencies perform.
- Monitor the weather reports of the National Weather Service for rainfall predictions. If a qualifying rain event (greater than 0.5 inch for each event) or storm event (greater than 0.1 inch in 24 hours) is predicted, ensure the contractor prepares a rain event action plan for risk levels 2 and 3 projects and deploys appropriate measures as identified in either the rain event action plan, the SWPPP, or the WPCP.
- Inform the resident engineer immediately of any problems with BMP measures 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 Inspections

The special provisions for water pollution control require the contractor to inspect the construction site at least once a week for the proper implementation, performance, and maintenance of BMP measures identified in the WPCP or SWPPP. The contractor must follow the site inspection procedure specified in the SWPPP or WPCP, and the *Construction Site Monitoring Program Guidance Manual*. The water pollution control manager, or trained personnel under the supervision of the water pollution control manager, must conduct the site inspections using Form CEM-2030, "Stormwater Site Inspection Report."

The contractor must notify the resident engineer whenever the SWPPP, WPCP, or BMP measures may not reduce or have not reduced the discharge of sediment or other pollutants into a waterway or outside of the project limits. The contractor must follow the verbal notification with a written report using Form CEM-2061, "Notice of Discharge Report," or Form CEM-2061T "Notice of Discharge Report—Lake Tahoe Hydrologic Unit Stormwater Sample Field Test Report/ Receiving Water Monitoring Report" if applicable. The contractor's report must conform to the provisions of Section 900.3, "Discharge Reporting," of the SWPPP or those of Section 50.2, "Discharge Reporting," of the WPCP.

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 district construction stormwater coordinator and district NPDES stormwater coordinator. Unless otherwise indicated in the district or regional work plans, the district NPDES stormwater coordinator will report it to the appropriate RWQCB. The resident engineer must require the contractor to amend the WPCP or the SWPPP, if necessary, and to employ additional BMP measures.

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 authorized or the ability of the authorized 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, municipal storm drain systems, or outside of the project limits. The project biologist must be notified of such releases, asked to determine the effect on protected species and their habitats, and asked to determine the need for required notices to regulatory agencies. 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 plan's effectiveness is diminished by any such changed condition.

Upon the resident engineer's authorization, the contractor must incorporate all WPCP or SWPPP amendments into the onsite documents. The contractor must prepare WPCP or SWPPP amendments in the format prescribed in the *Stormwater Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual*.

The resident engineer must review the contractor's proposed revised WPCP or SWPPP amendment for completeness and conformance with the revised conditions, and give written authorization to the contractor if the amendments are acceptable. The authorized revised SWPPP must be uploaded into SMARTS.

7-104B (6) Project Files

The resident engineer must keep copies of all documents related to stormwater pollution prevention in Category 20, "Water Pollution Control Program or Storm Water Pollution Prevention Plan," of the project files. Retain the following documents:

- SWPPP or WPCP and all amendments.
- Daily reports and photographs related to the prevention of stormwater pollution.
- The weekly contractor-prepared Stormwater Site Inspection Report.
- The Notice of Discharge Reports.
- All correspondence related to stormwater pollution prevention, including notices of noncompliance.
- Inspection reports from the district construction stormwater coordinators.
- Inspection reports from the resident engineer and assistant resident engineer.
- Copies of the certifications required by the specifications.
- The printout from SMARTS after filing the Notice of Termination.

7-104B (7) Contractor Files

The specifications require the contractor to keep at the project site copies of the SWPPP or WPCP and all authorized amendments.

7-104C Noise Control

Construction and traffic noise may be a sensitive issue in neighborhoods and communities adjacent to state highways. Funding has been provided for highway noise reduction through the construction of sound walls and other noise attenuation. Special

restrictions may be employed on night work in sensitive areas, such as residential neighborhoods, schools, and hospitals near the project site. Section 14-8, "Noise and Vibration," of the *Standard Specifications*, provides the contractor's requirements for noise control.

7-105 Permits, Licenses, Agreements, and Certifications

7-105 Permits, Licenses, Agreements, and Certifications

This section covers Permits, Licenses, Agreements, and Certifications (PLACs) that may be issued by regulatory agencies or may be part of the contract supplemental project information as described in the special provisions. For assistance regarding PLAC requirements, such as contractor submittals on reporting requirements, protocols, or information training, contact the environmental construction liaison or project biologist.

7-105A Special Use Permits and Other Federal Permits

The U.S. Forest Service, Bureau of Land Management, and other federal agencies issue permits to Caltrans to construct and operate highway facilities across lands under their jurisdictions. There can be special use permits, temporary use permits, U.S. Department of Transportation easements, federal land transfers, and, in the case of already existing roadways, there may be prescriptive rights of way. In addition, an Archaeological Resources Protection Act permit may be required.

7-105B California Fish and Game Code Sections 1602 and 5650

Section 1602 of the California Fish and Game Code requires that public agencies such as Caltrans reach an agreement with the California Department of Fish and Wildlife (CDFW) if the proposed work affects a waterway. The agreement required by this section of the code is known as the "Lake or Streambed Alteration Agreement," also known as the "1602 Agreement." The 1602 Agreement specifically prohibits polluting the waters of the state and may specifically prohibit certain activities at certain times of the year, such as working in the river during spawning season. It 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 placing specified materials in the waters of the state. Violations are punishable by fine, imprisonment, or both. 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 CDFW 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 110.11, "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 the environmental construction liaison or project biologist.

7-105C List of Potential Permits, Licenses, Agreements, and Certifications

Table 7-1.1 may be used for determining when permits or approval of contract plans may be required from state or local governmental agencies. The first 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.

Table 7-1.2 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. The third column lists the statute or regulation that applies to the resource or activity.

Most required permits and plan approvals should be obtained during the project's design phase. However, the following tables 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. Any changes to plan approvals or PLACs must be coordinated with the environmental construction liaison or Environmental Unit.

Table 7-1.1. State and Local Agency Permits, Licenses, Agreements, and Certifications (1 of 2)

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; California Department of Fish and Wildlife	Timberland conversion permit; California Endangered Species Act (Consultation)
Power transmission lines, pipelines, and railroad crossings	Public Utilities Commission	Review of plans and approval
Solid waste disposal	Department of Resource Recycling and Recovery (CalRecycle)	Disposal requirements
Sewage disposal	County health department	Disposal requirements
Waste discharge	State Water Resources Control Board; Regional Water Quality Control Board	Waste discharge requirements
Re-use of soil containing regulated concentrations of aerially deposited lead (ADL)	Department of Toxic Substances Control	Soil Management Agreement for ADL-Contaminated Soils (ADL Agreement)
Storing, treating, or disposing of hazardous waste	Department of Toxic Substances Control	Hazardous Waste Facilities Permit required for facilities receiving hazardous waste from Caltrans
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 Wildlife	Lake/Streambed Alteration Agreement (1602 Agreement); California Endangered Species Act (consultation)
Encroachment on or across cove, bay, or inlet	California Department of Parks and Recreation, Division 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 into the atmosphere
Fish and wildlife habitat	California Department of Fish and Wildlife	Lake/Streambed Alteration Agreement for activities in lakes, streams, and channels and crossings; California Endangered Species Act
Coastal zone	California Coastal Commission; local government local coastal program	Coastal Development Permit; California Coastal Act

Table 7-1.1. State and Local Agency Permits, Licenses, Agreements, and Certifications (2 of 2)

Resource or Activity	Agency	Permit or Approval
Water	California State Lands Commission; State Water Resources Control Board; Regional Water Quality Control Board; Department of Public Health, Division of Drinking Water and Environmental Management; or local health office	Land use lease (such as for encroachments, crossings on tidelands, submerged lands); National Pollutant Discharge Elimination System Permit for stormwater 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 Wildlife; State Lands Commission	Standard or special suction dredging permit; dredging permit
Surface (material borrow sites, for example)	Local agency (county or city)	Surface Mining and Reclamation Act (SMARA) permit
Burning	Local air pollution control district; California Department of Forestry and Fire Protection; 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; 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 7-1.2. Federal Agency Permits, Licenses, Agreements, and Certifications

Resource or Activity	Agency	Federal Statute, Regulation, or Executive Order
Water	U.S. Army Corps of Engineers; U.S. EPA; Bureau of Reclamation; U.S. Fish and Wildlife Service; National Oceanic and Atmospheric Administration	Clean Water Act (Section 404) Regulations concerning the National Pollutant Discharge Elimination System (40 CFR); Endangered Species Act
Air	U.S. EPA	Clean Air Act, Title 42, Sections 7401–7414
Fish and Wildlife Habitat	U.S. Fish and Wildlife Service; U.S. Forest Service; National Park Service; National Oceanic and Atmospheric Administration	Endangered Species Act (Section 7) Biological Opinion for protection of species and habitats
Navigable Waters	U.S. Army Corps of Engineers; U.S. Coast Guard	Rivers & Harbor Act
Federal Lands	U.S. Forest Service; Bureau of Land Management; National Park Service; U.S. Army Corps of Engineers; U.S. Fish and Wildlife Service; National Oceanic and Atmospheric Administration	Clean Water Act (Section 404); Endangered Species Act (Section 7)
Historic Properties	Advisory Council on Historic Preservation; State Historic Preservation Office	National Historic Preservation Act (Section 106)
Paleontological Resources	Bureau of Indian Affairs; Bureau of Land Management, U.S. Forest Service; National Park Service; U.S. Army Corps of Engineers	Antiquities Act of 1906; Paleontological Resources Preservation Act of 2009; Federal Land Policy and Management Act of 1976
Coastal Zone	U.S. Army Corps of Engineers; U.S. Fish and Wildlife Service; National Oceanic and Atmospheric Administration	Biological Opinion for protection of species and habitats; Federal Endangered Species Act; Federal Coastal Zone Management Act of 1972
Wild and Scenic Rivers	National Park Service; U.S. Forest Service, Bureau of Land Management	Code of Federal Regulations, Title 36, Section 297 (36 CFR 297); 43 CFR 8350
Wetlands	U.S. Army Corps of Engineers; U.S. EPA	Executive Order 11990 (Protection of Wetlands)
Floodplains	Federal Emergency Management Agency	Executive Order 11988 (Floodplains Management)
Dredging	U.S. Army Corps of Engineers; U.S. Fish and Wildlife Service; National Oceanic and Atmospheric Administration; U.S. Coast Guard	Clean Water Act (Section 404); Executive Order 11990; Endangered Species Act
Airport Airspace	Federal Aviation Administration	Federal Aviation Regulations, Part 77
Farmland	Natural Resources Conservation Service	Farmland Protection Policy Act

7-106 Hazardous Materials

7-106 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 safety data sheets (SDS) 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, refer to Chapter 16, "Hazardous Materials Communication Program," of the *Caltrans Safety Manual* and Chapter 2, "Safety and Traffic," of this manual. For pesticide use guidelines, refer to Section 4-20, "Landscape," of this manual.

Key sources of safety data information are available at the website listed below. The information this website provides could be critical in the event the contractor fails to provide an SDS or should additional information or clarification be required.

In using this information, keep in mind that the address may change over time and it may be necessary to search the more general website listing or call directly for assistance.

For SDS information, use the following free online database provided by MSDS Catalog Service LLC:

http://msdsdigital.com/msds-database

SDS information may also be obtained by entering the product name followed by SDS in a web search engine.

7-107 Hazardous Waste and Contamination

7-107 Hazardous Waste and Contamination

Hazardous waste may be generated as a result of construction activities. Examples of hazardous waste include the removal of stripe and pavement marking containing high levels of lead, removing lead-based paint from a bridge or other structure, and excavating soil containing aerially deposited lead. Removing hazardous waste and contamination that has been released into the environment may be part of the project activities. For example, the work may include excavating a defined area of contaminated soil at an old gas station location.

Special permits may be required when generating hazardous waste during construction. For example, demolishing a bridge, whether new, old, or temporary, requires an asbestos survey and a permit from the local air quality management district. For guidance regarding special permit and variance requirements and procedures, contact the environmental construction liaison or district Environmental Unit.

The district construction division must have a designated district hazardous waste coordinator who will carry out necessary administrative functions for hazardous waste and assist the resident engineer. The coordinator will assist the resident engineer by working with other functional areas in the district and headquarters to do the following:

- Identify hazardous waste training that might be needed.
- 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 anticipated and unanticipated hazardous waste and contamination.

The construction contractor is responsible for ensuring that hazardous waste and contamination is managed in compliance with all applicable laws and regulatory requirements. For information about the applicable laws and regulations, refer to Chapter 10 of the *Standard Environmental Reference*, Vol. 1. Additional information regarding hazardous waste management is available at the California Department of Toxic Substances Control (DTSC):

http://www.dtsc.ca.gov/

For information regarding hazardous waste transportation, refer to the DTSC:

http://www.dtsc.ca.gov/HazardousWaste/Transporters/index.cfm

Section 14-11, "Hazardous Waste and Contamination," of the *Standard Specifications* defines the contractor's responsibilities, including requirements for proper storage and handling. Guidance for managing hazardous waste during construction can be found at:

http://www.dot.ca.gov/hq/env/haz/hw_contaminants.htm

Guidance for implementing specific standard special provisions is available at:

http://www.caltrans.ca.gov/hq/env/haz/hw_sp.htm

7-107A Contractor-Generated Hazardous Waste Versus Department-Generated Hazardous Waste

Section 14-11, "Hazardous Waste and Contamination," of the *Standard Specifications* differentiates between contractor-generated waste and Department-generated waste.

Contractor-generated hazardous wastes are hazardous materials that the contractor brings to the job site that have no further use and must be disposed of. Examples include extra or spent chemicals and waste generated as a result of contractor spills and leaks. Caltrans does not pay for disposal of contractor-generated hazardous wastes. If the contractor-generated hazardous waste is characterized as a federal waste, often referred to as a Resource Conservation and Recovery Act (RCRA) waste, the contractor must obtain a U.S. EPA Identification Number from DTSC and sign manifests for disposal. If the contractor-generated hazardous waste is not characterized as a federal waste, it will be characterized as a California hazardous waste—also known as a non-RCRA waste—and the contractor must obtain a state identification from DTSC and sign manifests for disposal.

Department-generated hazardous wastes result from removal of materials that exist within the project limits such as stripe on the highway and soil containing aerially deposited lead. The *Standard Specifications* requires that Department-generated hazardous waste is labeled consistently, and the resident engineer obtains the U.S. EPA temporary generator identification number and signs the hazardous waste manifests. Department-generated hazardous waste is required to be disposed of within California at a facility that holds a DTSC permit to accept the waste. For more information regarding in-state disposal, refer to Chapter 18, "Environmental Contamination" of the *Project Development Procedures Manual*.

At the preconstruction meeting, have the contractor identify the permitted site for disposal of project hazardous waste. The resident engineer should follow up and confirm the disposal site's ability to dispose of the waste stream.

During the course of work, the resident engineer must do the following:

1. Retain a copy of the manifest. Send a copy to: DTSC, P.O. Box 400, Sacramento, CA, 95812-0400 within 30 days.
2. Review the manifest for accuracy before signing it as the generator. If you identify any errors at the time, line them out, correct them, and initial the correction. If you identify an error after the waste is transported, prepare a manifest correction letter. Seek assistance from the district hazardous waste coordinator if needed. The mailing address on the manifest should be the district office and the manifest should also show the project location address.
3. Check that the load is transported by a hauler with a valid hazardous waste hauler certification.

7-107B Aerially Deposited Lead

Aerially deposited lead (ADL) from leaded gasoline emissions still exists in unpaved areas along California highways, and lead is ubiquitous in the environment. Sample and analysis of soil is normally performed during project development to determine whether the lead is present at concentrations requiring special management. Sample results are analyzed statistically. The sampling and analysis methods were developed and are required by the U.S. EPA and DTSC. For safety purposes, do not allow Caltrans staff and contractor staff that have not completed a lead safety training program provided by the contractor to work in areas where soil is being disturbed.

