

CHAPTER 1

LEGAL REQUIREMENTS



LEGAL RESPONSIBILITIES

1.0 LEGAL REQUIREMENTS AND RESPONSIBILITIES

The State of California provides for the planning and design of permanent work to be prepared by the State (there are some exceptions with Design work prepared by a consultant), with the construction, including design of temporary work, to be performed by the Contractor.

This section of the Manual deals with the responsibilities of the Contractor and the State as related to trench and excavation work during the construction phase. Under Department of Transportation specifications, the Contractor is responsible for performing the work in accordance with the contract. This responsibility includes compliance with all State and Federal Laws, and applicable county or municipal ordinances and regulations, and the California Occupational Safety and Health Regulations, sometimes referred to as the Division of Occupational Safety and Health, (DOSH) but is better known as Cal/OSHA. These safety regulations are contained within the larger California Code of Regulations, Title 8 Industrial Relations (CCR Title 8). This Manual will refer to CCR Title 8 when referencing General Safety Regulations, while some references to the more specific subset of Construction Safety Orders will be noted as such. The hierarchy of the California Code of Regulations is as follows:

California Code of Regulations (CCR)

Title 1. General Provisions

...

Title 8. Industrial Relations

Division 1. Department Of Industrial Relations

Division of Occupational Safety and Health (Cal/OSHA)

Chapter 1

...

Chapter 3.2. California Occupational Safety And Health Regulations

Subchapter 2. Regulations of the Division of Occupational Safety and
Health (Sections 340 - 344.85)

Chapter 4. Division of Industrial Safety

Subchapter 4. Construction Safety Orders (Sections 1500 - 1938)

Article 6. Excavations

CT TRENCHING AND SHORING MANUAL

The 2006 Standard Specification contains references to the protection of workmen and public in trench and excavation operations. Of particular interest is Section 5-1.02A. "Excavation Safety Plans":

The Construction Safety Orders of the Division of Occupational Safety and Health shall apply to all excavations. For all excavations 5 feet or more in depth, the Contractor shall submit to the Engineer a detailed plan showing the design and details of the protective systems to be provided for worker protection from the hazard of caving ground during excavation. The detailed plan shall include any tabulated data and any design calculations used in the preparation of the plan. Excavation shall not begin until the detailed plan has been reviewed and approved by the Engineer

Detailed plans of protective systems for which the Construction Safety Orders require design by a Registered Professional Engineer shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California, and shall include the soil classification, soil properties, soil design calculations that demonstrate adequate stability of the protective system, and any other design calculations used in the preparation of the plan.

No plan shall allow the use of a protective system less effective than that required by the Construction Safety Orders.

If the detailed plan includes designs of protective systems developed only from the allowable configurations and slopes, or Appendices, contained in the Construction Safety Orders, the plan shall be submitted at least 5 days before the Contractor intends to begin excavation. If the detailed plan includes designs of protective systems developed from tabulated data, or designs for which design by a Registered Professional Engineer is required, the plan shall be submitted at least 3 weeks before the Contractor intends to begin excavation.

Attention is directed to Section 7-1.01E, "Trench Safety."

Standard Specification Section 7-1.01E "Trench Safety" reads:

Attention is directed to the requirements in Section 6705 of the Labor Code concerning trench excavation safety plans.

LEGAL RESPONSIBILITIES

Under Section 5-1.01 of the Standard Specifications it states, “the Engineer shall decide on questions that may arise as to the quality or acceptability of materials furnished and work performed...” However, it is the Contractor's responsibility to properly evaluate the quality of materials.

The State has the responsibility for administrating the contract. This means that interpretation of contract requirements, including acceptance of materials, is done by the State, not any other agency such as Cal/OSHA. Although the work must be performed in compliance with the CCR, Title 8, there may be situations or conditions where they are not applicable or adequate. Under these circumstances the Engineer makes an interpretation and informs the Contractor accordingly of what is required.

