

**Title:** Trenching & Excavation Safety  
**Department:** Grounds Shop  
**Effective Date:** September 4, 2019

## **PURPOSE**

To establish procedures for all excavations, trenches, and earthwork, consistent with Title 8, California Code of Regulations, Construction Safety Orders, Sections 1539 through 1541.

Establishes procedures and responsibilities for safeguarding CSUN personnel working in excavations and trenches. The following procedures shall be followed whenever it is determined that trenching or excavation shoring is necessary.

## **RESPONSIBILITIES**

All excavations, trenches and earthwork will be under the direction of a competent person. This person should be capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees, and have authorization to take prompt corrective measures to eliminate them.

## **GENERAL PROVISIONS**

- A. Before opening an excavation, all interferences such as trees, sidewalks, and foundations shall be removed or supported as necessary to protect employees and the public.
- B. The estimated location of utility and other underground installations that may be encountered during excavation work shall be determined before opening the excavation.
- C. When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means, usually by hand digging with an insulated shovel and the use of suitable gloves.
- D. If electric cables are damaged; the following steps shall be taken:
  1. If the damaged cable belongs to a utility other than the one performing the work, this utility shall be notified at once.
  2. The area shall be barricaded and the public kept out until hazardous conditions can be eliminated.
- E. If gas lines are damaged; the following steps shall be taken as soon as possible:
  1. The hole shall be left open to allow the gas to dissipate into the atmosphere.
  2. All possible sources that may ignite the gas shall be removed or eliminated.

3. The campus community in the area shall be warned when necessary and the public kept out.
  4. The Department of Police Services shall be notified.
  5. The Fire Department shall be notified immediately, as appropriate.
- F. If communication cables are damaged; campus IT Dept. shall be notified.
- G. While the excavation is open, underground installations shall be protected, supported or removed to safeguard employees.
- H. A stairway, ladder, ramp or other safe means of access/egress shall be located in trench excavations that are four feet or greater in depth. These devices must be located within twenty-five feet of all workers.
- I. Employees exposed to vehicular traffic shall wear orange reflective vests meeting ANSI/ISEA 107-2015 standards and other suitable garments.
- J. No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall wear hard hats at all times and stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.
- K. When mobile equipment is operated adjacent to an excavation and the operator does not have a clear and direct view of the edge of the excavation, a warning system such as barricades, a spotter, or stop logs shall be utilized. If possible, the grade should be away from the excavation.
- L. Employees shall not work in excavations in which there is accumulated water or in excavations in which water is accumulating unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shoring to protect from cave-ins, water removal to control the level of accumulating water, or use of a body harness and life line.
- M. If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation.
- N. Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided.
- O. Employees shall be protected from excavated materials or equipment that could fall or roll into excavations. Protection shall be provided by placing and keeping such materials or equipment no less than two feet from the edge of excavations or by using retaining devices that are sufficient to prevent materials or equipment from falling or rolling into the excavation.

- P. Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted before starting work and, as needed, throughout the shift. Inspections shall also be made after every rainstorm. Where the competent person finds evidence of a situation that could result in a possible cave-in, failure of protective systems, hazardous atmospheres, or other conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.
- Q. Where employees or equipment are required or permitted to cross over excavations, walkways or bridges with standard guardrails shall be provided.
- R. When excavations are left open, secured fencing with green screen shall be placed to adequately protect the public and employees.
- S. At the end of each workday, as much of the excavation as practical shall be closed. No more trenches shall be open at one time than is necessary.
- T. Proper warning devices shall protect any mechanical excavating equipment that is not returned to PPM Corporation Yard.
- U. When it is necessary to leave excavating equipment unattended, the blade, bucket, or scoop shall be lowered to the ground and the ignition system locked and keys removed.

## **PROCEDURES**

- A. Each employee in an excavation shall be protected from cave-ins by an adequate protective system, either sloping or benching, or by a shoring or shield system.
- B. When choosing a protective system, a competent person shall take into consideration soil type, vibration sources, previously disturbed soil, layered soil, presence of water, heavy equipment work adjacent to the excavation, limited work area, and other hazard-increasing conditions. (See section **PROTECTIVE SYSTEMS** for definitions.)
- C. Shoring and shield systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the shoring or shield system.
- D. Removal of shoring systems shall begin and progress from the bottom of the excavation. Members shall be released slowly so as to note any indication of possible cave-ins of the side of the excavation or possible failure of the remaining members.
- E. Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of a sudden lateral load.
- F. Employees shall be protected from the hazards of cave-ins when entering or exiting the areas protected by shields.