7-107B (1) Nonhazardous Waste Concentrations

If lead concentrations are nonhazardous, a lead compliance plan is required for safety precautions, but special disposal of the soil is not required. The requirements for the lead compliance plan are found in Section 7-1.02K (6)(j)(ii), "Lead Compliance Plan," of the *Standard Specifications* and project-specific information may be found in Section 7-1.02K (6)(j)(iii), "Earth Material Containing Lead," of the standard special provisions. The requirements specify whether soil must be retained on the job site or may be disposed of by the contractor.

If soil will be disposed of and Section 7-1.02K(6)(j)(iii), "Earth Material Containing Lead," indicates the average concentration of total lead exceeds 80 mg/kg, verify the additional text discussed in Section 3-510B, "Contractor-Property Owner Agreement," of this manual is included in the Contractor-Property Owner Agreement. Submit the Contractor-Property Owner Agreement to the district ADL coordinator, who will provide the agreement to DTSC. Coordinate and provide additional information to the district ADL coordinator as required by the ADL Agreement. The information needed includes the start and end dates of construction, volume of soil disposed of on the property, and bills of lading used to transport the soil. Refer to Item No. 6 on pages 10 and 11 of Exhibit A of the ADL Agreement:

http://www.dot.ca.gov/hq/construc/environmental/

The list of district ADL coordinators is available at:

http://www.dot.ca.gov/hq/construc/environmental/

The special provisions may contain handling requirements, for example, excavate to total depth, not in lifts. These requirements are included and must be followed in situations where mismanagement of the soil could result in unintended

misclassification of the soil and unnecessary hazardous waste generation. For more information about these special provisions, refer to the guidance at:

www.dot.ca.gov/hq/env/haz/hw_sp.htm

7-107B (2) Hazardous Waste Concentrations

If lead concentrations are hazardous waste and soil will be disturbed by project activities, the contract special provisions will require worker protection and soil management and disposal at a Class I Disposal Facility, or re-use under the Transition Plan (Exhibit A) requirements of the ADL Agreement between Caltrans and the DTSC.

ADL soil that must be disposed in a Class I disposal facility is designated in the specifications and on the plans as either Z-2 or Z-3 soil. When a contract includes disposal of Z-2 or Z-3 material, within 180 days after the contract has been accepted, the resident engineer must coordinate and provide additional information to the district ADL coordinator as required by the ADL Agreement. The additional information needed includes the start and end dates of construction, landfill names, copies of hazardous waste manifests used to transport the soil, and volume of soil disposed of at the landfills. Refer to Item No. 6 on pages 10 and 11 of Exhibit A of the ADL Agreement.

Reuse of ADL soils with lead concentrations exceeding regulatory thresholds is allowed by the ADL Agreement when the project is listed in Exhibit C of the ADL Agreement and the Transition Plan (Exhibit A) requirements of the ADL Agreement are met. For reference, the transition plan requirements are the requirements originally set forth in the variance (Exhibit B) with additional reporting requirements. Soil that can be re-used is designated in the specifications and on the plans as Y-1 (can be buried under soil) or Y-2 (must be placed under pavement). When the project includes excavation or placement of Types Y-1 or Y-2 soil, the resident engineer must verify, before contract award if possible, that the district ADL coordinator has submitted the project notification to DTSC, including providing copies of the DTSC written notification to:

- The applicable RWQCBs
- The local air pollution control districts or air quality management districts
- The Certified Uniform Program Agency

The written notification to DTSC must list all projects connected to the Y-1 or Y-2 soil, including projects receiving Y-1 or Y-2 soil or furnishing Y-1 or Y-2 soil.

If the written notifications and submittals were not sent, the resident engineer must notify the district ADL coordinator immediately, who must provide the required written notifications.

The resident engineer must be aware of the requirements of the ADL Agreement, including excavating, placing, stockpiling, transporting, managing, and burying soil containing ADL. Coordinating and communicating with the district ADL coordinator before, during, and after construction is very important. The resident engineer must be familiar with the recording and reporting requirements of the ADL Agreement.

As Y-1 or Y-2 project changes require a written update notification to DTSC, all changes to Y-1 or Y-2 soil must be discussed with the district ADL coordinator. Do not proceed with Y-1 or Y-2 project changes without update correspondence letters to

DTSC or written notification from the district ADL coordinator indicating concurrence with the change. All changes from the original design, including minor changes in placement locations, quantities, or protection measures, must be documented by the resident engineer on Form CEM 4501, "Resident Engineer's Daily Report or Assistant Resident Engineer's Daily Report" within 5 days of the change.

The contractor must submit Form CEM-1901, "Burial Location of Soil Containing Aerially Deposited Lead," and an electronic geospatial vector data shapefile to the resident engineer within 5 business days of completing placement of soil containing ADL at a burial location. The resident engineer should verify the information submitted on the form and notify the contractor within 5 business days if the information must be corrected. The contractor must then submit the corrected form and electronic geospatial vector data shapefile to the resident engineer and ADL@dot.ca.gov. The resident engineer must forward Form CEM-1901 and the geospatial vector data shapefile to the district ADL coordinator.

The resident engineer is responsible for showing on the as-built plans the locations where ADL was buried. Information submitted on Form CEM-1901 should be used as the basis for the plotting locations.

The resident engineer must coordinate with and provide the following to the district ADL coordinator:

- Lead compliance plan, within 10 days of accepting the plan
- Excavation and transportation plan, within 10 days of accepting the plan
- Start of construction notification (at least 5 days before construction)
    - List of contractor and subcontractors
    - Anticipated start and end (contract acceptance) construction dates
    - Resident engineer contact information
    - Project-defined corridor if soil will be moved from one Caltrans project to another
- Completion report (within 180 days of contract acceptance)
    - Actual start and end (contract acceptance) construction dates
    - List of all U.S. EPA and State Identification Numbers, including Temporary Identification Numbers, issued by DTSC for the project. The list must include the identification numbers obtained by the contractor for contractor-generated hazardous waste.
    - Survey data at each burial location as signed by the contractor's surveyor
    - Volume of soil at each burial location
    - The historical maximum elevation of the water table underlying each burial location
    - Copies of all bills of lading used for transporting ADL soil. These must be kept on file with the project as-built plans
    - Laboratory data if soil is tested for lead during construction

To comply with the record retention requirements of the ADL Agreement (6 years minimum), the resident engineer must retain ADL-related records in Category 19, "Hazardous Waste and Hazardous Materials" of the project records as follows:

- All ADL-related correspondence, reports, data, and records
- All ADL-related documents included with the resident engineer pending file.

7-107B (3) Minimal Disturbance of Material Containing Hazardous Waste Concentrations of Aerially Deposited Lead

The U.S. EPA allows certain discrete areas of generally dispersed contamination to be considered an individual waste management unit (equivalent to a landfill). These discrete areas are defined as areas of contamination (AOCs). An AOC is equated to a single unit; therefore, movement, consolidation, or in-situ treatment of hazardous waste within the AOC does not create a new point of hazardous waste generation. For an AOC, contamination must be contiguous but can have various concentrations.

The DTSC allows Caltrans to apply the AOC approach to projects that will only cause minimal disturbances of soil containing hazardous waste concentrations of ADL. Minimal or minor disturbances include installing guardrail, fencing, sign posts, traffic operation systems, highway planting and irrigation; minor clearing and grubbing; shoulder backing, pavement, and trenches for electrical systems. All soil disturbed must remain in the immediate area of disturbance and not be transported elsewhere. Health and safety precautions and dust control for hazardous waste must be implemented.

When the AOC approach can be applied, the contract specifications under Section 14-11.09, "Minimal Disturbance of Material Containing Hazardous Waste Concentrations of Aerially Deposited Lead" of the *Standard Specifications* will require a lead compliance plan for worker safety and dust control and require that disturbed soil be placed back in the immediate area that it came from.

7-107C Naturally Occurring Asbestos

If naturally occurring asbestos (NOA) exists within the project area, the contract will include specifications that contain safety and management requirements. The specifications require that the contractor must, at all times, comply with the dust mitigation requirements of the local air pollution control district or the county air quality management district and the California Occupational Safety and Health Administration code of safe work practices for working with asbestos (California Code of Regulations, Title 8, Section 1529, "Asbestos" [8 CCR 1529]).

The California Air Resources Board (ARB) restricts the use of material containing detectable NOA (equal to or greater than 0.25 percent) and the DTSC regulates material containing hazardous levels of NOA (defined as equal to or greater than 1.0 percent asbestos). However, the DTSC does not require that NOA be managed as a hazardous waste for disposal purposes, and, therefore, disposal at a Class I facility is not required. Because of this determination, a generator identification number is not necessary for disposing of excess NOA material, nor are waste manifests or DTSC-registered hazardous waste transporters required. However, surplus material containing 1.0 percent or greater of NOA must be disposed of by the contractor in a Class II or Class III landfill facility permitted to receive it and may not be relinquished for reuse on a site that is not a permitted disposal facility.

Ultramafic rock that has been tested and found to contain less than 0.25 percent asbestos and all NOA material containing less than 0.25 percent asbestos may be used in a surfacing application according to 17 CCR 93106, "Asbestos Airborne Toxic Control Measure for Surfacing Applications." "Restricted Material" is defined as ultramafic rock and serpentine rock, any material extracted from a region defined on geologic maps as an ultramafic rock unit, and any material that has been tested and found to have an asbestos content of 0.25 percent or greater. Surplus material with an NOA content greater than or equal to 0.25 percent, but less than 1.0 percent NOA must be disposed of in a licensed landfill facility if it is not relinquished to the contractor. If material containing less than 1.0 percent NOA is relinquished to the contractor for reuse in nonsurfacing applications, the contractor must provide the following warning to the entity receiving the NOA material:

W A R N I N G!

This material may contain asbestos.

It is unlawful to use this material for surfacing or any application

in which it would remain exposed and subject to possible disturbances.

Extreme care should be taken when handling this material to minimize the generation of dust.

The resident engineer must obtain written documentation from the contractor stating that the relinquished NOA material will not be reused in a surfacing application and what the final disposition of the restricted material is.

7-107D Department-Generated Contaminated Soil

If contaminated soil exists within the project area, the contract will include specifications that contain safety and management requirements. Depending on the depth to groundwater within the project area and the depth of construction activities, management of contaminated water may also be included. These specifications will vary depending upon the site-specific conditions and, therefore, must be reviewed carefully by the resident engineer to ensure that they are properly implemented.

7-107E Removing Yellow Traffic Stripe and Pavement Marking with Hazardous Waste Residue

Refer to Section 14-11.12, "Removal of Yellow Traffic Stripe and Pavement Marking with Hazardous Waste Residue," of the *Standard Specifications* and follow the procedures below when assessing, removing, and disposing of yellow traffic stripe and pavement marking materials on all projects.

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.

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 to determine whether a change order is needed.

The resident engineer must ensure the following:

- *Training*: The contractor must provide a safety training program that meets the requirements of 8 CCR 1532.1, "Lead." 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 compliance plan*: Work practices and worker health and safety must conform to 8 CCR 1532.1. The contractor must submit the written compliance programs required in Subsection (e)(2), "Compliance Program," of 8 CCR 1532.1, to the resident engineer before starting to remove yellow traffic stripes and pavement markings and at such times when a program revision is required. An industrial hygienist certified by the American Board of Industrial Hygiene must prepare the compliance program. A competent person capable of taking corrective action must monitor the program. Require that copies of all inspection reports made in accordance with 8 CCR 1532.1 are given to the resident engineer.
- *Work plan*: The contractor must submit a work plan that documents the removal equipment that will be used, removal and waste collection procedures, storage containers, storage location and security, sampling procedures, sampling personnel qualifications, certified laboratory that will run the analyses, hazardous waste hauler certifications, and receiving disposal site and requirements. Removal work may not start until the resident engineer has reviewed and accepted the work plan.
- *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 as hazardous waste in properly labeled metal containers approved by the U.S. Department of Transportation for hazardous waste transport.
    2. Cover and handle the containers in such a manner that no spillage will occur.
    3. Enclose the stored containers with temporary chain link fencing or a lockable shipping container at a location within the project limits approved by the resident engineer.
    4. Begin disposing of the contained residue no more than 90 days after accumulating 220 pounds of residue.

- *Testing and disposal*: Before disposal, the contractor is required to test the residue collected in the containers for proper waste classification. 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, disposal of the stored material is as follows:

    1. Dispose of the stored residue as hazardous waste when its lead content is detected to be at levels greater than 1,000 mg/kg total lead or greater than 5 mg/l soluble lead. Keep records in accordance with current requirements for hazardous waste handling and disposal, and file them in the project files. The contractor must dispose of all hazardous waste residues resulting from yellow

traffic stripe and pavement marking removal at an approved DTSC-permitted Class I disposal facility in accordance with the requirements of the disposal facility operator. A transporter currently registered with the DTSC using correct manifesting procedures must haul the yellow traffic stripe and pavement marking residue.

The contractor must make all arrangements with the disposal facility operator and perform any testing of the yellow traffic stripe and pavement marking debris required by the operator. The resident engineer must obtain the U.S. EPA or State Temporary Identification Number and sign all manifests as the generator. The resident engineer must also pay the manifest fees that may be billed several months after project completion.

2. Unless the lead removal work was already contemplated in the construction contract, pay as change order work all work performed for testing, additional removal costs, retesting, and additional disposal.
3. If the analytical test results demonstrate that the waste is actually nonhazardous, a change order must be prepared to direct the contractor to dispose of the waste at a Class II or Class III facility with no additional payment provided.

7-107F Disturbance of Existing Paint Systems on Bridge

Bridge paints contained high levels of lead, zinc, and chromium before being reformulated to reduce their toxicity. Even though the phase-out of those paints occurred many years ago, lead, zinc, and chromium are still a concern because when bridges are repainted, not all of the prior layers of paint are completely removed. In addition, lead from the paint is actually absorbed into the steel and, as a result, even steel that no longer has paint on it can be a hazard if heated because heating causes the lead to be released as a toxic fume.

When bridge paints are disturbed, the paint debris must be properly contained to protect waterways and workers. It has been determined that the grime and debris that collects on bridges also contains elevated concentrations of lead. Consider this grime and debris part of the existing paint system.

When bridge paint will be disturbed as part of the project, the contract specifications will require a lead compliance plan for worker safety, waste management, and verification sampling to document that heavy metals are not released during the work.

The resident engineer must ensure the following:

- *Training*: The contractor must provide a safety training program that meets the requirements in 8 CCR 1532.1, "Lead." Before performing any bridge paint removal, personnel (including Caltrans employees) who have had no prior lead training must complete the safety training program.
- *Lead compliance plan*: Work practices and worker health and safety must conform to 8 CCR 1532.1. The contractor must submit the written compliance programs required in Subsection (e)(2), "Compliance Program," of 8 CCR 1532.1, to the resident engineer before starting to remove bridge paint and at such times when a program revision is required. An industrial hygienist certified by the American Board of Industrial Hygiene must prepare the compliance program. A competent person capable of taking corrective action must monitor the program. Require that

copies of all inspection reports made in accordance with 8 CCR 1532.1 are given to the resident engineer.

- *Debris Containment and Collection Plan*: The contractor must submit a plan that documents the removal equipment and containment systems that will be used, removal and waste collection procedures, certified laboratory that will run the analyses, hazardous waste hauler certifications, and receiving disposal site and requirements. Work that will disturb the paint system may not start until the resident engineer has reviewed and accepted the plan.
- *Storage of residue*: The contractor must store the residue from paint disturbance or removal as follows:

  1. While waiting for any test results required by the disposal facility, store the collected residue as hazardous waste in properly labeled metal containers approved by the U.S. Department of Transportation for hazardous waste transport.
  2. Cover and handle the containers in such a manner that no spillage will occur.
  3. Enclose the stored containers with temporary chain link fencing or a lockable shipping container at a location within the project limits approved by the resident engineer.
  4. Begin disposing of the contained residue no more than 90 days after accumulating 220 pounds of residue.

