

Trenching Safety

The Occupational Safety and Health Administration (OSHA) has revised the Trenching requirements (CFR 1926.650, Subpart P) due to the high number of Cave-in accidents nationwide.

The focus of the revision is to safeguard employees who work in excavations from cave-in accidents and other hazards associated with trenching operations.

The new requirements apply to all excavations 4 to 20 Feet deep. Special rules apply for excavations deeper than 20 feet.

Safe Trenching Procedures:

1) Utility Location:

Before any excavation can begin, except remote areas, the existing underground utilities must be located and marked by the appropriate agency. This is usually a free service provided by a Locator company who is paid by the utilities companies as any disruption in service will cost them a lot of money in lost business and cost to repair.

2) Competent Person:

There must be a competent person present on the job while excavation work is being done. A competent person is defined as an individual who is capable of identifying existing hazards and who has the authority to make prompt corrective measures.

3) Soil Analysis:

The competent person must have knowledge of the types of soil to be excavated. A Soil Analysis must be performed to identify the class of soil.

- a) Visual test is where the competent Person examines the soil to see the characteristics of the soil, such as wet, dry, loose, sand, clay, etc.
- b) manual test must be performed where the Competent person presses a thumb (thumb test) or rolls the soil in the hand (hand test) to identify the density of the soil.
- c) Soil is classified into 3 categories:

- 1) **Type A** - soil is solid rock, clay and tough mud. Due to the density of the soil it would present the least exposure to cave-in accidents due to its stability and weight.
- 2) **Type B** - soil is somewhat solid gravel, crushed rock and silt.
- 3) **Type C** - soil is loose gravel, soil with water present and any re-worked soil.

d) **Protective System:**

Once the soil is classified a protective system must be selected to prevent cave-in's. Protective Systems include:

- 1) Sloping- excavate to form sides that re inclined away from the center of the excavation. The angle of the slope is a function the soil type. The slope will vary according to the soil class. The slopes horizontal to vertical ratio is used to determine the incline.

Type A soil: Side walls must be sloped at 53 degrees for a slope of $\frac{3}{4} : 1$. So for every 1 foot deep you dig the side wall must spread $\frac{3}{4}$ wide.

Type B soil: Side walls must be sloped at 45 degrees for a slope of 1: 1. So, for every 1 foot deep you dig the side wall bust be 1 foot out. For example, a 12 foot deep excavation would require a 12 foot wide opening, from top edge to the other top edge.

Type C soil: Side walls must be sloped a 34 degrees for a slope of $1 \frac{1}{2} : 1$.

- 2) Shoring- to prevent cave-ins a structure such as metal , hydraulic or a timber system can be used to that supports the lateral edges of the excavation.
- 3) Sheetting- using upright members, such as thick metal strips that connect vertically to retain the excavation.
- 4) Shields- this is the use of trench boxes or trench shields. The trench boxes must be certified as safe by a registered professional engineer prior to use.

4) Hazardous Atmospheres:

The area to be excavated must be evaluated for the possibility of hazardous elements in the excavation. Hazards such as:

- natural gas line
- low oxygen levels
- chemical tanks
- pipes
- electrical voltage lines

These hazards must be identified and marked and appropriate safety precaution taken to prevent injury to employees. This may include emergency rescue equipment.

Personal Protection Equipment (PPE) such as hard hats, hard sole shoes, long pants, and eye protection should be worn at all times by workers.

5) Entrance and Exit:

A safe means to enter and exit the excavation must be provided for workers. This should include ladders, steps, ramps or other appropriate means. Equipment should never be used for entry nor exit. Exits must not be more than 25 feet apart.

6) Excavation Jobsite Area:

The general area around the site should be controlled.

- Traffic which is in close proximity to the excavation should be controlled with safety controls such as road sign that indicate *Men Working*, flagmen and PPE such as high visibility vest and hard hats.
- Water, if any, must be removed form the excavation.
- Equipment should have back-up alarms
- Personal Protection Equipment must be work such as hard hats, long pants, work boots and eye protection and gloves available.
- Edge Wall- all equipment, tools, materials, barricades and hoses must be at least 2 feet from the trench edge to prevent it from falling on workers'.
- Fall Protection should be provided if workers must cross the trench opening with walkways and guardrails.

7) Documentation:

As with all OSHA program documentation of activities is required and must be kept on the jobsite. Required documentation includes:

- any tabulated data or calculations done to establish the best configuration of the protective system.
- name and number of the Professional Engineer
- Daily documented Inspection of the Excavation site
- Noted changes in soil condition due to rain, vibration or erosion.
- If excavation is over 20 feet deep a Professional Engineer must on the site at all times.

Trenching Operations Procedures- Daily Review Form

Job Name: _____ Location: _____

1) Has all the Utilities been identified and marked by a locator service?
Yes _____. By Whom _____. No_____ Do not continue.

2) Competent Person is: _____.

3) Soil Test Performed by: _____ Date: _____.

Results of the visual test are: _____.

Results of Manual test are: _____.

The Soil for this excavation is Type: _____.

4) Protective System to be used based on the Soil Test is: _____
_____.

5) Atmosphere Hazard: (any expectation of natural gas lines, high voltage lines? If so, what precautions have been taken to protect workers?
_____.

6) Lateral Support- are any building, roads, towers or other structures at risk of losing structural integrity due to the excavation? _____.
If so, will lateral supports be installed? _____.

7) If traffic exist are adequate road controls in place?_____.

8) Is there a safe way for workers to enter and exit such as a ladder _____.

9) Is Personal Protection Equipment being used such as hard hats, work boots, highly visible vest and eye protection _____.

Completed by: _____ Date: _____.