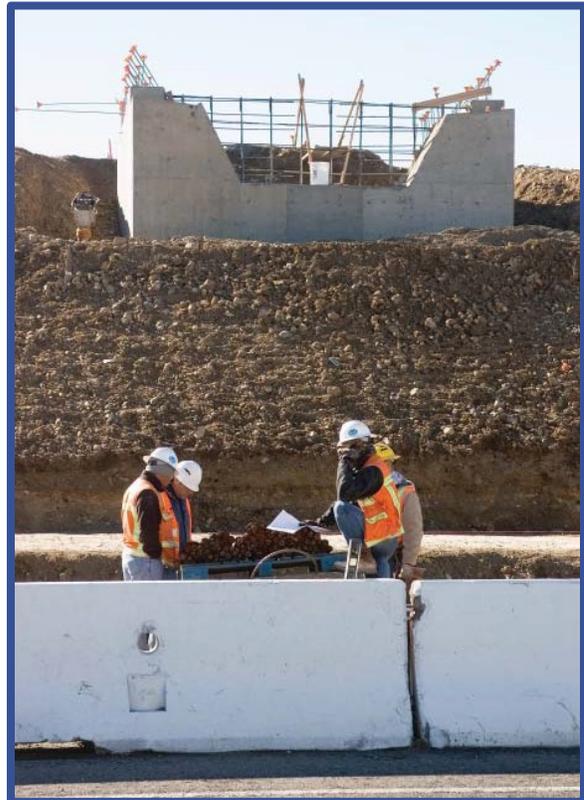


Local Agency Structure Representative Guidelines



STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

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Section 1 Introduction and Overview

1.1 Purpose and Need

The purpose of this guide is to provide structure representatives with an efficient resource to help them determine their roles and responsibilities in administering structure portions of local agency construction contracts built on state right-of-way.

As such, these guidelines are not an all-inclusive list of responsibilities. Instead, it provides an overview of the responsibilities and duties of local agency structure representatives and identifies manuals and other references that local agency structure representatives must consult to gain a comprehensive understanding.

Local agency structure representatives must understand their responsibilities and perform all necessary duties. Failure to do so could result in the encroachment permit being revoked, removal of personnel from the project, rejection of the project by the state, the loss of federal funds, and temporary or permanent loss of state funds. The need for these guidelines arises from the fact that Caltrans Office of Structures Construction oversight engineers often find that local agency structure representatives do not perform all required duties.

1.2 Scope and Organization

The structure-related administrative and construction topics discussed in these guidelines tend to be the predominant ones on locally advertised projects. Some projects include all elements of work discussed, other projects may involve only a few, and some projects may contain elements not discussed. In the latter case, it is incumbent on the local agency structure representative to conduct the required research to perform their responsibilities.

Sections in these guidelines are organized as follows:

- Section 1, Introduction and Overview—purpose and scope of the guideline, definitions used, and general requirements and manuals needed by local agency structure representatives.
- Section 2, General Administration—structure-related administrative duties associated with construction contracts.
- Section 3, General Structure Construction Work—common items of work frequently involved in constructing the different elements of a structure.
- Section 4, Specific Structure Construction Work—constructing specific bridge elements and a few miscellaneous structures.

Starting with Section 2, subsections within each section are generally organized in the same order as a bridge is built. For example, the section on footings precedes the section on columns.

Each subsection is organized to contain the following:

- A general statement of the local agency structure representative's responsibilities.
- A list of references, not necessarily all-inclusive, showing the main sources where further information on a subject can be found. Where possible, specific manual sections are cited.
- Three references not listed, but which always apply, are the special provisions, contract plans, and Standard Plans. These are core contract documents to which the local agency representative must refer for project specific requirements throughout the construction phase.
- A list of typical, significant duties usually required for a particular item of work.

1.3 Definitions

Cooperative agreement—A formal, legally binding contract between Caltrans and a local agency. Cooperative agreements outline responsibilities and respective obligations, including cost sharing, of the participants and may address more than just the project construction. Cooperative agreements and maintenance or ownership obligations are required when exchanges of funds or commitments of resources occur. The structure representative should obtain a copy of the cooperative agreement from the local agency's project manager or the resident engineer.

Encroachment permit—A permit issued by Caltrans granting permissive authority to enter the state right-of-way and construct approved facilities. An encroachment permit is an enforceable contract when accepted by the permittee. Acceptance of all terms of the encroachment permit are acknowledged when any act or work specified under the permit is performed. An encroachment permit does not convey a real property right. It authorizes only the permittee or permittee's agent to perform work within the state right-of-way. The permittee may not transfer or assign an encroachment permit to another party. The local agency and the contractor performing the work require dual permitting. The structure representative obtains copies of encroachment permits from the local agency project manager or the resident engineer.

Federal-aid project—A project funded in whole or in part by Federal Highway Administration (FHWA) funds.

Highway improvement agreement—A formal, legally binding contract between Caltrans and a private entity.

Independent quality assurance—Activities performed by Caltrans at a project level to ensure that the implementing agency's quality-assurance activities result in projects being developed in accordance with Caltrans standards, policies, and practices and the quality-control plan provided by the project sponsor.

Implementing agency—The entity charged with the successful completion of each project component, as defined in Government Code Section 14529(b):

- Project initiation document.

- Completion of all permits and environmental studies.
- Preparation of plans, specifications, and estimates.
- The acquisition of right-of-ways, including, but not limited to, support activities.
- Construction, construction management, and engineering including surveys and inspection. There could be a different implementing agency for each component of a project. To ensure clear lines of responsibility, only one agency can be the implementing agency for a single component.

The implementing agency should not be confused with lead agency, as defined under the California Environmental Quality Act and the National Environmental Policy Act.

Local agency—Any public entity such as a federal, state, or regional transportation planning agency, county, city, or other local government unit that sponsors or administers a construction contract on the state highway system. In addition, a private entity that sponsors or administers construction contracts on the state highway system, unless otherwise noted, is considered a local agency for the purpose of these guidelines.

Oversight engineer—A Caltrans employee who performs independent quality assurance of the activities being performed by the resident engineer, the local agency structure representative, and others assigned to a construction project. The oversight engineer is the local agency's primary Caltrans contact. The oversight engineer assures compliance with applicable state and federal regulations, contract requirements, Caltrans standards and practices, encroachment permit, and cooperative-agreement requirements. For federal-aid projects, the oversight engineer performs independent quality assurance of the quality-assurance work performed by the local agency for the entire project. For non-federal-aid projects, the oversight engineer performs independent quality assurance on only the portion of the project within the existing or future state right-of-way.

Oversight project—Any project within the existing or future state right-of-way financed, in whole or in part, and administered by a local agency.

- Projects sponsored by a local agency or private entity with a construction cost less than \$3 million are constructed under the terms of an encroachment permit. Projects such as those involving signal construction, landscaping, or sound walls, may also require a cooperative or highway improvement agreement.
- Projects sponsored by a local agency with an estimated construction cost of \$3 million or more are constructed under the terms of a cooperative agreement and the encroachment permit.
- Projects sponsored by private entities with an estimated construction cost of \$3 million or more are constructed under the terms of a highway improvement agreement and the encroachment permit.

Project sponsor—An entity that secures funding for projects and serves as the project advocate. The sponsor chooses an implementing agency and is the customer of the implementing agency. The project sponsor and implementing agency can be the same.

Quality assurance—Activities performed within the implementing agency during the project-delivery process that provide the confidence that the project team is fulfilling established project requirements and expectations.

For purposes of this guideline, quality assurance includes activities performed by the implementing agency to verify that the construction contractor is fulfilling all quality control responsibilities. Quality assurance provides confidence that the materials and workmanship meet requirements established in the construction contract.

Quality control—Operational processes, practices, and activities performed at the project-team level during the project delivery process to ensure that the product meets the project's purpose and need and fulfills established quality requirements.

For purposes of this guideline, quality control includes the inspections, testing, and documentation by the construction contractor and subcontractors, demonstrating that materials and workmanship meet requirements established in the construction contract.

Resident engineer—A local agency employee (or a consultant hired by a local agency) responsible for contract administration and construction engineering of a project as described within the *Construction Manual*. The resident engineer performs quality assurance of the contractor's work and performs the necessary administrative tasks to administer the contract.

Structure oversight engineer—An employee of Caltrans Office of Structures Construction who assists the oversight engineer in performing oversight over the local agency structure representative's activities relative to structure portions of a project.

Structure representative—A local agency employee (or a consultant hired by a local agency) that performs quality assurance over the contractor's work that involves structures and who performs the contract's necessary structure-related administrative tasks.