- *Waste testing and disposal*: Before disposal, the contractor is required to test the residue collected in the containers for proper waste classification. Depending on the test results, disposal of the stored material is as follows:

  1. Dispose of the stored residue as hazardous waste when its lead content is detected to be at levels greater than 1,000 mg/kg total lead or greater than 5 mg/l soluble lead. Keep records in accordance with current requirements for hazardous waste handling and disposal, and file them in the project files. The contractor must dispose of all hazardous waste residues at an approved DTSC-permitted Class I disposal facility in accordance with the requirements of the disposal facility operator. A transporter currently registered with the DTSC using correct manifesting procedures must haul the residue.

     The contractor must make all arrangements with the disposal facility operator and perform any testing of the residue required by the operator. The resident engineer must obtain the U.S. EPA or State Temporary Identification Number and sign all manifests as the generator. The resident engineer must also pay the manifest fees that may be billed several months after project completion.
  2. Unless the lead removal work was already contemplated in the construction contract, pay as change order work all work performed for testing, additional removal costs, retesting, and additional disposal.
  3. If the analytical test results demonstrate that the waste is actually nonhazardous, a change order must be prepared to direct the contractor to dispose of the waste at a Class II or Class III facility with no additional payment provided.

- *Work area monitoring:* The contractor must perform air monitoring to demonstrate that lead is not being released from the containment structure and perform soil

sampling before and after the work to demonstrate that lead has not been released to the ground beneath the work area. Consult the hazardous waste coordinator to determine the adequacy of the reports and whether a release has occurred requiring corrective action. If the area beneath the bridge is paved soil, sampling will not be included in the specifications. In these cases, look for color changes on the pavement which indicate a release of paint residue.

7-107G Treated Wood Waste

Treated wood has been used to support metal beam guard railing, thrie beam barrier, piles, and roadside signs. These wood products are typically treated with preserving chemicals that protect against insect attack and fungal decay. These chemicals may be hazardous and include but are not limited to arsenic, chromium, copper, creosote, and pentachlorophenol. The DTSC requires that treated wood waste (TWW) either be disposed of as hazardous waste or, if not tested, the generator may presume that TWW is a hazardous waste and manage the waste using DTSC's Alternative Management Standards. The standards are described in 22 CCR 67386.1–67386.12. The standards ease storage requirements, extend accumulation periods, allow shipment of TWW without manifests and use of a registered hazardous waste hauler, and permit disposal at specific nonhazardous waste landfills.

Whenever TWW will be removed as part of the project, the contract specifications will direct the contractor to follow the alternative standards, including providing training to all personnel who may come into contact with TWW.

For projects that will generate more than 10,000 pounds of TWW per calendar year, the DTSC must be notified within 30 days of exceeding this weight threshold. Notification must include the name and mailing address of the generator, generator identification number, date that the 10,000-pound limit was or is expected to be exceeded, the weight of the TWW as measured by the receiving facility, and the name and address of the receiving facility. The resident engineer requests the temporary generator identification number from the DTSC and files an electronic form available on DSTC's website for TWW. The DTSC will forward a copy to the California State Board of Equalization which, in turn, sets up an administrative record. If a project will generate more than 10,000 pounds of TWW, a Basic Engineering Estimating System item 066915, "BOE TWW Generation Fee," will be included as a department-furnished material. This item will be paid prior to or during the closeout process of the project, up to 1 year after construction contract acceptance.

TWW can be shipped off-site by a hauler with a shipping document, bill of lading, or invoice serving as documentation. If TWW is less than 10,000 pounds per calendar year per project, a generator identification number is not required. Records must be kept for 3 years from the date of the last waste shipment.

If there is limited space or no area to temporarily store TWW on the job site, it may be transferred to a remote consolidation site, such as a maintenance facility, or a location that meets all the requirements of 22 CCR 67386.7(c), "Offsite Shipments."

7-107H Disposal of Electrical Equipment Requiring Special Handling

California law requires special handling of electrical waste such as ballasts containing polychlorinated biphenyl (PCB), batteries, and fluorescent or mercury tubes, bulbs, and lamps. PCBs found in ballasts and thionyl chloride found in vehicle sensor node batteries are considered extremely hazardous wastes if they are released from the equipment.

PCB disposal is regulated by the U.S. EPA under the Toxic Substances Control Act and by 40 CFR Part 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions." PCB wastes are also regulated as hazardous waste by the DTSC under the California Health and Safety Code and the California Code of Regulations, Title 22, Division 4.5, "Environmental Health Standards for the Management of Hazardous Waste." All PCB wastes must be packaged in a container approved to transport PCB, marked, "Contains PCBs," and transported with a proper hazardous waste manifest by an authorized PCB or hazardous waste transporter to an appropriately permitted disposal facility. If a ballast containing PCBs is damaged, it may leak and, therefore, requires special management. Damaged ballasts containing PCBs must be contained and transported to a U.S. EPA-approved high-temperature incinerator.

Waste batteries and fluorescent or mercury tubes, bulbs, and lamps are considered universal wastes under 22 CCR 66273.1–66273.90. These are wastes generated by everyone, hence the term "universal." The management requirements are more relaxed than those for hazardous wastes. However, universal wastes can adversely impact public health and the environment if not properly managed, and, therefore, must be disposed of at appropriately permitted facilities. Damaged vehicle sensor node batteries may leak thionyl chloride and, therefore, must be contained. Once damaged, these batteries are no longer considered universal waste and must be managed and disposed of as a hazardous waste.

When these types of electrical equipment will be removed as part of the project, the contract specifications will alert the contractor to the special management requirements for these wastes.

7-107I Unanticipated Discovery of Hazardous Waste and Contamination

Caltrans construction employees must follow safe practices and minimize their exposure after discovery of unanticipated and unidentified hazardous wastes and contamination. Minimize potential risks during project construction by having all construction personnel follow the general procedures below:

- After unknown and potentially hazardous wastes and contamination (including underground tanks) are discovered, cease construction work in that area. When a waste is discovered, follow the procedure described in Figure 7-1.1, "Unknown Hazards Procedure," of this manual.
- Secure the area with barriers or fences, and evacuate the vicinity.
- 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 and contamination. 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.
    4. State law specifically prohibits the use of the prime contractor's forces (including subcontractors) to respond to an unanticipated discovery if the type

of hazard was not identified in the original contract documents. The contractor must stop work in the area and Caltrans must independently hire a Class A contractor with a Hazardous Waste Substances Removal Certification to respond. To ensure rapid response, Caltrans regions and districts are the contract administrators for on-call construction emergency contracts. For assistance, contact the contract manager for your specific region or district. A contact list is available at:

http://www.dot.ca.gov/hq/construc/environmental/

- 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, 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response," requires that no one enter the designated exclusion zones until a complete and effective "hazardous waste worker protection program" is established 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.)

7-108 Crumb Rubber Usage Reporting

7-108 Crumb Rubber Usage Reporting

For projects that include items of work that use crumb rubber modifier, the contractor is required to report crumb rubber usage on Form CEM-4410, "Crumb Rubber Usage Report." Crumb rubber is used in the following items of work:

- Rubberized hot mix asphalt
- Hot mix asphalt with performance grade modified asphalt binder with crumb rubber modifier
- Seal coat with crumb rubber modifier
- Vegetation control (minor concrete)

The contractor is required to track and report the weight (in pounds) of crumb rubber used throughout the duration of the contract. The contractor reports the monthly usage and total year-to-date usage information monthly on Form CEM-4410. During the preconstruction conference, the resident engineer must advise the contractor that this form is available on the Division of Construction's forms website. The requirements of the form should be explained and reiterated during the preconstruction conference held at the beginning of the project and preconstruction meetings for the various items of work that include crumb rubber.

The contractor submits the form monthly, for ongoing contracts, to the resident engineer by the 10th of the month following the reporting period, and a final report at the end of the project. If no crumb rubber was used during the reporting period, the contractor checks the "No crumb rubber was used" check box.

Form CEM-4410 must be completely filled out and certified by the contractor for it to be acceptable. The resident engineer must review for accuracy all reports submitted by the contractor. The resident engineer completes and signs the section of the form verifying that the supplier is on the Authorized Material List, quantities were paid on the monthly estimate, and that the contractor submitted the report to CRM@dot.ca.gov.

In accordance with Section 9-1.16E(3), "Performance Failure Withholds," of the *Standard Specifications*, withhold $10,000 for each failure to submit a completed report.

7-109 Solid Waste Disposal and Recycling Reporting

7-109 Solid Waste Disposal and Recycling Reporting

Solid waste disposal and recycling reports require the contractor to track and report landfill disposal and material recycling activity performed throughout the duration of the contract. The contractor reports this information annually on Form CEM-4401, "Solid Waste Disposal and Recycling Report." During the preconstruction conference, the resident engineer must advise the contractor that this form is available on the Division of Construction's forms website. The requirements of the form should be explained and reiterated during the preconstruction conference and other meetings.

Form CEM-4401 must include, at a minimum:

- The report calendar year.
- Amount of solid waste taken to landfills.
- Amount of solid waste diverted from landfills to recycling facilities.
- Amount of recycled material generated and then reused on a project.
- Name, title, and signature of the contractor's representative.
- Date of the report.

The contractor submits the annual report for ongoing contracts to the resident engineer by January 15, and a final annual report 5 days following contract acceptance. If no work was conducted during the reporting period, the report states that no work was performed during that period.

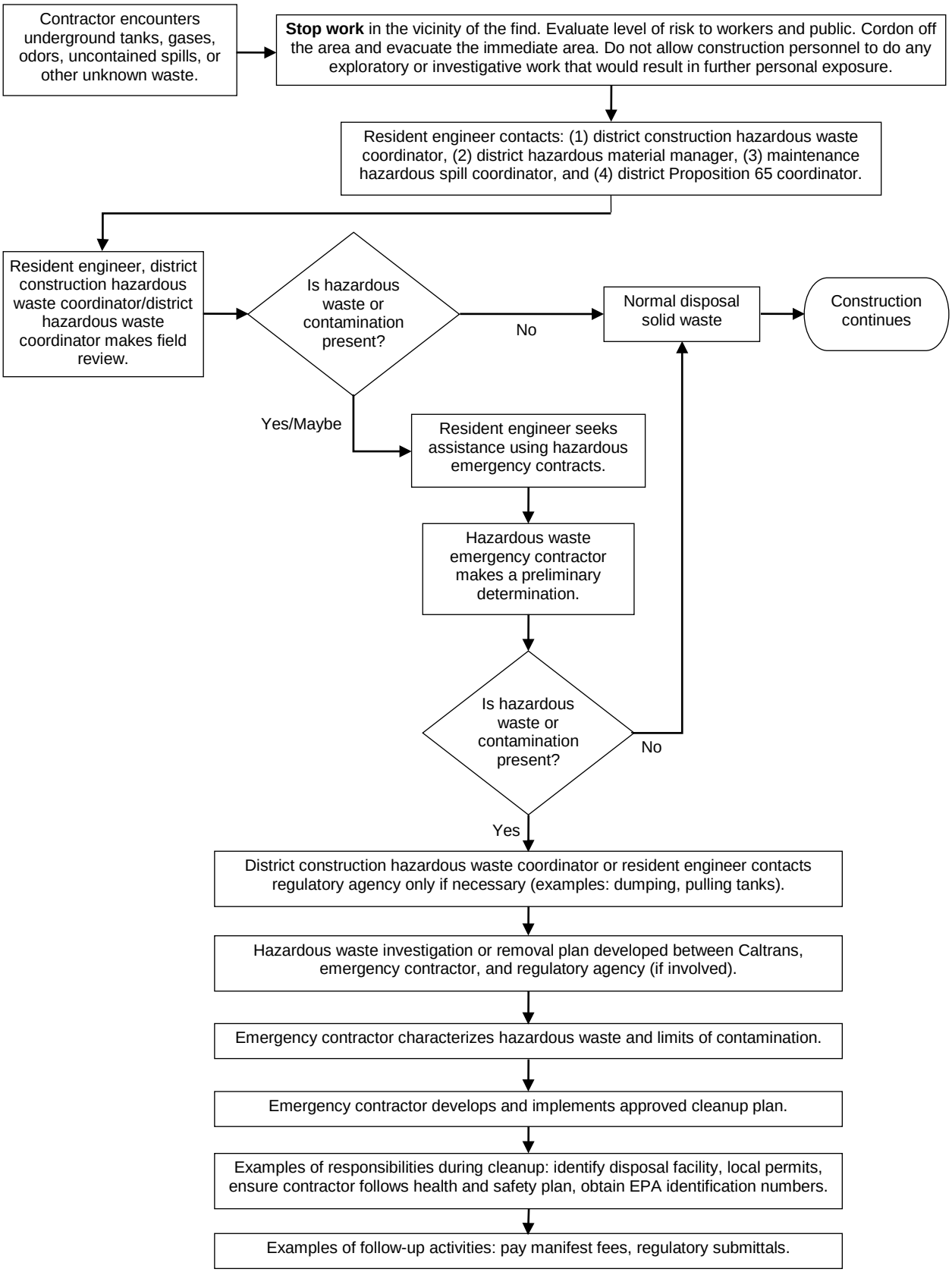
Section 14-10.02, "Solid Waste Disposal and Recycling Report," of the *Standard Specifications*, requires that the contractor submit to the resident engineer a final solid waste disposal and recycling report before the contract can be finalized.

Form CEM-4401 must be completely filled out and signed by the contractor for it to be acceptable. The resident engineer must review for accuracy all reports submitted by the contractor. Compare the total amount listed on Forms CEM-4401 of materials taken to and diverted from landfills with the approximate amount of work requiring the removal of materials. Before signing each report, resolve any discrepancies in material type or amount with the contractor. In accordance with Section 14-10.02, "Solid Waste Disposal and Recycling Report," of the *Standard Specifications*, Caltrans withholds $10,000 for each failure to submit a completed report.

The resident engineer must submit the approved Form CEM-4401 to the district recycling coordinator with a copy to the district construction office no later than February 1 of each year or within 15 days after receiving the final report. Contact information for district and statewide recycling coordinators is available at:

http://www.dot.ca.gov/hq/oppd/rescons/sb1016/coordinators.htm

Figure 7-1.1. Unknown Hazards Procedure



7-110 Certificate of Environmental Compliance

A Certificate of Environmental Compliance (CEC) is prepared at the end of construction to document and certify Caltrans' environmental compliance efforts for measures specified in final environmental (or other project) documentation, including PLACs and ECR.

For any commitments not completed by the end of construction, initiate notification to, and have ongoing communication with, appropriate staff including, but not limited to, the environmental construction liaison, project manager, and Environmental Unit chief, to discuss and document the logistics (timing, staff, resources) of when those commitments will be completed, and to identify who is responsible for tracking such completion efforts. All activities to complete post-construction commitments are identified in the CEC. The resident engineer is responsible for ensuring that the CEC is prepared and distributed. The CEC refers to the ECR to determine:

- Whether the environmental commitments were met and, if not, which measures were implemented
- Which contract specifications satisfied environmental commitments and concerns
- Whether additional environmental commitments are required as a result of project changes, and their outcomes

The updated ECR will serve as the basis for the CEC documentation.

The CEC will be signed by the environmental construction liaison, environmental branch chief, project manager, and resident engineer, and will be filed in the project files.

Provide copies of the CEC to all district or regional organizational units responsible for the project including Environmental, Design, Project Management, and Construction.

Discuss the CEC fully at the project closeout meeting. This can result in identifying the lessons learned on the project and areas of environmental compliance that may need improvement. Include district maintenance staff in the project closeout meeting if there are post-project commitments.

The CEC form is available on the Division of Environmental Analysis website:

http://www.dot.ca.gov/ser/forms.htm#cert_compliance

Chapter 8-
Employment Practices

Chapter 8 Employment Practices

Section 1 Labor Compliance

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Chapter 8 Employment Practices

Section 1 Labor Compliance

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 Part 5); regulations of the Federal Highway Administration (FHWA); the California Code of Regulations; and the U.S. 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 U.S. Department of Labor. In addition, these laws set guidelines for 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 non-covered 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 determine and publish the general prevailing wage rates and that those rates be referenced in the contract.

