

Southern California Trade Contractors Association

Safety Newsletter

2nd Quarter, 2015

Trench and Excavation Safety

There are many potential hazards when working in excavations and trenches. Probably the most common hazard at any work site is the threat of cave-in. A cave-in occurs when walls of an excavation collapse. Cave-ins can be deadly. Wall failures often occur suddenly, with little or no time for the worker to react. The weight of the soil crushes and twists the body, causing death or serious injury in a matter of minutes. Excavations need not be deep or large to create a life threatening hazard, so every excavation must be taken seriously.

Why do cave-ins occur? Undisturbed soil is kept in place by natural horizontal and vertical forces of the nearby soil. When we dig in the earth, these natural forces are no longer able to hold back the soil left behind. With no support, eventually the laws of gravity take over, and the soil from the excavation walls move downward and inward into the excavation. The result is a cave-in. Cave-ins are more likely to occur in unprotected excavations where:

- The excavation is dug in unstable soil, or in soil that has been dug in before
- There is excessive vibration from construction equipment or vehicle traffic around the excavation.
- Too much weight near the sides of an excavation, most frequently from equipment or the excavated material (spoil pile) too near to the edge.
- Water has collected in the excavation.
- Changes in weather conditions (freezing, melting, sudden heavy rain, etc.)

Properties of Soil

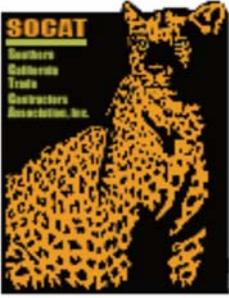
Soil is a mixture of sand, gravel, silts, clay, water, and air. The amounts of these ingredients determine its "cohesiveness", or how well a soil does not crumble. It can be molded easily when wet, and is hard to break up when dry. Clay is a very fine grained soils, having little cohesiveness and often called granular. Generally speaking, the more clay that is in the soil being excavated, the better the trench walls will hold up.

Another factor in soil cohesiveness is water. Soil that is filled with water is termed saturated. Saturated soil does not hold together well, and is particularly dangerous in excavation work. However, the opposite can also be true. Soil that has little or no water in it, or oven-dry, can crumble easily, and will not hold together when excavated.

Solid is heavy. A cubic foot can weigh as much as 114 pounds, and a cubic yard, a cube 3 foot x 3 foot x 3, can weigh over 3,000 lb. – as much as a pick-up truck! Most workers don't realize the force that will hit them when a cave in occurs. 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 three minutes. Heavier soils can crush and distort the body in a matter of seconds. It's no wonder trench accidents involve so many deaths and permanently disabling injuries.

Soil Classifications

OSHA classifies soils into four categories: Solid Rock, Type A, Type B, and Type C. Solid Rock is the most stable, and Type C soil is the least stable. Soils are typed not only by how cohesive they are, but also by the conditions in which they are found. Stable rock practically



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unachievable in the excavation of a trench. This is because the excavation of rock typically requires drilling and blasting, which fractures the rock, make it less stable.

- **Type A** soil can be clay, silty clay, or sandy clay. Many OSHA compliance personnel believe that construction equipment at the site create enough vibrations to prevent any soil from being typed as "A". If vibrations can be felt while standing next to an excavation, the competent person should consider downgrading Type A soil to Type B or C.
- **Type B** soils include both cohesive and non-cohesive soils. They include silts, sandy loams, medium clays, and unstable rock. Soils that might be classified as A, but have fissures, or are subject to vibration, may also be classified as "B" soils.
- **Type C** soils are the most unstable (and therefore most dangerous) of the four soil types. They are easily recognized by the continual sloughing of the sides of the walls excavation. If soil is submerged, or water is seeping from the sides of an excavation, it's very probably "C" soil.

Requirements

The standard covering excavation safety is Title 29 Code of Federal Regulations, Part 1926.650-652, (Subpart P), OSHA's Rules and Regulations for Construction Employment. The standard covers all excavations made in the earth's surface, including trenches, and the requirements for protective systems to be used.

OSHA defines an excavation as any man-made cut, cavity, trench, or depression in the earth's surface as formed by earth removal. This can include anything from excavations for home foundations to a new highway. A trench refers to a narrow excavation made below the surface of the ground in which the depth is greater than the width-and the width does not exceed 15 feet. Trenching is common in utility work, where underground piping or cables are being installed or repaired.

If an excavation is more than 5 feet in depth, there must be a protective system in place while workers are in the excavation. Excavations more than 4 feet in depth must have a way to get in and out, usually a ladder, for every 25 feet of horizontal travel.

**This bulletin is intended only as a reminder and is offered solely as a guide to assist management in its responsibility of providing a safer working environment. This bulletin is not intended to cover all possible hazardous conditions or unsafe acts that may exist. Other unsafe acts or hazardous conditions should also be noted and corrective action taken.*

**For more complete information:
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