

# Excavation and Trenching Safety Sample Written Program



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# Excavation & Trenching Safety Sample Written Program

## 29 CFR 1926, Subpart M



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The following Excavation and Trenching Safety Sample Written Program is provided as a guide to assist employers and employees in complying with the requirements of the Occupational Safety and Health Administration (OSHA) standard [29 CFR 1926, Subpart P](#). It is not intended to supersede the requirements of the standard. An employer should review the standard for particular requirements which apply to their situation and adjust this program to their specific company needs. An employer will need to add information relevant to their work processes to develop an effective, comprehensive program. There are example statements in this program that should be removed and replaced with employer-specific information.

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### Instructions:

This fillable publication is designed as a template to allow employers to customize an Excavation and Trenching Safety Program by replacing the blank boxes with their company's name, responsible individual(s) assigned to meet the OSHA standard and other information as requested when floating a cursor over the interactive form. Before creating this plan, read OSHA's Excavation Standard [29 CFR 1926, Subpart P](#).

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# Excavation and Trenching Safety Sample Written Program

## Objective

This Excavation and Trenching Safety Program has been developed to protect employees from potential safety hazards during work in trenches and excavations. This program is intended to ensure that:

- employees who perform work in excavations are aware of their responsibilities and know how to perform the work safely;
- the company appoints one or more individuals within the company to ensure compliance with the requirements of this program;
- the responsibilities of the Program Manager and workers are clearly detailed; and
- all persons involved in excavation and trenching have received proper training in safely performing this type of work.

## Assignment of Responsibility

### **Employer**

The company management must:

- monitor the overall effectiveness of the program;
- provide atmospheric testing and equipment as needed;
- provide personal protective equipment (PPE) as needed;
- provide protective systems as needed;

- provide training to affected employees and supervisors;
- provide technical assistance as needed; and
- preview and update the program as needed or on at least an annual basis.

### **Program Manager**

The Program Manager acts as the competent person for the company regarding this program and must ensure that:

- safe work practices outlined in this program are followed;
- employees entering excavations or trenches are properly trained and equipped to safely perform their duties; and
- all required inspections, tests, and recordkeeping functions have been performed.

## Employees

All employees including contractors who work in or around excavations must comply with the requirements of this program. Employees are responsible for:

- reporting hazardous practices or situations and
- reporting incidents that cause injury to themselves or other employees.

## Training

### Training Schedule

- with assistance from the appropriate supervisors must train all personnel involved in trenching or excavation work before an employee is assigned duties in excavations.
- Perform retraining when worksite inspections indicate that an employee does not have the knowledge or skills to safely work in or around excavations, or when changes to this program are made.
- must maintain training records that include:
  - date of the training program;
  - name(s) of the instructor(s) who conducted the training;



- a copy of the written material presented; and
- name(s) of the employee(s) who received the training.

### Training Components

All employees who perform work in excavations must receive training in:

- required safe work practices during excavations;
- use of required PPE during



excavations including, but not limited to, safety shoes, hard hats, and fall protection devices;

- procedures required when hazardous atmospheres exist or could develop during excavation work;
- regulations in the OSHA Excavation Standard, [29 CFR 1926, Subpart P](#);
- emergency and non-entry rescue methods and the procedure for calling rescue services;
- company policy on reporting incidents that cause injuries; and
- duties of the Program Manager.

- coordinate, actively participate in, and document the training of all employees affected by this program;
- ensure daily, or more often as detailed in this program, that worksite conditions are safe for employees while working near or in excavations;
- determine the means of protection that must be used for each excavation project;
- ensure, if required, that the design of a protective system has been completed and approved by a registered professional engineer before work begins in an excavation; and
- make available a copy of this program and the OSHA Excavation Standard to any employee who requests it.

### **Program Manager's Training Duties**

Program Manager shall receive the training detailed in this program and the OSHA Excavation Standard. The Program Manager shall:

## **Excavation Requirements**

### **Inspect the Site Before Work Begins**

Before excavation, must thoroughly inspect the site to determine if all excavation requirements are met.

### **Remove Surface Encumbrances**

Remove or support any surface encumbrance as needed to protect employees. Surface encumbrances may include equipment, materials, supplies, permanent installations, buildings, roadways, trees, brush, boulders, or other surface objects that could present a hazard to

employees working in the excavation.

