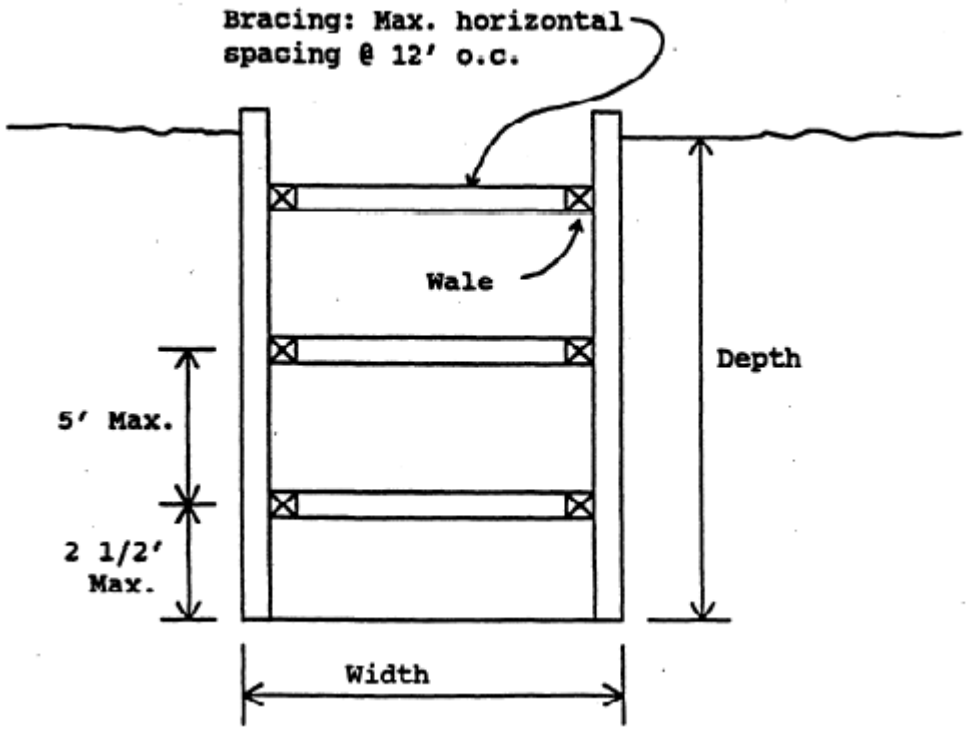
CHAPTER 2

Cal/OSHA



2.0 *Cal/OSHA*

The California Division of Occupations Safety and Health, better known as Cal/OSHA, reports that more construction deaths occur in trenches than in any other form of construction work. This is despite a number of trench and excavation failures that go unreported. It is evident from this that a continued diligence must be given to the planning, construction, monitoring, and supervisory aspects of excavations and trenching.

The information in this chapter and in Appendix A of this Manual is current as of January 2010. It will be the responsibility of the reader to determine up-to-date applicable requirements.

Cal/OSHA adopted the Federal OSHA safety regulations pertaining to protection of workmen in excavations, effective September 25, 1991. These are embodied in the California Code of Regulations, Title 8 (CCR, Title 8).

This chapter contains outlines of major portions of the adopted safety regulations that pertain to safety in conjunction with excavations. Major considerations, or requirements of the safety regulations, in numerical order of the Sections, are briefly outlined on the following pages. Following the brief outlining is a condensed outline of most of the Cal/OSHA Safety Orders pertaining to the subject of excavations. The text of most Cal/OSHA excavation requirements may be found in Appendix A of this Manual. Appendix A text includes Construction Safety Order from CCR, Title8, Sections 1504, 1539, 1540, 1541, 1541.1 (including appendices A - F), and Sections 1542 and 1543.

Excavations 20' Deep Or Less: Construction Safety Orders Section 1504 and Sections 1539 through 1543 contain the excavation and shoring requirements. These sections provide for a variety of excavation plans for workman protection in excavations. For excavations less than 20 feet in depth the Contractor may use sloping or benching of the soil, tables for timber or aluminum hydraulic shoring, shields, or the shoring may be designed by a California Registered Professional Engineer.

Excavations Over 20' Deep - Deviations: A California Registered Professional Engineer is required to design a protective system for excavations greater than 20 feet in depth, when there are:

- deviations from the sloping criteria

- deviations not covered in the Safety Orders from the timber or aluminum hydraulic shoring tables
- shields to be used in a manner not recommended or approved by the manufacturer
- surcharges that must be accounted for
- alternate designs used

The designing engineer may base his design on manufacturer's information, on a variety of tables and charts, use of proprietary systems, on soils information furnished by a competent person, and in accordance with accepted professional engineering practice.