The documents that apply to a contract are as follows:

- Department of Transportation Standard Specifications
- Standard Plans
- Project plans
- Project Special Provisions
- Contract change orders
- California Code of Regulations, Title 8 (CCR, Title 8)
- California Streets And Highways Code
- California Labor Code (The Law).
- 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.

1.1 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' was enacted by Statute 1937 with changes in 1973, 1977, and 1979. Sections 6300 to 6707 pertain to the subject of trenching and shoring.

Section 6300 establishes that the California Occupational Safety and Health Act of 1973 is enacted law. 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 California Code of Regulations (CCR), Title 8, under which the Safety Orders reside.

Section 6407, states that, "Every employer and every employee shall comply with occupational safety and health standards, with Section 25910 of the Health and Safety Code, and with all rules, regulations and orders pursuant to this division which are applicable to his own actions and conduct (Statute 1977 Ch. 62)".

Section 6705 establishes that for public work projects involving an estimated expenditure in excess of \$25,000 for the excavation of any trench or trenches, five feet or more in depth, the Contractor must submit shoring plans to the awarding body.

Section 6706 pertains to the permit requirements for trench or excavation construction.

The California Code of Regulations can be viewed at the following website:

<http://www.leginfo.ca.gov/calaw.html>

The CCR Title 8 Industrial Relations can be viewed at the following website:

<http://www.dir.ca.gov/counters/t8index.htm>

And from this page you can find the Cal/OSHA and all the Safety Orders

1.2 Cal/OSHA

Cal/OSHA enforces the California Code of Regulations, Title 8 safety regulations 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 may perform the following activities:

- Preparation of construction safety orders
- Policing of conformance with safety orders
- Investigation of accidents
- Compilation of Safety Statistics
- Conduct Safety Training
- Publication of Safety Order Changes

LEGAL RESPONSIBILITIES

- Publication of Safety, Information (Training & Education Brochures)
- Consultation Service
- Assessment and review of citations

There are numerous geographical Cal/OSHA offices within the state. Refer to Appendix A of this Manual or go to <http://www.dir.ca.gov/dosh/DistrictOffices.htm> for a web listing of the Cal/OSHA offices.

Compliance with CCR, Title 8 is not the same as conducting a "safety program" for employees. The objective of accident-free work is the same, but the means of implementation are quite different. Every employer in California is required by law (Labor Code Section) to provide a safe and healthful workplace for his/her employees. Title 8, of the California Code of Regulations (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, Section 3203 "Injury and Illness Prevention Program" and the requirements in CCR, Title 8, Construction Safety Orders, Section 1509 "Injury and Illness Prevention Program." Effective safety programs rely on the inspection for compliance with the Construction Safety Orders, but includes education and training activities and taking positive actions in regard to conduct of the work.

Cal/OSHA will not perform engineering or inspection work for the Contractor or Caltrans. The Cal/OSHA activity is essentially a policing operation in regard to ascertaining compliance with the CCR, Title 8 safety regulation.

The CCR, Title 8, Construction Safety Orders 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 Construction Safety Orders take precedence over any other general orders that are inconsistent with them, except for Tunnel Safety Orders or Compressed Air Safety Orders.

The introduction to the Construction Safety Orders states that no employer shall occupy or maintain any place of employment that is not safe. Construction Safety Orders Section 1541 extends this protection directing 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, and also that all excavation work shall have daily and other periodic inspections.

A permit is required by Cal/OSHA prior to the start of any excavation work for any trench 5 feet or deeper in to which a person is required to descend, per CCR Title 8, Chapter 3.2, Subchapter 2, Article 2, Section 341, Subsection (d)(5)(A). Note that this reference is to safety regulations outside Chapter 4, Subchapter 4, Construction Safety Orders. The employer shall 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. There are some exceptions, such as work performed by State forces on State R/W, and forces of utilities which are under the jurisdiction of the Public Utilities Commission. Railroads are included in the foregoing group.

It should be noted that a Cal/OSHA permit is not an approval of any shoring plan. The Contractor makes 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 that the Contractor furnish more 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 approval.

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 his 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 Engineer to ascertain that the Contractor has secured a proper permit before permitting any trenching or excavation work to begin.