### **Identify Underground Utilities**

The location of underground installations and wires such as sewer, telephone, fuel, electric, and water utilities must be determined and marked before opening an excavation.

\_\_\_\_\_ must arrange with the utility company to remove, shut down, or relocate underground installations as needed to protect employees working in the excavation.



- Guardrails, fences, or barricades are provided on walkways, driveways, and other pedestrian or vehicle thoroughfares beside excavations.
- Guardrails on walkways and bridges are provided where employees and the general public are permitted to cross excavations.
- Standard guardrails and toeboards are provided to prevent falling object hazards in areas where excavation workers may pass under walkways or bridges.

If it is not possible to find the exact location of these installations and the utilities are left in place, the work may proceed with caution if:

- detection equipment or other safe and acceptable means are used to locate the utility;
- excavation does not endanger the underground installations or the workers; and
- utilities are protected by barricades, shoring, suspension, or other means to protect employees.

### **Protect the Public**

Provide barricades, walkways, lighting, and sign postings as needed before the start of excavation to protect the public.

following: must ensure the

- Warning lights or other lighting are maintained from sunset to sunrise and as needed for the safety of the public and employees.
- Barricade or cover all wells, holes, pits, shafts, and all similar hazardous excavations to prevent unauthorized access. Post warning signs.
- Backfill all temporary excavations as soon as possible.

### **Provide employees with a safe entry and exit**

In excavations deeper than 4 feet, keep ladders, steps, or ramps within 25 feet of workers to ensure a safe entry (ingress) and exit (egress).



- A [competent person](#) must design all ramps used by workers to enter or exit excavations.
- A person qualified in structural design must plan and oversee the construction of all ramps used for equipment ingress or egress at excavations.
- Ramps and runways constructed of two or more structural members must be connected and of uniform thickness to prevent movement or displacement.
- Structural ramps used in place of steps must have cleats or other surface treatments on the top surface to prevent slipping.
- Cleats or other appropriate means used to connect runway structural members must be attached to the bottom of the runway or in a manner that prevents others from tripping.
- When portable ladders are used, the ladder side rails must extend at least 3 feet above the upper surface of the excavation.
- Ladders must have nonconductive side rails when performing work near exposed energized equipment or systems.
- Provide two or more ladders or a double-cleated ladder when 25 or more employees work in an excavation where ladders serve two-way traffic or as the primary means of egress.
- Inspect ladders before each use for signs of damage or defects. Remove damaged ladders from service and mark with “Do Not Use” until repaired.
- Use ladders only on stable and level surfaces unless secured. All ladders placed in any location where displacement from workplace activities or traffic can occur must be secured or barricaded.
- Position non-self-supporting ladders so the foot of the ladder is one-quarter of the working length away from the support.
- Never carry any object or load while on a ladder that may cause a loss of balance.

## Protect employees from vehicle traffic

- Provide and require employees to wear reflective or high-visibility warning vests or other suitable garments when working near traffic. Use red or orange reflective material on warning vests if worn at night
- Provide emergency lighting such as spotlights or portable lights as needed to perform work safely.

## Never work under a lifted load

- Prohibit employees from standing or working underneath lifted loads or digging equipment.
- Require employees to stand away from any vehicle during loading or unloading to avoid exposure to falling hazards.
- Require vehicle operators to remain in the cab during loading and unloading.

## Use warning systems on mobile equipment

- When mobile equipment is operated beside the edge of an excavation, use a warning system. If the operator does not have a clear and direct view of the edge of the excavation.
- Use a warning system that consists of barricades, hand or mechanical



signals, or stop logs.

- If possible, grade away from the excavation.

## Test for hazardous atmospheres

- must test the air in excavations over 4 feet deep if a hazardous atmosphere exists or might exist. Toxic atmospheres may exist in excavations near landfills, gas pipelines, hazardous materials storage areas, and others.
- Precautions such as providing proper respiratory protection or forced ventilation must be taken to prevent employee exposure to hazardous atmospheres including those containing less than 19.5% oxygen.
- Forced ventilation or other effective means must also be used to prevent employee exposure to an atmosphere containing a flammable gas above 10% of the lower flammability limit of the gas.



- \_\_\_\_\_ must perform continuous air monitoring when controls intended to reduce atmospheric contaminants are used.
- Ensure devices used for atmospheric monitoring are equipped with an audible and visual alarm.
- Perform atmospheric testing with a properly calibrated direct reading gas monitor, direct reading gas detector tubes, or other acceptable means.
- \_\_\_\_\_ shall calibrate each atmospheric testing instrument:
  - at least every six months;
  - every 30 days if the instrument has not been in use during that time; and
  - according to manufacturers' recommendations.

