JULY 2025

CHAPTER 1

LEGAL REQUIREMENTS

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Chapter 1: Legal Requirements

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1-1 Legal Requirements and Responsibilities

The State of California provides for the planning and design of permanent work to be prepared by the Department. During construction, the Contractor is responsible for the design, construction, and removal of temporary works needed to build the planned infrastructure. This chapter deals with the responsibilities of the Contractor and the Department as related to trench and excavation work performed in completing the contract work.

The *Contact Specifications (CS)*, Section 7-1.02*, Legal Relations and Responsibility to the Public – Laws*, requires the Contractor to adhere to all existing and future laws. The *CS*, Section 7-1.02K, *Legal Relations and Responsibility to the Public – Laws – Labor Code*, directs the Contractor to adhere to the California Labor Code, which is discussed in more detail below. Within here, subsection (6)(b), *Occupational Safety and Health Standards – Excavation Safety*, requires the protection of workers and public in trench and excavation operations as part of the California Labor Code, Section (§) 6705, while excavating on the project. For any excavation 5 feet or more in depth, the Contractor must submit shop drawings for a protective system.

The drawings must show the design and details for providing worker protection from caving ground during excavation. The review time allowed for the shop drawings will vary depending on the design of the protective system and additional time will be allowed if the shoring must also be reviewed by a railroad representative.

The Department has the responsibility for administering the contract. This means that interpretation of contract requirements, including acceptance of materials, is done by the Department, not by any other agency such as the Department of Industrial Relations, Division of Occupational Safety and Health (also known as Cal/OSHA). Although the work must be performed in compliance with the California Code of Regulations (CCR), Title 8, Industrial Relations, there may be situations or conditions where the regulations are not adequate or applicable; under these circumstances, the Engineer makes an interpretation and informs the Contractor accordingly of what is required. See *CS,* Section 5-1.03, *Control of Work – Engineer's Authority*.

The shop drawings for protective systems for excavations must comply with the following:

1. Special provisions
2. Project plans
3. Revised standard specifications, then standard specifications
4. Revised standard plans, then standard plans
5. Change orders

6. California Code of Regulations (CCR), Title 8
7. California Streets and Highways Code
8. California Labor Code
9. All existing and future state and federal laws and county and municipal ordinances and regulations of other governmental bodies or agencies, such as railroads, having jurisdiction within the project.

Please note that shop drawings for worker protection in excavations are often referred to simply as “excavation plans.”

1-2 Labor Code

The California Labor Code is the document of enacted law to which all employers and employees must conform.

Division 5, Safety in Employment, Part 1 – Occupational Safety and Health, Sections 6300 to 6725, pertain to the subject of trenching and shoring. Section 6300 establishes the California Occupational Safety and Health Act. This authorizes the enforcement of effective standards for safety at work sites. Section 6307 gives Cal/OSHA the power, jurisdiction, and supervision over every place of employment to enforce and administer the various safety orders found within the CCR, Title 8. Section 6706 pertains to the permit requirements for trench or excavation construction.

Every employer in California is required by law (Labor Code Section) to provide a safe and healthful workplace for their employees. Title 8 of the CCR requires every California employer to have an effective Injury and Illness Prevention Program in writing that must be in accord with CCR, Title 8, General Industry Safety Orders, § 3203, *Injury and Illness Prevention Program.* This requirement is also in the CCR, Title 8, Construction Safety Orders, § 1509, *Injury and Illness Prevention Program*. Effective safety programs rely not only on inspection for compliance with the Construction Safety Orders but also include education and training activities and taking positive actions regarding conduct of the work.

