

 CORPORATE SAFETY MANUAL	<b>ENVIRONMENTAL, HEALTH AND SAFETY STANDARDS</b>	
<b>TITLE: EXCAVATION AND TRENCHING</b>	<b>Document Number: *</b>	
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## 1 Purpose

The purpose of this policy and procedure is to protect employees and subcontractors from potentially hazardous conditions and environments that could be encountered during an excavation. The primary goal is to minimize entries into excavations. When employees or subcontractors must enter an excavation, the procedures outlined below must be followed.

## 2 Responsibilities

It is the responsibility of the (insert title) to ensure that the procedures outlined in this policy are being adhered to at all job sites. It is the responsibility of the (insert title) to enforce the procedures outlined in this policy.

## 3 Policy Content

### 3.1 DEFINITIONS

**Accepted Engineering Practices** refers to the requirements, which are compatible with the standard of practice required by a registered professional engineer.

**Competent Person** must be capable of identifying existing and predictable hazards in and around the site of the excavation. The competent person must be able to identify unsanitary, hazardous or dangerous working conditions and must have the authority to take immediate corrective measures to eliminate those conditions.

**Excavation** is any man-made cut, cavity, trench or depression in the earth's surface, formed by the removal of earth.

**Trench or trench excavation** is a narrow excavation (compared to its length) made below the ground's surface. In general, the depth is greater than the width but the width of a trench, when measured at the bottom of the trench is not greater than 15 feet. An excavation is defined as a trench if forms or other structures are installed or constructed in the excavation which reduces the dimension measured from the forms or structure to the side of the excavation to 15 feet or less, when measured at the bottom of the excavation.

### 3.2 GENERAL REQUIREMENTS

**Personal Protective Equipment (PPE) and Monitoring Equipment**

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Employees and subcontractors working in and around excavations must wear, at a minimum:

- reflective vest
- hard hat
- safety boots with steel toe and shank that are at least 6 inches high
- eye protection

The nature of the site will determine whether additional PPE, such as respirators and suits are required. The Site Specific Safety and Health Plan should be consulted to determine the PPE requirements and air monitoring to be conducted.

### ***Preparation of Site***

Prior to excavation, a site survey must be conducted to determine potential hazards, both on the surface and underground. Potential hazards that may be on the surface include:

- debris
- ice
- standing water

Potential hazards that may be buried include:

- utility lines
- hazardous waste drums
- underground storage tanks

Location of utility lines must be determined by contacting the utility companies or owners during their business hours. Allow at least a 24 hour response. If no response is received within 24 hours, excavation may begin, but only with suitable detection equipment or by using other methods to determine the utility line locations.

### ***Entering and Exiting the Excavation***

If employees must enter a trench excavation, ladders or some other means of entering and exiting the trench excavation must be located every 30 feet lateral distance along the trench. This will allow the employees inside the trench a travel distance of only 15 feet in any direction to reach a means of escape.

### ***Ramps***

A registered professional engineer must approve the design of ramps used as a means of entering or exiting an excavation. The Project Superintendent is responsible for ensuring that the construction of the ramps is done in accordance with the design. The following design considerations should be incorporated into the ramps:

- make the top walking surface non-slippery by using cleats or other surface coatings
- ensure that structural members are of the same thickness and are connected so that they do not become displaced

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- attach cleats to the bottom of the runway to connect structural members or other appropriate means to ensure the connection is smooth and no tripping hazard exists

### ***Fall Protection***

Barricades must be set up around the excavation to prevent anyone from falling into the site. If workers must use ramps or bridges to cross over the excavation, guardrails must be provided to prevent falls into the excavation.

### ***Precautions around mobile equipment***

Employees may not work beneath loads handled by lifting or digging equipment and must stay as far away as possible from the moving equipment. When equipment is working around the worksite, employees should check the direction that the equipment is moving before walking around the jobsite.

The operator inside a mobile equipment cab that will be loaded or unloaded must be protected with the features that are designated in 29 CFR 1926.601(b)(6).

Barricades or some other indication of the edge of the excavation must be used when an operator inside mobile equipment must approach the edge of an excavation.

## **3.3 STABILITY OF THE EXCAVATED AREA**

The “competent person” must inspect the excavation at regular intervals while the excavation is open. The excavation should be inspected at start, middle and end of the workday. Additional inspections should be conducted when the conditions are expected to change, such as when water may accumulate inside the excavation during a rain, or when signs of instability are seen.

### ***Water Accumulation***

Excavations may not be entered where water has accumulated or where water is starting to accumulate. The “competent person” and the use of additional safety precautions may make exceptions to this rule only after careful consideration. The additional safety precautions to consider, include:

- a water removal system
- a safety harness and line
- special support or shield system to protect from cave-ins

When a water removal system is used, the competent person is responsible for ensuring that it is working properly by inspecting it regularly and monitoring its operation. As always, measures to prevent water from entering the excavation should be taken. Diversion ditches or dikes should be built to prevent the natural flow of a water body from entering the excavation.

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Tarps or some other waterproof covering should be placed over an open excavation at the end of the workday to minimize or prevent rainwater from entering the excavation.

### ***Stability of Adjacent Structures***

The (insert title) is responsible for ensuring that adequate precautions are taken when an excavation is close to buildings, walls, sidewalks, pavements or other structures. The competent person is responsible for inspecting the excavation and adjacent structures for any signs of instability. The competent person has the authority to stop all work on the site until safety for all workers is assured.