Maintain Design Plan At The Jobsite: Construction Safety Orders Section 1541.1 (b) (3) (B) 4 require that at least one copy of the tabulated data, manufacturer's data or engineer's design is to be maintained at the jobsite during construction of the protective system and that the identity of the Registered Professional Engineer approving tabulated or manufacturer's data be included in the information maintained at the jobsite. The Registered Professional Engineer approving the data refers to the engineer responsible for the design of the protective system.

Registered Professional Engineer: For work in California the design engineer must be a Registered Professional Engineer in California pursuant to California Streets and Highways Code Section 137.6.

Competent Person: The Construction Safety Orders in Section 1504 defines a competent person as, "One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them."

Surcharges: The Figures and Tables in the Appendices of Section 1541.1 of the Construction Safety Orders provide for a minimum surcharge equivalent to an additional soil height of 2 feet. The minimum surcharge may be considered to represent a 2 feet high soil embankment, small equipment, material storage, or other small loadings adjacent to the excavation. No provision is made for nearby traffic, adjacent structure loadings, or for dynamic loadings. (See, Section 1541.1 Appendix C)

Shoring Plan Submittal: The Contractor may submit a shoring plan using Construction Safety Orders Details for sloping excavations or tabular data, in the form of a letter stating which portions of the Details are to apply to the plan. The letter should list:

- location of the work
- limits of the work
- the times the work is to start and be in progress and sequence
- the applicable Construction Safety Orders Detail Figures or Tables
- any other information which will pertain to the progress or complexity of the work
- who will be in charge of the work
- who will be the designated competent person responsible for safety

If the Contractor elects to use the shoring details in the Construction Safety Orders, it is not necessary to have the shoring plan prepared by a registered engineer; and the reviewing engineer does not have to do a structural analysis. However, the reviewing engineer must ascertain that the Contractor does the work in accordance with the Construction Safety Orders and that the site conditions are such that the shoring plan is appropriate for the soil conditions encountered.

2.1 *SOME IMPORTANT CalOSHA DEFINITIONS*

Describing or citing primary sections can condense a lot of information about the requirements in the Construction Safety Orders. A few important definitions are included here, but the reader is directed to a more complete text of the CCR, Title 8 and Construction Safety Orders included in Appendix A of this Manual.

From Section 1504, "Excavation, Trenches, Earthwork,":

Geotechnical Specialist (GTS): "A person registered by the State as a Certified Engineering Geologist, or a Registered Civil Engineer trained in soil mechanics, or an engineering geologist or civil engineer with a minimum of 3 years applicable experience working under the direct supervision of either a Certified Engineering Geologist or Registered Civil Engineer".

From Section 1540, "Excavations,"

Accepted Engineering Practices: Those requirements, which are compatible with standards of practice required by a Registered Professional Engineer.

Excavation: All excavations made in the earth's surface. Any manmade cut, cavity, trench, or depression in an earth surface, formed by earth removal. Excavations are defined to include trenches.

Protective System: A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

Registered Professional Engineer: A person who is registered as a Professional Engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "Registered Professional Engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce. (The interstate commerce provision affords relief for utilities when crossing State boundaries).

Shield (Shield System): A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with Section 1541.1(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

Sloping (Sloping System): A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Shoring (Shoring System): A structure such as a metal hydraulic, mechanical, or timber shoring system that supports the side of an excavation and which is designed to prevent cave-ins.

Tabulated Data: Tables and charts approved by Registered Professional Engineer and used to design and construct a protective system.

Trench: 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.

2.2 *SOME IMPORTANT Cal/OSHA REQUIREMENTS*

A few of the important considerations from the Construction Safety Orders portion of the CCR, Title 8 are listed here for easy reference. The complete text of Section 1541 referred to below is included in Appendix A of this Manual.

2.2.1 General Requirements Section 1541

Underground utilities must be located prior to excavation. The Contractor should notify Underground Alert or other appropriate Regional Notification Centers a minimum of 2 working days prior to start of work. Excavation in the vicinity of underground utilities must be undertaken in a careful manner while supporting and protecting the utilities.

Egress provisions, which may include ladders, ramps, stairways, or other means, shall be provided for excavations over 4 feet in depth so that no more than 25 feet of lateral travel will be needed to exit trench excavations.