The Division of Construction, Labor Compliance Unit, establishes policy and procedure for FHWA-delegated labor compliance responsibilities and for the California Department of Industrial Relations-approved Caltrans labor compliance program.

8-102 Labor Compliance Responsibilities

The responsibilities and procedures when administering the contract's labor requirements are described as follows:

8-102A Resident Engineer

8-102A (1) Resident Engineer General Responsibilities

At the project level, the resident engineer is responsible for enforcing the labor requirements that are in the contract. To fulfill this responsibility, the resident engineer

and support staff must have an adequate working knowledge of the contract labor requirements.

Early surveillance and detection of labor compliance violations are preferable to conducting belated investigations and implementing formal enforcement actions. The resident engineer brings labor compliance issues to the attention of the contractor and the district labor compliance office immediately upon detection. Resolve minor issues, such as clerical errors or inadvertent acts, at the project level. If the issue is not resolved timely, base the decision to withhold funds on the recommendation of the district labor compliance office. If the contractor provides evidence of full restitution, promptly return the withheld funds to the contractor.

When the contractor knowingly violates labor law or refuses to comply with the contract labor requirements, consider these actions willful in nature. Willful violations include fraud, wage kickback schemes; or falsifying certified payrolls, fringe benefit statements, evidentiary source documents, or daily extra work bills. These violations require that the district labor compliance office 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 veteran business enterprise (DVBE) requirements are discussed at the preconstruction conference. Request district labor compliance staff attendance to communicate these topics. Labor compliance staff will provide a standard checklist covering the topics. File a copy of the signed checklist in the project records.
- Forward all labor compliance, EEO, DBE, and DVBE documents submitted by the prime contractor or any subcontractor 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 properly displayed at the job site. A checklist of posters is available on the labor compliance website at:

  http://www.dot.ca.gov/hq/construc/LaborCompliance/posters.htm
- Notify the district labor compliance office of all contractor and subcontractor activity during the week.
- After receiving recommendations from the district labor compliance office, authorize deductions from progress payments for labor compliance, EEO, DBE, and DVBE violations.
- Document the presence of contractor employees and owner-operators at the job site 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 or owner-operator.
  3. Hours worked per employee or owner-operator.
  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 names of employees, wage rates, and hours listed on change order bills match information listed on the contractor's certified payrolls.
- Ensure that Caltrans personnel properly record charges for labor compliance activities. Details are available from the district labor compliance office 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, refer to Section 8-102A (3), "Interviews With Contractor Personnel," below.

8-102A (3) Interviews With Contractor Personnel

The contract requires the contractor to allow authorized Caltrans personnel to interview contractor employees during working hours.

Record employee interviews on Form CEM-2504, "Employee Interview: Labor Compliance/EEO" or Form CEM-2504 (Spanish), "Entrevista de Empleado: Labor Compliance/EEO," if applicable. The employee interview is used by the district labor compliance office to check the validity of information shown on the certified 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 such as a lack of knowledge of classification or rate of pay or labor violation such as nonpayment of overtime, notify the district labor compliance office, which will conduct a full investigation.

Conduct interviews at the rate of two 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. A variety of crafts and trades should be interviewed. The number of interviews taken must constitute a representative sample of workers employed on the project.

In the case of a small contractor having two or three employees on the project for several months, do not continue taking interviews once all the contractor's staff have been interviewed. Contact the district labor compliance office to confirm the contractor is fully compliant with the labor requirements of the contract and no additional interviews of the contractor's staff are necessary. If the resident engineer chooses to suspend further interview activity, document the decision in the project records and notify the district labor compliance office.

During the interviews, assure the interviewees that their statements, whether oral or written, will be confidential. Interview employees individually and away from supervisory personnel and other contractor staff. Do not disclose to the employer the identity of the employee without the employee's consent.

In addition to conducting contractor employee interviews, interview truck and equipment operators designated as "owner-operator" to determine the correctness of this classification. Interview at least one equipment owner-operator and a sampling of truck owner-operators to adequately determine owner-operator status. 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 Office

The district labor compliance office administers labor compliance policy and procedures by assisting resident engineers in the enforcement of the labor requirements in the contract.

8-102B (1) District Labor Compliance Manager General Responsibilities

Under the general direction of the district construction deputy director, the district labor compliance manager has immediate charge of the district labor compliance office and must directly supervise and train labor compliance staff administering and monitoring labor compliance and other related contractual obligations. Further, the district labor compliance manager must ensure that employees use proper charging practices when performing labor compliance activities.

The administration and monitoring of labor compliance provisions extends to state and federal highway construction projects.

8-102B (2) Labor Compliance Office Project Responsibilities

The district labor compliance office is charged with specific responsibilities in assisting the resident engineer to administer contracts, including:

- Attend 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.
- Assist resident engineers with the required process for Title VI and Title VII complaints. For detailed information on the complaint process, refer to Section 8-2, "Equal Employment Opportunity," of this manual.
- Review and confirm all contractor certified payroll records according to current labor compliance program policy located at:

  http://www.dot.ca.gov/hq/construc/LaborCompliance/lcpbulletins.htm
- When necessary, recommend to the resident engineer that funds be withheld from progress payments made to the contractor for missing or inadequate certified payroll records or established violations.
- To verify the accuracy of payrolls, review source documents at the contractor's office and collect evidence.
- When wage underpayments have occurred, prepare labor compliance violation cases and submit them to the Division of Construction, Labor Compliance Unit, for approval. Upon review and approval, the unit will submit the case to the California Department of Industrial Relations for state labor code violations. For federal code violations, cases are approved by Caltrans and sent to the Federal Highway Administration as a notice only. A copy of either type of case must be retained in the project records.
- 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

The prime contractor is responsible for labor compliance for its own company as well as all subcontractors and owner-operators. 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 in Section 8-104, "Covered and Non-Covered Employment," of this manual. 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. Contract labor requirements apply the same standard of performance to prime contractors and subcontractors as expected of all other requirements of the contract. For noncompliance with contract labor requirements, 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 7-1.02K(3) "Certified Payroll Records (Labor Code §1776)," 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 the district labor compliance office by the 15th day of each month for the previous month. The payrolls can be submitted on the state-furnished Form CEM-2502, "Contractor or 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 who 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 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 straight time and 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 resident engineer will use the payrolls to verify extra work bills. The labor compliance office will conduct the payroll review using the following information and processes.

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, Subsistence, and Zone Pay

When a project is located in a geographic area designated as a subsistence area, contractors are required to make travel, subsistence, or zone payments to their employees in accordance with the current requirements on file with the California 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 approved agreements.

8-103A (3) Workday

Each workday is limited and restricted to 8 hours during any one calendar day, for which the employee is entitled to be paid at the proper prevailing straight-time rate.

8-103A (4) Assistant Resident Engineers' Daily Reports

Using assistant resident engineers' daily reports, district labor compliance staff confirm that the payroll reflects the labor used and the hours worked for each day of work at the job site, including weekends and holidays; that 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, and 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. Work performed on Saturday and Sunday generally must be paid at premium rates of pay at time and a half and double time, respectively. For exemptions to this rule, contact the district labor compliance staff. The federal wage decisions do not differentiate between weekday rates of pay and Saturday or Sunday rates of pay; however, all hours worked over 40 in a work week must be paid at the overtime rate of pay.

8-103A (7) Apprentices

Resident engineers are responsible for tracking apprentices used on the contract and recording that information in daily reports. District labor compliance staff will ensure apprentice classifications are correctly identified on certified payroll records 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. Additionally, labor compliance staff will verify that apprentices are registered in appropriate state and/or federal programs.

8-103A (8) Payroll 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, 29 CFR 3, "Copeland Anti-Kickback Act." Additional regulatory language can be found in the California Labor Code Sections 213 and 224.

8-103B Wage Calculation Methods

Various calculation methods are used to verify the accuracy of certified payrolls. Following are examples of methods commonly used by contractors. 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 one-half times 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
($14.00 + $2.00 + $6.00) = $22.00/hour

2 hours @ $29.00/hour = $ 58.00
[($14.00 X 1.5) + $2.00 + $6.00] = $29.00/hour
Subsistence and fringe benefits are not paid at overtime rates.

Total Pay for the day = $234.00

Method Two: Adjusted rate of pay

10 hours @ $22.00/hour = $220.00
($14.00 + $2.00 + $6.00) = $22.00/hour

2 hours @ $7.00/hour = $ 14.00
($14.00 ÷ 2) = $7.00/hour
This is the difference between straight-time and overtime pay for hours in excess of 8 hours - subsistence and fringe benefits are not paid at overtime rates.

Total Pay for the day = $234.00

8-103C Discrepant, Delinquent, or Inadequate Payrolls

This section covers procedures for payroll discrepancies, delinquencies, and inadequacies. The contractor must timely submit payrolls and accompanying statements of compliance in accordance with Section 7-1.02K(3), "Certified Payroll Records (Labor Code § 1776)," of the *Standard Specifications*.

8-103C (1) Discrepant Payrolls

When discrepancies are found during payroll review and confirmation, the following actions must be taken:

The district labor compliance office must request that the contractor submit a supplemental payroll correcting the discrepancy. Under no circumstances should the incorrect or incomplete certified payrolls be returned 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. Proof of wage restitution for all affected employees must be provided and can be in the form of canceled checks, copied both front and back.

To ensure that payroll discrepancies are corrected, the district labor compliance office will use a tabulation or summary sheet to record discrepancies and to note when and how each error was corrected.

8-103C (2) Delinquent or Inadequate 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. If payrolls and statements of compliance received are incomplete, consider the records inadequate. The labor compliance officer must notify the resident engineer and the contractor which certified payroll documents are missing or inadequate.

The resident engineer must withhold monies due to the contractor on the monthly progress payment in accordance with Section 7-1.02K(3), "Certified Payroll Records (Labor Code § 1776)," of the *Standard Specifications*. Make withholds separately for each payment period in which a new delinquency or inadequacy appears. When all delinquencies or inadequacies for a period have been corrected, release the withhold covering that period on the next progress payment. Withholds can only be taken once and do not compound on each monthly estimate. District labor compliance offices will advise the resident engineer when funds should be withheld or returned during a payment period. The recommended withhold is up to 10 percent of the payment, a minimum of $1,000 and a maximum of $10,000.

8-103C (3) Payment Withholds for Missing or Inadequate Payrolls

The following examples illustrate the process for taking and releasing withholds on the monthly progress payment.

Example 8-1.1. Progress Payment 1:

Progress Payment 1 has a value of $9,500.

Value of the withhold is 10 percent of $9,500 or $950.

Therefore, the resident engineer must withhold the minimum amount of $1,000.

Example 8-1.2. Progress Payment 2:

Progress Payment 2 has a value of $49,000.

One or more pay documents are still delinquent under a previous month's withhold plus one or more new delinquencies for this period.

Value of the withhold is 10 percent of $49,000 or $4,900. Last month's withhold was $1,000. Therefore, the resident engineer should have a withhold of $4,900 from the current progress payments and is still withholding $1,000 from the previous month's payment for a total of $5,900 withheld from contractor payments for labor compliance issues.

Example 8-1.3. Progress Payment 3:

The delinquencies are all cleared up for the previous months, but new delinquencies have originated during this period. Payment three has a value of $55,000.

Value of the withhold is 10 percent of $55,000 or $5,500. Total withhold for this pay period is $5,500.

The resident engineer should return $5,900 to the contractor for the current progress payment. Since the current withhold is $5,500, the contractor will only see a return of $400 in the pay documents.

Example 8-1.4. Progress Payment4:

The contractor has not corrected the problems with the payrolls in question during Progress Payment3. No new delinquencies have occurred. No additional withhold is warranted. Make no change to the amount of money previously withheld from the contractor, and continue to hold $5,500.

Example 8-1.5. Progress Payment5:

Progress Payment 5 is for a total of $120,000. The contractor has a carryover withhold from progress payment 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 withhold for missing labor compliance documents is $10,000 per pay estimate. Withhold $10,000 from the current estimate.

The total value for labor compliance delinquencies is $10,000+$5,500 from Progress Payment 3 to equal $15,500 in total withholds.

8-103C (4) Refusal to Provide Payrolls

If the prime contractor refuses to submit certified payrolls, in accordance with Section 7-1.02K(3), "Certified Payroll Records (Labor Code § 1776)," of the *Standard Specifications*, the district labor compliance office will notify the contractor by certified mail that payrolls have not been received. The letter advises 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 California Labor Code Section 1776(h) in the amount of $25.00 per worker for each calendar day the payroll has not been submitted for contracts advertised prior to January 1, 2012, and $100 per worker on or after January 1, 2012. This type of penalty must be pre-approved by the California Department of Industrial Relations prior to deducting any funds from the contractor. The district labor compliance office will notify the resident engineer when it is appropriate to deduct the funds for missing certified payroll records. 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.

8-103C (5) Correlation of Payrolls and Change Order Bills

Resident engineers compare the labor charged by the contractor for change order work with the corresponding payrolls. The certified payrolls and fringe benefit statements serve as source documents for approval of every change order bill. The change order bill must show the identical labor classifications, hours worked, and wage rates, including fringe benefits, that are shown on the certified payroll documents. Notify the labor

compliance office immediately of any discrepancy on the payroll records. Do not approve payment of the change order bill until the discrepancy is corrected or it is determined by the labor compliance office to be a labor compliance violation, not a change order overcharge.

8-103C (6) Deducting Payment for Violations

When contractors do not comply with the district labor compliance office's request for correction of discrepancies, missing certified payroll records, or correction of inadequate certified payroll records, the issues become violations and are compiled into a wage case. The district labor compliance office 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 a good faith mistake or a willful violation. Based on the determination, the district labor compliance manager recommends a 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 and inform the district labor compliance office when it is appropriate to withhold funds for violations and associated penalties. The Division of Accounting, Disbursing Office, will withhold the full amount of the violation equaling the state and federal penalties and the amount of wage underpayments. When the Division of Accounting, Disbursing Office, has placed a hold on the contractor's funds, the district will be notified when to release any associated withholds for labor compliance violations.

8-103C (7) Payroll Documents Outstanding at the Time of Contract Acceptance

When there are outstanding payroll documents, take an "Other Outstanding Documents" deduction from payment after contract acceptance, as covered in Section 5-103F (1c), "Deductions," of this manual.

8-103D Review of Owner-Operator Listing

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.
- Business address of the owner-operator.
- The owner-operator's social security number.
- The equipment license number. If the equipment is used off-highway, the contractor must provide a complete description and include the dates it was operated on the project.
- Operator labor classification.
- Hours worked by the owner-operator as reported on a daily basis.
- Combined hourly rental rate and labor 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," 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 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 resulting hourly wage rate 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" or Form CEM-2504 (Spanish), "Entrevista de Empleado: Labor Compliance/EEO," if applicable. 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 office.

8-103D (2a) Truck Owner-Operators

- To verify truck owner-operator status, the contractor must provide an owner-operator completed Form CEM-2510, "Truck Owner-Operator Certification of Ownership."
- 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 (DMV) registration.
- If the legal owner is a firm or corporation, and the firm or corporation 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 office.
- 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 office. The district labor compliance office will send information to the Division of

Construction, Labor Compliance Unit, to be run through DMV or CHP Motor Carrier Permit Division record check.

8-103D (2b) Equipment Other Than Trucks

If the owner-operator is leasing or financing the equipment, 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 district labor compliance office 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, sole owners, partners, corporate officers, and rental companies furnishing equipment with an operator.

The terms "job site" 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 materials 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 2 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. The interpretation of covered work can change often with new legislation, coverage determinations issued by the California Department of Industrial Relations, federal all-agency memorandums, and court decisions forming case law. When the distinction between covered and non-covered employment is not clear, the matter should be referred to the district labor compliance manager 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 materials sites include:

- The commercial or noncommercial nature of the operation
- The amount of contractor or supplier control of the site
- The exclusiveness of the materials 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 prevailing wages are required.

