
Introduction to Trenches and Excavations

2 Hour Course



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Introduction to Trenches & Excavations

About this Course

This awareness level course is designed for workers who perform work in and around trenches and excavations. This course will familiarize participants with recognizing and avoiding hazards associated with this type of work. This class will not certify workers as competent persons. This material was produced under grant number SH-05166-SH9 from the Occupational Safety and Health Administration, U.S. Department of Labor. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

Delivery Method

This course will be instructor led and delivered in person.

Course Prerequisites

- Participants must be employed at a company with fewer than 250 employees.
- By taking this course participants agree to participate in a 3 month follow up electronic survey through Survey Monkey.

Course Length

The minimum student contact hours for this course is **2** hours.

Registration

All attendees should be pre-registered for this course. If you need help registering for today's class please make the course instructor or program staff aware of this so that they can properly assist you. In order to receive a certificate of completion for attending this course all participants must sign the attendance roster located near the front of the classroom and complete an end-of-course evaluation form.

Contact Us:

OSHA Continuing Education
Department of Environmental Health
University of Cincinnati
Phone: 513-588-1393
Email: oshaed@ucmail.uc.edu
Resource Site: trenchingsafety.com

Course Takeaways

1. Worker Duties

- a. Obey safety regulations
- b. Follow the employer's health and safety rule
- c. Wear prescribed personal protective equipment while working

2. Worker Rights

- a. A safe workplace
- b. Certain employer provided information
- c. Make safety complaints
- d. Receive training
- e. Participate in OSHA inspections
- f. Refuse to perform dangerous work
- g. Examine OSHA records
- h. Hazardous chemical information
- i. Medical records
- j. Contest the abatement period
- k. Participate in enforcement proceedings
- l. "Whistleblow" on employers
- m. Protection from discrimination

3. Definitions

- a. **Excavation:** Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal
- b. **Trench:**
 - A narrow excavation (in relation to its length) made below the surface of the ground.
 - Generally deeper than it is wide, but not more than 15 ft. wide at the bottom.
 - Can also be made by having forms or other structures inside an excavation.

- c. **Cave-in:** Separation of a mass of soil or rock material from the side of an excavation....in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person
- d. **Hazardous Atmosphere:** An atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury
- e. **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 the collapse of adjacent structures.

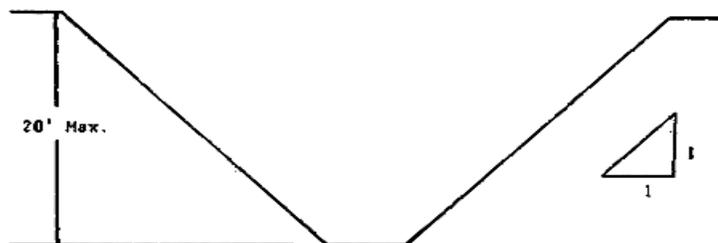
4. Common Hazards

- a. Underground Utilities
- b. Access and egress
- c. Equipment & Vehicular Traffic
- d. Hazardous Atmosphere
- e. Water Accumulation
- f. Stability

5. Avoiding Hazards

- a. Locating Utilities
- b. Ladders & Ramps
- c. Exposure Controls & Warning Systems
- d. Testing & Controls
- e. Dealing with Water
- f. Soil Support

6. Cave-in Protection



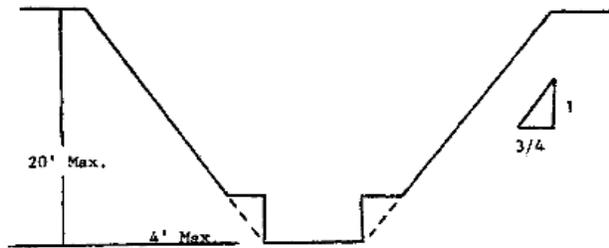
- a. Sloping

Image Courtesy of OSHA

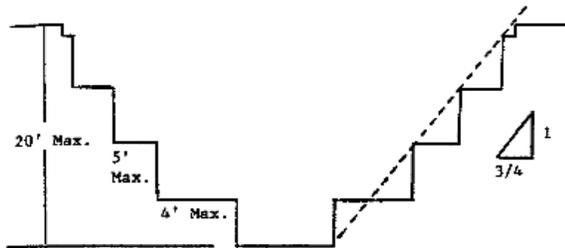
Soil or Rock Type	Maximum Allowable Slopes (H:V)(1) For Excavations Less Than 20 Feet Deep(3)
STABLE ROCK TYPE A (2) TYPE B TYPE C	VERTICAL (90°) 3/4:1 (53°) 1:1 (45°) 1 ½:1 (34°)

Table Courtesy of OSHA

b. Benching



SIMPLE BENCH



MULTIPLE BENCH
Image Courtesy of OSHA

c. Shoring



d. Shielding (boxing)



7. Responsibility and Benefits

a. Workers

- Report unsafe observations
- Follow safety rules and regulations
- Maintain their health and safety
- Improve safety culture and practices

b. Employer

- Provide competent person
- Strive for OSHA compliance, & correct known hazards
- Avoid costs associated with injuries & have a productive workforce

Guidelines for Uniform Temporary Marking of Underground Facilities

Adapted from a handout received from the Ohio Utilities Protection Service

Call 48 hours Before You Dig 1-800-362-2764 or 8-1-1

OHIO811.org

Use of markings

Use color-coded surface marks to indicate the location and route of buried lines with paint or a similar coating. Color-coded vertical markers (such as a temporary stake or flag) should supplement surface marks. All marks and markers should indicate the name, initials, or logo of the company that owns or operates the line and the width of the facility if it is greater than 50 mm (2"). If the surface over the buried line is to be removed, supplemental offset markings may be used. Offset markings should be on a uniform alignment and must clearly indicate that the actual facility is a specific distance away.

