

Excavation and Trenching Safety

Background

Each year dozens of people around the country die while working in trench collapses. In fact, there has been an increase in trench related fatalities over the last few years. In nearly all of these incidents, proper precautions were not taken to ensure that the excavation site or trench was stable and that employees were protected from cave-ins.

Requirements

Trench Safety Measures

Excavations and trenches that are five feet deep or greater require a protective system to be in place prior to entry. Trenches that are 20 feet deep or greater require that the protective system is designed by a registered professional engineer or be based on data prepared and or/approved by a registered professional engineer in accordance with 1926.625 (b) and ©.

Competent Person

A competent person is an individual who is capable of the following:

- Identifying existing and anticipated hazards and hazardous working conditions
- Understands soil types and the protective systems required
- Authorized to take prompt corrective measures to eliminate hazards and stop work if required.

Before entering a trench or excavation, a competent person is required to perform an inspection of the site. Inspections must be performed daily and as conditions change to ensure excavation hazards are eliminated as soon as possible.

Access and Egress

Safe means of entering and exiting excavations are required when a depth of four feet or greater is reached. Ladders, steps, ramps or other safe access devices must be located within 25 feet of all workers.

General Rules

- Ensure utility locates have been performed prior to starting work
- Keep heavy equipment and vehicles away from the edges of trenches
- Excavated soil (soils) and other materials must be kept at least two feet away from trench edges
- Test for atmospheric hazards (oxygen, hazardous fume, toxic gases, etc.) using a 4-gas meter when trenches are 4 feet deep or greater.
- Inspect trenches before each shift, after rainstorms or water intrusion, or after any event that could change the trench conditions.
- Do not work under suspended or overhead materials.
- Wear high-visibility clothing that is at least ANSI Class 2 when working near equipment or vehicle traffic.

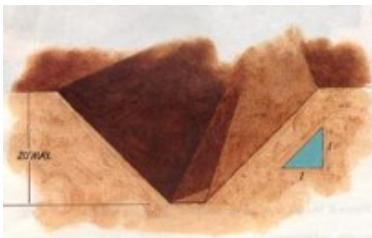


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Protective Systems

There are three primary types of protective systems used to prevent trench collapse and cave-ins.

1. Sloping– This involves cutting back the trench walls so that they are angled away from the trench bottom. The slope of the walls is determined by the soil type.



2. Shoring- Installing metal hydraulic or other similar types of supports to prevent cave-ins.



3. Shielding- This method involves using a designed and rated trench box to prevent soil cave-ins.



Soil Classification

When choosing a protective system to prevent trench collapse, the type of soil must be considered. There are five different soil types that must be considered by the competent person when deciding which one(s) exist on a particular work site.

1. Stable Rock– Usually identified by a rock name such as sandstone
2. Type A Soils– Examples include clay silty clay, sand clay, and clay loam. Type A cannot be previously disturbed or fissured.
3. Type B Soils– Examples include angular gravel, silt, and silt loam
4. Type C Soils– Examples include gravel, sand, loamy sand, submerged soil, and soil that have water freely seeping from it.
5. Multi-type Soil– This exists when there are layered soil types in an excavation. The soil must be classified based on the weakest soil layer.

The amount of cohesive material in the soil plays the largest role in determining its stability and compressive strength. The competent person is responsible for determining the compressive strength of the soil so that an appropriate protective measure can be selected and implemented to prevent cave-ins. A common tool used to measure compressive strength is the Pocket Penetrometer, which gives a value in tons per square foot (tsf) or kilopascal (kPa).

Questions

If you have questions on this topic, please contact Health, Safety, and Risk Management (HSRM) at (612) 626-6002.

Website: <http://hsrm.umn.edu>