Section 1540 of the Construction Safety Orders (Chapter 4, Subchapter 4 of the CCR, Title 8) 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

LEGAL RESPONSIBILITIES

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. However, this does not mean that an excavation permit and shoring plans are not required. Box culvert and bridge foundations are examples. Bridge abutments will 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 cut the slope back at an acceptable angle.

1.3 STATE STATUTES

California Streets and Highways Code Section 137.6 of Article 3 in Chapter 1 of Division 1 of the Statutes, requires that the review and approval of Contractor's plans for temporary structures in connection with the construction of State Highways shall be done by a Registered Professional Engineer.

"137.6. The design of, the drafting of specifications for, and the inspection and approval of state highway structures shall be by civil engineers licensed pursuant to the Professional Engineers Act (Chapter 7 (commencing with Section 6700), Division 3, Business and Professions Code)."

"The approval of plans for, and the inspection and approval of, temporary structures erected by contractors in connection with the construction of state highway structures shall also be by such licensed civil engineers."

This means that the Engineer has the responsibility to see that appropriate plans are submitted and properly reviewed for work to be performed within State right of way.

1.4 FEDERAL HIGHWAY ADMINISTRATION (FHWA)

Section 7 of the Amended Standard Specifications 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 Fed/OSHA.

1.5 RAILROAD RELATIONS AND REQUIREMENTS

Contract Special Provisions, Section 13, for the project will contain the railroad agreement with the State. These provisions require that the Contractor shall 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 railroad concerned shall be complied with. It also requires that the Contractor and subcontractors have approved Railroad Insurance and submit plans for all temporary works on railroad property to the railroad for review and approval.

The Department of Transportation has established an administrative procedure for handling shoring plans that involve railroads as follows:

- Contractor submits shoring plans to the Engineer (Project Resident Engineer). Railroads require that a plan be prepared even if proposed system is in accordance with Cal/OSHA Details. Shoring is required for excavations less than 5 feet in depth if specific railroad criteria calls for it (railroads differ in requirements). The drawing must include a trench cross-section and a plan view giving minimum clearances relative to railroad tracks. Provisions for walkways, if required, are to be submitted with the plans. Plans are to be prepared by a California Registered Professional Engineer with each sheet of the plans signed.
- Some railroads have their own specifications for shoring. The railroad specifications will be used in conjunction with DOT Policy and the Cal/OSHA Construction Safety Orders. The most restrictive of these will apply. The reader is referred to CHAPTER 8 of this Manual for railroad requirements.
- The Engineer reviews the plan for completeness. Once satisfied the Contractor's design meets all the requirements and is structurally adequate, the Engineer will forward the plan with the Contractor's and the Engineer's calculations to the Offices of Structure Construction Headquarters in Sacramento (OSC HQ).
- In Sacramento, OSC HQ will make a supplementary review. Then if the plans and calculations are satisfactory they will be forwarded to the railroad concerned.
- The railroad reviews and approves the shoring plans, and notifies OSC HQ in Sacramento of an approval or a rejection.

LEGAL RESPONSIBILITIES

- OSC HQ notifies the Engineer of the result of railroad's review.
- Shoring plans that are rejected are returned to the Contractor for resubmittal after corrections are made addressing all railroad comments.
- The Engineer approves the plans and notifies the Contractor only upon receiving OSC HQ notice of the railroads approval.

Section 19-1.02, "Preservation of Property" of the Standard Specifications for Earthwork includes a provision stipulating that detailed shoring plans of the protective systems for excavations on or affecting railroad property be submitted at least 9 weeks before the Contractor intends to begin any excavation requiring protective shoring.

Note that the railroad deals directly with the Sacramento Office of OSC, not with the Engineer on the job site. Adequate time should be allowed for the review procedure. The railroad may take up to 6 weeks for review from the time that they receive the plans from Sacramento. The proper time to alert the Contractor to procedure and time needed is at the pre-job conference.