1.4 General Requirements

Construction contracts involving structures that local agencies administer must have a qualified structure representative responsible for administering the structure portion. The structure representative may be a local agency employee or consultant. Local agency contracts frequently involve the following structure work:

- New bridges
- Bridge widenings and other structure modifications
- Tunnels
- Box culverts

- Retaining walls or other earth-retaining systems
- Sound walls
- Overhead signs
- Structural steel
- Pump plants
- Building structures and facilities

The structure representative is responsible for the technical and administrative control of the structure elements of a locally administered project, just as a Caltrans structure representative is responsible for a Caltrans-advertised project. In general, the structure representative is responsible for performing the duties of the structure representative as described in Section 1- 105C, “Structure Representative,” of the *Construction Manual*.

When the construction project involves structures but has only a minor amount of roadway work, the structure representative may also serve as the resident engineer. Conversely, if a project has only a minor amount of structure work, the resident engineer may serve as the structure representative only if qualified and approved as discussed below.

The structure representative is required to be a professional civil engineer licensed by the State of California, have qualifying structure-related experience relative to the structure work involved, and be pre-approved by the Office of Structures Construction Area Construction Manager. The structure representative must communicate and coordinate with the structure oversight engineer on all structure matters pertaining to:

- Administrative issues.
- Construction methods.
- Interpretation of specifications.
- Interpretation of Caltrans policies and procedures.
- Technical issues.
- Contract change orders.

In addition to the structure oversight engineer, many Caltrans structure functional units have a support role in local agency construction projects. The structure representative may also have direct contact with Materials Engineering and Testing Services (METS) and the Office of Special Funded Projects.

The Office of Special Funded Projects is the Caltrans structures unit that approves the structure design package for construction in the state right-of-way. The approval signature of a liaison engineer from the Office of Special Funded Projects appears in the lower left corner of the structure plan sheets. All subsequent changes to the structure plans and specifications must have

the liaison engineer's approval. The structure oversight engineer or the bridge designer usually coordinates approval. The liaison engineer is the point of contact for support from other Caltrans structure units.

METS is responsible for ensuring that materials used in construction projects on the state right-of-way meet Caltrans requirements. Among other responsibilities, they certify suppliers' scales and batching equipment, perform source inspections at the manufacturer's site, and sample and test materials.

For local agency projects, most of these duties are performed for METS by laboratory or inspection firms hired by the local agency. These firms are subject to METS approval and oversight. Cooperative agreements and encroachment permits usually detail the agency responsible for performing tests.

The structure representative must coordinate communication and correspondence with these and other Caltrans units with or through the structure oversight engineer. This does not preempt the need for the structure representative to coordinate with the resident engineer and others when necessary.

The structure representative must personally comply with all safety requirements and ensure that contract operations comply with all applicable federal, state, and local safety regulations for the safety of workers and the traveling public. Every project must post a Code of Safe Practices signed by jobsite employees. The structure representative must take decisive action on any safety violation. In addition to the contract documents, available jobsite safety resources include Cal OSHA; *Caltrans Safety and Health Manual*; and *Bridge Construction Records and Procedures*, Volume 1, Chapter 14, "Accidents and Safety."

1.5 Manuals

The structure representative must possess or have immediate access to the manuals, agreements, and other documents needed for administrative and technical control of structure work on a project.

Primary manuals that address the administrative control of projects:

- *Construction Manual*^{1,2}
- *Bridge Construction Records and Procedures*^{1,3}
- *Local Assistance Procedures Manual*^{1,2}

The Caltrans *Office of Special Funded Projects Information and Procedures Guide*, an additional manual that contains relevant procedural information, is available at www.dot.ca.gov/hq/esc/osfp/. This manual discusses contract change orders, work drawings, cost-reduction incentive proposals, and other items, especially those relating to the roles of consultant designer and Office of Special Funded Projects liaison engineer.

In addition to the manuals above, the structure representative must obtain a copy of and fully understand the requirements in the Caltrans encroachment permit and cooperative agreement. These documents detail specific responsibilities relative to administering the project.

Primary manuals addressing technical control of structure construction are:

- *Construction Manual*^{1,2}
- *Bridge Construction Records and Procedures*^{1,3}
- *Bridge Construction Survey Manual*³
- *Caltrans Staking Information*³
- *Bridge Deck Construction Manual*¹
- *Foundation Manual*¹
- *Falsework Manual*¹
- *Prestress Manual*¹
- *Trenching and Shoring Manual*¹
- *Outline of Field Construction Practices*³
- *Overhead Sign Structure Manual*³
- *Soil Nailing Field Inspectors Manual*, published by the US Department of Transportation^{1,4}
- *Building Construction Manual*^{1,3}

The manuals contain what Caltrans views as the best industry construction practices. While the manuals are not a direct part of the construction contract, Section 4-1.02, “Intent” of the *Standard Specifications* states, “The Contract intent is to provide for work completion using the best general practices.” Therefore, the structure representative must use these manuals to ensure satisfactory standards of construction.

Notes:

¹Available from Caltrans website, <http://www.dot.ca.gov/manuals.htm>

²Hardcopy available for purchase at <http://caltrans-opac.ca.gov/publicat.htm>

³Available through the structure oversight engineer

⁴Available at <http://www.fhwa.dot.gov/engineering/geotech/>

Section 2 General Administration

2.1 Project Records

The structure representative must maintain project records for the structure work involved in a project.

References

- *Construction Manual*: Section 5-1, “Project Records and Reports”
- *Local Assistance Procedures Manual*: Chapter 16, “Administer Construction Contracts”
- *Bridge Construction Records and Procedures*: sections throughout Volume 1 and Volume 2

Typical Duties

- Set up and maintain project files pertaining to structure work on the contract with particular attention to material files, payments, and contractor submittals designated by the *Construction Manual* and *Bridge Construction Records and Procedures*.
- Ensure that project files are organized, complete, accurate, and maintained. Conduct quarterly quality-assurance project-record reviews.
- Correct all deficiencies identified during project-record reviews and audits conducted by the district oversight engineer, the structure oversight engineer, or the FHWA.

2.2 Progress Payments

The structure representative must ensure timely payment to the contractor for satisfactorily completed structures work.

References

- *Construction Manual*: Section 3-906, “Progress Payments”; Section 5-2, “Funds”
- *Local Assistance Procedures Manual*: Chapter 16, “Administer Construction Contracts”
- *Bridge Construction Records and Procedures*: Volume 1: Bridge Construction Memo (BCM) 6-4.0, “Partial Payments”; BCM 6-4.1, “Partial Payment for Structural Concrete, Bridge”
- *Standard Specifications*: Section 9-1.16, “Progress Payments”

Typical Duties

- Comply with local agency procedures for substantiating, authorizing, processing, and administering progress payments.
- Prepare quantity calculations sheets and source documents to substantiate each authorized

payment.

- File quantity calculation sheets in the project records.
- Provide a segregation of costs when multiple funding sources participate in the project.

2.3 Contract Change Orders

The structure representative prepares and coordinates approvals of contract change orders involving structure work.

References

- *Construction Manual*: Section 5-3, “Change Orders”
- *Local Assistance Procedures Manual*: Chapter 16, “Administer Construction Contracts”
- *Bridge Construction Records and Procedures*: Volume 1, Section 7, “Contract Change Orders”
- *Standard Specifications*: Section 4, “Scope of Work”

Typical Duties

- Coordinate the review and approval of change orders with all stakeholders that may have an interest. At a minimum, coordinate with the following representatives:
 - Resident engineer
 - Local agency
 - Structure oversight engineer
 - Designer of record
 - Office of Special Funded Projects liaison engineer
- Obtain prior approval and final approval for applicable change orders from the FHWA engineer.
- Follow the local agency’s administrative procedures for the approval of contract change orders.

2.4 Notice of Temporarily Impaired Clearances

The structure representative reports temporary changes in horizontal and vertical structure clearances. Temporary changes to vertical clearance can result from the installation of falsework over a roadway. Horizontal clearance changes can result from the placement of k-rail associated with the construction of bridge columns and falsework.

References

- *Construction Manual*: Section 3-703, “Public Safety”
- *Bridge Construction Records and Procedures*: Volume 1, BCM 2-20, “Notice of Change in Structure Clearance or Permit Rating”; Volume 2, BCM 120-2.0, “Impaired Clearance at Falsework Traffic Openings”
- *Standard Specifications*: Section 7-1.04, “Public Safety”

Typical Duties

- Submit the appropriate form, either Form TR-0019, “Notice of Change in Clearance or Bridge Weight Rating” (for divided highways); Form TR-0020, “Notice of Change in Vertical or Horizontal Clearance”; or Form TR-0029, “Notice of Change in Clearance or Bridge Weight Rating” (for undivided highways), to the structure oversight engineer not less than 20 days and not more than 90 days (or within the time frame provided in the contract specifications) before the beginning of an operation that will change horizontal clearance or vertical clearance. These forms are available on the Caltrans internet:

<http://www.dot.ca.gov/hq/traffops/permits/>

Clearance is initially estimated using plan sheet layouts. Verify the planned clearance with field measurements.