Adequate protection from hazardous atmospheres must be provided. This includes testing and controls, in addition to the requirements set forth in the Construction Safety Orders and the General Industry Safety Orders to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions.

Employees shall be protected from the hazards of accumulating water, from loose or falling debris, or from potentially unstable adjacent structures.

Daily inspections, inspections after rain storms and as otherwise required for hazardous conditions, are to be made by a competent person. Inspections must be conducted prior to the start of work and as needed throughout the shift. The competent person will need to check for potential cave-ins, indications of failure of the protective system, and for hazardous atmospheres. When the competent person finds a hazardous situation he shall

have the endangered employees removed from the area until the necessary precautions have been made to ensure their safety.

Adequate barrier physical protection is to be provided at all excavations. This is extremely important at remotely located locations, where active construction operations are absent. All wells, pits, shafts, etc., shall be barricaded or covered. Upon completion of exploration and other similar operations, temporary shafts etc., shall be backfilled.

2.2.2 Protective System Selection

Section 1541.1 of the Construction Safety Orders covers almost all of the requirements that must be considered in selecting or reviewing a particular type of shoring system. The text of this section contains general information and considerations about the various selections, which may be made for shoring systems. This section describes the various shoring systems, which can be used with and without the services of a Registered Professional Engineer. Additional information about the various shoring systems may be found in Appendix A through Appendix F of Section 1541.1 (See Appendix A of this Manual).

The Contractor may use this portion of the Cal/OSHA, Construction Safety Orders to select a particular type of shoring system best suited to fit the soil conditions and the jobsite situation. The services of a Registered Professional Engineer are not necessarily required for the shoring options available to the Contractor in these Construction Safety Orders Details provided they are used within the limitations of the Details.

An overview of the major portions of Section 1541.1 is outlined below. The complete text of Cal/OSHA, Construction Safety Order Section 1541.1 is included in Appendix A of this Manual.

The design of a protective system for workmen in an excavation may be selected from one of the possible options listed below:

Stable rock - No shoring needed.

Excavation less than 5 feet deep - No shoring needed.

Sloping or benching:

- Slope 1 l/2 : 1 as for Type C soil.

  Steeper slopes may be used for short term (1 day).

- Slope using Table B-l or Figure B-l of Appendix B.

  Slopes dependent on soil type - see Appendix A.

- Per tables or charts identified by a California Registered Professional Engineer.

- Design by a California Registered Professional Engineer.

Design of support systems, shield, or other systems:

- Design in accordance with Appendix A, or C - F.

  Appendix A - Soil classification.
  Appendix C - Timber shoring tables.
  Appendix D - Hydraulic shoring tables.
  Appendix E - Alternatives to timber shoring.
  Appendix F - Flow chart guides to system selection.

- Design using Manufacturer's data (shields for example)

  Data includes specifications, limitations, and/or other tabulated data (Tables or Charts).

- Design using other tabulated data (Tables or Charts),

  Identified by a California Registered Professional Engineer approving the data. [Approving engineer implies the California Professional Engineer designing or submitting the shoring plan.]

- Design by a Registered Professional Engineer.

  Identified by a California Registered Professional Engineer approving the plan. [Approving engineer implies the California Professional Engineer designing or submitting the shoring plan.]

Shoring system designs (including manufacturer's data) other than those selected directly from tables in Appendix A - F will need to be posted at the jobsite during construction of the protective system.

Damaged materials or equipment will need to be reevaluated for use by a competent person or by a Registered Professional Engineer before being put back into use.

Individual members of support systems may not be subjected to loads exceeding those which they are designed to withstand.

Excavation of material to a level no greater than 2 feet below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the excavation, and no loss of soil is possible.

Shields systems are not to be subjected to loads exceeding those which the system was designed to withstand.

2.2.3 Soil Classification

APPENDIX A TO SECTION 1541.1

Appendix A to Construction Safety Order Section 1541.1 contains the soil classification information that may be used for the proper selection of a shoring system. (See Appendix A of this Manual.) This section describes when soil classification information may be used as well as defining soil and soil types (A, B, or C). The section also covers the basis of soil classification, who can classify soil and how soil classification may be done by using visual or manual tests and through other various field testing methods.

A competent person, or a testing lab, may make determinations by at least one visual and at least one manual test to classify rock or soil for the proper selection, or for the design, of a shoring system. Classification of the soil is necessary to determine the effective active soil pressures that the shoring system may be subjected to. The tables for the selection of sloping, timber shoring, or aluminum hydraulic shoring, are based on one of three types of soil (A, B, or C).