The OSC Structure Representative on the project will handle the review and approval of shoring plans that involve railroads. However, when there is no OSC representative, the District should request technical assistance from the Offices of Structure Construction by contacting the Area Construction Manager, or from the Offices of Structure Construction Headquarters in Sacramento.

1.6 SHORING PLANS

Section 5-1.02A of the Standard Specifications requires that a Contractor submit a shoring plan for any excavation 5 feet or deeper to the Engineer for his review and approval. Such plans are to be submitted in a timely manner as specified in Section 5-1.02A of the Standard Specifications (or as required by the contract Special Provisions) before the Contractor intends to begin excavating. No work shall begin until the shoring plans are approved by the Engineer.

If the Contractor elects to use the Construction Safety Orders Details, it is not required that a Professional Engineer prepare the plan. However, a shoring plan is still required. This plan can be a letter to the Engineer containing the information outlined in Section 2.0 "Shoring Plan Submittal," in CHAPTER 2 of this Manual.

The Details in the Construction Safety Orders consist of sloping, or tables of minimum member sizes for timber and aluminum hydraulic shoring with member spacings related 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 Construction Safety Order Details will not apply: for example when a surcharge load exceeds the minimum construction surcharge of 72 psf. In such a case, an 'engineered' system is required. The proposed plan must provide a system at least as effective as the Construction Safety Orders Details, and the plan must be prepared and signed by a California Registered Professional Engineer. The contractor's engineered plan would include the following items in addition to the information listed for Construction Safety Order Details:

- An engineering drawing showing sizes, spacing, connections, etc. of materials.
- Appropriate additional soils data.
 - A Geotechnical Engineer or a Civil Engineer specializing in soils shall prepare soils reports and supplemental data.
- Supporting data such as design calculations or material tests.

The Engineer will make a structural review of any plan that deviates from the Construction Safety Orders Details.

In general practice, engineered drawings will be accompanied by an engineer's calculations. If railroads are involved, a minimum of three sets of calculations and seven sets of plans should be submitted. The railroads require a minimum of one set of calculations each from the designer and reviewer and four sets of shoring plans. The Engineer retains one set of calculations and two sets of plans. One additional complete set of calculations and drawings will be needed for the HQ OSC Sacramento Office.

1.7 SUMMARY

This Manual contains a presentation of much of the technical engineering information that can be used by the Engineer in making a review of shoring plans.

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

- The soil or earth that is to be retained and its engineering properties are determined.
- Soil properties are then used in geotechnical mechanics or procedures to determine the earth pressure force acting on the shoring system.
- 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 type of shoring system and the soil interaction with the system.
- Lateral loads due to surcharges and from sources other than basic soil pressure (e.g. ground water) are determined and combined with the basic soil pressure diagram. The resulting lateral pressures become the design lateral pressure diagram.
- The design lateral pressure diagram is applied to the system, and a structural analysis is made. Again, there is a range from simplified to refined or complex procedures that can be used.

Keep in mind a proper balance of engineering effort. If soils 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, use a more refined procedure.

The engineering analysis is a progressive procedure dependent upon complexity or sophistication. It is a function of the size of the project or how unusual or unique it is. A simplified analysis procedure can be used for the majority of trench and shoring 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 basic engineering procedures. Additional design information or copies of text material needed to analyze the calculations should be requested. The

CT TRENCHING AND SHORING MANUAL

Geotechnical Services of the Division of Engineering Services (DES) is available for consultation for major problems.

It is recognized that the construction phase is of equal importance. Construction activities include workmanship, inspection, and taking appropriate timely action with regard to changing conditions. The reader is referred to CHAPTER 9, Construction and Special Considerations, for more information.

When shoring plans are being reviewed, the following procedure is recommended. Perform an initial review of the shoring in conformance with the procedures in the Trenching and Shoring Manual. As with any set of plans or working 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, for example, 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 used by the designer. Note, however, there is no requirement that the design must be in conformance with the criteria outlined in this Manual. It may be necessary for the Contractor to also submit copies of the confirming design theory and computations. In case of a dispute, contact the Offices of Structure Construction HQ in Sacramento.