If material is delivered to the project site by the prime contractor or any on-site subcontractor's employees, the hauling will be covered under prevailing wage requirements. If material is delivered from a commercial establishment by a third-party or independent hauler, prevailing wages are not required to be paid as long as the establishment meets the following criteria:

1. The establishment must be in the business of selling supplies to the public.
2. The establishment cannot have been opened specifically for the contract.
3. The plant cannot be located at the site of work.
4. The materials delivered from the plant cannot be immediately incorporated into the project with no re-handling out of the flow of construction.

8-104B Materials Plants

Roadside production of materials produced by other than the contractor's forces is considered "subcontracted" with respect to the contract labor requirements.

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. Use the following guidelines to determine if a plant is commercial and, therefore, not covered:

- 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 weighmaster operates scales at the materials plant.
- The contractor provides proof of sales to other agencies or individuals.
- The plant is in operation before the project begins and remains in operation after the project is completed.

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 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 state and federal prevailing wage requirements. The hiring contractor must list them on Form CEM-2505, "Owner-Operator Listing." The owner-operator must be paid at least the minimum prevailing wage rate in effect for the type of equipment operated. On federally funded contracts, the Form CEM-2505 must also include the rate for the equipment rental.

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, are covered by prevailing wage requirements. Established, independent commercial repair shops that have been in business 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 job site. 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 job site 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. When using a federal classification, coverage will apply only when the employee, during one workweek, has 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 are 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 at the job site, such as construction inspection, materials testing, and land surveying, regardless of whether that firm is hired by the contractor or Caltrans, are 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 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 office 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, the district labor compliance office uses 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 U.S. Department of Labor will be the same for any given labor classification. If there is a difference between Department of Labor wage rates and California 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 California Department of Industrial Relations or the Department of Labor, depending on which agency's rate is in error.

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 is not listed in the general prevailing wage rates. In this situation, the district labor compliance office must obtain a special wage determination from the California Department of Industrial Relations.

To initiate the request, the district labor compliance office prepares 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 California Department of Industrial Relations, Office of Policy, Research, and Legislation, which will prepare a special wage determination and send it back 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 offices for appropriate handling or future reference.

In case of a jurisdictional dispute, such as a dispute between cement masons and operating engineers, a nonsignatory contractor may pay either wage rate, as long as it is recognized by the California 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 nonmanual 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 who 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 worker 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 California 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 California Labor Code and the *Standard Specifications*. Under the provisions of the contract, a nonindentured 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 Form DAS-1, "Apprenticeship Agreement," or a letter giving notice of registration from the DAS. Either Form DAS-1 or a letter from the DAS is acceptable evidence of apprentice registration. District labor compliance staff may also identify apprenticeship status through the DAS online registration database located at:

http://www.dir.ca.gov/das/appcertpw/AppCertSearch.asp

If an apprentice is scheduled to work on the project before the contractor receives evidence of registration, the district labor compliance office must telephone the nearest 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 California Labor Code Section 1777.5.

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.

California Labor Code Section 1777.5 requires the contractor to contribute the training fund portion of the fringe benefit to the appropriate apprentice trust fund or to the DAS, California Apprenticeship Council.

On federal-aid projects, the prime contractor and subcontractor must furnish evidence of federal registration for apprentices performing work on the contract. Federal registration must be provided on U.S. DOL Form ETA-671, "Program Registration and Apprenticeship Agreement," or identified in a letter from the U.S. Office of Apprenticeship providing notice of registration. Form ETA-671 will provide the wage schedule for each registered apprentice.

Some federal-aid projects will contain a requirement for a minimum number of apprentices that must be used on the project. Contractors must provide the resident engineer with a plan identifying the specific training program to be used and how the contractor will achieve the number of apprentices to be used before work begins on the project. For more information, refer to Section 8-208, "Contracts Containing 'Federal Requirements Training Special Provision,' " of this manual.

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 office will determine the amount of penalty assessment and wage restitution due from the contractor. The district labor compliance manager 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 California 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.

When forwarding cases to the Division of Construction, Labor Compliance Unit, with the district's recommendations, attach the following to a cover letter:

- Forms CEM-2506 and CEM-2507
- Form CEM-2508, "Contractor Payroll Source Document Audit Summary"
- Form CEM-2509, "Checklist—Source Document Audit"

- A case history
- Applicable correspondence with the contractor

8-106A Withhold of Funds Hearing

Legal authority to withhold funds from the contractor for labor compliance violations is provided by California Code of Regulations, Title 8, Sections 16410–16414.

Caltrans must provide written notice to the contractor and to any affected subcontractor of the withholding or forfeiture. The notice must contain the following information:

- The amount to be withheld or forfeited.
- A short statement of the factual basis as to why the funds are to be withheld or forfeited. Include the computation of any wages found to be due and the computation of any penalties assessed under 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 known 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.

8-107 Debarment of Contractors

8-107 Debarment of Contractors

8-107A State

The California 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 California 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 3-year period from bidding on public works projects.

The requirements and procedures for debarment can be found in Section 1777.1 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 Complaint

The district labor compliance office may request the Division of Construction, Labor Compliance Unit, to file a complaint for Caltrans with the California Department of Industrial Relations, Division of Labor Standards Enforcement. The following information must 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 State Labor Commissioner's office

Each district labor compliance office 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 California Department of Industrial Relations for a final decision.

The investigation and final determination for debarment rests solely with the California Department of Industrial Relations legal office and the Division of Labor Standards Enforcement. Final determinations will be forwarded to the 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

This 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 3 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 6 months' imprisonment.)

8-108A (4) False Information Act

- The making or use of false statements is a felony ($10,000 fine and/or 5 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 and 224 disallow a contractor from withholding funds improperly and requires employee authorization to withhold portions of the employee's wages.

Section 1725.5 requires a contractor to register with the California Department of Industrial Relations to qualify to bid and be listed on a bid proposal.

Section 1729 holds the subcontractor liable for failure to comply with the prevailing wage requirements.

Section 1742 allows the contractor to pursue a hearing on a determination of a willful wage violation case through the California Department of Industrial Relations.

Section 1771.1 prohibits a contractor or subcontractor from qualifying to bid or be listed on a bid proposal and contract for public works if not registered with the California Department of Industrial Relations. This requirement applies to bid proposals submitted on or after March 1, 2015, and any contract for public works entered into on or after April 1, 2015.

Section 1771.3 pertains to the State Public Works Enforcement Fund that serves to monitor and enforce the public works requirements.

Section 1771.4 calls for bids and contract documents to specify that projects are subject to compliance monitoring and enforcement by Caltrans' Labor Compliance Program.

Section 1771.5 provides for approval of the Caltrans labor compliance program and excludes from the prevailing wage requirements 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.

Section 1774 requires all workers be paid not less than the specified prevailing wage rate.

Section 1775 requires that penalties be assessed against the contractor for failure to pay employees prevailing wages.

Section 1776 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 1777.5 pertains to apprenticeship standards and ratios, and nondiscrimination.

Section 1778 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 prohibits the charging of a fee for employing a person on public works projects.

Section 1780 prohibits a fee for placing an order for employment on public works.

Section 1810 defines 8 hours as a legal day's work.

Section 1811 restricts work to 8 hours per day and 40 hours per calendar week without overtime compensation.

Section 1812 requires the contractor to keep accurate records of hours worked and have records available for inspection by the awarding body.

Section 1813 provides penalties for violations of provisions of Sections 1810-1815 by any contractor.

Section 1814 provides that persons violating provisions of Sections 1810-1815 are guilty of a misdemeanor.

Section 1815 provides overtime payment at one and one-half times the basic rate of pay for hours worked in excess of 8 hours per day and 40 hours per calendar week.

Section 2750.5 provides 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 Onsite Interviews
8-205 Federal-Aid Project Equal Employment Opportunity Posters
8-206 Contractor Employee Title VII Complaints—Discrimination Complaint Processing
8-207 Equal Employment Opportunity Title VI Complaints and Contract Administration
8-208 Contracts Containing "Federal Requirements Training Special Provision"
8-209 Contractor's Annual Equal Employment Opportunity
8-210 Deducting Payment for Failure to Submit Reports
Example 8-2.1 Sample Letter to the Complainant
Example 8-2.2 Sample Letter to the Contractor

Section 2 Equal Employment Opportunity

Section 2
Equal
Employment
Opportunity

8-201 General

8-201
General

This section presents the requirements for administration of the nondiscrimination and equal employment opportunity (EEO) provisions of the contract. The total EEO program is complex and involves functional units outside of construction. Requirements in this section apply primarily to activities and responsibilities resulting from contractual requirements and are not necessarily complete for either Caltrans or the contractor insofar as the total responsibilities and activities.

8-202 Laws, Regulations, and Specifications

8-202
Laws, Regulations,
and Specifications

California requirements for public works contractors on the subjects of nondiscrimination and EEO are located in Title VI of the Civil Rights Act of 1964; California Government Code, Section 12990; Title 2 of the regulations of the Fair Employment and Housing Commission; and California Code of Regulations, Sections 8107 and 8203.

Sections 7-1.02I(2), "Nondiscrimination," and 7-1.11B, "FHWA-1273," II, "Nondiscrimination," of the *Standard Specifications* and in the required federal contract provisions of the specifications call the contractor's attention to these and other requirements. Under the terms of the contract, the contractor is responsible for its subcontractors' compliance.

8-203 Preconstruction Conference

8-203
Preconstruction
Conference

The resident engineer or district labor compliance officer must discuss the nondiscrimination and EEO provisions of the contract at the preconstruction meeting and advise the contractor of the requirements in Title VI of the Civil Rights Act of 1964. Refer to Section 5-0, "Conduct of the Work," of this manual for details on preconstruction conferences.

8-204 Onsite Interviews

8-204
Onsite Interviews

District labor compliance officers or project personnel conduct onsite interviews with employees of the contractor and subcontractors. Conduct employee interviews for nondiscrimination and EEO at the rate of at least two employees per contract, per month including at least one interview from the prime contractor and each subcontractor until the contract is accepted or all employees on the project have been interviewed. Record interviews on Form CEM-2504, "Employee Interview: Labor Compliance/EEO," or Form CEM-2504 (Spanish), "Entrevista de Empleado: Labor Compliance/EEO," if applicable. EEO interviews are done in conjunction with the labor compliance interviews as a means of verifying that the contractors and subcontractors are in compliance with the EEO and the labor nondiscrimination contract provisions mandated by state and federal statutes and regulations.

When an employee's responses to the EEO questions in Form CEM-2504 indicate possible violations, the district labor compliance officer must forward a copy of that interview to the Division of Construction, Labor Compliance Unit, for further action. Refer to Section 8-102A (3), "Interviews With Contractor Personnel," of this manual for more information.

8-205 Federal-Aid Project Equal Employment Opportunity Posters

8-205 Federal-Aid Project Equal Employment Opportunity Posters

Ensure the contractor's EEO policy and the "Equal Employment Is the Law" poster are posted in a prominent location on the project for all employees to review for the duration of the contract. Check to see that the contractor has these posted when visiting each construction location. The "Equal Employment Opportunity Is the Law" poster must also be posted in the resident engineer's and contractor's office.

The district labor compliance officer verifies that the policy and poster are displayed at offsite locations during a source document audit. If the contractor is noncompliant, the district labor compliance officer provides additional posters and writes a memo advising the resident engineer of the contractor's compliance status for inclusion in the project file.

A checklist of posters is available on the labor compliance website:

http://www.dot.ca.gov/hq/construc/LaborCompliance/posters.htm

8-206 Contractor Employee Title VII Complaints-Discrimination Complaint Processing

8-206 Contractor Employee Title VII Complaints—Discrimination Complaint Processing

A complaint that implicates the contractor's employment practice is considered an EEO complaint based on Title VII of the Civil Rights Act of 1964. EEO complaints may originate as a direct complaint from the contractor's employees or as a result of a contractor employee interview. When a complaint is received, document all EEO complaints in a diary, a memo to the project files, or on form CEM-2504. The public, contractors, suppliers, and vendors may also present these complaints. File the original EEO complaint in the project records and send a copy of the complaint to the district labor compliance officer.

The district labor compliance officer sends complainants a letter notifying them of their rights under the Civil Rights Act of 1964. The letter also provides a complete list of resolution options, including:

- Use of the employer's internal EEO program for investigation and resolution.
- Filing a complaint directly with the California Department of Fair Employment and Housing (DFEH).
- Filing a complaint directly with the U.S. Equal Employment Opportunity Commission.

A copy of the following items should be included in the letter:

- Form DFEH-159 "Guide for Complainants and Respondents," a DFEH brochure available on the internet:

  http://www.dfeh.ca.gov/complaint-process/complaint-forms/

- Instructions on "Filing a Charge of Employment Discrimination," are available on the internet:

  http://www.eeoc.gov/employees/howtofile.cfm

For a sample letter to the complainant, refer to Example 8-2.1 at the end of this section.

In addition, the district labor compliance officer sends a notification letter to the prime contractor that an employee has alleged discrimination and that the employee was given notice of available recourse. The labor compliance officer must not divulge the employee's name. The letter reminds the contractor of the obligation to conduct an investigation pursuant to contract requirements. For a sample letter to the contractor, refer to Example 8-2.2 at the end of this section.

The district labor compliance officer refers the issue to the Division of Construction, including copies of the letter to the complainant, the letter to the contractor, and the employee interview form. Take further district construction actions only on the advice and guidance of the Division of Construction.

8-207 Equal Employment Opportunity Title VI Complaints and Contract Administration

8-207 Equal Employment Opportunity Title VI Complaints and Contract Administration

The Civil Rights Act of 1964, Title VI, Section 601 states in part, "No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."

Any complaint indicating that the practices of Caltrans have the effect of discrimination is considered a Title VI complaint. It may originate from a direct complaint made by the public or by a contractor. Refer Title VI complaints that occur during construction to the district labor compliance officer, who refers the complaint to the Division of Construction. The division reviews the complaint, gathers relevant documents, and refers it to the Discrimination Complaint Investigations Unit to process the complaint and take further action as necessary.

During construction, amendments to the contract may occur by change order. Some change orders may invoke Title VI complaints or violate the principles of environmental justice. Environmental justice is the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. Examples include new traffic detours; changes in the length or limits of the project; mitigation measure changes; materials changes; and changes in contract-mandated material borrow, disposal sites, or setup of portable asphalt or concrete plants.

Take affirmative measures to ensure nondiscrimination and preservation of environmental justice when administering changes. If a change requires Title VI mitigation measures, the resident engineer may conduct community meetings, prepare news releases, or hire public relations consultants to keep communities informed on project scope and schedule changes. Consult with the Division of Construction's Labor Compliance Officer, the design project engineer, and the project manager as necessary to evaluate the impacts of any significant change including compliance with Title VI requirements.

8-208 Contracts Containing "Federal Requirements Training Special Provision"

8-208 Contracts Containing "Federal Requirements Training Special Provision"

Federal-aid projects use the training special provision when a project is of sufficient size and duration to support full training periods. When the special provision provides a number of required trainees or apprentices, Section 7-1.11D, "Training," of the *Standard Specifications* applies. The intent of the provision is to enhance contractors' EEO

programs through on-the-job training. Training and upgrading of minorities and women toward journeyman status are the primary objectives of the provision. However, the contractor must not use the training program to discriminate against an applicant for training. The provision states the number of apprentices or trainees the contractor must use on the project and provides guidance on actions the contractor must take. In addition, the provision provides for reimbursement to the contractor for each apprentice or trainee used on the project.

Before the work involving apprentices or trainees begins, the resident engineer requests that the contractor submit a training plan with the number of apprentices or trainees in each classification, the training program to be used, and the start date for training in each classification. Review the training plan to confirm that it meets the requirements of the training specification. Subcontractors who will be using apprentices or trainees must provide a plan for them. Apprentices and trainees must be employed under programs currently approved by the U.S. Department of Labor, Office of Apprenticeship Training, Employer and Labor Services (DOL). Contractors must submit evidence of apprentice or trainee registration in an approved training program to the resident engineer or district labor compliance officer. Contractors may use trainees only when the trainee wage schedule for the specific classification is listed in the federal wage determination applicable to the contract.