- Field check each atmospheric testing instrument immediately before use to ensure it is properly operating.

### ***Wear personal protective equipment (PPE)***

The following PPE shall be worn as determined by [Responsible Person]:

- All employees working in trenches or excavations must wear approved hard hats and steel-toed shoes or boots.
- All employees exposed to flying fragments, dust, or other materials produced by drilling, sawing, sanding, grinding, and similar operations must wear approved safety glasses with side shields.
- All employees performing or who are exposed to the hazards produced by welding, cutting, or brazing operations must wear approved spectacles, welding shields, or welding helmets.



- Employees entering bell-bottom pier holes or other similar deep and confined footing excavations must wear a harness with a lifeline securely attached. The lifeline must be separate from any line used to handle materials and must be individually attended to at all times while the employee wearing the lifeline is in the excavation.

- Employees must wear approved gloves or other suitable hand protection.
- Employees using or working near hammer drills, masonry saws, jackhammers, or similar high-noise producing equipment must wear suitable hearing protection.
- Provide employees working at the edge of excavations 6 feet or deeper with fall protection. Fall protection may include guardrail systems, fences, barricades, covers, or a tie-back system meeting OSHA requirements.
- Ensure emergency rescue equipment, such as breathing apparatus, a safety harness and line, and a basket stretcher, are readily available where hazardous atmospheric conditions exist or may develop during work in an excavation. Only personnel who have received approved training and have appropriate equipment shall attempt retrieval requiring entry into a hazardous atmosphere. Give advance notice before entering a known hazardous atmosphere so hazards can be evaluated and rescue personnel can be placed on standby, if necessary.



- Provide guardrails where walkways accessible only to on-site project personnel are 6 feet or more above lower levels.

### **Protect against water hazards**

- Employees are not permitted to work in excavations that contain or are collecting water unless precautions have been taken to protect them from the hazards. Precautions may include special support or shield systems to protect from cave-ins, water removal to control the level of rising water, or the use of safety harnesses and lifelines.
- If water is controlled or prevented from collecting using water removal equipment, the water removal equipment and operation shall be monitored by a person trained in the use of that equipment.
- If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall

### **Provide walkways and guardrails**

- Provide walkways where employees or equipment are permitted to cross over excavations.



be used to prevent surface water from entering the excavation. Also, take precautions to provide adequate drainage to the area adjacent to the excavation.

- [Responsible Person] must reinspect excavations subject to runoff from heavy rains after each rain incident. [Responsible Person] must determine if additional 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 safety harnesses and lifelines for fall protection and emergency retrieval.
- [Responsible Person] shall inform affected workers of the precautions or procedures that are to be followed if water collects or is collecting in an excavation.
- Ensure the stability of nearby structures.
- [Responsible Person] shall determine if the excavation work may affect the stability of adjoining buildings, walls, sidewalks, or other structures.
- Support systems such as shoring, bracing, or underpinning to strengthen structures and protect employees must be used when

excavation operations may affect the stability of adjoining buildings, walls, or other structures.

- Excavation below the base or footing of any foundation or retaining wall that might pose a hazard to employees is not permitted unless:
  - a support system, such as underpinning, is provided to ensure employee safety and structural stability;
  - the excavation is in stable rock;
  - a registered professional engineer has determined and approved that the structure is far enough away to be unaffected by the excavation activity; or
  - a registered professional engineer has determined and approved that the excavation work will not pose a hazard to employees.
- Sidewalks, pavements, and other nearby buildings shall not be undermined unless a support system or other method of protection is provided to protect employees from possible structural collapses.
- When a support system requires a registered professional engineer's review or approval, [Responsible Person] must get the findings in writing before work begins.



- Keep materials and equipment at least 2 feet from the excavation edge, use restraining devices to prevent materials or equipment from falling or rolling into excavations, or use a combination of both if needed. Materials and equipment may, as determined by need to be stored further than 2 feet from the edge of the excavation if a hazardous loading condition is created on the face of the excavation.