When the (insert title) or competent person determines that adjoining structures will be or are less stable as a result of the excavation, then those structures must be supported by shoring, bracing, pinning or some other appropriate method. A civil engineer should be consulted to approve the support structure.

Excavations should not be below the level of the base or footings of a foundation or retaining wall unless:

- a support system is used to ensure the stability of the structure
- the excavation is in stable rock
- a registered professional engineer has determined that the excavation does not pose a hazard to employees

### ***Loose Rock and Soil***

Loose rock and soil that has been removed from the excavation and the forms on the sides of the excavation pose a hazard to employees. Excavated soil must be placed more than 2 feet away from the edge of the excavation. The edge of the pile of excavated soil may never be less than 2 feet from the edge of the excavation. Retaining devices should be used to prevent the excavated material from falling back into the excavation.

The sides of the excavation should be scaled to remove loose rock and soil. If scaling is not feasible, then protective barricades must be placed at appropriate intervals on the sides of the excavation to prevent the loose material from falling into the excavation. A professional engineer should be consulted if there is any doubt as to how to apply protective measures.

No employees may work on the faces of sloped or benched excavations at levels above other employees. Exceptions to this rule may be made only when absolutely necessary and when the employees at the lower levels are adequately protected from the hazard of falling, rolling or sliding material or equipment.

## **3.4 PROTECTIVE SYSTEMS – SLOPING AND BENCHING**

Protective systems must be implemented to protect employees from cave-ins, except when the excavation is completely in stable rock. When the excavation is less than 5 feet deep, protective systems are not needed if the competent person inspects the excavation and determines that there is no potential for cave-in. Protective systems must be able to

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withstand all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

Benching and sloping systems should be designed in accordance with standard industrial practices. Slopes in excavations should not be greater than one and one-half horizontal to one vertical. This is equivalent to 34 degrees measured from the horizontal. The slope configurations should be in accordance with Type C soil. If slopes are steeper than 34 degrees then tables, charts or other tabulated data should be consulted to design sloping and benching systems. The tabulated data that is used must be in writing and include:

- Identification of the parameters that affect the selection of a slopping or benching system drawn from such data
- Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe
- Information explaining to the user how to make an appropriate selection of a protective system from such data

A copy of the tabulated data must be kept at the job site during construction of the protective systems. The data must contain the name of the professional engineer who approved the data. Once the protective system is constructed, the (insert title) must maintain the data in a project file. A copy of the data must be made available to OSHA upon request.

### **3.5 PROTECTIVE SYSTEMS – SUPPORT SYSTEMS AND SHIELDS**

#### ***Materials and Equipment***

Only materials and equipment that are free from defects may be used in the construction of protective systems. If manufactured materials and equipment are used they must be maintained per the manufacturer's specifications. The competent person must inspect any damaged or defective material and evaluate its suitability for continued use. If the material and equipment cannot be assured to support the intended loads or is otherwise unsuitable, then the material and equipment must be removed from service immediately.

The equipment can only be returned to service after a registered professional engineer has evaluated it and determined that is safe for its intended use.

#### ***Installation of Support Systems and Shields***

Members of the support system must be securely connected to each other to prevent sliding, falling, kickouts or other predictable failure. The installation of the support systems must be coordinated with the removal of the material from the excavation. Ensure that the installation and removal of the support system is done in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system. The designed load of the structural members may not be exceeded.

Excavated material may not be excavated at a depth of greater than 2 feet below the support system or shield in a trench excavation. The 2 feet distance should be measured from the bottom of the members of the support system or shield. Excavation to any depth

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below the support system or shield can only be done if the system is designed to resist the forces calculated for the full depth of the trench. Additionally, there can be no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system or shield.

Shields should be installed so that they will not move in a lateral direction or in any direction that may create a hazard. Employees cannot enter shields while the shield is being installed, removed or moved.

### ***Removal of Support Systems and Shields***

The temporary removal of support systems requires that additional precautions be implemented. Examples of additional precautions may include installing other structural members to carry the loads imposed by the support system.

Removal of the support system begins from the bottom of excavation and progresses from there. Release parts of the support system slowly so that indications of possible failures can be noted and prevented. Backfill the excavation as removal of the support system progresses.

### ***Design of Support Systems, Shield Systems, and other Protective Systems***

The design of a support system, shield system or other protective system must be designed in accordance with standard industrial practices. Tables, charts or other tabulated data may be consulted in the design. The tabulated data that is used must be in writing and include:

- Identification of the parameters that affect the selection of a slopping or benching system drawn from such data
- Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe
- Information explaining to the user how to make an appropriate selection of a protective system from such data

A copy of the tabulated data must be kept at the job site during construction of the protective systems. The data must contain the name of the professional engineer who approved the data. Once the protective system is constructed, the (insert title) must maintain the data in a project file. A copy of the data must be made available to OSHA upon request.

If a register engineer designs the protective system it must be in writing and include:

- a plan indicating the sizes, types and configurations of the materials to be used in the protective system
- identify the registered engineer approving the design

The design must be kept in the project file and be made available to OSHA upon request.

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## **4 References**

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OSHA Standard on Excavations (29 CFR 1926.650, .651 and .652)