The resident engineer may accept a training program not currently approved by DOL as long as the program meets the EEO requirements of the federal contract special provisions. Contractors must submit a request to the resident engineer for approval of such programs before their use on the project. Submit the contractor's request to the district labor compliance officer who forwards it to the Division of Construction for verification of conformance to federal requirements. If the training program meets the requirements, the Division of Construction will submit the program to the Federal Highway Administration (FHWA) with a recommendation for approval. Upon approval from the FHWA, the division will notify the district labor compliance officer and resident engineer. Notify the contractor of the training program approval.

Write a change order, as specified in the contract, to provide the appropriate compensation for the apprentices or trainees. The total amount of the change order should reflect the contractor's plan for use of apprentices or trainees. No markup will be applied to the specified hourly rate.

During construction, the contractor must give periodic reports demonstrating performance regarding training requirements. Tailor reporting periods to the duration of the project. For example, a year-long project should require at least quarterly reports. Review the reports for conformance with the contractor's training plan before approving reimbursement for training hours. Do not reimburse the contractor unless the reports have been provided. Reimburse the contractor for training in excess of the required number of apprentices or trainees as long as evidence of registration in a DOL program is provided. When an apprentice or trainee quits the project, the contractor must provide the reason. The contractor will have fulfilled contract requirements if applicable training has been provided to the specified number of apprentices or trainees.

8-209 Contractor's Annual Equal Employment Opportunity

8-209 Contractor's Annual Equal Employment Opportunity

The U.S. Code of Federal Regulations, Title 23, Section 230.121 requires prime contractors and subcontractors, regardless of tier, to submit the FHWA Form PR-1391, "Federal-Aid Highway Construction Contractors Annual EEO Report" to the resident

engineer for review. The form shows the composition of the contractor's workforce by race and gender for each job category. The requirement applies to all contractors, regardless of tier, who have federal-aid contracts exceeding $10,000 and who worked during all or any part of the last payroll period preceding the end of the month of July. Contractors are subject to a progress pay deduction for failure to submit a satisfactory form. Section 8-210 below lists applicable procedures and amounts.

8-210 Deducting Payment for Failure to Submit Reports

8-210 Deducting Payment for Failure to Submit Reports

Make EEO deductions in situations where the contractor or subcontractor fails to submit the required training plan, does not post the necessary EEO information, or fails to provide FHWA Form PR-1391, "Federal-Aid Highway Construction Contractors Annual EEO Report."

Before taking a deduction, notify contractors found to be noncompliant in writing, advising them of the specific deficiencies. Refer to Section 5-103F (1c), "Deductions," of this manual for instructions on taking the deduction.

Example 8-2.1. Sample Letter to the Complainant (Employee)

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DIVISION OF CONSTRUCTION
[Resident Engineer's Address]
[City, CA ZIP]
[PHONE (Area Code) xxx-xxxx]
[FAX (Area Code) xxx-xxxx]
TTY 711
www.dot.ca.gov

Making Conservation a California Way of Life.

[The telephone and fax numbers must be those of the signature block regardless of who signs the letter. REMOVE THIS NOTE BEFORE PREPARING THE LETTER.]

[Date: Month dd, yyyy]

[Employee's Name]
[Address]
[City, State, ZIP]

RE: [Caltrans Contract Number, Federal ID Number, and Project Description]

Dear [Employee's Name]:

This letter confirms our discussion on [date] where you informed us that you believe you have experienced discrimination and allege [company name] discriminated against you based on [race, color, national origin, sex, age, or disability].

The district labor compliance officer reviewed the allegations and notified [company name] in writing, that you have been provided a complete list of resolution options, including the use of the employer's internal equal employment opportunity program for investigation and resolution. Your name was not given to [company name].

The California Department of Transportation (Caltrans) monitors discrimination complaints against sub-recipients of state or federal financial assistance. However, Caltrans has no statutory or regulatory authority to conduct an investigation of alleged discrimination complaints between the contractor and the contractor's employee. Caltrans has no authority to gather evidence, subpoena documents, depose witnesses, or file equal employment opportunity cases on behalf of a contractor's employee. Caltrans ensures that the contractor conducts an equal employment opportunity investigation, and documents oversight activities in the project records.

You must file a complaint with the California Department of Fair Employment and Housing or the United States Equal Employment Opportunity Commission within specific statutory deadlines from the date of the alleged discriminatory act. For more information, please refer to enclosed Form DFEH-159, "Guide for Complainants and Respondents."

If you have questions relating to the information referenced above, please contact [Labor Compliance Officer's name] at [Labor Compliance Officer's telephone number].

Sincerely,

[District Labor Compliance Officer's Name]
District Labor Compliance Officer
District [Number] Construction

Enclosures: Form DFEH-159, "Guide for Complainants and Respondents"
"Filing a Charge of Employment Discrimination," available online at:
http://www.eeoc.gov/employees/howtofile.cfm

c: Division of Construction
Office of Business and Economic Opportunity

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Example 8-2.2. Sample Letter to the Contractor

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DIVISION OF CONSTRUCTION
[Resident Engineer's Address]
[City, CA ZIP]
[PHONE (Area Code) xxx-xxxx]
[FAX (Area Code) xxx-xxxx]
TTY 711
www.dot.ca.gov

Making Conservation a California Way of Life.

[The telephone and fax numbers must be those of the signature block regardless of who signs the letter. REMOVE THIS NOTE BEFORE PREPARING THE LETTER.]

[Month dd, yyyy]

[Contractor's Name]
[Address]
[City, State, ZIP]

RE: [Caltrans Contract Number, Federal ID Number, and Project Description]

Dear [Contractor's Name]:

The California Department of Transportation (Caltrans) has been notified that a current or former employee of [company name] filed *(or)* plans to file a formal complaint of discrimination. The current or former employee is alleging discrimination based on [race, color, national origin, sex, age, or disability].

The district labor compliance officer provided the complainant a complete list of resolution options, including (1) the use of the employer's internal equal employment opportunity program for investigation and resolution and (2) filing a complaint with the California Department of Fair Employment and Housing or with the United States Equal Employment Opportunity Commission.

Caltrans complies with nondiscrimination laws and regulations, including Title VII of the Civil Rights Act of 1964. Title VII states, "It shall be an unlawful employment practice for an employer: (1) to fail or refuse to hire or to discharge any individual or otherwise to discriminate against any individual with respect to their compensation, terms, conditions, or privileges of employment, because of such individual's race, color, religion, sex, or national origin or (2) to limit, segregate, or classify their employees or applicants for employment in any way which would deprive or tend to deprive any individual of employment opportunities or otherwise adversely affect their status as an employee, because of such individual's race, color, religion, sex, or national origin." Caltrans ensures that its activities or programs are nondiscriminatory.

No one may intimidate, threaten, coerce, or engage in other discriminatory conduct against anyone because he or she has either taken action or participated in an action to secure rights protected by the nondiscrimination statutes. Any individual alleging such harassment, retaliation, or intimidation may file a complaint with the California Department of Fair Employment and Housing or with the United States Equal Employment Opportunity Commission.

If you have questions relating to the information referenced above, please contact the Office of Business and Economic Opportunity at (916) 324-0449.

Sincerely,

[District Labor Compliance Officer's Name]
District Labor Compliance Officer
District [Number] Construction

c: Division of Construction
Office of Business and Economic Opportunity
Subcontractors (if applicable)

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

Section 3 Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises

8-301 General

8-302 Terms Used in Construction

8-302A Commercially Useful Function

8-302B Underutilized Disadvantaged Business Enterprises

8-303 Before Work Begins

8-303A Disadvantaged Business Enterprise and Disabled Veteran Business Enterprise Commitment Form

8-303B Subcontractor List Versus Disadvantaged Business Enterprise and Disabled Veterans Business Enterprise Commitment Form

8-303C Preconstruction Conference

8-304 Activities During Construction

8-304A Monitoring and Enforcement

8-304A (1) Monthly DBE/UDBE Trucking Verification Form

8-304A (2) When Listed DBE or DVBE Does Not Perform the Work

8-304B Substitution of Listed Firms

8-304B (1) Underutilized Disadvantaged Business Enterprise Substitutions

8-304B (2) Disadvantaged Business Enterprise Substitutions

8-304B (3) Disabled Veteran Business Enterprise Substitutions

8-304C Adding Disadvantaged Business Enterprises or Disabled Veteran Business Enterprises

8-305 Forms Required After Contract Acceptance

8-305A Final Report, Use of Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises, First-Tier Subcontractors

8-305B Disadvantaged Business Enterprises Certification Status Change (Federal-Aid Contracts)

8-306 Caltrans Office of Business and Economic Opportunity

Example 8-3.1 Second Notice, Contractor Has Failed to Respond to Verbal Notice on Nonuse of Disabled Veteran Business Enterprise

Section 3 Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises

Section 3 Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises

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 includes programs designed to increase the use of disadvantaged business enterprises (DBEs) on federally funded contracts and disabled veteran business enterprises (DVBEs) on state-funded contracts.

Federal regulations define DBEs as firms owned and controlled by individuals who are both socially and economically disadvantaged. For the state's federally assisted transportation program, Caltrans establishes an annual overall participation goal for DBEs. Caltrans strives to meet the annual goal through varying individual contract goals that contractors must either meet or conduct a good faith effort to meet during the bidding process.

State law defines DVBEs as firms owned, managed, and controlled by one or more disabled veterans. State law requires Caltrans to ensure at least 3 percent DVBE participation in its contracting dollars expended annually. Caltrans strives to meet this requirement by establishing individual DVBE participation requirements on state-funded contracts. Contractors must meet the contract requirement to be awarded a state-funded contract.

Contract goals are set based upon the type of work in the contract and the availability of DBE firms to participate in the bidding process in the geographical area of the contract. DVBE contract participation requirements vary from 3 percent to 5 percent depending on the dollar value of the overall project. Contracts may also include a DVBE bid incentive based on the percentage of the commitment made by the bidder.

For every advertised contract containing goals or percentage requirements, the contractor must submit information to Caltrans during the bidding process regarding the proposed use of DBEs or DVBEs. The contractor's proposal is evaluated prior to award of a contract to see if the contract requirement has been met or if a good faith effort to use DBEs has been made, as applicable. If the low bidder has not met the contract requirement or shown good faith efforts to do so, 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 with state funds have no specific requirement for the use of DBEs. Likewise, projects funded with federal transportation funds 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 meet the DVBE requirement, and projects funded with federal transportation funds cannot use a DVBE to meet the DBE goal.

Some contracts do not have DBE or DVBE goals. However, Caltrans still encourages the use of DBEs and DVBEs on these contracts, and bidders are urged to obtain DBE or DVBE participation.

The contract contains the Caltrans DBE or DVBE requirements. Specific restrictions exist regarding the removal and replacement of both DBEs and DVBEs listed on the contractor's commitment documents provided at the time of bid submission. DBE or DVBE requirements are in addition to the requirements of Sections 4100–4114, "Subletting and Subcontracting Fair Practices Act" (Fair Practices Act), of the Public Contract Code, which are described in Section 3-507C, "The Subletting and Subcontracting Fair Practices Act," of this manual.

8-302 Terms Used in Construction

8-302 Terms Used in Construction

8-302A Commercially Useful Function

- DBE—a DBE performs a commercially useful function when it does all of the following (as detailed in the Code of Federal Regulations Section 26.55[c]):
    1. Performs at least 30 percent of the total cost of its contract with its own work force and does not subcontract out portions of its contract work that are greater than normal industry practices for the type of work performed.
    2. Performs, manages, and supervises the work involved.
    3. Negotiates prices, determines quantity and quality, orders materials and supplies, pays for the materials and supplies, and installs the materials where applicable.
- DVBE—a DVBE performs a commercially useful function when it does all of the following (as detailed in California Military and Veterans Code, Section 999[b][5][B]):
    1. Is responsible for the execution of a distinct element of the contract
    2. Carries out the obligation by actually performing, managing, or supervising the work involved
    3. Performs work that is normal for its business services and functions
    4. Is responsible with respect to products, inventories, materials, and supplies required for the contract; for negotiating price; determining quality and quantity; and ordering, installing, if applicable, and making payment
    5. Is not further subcontracting a portion of the work that is greater than that expected to be subcontracted by normal industry practices

A DBE or DVBE firm does not perform a commercially useful function if its role on the contract is limited to being an extra participant in a transaction or contract through which funds are passed in order to obtain the appearance of participation.

8-302B Underutilized Disadvantaged Business Enterprises

An underutilized disadvantaged business enterprise (UDBE) is a certified DBE firm that is recognized as being in one or more of the following DBE categories: Black American, Asian-Pacific American, Native American, or Women.

In a 2007 Caltrans-led disparity study conducted to determine if disparity existed in the use of one or more DBE categories, the four categories above were determined to be

underutilized in the construction industry. To achieve greater participation in the four groups, Caltrans set UDBE goals on contracts advertised on or after February 27, 2009 through June 15, 2012. UDBE contract goals were not set on projects advertised after June 15, 2012.

8-303 Before Work Begins

8-303A Disadvantaged Business Enterprise and Disabled Veteran Business Enterprise Commitment Form

The DBE or DVBE commitment form provides the resident engineer with a listing of specific work to be done or materials to be furnished by specific DBEs or DVBEs and is based on information the contractor submitted during the bidding process. The resident engineer will receive the approved commitment of DBE or DVBE participation in the award package. For DBE participation commitments, bidders use Form DES-OE-0102.10D, "DBE-Commitment." For DVBE participation commitments, bidders use Form DES-OE-0102.5, "Certified DVBE Summary." For DBE good faith efforts, bidders use Form DES-E-0102.11A, "DBE Good Faith Efforts Documentation." The percentage specified in the original contract advertisement may differ from the approved listing, which is a specific contract commitment from the contractor. The contractor must meet the DBE or DVBE commitment, regardless of the contract percentage.

Review the commitment forms with inspection staff before work begins to ensure that field staff knows who should be performing DBE or DVBE contract work. If the commitment form has not been provided in the award package or is incomplete, the resident engineer must contact the district labor compliance officer or the office engineer.

8-303B Subcontractor List Versus Disadvantaged Business Enterprise and Disabled Veteran Business Enterprise Commitment Form

Do not construe the commitment of DBE or DVBE subcontractors as a request to subcontract or a notice of intent to subcontract as required by Section 5-1.13, "Subcontracting," of the *Standard Specifications*. However, the approved form does equate to a commitment from the contractor to meet the DBE or DVBE requirements of the contract. In those instances where a DBE or DVBE subcontractor exceeds the dollar threshold (one-half of 1 percent of the total bid, or $10,000, whichever is greater) specified in the Fair Practices Act, the DBE or DVBE must also be listed on the "subcontractor list." Conversely, a DBE or DVBE whose value of work falls below the threshold will not be listed on the subcontractor list, in accordance with the Fair Practices Act. Because the DBE or DVBE may not be on the subcontractor list, the DBE or DVBE listing and the subcontractor list 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." Refer to Section 3-507D, "Procedure for Approval or Acknowledgment of Subcontractors," of this manual for additional information on first-tier subcontractors.

To cross-check DBE or DVBE commitments, compare the subcontractors and contract items listed on the subcontractor list and Form CEM-1201, "Subcontracting Request," with the approved DBE or DVBE commitment forms. Identify any irregularities during the preconstruction conference.

8-303C Preconstruction Conference

During the preconstruction conference, review the commitment details with the prime contractor and other attending parties. Inform the contractor of the contract requirements to use the committed DBE or DVBE firms or go through the applicable substitution process. Also inform the contractor that unless the work is performed or supplied by the listed DBEs or DVBEs or a substitution is approved, the contractor is not entitled to any payment for work or materials or may be subject to a 10 percent contract withhold. The preconstruction conference is a good opportunity for the prime contractor to inform Caltrans staff of any known issues prior to the work starting. If the contractor identifies any issues, follow the process identified in Sections 8-304B, "Substitution of Listed Firms," and 8-304C, "Adding Disadvantaged Business Enterprises or Disabled Veteran Business Enterprises," of this manual.