The three soil types in the Construction Safety Orders are described below:

Type A: Cohesive soil with unconfined compressive strength of 1.5 tsf or greater.

Examples of this soil type are: clay, silty clay, sandy clay, clay loam, silty clay loam, sandy clay loam, cemented soils like caliche or hardpan.

No soil-is Type A if:

- The soil is fissured.
- Vibratory or dynamic loads will be present.
- The soil has been previously disturbed.
- Sloped (4H:1V or greater) layers dip into the excavation.
- Other factors preclude Type A classification.

Type B: Cohesive soil with unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf or:

Granular cohesionless soils including: angular gravel, silt, silty loam, sandy loam, or maybe silty clay loam and sandy clay loam, or:

Previously disturbed soils not classified as Type C or:

Soil that meets the requirements of type A but is fissured or subject to vibration, or:

Dry rock that is not stable, or:

Type B soil that has sloped (4H:1V or less.) layers that dip towards the excavation.

Type C: Cohesive soil with unconfined compressive strength of 0.5 tsf or less or:

Granular soil including gravel, sand, and loamy sand, or:

Submerged soil, or from which water is freely seeping, or:

Submerged rock that is not stable, or:

Material sloped towards the excavation 4H:lV or steeper in a layered system.

Tables in the Construction Safety Orders for timber or for aluminum hydraulic shoring consider the effective lateral pressures for a depth H due to the three different soil types as follows:

Type A: PA= 25H + 72psf (2 Ft. Surcharge)

Type B: PA= 45H + 72psf (2 Ft. Surcharge)

Type C: PA= 80H + 72psf (2 Ft. Surcharge)

Manual testing of soils includes tests for plasticity, tests for dry strength, thumb penetration, and the use of a pocket penetrometer or hand operated vane shear tester. Samples of soil can be dried to determine relative cohesive content. A few of these tests may be used to determine compressive strength; the other tests may be used to determine relative cohesive properties of the soil. The test procedures are outlined in the complete text of Appendix A to Section 1541.1 (See Appendix A of this Manual). Note that expansive clays are not mentioned and may need special consideration.

2.2.4 Sloping or Benching Systems

APPENDIX B TO SECTION 1541.1

Appendix B of Construction Safety Order Section 1541.1 contains specifications for sloping and benching options, including visual diagrams, for excavations less than 20 feet in depth. (See Appendix A of this Manual.) A Registered Professional Engineer may design alternate configurations. Slopes may be laid back in conformance with the figures in Appendix B to-Section 1541.1 providing there is no sign of distress and surcharge loads will not be a factor. Signs of distress include: caving-in-of the soil, development of fissures, subsidence, bulging or heaving at the bottom of the excavation, or spalling or raveling at the face of the excavation.

When there is a sign of distress, the slope shall be laid back at least l/2 horizontal to 1 vertical less than the maximum allowable slope.

Allowable slopes shall be reduced as determined by a competent person when surcharge loads other than from adjacent structures are present.

When surcharge loads from structures are present, underpinning or bracing will be required, otherwise the structure must be on stable rock or a Registered Professional Engineer must determine that the excavation work will not pose a hazard to employees.

Table B-1 of Appendix B to Section 1541.1 lists the following maximum slopes for the various soil types:

Stable Rock:	Vertical
Type A:	¾:1
Type B:	1:1
Type C:	1½:1

Exceptions:

Type A soil:	½H:1V	Slope permitted for up to 12 feet in depth for short term duration (24 hours or less).

A Registered Professional Engineer shall design excavations over 20 feet in depth.

Type A Soil Sloping and/or Benching Options:

¾:1 slopes.

½:1 slopes (Short term and 12 feet or less).

¾:1 slope with 4 foot high single bench at bottom.

¾:1 slope replaced with 4' high and 5' high benches.

¾:1slope above 3½ foot high bench (8, max. depth).

1:1 slope above 3½ foot high bench (12, max. depth).

¾:1 slope above supported or shielded system.

A single or lower bench may be in front of the slope line, but all higher benches must be behind the slope line.

Type B Soil Sloping and/or Benching Actions:

1:1 slopes.

1:1 slopes above 4' high single bench.

1:1 slopes replaced with 4' high benches (Cohesive soil).

1:1 slopes above supported or shielded system.