- G. Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.
- H. A registered professional engineer shall provide a design on a sealed drawing for sloping or benching, shoring or shielding, for excavations greater than 20-feet depth. Excavations less than 20-feet also have maximum slope requirements based on soil type.
- I. "Competent person" as used in this section is a person who meets all the requirements as set forth in CAL-OSHA, CCR, Title 8, Article 6, Excavations.

## PROTECTIVE SYSTEMS

### 1. Protective systems: Types

**Benching** means a method of protecting workers from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels. Benching cannot be done in Type C soil.

**Sloping** involves cutting back the trench wall at an angle inclined away from the excavation.

**Shoring** requires installing aluminum hydraulic or other types of supports to prevent soil movement and cave-ins.

**Shielding** protects workers by using trench boxes or other types of supports to prevent soil cave-ins. Designing a protective system can be complex because you must consider many factors: soil classification, depth of cut, water content of soil, changes caused by weather or climate, surcharge loads (e.g., spoil, other materials to be used in the trench) and other operations in the vicinity.

### 2. Protective Systems: Diagrams

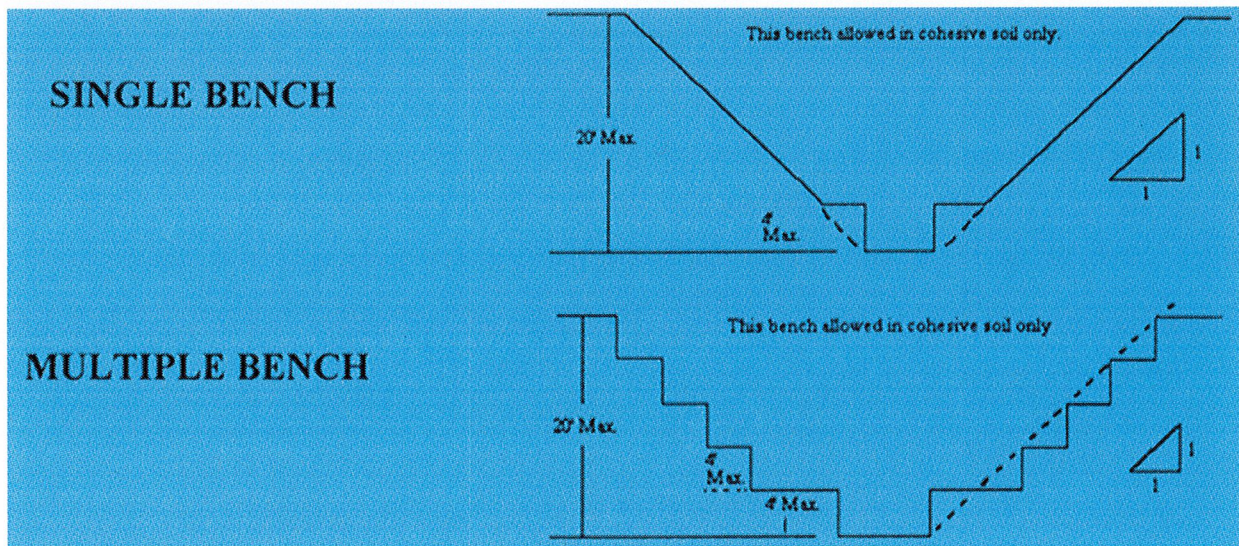


Figure 1 Benching (Single & Multiple)