- Measure the actual clearance once the facility is in place. Submit the revised Form TR-0019, TR-0020, or TR-0029 immediately to the structure oversight engineer if there are changes from the one initially submitted. If the clearance is less, the structure representative should consider halting the operations and removing the stringers already set until clearance issues are resolved.

2.5 Revisions to Permanent Clearances

The structure representative reports permanent changes to the horizontal and vertical clearances of structures. Changes to the permanent vertical clearance on a roadway can be the result of new overhead structures, widening existing overhead structures, or shifting traffic to new configurations under existing structures. Instances of horizontal clearance changes could occur because of the construction of bridge columns, sign structures posts, or barrier rails.

References

- *Construction Manual*: Chapter 3-703, “Public Safety”
- *Bridge Construction Records and Procedures*: Volume 1, BCM 2-20, “Notice of Change in Structure Clearance or Permit Rating”
- *Standard Specifications*: Section 7-1.04, “Public Safety”

Typical Duties

- Obtain approval for horizontal and vertical clearances that will be different than the ones in the contract plans. Prior to initiation, the structure oversight engineer, the designer, and the Office of Special Funded Projects liaison engineer must review and approve proposed changes.
- Complete and submit either Form TR-0019, “Notice of Change in Clearance or Bridge Weight Rating” (for divided highways); Form TR-0020, “Notice of Change in Vertical or Horizontal Clearance”; or Form TR-0029, “Notice of Change in Clearance or Bridge Weight Rating” (for undivided highways), to the structure oversight engineer not less than 20 and not more than 90 days (or within the time frame provided in the contract specifications) before the beginning of an operation that will change horizontal clearance or vertical clearance. Clearance is initially estimated using plan sheet layouts. Verify the planned clearance with field measurements.
- Measure the actual permanent clearance once it is in place. If there are changes from the one initially submitted, immediately submit a revised Form TR-0019, TR-0020, or TR-0029 to the structure oversight engineer.

2.6 Permanent Reference Elevations

Upon completion of the project, the structure representative ensures that permanent reference points used to determine future settlement and deflection of the bridge are installed on top of all new bridge rails.

References

- *Bridge Construction Records and Procedures: Volume 1, BCM 2-15, “Permanent Reference Elevations”*

Typical Duties

- Request copper nails from the structure oversight engineer.
- Install permanent reference points (copper nails) in all new concrete bridge rails.
- Install permanent reference points on metal bridge rails by marking tops of vertical anchor bolts with a chiseled or sawed “X.”
- Determine elevations of permanent reference points to the nearest 0.005 feet.
- Show the location and elevation of all permanent reference points on as-built drawings.

2.7 As-Built

The structure representative prepares structure as-built plans and submits them to the structure oversight engineer, who will forward to the Office of Structures Construction headquarters.

Before submitting the as-built plans, the structure representative must coordinate with the resident engineer, district oversight engineer, local agency, and district permits engineer to make sure all are aware that the structure as-built plans will be submitted directly to the structure oversight engineer. This coordination is important because the encroachment permit makes the local agency responsible for submitting as-built plans to the Caltrans district permits engineer.

References

- *Construction Manual*: Section 5-104, “Final Construction Project Records”
- *Bridge Construction Records and Procedures*: Volume 1, BCM 9-1.0, “As-Built Plans”
- *Encroachment Permits*: Section 206.2A, “As-Built Plans and Other Completion Records”
- *Office of Special Funded Projects Information and Procedures Guide*: Section 5-5, “Structure As-Built Plans”
- Cooperative Agreement

Typical Duties

- Maintain a set of as-built plans as construction progresses that show all the changes to date.
- When the structure portion of the project is complete, verify all the changes are included on the as-built structure plans (redline markups).
- Stamp as-built plans “As-Built” in accordance with *Encroachment Permits* and *Bridge Construction Records and Procedures*.
- Review the redline as-built markups with the structure oversight engineer. If the structure representative will be replaced or leave before construction is complete, the outgoing structure representative must ensure the as-built changes are up-to-date, use the “As-Built” stamp, sign the revisions, and review the changes with the structure oversight engineer before departure.
- Inform all pertinent representatives that the structure as-built plans will be submitted directly to the structure oversight engineer, and, if necessary, make copies to meet their needs.
- Submit the final structure as-built plans to the structure oversight engineer within 30 days after the completion of the structures work.

2.8 Material Certification

The structure representative certifies that all material incorporated into the completed structure work is in compliance with the contract.

References

- *Construction Manual*: Section 6-108, “Project Certification”

- *Local Assistance Procedures Manual*: Chapter 16, “Administer Construction Contracts”
- *Bridge Construction Records and Procedures*: Volume 1, BCM 9-2.0, “Certification of Materials”

Typical Duties

Prepare and submit a letter to the resident engineer certifying that all material incorporated into the structure complies with the contract. A certification statement and structure representative signature are required to validate this letter.

2.9 Final Records and Reports

Upon completion of the contract, the structure representative submits complete final project records, reports, tests, and other documentation to the structure oversight engineer, resident engineer, or district oversight engineer. If structure as-builts were not yet submitted to the structure oversight engineer, they must be submitted at this time.

References

- *Construction Manual*: Chapter 5-1, “Project Records and Reports”
- *Bridge Construction Records and Procedures*: Volume 1, BCM 2-19.0, “Administration of Special Funded Projects”; BCM 3-7.0, “Pile Records”; BCM 6-2.1, “Structures Construction Project Initiation and Completion”; Section 9, “Final Records and Reports”; Volume 2, BCM 130-13.0 “CIDH Pile Information Submittal”
- *Local Assistance Procedures Manual*: Chapter 17, “Project Completion”
- *Encroachment Permits*: Section 206.2A, “As-Built Plans and Other Completion Records”

Typical Duties

- As work progresses, prepare reports of completion for each structure as described in *Bridge Construction Records and Procedures*, and submit them to the structure oversight engineer.
- Submit joint movements calculation forms for each structure to the structure oversight engineer.
- Review the structure as-built redlined plans for completeness with the structure oversight engineer.
- Submit the completed structure as-built plans to the structure oversight engineer.
- Upon completion of pile driving for each structure, submit a copy of the pile layout sheet, log pile sheet, and pile quantity and driving record sheet to the structure oversight engineer.
- Upon completion of all cast-in-drilled-hole (CIDH) piles (wet method), submit the form, “CIDH Pile Information,” to the structure oversight engineer.

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- Submit documentation of painting work, paint tests, and painting records for each structure to the structure oversight engineer.
- Prepare and certify the materials certification, and submit it to the resident engineer.
- Submit the “Project Status Initial” and “Project Status Final” forms at the beginning and completion, respectively, of the structures work.

Section 3

General Structure Construction Work

3.1 Bridge Deck Contours

The structure representative uses bridge deck contours provided by the designer to establish grades for the various bridge elements including abutments, columns, soffits, and decks.

When no bridge deck contours are available through the designer (usually the case for widenings) the structure representatives must develop the bridge deck contours in the field.

References

- *Bridge Construction Records and Procedures: Volume 1, BCM 2-4.0, “Bridge Deck Contours and Geometrics”*
- *Bridge Deck Construction Manual*
- *Bridge Construction Survey Manual*

Typical Duties

- Obtain deck contours from the designer (4-scales for English unit projects and 50-scales for metric unit projects).
- Ensure that the deck contour sheets provided are true scale reproductions and verify the accuracy of the contours.
- Survey existing facilities, and calculate and plot the deck contours when the designer does not provide deck contours.
- Verify the location and dimensions of abutment and bent centerlines and the edge of decks on deck-contour plans provided by the designer.
- Provide a copy of the bridge deck contours to the contractor when the duties above are completed.
- Plot the limits or outline of girders, footings, columns, abutments, utilities, and other structural sections or items of work on the 4-scales/50-scales for use in determining grades.

3.2 Working Drawings

The structure representative ensures that the contractor submits all working drawings required by the contract.

Contracts require that the contractor send certain working drawings directly to the structure representative for review and approval at the field level. Examples of these drawings are as follows:

- Trenching and shoring

- Demolition plans
- Pile driving
- Column support systems
- Falsework

Contracts require the contractor to submit other types of working drawings directly to the Caltrans Office of Structure Design–Documents Unit, which coordinates the reviews and approvals. The working drawings are for the following:

- Earth-retaining structures
- Prestressing
- Precast girders
- Joint-seal assemblies
- Building equipment
- Pump-plant equipment
- Structural steel
- Bearing assemblies

When contract specifications stipulate, the structure representative must ensure that the contractor submits working drawings directly to the Office of Structure Design–Documents Unit. The Documents Unit will perform the following duties:

- Receive the drawings from the contractor.
- Distribute the drawings to all representatives who must perform a review, including various Caltrans functional units and specialists, the structure representative, and the engineer of record.
- Gather comments from the reviewers, and return them to the contractor.
- Coordinate re-submittals and re-reviews similarly.
- Distribute final, approved sets to the appropriate representatives.
- Ensure that the contractor submits the final bond working drawings before contract close-out.

