

## EXCAVATIONS AND TRENCHING

This policy applies to all open excavations made in the earth's surface. Excavations are any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal. A trench is a narrow excavation in which the depth is generally greater than the width, but with the width (measured at the bottom) not greater than 15 feet.

### I. General Requirements:

- A. All surface encumbrances adjacent to excavations that may create a hazard to employees will be removed or supported in order to safeguard employees.
- B. Underground Installations
  - 1. The estimated location of utility installations (such as fuel, electric, sewer) must be determined prior to opening an excavation.
  - 2. Utility companies or other responsible parties shall be contacted, advised of proposed work and asked to establish the locations well in advance of beginning work.
  - 3. When the responsible party cannot respond to a request to locate underground installations **within Twenty-four hours**, it is permissible to proceed provided the exact locations are determined by detection equipment or other acceptable means.
  - 4. While the excavation is open the underground installations must be protected, supported or removed in order to safeguard employees.
- C. Access and Egress From Excavations
  - 1. Ramps used solely by employees for access and egress must be designed by a **\*Competent Person**.
  - 2. A stairway, ladder, ramp or other safe means of egress is required in trenches four feet or more in depth (with no more than twenty-five feet of lateral travel required.)
- D. Employees exposed to public vehicular traffic must be provided with and dressed with warning Vest or other suitable Warning Apparel.
- E. Employees shall not be permitted underneath loads handled by lifting or digging equipment.
- F. A warning system, such as barricades must be used when mobile equipment is operated adjacent to an excavation or when the operator does not have a clear view of the edge.
- G. Hazardous Atmospheres
  - 1. Testing and Controls
    - a. Atmosphere must be tested before entering excavations deeper than four feet where oxygen deficiency (less than 19.5% oxygen) or other hazardous atmospheres could reasonably be

expected.

- b. Ventilation or respiratory protection must be adequate to control:
  - oxygen deficiency
  - toxic exposure
  - flammable gas in excess of 20% of the lower flammable limit.
2. Emergency rescue equipment such as breathing apparatus and safety harness must be used for deep and confined footing excavations.

#### H. Water Accumulation Hazards

1. Employees shall not work in excavations where water is accumulating unless special precautions such as special support or Shield Systems or water removal are used.
2. Water removal must be monitored by a **\*Competent Person**.
3. Surface water must be prevented from entering excavations. Excavations will require an inspection by a **\*Competent Person** after rainstorms.

#### I. Stability of Adjacent Structures

1. Where the stability of adjoining structures such as buildings or walls endanger personnel, special Support Systems must be provided.
2. Excavations below the level of footings of foundations or retaining walls must Not be permitted except when:
  - a. Support Systems such as underpinning are provided or
  - b. The excavation is in stable rock or
  - c. A **\*Registered Professional Engineer** approves the determination that work will not pose a hazard to employees.
3. Sidewalks, pavements and similar structures must not be undermined unless a support system or other protection is provided.

#### J. Protection from Loose Rock or Soil

1. Protection from rock or soil falling from an excavation face must be provided by scaling, protective barricades, or other means.
2. Hazards from falling excavated or other materials or equipment must be protected by keeping all materials at least **two feet** from the edge of excavations or use of retaining devices.

#### K. Inspections

1. Daily inspections of excavations, adjacent areas, and protective systems must be made by a **\*Competent Person** for hazardous conditions:
  - a. Prior to the start of work
  - b. After every rainstorm
  - c. As needed throughout the shift
2. When the **\*Competent Person** finds evidence of a possible cave-in, failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees must be removed from the excavation.

L. Fall Protection

1. Walkways or bridges with standard guardrails must be provided where employees are permitted to cross over excavations.
2. Physical barriers must be provided at all remotely located excavations.

## II. Protective Systems

A. Employees in excavations must be protected from cave-ins by adequate protective systems except when.

1. Excavations are made in stable rock, or
2. Excavations are less than **five feet deep** and an examination by a **\*Competent Person** has been completed that there is no indication of a potential cave-in.