## **Protect employees from falling objects and loose rocks or soil**

- Employers must protect employees from loose rock or soil that may fall or roll from an excavation. Protection shall include:
  - scaling to remove loose material;
  - installing protective barricades, such as wire mesh or timber, at appropriate intervals on the face of the slope; or
  - benching to contain falling material.
- Prohibit excavation personnel from working above one another where the danger of falling rock or earth exists.
- Protect employees from excavated materials, equipment, or other materials that may fall or roll into excavations.

- Materials piled, grouped, or stacked near the edge of an excavation must be stable and self-supporting.

## **Inspect excavations before work begins**

- The Program Manager must conduct daily inspections of excavations, adjacent areas, and protective systems for possible dangers that could result in cave-ins, failure of protective systems, hazardous atmospheres, or other hazardous conditions.
- Employees must inspect the excavation before the start of work, as needed throughout the shift, after every rainstorm, and as needed after any other possible hazardous occurrence. These inspections are only required when the trench will be or is occupied by employees.



- When the Program Manager finds evidence of a situation that could result in cave-ins, failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees must be removed from the hazardous area until precautions have been

taken to ensure their safety.

- The Program Manager must keep a written log of all inspections. The log must include the date, work site location, results of the inspection, and a summary of any action taken to correct existing hazards.

## Protective System Requirements

### Protect employees from cave-ins

- Protect employees from cave-ins by using either an adequate sloping and benching system, support system, or protective system. The only exceptions are when:
  - excavations are entirely in stable rock or
  - excavations less than 5 feet deep indicate no cave-in potential after inspection by [Responsible Person].
- Ensure protective systems are capable of resisting all loads that could reasonably be expected to be applied to the system.



### Properly design sloping and benching systems

The angle and configuration of sloping and benching systems shall be selected and constructed by

The slopes must be:

- at an angle no steeper than 34 degrees measured from the horizontal edge (1½ horizontal to

1 vertical) unless one of the “other tabulated data” options listed below is used and

- designed according to OSHA regulations that outline the configurations and maximum allowable slope for specific soil types. (See Appendix A).

Sloping or benching system designs may be selected using **other tabulated data**. Other tabulated data may include tables and charts approved by a registered professional engineer that is used to design and construct a protective system. The data must:

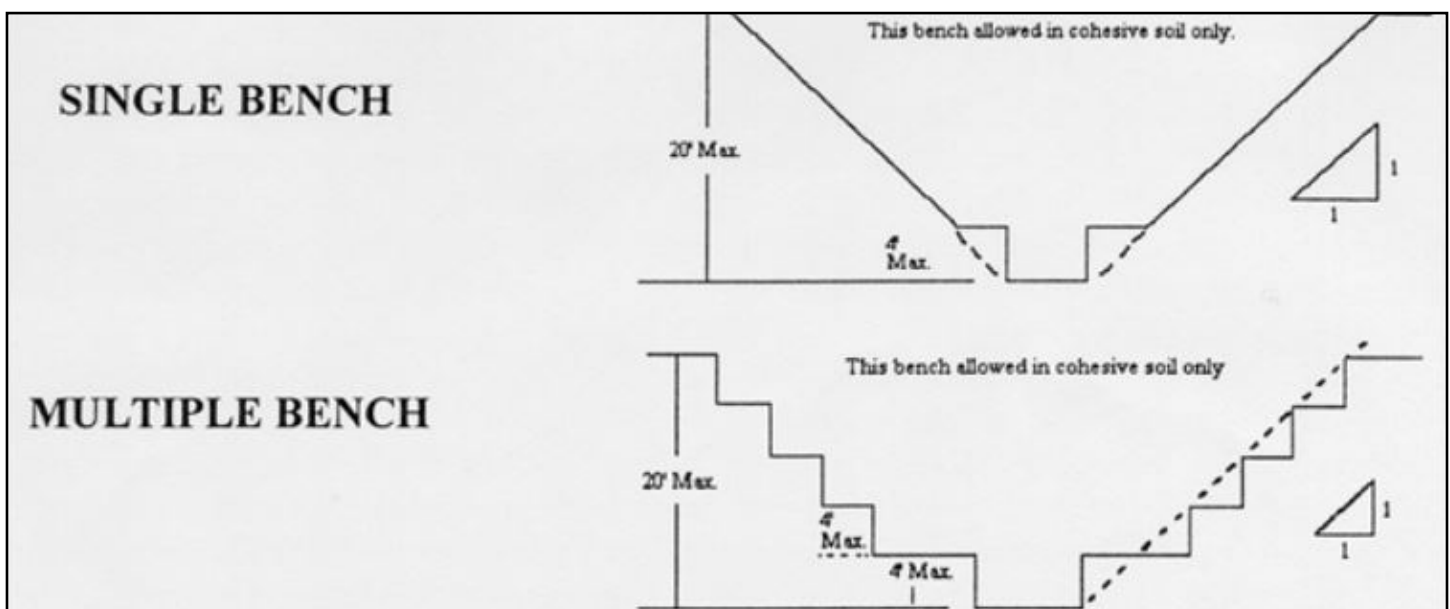
- be in written form;
- Identify the factors that led to the selection of the sloping or benching system;
- identify the maximum safe height and angle of the slopes; and