References

- *Office of Special Funded Projects Information and Procedures Guide*: Section 5-4, “Working Drawings and Submittals”
- *Standard Specifications*: Section 5-1.23B(2), “Shop Drawings”; Section 46-1.01C(2), “Shop Drawings” (Ground Anchors and Soil Nails); Section 48-2.01C(2), “Shop Drawings” (Falsework); Section 49-2.02A(3)(d), “Shop Drawings” (steel pipe piles); Section 49-2.04,

“Precast Prestressed Concrete Piling”; Section 50-1.01C(3), “Shop Drawings” (prestress); Section 51-2.02D(1)(c)(ii), “Shop Drawings” (joint seal); Section 52-1.01C(3), “Shop Drawings” (reinforcement); Section 55-1.01C(2) “Shop Drawings” (steel structures)

Typical Duties

- When required by the contract documents, ensure that the contractor submits working drawings directly to the Office of Structure Design–Documents Unit.
- Review and comment on the submitted working drawings whether they are received directly from the contractor or from the Documents Unit. Return review comments to the contractor or Documents Unit, respectively. Ensure that final copies are sent to the Documents Unit before release of final retentions.
- Coordinate the review of working drawings with the structure oversight engineer.

3.3 Trenching and Shoring

The structure representative ensures that the contractor complies with the contract specifications and Cal OSHA requirements for excavations that are within the state right-of-way or that may affect state facilities. Requirements that must be met include those for public safety, worker safety, and protection of existing facilities.

References

- *Construction Manual*: Section 4-19, “Earthwork”
- *Cal OSHA Construction Safety Orders*
- *Bridge Construction Records and Procedures*: Volume 1, BCM- 3-6.0, “Shop Drawing Review of Temporary Structures”; BCM- 3-9.0, “Chronological Record of Falsework or Shoring Drawing Review”; Volume 2, Section 122.0, “Shoring”
- *Trenching and Shoring Manual*
- *Standard Specifications*: Section 5-1.23B(2), “Shop Drawings”; Section 7-1.02K(6), “Occupational Safety and Health Standards”

Typical Duties

- Ensure that the contractor submits a trench-excavation safety plan for any excavation five or more feet deep or when shallower excavations warrant a trench-excavation safety plan.
- Verify that submitted shoring plans are at least as effective as the details specified in the *Cal OSHA Construction Safety Orders*.
- Require that shoring plans deviating from the details specified in the *Cal OSHA Construction Safety Orders* are supported with stamped design calculations and are engineered, sealed, and signed by a licensed civil engineer registered in the State of California.

- Perform an independent engineering review of the submitted shoring plans. The structure representative or other registered engineer who performs the review must stamp the independent review calculations.
- Verify that the actual field conditions match those depicted in the submittal.
- Submit the shoring plans, contractor's calculations, and the structure representative's independent check calculations to the structure oversight engineer for concurrence. For shoring subject to review by a railroad, the structure oversight engineer will forward these items through the Caltrans headquarters office to the railroad.
- Provide final shoring approval to the contractor only after obtaining concurrence from the structure oversight engineer.
- Allow the contractor to begin the excavation only after the shoring plans are approved.
- Ensure that the contractor identifies in writing (per Cal OSHA) a competent person who will monitor the excavation work.
- Determine if the excavation will be considered a confined space, and ensure that proper ingress and egress are provided.
- Verify that the shoring system is constructed in accordance with the approved plans.
- Review and approve shoring revisions. Do not allow the contractor to incorporate revisions into the work until they are approved.

3.4 Overloads

The structure representative ensures that the contractor does not allow materials and equipment exceeding the weight limitations set forth in the contract to be on the structure or to be stockpiled. Examples of construction equipment typically placed on structures and subject to the limitations include loaded concrete trucks, earth-moving equipment, cranes for bridge construction activities, and excavators for bridge demolition.

References

- *Bridge Construction Records and Procedures*: Volume 2, Section 150, "Overloads"
- *Standard Specifications*: Section 5-1.37B, "Load Limits"

Typical Duties

- Advise the contractor to keep off bridge decks all overload equipment that does not comply with the requirements of *Standard Specifications* unless the structure representative approves and the structure oversight engineer concurs.
- Obtain approval from the structure oversight engineer and the Office of Structure Maintenance and Investigations when the contractor requests permission to allow overloads within the project limits on structures.

3.5 Surveying

The structure representative ensures that construction staking for bridge elements is sufficient to control the line and grade of each structure element and the finished structure. The *Caltrans Staking Information* booklet details typical minimum staking requirements to control the line and grade of many structural elements.

References

- *Construction Manual*: Section 3-512, “Construction Surveys”
- *Bridge Construction Records and Procedures*: Volume 2, Section 175, “Surveying”
- *Caltrans Staking Information*
- *Bridge Construction Survey Manual*
- *Standard Specifications*: Section 5-1.26, “Construction Surveys”

Typical Duties

- Ensure that construction staking is adequate to control the line and grade of the structure elements of the project, regardless of whether the contract makes the contractor or the local agency responsible for the staking.
- Verify lines and grades for such structure elements as piles, footings, abutments, columns, soffit grades, and bridge deck grades.
- Verify that slope stake notes, cut sheets, reference points, and instructions to the contractor are clear and accurate. If the contract does not include staking, determine the lines and grades for the structure elements using local agency or consultant resources.
- Maintain the records of all surveys performed by the inspection staff.
- Coordinate and direct independent quality-assurance surveys.

3.6 Sampling and Material Testing

The structure representative ensures that materials to be incorporated in structures comply with contract requirements. The structure representative ensures that quality control plans are developed and implemented. The structure representative coordinates material source inspections with the structure oversight engineer, METS, and the local agency material testing labs to ensure the materials pass the types and frequency of tests required.

References

- *Construction Manual*: Section 3-6, “Control of Materials”; Chapter 6, “Sampling and Testing”
- *Bridge Construction Records and Procedures*: Volume 1, Section 4, “Control of Materials”

Local Agency Structure Representative Guidelines

- *Local Assistance Procedures Manual*: Chapter 16, “Administer Construction Contract”
- *Standard Specifications*: Section 6, “Control of Materials,” and other sections that deal with specific items of work.
- Cooperative Agreement

Typical Duties

- Consult the cooperative agreement to determine responsibilities for material testing and source inspections.
- Use the contract testing requirements, contractor's schedule, and quantities in the engineer's estimate to plan materials-testing frequencies, timing, and resources.
- Ensure that the contractor has designated a quality-control manager and fully implements requirements of the quality control plans.
- Verify that all material testers are certified and laboratories are certified or accredited by Caltrans for the tests that will be performed. Verify certifications and accreditations before the start of the project, and ensure that they remain current throughout the project.
- Maintain records of material testers certifications in the project files.
- Ensure compliance with “Buy America” contract requirements.
- Coordinate material source inspections with the district oversight engineer, structure oversight engineer, METS, the local agency material testers, and the local agency's materials testing lab.
- Ensure that the local agency's material testers perform asphalt concrete and concrete plant inspections.
- Perform material tests with the frequencies specified in the *Standard Specifications*, contract special provisions, and the *Construction Manual*.
- Ensure that independent assurance tests are performed as required by the *Local Assistance Procedures Manual* and the *Construction Manual*.
- Ensure that all required quality-control tests are performed and that the contractor submits resulting reports.
- Review quality-assurance reports for compliance. Take corrective action for unsatisfactory product quality. Ensure that all materials are approved before incorporating them into the work.
- Require the contractor to submit certificates of compliance for certain materials where acceptance by certificate is appropriate. Review certificates of compliance for applicability, completeness, and acceptability.

- Collect inspection-release tags in the field for material tested at the source. File the release tags in the project files along with the inspection reports provided by the testing lab.
- Cross-check the materials-test-summary sheets against the quantities of material inspected and delivered.
- For field-accepted materials, perform the required inspections and tests, document the findings, and complete and file in the project records Caltrans Form CEM-4102, “Material Inspected and Released on the Job,” available on the Caltrans intranet:
<http://cefs.dot.ca.gov/jsp/forms.jsp>
- Make the final determination of acceptability for all material incorporated into the project, regardless of whether it was previously inspected at the source.
- Maintain project records of all material tests performed. Records must indicate the result of each test (pass, fail, and reworked pass), along with the remedial actions taken to resolve failing tests.

3.7 Concrete Materials and Testing

The structure representative ensures that concrete conforms to contract requirements.

