

*OSHA Consultation's  
Construction Industry Series:  
Trenching & Excavation*



**Oklahoma Department of Labor**

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# Trenching & Excavation

Trenching and excavation is recognized as one of the most hazardous construction operations. The Occupational Safety & Health Administration (OSHA) recently revised Subpart P, Excavations, to make the standard easier to understand, permit the use of performance criteria where possible, and provide construction employers with options when classifying soil and selecting employee protection methods.

Fatalities and injuries can be prevented and construction can be a safe occupation when workers are aware of the hazards, and an effective Safety & Health Program is used.

Cave-ins are perhaps the most feared trenching hazard and one of the most difficult hazards to control. Unsafe trenches are the greatest killers. By their nature trenches tend to be temporary (short term) with less attention given to safe procedure. They are also more confining making escape more difficult. 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.

Excavation-related fatalities in the United States according to Bureau of Labor Statistics (BLS) data:

<b>YEAR</b>	<b>FATALITIES</b>
1994	47
1995	39
1996	50
1997	50
1998	42

OSHA requires that workers in trenches and excavations be protected, and that safety and health programs address the variety of hazards they face. The following hazards cause the most trenching and excavation injuries:

- No protective system
- Failure to inspect trench and protective systems
- Unsafe spoil-pile placement
- Unsafe Access/Egress

All excavations are hazardous because they are inherently unstable. If they are restricted spaces they present the additional risks of oxygen depletion, toxic fumes, and water accumulation. If you are not using protective systems or equipment while working in trenches or excavations at your site, you are in danger of suffocating, inhaling toxic materials, fire, drowning, or being crushed by a cave-in.

Pre-planning is vital to accident-free trenching; safety cannot be improvised as work progresses.

## **No Protective System**

### ***How To Avoid Hazards***

The following concerns must be addressed by a competent person:

- Evaluate soil conditions and select appropriate protective systems.
- Construct protective systems in accordance with the standard requirements.
- Pre-plan; contact utilities (gas, electric) to locate underground lines, plan for traffic control if necessary, determine proximity to structures that could affect choice of protective systems.
- Test for low oxygen, hazardous fumes and toxic gases, especially when gasoline engine-driven equipment is running, or the dirt has been contaminated by leaking lines or storage tanks. Insure adequate ventilation or respiratory protection, if necessary.
- Provide safe access into and out of the excavation.
- Provide appropriate protections if water accumulation is a problem.
- Inspect the site daily at the start of each shift, following a rainstorm, or after any other hazard-increasing event.
- Keep excavations open the minimum amount of time needed to complete operations.

## **Failure to Inspect Trench and Protective System**

If trenches and excavations at your site are not inspected daily for evidence of possible cave-ins, hazardous atmospheres, failure of protective systems, or other unsafe conditions, you are in danger.

### ***How To Avoid Hazards***

Inspect excavations:

- Before construction begins.
- Daily before each shift.
- Following rainstorms or other hazard-increasing events (such as a vehicle or other equipment approaching the edge of an excavation).

Inspections must be conducted by a competent person who:

- Has training in soil analysis.
- Has training in the use of protective systems.
- Is knowledgeable about the OSHA requirements.
- Has authority to immediately eliminate hazards.

## Unsafe Spoil-Pile Placement

Excavated material (spoils) at your site are hazardous if they are set too close to the edge of a trench/excavation. The weight of the spoils can cause a cave-in, or spoils and equipment can roll back on top of workers, causing serious injuries or death.

### *How To Avoid Hazards*

Provide protection by one or more of the following:

- Set spoils and equipment at least 2 feet back from the excavation.
- Use retaining devices, such as a trench box, that will extend above the top of the trench to prevent equipment and spoils from falling back into the excavation.
- Where the site does not permit a 2 foot set back, spoils may need to be temporarily hauled to another location.

## Unsafe Access/Egress

To avoid fall injuries during normal entry and exit of a trench or excavation at your job site, ladders, stairways, or ramps are required. In some circumstances, when conditions in a trench or excavation become hazardous, survival may even depend on how quickly you can climb out.

### *How To Avoid Hazards*

- Provide stairways, ladders, ramps, or other safe means of egress in all trenches that are 4 feet deep or more.
- Position means of egress within 25 lateral feet of workers.
- Structural ramps that are used solely for access or egress from excavations must be designed by a competent person.
- When two or more components form a ramp or runway, they must be connected to prevent displacement, and be of uniform thickness.
- Cleats or other means of connecting runway components must be attached in a way that would not cause tripping (e.g., to the bottom of the structure).
- Structural ramps used in place of steps must have a non-slip surface.
- Use earthen ramps as a means of egress only if a worker can walk them in an upright position, and only if they have been evaluated by a competent person.

Trenching and excavation work presents serious risks to all workers involved. The greatest risk is cave-ins. When cave-in accidents occur, they are much more likely to result in worker fatalities than other excavation-related accidents. However, having and following a comprehensive safety and health program and compliance with the standards will prevent or greatly reduce the risk of cave-ins as well as other excavation-related accidents.

# For more information about trenching & excavation. . .

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