Under the Department of Transportation *Contract Specifications (CS)*, the Contractor is responsible for performing the work in accordance with the contract. This responsibility includes compliance with all state and federal laws, applicable county or municipal ordinances and regulations, and the California Occupational Safety and Health Regulations. These safety regulations are contained within the larger CCR, Title 8, Industrial Relations (CCR Title 8). This manual will refer to the CCR Title 8 when referencing general safety regulations, while other references to the more specific subset of Construction Safety Orders will be noted as such. Note that the California Code of Regulations (CCR), Title 8, Chapter 4, subchapter 4 contains the Construction

Safety Orders (hereafter referenced as Cal/OSHA CSO). The hierarchy of the CCR is outlined below to help the reader understand these external requirements:

California Code of Regulations (CCR)
- Title 1. General Provisions
- Title 8. Industrial Relations
  - Division 1. Department of Industrial Relations
    - Chapter 3.2. California Occupational Safety and Health Regulations (Cal/OSHA)
      - Subchapter 2. Regulations of the Division of Occupational Safety and Health (Sections 340 - 344.90)
    - Chapter 4. Division of Industrial Safety
      - Subchapter 4. Construction Safety Orders (Sections 1500 - 1962)
        - Article 6. *Excavations* (Sections 1539-1547)

1-3 Cal/OSHA

Cal/OSHA enforces the safety regulations within the CCR Title 8 in every place of employment by means of inspections and investigations. Citations are issued for violations, and penalties may be assessed. In the event of an "imminent hazard," entry to the area in violation is prohibited.

Cal/OSHA operates from several district offices dispersed geographically throughout the state, and can be found at this link, Cal/OSHA offices.

Cal/OSHA CSO establish minimum safety standards whenever employment exists in connection with the construction, alteration, painting, repairing, construction maintenance, renovation, removal, or wrecking of any fixed structure or its parts. They also apply to all excavations not covered by other safety orders for a specific industry or operation. At construction projects, the Cal/OSHA CSO take precedence over any other general orders that are inconsistent with them, except for Compressed Air Safety Orders or Tunnel Safety Orders, Subchapters 3 and 20 of Chapter 4 of Division 1 of Title 8.

Cal/OSHA CSO, § 1541, *General Requirements,* states that no work in or adjacent to an excavation will be performed until conditions have been examined and found to be safe by a competent person. Refer to Chapter 2, *Cal/OSHA Overview*, Section 2-1, *Introduction*, of this manual for information on the competent person. Also, all excavation work must have daily and other periodic inspections by the competent person.

Cal/OSHA § 341, *Permit Requirements,* Subsection (d)(5)(A) (from CCR Title 8, Chapter 3.2, Subchapter 2, Article 2), requires a permit prior to the start of any excavation work 5 feet or deeper into which a person is required to descend. The employer must hold either an Annual or a Project Permit. Note: For purposes of this subsection, "descend" means to enter any part of the trench or excavation once the excavation has attained a depth of 5 feet or more.

A Cal/OSHA permit is not an approval of any worker protection plan for excavations. The Contractor submits an application to Cal/OSHA to procure an excavation permit. This application will describe the work, its location, and when it is to be performed. Cal/OSHA may request the Contractor to furnish additional details for unusual work, perhaps even a set of plans. These plans are not necessarily the detailed plans that are submitted to the Engineer for review and authorization.

The objective of a Cal/OSHA permit is to put Cal/OSHA on notice that potentially hazardous work is scheduled at a specific location. Cal/OSHA may then arrange to inspect the work.

Cal/OSHA issues permits for various conditions. A single permit can cover work of a similar nature on different contracts. It can be for a specific type of work within a Cal/OSHA regional area. In this case, the permit will have a time limit and the user is obligated to inform the appropriate Cal/OSHA office of the schedule for work covered by the permit. A copy of the permit is to be posted at the work site. It is the responsibility of the Structure Representative to verify that the Contractor has secured a proper permit before allowing any trenching or excavation work to begin.

Cal/OSHA CSO, § 1540, *Excavations*, defines a Trench (Trench excavation) as:

> "A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet. If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet or less, (measured at the bottom of the excavation), the excavation is also considered to be a trench."

Excavations, which are more than 15 feet wide at the bottom, or shafts, tunnels, and mines, are excavations by Cal/OSHA definition. Thus, an excavation permit and excavation plan are still required for these "non-trench" conditions. Box culvert and bridge foundations are examples of excavations. Bridge abutments and retaining wall will often present a trench condition at the time that vertical rebar or back wall form panels are erected. The solution is to either provide a shoring system to retain the earth, or lay the slope back at an acceptable angle.