References

- *Construction Manual*: Chapter 6, “Sampling and Testing”
- *Bridge Construction Records and Procedures*: Volume 1, BCM 4-9.0, “Prequalification of Specified Strength Concrete”; Section 16-0, “Bridge Construction Forms”; Volume 2, Section 100, “Concrete Materials and Mixing”
- *Standard Specifications*: Section 6, “Control of Materials”; Section 90, “Concrete”

Typical Duties

- Review and approve concrete mix designs for structures. Use Caltrans Forms DS-OS C70A, “Concrete Mix Design–Aggregate Gradation,” and DS-OS C70B, “Concrete Mix Design–Mix Design Calculations,” from *Bridge Construction Records and Procedures* to perform the reviews.
- Verify that the concrete admixtures the contractor proposes are of the type allowed by the *Standard Specifications* and are on Caltrans’ list of approved admixtures. Ensure the doses comply with contract requirements or manufacturer’s recommendations.
- Verify that cementitious material content is as specified in the contract documents.
- Ensure that the proper ASTM designations of cement and type of cement are being used.
- Verify that concrete batch plants are certified by Caltrans using California Test 109 Certification, “Method of Testing of Material Production Plants.”

- Verify that all material testers are certified and that Caltrans has accredited the laboratories for the appropriate California test methods.
- Verify that plant scales, meters, hoppers, and batching devices are certified at the time the material is produced.
- Verify the trial batch and certified test data for concrete designated by compressive strength.
- Ensure that for material not required to be tested before use, such as cement, the necessary certificates of compliance are submitted, reviewed, and filed for every concrete pour.
- Perform concrete materials tests at the frequencies required.

3.8 Bar Reinforcing Steel

The structure representative ensures that all bar-reinforcing steel is tested, accepted, and placed in accordance with the contract.

References

- *Construction Manual*: Section 4-52, “Reinforcement”
- *Bridge Construction Records and Procedures*: Volume 2, Section 165, “Reinforcing Steel”
- *Standard Specifications*: Section 52, “Reinforcement”

Typical Duties

- Ensure compliance with “Buy America” contract requirements.
- Review and approve all guying systems for conditions that require such a plan. Unsupported reinforcement assemblages over 20 feet high require working drawings for the guying system to be used.
- Ensure that splices the contractor intends to use are appropriate and approved for the location and splice type.
- Review the mechanical splices the contractor proposes to ensure they are a Caltrans-approved splice system. Ensure that the contractor performs prequalification and production testing. Ensure the contractor’s quality control manager reviews, approves, and submits the required testing reports to the structure representative for review and approval before proceeding with the work.
- Review and approve welding quality control plans for welded splices.
- Require that the contractor submit certificates of compliance for all bar-reinforcing steel delivered to the project.
- Cross-check and verify that the quantities of steel planned, delivered, and incorporated match the certificates of compliance provided by the contractor.

- Ensure that bar-reinforcing steel placement is in accordance with contract plans and specifications, and ensure that the steel is the correct grade and ASTM designation.
- Sample and test bar reinforcing steel, epoxy coatings, mechanical couplers, and welded splices for contract compliance.
- Perform the required quality-assurance testing. Compare quality-assurance test results with the contractor's quality-control test results. Reconcile variant test results with the contractor, and require the contractor to take corrective action.

3.9 Welding

The structure representative ensures that welding on permanent elements of work conforms to contract requirements. Welding on permanent elements of the work typically requires a welding quality-control plan for both shop and field welding. The structure representative must coordinate with the structure oversight engineer for the review of the welding quality-control plan. METS will assist in the review of the welding quality-control plan and approval.

References

- *Bridge Construction Records and Procedures*: Volume 2, Section 180, "Welding"
- *Standard Specifications*: Section 49-2.02, "Steel Pipe Piling" (piles); Section 52-6, "Splicing" (rebar); Section 55, "Steel Structures"
- Cooperative Agreement

Typical Duties

- Before the start of welding operations, require an approved welding quality-control plan for all welding on permanent structure elements such as bar reinforcing, column casings, steel piles, sign structures, and structural steel.
- Coordinate with METS, through the structure oversight engineer, for review and approval of welding quality control plan submittals and pre-weld meetings.
- Coordinate with the structure oversight engineer for METS personnel to provide quality-assurance inspections of the welding. Depending on the terms of the cooperative agreement and with METS approval, a certified, independent, material-testing lab may perform quality-assurance inspections.
- Review welding reports submitted by the contractor's quality-control manager. Notify the contractor immediately of any deficiencies found. Evaluate the contractor's proposal to correct deficiencies, and obtain concurrence from the structure oversight engineer before initiation of corrective work.

3.10 Structural Steel

The structure representative ensures that construction of structural steel conforms to contract requirements.

References

- *Construction Manual*: Section 4-55, “Structural Steel”
- *Bridge Construction Records and Procedures*: Volume 2, Section 170, “Structural Steel”
- *Standard Specifications*: Section 55, “Steel Structures”

Typical Duties

- Ensure that the contractor submits structural steel working drawings directly to the Office of Structure Design–Documents Unit, as required in *Standard Specifications*.
- Review the structural steel working drawings received from the Documents Unit. Coordinate the review comments with the structure oversight engineer. Return comments to the Documents Unit.
- Ensure compliance with “Buy America” contract requirements.
- Ensure that the contractor submits a welding quality-control plan for all welding to be completed on structural steel members.
- Verify that the structural steel and structural steel fasteners have been inspected and released by METS or the local agency’s certified material testing laboratory.
- Verify that high-strength bolts are properly tested, installed, and tensioned.

3.11 Painting

The structure representative ensures that surface preparation, paint material, paint systems, and the paint are applied in compliance with the contract.

References

- *Construction Manual*: Section 4-59, “Painting”
- *Bridge Construction Records and Procedures*: Volume 1, Section 14, “Accidents and Safety”; Section 16, “Bridge Construction Forms”; Volume 2, Section 155, “Paint”
- *Standard Specifications*: Section 59, “Painting”

Typical Duties

- Verify that paint materials have been tested and released by METS or the local agency’s certified testing laboratory.
- Ensure that surfaces to be painted are properly prepared.

- Verify whether structures to be cleaned and painted require the removal of lead-based paint.
- If lead-based paint is present, ensure that the contractor prepares and submits a lead-compliance plan. The plan must include precautions to prevent exposure to the public, inspectors, and the contractor personnel. It must also include provisions for training employees and for blood-lead-level testing of those exposed to lead-contaminated materials. Review and approve the lead-paint-removal plan prior removal operations.
- Verify that the required weather and working conditions are appropriate for painting and drying.
- Verify that each coat of primer and paint is the proper thickness.
- Maintain daily paint records for work that requires cleaning and painting as provided in *Bridge Construction Records and Procedures*.

Section 4

Specific Structure Construction Work

4.1 Bridge Demolition

The structure representative ensures that the contractor performs bridge removal or demolition in accordance with an approved demolition plan and other contract requirements.

References

- *Construction Manual*: Section 4-15, Existing Facilities
- *Bridge Construction Records and Procedures*: Volume 2, Section 124, “Demolition”
- *Cal OSHA Construction Safety Orders*
- *Standard Specifications*: Section 15-4, “Bridge Removal”

Typical Duties

- Require that the contractor submit bridge-removal or bridge-demolition plans that are engineered, sealed, and signed by a civil engineer licensed by the State of California.
- Review and approve the demolition plan for compliance with contract specifications. The responsible design unit can assist with submittals having complex structural analysis. Independent check calculations must be stamped and signed.
- Verify that any asbestos or lead present on the existing bridge (for example, conduits, bridge-railing-post shims, and bearing-hinge assemblies) receives the required special handling and removal.
- Submit the contractor’s demolition plan, calculations, and the structure representative’s independent check calculations to the structure oversight engineer for review and concurrence. The structure oversight engineer will forward these items through Office of Structures Construction headquarters to the railroad if review by the railroad is required.
- Obtain concurrence from the structure oversight engineer before final acceptance of the contractor’s demolition plan and the beginning of any demolition or removal work.
- Require that the contractor attend a bridge-removal meeting before bridge removal and demolition operations. Invite the structure oversight engineer to this meeting.
- Verify that the contractor has obtained all necessary permits, including those from Cal OSHA, the air quality district, and the water quality district.
- Ensure that the contractor complies with the approved Water Pollution Control Plan or Stormwater Pollution Prevention Plan.
- Monitor the contractors operations to ensure that demolition or bridge removal is conducted in accordance to the approved demolition plan.

4.2 Embankment Settlement Periods

The structure representative ensures that embankment surcharge loads are built and that settlement periods are adequate and conform to contract requirements.

