

*Sample Lesson Plan
Construction Training Program (10-hour)*

Topic: Excavations

Overview of OSHA Standard

Cave-ins are perhaps the most feared trenching hazard. But, other potentially fatal hazards exist, including asphyxiation due to lack of oxygen in a confined space, inhalation of toxic fumes, drowning, etc. Electrocution or explosions can occur when workers contact underground utilities. OSHA requires that workers in trenches and excavations be protected, and that safety and health programs address the variety of hazards they face.

The OSHA standards intend to protect workers in excavations and trenches. Basically, these standards require that walls and faces of all excavations in which workers are potentially exposed to danger from moving ground be guarded by a shoring system, safe sloping of the ground, or equivalent means of protection such as trench shield or boxes. However, the standards are applicable only to trenches 5 feet or more in depth.

The standard applies to all open excavations made in the earth's surface, which includes trenches. OSHA defines a trench as a narrow excavation made below the surface of the ground in which the depth is greater than the width-the width not exceeding 15 feet. An excavation is any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal. This can include excavations for anything from cellars to highways.

Step 1: Planning the Lesson

• Instructional Materials.

1. PowerPoint presentation.
2. Instructor notes.
3. Other materials.

• Instructional Objectives.

1. Complete the required topics for the OSHA 10-hour course.
2. Complete the following optional topics:
 - a.
 - b.
 - c.
3. Present *Excavations* to [number] participants.
4. Incorporate active participation in each lesson.
5. Provide a quiz or short evaluation at the end of the course.
6. Ensure feedback from participants at various points in the training.

• Guest Speakers/Presenters and Topics/Responsibilities.

Step 2: Presenting the Lesson

- **Lesson Introduction.**

Introductory remarks or transition from previous lesson.

- **Learning Objectives/Outcomes.**

Upon completion of the lesson, participants will be able to:

1. State the greatest risk that is present at an excavation.

Possible response.

- Cave-ins.

Note: Several other risks exist (drowning, asphyxiation, falling, etc.); however, the possibility of cave-in is present for every excavation, and impacted by multiple factors.

2. Briefly describe the three main methods for protecting employees from cave-ins.

Possible responses.

- Sloping. A technique that employs a specific angle of incline on the sides of the excavation. Angle varies based on assessment of impacting site factors.
- Shielding. A structure able to withstand cave-in and protect employees.
- Shoring. A structure that supports the sides of an excavation and protects against cave-ins.

3. Name at least three factors that pose a hazard to employees working in excavations, and at least one way to eliminate or reduce each of the hazards.

Possible responses.

Potential Hazard

- Cave-in
- Soil Type
- Water
- Vehicles and equipment
- Spoil pile

Potential Solution(s)

- Sloping, shielding or shoring
- Assessment of proper protective system by competent person
- Proper drainage and protective system
- Barricades, “stop” logs, grade soil away from excavation, fencing
- Place more than 2 feet from edge of excavation

• **Learning Objectives/Outcomes. (Continued).**

(Possible responses for Objective 3 continued)

Potential Hazard

- Crane operation

- Asphyxiation

- Access/egress

Potential Solution(s)

- Operate as far away from the edge of the excavation as possible; not closer than two feet

- Ensure testing of space by competent person; emergency recovery plan in place and ready to be implemented, if needed

- Proper design, positioning and use of structural ramps and ladders

4. Describe the role of a competent person at an excavation site.

Possible responses.

- Trained and knowledgeable in soil analysis, use of protective systems, and requirements of the standard.

- Site evaluation/planning responsibilities:

<ul style="list-style-type: none"> ┆ evaluate soil conditions ┆ contact utilities for locations of underground lines ┆ test for low oxygen and/or be prepared to test as excavating proceeds ┆ ensure protection from water accumulation 	<ul style="list-style-type: none"> ┆ select and oversee construction of proper protective systems ┆ traffic control ┆ ensure safe access to/from and in/out of the excavation
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- Inspection of excavation:

<ul style="list-style-type: none"> ┆ inspect site daily, before work starts, after a rainstorm, or during other inclement weather conditions such as high winds ┆ look for evidence of potential cave-ins, indication of failure of protective systems, hazardous atmospheres or other hazardous conditions

- **Learning Objectives/Outcomes. (Continued).**

(Possible responses for Objective 4 continued)

- remove employees from hazardous areas and ensure employees do not return until necessary precautions have been taken

- **Planned Activities, Discussion, or Participant Interaction**

Step 3: Evaluating Student Learning and Instruction

- **Lesson Evaluation and Comments.**

References

OSHA Standard: 29 CFR 1926 Subpart P (1926.650 to 1926.652)

- www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_P.html

OSHA Publications

- www.osha-slc.gov/OshDoc/Additional.html
- 2226 Excavations

OSHA References/Resources

- Construction Safety and Health Outreach Program
 - www.osha-slc.gov/doc/outreachtraining/htmlfiles/excavate.html
- Electronic library of Construction Occupational Safety and Health - Safety Hazards - Trenches and Excavations
 - www.cdc.gov/niosh/elcosh/docs/hazard/safety.html
- OSHA Construction eCAT - Trenching and Excavation
 - www.osha-slc.gov/SLTC/construction_ecat/trenching/mainpage.html
- OSHA Technical Links - Construction: Trenching and Excavation
 - www.osha-slc.gov/SLTC/constructiontrenching/index.html