B. Sloping and Benching Systems

1. Option 1, Slope no steeper than 1 ½ horizontal to 1 vertical.
2. Option 2, Maximum allowable slope designed according to OSHA Construction Standard 1926.252 (Appendices A, Soil Classification and B, Slope Configuration).
3. Option 3, Design of sloping using tabulated data, maintained in writing, and kept on site identifying **\*Registered Professional Engineer** who approved data.
4. Option 4, Design of sloping system by a **\*Registered Professional Engineer**.

C. Design of Support Systems, Shield Systems, and other Protective Systems:

1. Option 1, Design according to standard 1926.252 Appendices A; Soil Classification, Appendix C; Timber Shoring, Appendix D; Aluminum Hydraulic Shoring.
2. Option 2, Design using manufacturers tabulated data.

3. Option 3, Design by using other tabulated data which identifies the approving **\*Registered Professional Engineer**.
4. Option 4, Design by a **\*Registered Professional Engineer**.

D. Materials and Equipment

1. Materials and equipment must be free from defects and used in accordance with manufacturer's recommendations.
2. When material or equipment is damaged it must be examined by a **\*Competent Person** for approval or disapproval of current usage.

E. Installation and Removal of Supports

1. Components of Support Systems must be securely connected.
2. Support Systems shall be installed and removed in a manner that protect employees.
3. Actual loads must not exceed design loads.
4. Before temporary removal of individual components/supports, insure personnel safety with additional supports.
5. Removal of supports should progress from bottom to top.
6. Release components slowly to observe possible failures.
7. Backfilling must progress with removal of Support System.

F. Additional Requirements:

1. Excavation **no greater than 2 feet** below bottom of Support System.
2. Installation of the Support System must progress closely with the excavation.

G. Sloping and Benching Systems:

Employees must not be permitted to work on the faces of sloped or benched excavations unless employees below are protected from falling material.

H. Shield Systems:

1. Shield Systems should not be subject to actual loads greater than design load.
2. Shield must be installed in a manner to restrict lateral movement.
3. Employees must be protected from cave-ins while entering and exiting.

4. Employees should not be permitted in the shield when they are being installed, removed, or moved vertically.

### **\*DEFINITIONS**

1. **Accepted Engineering Practice-** Requirements which are compatible with standards of practice required by a registered professional engineer. Competent person must know which aspects of the protective system require the Involvement of a registered professional engineer.
2. **Cave-In-** The separation of a mass of soil or rock material from the side of an excavation or loss of soil from under a trench shield or support system and its sudden movement into the excavation either by falling or sliding in sufficient quantity so that it could entrap, bury or otherwise injure and immobilize a person.
3. **Competent Person-** one who is capable of identifying existing or predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees and who has authorization to take prompt corrective measures to eliminate them.
4. **Excavation-** Any man made cut, cavity, trench, or depression in the earth surface formed by earth removal. This standard applies to all open excavations made in the earth's surface. Excavations are defined to include trenches.
5. **Protective Systems-** A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, sloping and benching systems, shield systems and other systems that provide the necessary protection.
6. **Registered Professional Engineer (RPE)-** A person who is registered as a professional engineer in the State where the work will take place. However, a professional engineer registered in any state is deemed to be a "Registered Professional Engineer" within the meaning of the standard of when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce. The competent person should know or have access to the name of the RPE or the name of the engineering firm and the "engineer of record" and the RPE registration number of that individual.
7. **Stable Rock-** Natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by another protective system that has been designed by an RPE.
8. **Structural Ramp-** A ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered to be structural ramps.
9. **Support System-** A structure such as underpinning, bracing, or shoring which provides support to an adjacent structure, underground installation, or the side of an excavation.

10. **Tabulated Data**- Tables and charts approved by an RPE that are used to design and construct a protective system.