References

- *Construction Manual*: Section 4-19, “Earthwork”
- *Bridge Construction Records and Procedures*: Volume 2, BCM 130-16, “Settlement Platforms”
- *Standard Specifications*: Section 19-6.03D, “Settlement Periods and Surcharges”

Typical Duties

- Ensure that embankments and surcharge loads are constructed to the specified lines and grades before the settlement period begins.
- Coordinate with the project designer, geotechnical engineer, contractor, and structure oversight engineer to determine the placement and installation of settlement platforms.
- Establish a survey-control system to monitor embankment settlement.
- Coordinate with the project designer, geotechnical engineer, and structure oversight engineer to determine when the settlement period is complete.
- Until the embankment settlement period is complete, do not allow the contractor to perform pile driving and other activities that could be adversely affected by embankment settlement.

4.3 Piles and Pile Records

The structure representative ensures that all driven and CIDH piles are constructed in accordance with contract requirements.

References

- *Construction Manual*: Section 4-49, “Piling”
- *Bridge Construction Records and Procedures*: Volume 1, BCM 3-7.0, “Pile Records”; Volume 2, Section 130, “Foundations”
- *Foundation Manual*: Chapter 5, “Pile Foundations—General”; Chapter 6, “Cast-in-Place Piles”; Chapter 7, “Driven Piles”; Chapter 8, “Static Load Testing & Dynamic Pile Monitoring”; Chapter 9, “Slurry Displacement Piles”; Chapter 10, “Pier Columns”
- *Standard Specifications*: Section 49, “Piling”

Typical Duties

General

Ensure compliance with “Buy America” contract requirements.

- Verify pile layout before pre-drilling for driven piles, driving piles, or drilling for CIDH piles.
- Plan, prepare, and record a numbering system for piles in each footing using Form DH-0S C80, “Pile Layout Sheet” from *Bridge Construction Records and Procedures*.
- Verify that the pile cutoffs proposed by the contractor are permissible and performed in accordance with *Bridge Construction Records and Procedures*.
- Obtain concurrence from the structure oversight engineer and the designer for such potential changes to piling as layout, pre-drill depth, pile length, pile diameter, reinforcement, and pile tip and top elevations.

Driven Piles

- Sufficiently in advance to avoid delays to pile-driving operations, coordinate with the contractor, METS, local agency testing personnel, and the structure oversight engineer to ensure that pilings are source-inspected, released, and tagged in a timely manner.
- Request pile-hammer specifications and performance data from the contractor. Ensure that pile-hammer capacity and operation do not exceed the pile material-strength capacity.
- Calculate the blow count that will be required when pile is at capacity.
- For contracts that involve dynamic monitoring of piles where the contractor must submit a pile-driving-system submittal:
 - Review the submittal, and obtain the structure oversight engineer’s concurrence.
 - Coordinate with the structure oversight engineer to obtain a review of the submittal by the Foundation Testing Branch of the Division of Engineering Service–Geotechnical Services.
- To ensure the piles are the correct ones, verify that delivered piles were inspected and released, and compare the inspection release report to the physical pile characteristics delivered.
- Verify that the curing method and duration for concrete piles was appropriate and that the duration is complete before driving.
- Perform the inspection, field release, and documentation of piling that does not require source inspection.
- Coordinate the review and approval of the welding quality-control plan required for the welding of steel piling with the structure oversight engineer and METS.
- Review and approve a pile-handling plan submitted by the contractor before the pile-driving operation.

- Continuously monitor pile-driving activities, and verify that the required pile tip and blow count are achieved. Log and make a record of each pile using Forms DH-OS C79, “Log Pile Sheet,” and DC-SC78, “Pile Quantity and Driving Record (Driven Piles)” from *Bridge Construction Records and Procedures*.
- When pile driving is complete, submit a copy of all pile driving records to the structure oversight engineer.

CIDH Piles

- Use Form DC-SC78A, “Pile Quantity and Driving Record (CIDH Piles),” to document the construction of each pile.
- Ensure that depth, diameter, and quality of drilled holes conform to the contract requirements before placing concrete.
- Coordinate acceptance testing of the piling with the structure oversight engineer, Caltrans Foundation Testing personnel, and local agency testing personnel. Note that acceptance testing by Caltrans Foundation Testing personnel is a reimbursable Caltrans cost that will be charged back to the local agency.
- For piles constructed under the slurry-displacement method:
 - Ensure that the contractor submits a placing plan and mitigation plan in accordance with the specifications.
 - Review the plans, and obtain the structure oversight engineer’s concurrence before approving.
- Ensure that the contractor conducts operations in accordance with the plans.

4.4 Footings

The structure representative determines the suitability of foundation material at the planned bottom elevation of spread footings and under certain conditions determines thicknesses of seal courses.

References

- *Bridge Construction Records and Procedures*: Volume 1, BCM 2-9.0, “Footings and Seal Course Revisions”; Volume 2, Section 130, “Foundations”
- *Foundation Manual*: Chapter 4, “Footing Foundations”; Chapter 12, “Cofferdams and Seal Courses”
- *Standard Specifications*: Section 7-1.04, “Public Safety”; Section 19-3.03D, “Water Control and Foundation Treatment”; Section 51-1.03C, “Preparation”; Section 51-1.03D(3), “Concrete Placed Under Water”

Typical Duties

- Inspect and determine the suitability of the footing foundation material at the planned bottom of footing elevation. If foundation material is unsuitable, disturbed, contaminated, or of a questionable nature:
 - Determine the extent of the condition.
 - Discuss the condition with the structure oversight engineer, design engineer, and geotechnical engineer. Use their recommendations to make the final determination of corrective action required.
 - Require the contractor to take corrective action.
- If a seal course is shown on the plans and no thickness is shown, determine the thickness required based on water conditions. Where seal courses are not shown on the plans and the contractor uses one for its own benefit, the contractor is responsible for determining the thickness and the performance of the seal course.
- Make the final determination relative to the bottom of the footing elevations.
- Obtain approval from the structure oversight engineer for proposed changes to footing elevations and seal-course depths before proceeding with the work.
- Notify the contractor in writing of potential changes to footing elevations and seal-course thicknesses, as discussed in *Bridge Construction Records and Procedures*.

4.5 Abutments

The structure representative ensures that abutments are constructed in accordance to contract requirements.

References

- *Bridge Construction Records and Procedures*: Volume 2, Section 105, “Concrete - Place, Finish and Protect”; Section 165, “Reinforcing Steel”
- *Outline of Field Construction Practices*
- *Standard Specifications*: Section 51, “Concrete Structures”; Section 52, “Reinforcement”

Typical Duties

- Verify that abutments and wing walls are accurately established and constructed to the required lines and grades.
- Verify that bearing pads, electrical conduits, weep holes, and drainage systems are installed as required.
- Verify the location and dimensions of internal and external shear keys and block-outs for pre-stress systems.

- Ensure that a Class 1 surface finish is obtained per the contract.

4.6 Columns

The structure representative ensures that columns are constructed to the lines and grades shown on the contract plans and in accordance with contract requirements.

References

- *Bridge Construction Records and Procedures*: Volume 1, BCM- 3-6.0, “Shop Drawing Review for Temporary Structures”; Volume 2, Section 105, “Concrete - Place, Finish and Protect”; BCM 120-4.0, “Reviewing and Submitting Temporary Support (Guying Plans) & Working Drawings”; Section 165, “Reinforcing Steel”
- *Outline of Field Construction Practices*
- *Standard Specifications*: Section 5-1.23B(2), “Shop Drawings”; Section 51, “Concrete Structures”; Section 52, “Reinforcement”

Typical Duties

- Require the contractor to submit guying plans for column rebar cages and column forms.
- Perform an independent engineering review of and approve the contractor’s guying plans before erecting column cages or column forms.
- Verify that the column guying system is installed in accordance with the approved plan.
- Ensure that the contractor provides safe access to work areas by means of adequate ladders, platforms, and walkways for elevated work areas.
- Verify the elevations of the tops of columns and column flares prior to placing column concrete.
- Ensure proper placement of drain piping and electrical conduits before placing column concrete.
- Ensure that a Class 1 surface finish is obtained as per the contract.

4.7 Falsework

The structure representative ensures that the contractor complies with the contract specifications and Caltrans policies and practices for falsework design, materials, erection, and removal. The structure representative must keep the structure oversight engineer informed of the status and about any issues relative to falsework from the working drawing stage through falsework removal.

