Trenching and Excavation Standards – Quick Tips

OSHA recognizes excavating as one of the most hazardous activities of a construction operation. OSHA revised Subpart P-Excavations, of 29 CFR 1926.650, .651, and .652 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.

Excavating and trenching are defined as two separate items within the OSHA regulations. Excavating is any man-made cut, cavity, trench or depression in an earth surface formed by earth removal. Trenching is defined as 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. If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet or less (measured at the bottom of the excavation), the excavation is also considered a trench.

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres or other hazardous conditions. The designated competent person shall be able to demonstrate the following:

1. Training, experience and knowledge of:
    - Soil analysis
    - Use of protective systems
    - Requirements of 29 CFR Part 1926, Subpart P
2. Ability to detect:
    - Conditions that could result in cave-ins
    - Failures in protective systems
    - Hazardous atmospheres
    - Other hazards including those associated with confined spaces
3. Authority to take prompt corrective measures to eliminate existing and predictable hazards and stop work when required.

An inspection shall be conducted and documented by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard-increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated. The following list specifies the frequency and conditions requiring inspections:

- Daily and before the start of each shift
- As dictated by the work being done in the trench
- After every rainstorm
- After other events that could increase hazards, e.g. snowstorm, windstorm, thaw, earthquake, etc.
- When fissures, tension cracks, sloughing, undercutting, water seepage, bulging at the bottom or other similar conditions occur
- When there is a change in the size, location or placement of the spoil pile
- When there is any indication of change or movement in adjacent structures

Where a competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Trenches of 4-foot or more in depth should be provided with a fixed means of egress. Spacing between ladders or other means of egress must be such that a worker will not have to travel more than 25-feet laterally to the nearest means of egress. Ladders must be secured and extend a minimum of 36-inches above the landing. Metal ladders should be used with caution, particularly when electric utilities are present.

OSHA categorizes soil and rock deposits into four types as follows:

1. **Stable rock** is a natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed. Most of the time it is identified by a rock name such as granite or sandstone. Determining if a deposit is of this type may be difficult unless it is known whether cracks exist and whether or not the cracks run into or away from the excavation.
2. **Type A soils** are cohesive soils with an unconfined compressive strength of 1.5 tons per square foot or greater. These types of soils are often clay, silt clay, sandy clay, clay loam and in certain cases, silty clay loam and sandy clay loam.
3. **Type B soils** are cohesive soils with an unconfined compressive strength greater than 0.5, but less than 1.5 tons per square foot. Examples of types of soils within this category are angular gravel silt, silt loam and/or previously disturbed soils unless otherwise classified as type C soil.
4. **Type C soils** are cohesive soils with an unconfined compressive strength of 0.5 tons per square foot or less. Granular soils like gravel, sand and loamy sand, submerged soil, soil form which water is freely seeping and submerged rock that is not stable fall into the type C soil category.
5. **Layered geological strata** are soils that are configured in layers of several different soil types/categories. This type of soil condition must be classified on the basis of the soil type within the various layers that is the weakest of the soil type/layers. Each layer may be classified individually if a more stable layer lies below the less stable layer, eg., where a type C soil rests on top of stable rock.

The OSHA regulation identifies the following types of test equipment and several methods to be used for evaluation of soil types:

1. Pocket Penetrometers are a direct reading, spring-operated instruments used to determine the unconfined compressive strength of saturated cohesive soils. Once pushed into the soil, an indicator sleeve displays the reading. This type of instrument reads out in either tons per square foot or kilograms per square centimeter.
2. Plasticity or wet thread test is conducted by molding a moist sample of the soil into a ball and attempting to roll it into a thin thread, approximately 1/8-inch diameter by 2 inches in length. The soil sample is held by one end. If the

sample does not break or tear, the soil is considered cohesive.
3. Visual test is a qualitative evaluation of conditions around the site. In a visual test, the entire excavation site is observed, including the soil adjacent to the site and the soil being excavated. If the soil remains in clumps, it is cohesive; if it appears to be coarse-grained sand or gravel, it is considered granular. The evaluator shall also check for any signs of vibration.

During a visual test, the evaluator should check for crack-line openings along failure zones that would potentially indicate tension cracks. Evaluator should also look for existing utilities that indicate that the soil has previously been disturbed, and observe the open side of the excavation for indications of layered geologic structuring.

The evaluator should also look for signs of bulging, boiling or sluffing, as well as for signs of surface water seeping from the sides of the excavation or from the existing water table. If there is standing water in the cut, the evaluator shall check for quick conditions. In addition, the area adjacent to the excavation shall be checked for signs of foundations or other intrusions into the failure zone and the evaluator should check for surcharging and the spoil distance from the edge of the excavation.

The specific terminology and definitions to the various terms used throughout the specific excavating and trenching regulations are detailed within the OSHA standards that pertain to this topic.

Grainger offers several soil testing devices (penetrometers) that are required by OSHA for all excavation sites where trenching takes place.

Source

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