

Safety Newsletter

May, 2014

This Month's Topic: Trenching & Excavation Safety

Excavating is recognized as one of the most hazardous construction operations. 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.

Trenches & Excavation

An excavation is any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal.

Trench (Trench excavation) means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 meters).

Preplanning

No matter how many trenching, shoring, and backfilling jobs you have done in the past, it is important to approach each new job with the utmost care and preparation. Many on-the-job accidents result directly from inadequate initial planning. Waiting until after the work has started to correct mistakes in shoring or sloping slows down the operation, adds to the cost, and increases the possibility of a cave-in or other excavation failure.

OSHA Guidelines

Let's go over the main points of OSHA's rules for trenches to see how to keep workers safe. All trenches must follow OSHA's rules. One cubic yard of soil can weigh as much as a car, nearly 3,000 pounds, so unless the trench is cut entirely into stable rock, protection against cave-ins must be used for all trenches more than 5 feet deep (PG&E trenching requirement is 4 feet deep) or for any trench that show signs of cave-in.

Before workers can do any work in a trench, a competent person must conduct an inspection to identify and remove any potential hazards. A competent person is someone who can recognize hazards in the area and who has authority to take quick actions to eliminate the hazard, which may include temporarily stopping the work.

Inspections must be performed at the start of every shift, after a rainstorm, or whenever conditions change. The competent person must also test the soil in a trench. OSHA requires at least one test by looking at the soil and at least one test by hand. If a person knows the soil types, they can pick the right protective system to keep workers safe when they're in trenches.

OSHA classifies soil in a trench as stable rock, type A, type B, or type C soil. Stable rock is the safest soil for a trench, type A is the next most stable, and then type B, and finally type C soil is the least stable. It's important to remember that trenches can have different types of soil based on depth and climate conditions. The competent person can choose from different protective systems for a trench, based on the types of soil found. For all trenches deeper than 5 feet deep or for any trench that shows signs of cave-in, OSHA requires sloping, benching, shoring, or shielding to protect workers from cave-ins.

Alisto Engineering 2014 Safety Statistics

Motor Vehicle Accidents/ Total Miles Driven (01/01/14 – 03/30/14)	Lost Work Days/ Total Work Days (01/01/14 – 03/30/14)	Occupational Injuries and Illnesses (01/01/14 – 03/30/14)
0/ 53,943 miles	0 days*/ 60 days	0*

* From Edgewood Partners Insurance Center

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.



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.

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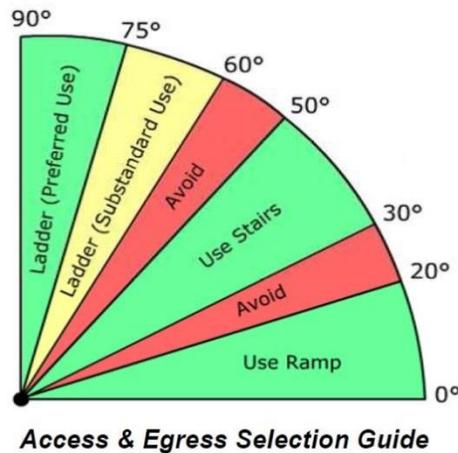
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Access & Egress for Excavations

OSHA requires safe access and egress to all excavations, including ladders, steps, ramps, or other safe means of exit for employees working in trench excavations 4 feet (1.22 meters) or deeper. These devices must be located within 25 feet (7.6 meters) of all workers.

The decision to choose a ramp, stair system or ladder for accessing and regressing from an excavation or trench depends largely on the allowable slope or angle that the sides (or ends) are cut back.



General Trenching & Excavation Rules

- Do not enter an unprotected trench!
- Keep heavy equipment away from trench edges.
- Keep surcharge loads at least 2 feet (0.6 meters) from trench edges.
- Know where underground utilities are located.
- Test for low oxygen, hazardous fumes and toxic gases.
- Inspect trenches at the start of each shift.
- Inspect trenches following a rainstorm.
- Do not work under raised loads.

References:

1. https://www.osha.gov/Publications/trench_excavation_fs.html
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“Always pay close attention to the type of soil you are excavating. Certain soils can collapse easier than others. Make sure there is always an escape route such as a ramp or a ladder.”

Zachary Leonard
 Construction Manager,
 Alisto Engineering Group, Inc.

Trenching Facts:

- Two workers are killed every month in trench collapses.
- The fatality rate for excavation work is 112% higher than the rate for general construction.
- Soil is heavy. A cubic foot can weigh as much as 114 pounds, and a cubic yard can weigh over 3,000 lb. - as much as a pick-up truck!
- A person buried under only a few feet of soil can experience enough pressure in the chest area to prevent the lungs from expanding. Suffocation can take place in as little as 3 minutes.
- Heavier soils can crush and distort the body in a matter of seconds.
- One useful instrument for measuring soil strength is a **penetrometer**. When you press this instrument into a soil sample, it measures its unconfined compressive strength in tons per square foot (tsf).