References

- *Construction Manual*: Section 3-7, “Legal Relations and Responsibility to the Public”

Local Agency Structure Representative Guidelines

- *Bridge Construction Records and Procedures*: Volume 1, BCM 2-20.0, “Notice of Change in Structure Clearance or Permit Rating”; BCM 3-6.0, “Shop Drawing Review of Temporary Structures”; BCM 3-9.0, “Chronological Record of Falsework or Shoring Drawing Review”; Volume 2, Section 120, “Falsework”
- *Falsework Manual*
- *Standard Specifications*: Section 7-1.04, “Public Safety”; Section 48-2, “Falsework”; Section 86-6.13, “Falsework Lighting”

Typical Duties

- Perform an independent check of the contractor’s falsework design submittal. The check must include independent engineering verification and calculation of falsework loads and stresses in the falsework members.
- For submittals subject to railroad company review and approval, check to ensure compliance with the railroad company’s requirements.
- The California licensed engineer who performs the independent check must seal and sign the independent check calculations.
- Submit the contractor’s falsework submittal and independent check calculations to the structure oversight engineer for concurrence before approving the drawings. For instances that involve a railroad, the structure oversight engineer will forward the plans and calculations through Caltrans headquarters office for submittal to the railroad company for approval.
- Upon determination that the contractor's falsework design submittal is safe, adequate, and compliant with all requirements; and, if the structure oversight engineer concurs, stamp the contractor's working drawings as approved.
- Provide a complete set of the approved falsework working drawings, the contractor’s calculations, and the structure representative’s independent-check calculations to the structure oversight engineer (to be forwarded to Caltrans headquarters).
- Require the contractor to submit revised falsework plans, sketches, and calculations for falsework revisions. Perform an independent check on the revisions and follow the same procedures used for the original submittal.
- Submit either Form TR-0019, “Notice of Change in Clearance or Bridge Weight Rating” (for divided highways); Form TR-0020, “Notice of Change in Vertical or Horizontal Clearance”; or Form TR-0029, “Notice of Change in Clearance or Bridge Weight Rating” (for undivided highways), to the structure oversight engineer for reduced horizontal and vertical clearance. These forms are available on the Caltrans internet:

<http://www.dot.ca.gov/hq/traffops/permits/>
- Submit the form not less than 20 days and not more than 90 days (or within the timeframe

provided in the contract specifications) before placement of k-rail to protect falsework bents or placement of falsework beams over active roadways.

- Clearances to be provided are the planned clearances based on the layout.
- Upon installation of the k-rail and falsework members, make field measurements to verify the previously submitted clearances.
- If there are any variances, immediately submit the revised Form TR-0019, TR-0020, or TR-0029.
- Inspect falsework materials and construction for conformance to the contract specifications and approved falsework drawings. Inspect in a timely manner so the contractor can easily correct deficiencies.
- Before placement of concrete, require the contractor to perform testing and to obtain a certification letter for all welded splices in falsework beams.
- Perform a field review of the falsework with the field inspector and contractor to jointly address deficiencies before requesting that the structure oversight engineer perform a field review of the falsework system.
- Request a field review of falsework by the structure oversight engineer. Resolve all issues, and correct all deficiencies identified.
- Before placement of concrete, confirm that the falsework designer or authorized representative has provided a letter to the contractor verifying inspection and approval of the falsework construction. The structure representative must request a copy of the falsework designer's approval letter, even if the requirements for the submission of the falsework certification letter are not addressed in the *Standard Specifications* and contract special provisions.
- Conduct a falsework removal meeting with the contractor before falsework removal. Invite the structure oversight engineer to this meeting.

4.8 Soffit and Girder Stems

The structure representative ensures that the soffit and girder stem forms, rebar, prestress materials, hinge details, and girder diaphragms are installed in accordance with the contract plans and specifications.

References

- *Bridge Construction Records and Procedures*: Volume 2, Section 105, "Concrete - Place, Finish and Protect"; Section 165, "Reinforcing Steel"; BCM 125-2.0, "Soffit Forms"
- *Outline of Field Construction Practices*
- *Standard Specifications*: Section 51, "Concrete Structures"; Section 52, "Reinforcement"

Typical Duties

- Verify that soffit forms are graded properly, and allow for falsework settlement, falsework deflection, bridge camber, vertical curves, cross slope, hinge curl, and parabolic configurations.
- Verify that forms are in good condition and uniform throughout the structure. Ensure that old and new plywood forms are not mixed on soffits and exposed surfaces of girders because of the different surface textures they create.
- Verify that the forms are mortar tight and have no gaps.
- Verify the location and dimensions of soffit and girder stem flares and any other variant sections.
- Verify proper placement of prestress ducts, anchor heads, duct ties (rebar ties), and other additional reinforcement.
- Verify placement of electrical conduits, soffit lights, utility saddles, soffit vents, duct vents, and any other features required.
- Ensure that a Class 1 surface finish is obtained per the contract.

4.9 Bridge Deck Construction

The structure representative ensures that the bridge deck is constructed to the lines and grades shown in the plans and that it conforms to all other contract requirements.

In the field, the structure representative develops bridge deck grades, determined from the bridge deck contours.

References

- *Bridge Deck Construction Manual*
- *Bridge Construction Records and Procedures: Volume 1, BCM 2-4, “Bridge Deck Contours and Geometrics”*; Volume 2, Section 105, “Concrete - Place, Finish and Protect”; Section 112, “Decks”; BCM 125-1.0, “Lost Deck Forms”
- *Standard Specifications: Section 51, “Concrete Structures”*; Section 51-1.0-3H, “Curing Concrete Structures”; Section 52, “Reinforcement”

Typical Duties

- Provide to the contractor deck-finish grades that are based on deck contours and that account for bridge camber, falsework deflections, falsework settlement, and other necessary allowances. Verify that deck finish grades will conform to adjacent roadway or structures.
- Verify that lost deck forms comply with the approved falsework plan.

- Verify proper rebar placement and clearances, paying special attention to the clearance distance and minimum concrete coverage requirements between the top of the rebar and the bridge deck surface.
- Verify that all necessary barrier dowels and other anchorages are installed.
- Require the contractor to demonstrate that the bridge-deck finishing machine and other finishing equipment will provide a deck that conforms to the required finish grades. To accomplish this, require the contractor to move the finishing equipment over the entire deck for each setup before placement of concrete.
- Verify that the Water Pollution Control Plan or the Stormwater Pollution Prevention Plan contains provisions for bridge-deck pouring, curing, and concrete washout, and ensure that the contractor complies with these plans.
- Ensure that the contractor cures bridge deck concrete as required. The curing method almost always requires both curing compound and water curing.
- Before prestressing and release of falsework, determine whether the bridge-deck surface-crack intensity exceeds the maximum allowed.
- Require the contractor to treat areas of bridge deck that exceed maximum surface-crack intensities with methacrylate resin.
- Provide a METS-approved profilograph, and perform profilograph tests (California Test 547) to verify that the deck has the required smoothness. The structure oversight engineer must concur with any corrective actions the contractor proposes to repair defective work.
- In the event of a failing profilograph test, ensure that the contractor grinds the bridge deck or performs other corrective work and achieves a passing test result before installing joint seals.
- Schedule a coefficient of friction test through the structure oversight engineer, and confirm a passing test result before opening the bridge to traffic.

4.10 Prestressing Concrete

The structure representative ensures that grouting and the installation of prestressed elements are in accordance with the contract requirements.

References

- *Construction Manual*: Section 4-50, “Prestressing Concrete”
- *Bridge Construction Records and Procedures*: Volume 2, Section 160, “Prestressing Concrete”
- *Prestress Manual*
- *Standard Specifications*: Section 50, “Prestressing Concrete”

Typical Duties

- Ensure that the contractor submits prestress working drawings directly to the Office of Structure Design–Documents Unit.
- Review the prestressing drawings received from the Documents Unit, coordinate the review with the structure oversight engineer and the designer of record, and return comments to the Documents Unit.
- Inspect prestress ducts delivered to the project, and provide a release if they are contract compliant.
- Use the inspection checklists in Appendix B and C of the *Prestress Manual* for the inspection of prestress elements.
- Inspect duct alignment for compliance with the approved working drawings, and verify that duct alignment is smooth and without kinks, binds, faults, or breaks.
- Verify the placement of duct ties and rebar required for anchorage zones.
- Before pouring stem concrete, ensure that ducts are mortar-tight.
- Verify that the prestress ducts are free of obstructions before the placement of deck forms.
- Verify that the prestress ducts are free of water and obstructions before the placement of the prestress steel.
- Inspect every roll of prestress strands as each package is opened to verify that strands are free of rust and oxidation.
- Verify that the installation of prestress anchor heads complies with the approved working drawings.
- Verify the contractor’s pressure-gage readings during stressing operations that use a pressure cell.
- To comply with Cal OSHA requirements, ensure that a safety meeting is held before the stressing operation.
- Calculate, measure, and record elongations of prestress strand during stressing operations. For this purpose, use the chart in the *Prestress Manual* (Figure 6, Page 30).
- Ensure that prestress ducts are grouted within ten days after prestress strands are placed in the ducts.
- Ensure that the contractor provides standby flushing equipment at the project site for the duration of the grouting operation.
- Test efflux time of the grout for prestress ducts in accordance with California Test 541 and the *Standard Specifications*.

- Ensure that certificates of compliance for the cement used in grout are provided and filed. Ensure that the proper ASTM designations of cement and cement type are used.
- Ensure that “Buy America” requirements are met.

