



Rhode Island Local Technical Assistance Program

Everyday Safety Talks

Trenching and Shoring Basics

Information You Can Use to Prevent Accidents & Injuries

Excavations and trench cave-ins account for a growing number of fatalities and serious injuries in construction. Such accidents seldom have a single specific cause. Usually, there is a series of separate, yet related causes resulting from such factors. With little or no warning, an unsupported improperly shored or sloped trench or excavation wall collapse, trapping the workers below in seconds.

Active measures on the part of everyone to prevent cave-ins and other job accidents will pay big dividends for everyone. The following is an overview of excavation and trench safety basics to make you more aware of their responsibilities when working in, near or around excavations or trenches.

Planning for safety begins before you dig. You will need to know about traffic conditions, nearness of structures and their conditions, types of soil, ground water, overhead and underground utilities and the weather. Other conditions can be determined by jobsite studies, observations, test borings and by consultations with local officials and utility companies.

You must locate any underground installations, such as sewer, telephone, water, fuel, cable TV and electrical lines. If underground utilities are encountered in the digging, they must be properly supported and the contractor must contact the utility companies involved and inform them of the proposed work.

Once you have the preliminaries completed, your safety requirements should be planned to protect the public, the employees and property. Planning and following through with the plan is the first important step to safety in excavations and trenching operations.

Current OSHA regulations require that all excavations over 5 feet deep be sloped, shored, sheeted, braced or otherwise supported. When soil conditions are unstable, excavations shallower than 5 feet also must be sloped, supported or shored.

You may have heard the term: **Angle of Repose**. This is a method of ensuring safety in an excavation or trench by sloping the sides of the cut, to the angle of repose which is the angle closest to the perpendicular at which the soil will remain at rest. The angle of repose varies with different kinds of soil and must be determined on each individual project.

When an excavation has water conditions, silty material or loose boulders or when it's being dug in areas where erosion, deep frost or slide planes are apparent, the angle of repose must be flattened. Various types of soil have varying degrees of angle of repose. Generally, a qualified engineer must determine the proper angle of repose for the specific type of soil condition.

A second method of support is shoring-sheeting, tightly placed timber shores, bracing, trench jacks, piles or other materials installed in a manner strong enough to resist the pressures surrounding the excavation. You may also use a trench box, which is a prefabricated movable trench shield composed of steel plates welded to a heavy steel frame. A trench box may be used as long as the protection it provides is equal to or greater than the protection that would be provided by the appropriate shoring system.

The soil structure must be carefully identified. Excavations in wet soil, sandy soil or areas that have been backfilled are relatively unstable and must have strong support. Even hard rock sometimes can be hazardous as faults in the strata can make it unstable when cut.

Changing weather conditions and climate also greatly affect how strong shoring systems must be. Excess water from rain or melting snow loosens the soil, drastically increasing the pressure the shoring system. A rainstorm can turn a stable trench side that required only light bracing into a mass of loose soil, posing an immediate threat to the employees working within.

Shoring frozen ground presents another potential problem....a sudden thaw can undermine an entire section of shoring. Even excessively dry conditions can reduce the cohesiveness of the soil. Large excavations, in particular, are subject to changing weather conditions because they are generally open for longer periods of time than are trenches.

Whatever support system is used, workers should always apply shoring starting from the top of the trench or excavation and working down. In installing the shoring, care must be taken to place the cross beams or trench jacks in true horizontal position and to space them vertically at appropriate intervals. These braces also must be secured to prevent sliding, falling or kickouts. Installing the shoring should closely follow the excavation work. It's dangerous to allow trenches to remain unshored even if no work is being done in them. Dirt walls will slough off, causing dangerous overhangs.

The longer a trench is left unsupported, the greater the chance of a cave in. In some cases, the contractor will have to guard against an unstable excavation bottom, such as below the water line. Sheeting may have to be driven below the bottom of such an excavation to add to the soil stability.

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When employees are required to be in trenches 4 feet deep or more, adequate means of exit, such as a ladder or steps, shall be provided and located so as to require no more than 25 feet lateral travel. Ladders must be in good condition, extend from the floor of the trench to 3 feet above the top of the excavation and be secured at the top.

As soon as the work is completed, the trench should be backfilled as the shoring is dismantled. After the trench has been cleared, workers should remove the shoring from the bottom up, taking care to release jacks or braces slowly. In unstable soil, ropes should be used to pull out the jacks or braces from above.

A greater awareness of the safety problems to be overcome in excavations, particularly by the individuals who design and install the shoring, will help end cave in hazards in the construction business. There can be no short cuts or risk taking. It's a responsibility of every individual on the jobsite associated with excavations and trenching operations. Safety is just too important not to follow the rules.



- * Users of this tailgate talk are advised to determine the suitability of the information as it applies to local situations and work practices and its conformance with applicable laws and regulations.

Everyday Safety Talks are published by the Rhode Island LTAP Program in cooperation with the National Local Technical Assistance Association and participating partner organizations.