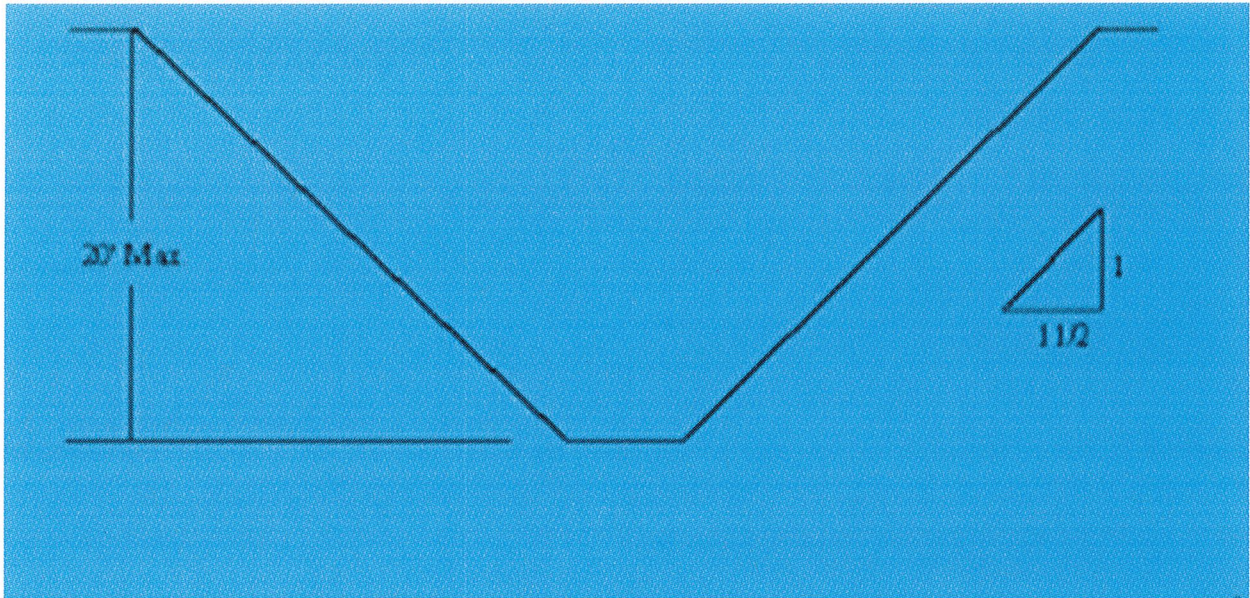


Figure 2 Slope 1 1/2:1

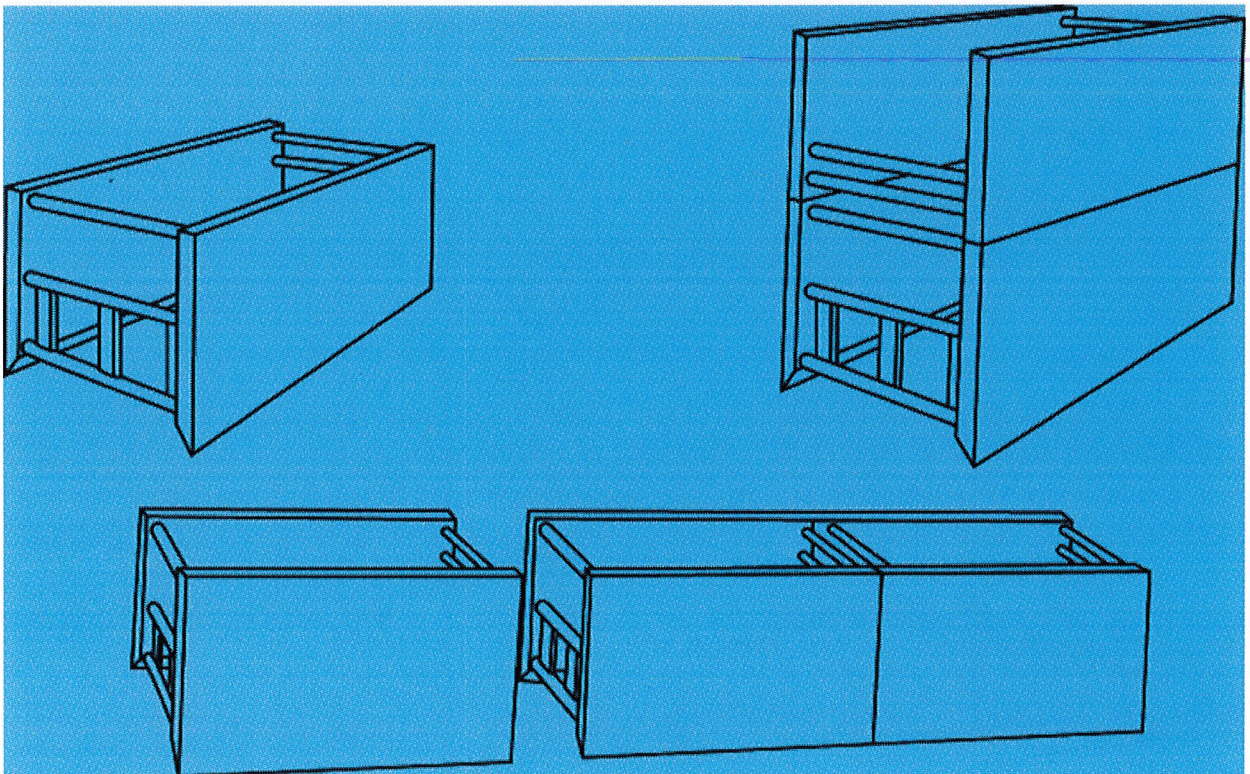


Figure 3 Trench Shields

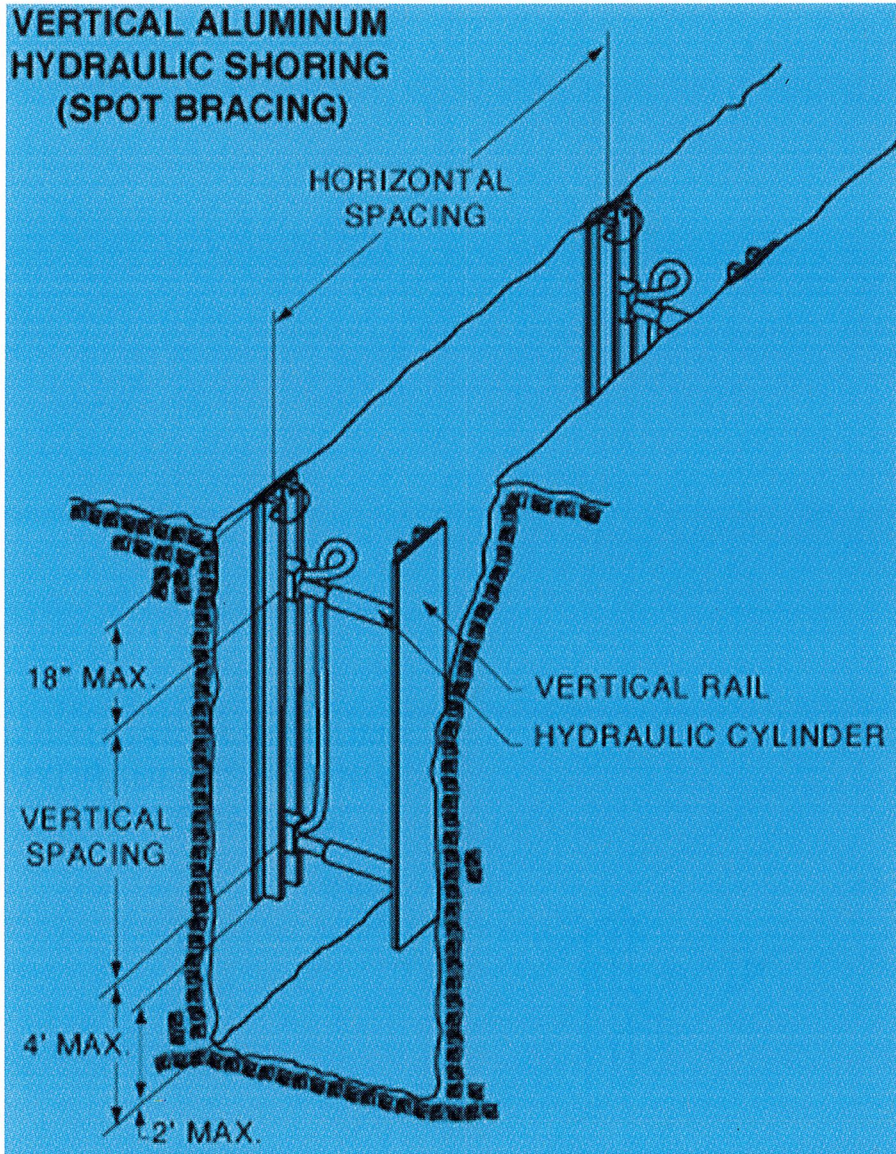


Figure 4 Hydraulic Shoring

**VI. REFERENCES**

CCR, Title 8, CSO Section 1504, Definitions

CCR, Title 8, CSO Section 1539-43, Excavations

CCR, Title 8, GISO Section 17953

**APPROVED**

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*09-04-19*  
 Date