4.11 Approach Slabs

The structure representative ensures that approach slabs are constructed in accordance with the contract requirements.

References

- *Bridge Construction Records and Procedures*: Volume 2, Section 105, “Concrete - Place, Finish and Protect”; Section 165, “Reinforcing Steel”
- *Standard Specifications*: Section 51, “Concrete Structures”; Section 52, “Reinforcement”

Typical Duties

- Verify the line and grade of approach slabs, and make adjustments as necessary to match field conditions.
- Verify that planned grades match existing adjacent structures and will provide a smooth ride.
- For approach-slab-replacement projects that have time limits for putting traffic on the approach slab, require the contractor to demonstrate that planned procedures will allow traffic on the approach slab within the allotted time.
- Verify that the contractor has developed a contingency plan in the event that approach slabs cannot be opened to traffic as planned and scheduled.
- Ensure that the contractor properly cures the approach slab.

4.12 Barriers

The structure representative ensures that barriers are constructed in accordance with the contract requirements.

References

- *Construction Manual*: Section 4-83, “Railings and Barriers”
- *Bridge Construction Records and Procedures*: Volume 2, Section 162, “Railings and Barriers”
- *Standard Specifications*: Section 83, “Railings and Barriers”

Typical Duties

- Profile the entire length of the rail section on ten-foot intervals near the edge of the deck. Plot and smooth out the profile on grid paper, include camber corrections, and provide to contractor.

- Sight down barrier form when set to ensure that the top and sides of the barrier will present a smooth profile when cast.
- Ensure that the contractor installs inserts at the barrier ends for metal beam guard rail connections. Check for locations of pull boxes, electrolier bolts, or other attachments.
- Place copper nails on top of rail after concrete is placed to check for long-term deflections.
- Ensure that the contractor removes all wires and tie rods one inch below the concrete surface, and patch area as necessary.
- Ensure that a Class 1 surface finish is obtained per the contract.

4.13 Joint Seals and Assemblies

The structure representative ensures that joint seals and joint-seal assemblies are of the required movement rating and installed according to contract requirements and manufacturer recommendations.

References

- *Bridge Construction Records and Procedures: Volume 2, BCM 135-2.0, “Bridge Deck Expansion Joints and Joint Seals”*
- *Standard Specifications: Section 51-2, “Joints”*

Typical Duties

- Where required by the specifications, ensure that the contractor submits working drawings directly to the Office of Structure Design–Documents Unit.
- Review the working drawings received from the Documents Unit, coordinate the review with the structure oversight engineer, and return comments to the Documents Unit.
- Determine the proper groove width for type-A joint seals and the installation width for type-B joint seals using Form DSD-D-0129, “Joint Movements Calculations,” available at:
<http://cefs.dot.ca.gov/jsp/forms.jsp>
- Verify that the correct installation width is used when joint seal assemblies are specified, using Form DSD-D-0129, “Joint Movements Calculations,” to calculate the proper width.
- Submit completed joint movements calculation forms with the final records and reports.
- Install movement-recording scribes on all expansion joints.

4.14 Earth-Retaining Structures

The structure representative ensures that earth-retaining structures are built in accordance with contract requirements and approved working drawings.

Earth-retaining structures include retaining walls of a more standard variety like those shown in the standard plans and those that are specially designed. Examples of these latter types of walls include:

- Soil nail walls
- Tieback walls
- Soldier pile walls
- Mechanically stabilized embankment walls

References

- *Bridge Construction Records and Procedures*: Volume 2, BCM 145-8.0, “Earth Retaining Structures”; BCM 145-9.0, “Review of Working Drawings for Proprietary Earth Retaining Systems”
- *Soil Nailing Field Inspectors Manual*, published by the U.S. Department of Transportation
- *Standard Specifications*: Section 19-3, “Structure Excavation and Backfill”; Section 46, “Ground Anchors and Soil Nails”; Section 51, “Concrete Structures”; Section 52, “Reinforcement”
- *Foundation Manual*: Appendix H, “Tiebacks, Tiedowns, and Soil Nails”

Typical Duties

- Ensure that the contractor submits working drawings as required. Contract specifications almost always require the contractor to submit working drawings for specially designed walls to the Office of Structure Design–Documents Unit.
- Review the working drawings, coordinating with the structure oversight engineer.
- Ensure that all retaining walls are constructed to the required lines and grades, and verify that the planned top of wall grades will match finished grades for adjacent roadways and structures.
- Verify the placement of weakened plane and construction joints.
- Verify that the location and grades for the weep holes will match the grades for the finished ground surface at the face of the wall.
- Ensure that tiebacks and soil nails are constructed and tested as required.
- Monitor the amount of grout pumped into holes. If excessive amounts of grout are used, attempt to determine where the leakage is occurring, since the leakage may be an indication that different installation procedures are necessary.
- Ensure that structure backfill is not placed against retaining walls until the concrete has achieved the required aging or compressive strength.

- Verify that drainage systems or drainage materials are placed as required.
- For the mechanically stabilized embankment walls, perform all material testing identified in the *Bridge Construction Records and Procedures* checklist.
- Ensure compliance with “Buy America” contract requirements.

4.15 Sound Walls

The structure representative ensures that sound walls constructed on barriers, piles, and spread-footing foundations are constructed to the specified lines and grades and in accordance with all other contract requirements.

References

- *Building Construction Manual*: Division 4, “Masonry”
- *Outline of Field Construction Practices*: Section 46, “Retaining Walls”
- *Standard Specifications*: Section 51, “Concrete Structures”; Section 52, “Reinforcement”; Section 58 “Sound Walls”

Typical Duties

- Ensure that the contractor verifies the location of all underground and overhead utilities before starting excavation for pile cap or drilling cast in drilled hole piles.
- Document the condition of private properties adjacent to the sound wall to prepare for potential damage claims by property owners.
- Ensure that private properties are secured with temporary fencing or other measures to prevent access to state or public right-of-way.
- Ensure that the contractor's working drawings are submitted in accordance with the contract.
- Review and approve the contractor's working drawings.
- Verify proper spacing, depth, diameter, and reinforcement of sound-wall piles.
- Ensure that all reinforcement to accept the masonry blocks is laid out in the proper modular pattern throughout the wall and at expansion joints and openings.
- Verify that pile caps are constructed to the lines, grades, and locations shown on the plans, ensuring that the tops of barriers, walls, pile caps, and footings are finished to accept the masonry block.
- Ensure that masonry block, grout, and other materials are tested and that they comply with the contract.
- Ensure that masonry block samples of colors and block surface textures are submitted and approved by the structure oversight engineer before construction begins.

- Ensure that expansion joints and sound-wall design heights are constructed as shown on the plans.

4.16 Overhead Signs

The structure representative ensures that overhead signs are constructed at the locations and elevations shown on the plans and in accordance with all other contract requirements.

References

- *Construction Manual*: Section 4-56, “Signs”
- *Overhead Sign Structures Manual*
- *Standard Specifications*: Section 56, “Signs”
- *Bridge Construction Records and Procedures*: Volume 2, Section 168-0, “Signs”

Typical Duties

- Review and approve shop plans for overhead sign structures.
- Coordinate the review of overhead sign shop drawings and plans with the structure oversight engineer.
- Require an approved welding quality-control plan before the start of work.
- Verify sign locations in the field, and confirm vertical clearance.
- Submit the appropriate form, either Form TR-0019, “Notice of Change in Clearance or Bridge Weight Rating” (for divided highways); Form TR-0020, “Notice of Change in Vertical or Horizontal Clearance”; or Form TR-0029, “Notice of Change in Clearance or Bridge Weight Rating” (for undivided highways), to the structure oversight engineer not less than 20 days and not more than 90 days (or within the time frame provided in the contract specifications) before the beginning of an operation that will change horizontal clearance or vertical clearance. Estimate the revised clearance using the planned layout. These forms are available on the Caltrans internet:
- <http://www.dot.ca.gov/hq/traffops/permits/>
- Upon installation of the element that changes the horizontal or vertical clearances, measure the actual clearance, and, if it is different than the one initially submitted, immediately submit to the structure oversight engineer a revised Form TR-0019, TR-0020, or TR-0029.”
- Inspect foundation installation for compliance with contract specifications.
- Verify proper anchor-bolt size, configuration, orientation, and installation.
- At the time of delivery, inspect sign structures for damage that may have occurred during shipping.

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- Verify that overhead sign materials have been inspected and released and that shop drawings and welding quality-control plans have been approved before use.
- Ensure that state-furnished sign panels are ordered early during the project to prevent delay and disruption to the completion of the project.
- Inform the contractor of any non-conformance to contract plans, specifications, and approved shop plans. Require that the contractor take corrective measures to bring the work into compliance.
- Ensure that work is performed in accordance with the details and procedures of the *Overhead Sign Structures Manual*.
- Ensure compliance with “Buy America” contract requirements.