Location tolerance zone

Any excavation within the tolerance zone should be performed with hand tools until the marked facility is exposed. The width of the tolerance zone may be specified in law or code. If not, 500 mm (18") is required from each side of the facility. The tolerance zone includes the width of the facility and 500 mm (18") measured horizontally from each side of the facility.

Proposed excavation

Use white marks to show the location or boundary of a proposed excavation. Surface marks on the roadways should not exceed 40 mm by 500 mm (1 ½" x 18"). The facility color may be added to white flags or stakes.

One-call systems

One-call damage prevention systems should be contacted prior to excavating to prevent damage to buried facilities.

Adopt a uniform color code

See next page.

Utility Color Code Chart

ANSI standard Z53.1

RED	Electric Power Lines, Cables, Conduit and Lighting Cables
YELLOW	Gas, Oil, Steam, Petroleum or Gaseous Materials
ORANGE	Communication, Alarm or Signal Lines, Cables or Conduit
BLUE	Potable Water
PURPLE	Reclaimed Water, Irrigation and Slurry Lines
GREEN	Sewers and Drain Lines
PINK	Temporary Survey Markings
WHITE	Proposed Excavating

Additional Resources

- National Emphasis Program on Trenching and Excavation
<https://www.osha.gov/enforcement/directives/cpl-02-00-161>
- OSHA Safety and Health Topics Trenching and Excavation Webpage
<https://www.osha.gov/SLTC/trenchingexcavation/>
- NIOSH Trenching and Excavation Webpage
<https://www.cdc.gov/niosh/topics/trenching/>

Questions?

- If you have any questions or need assistance locating additional resources on Trench and Excavation Safety please contact us at:
 - (513) 558-1393
- If you are in danger at your job:
 - Contact your supervisor
 - Call OSHA 1-800-321-OSHA

Trenching and Excavation Safety

Trench collapses, or cave-ins, pose the greatest risk to workers' lives. When done safely, trenching operations can reduce worker exposure to other potential hazards include falls, falling loads, hazardous atmospheres, and incidents involving mobile equipment.

OSHA standards require that employers provide workplaces free of recognized hazards. The employer must comply with the trenching and excavation requirements of 29 CFR 1926.651 and 1926.652 or comparable OSHA-approved state plan requirements.

Trench Safety Measures

Trenches 5 feet (1.5 meters) deep or greater require a protective system unless the excavation is made entirely in stable rock. If less than 5 feet deep, a competent person may determine that a protective system is not required.

Trenches 20 feet (6.1 meters) deep or greater require that the protective system be designed by a registered professional engineer or be based on tabulated data prepared and/or approved by a registered professional engineer in accordance with 1926.652(b) and (c).

Competent Person

OSHA standards require, before any worker entry, that employers have a competent person inspect trenches daily and as conditions change to ensure elimination of excavation hazards. A competent person is an individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to workers, soil types and protective systems required, and who is authorized to take prompt corrective measures to eliminate these hazards and conditions.

Access and Egress

- Keep heavy equipment away from trench edges.
- Identify other sources that might affect trench stability.
- Keep excavated soil (spoils) and other materials at least 2 feet (0.6 meters) from trench edges.
- Know where underground utilities are located before digging.

- Test for atmospheric hazards such as low oxygen, hazardous fumes and toxic gases when > 4 feet deep.
- Inspect trenches at the start of each shift.
- Inspect trenches following a rainstorm or other water intrusion.
- Do not work under suspended or raised loads and materials.
- Inspect trenches after any occurrence that could have changed conditions in the trench.
- Ensure that personnel wear high visibility or other suitable clothing when exposed to vehicular traffic.

Protective Systems

There are different types of protective systems.

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.

Additional Information

Visit OSHA's Safety and Health Topics webpage on trenching and excavation at www.osha.gov/trenching.

Workers' Rights

Workers have the right to:

- Working conditions that do not pose a risk of serious harm.
Receive information and training (in a language and vocabulary the worker understands) about workplace hazards, methods to prevent them, and the OSHA standards that apply to their workplace.
- Review records of work-related injuries and illnesses.
- File a complaint asking OSHA to inspect their workplace if they believe there is a serious

hazard or that their employer is not following OSHA's rules. OSHA will keep all identities confidential.

- Exercise their rights under the law without retaliation, including reporting an injury or raising health and safety concerns with their employer or OSHA. If a worker has been retaliated against for using their rights, they must file a complaint with OSHA as soon as possible, but no later than 30 days.

For additional information, see OSHA's Workers page (www.osha.gov/workers).

How to Contact OSHA

Under the Occupational Safety and Health Act of 1970, employers are responsible for providing safe and healthful workplaces for their employees. OSHA's role is to help ensure these conditions for America's working men and women by setting and enforcing standards, and providing training, education and assistance. For more information, visit www.osha.gov or call OSHA at 1-800-321-OSHA (6742), TTY 1-877-889-5627.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.



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