1-4 State Statutes

The Professional Engineers Act referenced in California Streets and Highways Code, § 137.6 of Article 3 in Chapter 1 of Division 1 of the Statutes, requires that the review and authorization of Contractor's plans for temporary structures in connection with the construction of State highways must be done by a registered professional engineer. Note that the Professional Engineers Act is found in Chapter 7 (commencing with § 6700), Division 3, of the Business and Professions Code. The Engineer has the responsibility to see that appropriate shop drawings are submitted and properly reviewed for work to be performed within the State right-of-way.

1-5 Federal Highway Administration (FHWA)

The *Contract Specifications,* Section 7, *Legal Relations and Responsibility to the Public,* contains the federal requirements for the project. These include provisions for safety and accident prevention. The Contractor is required to comply with all applicable federal, state, and local laws governing safety, health, and sanitation. Conformance with current Cal/OSHA standards will satisfy federal requirements, including Federal OSHA.

1-6 Railroad Relations and Requirements

If the project is on or adjacent to railroad property, the contract will contain a railroad agreement with the Department as referenced in *CS,* Section 5-1.20C, *Control of Work – Coordination with Other Entities – Railroad Relations*. This agreement is located in the *Information Handout* for the project and requires the Contractor to cooperate with the railroad where work is over, under, or adjacent to tracks, or within railroad property, and that all rules and regulations of the affected railroad must be complied with. The agreement also requires that the Contractor and subcontractors have authorized railroad insurance. The *Contract Specifications,* Section 5-1.36B, *Control of Work – Property and Facility Preservation – Railroad Property*, requires submission of shop drawings for an excavation on or affecting railroad property to the railroad for review and approval.

The Department of Transportation has established an administrative procedure for handling protective system shop drawings for excavations on or affecting railroad property. This procedure is detailed in Bridge Construction Memo (BCM) C-11, *Shop Drawing Review of Temporary Structures*.

The *Contract Specifications*, Section 5-1.36, *Control of Work – Property and Facility Preservation*, includes a provision detailing a timeline for the submission of shop drawings of the protective systems for excavations on or affecting railroad property. Note that the railroad communicates directly with the Structure Construction (SC)

Falsework Engineer, not with the Engineer on the job site. Adequate time should be allowed for the review procedure. *Contract Specifications,* Section 5-1.36B, *Railroad Property*, and Section 7-1.02K(6)(b), *Excavation Safety*, allows 65 days for the review of shop drawings for excavations on or affecting railroad properties. Alert the Contractor of the procedure and review duration at the preconstruction conference.

The Structure Representative on the project will handle the review and authorization of excavation shop drawings that involve railroads. When there is no SC involvement or items on a project requiring a review of excavation shop drawings, the District should request technical assistance from SC by contacting the Area Construction Manager, or SC Headquarters[1] in Sacramento.

1-7 Excavation Shop drawings

The Contractor must submit worker protection (excavation) shop drawings for any excavation 5 feet or deeper, as noted previously in *CS*, Section 7-1.02K(6)(b), *Excavation Safety*, to the Engineer for review and authorization. Such plans are to be submitted in a timely manner before the Contractor begins excavating. The Engineer must authorize the excavation shop drawings before work begins.

A copy of all excavation shop drawings authorized by the Engineer should be sent by email to the SC Falsework Engineer the same day authorization is sent to the Contractor. Follow the procedure detailed in BCM C-11, *Shop Drawing Review of Temporary Structures*. Briefly, the procedure is to retain one copy of the following documents in the job file and send one copy to SC Headquarters for retention in VISION and for emergency response:

1. Authorized shop drawings
2. Temporary structure analysis report
3. Engineering analysis calculations
4. Contractor's calculations
5. Manufacturer's catalog data for manufactured assemblies.

If the Contractor elects to use the standard options in the Cal/OSHA CSO, it is not required that a professional engineer prepare the plan. However, a worker protection (excavation) shop drawing is still required. This plan can be a letter to the Engineer containing the information outlined in Section 2-1.08, *Introduction - Worker Protection System Shop Drawing Submittal*, in Chapter 2, *Cal/OSHA Overview,* of this manual.

