Health and Safety Meeting

Subject: Excavation Safety

Date: June 21, 2010

You may encounter trenching and excavation operations on site. Therefore, it is important that you are aware of the potential hazards. By understanding the hazards; providing adequate work zone traffic control; using protective equipment such as trench boxes; having a properly trained, competent person on site to monitor the trenching operations; and instituting a written program that emphasizes planning, prevention, and training; excavation-related injuries and fatalities can be prevented.

Information contained in this document was obtained from 29 CFR 1926, Subpart P – Excavations.

What Are the Hazards of Trenching and Excavation Work?

Cave-in

Cave-ins are the most common and severe hazard associated with excavation activities. If trench sides collapse, workers can be seriously injured or killed. Cave-ins are most often caused by:

- Vibration from construction equipment or traffic.
- Soils that do not hold tightly together.
- Previously disturbed soils.
- Wet soils.

Other Hazards

- Contact with electric, water, sewer, natural gas, or other types of utility lines
- Toxic gases released during digging
- Being struck by vehicles when working in or near traffic

Competent Person

The competent person has a crucial role in excavation operations. The competent person is designated by the employer and has the authority to take prompt corrective measures to eliminate existing and predictable hazards, to stop work when required, and be able to demonstrate training, experience, and knowledge of soil analysis, use of protective systems, and Part 1926 Subpart P.

Specific Excavation Requirements

Surface Hindrances

Surface hindrances that are located so as to create a hazard to employees are to be removed or supported, as necessary, to safeguard the employees.

Underground Installations

Contractors need to locate the utility installations, such as sewer, telephone, fuel, electric, water lines, or other underground installations prior to excavating. While the excavation is open, underground installations should be protected, supported, or removed as necessary to safeguard employees.

Access and Egress

A trench is defined as a narrow excavation where, in general, the depth is greater than the width, but the width is not greater than 15 feet. A stairway, ladder, ramp, or other safe means of egress must be located in trench excavations that are 4 feet or more in depth and established at intervals so that employees are not required to travel more than 25 feet.

Exposure to Falling Loads

Employees are not permitted underneath loads handled by lifting or digging equipment. Employees are required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.

Warning System for Mobile Equipment

Contractors need to use a warning system when operating mobile equipment adjacent to an excavation, or when such equipment is required to approach the edge of an excavation and the operator does not have a clear and direct view of the edge of the excavation.

Hazardous Atmospheres

Contractors are to monitor the atmosphere in excavations if there is a potential for a hazardous atmosphere. If employees are to enter the excavation:

- For excavations greater than 4 feet in depth, the atmospheres in the excavation will be tested before employees enter.
- Contractors will implement measures to maintain oxygen levels greater than 19.5 percent, below permissible exposure limits, and less than 20 percent of the lower flammable limit of the gas.

Emergency Rescue Equipment

When dealing with hazardous atmospheric conditions or where they may reasonably be expected to exist, emergency rescue equipment, such as a breathing apparatus, a safety harness and line, or a basket stretcher is to be readily available.

Protection from Hazards Associated with Water Accumulation

Employees will not work in excavations where there is accumulating or standing water unless the contractor implements precautions such as special support or shield systems to protect from cave-ins,

water removal to control the level of accumulating water, or use of a safety harness and lifeline. A competent person must verify and monitor proper operation of water removal equipment.

Stability of Adjacent Structures

Excavators will install support systems such as shoring, bracing, or underpinning to increase the stability of such structures to protect employees where excavation operations endanger the stability of adjoining buildings, walls, or other structures.

Contractors will not excavate below the level of the base or footing of a foundation or retaining wall that could pose a hazard to employees except when under specific conditions.

A support system or another method of protection will be provided to protect employees from the possible collapse of sidewalks, pavements, and appurtenant structures when they are undermined.

Protection of Employees from Loose Rock or Soil

Protection will be provided from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection will consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

Employees will be protected from excavated (spoils) or other materials or equipment that could pose a hazard by falling or rolling into excavations by placing and keeping such materials or equipment at least 2 feet from the edge of excavations, or by the use of retaining devices.

Inspections

A competent person will conduct daily inspections of excavations, the adjacent areas, and protective systems for evidence of possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. This, and additional inspections, will be conducted prior to the start of work and as needed throughout the shift and after rainfall or if other hazard occurrence may increase. These inspections are only required when employee exposure can be reasonably anticipated by work in or near the excavation.

Fall Protection

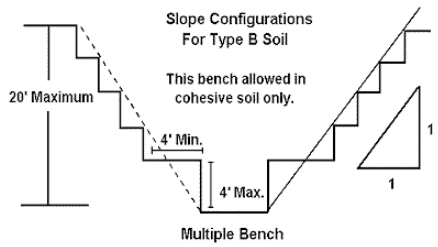
Walkways will be provided where employees or equipment are required or permitted to cross over excavations. Guardrails will be provided where walkways are 6 feet or more above lower levels.

Excavations need to be barricaded to prevent unauthorized entry and falls.

Protection of Employees in Excavations

Excavations are limited to 20 feet in depth, unless approved by a professional engineer. For excavations 5 feet or more, or with a potential for cave-ins, employees will use a protective system (except if the excavation is made in stable rock). Protective systems include sloping, benching, support systems, and shield systems.

Figure N-9



Sloping and Benching

The required angle from horizon for which the sloping and benching is designed depends on the soil classification (type). Excavations are not to exceed 20 feet in depth without approval of a registered professional engineer.

Soil or Rock Type	Maximum Allowable Slopes
Stable Rock	Vertical (90º)
Type A (clay, silty clay, sandy clay, clay loam)	3/4:1 (53º)
Type B (angular gravel [similar to crushed rock], silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam, previously disturbed soils)	1:1 (45º)
Type C (granular soils, including gravel, sand, and loamy sand; submerged soil or soil from which water is freely seeping; submerged rock that is not stable)	1 ½:1 (34º)

Support Systems, Shield Systems, and Other Similar Protective Systems

Support systems, shield systems, and other similar protective systems include timber shoring, aluminum hydraulic shoring, and others approved by a registered professional engineer. The top edge of the shielding must protrude 18 inches above the trench.

Support System Inspections

When material or equipment that is used for protective systems is damaged, a competent person will examine and evaluate its suitability for continued use. If the competent person cannot validate that the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then it will be removed from service and evaluated and approved by a registered professional engineer before being returned to service.

It cannot be denied that there are numerous hazards associated with excavation and trenching; however, with training, planning, and commitment to safety protocol, it can be performed safely and efficiently. Be aware that some states may have extra regulatory precautions when it comes to trenching and excavation.

References

Occupational Safety and Health Administration (OSHA). 1926 Subpart P – Excavations. Available from: http://osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1926.