Excavation Safety Training

Trenching and excavation are widely recognized as among the most hazardous construction operations, resulting in an average of two deaths per month and hundreds of injuries each year due to trench collapses. OSHA has addressed construction-related trenching and excavation hazards by developing specific safety standards for the construction industry, making the requirements easier to understand and providing construction employers with various options for classifying soil and selecting employee protection methods.

Cave-ins pose the greatest risk in trenching and excavation operations, and are much more likely than other excavation-related accidents to result in worker fatalities. One cubic yard of soil can weigh as much as a car. Other potential trenching and excavation hazards include falls, falling loads, hazardous atmospheres, and incidents involving mobile equipment.

There are many factors in determining the proper protective systems to reduce or eliminate trenching and excavation hazards, including soil classification, depth of cut, water content of soil, changes due to weather or climate, surcharge loads (e.g., other materials to be used in the trench) and other operations in the vicinity.

Cal-OSHA has made reducing trenching and excavation hazards the Agency's Priority Goal. Trench collapses, or cave-ins, pose the greatest risk to workers' lives. To prevent cave-ins:

- SLOPE or bench trench walls
- SHORE trench walls with supports, or
- SHIELD trench walls with trench boxes

Employers should also ensure there is a safe way to enter and exit the trench. Keep materials away from the edge of the trench. Look for standing water or atmospheric hazards. Never enter a trench unless it has been properly inspected.

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Egress - Trench Excavation

Ramp, ladder or stairs required at 4 feet or deeper.

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Article 6. Excavations
§ 1541. General Requirements.
(c) Access and egress.
§1541.1. Requirements for Protective Systems.

(a) Protection of employees in excavations.
   (1) Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with Section 1541.1(b) or (c) except when:
      (A) Excavations are made entirely in stable rock; or
      (B) Excavations are less than 5 feet in depth and examination of the ground by a competent person provides no indication of a potential cave-in.
§ 1541.1. (e) Installation and removal of supports.

(2) Additional requirements for support systems for trench excavations.

(A) 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 trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

§ 1541. General Requirements.

(1) Fall protection.

(1) Where employees or equipment are required or permitted to cross over excavations over 6-feet in depth and wider than 30 inches, walkways or bridges with standard guardrails shall be provided.

§ 1541. General Requirements

(1) Fall protection.

(2) Adequate barrier physical protection shall be provided at all remotely located excavations. All wells, pits, shafts, etc., shall be barricaded or covered.

*Case 5 Bedding Installation*

*Trench shield for MH structure*
§1541.1. Requirements for Protective Systems, Appendix A

(c) Requirements.

(1) Classification of soil and rock deposits. Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.

(2) Basis of classification. The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by a competent person using tests described in paragraph (d) below, or in other approved methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

*Competent person must perform at least one visual and one manual analysis*

BCA M-141 (10/04)

COMPETENT PERSON
TRENCH / EXCAVATION CERTIFICATION

JOB TITLE: ___________________________ JOB NUMBER: ______________

EXCAVATION CONTRACTOR: ___________________________ DATE: ______________

ADDRESS: ____________________________________ INSPECTOR: ____________________

The items below must be completed and signed by persons knowledgeable about the job to be covered by a trench/excavation permit before the end of the first day of work and prior to any workers entering the trench/excavation.

DOSH PERMIT NUMBER: _______________ EXPIRATION DATE: _______________

I hereby certify that to the best of my knowledge the soil type is:

- STABLE ROCK [ ] A [ ] B [ ] C [ ]

The protective system that will be used is:

- [ ] SHORING [ ] TIMBER [ ] ALUM HYDRAULIC [ ] TABLE NO. [ ]
- [ ] SLOPING 1-1/2 TO 1 [ ] 1 TO 1 [ ] 3/4 TO 1 [ ]
- [ ] TRENCH SHIELD

BCA Inspector is required to have the Competent Person identified every day.
BURB ELEMENT ENGING SPECIAL ORDER 001-0912 states,

7-10.4.2.2 Shoring Plan. Replace the second sentence of the first paragraph with the following:
Working Drawing (Shoring Plan) shall be prepared by a Civil or Structural Engineer registered in the State of California except for working drawings for trench shoring up to 10 feet in depth that do not vary from the shoring system standards established by the Construction Safety Orders of the State Division of Industrial Safety.

![Typical Trench Cross Sections]

1. This shoring plan is to be implemented by the contractor’s competent person as defined by Title 8, Chapter 4, Section 1504(a) of the State of California Safety Orders adopted 9/25/91. Shoring shall be installed in accordance with Title 8, Chapter 4, Section 1541.1(e).
2. This case is based on encountering stable soil with a stand-up time which allows for the installation of shores. The Contractor shall be aware that the soils investigation indicates areas which may be susceptible to sloughing or raveling (sandy soils). If a type of soil is encountered within these reaches which requires the use of a different method of shoring, or if this shoring method is found to be ineffective, then shoring details will be revised and resubmitted for approval as necessary.
3. This shoring plan has been prepared in accordance with the provisions of Title 8, Chapter 4, Section 1541.1(c)(4) of the State of California Safety Orders adopted 9/25/91.
4. Calculations not shown hereon are on file at the office of the accepting agency and/or the office of the shoring design engineer.
5. No-one shall be exposed where shoring has not been installed, has been removed, or is ineffective.
6. All construction equipment, stockpiled materials, spoil piles and other surcharges shall be kept a minimum of 5 feet from the edge of the excavation.

7. The Contractor has reviewed this plan and found it to be compatible with his proposed construction methods. The Contractor shall also review the compatibility of this shoring system with associated prime and subcontractors.

8. Spacings between members may be decreased.

9. The bottom of the upright may vary from Otto 2 feet above the bottom of the trench provided there are no indications of a possible loss of soil from behind or below the shores.

10. The trench walls may be sloped back a maximum of 15 degrees.

11. A shore(s) may be removed to facilitate installation of the pipe, however, no-one shall be in or adjacent to the un-shored area of the trench.

12. Sheeting consisting of plywood sheets (1-1/8" thick wood or 3/4" thick 14 ply Arctic White Birch Finland Form) per Section 1541.1 Appendix D(g) of the Safety Orders or steel plates 1/2" thick shall be used behind the uprights to prevent localized raveling where material is likely to slough (loose, dry or sandy materials, etc.). Additionally, the shore spacing shall be reduced such that no gaps in the sheeting exist (4' c.c. max.). The contractors' competent person shall make the determination to use sheeting when conditions warrant.

13. For depths of cuts between 9 and 14 feet, when 2 each 7-foot shoring units are used, they shall be offset and overlapped such that no struts are above the ground surface.

14. In no case shall any struts project above the street surface.

15. A minimum of 3 vertical sets of shores shall be installed in the trench when workmen are in or around the trench. No one shall be beyond the last shore in the un-shored portion of the trench.

16. The Contractor shall maintain the excavation in a dewatered condition to subgrade. The Contractor shall take preventative measures to route surface runoff away from the excavation.