8-304 Activities During Construction

8-304 Activities During Construction

8-304A Monitoring and Enforcement

Caltrans is required by federal and state regulations to monitor worksites to ensure work committed to a DBE or DVBE is being performed by the respective firms and ensuring a commercially useful function. For federally funded projects, the resident engineer must certify in writing that a field review of DBE records occurred and the worksite was monitored by Caltrans staff.

The following procedures must be used by field staff to monitor and enforce the DBE or DVBE requirements of the contract, including prompt payment:

1. When a DBE or DVBE firm performs work on the contract, inspection staff must document in the daily inspection report the name of the firm and the associated contract items performed. Cross-check the inspection reports against commitment forms to ensure the appropriate firm is performing the work or providing the materials.
2. Interview workers of DBE or DVBE subcontractors. For additional information on conducting interviews, refer to Section 8-102A (3), "Interviews With Contractor Personnel," of this manual.
3. Confirm with the district labor compliance officer that certified payroll records have been received for the DBE or DVBE, if applicable.
4. If the DBE or DVBE firm is a materials supplier, request that the contractor provide documents such as delivery confirmation reports and canceled payment checks to confirm that the DBE or DVBE supplied the materials.
5. Ensure the contractor submits Form CEM-2406, "Monthly Disadvantaged Business Enterprises (DBE) Payment," by the 15th of the month for the previous month's activities.
6. If trucking is part of the contractor's DBE commitment, identify trucking firms and drivers and associated items of work for each trucking firm on daily inspection reports. In addition, ensure the contractor submits Form CEM-2404F, "Monthly DBE/UDBE Trucking Verification," by the 15th of the month for the previous month's trucking activities. Randomly confirm the information on these forms by requesting copies of weighmaster certificates and canceled payment checks from the contractor. Cross-check the information against daily inspection reports as well.

Refer to Section 8-304A (1), "Monthly DBE/UDBE Trucking Verification Form," of this manual for additional information.

7. Do not allow a contractor to terminate or substitute a listed DBE or DVBE from the contract without written consent. For information on the substitution process, refer to Section 8-304B, "Substitution of Listed Firms," of this manual.
8. Withhold contract funds, as applicable, for improper substitutions, terminations, or failure to meet contract commitments.
9. Bring to the attention of the district labor compliance officer any complaints of failure by the contractor to promptly pay DBE or DVBE firms.
10. Require the contractor to notify you in writing of any changes in DBE certification status; that is, a DBE becomes decertified or a business entity becomes certified as a DBE. For additional information on changes in DBE certification status, refer to Section 8-304B (2), "Disadvantaged Business Enterprise Substitutions," of this manual.
11. Consult with the district labor compliance officer for questions on implementing enforcement activities.

8-304A (1) Monthly DBE/UDBE Trucking Verification Form

When DBE trucking is approved on the commitment list, the contractor must submit to the resident engineer Form CEM-2404F, "Monthly DBE/UDBE Trucking Verification," before the 15th of each month. The form must include the following for all trucking performed during the reporting period:

- 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 applicable

If the prime contractor fails to submit the form, the resident engineer must hold 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 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. The leased truck may work for others during the term of the lease with the consent of the DBE, as 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.)

8-304A (2) When the Listed DBE or DVBE Does Not Perform the Work

If Caltrans personnel observe that firms other than those listed 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 for the dollar amount of work that should have been performed to date as listed on the DBE commitment for the specific firm. For DVBEs, hold an administrative deduction for 10 percent of the DVBE commitment for the specific firm.

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 full amount of the items of work listed and a referral to the Department of General Services (DGS) for investigation for contracts with DVBE commitments. For a sample copy of such a letter, refer to Example 8-3.1, "Second Notice, Contractor Has Failed to Respond to Verbal Notice on Nonuse of DBE or DVBE," at the end of this section.

If the written notice fails to achieve results, submit to the district labor compliance office a memorandum noting the following:

- The apparent violation
- Actions taken
- The contractor's subsequent action or inaction
- Documentation of the notices sent to the contractor

The district labor compliance office reviews for consistency the actions taken and forwards 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 the Caltrans Office of Business and Economic Opportunity (OBEO). When necessary, OBEO will investigate the apparent violation and notify the federal or state authorities as appropriate.

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.

8-304B Substitution of Listed Firms

The resident engineer must not allow a prime contractor to remove or substitute a listed DBE or DVBE firm without prior written consent from Caltrans. This includes allowing the prime contractor to self-perform work originally committed to a DBE or DVBE firm. Requests for substitution of a listed DBE or DVBE firm must be in writing.

8-304B (1) Underutilized Disadvantaged Business Enterprise Substitutions

The UDBE substitution procedures apply to contracts advertised on or after February 27, 2009 through June 15, 2012. For contracts with UDBE participation, follow the process described below. The prime contractor is required to replace the listed UDBE with another certified DBE firm identified as underutilized or conduct a good faith effort to do so to the extent required to meet the original contract goal. For additional information on those DBE firms considered to be underutilized, refer to Section 8-302, "Terms Used in Construction," of this manual.

Require the contractor to submit a written request for substitution of a listed UDBE. Ensure the request cites one of the seven reasons listed in Section 5, "General, Performance of UDBEs," of the special provisions. If the prime contractor requests substitution with a non-UDBE, the good faith effort must be included with the request and must address the eight information and supporting document items identified in the contract under "Disadvantaged Business Enterprises." The prime contractor's good faith effort must be reviewed and approved by the district construction division chief before approval of a substitution request. If the prime contractor fails to conduct a good faith effort to replace a listed UDBE with another UDBE, deny the substitution request.

Provide the listed UDBE with written notice, including confirmation of receipt, of the prime contractor's request to substitute upon receipt of a request for substitution. The written notice must allow the listed UDBE at least 5 days to object to the substitution. If the UDBE objects and provides a timely response, the district must conduct a hearing on the substitution request. Provide the prime contractor and UDBE with written notice at least 5 days before the scheduled hearing. If the UDBE does not object to the substitution or does not respond within the 5-day timeframe, give the prime contractor written notice of the substitution approval. For approval of the substitution, complete Form CEM-2401, "Substitution Report for Disadvantaged Business Enterprise (DBE) or Underutilized Disadvantaged Business Enterprise (UDBE)."

If the prime contractor replaces a listed UDBE without approval, temporarily withhold payment for the items of work committed to the UDBE from the next progress payment. Send the prime contractor written notice of the improper substitution and payment withhold. If the UDBE is also a listed subcontractor pursuant to the Fair Practices Act, the substitution process must comply with the Fair Practices Act and with Section 3-507C (5), "Hearing Process for Substitution Violations," of this manual. If the prime contractor is found in violation of the Fair Practices Act, the hearing officer may also assess a penalty of up to 10 percent of the subcontract amount. Any temporary withholds become permanent when a violation is confirmed.

8-304B (2) Disadvantaged Business Enterprise Substitutions

For DBE substitutions, follow the process listed below. The prime contractor is required to replace the listed DBE with another certified DBE or conduct a good faith effort to do so to the extent needed to meet the original contract goal.

Require the contractor to submit a written request for substitution of a listed DBE. Section 5 "General, Performance of Disadvantaged Business Enterprises," of the contract identifies the information required for a contractor-requested substitution. Review the contractor's written request and ensure it includes all of the following:

- One of the 11 reasons for substitution as identified in the special provisions

- A copy of the 5-day notice from the contractor to the DBE regarding the substitution, including verification that the DBE received the notice
- The DBE's response to the 5-day notice
- If applicable, the contractor's good faith effort documentation addressing the eight requirements found in Section 2-1.12B(3), "DBE Good Faith Efforts Submittal," of the *Standard Specifications*

If the request for substitution does not include the required information, notify the contractor of the requirement to comply with the contract and do not proceed with the substitution request.

If the DBE objects to the 5-day notice of substitution, the district must conduct a hearing on the substitution request. The prime contractor and DBE must be provided at least 5 days' written notice of the scheduled hearing. If the DBE does not object to the substitution or does not respond to the contractor's notice within the 5-day timeframe, the substitution can occur with another DBE or non-DBE as a result of an approval of the good faith effort. To document written substitution approval, complete Form CEM-2401, "Substitution Report for Disadvantaged Business Enterprise (DBE) or Underutilized Disadvantaged Business Enterprises (UDBE)," and provide a copy to the contractor.

If the prime contractor replaces a listed DBE without written approval from the resident engineer, payment for the items of work committed to the DBE must be temporarily withheld from the next progress payment. Send the prime contractor written notice of the improper substitution and payment withhold. In addition, if the DBE is also a subcontractor required to be listed at bid time by the Fair Practices Act, the substitution process must comply with Section 3-507C (5), "Hearing Process for Substitution Violations," of this manual. If the substitution is found to be in violation of the Fair Practices Act, the hearing officer may assess the prime contractor a penalty of up to 10 percent of the subcontract amount. Any temporary withholds become permanent when a violation is confirmed.

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.

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-2402F, "Final Report - Utilization of Disadvantaged Business Enterprises First-Tier Subcontractors," which should show the total paid to the DBE. For additional information on the final report, refer to Section 8-305A, "Final Report, Use of Disadvantaged Business Enterprises or Disabled Veteran Business Enterprises," of this manual.

8-304B (3) Disabled Veteran Business Enterprise Substitutions

For contracts advertised on or after January 1, 2010, DVBEs listed at the time of bid for participation credit must only be substituted with another DVBE. For contracts advertised on or after April 1, 2013, DVBEs must be substituted with another DVBE or a small business in the demonstrated absence of an available DVBE. In addition, for all DVBE substitutions, Caltrans must receive approval from DGS before allowing a contractor to proceed with the substitution.

Require the contractor to submit a written request for substitution. Review the request to ensure compliance with the requirements of Section 5-1.13C, "Disabled Veteran Business Enterprises," of the Standard Specifications. This includes citing one or more of the allowed reasons for substitution and providing copies of the following:

- Written notice of the substitution request provided to the DVBE and any response received
- Documentation of the absence of DVBE substitutable firms, if applicable
- The commitment quote from the replacement firm
- The business information, items of work, and corresponding dollar value for the replacement firm.

The allowable reasons for substitution are as follows:

1. When the DVBE becomes bankrupt, insolvent, or goes out of business.
2. When the DVBE does not perform as listed in the Bidder Declaration.
3. When the DVBE does not meet the bond requirements of the contractor.
4. When the DVBE's name is incorrect due to an inadvertent clerical error. In the case of public works contracts, compliance with Section 4107.5 of the Public Contract Code is required.
5. When the DVBE is not licensed as required by any California regulatory agency.
6. When the awarding department, or its duly authorized officer, determines that the DVBE: (a) did not perform in accordance with the plans and specifications; or, (b) has delayed or disrupted the progress of the work.

For contracts advertised prior to April 1, 2013, Caltrans provides the DVBE with written notice of the substitution request, using a traceable mailing method such as registered, overnight, or certified mail, if the contractor's request does not already include documentation of such notice. The written notice gives the DVBE 5 working days to object, in writing, to the substitution and request a hearing with Caltrans.

Return to the contractor for correction requests that do not include the required information or do not indicate substitution with another DVBE or small business firm.

If the listed DVBE provides a written objection to a contractor's substitution request, within 5 working days of receipt of the objection, set a date for a hearing and send a notice to the contractor and DVBE of the date and location. Conduct the hearing in compliance with Section 3-507C (3), "Hearing Process for Substitutions," of this manual. If the listed DVBE does not respond to the notice of a contractor's request to substitute within 5 working days or does not object to the substitution, no hearing is required.

After resolving any issues with the substitution request and determining that the substitution may occur, complete Form CEM-2405, "Disabled Veteran Business Enterprise (DVBE) Substitution Request to the Department of General Services (DGS)," and send it to the Division of Construction, to the attention of the labor compliance program manager. Also send a copy to the district labor compliance manager. Include all supporting documents such as the contractor's substitution request; notice to the DVBE; DVBE's response, as applicable; request for hearing; and hearing decision. The Division of Construction labor compliance program manager reviews and signs the DVBE substitution form and forwards it to DGS for final review and approval or denial. DGS responds to the request within 3 business days. The Division of Construction notifies the district of DGS' final decision upon receipt.

Provide the contractor with notice of DGS' decision. If the substitution is approved by DGS and the new DVBE or small business is a first-tier subcontractor, ensure the prime contractor completes and submits an updated Form CEM-1201, "Subcontracting Request." If the substitution is denied by DGS, do not allow substitution of the DVBE originally listed.

Do not allow the proposed substitute DVBE or small business firm's work to occur until a substitution request has been approved by DGS.

If the contractor improperly substitutes a listed DVBE with a non-DVBE or non-small business, withhold 10 percent of the dollar value of the original listed DVBE participation. Send the prime contractor written notice of the improper substitution and payment withhold. In addition, if the DVBE is also a subcontractor required to be listed at bid time by the Fair Practices Act, the substitution process must comply with Section 3-507C (5), "Hearing Process for Substitution Violations," of this manual. Substitution of a listed DBE or DVBE may be a lengthy process. However, contractors are not entitled to either time adjustments or increased costs as a result of substituting the DBE or DVBE firm.

Consult with the district labor compliance program manager for assistance with the substitution process for DBE or DVBE firms.

8-304C Adding Disadvantaged Business Enterprises or Disabled Veteran Business Enterprises

Caltrans permits and encourages the contractor to increase the amount of work to DBEs or DVBEs over what was originally listed for contract commitment. If a portion of the work will be subcontracted, the contractor must comply with Section 5-1.13, "Subcontracting," of the *Standard Specifications* and with the Fair Practices Act. For the procedures for subcontracting, refer to Section 3-507, "Subcontracting," of this manual. Place a copy of the contractor's request in the project file for later reference when approving Form CEM-2402F, "Final Report - Utilization of Disadvantaged Business Enterprises (DBE) First-Tier Subcontractors," or Form CEM-2402S, "Final Report - Utilization of Disabled Veteran Business Enterprises (DVBE) State Funded Projects Only."

8-305 Forms Required After Contract Acceptance

8-305 Forms Required After Contract Acceptance

The following forms are required after contract acceptance. Refer to the S*tandard Specifications* for the specific due date of each form.

8-305A Final Report, Use of Disadvantaged Business Enterprises or Disabled Veteran Business Enterprises

The specifications require the contractor to submit to the resident engineer either Form CEM-2402F, "Final Report - Utilization of Disadvantaged Business Enterprises (DBE) First-Tier Subcontractors," or Form CEM-2402S, "Final Report - Utilization of Disabled Veterans Business Enterprises (DVBE) State Funded Projects Only," upon completion of the contract work. These final reports provide key information required to certify that DBE and DVBE firms participated on the contract and were paid for the work performed.

Ensure the final utilization report includes the following information:

- The names and addresses of DBE or DVBE firms and first-tier subcontractors for federal-aid projects
- The date each of the firms completed the work
- The date of final payment to the 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 reports 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 commitments. Require the contractor to submit a complete form if any of the required information is not included.

Compare the contractor's original dollar commitment with the amount shown on the final DBE or DVBE report. Review the contractor's calculations to verify that the appropriate amount is credited for participation of DBE suppliers and truckers. Below are the criteria for crediting DBE supplier and trucker participation:

- One hundred percent credit if the materials or supplies are obtained from a DBE manufacturer.
- Sixty percent credit if the materials or supplies are obtained from a DBE regular dealer.
- Only fees, commissions, and charges for assistance in the procurement and delivery of materials or supplies, if they are obtained from a DBE that is neither a manufacturer nor regular dealer. Code of Federal Regulations, Title 49, Section 26.55, "How is DBE Participation Counted Toward Goals?," defines "manufacturer" and "regular dealer."
- One hundred percent credit for the total value of the transportation services the DBE provides on the contract using trucks it owns, insures, and operates using drivers it employs or leases from another DBE.
- Actual fee or commission amount for participation by non-DBE trucks leased by DBEs.