A single or lower bench may be in front of the slope line, but all higher benches must be behind the slope line.

Type C Soil Sloping and/or Benching Options:

1½:1 slopes.

1½:1 slopes above supported or shielded system.

Layered Soils Sloping:

Type B over Type A: Slope Type B 1:1 and Type A ¾:1.

Type C over Type A: Slope Type C 1½:1 and Type A ¾:1.

Type C over Type B: Slope Type C 1½:1 and Type B 1:1.

Type A over Type B: Slope both 1:1.

Type A over Type C: Slope both 1½:1.

Type B over Type C: Slope both 1½:1.

2.2.5 Timber Shoring for Trenches

APPENDIX C TO SECTION 1541.1

Appendix C of Construction Safety Order Section 1541.1 contains information and tables that the Contractor may utilize to shore trenches less than 20 feet deep with rough or finish timbers in any of the three types of soil. (See Appendix A of this Manual) Tables C-1.1 through C-l.3 may be used for minimum rough (actual) size timbers having a minimum f_b of 850 psi, and Tables C-2.1 through C-2.3 are for finished (S4S) timbers having a minimum f_b of 1500 psi. There is one table for each soil type for each of the timber grading sizes.

Summaries of notes which are meant to accompany the tables are listed below:

- When conditions are saturated use tight sheeting (tight sheeting refers to 3 " rough tongue and groove timbers, steel sheet piling or similar to resist imposed lateral loads including water). Close spacing refers to placing planks side-by-side as close as possible.
- All spacings indicated are center to center.
- Wales are to be installed with greatest dimension horizontal.
- If the vertical distance from the center of the lowest cross brace to the bottom of the trench is to exceed 2.5 feet uprights are to be firmly imbedded, or a mudsill is to be used. A mudsill is a waler placed at the bottom of the trench.

  Maximum distance from lower brace to bottom of trench:

  36 inches for imbedded sheeting.

  42 inches when mudsills are used.

- Trench jacks may be used in place of, or in combination with timber struts.
- Upper crossbrace (strut) vertical spacing from top of excavation is not to exceed one-half tabulated vertical crossbrace spacing.
- When any of the following conditions will exist the tables will not be adequate:
  - When loads imposed by structures of stored materials adjacent to the trench will exceed the load from a 2 foot surcharge. Adjacent means within a horizontal distance equal to the depth of the trench.
  - When vertical loads on the center of crossbraces exceed 240 pounds.
  - When surcharge loads from equipment weighing over 20,000 pounds are present.
  - When only the lower portion of a trench is shored and the remaining portion is slopped or benched unless:
    - The sloping portion is sloped less than 3H:1V, or
    - The shoring is selected for full depth excavation.

Appendix C to Section 1541.1 also contains four example problems demonstrating selection of shoring from the tables.

2.2.6 Aluminum Hydraulic Shoring for Trenches

APPENDIX D TO SECTION 1541.1

Appendix D of Construction Safety Order Section 1541.1 contains typical installation diagrams, tables, and information for the use of aluminum hydraulic shoring in trenches less than 20 feet deep. (See Appendix A of this Manual.) Tables D-1.1 and D-1.2 are for vertical shores in Type A and B soils. Tables D-1.3 and D-1.4 are for horizontal waler systems in Type B and Type C soils. Type B soils may require sheeting, whereas Type C soils always require sheeting.

The tables consider two cylinder sizes with minimum safe working capacities as follows: 2 inch inside diameter with 18,000 pounds axial compressive load at maximum extension, or 3 inch inside diameter with 30,000 pounds axial compressive load at extensions as recommended by the product manufacturer.

When any of the following conditions exist the tabular data will not be valid:

- When vertical loads exceeding 100 pounds will be imposed on the center of hydraulic cylinders.
- When surcharge loads are present from equipment weighing in excess of 20,000 pounds.
- When only the lower portion of the trench is shored and the upper portion is sloped or benched steeper than 3H:1V; unless the shoring is selected for a trench full depth from the upper hinge point to the bottom of the trench.

Footnotes for the aluminum hydraulic shoring will be found in Section (g) of Appendix D to Section 1541.1 immediately preceding the Figures (See Appendix A of this Manual).

Minimum thickness plywood of 1 l/8" (or 3/4" thick 14 ply Finply) may be used in conjunction with aluminum hydraulic shoring to prevent raveling, but may not be used as structural members.

Alternate designs and designs for excavations over 20 feet deep must be submitted by a California Registered Professional Engineer.