The details in the Cal/OSHA CSO consist of sloping, benching, and tables of minimum member sizes for timber and aluminum hydraulic shoring with member spacings related

[1] Caltrans internal use only

to the three general types of soil, along with various restrictions on use of materials and construction methods.

The Engineer is cautioned that conditions may be such that the Cal/OSHA CSO will not apply. For example, when a surcharge load exceeds the two feet of spoils (lateral pressure of approximately 72 psf) that the Cal/OSHA CSO reference, an engineered system is required. The proposed plan must provide a system at least as effective as the Cal/OSHA CSO, and the plan must be prepared and signed by a California registered professional engineer. The Contractor's engineered plan should include the following items in addition to the information listed in the Cal/OSHA CSO:

1. A detailed engineering drawing showing sizes, spacing, connections, etc. of materials.
2. Appropriate additional soils data.
3. A geotechnical engineer or a civil engineer specializing in soils must prepare soils reports and supplemental data.
4. Supporting data, such as design calculations or material tests.

The Contractor's engineer must provide a structural review of any plan that deviates from the Cal/OSHA CSO.

1-8 Summary

This manual presents the technical engineering information that can be used by the Engineer in making a review of excavation shop drawings.

The design or engineering analysis of a shoring system is accomplished in the following sequence:

1. The soil or earth that is to be retained and its engineering properties are determined.
2. Soil properties are then used in geotechnical mechanics or procedures to determine the horizontal earth pressure acting on the shoring system.
3. The design lateral force is then distributed in the form of a pressure diagram. The distribution or shape of the diagram is a function of the type of shoring system and the soil interaction with that system.
4. Lateral loads due to surcharges and from sources other than basic soil pressure (e.g., groundwater) are determined and combined with the basic soil pressure diagram. The resulting combined lateral pressures become the design lateral pressure diagram.

5. The design lateral pressure diagram is applied to the system, and a structural analysis is made. Again, there is a range from simplified to complex procedures that can be used.

Remember to use a proper balance of engineering effort. If the soil data is not detailed or is not available, it is not proper to use complex or sophisticated analyses. With good soils data, it is satisfactory to first use simplified analysis procedures which lead to a conservative check; then, if the system appears inadequate, a more detailed and refined procedure may be appropriate.

The extent of engineering analysis required is a function of the size of the project and how unusual or unique it is. A simplified analysis procedure can be used for the majority of trenching and shoring systems seen on projects. For complex systems, the Engineer may be presented with methods that are not discussed in this manual. The Engineer should be prepared to do some research. A procedure should not be rejected simply because it is not covered in this manual. This manual presents standard engineering procedures and some tools for more complex soil geometrics. Additional design information or copies of text material confirming the design theory needed to support the Contractor's calculations should be requested. Geotechnical Services of the Division of Engineering Services (DES) is available for consultation on soil properties.

It is recognized that the installation of the authorized excavation shop drawings is of equal importance. Construction activities include verifying quality of workmanship, inspection, and taking appropriate timely action with regard to changing conditions. See Chapter 11, *Construction Considerations and Final Summary,* of this manual for more information.

When excavation shop drawings are being reviewed, the following procedure is recommended: Perform an initial review of the shoring in conformance with the procedures in the *Falsework Manual*, Chapter 2, *Review of Shop Drawings*, Section 2-4*, Shop Drawing Review*. As with any set of shop drawings, if the submitted material is incomplete, the Contractor should be notified immediately. It will be necessary for the Contractor to submit all additional information needed to perform a review, which may include a more thorough description of design procedures, assumptions, and additional calculations. If the review indicates discrepancies in the design, it will be necessary to review the criteria and assumptions used by the designer. Note: there is no requirement that the design methodology used be in conformance with that outlined in this manual. If warranted, request from the Contractor additional information to support the alternative earth pressure theory used in their analysis. In case of a dispute, contact the SC Falsework Engineer[1] in Sacramento.

[1] Caltrans internal use only