DVBE subcontractors, suppliers and truckers receive full participation credit as long as the entity has performed a commercially useful function on the project.

If any question exists concerning the report's accuracy, require a written explanation from the contractor. The response 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 explanation to the final DBE or DVBE report. The written explanation 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 commitment.

For federally funded projects only, if the contractor's DBE attainment falls short of the contract commitment, hold only the amount of contract funds necessary to meet the original DBE contract goal. If funds were previously withheld from the contractor for failure to meet DBE participation requirements, continue to hold only the amount of contract funds necessary to meet the original DBE contract goal. Any penalties previously assessed for violations of the Fair Practices Act are not returned to the contractor, even if the contractor meets the DBE commitment with other DBE firms. For contracts with DVBE participation commitments, do not return previously withheld funds to the contractor. If the contractor does not attain the original goal for reasons beyond their control, then no funds should be withheld. For example, if a 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. Conversely, if a 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. Consult with the district labor compliance manager for questions regarding withheld funds for DBE or DVBE participation.

If no issues with the final utilization reports are identified, the resident engineer signs the final report. For federally funded contracts, the signature of the resident engineer provides written certification of DBE participation through onsite monitoring and record review activities. The final DBE or DVBE report (together with the contractor's narrative) must be sent to the Office of Business and Economic Opportunity (OBEO) by email at business.support.unit@dot.ca.gov. A copy should also be sent to the district construction office.

If the contractor does not submit the final utilization reports, take the appropriate deduction on the after-acceptance estimate. For federal-aid contracts, withhold $10,000. For state-funded contracts, initiate an "other outstanding document" (OOD) withhold. For more information on these withholds refer to Section 3-907A, "Payment Before Final Estimate," of this manual. Return the withhold when a completed report is submitted and verified.

8-305B Disadvantaged Business Enterprises Certification Status Change (Federal-Aid Contracts)

To document and report changes to DBE certification, the contractor must complete Form CEM-2403F, "Disadvantaged Business Enterprises (DBE) Certification Status Change." The form must list the amount of money paid to the DBE while it was certified.

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-2403F. If the prime contractor fails to submit the form, include this report as part of the OOD deduction when preparing the after-acceptance payment.

8-305C Monthly Disadvantaged Business Enterprises (DBE) Payment

The purpose of monthly DBE payments is to comply with the uniform report of DBE awards or commitments and payments to ensure "real time" payments and breakdown of participation by minority-owned DBEs.

The resident engineer ensures the contractor submits a completed Form CEM-2406, "Monthly Disadvantaged Business Enterprises (DBE) Payment," including explanation of differences between the original commitment and payment to the DBE in the comment section. A copy is emailed to the Office of Business and Economic Opportunity at business.support.unit@dot.ca.gov.

8-306 Caltrans Office of Business and Economic Opportunity

8-306 Caltrans Office of Business and Economic Opportunity

Caltrans OBEO develops policy related to and generally administers and oversees the DBE program for Caltrans. Additionally, among other duties, OBEO certifies DBEs, publishes the lists of the certified firms, and determines whether those firms meet the requirements of applicable federal regulations. DGS certifies DVBEs, and determines whether these firms meet the requirements of applicable state regulations.

OBEO also approves contract goals, determines goal attainment during the contract award process, and performs external equal employment opportunity compliance reviews of Caltrans' contractors, including use of DBE and DVBE firms.

Although overall program responsibility rests with OBEO, specific construction project responsibility rests with district construction and the Division of Construction. Be aware of the general contract requirements related to use of DBE and DVBE firms and equal employment opportunity, and when a question arises about the requirements or when a violation of the requirements has apparently occurred, immediately notify the district construction office.

If the district needs assistance, the district contacts the Division of Construction labor compliance manager. 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, 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, OBEO, 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 Disabled Veteran Business Enterprise

[Contract Identification]
[Today's Date]
[Contractor's Superintendent]
[Prime Contractor]
[Job Site Address]

Dear [Superintendent]:

On [date], the work on Contract Item [contract item ##, description of item] apparently was being done by employees of [name of firm]. Our records indicate that your company stated in its DVBE use plan that this work would be done by [name of DVBE firm]. On [notification date], I called your attention to this apparent violation of the contract, yet [name of firm] has continued to perform work on curbs and gutters. Be advised that, pursuant to the paragraph titled "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 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 DVBEs with other DVBEs or small businesses, subject to Caltrans and the Department of General Services approval. 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
RE 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 DVBE. If a second subcontractor is involved, other contract specifications are probably being violated; for instance, the following:

- *Standard Specifications* Section 5-1.13, "Subcontracting"—Lack of prior notice of subcontract (if state funded).
- Sections 4100–4114, "Subletting and Subcontracting Fair Practices Act," of the Public Contract Code—Substitutions for listed subcontractors without the engineer's approval will result in a penalty of up to 10 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 DVBE provisions" rather than merely "DVBE provisions." When the subcontractor listing law is involved, the letter must clearly address both the Subletting and Subcontracting Fair Practices Act and DVBE violations.

Chapter 9 Projects Sponsored by Others

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Chapter 9 Projects Sponsored by Others

Section 1 Construction Contract Administration for Projects Sponsored by Others

Section 1 Construction Contract Administration for Projects Sponsored by Others

9-101 General

9-101 General

Caltrans encourages local and private sponsoring of state highway improvements. Local agencies develop and implement local funding programs that supplement federal and state funding programs to meet their current and future transportation needs. Projects sponsored by others that are constructed on the state highway system may be implemented by a city, county, local transportation authority, local transit agency, or private entity and use local or private funding.

Local revenues for state highway projects may include local sales tax, other local funds, local federal-aid funds (such as funds from Surface Transportation Program, Congestion Mitigation Air Quality, or Active Transportation Program), and private funds. Local agencies may combine their funds with state funds (such as the State Transportation Improvement Program, State Highway Operation and Protection Program, or Minor Programs) to develop transportation improvements.

The term "local agency" used throughout this section means any public entity (federal, state, regional transportation planning agency [RTPA], county, city, or other local government entity) that sponsors or acts as implementing agency for a construction contract on the state highway system. In addition, any private entity that sponsors or administers construction contracts on the state highway system, unless otherwise noted, can be considered a local agency.

Caltrans policy states that the local or private entities sponsoring state highway system projects financed with local and private funds will select the implementing agency for construction contract administration. Caltrans will consider acting as implementing agency for a construction contract on a reimbursement basis in certain cases that are described in Section 9-103, "Caltrans Administered Projects Sponsored by Others," of this manual.

9-102 Advertise, Award, and Administer Construction Contracts

9-102 Advertise, Award, and Administer Construction Contracts

Caltrans policy states that advertising, award, and contract administration shall not be divided among different entities; that is, the entity that advertises the project shall also award and administer the construction contract. Only the Chief, Division of Construction can waive this policy.

9-103 Caltrans Administered Projects Sponsored by Others

9-103 Caltrans Administered Projects Sponsored by Others

The district may honor local agency requests that Caltrans advertise, award, and administer the construction contract for locally sponsored projects at the discretion of the district director, and subject to availability of resources. The local agency must accept the processing procedures normally applied to state highway projects, since the

locally sponsored project will be processed along with Caltrans' regular workload associated with developing the statewide transportation program.

The district director determines the appropriate method for advertising, awarding, and administering a construction contract project sponsored by others. The district director should consider advertising, awarding, and administering contracts if:

- The project involves major urban freeway or expressway construction, where heavy public traffic will occur through construction.
- The project requires extensive night work.
- The project involves long and unusual structures.
- The Federal Highway Administration requests administration by Caltrans.

Caltrans administered projects that are sponsored by others follow the guidance of this manual and the terms of the cooperative agreement. Whenever Caltrans advertises, awards, and administers the contract, the project is considered to be "state administered." Caltrans personnel perform the construction engineering in most cases. Arrangements may be made, however, for Caltrans to provide the resident engineer, structures representative, lead inspectors, and the remainder of the construction engineering staff to be local agency personnel, local agency hired consultants, or a combination of the two. In a combined effort, the Caltrans district (not the local agency) is responsible to properly staff such a project whether or not the local agency can furnish the expected personnel. The cost of the construction engineering team provided by a local agency is considered part of the local agency's share of the project costs.

Caltrans personnel make charges against the project identification number for state administered projects similar to charging practices used on Caltrans projects. As a result of using this charging method, the local agency shares the engineering costs in accordance with the cooperative agreement between the local agency and Caltrans. Charges made for the local agency's personnel or consultants on state administered projects are also charged against the project and shared in accordance with the cooperative agreement. The method of charging the project for local agency personnel may vary depending on the entity and the agreement.

The Caltrans claims process in consultation with the fund provider is used when Caltrans administers a construction contract. 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.

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

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

- The meeting with the resident engineer, construction engineer, construction field coordinator, and project manager to discuss funding needs and alternatives shall also include the district local assistance engineer and a representative of the local agency that sponsored the project. The meeting should include a representative of the local RTPA if the local federal-aid funds are programmed by the RTPA. The

meeting should include the Federal Highway Administration transportation engineer for projects of division interest.

- The memorandum to request additional funds will be processed through the RTPA or district local assistance engineer. The meeting participants decide who receives the memorandum.
- If state funds pay for part of the project costs, the meeting will determine the responsibilities for the additional funds request. Project managers process the request for additional state funds as outlined in Section 9-103B, "Requesting Additional Local Funds for Locally Sponsored Projects," of this manual. The request for additional local federal-aid funds will be processed as determined at the meeting.

9-103B Requesting Additional Local Funds for Locally Sponsored Projects

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

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

Section 2 Projects Administered by a Local Agency on the State Highway System

9-201 General
9-202 Quality
9-203 Reimbursement
9-204 Source Inspection
9-205 Project Review

Section 2 Projects Administered by a Local Agency on the State Highway System

Section 2 Projects Administered by a Local Agency on the State Highway System

9-201 General

9-201 General

Ensure that all projects on or proposed for the state highway system are constructed efficiently and effectively in accordance with Deputy Directive 23-R1, "Roles and Responsibilities for Development of Projects on the State Highway System." The directive requires local agencies to conform to Caltrans standards and practices as defined in policies, procedures, manuals, and guidance documents.

The implementing agency is that entity charged with successful completion of each project component as defined in California Government Code, Section 14529 (b) of which one component is construction, construction management, and engineering, including surveys and inspection. To establish clear lines of responsibility, contract advertisement, award, and administration shall be completed by the same implementing agency.

Work in partnership with the local agency by committing to fulfill all Caltrans promises as established by Director's Policy DP-10, "Department Commitments." These commitments will have been agreed to in the cooperative agreement and the encroachment permit.

Obtain a copy of the cooperative agreement and encroachment permit before work begins. Comply with the terms of both agreements or jointly amend them as necessary.

Perform quality management work in accordance with Deputy Directive 90, "Funding of Quality Management Work on State Highway Projects," that outlines how quality management work will be performed for state highway system projects. That directive requires the implementing agency, other than Caltrans, to develop a quality control plan for construction administration.

The local agency must obtain an encroachment permit and use Caltrans approved plans and specifications before performing any construction administration or work on the state highway system. The local agency will provide the resident engineer and construction engineering team. Caltrans will provide independent quality assurance (IQA) and oversight of construction.

The *Construction Manual Supplement for Local Agency Resident Engineers* and the *Local Agency Structure Representative Guidelines* provide guidance to the implementing agency when it administers a construction project that modifies, maintains, or improves the state highway system. District construction and Structure Construction oversight resident engineers should provide copies of these guidelines to the implementing agency at the project development team meeting where the construction phase cooperative agreement is discussed and at the preconstruction

meeting where roles, responsibilities, and procedures are discussed. The local agency is expected to conform to these guidelines.

9-202 Quality

9-202 Quality

When Caltrans is the implementing agency for construction administration, quality assurance consists of quality control, department acceptance, and IQA activities described in the contract, structure construction technical manuals, the *Construction Quality Assurance Program* manual and this manual.

When a government agency or private entity is the implementing agency, it is responsible for implementing quality control and quality assurance procedures for the project that comply with Caltrans policies, procedures, standards and best practices such that the local agency's:

1. Contractor is responsible for quality control that consists of operational techniques and activities that are performed or conducted to fulfill contract requirements for quality.
2. Resident engineer is responsible for quality assurance that consists of planned and systematic actions necessary to provide confidence that product or service quality will satisfy the contract requirements as detailed in the *Construction Manual Supplement for Local Agency Resident Engineers*.
3. Structure representative is responsible for providing quality assurance as detailed in the *Local Agency Structure Representative Guidelines*.

The *Construction Manual Supplement for Local Agency Resident Engineers* and the *Local Agency Structure Representative Guidelines* are used by government agencies and private entities to prepare their quality management plan and to administrate the construction contract. A recommended local agency quality management plan outline is provided in the *Oversight Resident Engineer Guidelines*:

http://www.dot.ca.gov/hq/construc/publicationlist.htm

Caltrans district construction, with input from Structure Construction for projects involving structures, must approve the quality management plan before the encroachment permit for construction is issued.

Caltrans oversees construction administration of the project administered by local agencies for compliance with state and federal regulations and laws, and Caltrans standards. This IQA means Caltrans provides policy and procedural oversight to non-Caltrans organizations, personnel, or companies administering construction contracts on projects under encroachment permit on the state highway system. Caltrans provides direction for similar organizations and personnel for projects that will become a part of the state highway system.

The Division of Construction's *Oversight Resident Engineer Guidelines* provides policy and procedures related to the duties of Caltrans construction IQA personnel on local agency-administered construction projects. These guidelines are to be used as a resource for Caltrans employees who provide IQA on projects administered by others on the existing or future state highway system. The *Oversight Resident Engineer Guidelines* should not be used as a substitute for the encroachment permit or the cooperative agreement.

9-203 Reimbursement

9-203
Reimbursement

When the implementing agency is a private entity, Caltrans performs IQA services at the private entity's expense. When another government agency is the implementing agency, Caltrans IQA services are typically provided at state expense. Reimbursement of Caltrans activities would be documented in a cooperative agreement prior to start of construction. Quality assurance and quality control activities are the responsibility of the implementing agency, and Caltrans will not perform these activities as reimbursed work.

9-204 Source Inspection

9-204
Source Inspection

The local agency provides source inspection on projects they administer.

The local agency is required to prepare a Source Inspection Quality Management Plan (SIQMP). Prior to issuance of the encroachment permit for construction, the SIQMP must be approved by the state materials engineer.

The recommended *SIQMP Outline* was introduced with the "Materials Engineering and Testing Services Source Inspection Quality Management Plan Outline" memorandum dated April 20, 2012, from the Division of Engineering Services, Deputy Division Chief for Materials Engineering and Testing Services (METS).

METS developed the *SIQMP Outline* to help local agencies manage their source inspection efforts when administering construction projects within the state highway system. The outline is provided in the *Oversight Resident Engineer Guidelines*:

http://www.dot.ca.gov/hq/construc/publicationlist.htm

9-205 Project Review

9-205
Project Review

Caltrans, the local agency, and the contractor review a locally-administered state highway construction project prior to Caltrans' acceptance of the work.

Prior to this review, Caltrans oversight personnel perform a separate review and coordinate Caltrans safety and maintenance reviews of the local agency project at 90 percent complete.

Before acceptance of the work, Caltrans oversight personnel discuss the findings of the independent review, safety review, and maintenance review with the local agency.

The local agency must submit all required contract, technical, and administrative documents, including change orders and project history file, before Caltrans accepts the work.

Caltrans oversight personnel must use Form OFG-6, "Final Acceptance Checklist for Caltrans Oversight Projects," to facilitate the review and acceptance by Caltrans of local agency or private entity-administered construction projects on the state highway system.

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