2.2.7 Shield Systems

APPENDIX E TO SECTION 1541.1

Appendix E of Construction Safety Order Section 1541.1 contains a few diagrams of manufactured trench shields. (See Appendix A of this Manual.)

The reviewing engineer should be aware that manufacturers will normally furnish engineering data to a supplier, who in turn will furnish the data to the Contractor. A Contractor may submit a sales brochure as a shoring plan for approval. A brochure is not a plan; it generally will represent the manufacturer's data (the strength or capacity of the product). A shoring plan for specific use of the shield must be prepared. The engineer can determine forces, including surcharges that are to be resisted, and then make comparisons with manufacturer's data, or with the submitting engineer's computations that define the capacity of the shoring system.

A number of the trench shoring and shield manufacturers/suppliers belong to the TRENCH AND SHIELDING ASSOCIATION. The Association has published a manual covering product use and safety with respect to trench and shoring work. Member listing and other information may be obtained from:

TRENCH SHORING AND SHIELDING ASSOCIATION
25 North Broadway
Tarrytown, N. Y. 10591 Phone (914) 332-0040

2.3 *MANUFACTURED PRODUCTS*

Manufactured trench shoring and worker protection products include screw jacks, hydraulic shores, screw or hydraulic operated frames, work shields and other devices used to shore a trench and/or protect workmen.

If the Contractor's shoring or worker protection plan includes a manufactured product, the Engineer should not hesitate to request from the Contractor the manufacturer's recommendations if they are needed to verify the safe load capacity of the product.

The maximum loading which may be applied per Construction Safety Orders Section 1541.1 (c)(2) to a manufactured product shall not exceed the capacities as given by the manufacturer. These are usually shown in a catalog or brochure published by the manufacturer, or in the form of a letter

from the manufacturer pertaining to the use of his product for specific job conditions. This statement may be shown on a working drawing or included in a letter. To be acceptable it must be signed by the manufacturer; not the Contractor. When professional engineering data accompanies manufactured products that data may be used with minimum supplemental review.

Be aware that some manufacturer's catalogs do not always present enough engineering data; they may only be sales brochures. Be sure to review the conditions that apply to the data submitted. This is necessary to ascertain that 'capacity ratings' and other information were established while including the minimum loads (such as surcharges) required by the CCR, Title 8. It may be necessary to request that the contractor furnish additional engineering data from the manufacturer.

The maximum allowable safe working load as recommended by the manufacturer will be based on the use of new or undamaged used material. If the product or its components are not in good condition it must be determined if the product can function as intended, or if the safe working loads should be reduced. It is the responsibility of the Contractor to furnish proof of loading capacity.

In the case of manufactured products which cannot be found in any catalog, and the manufacturer is unknown or unable to recommend a safe working load, the Engineer should require a load test to establish the safe load capacity of the product as it is to be used. A load test should be conducted to a predetermined value or to failure to determine the maximum capacity of the manufactured product. The safe working load may then be one-half of the ultimate test loading, thus a minimum safety factor of 2.

A non-commercial product generally has less quality control during its fabrication relative to a manufactured product and as such non-commercial material should have a safety factor of 3. Load tests witnessed by the Engineer should be documented in the project records and a copy submitted to Sacramento with the approved shoring plans.

Materials must be properly identified on the submitted plan and verified in the field. This is very important when analyzing aluminum members as there are many different alloys.

2.4 ALTERNATE DESIGN CONSIDERATIONS

A minimum construction surcharge of 72 pounds per square foot lateral pressure shall be included in all shoring designs. Any additional surcharge loads such as from equipment, buildings, etc., should also be included in the shoring design. Refer to CHAPTER 4, Earth Pressure Theory and Application.

Alternate allowable stresses may be used provided that it can be satisfactorily shown that these values conform to acceptable engineering practice. Refer to Allowable Working Stresses in CHAPTER 5, Structural Design of Shoring Systems.

2.5 INFORMATION ABOUT TEXT FORMATTING IN THE CONSTRUCTION SAFETY ORDERS

In the CCR, Title 8 all subtopics are usually indented the same amount only on the first line of type. The subjects and subheadings format generally conforms to the following example:

Sub Chapter Title

Article No. Major Heading

Section Number. Heading.

(a) Lower case letter used for first subtopic.

(1) Number used for subtopic to lower case letter.

(A) Upper case letter used for subtopic to number.

1. Number used for subtopic to uppercase letter.

Another Heading.