



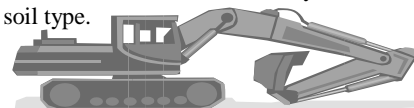
Company Name: \_\_\_\_\_ Job Site Location: \_\_\_\_\_

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ Finish Time: \_\_\_\_\_ Foreman/Supervisor: \_\_\_\_\_

## Topic 153: Safe Excavating and Shoring Operations (Part A)

**Introduction:** Trench cave-ins are the leading cause of death in trenching operations. Death may be caused by suffocation, but the force of a trench wall collapse has been known to embed the bodies of workers up to 12 inches into the opposing wall of the trench. Several factors can contribute to trench cave-ins and all should be addressed and safeguarded against in any trenching operation. The instability of soil which leads to cave-in may be either a natural property such as loose sandy soil, or the drying of previously stable soil as a result of being exposed by excavation. Instability may also be a result of external factors such as vibrations from traffic or machinery, pressure from heavy equipment or machinery, or adjacent structures. Safeguarding against cave-ins is accomplished by proper sloping or benching of trench walls, or proper support of walls by shoring or shielding. It is the law that one of these precautions be used on all trenches unless the excavation is made entirely in stable rock or the excavation is less than 5 feet in depth and has been examined by a competent person to ensure there is no potential for cave-in. Soil type must be known in order to determine which system or angle of slope to use, and should be determined by a trained competent person who must identify and classify the soil type.

**Sloping of trench walls** is the simplest way to ensure the safety of employees in a trench. However, sloping requires a significant increase in the volume of material to be excavated and stock-piled.

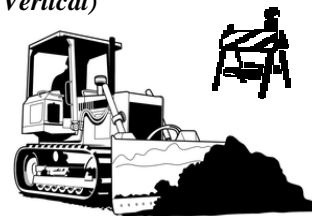


**Sloping for trench walls 20 feet or less in depth varies as follows:**

- Soil Type A:  $\frac{3}{4} : 1$ , ■ Soil Type B:  $1 : 1$ , ■ Soil Type C:  $1 \frac{1}{2} : 1$  ■ (Ratios are Horizontal : Vertical)

**Benching systems:** Benched (or stepped) trench walls should be built according to the following OSHA guidelines:

- No unsupported vertical side should be over 3 ½ feet
- Trenches less than 8 feet deep have a maximum allowable slope of  $\frac{3}{4}$  horizontal to 1 vertical
- Trenches 8 to 20 feet deep have a maximum allowable slope of 1 horizontal to 1 vertical
- Sloping or benching for excavations over 20 feet deep must be designed by a registered professional engineer.

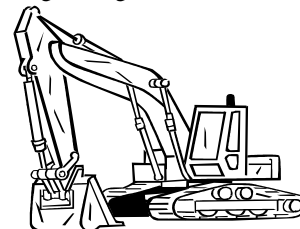


**Support Systems:** Design of support systems that are drawn from manufacturer's tabulated data must be in accordance with all specifications, recommendations, and limitations made by the manufacturer. Any deviations from those specifications are only allowed after the manufacturer issues specific written approval.

- Material and Equipment used for protective systems must be free from damage or defects that might impair their proper function.
- Manufactured materials and equipment used must be used and maintained according to manufacturer's recommendations.
- Damaged material or equipment must be inspected and approved before re-use.

**Installation and Removal of Support:** Members of support systems must be securely connected together to prevent sliding, falling, or kick outs.

- Support systems must be installed and removed in a manner that protects employees from cave-ins, structural collapse, or from being struck by members of the system.
- Do not subject individual members to loads they weren't designed for.
- Before temporary removal of individual members begin, additional precautions, such as installing other members, must be taken to ensure employee safety.
- Removal of shoring panels shall begin with lowest members and progress upward.
- Members must be released slowly to note any indication of remaining members failing or possible cave-in.
- Backfilling operations should be coordinated as closely as possible with removal of support systems.
- Top edge of support system shields should protrude at least 18 inches above the lip of the trench.
- Excavate no lower than 2 feet below the bottom of the support system and then only if the system is designed for the full depth of the trench and there is no indication of loss of soil from behind or below the system.
- Shields must be installed in a manner to restrict lateral or other hazardous movement.
- Employees must not be allowed inside shoring or shields when they are being installed, removed, or moved vertically.
- Employees shall be protected from cave-ins when entering or exiting the area protected by shields.
- Support systems must be examined at the beginning of each shift and after any incident, such as heavy rains, which may compromise integrity.



**Conclusion:** Proper sloping, benching, and shoring or support systems for trenches when applied according to regulation, will prevent injuries and fatalities caused by cave-ins. Carefully follow these guidelines for safe trenching operations.

### Work Site Review

Work-Site Hazards and Safety Suggestions: \_\_\_\_\_

Personnel Safety Violations: \_\_\_\_\_

**Employee Signatures:**

(My signature attests and verifies my understanding of and agreement to comply with, all company safety policies and regulations, and that I have not suffered, experienced, or sustained any recent job-related injury or illness.)

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**Foreman/Supervisor's Signature:** \_\_\_\_\_

These guidelines do not supersede local, state, or federal regulations and must not be construed as a substitute for, or legal interpretation of, any OSHA regulations.