- provide any other information needed by the user to make the correct selection of a protective system.

At least one copy of the tabulated data must be maintained at the job site. It must identify the registered professional engineer and remain at the job site throughout the construction of the protective system. After that time, [Responsible Person] will maintain the data, which may be stored off-site.

Sloping and benching systems designed and approved by a registered professional engineer must be:

- designed in a manner other than those described in the preceding options;
- written and include at least the following information:
  - the maximum height and angle of the slopes that were





determined to be safe for a particular project and

- the registered professional engineers who approved the design.
- maintained at the job site (at least one copy) while the slope is being constructed. After that time, the design may be stored off the job site and shall be maintained by

## ***Properly design support, shield, and other protective systems***

The design of support systems, shield systems, and other protective systems must be selected and constructed by [Responsible Person] based on one of four options: OSHA guidelines, manufacturer's tabulated data; other tabulated data; or approval from a registered professional engineer.

### **OSHA guidelines:**

- Timber shoring in trenches shall be designed per OSHA requirements in [29 CFR 1926, Subpart P, Appendix C](#).
- Aluminum hydraulic shoring shall be designed using the manufacturer's tabulated data or OSHA requirements in [29 CFR 1926, Subpart, Appendix D](#).

### **Manufacturer's tabulated data**

Support systems, shield systems, and other protective systems designed using the manufacturer's tabulated data must:



- be constructed and used according to the manufacturer's recommendations and limitations; and
- only deviate from the manufacturer's recommendations and limitations if the manufacturer provides specific written approval, which must be kept on the job site during construction of the protective system(s). After that time, the information may be stored offsite and maintained by [Resp.

### **Other tabulated data**

If other types of tabulated data such as tables and charts are used to design support systems, shield systems, or protective systems, the data must:

- be in written form;
- identify the data that led to the selection of the protective system;
- identify the limits of the use of such data; and

- provide the information needed by the user to make a correct protective system selection from the data.

At least one written copy of the tabulated data, which identifies the registered professional engineer who approved the data, shall be maintained at the job site during the construction of the protective system. After that time, the data may be stored off the job site and maintained by [Responsible Person].

### Approval from a registered professional engineer

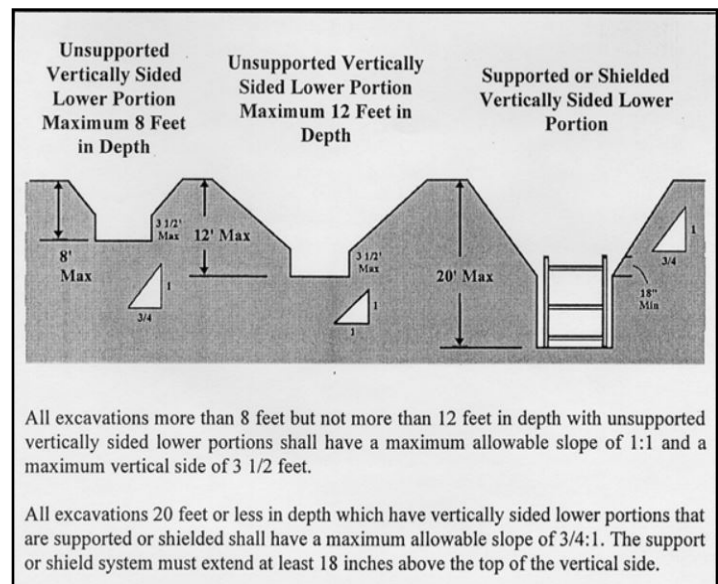
A registered professional engineer must approve support and protective systems designed in a manner other than the preceding three options. The design must:

- be in written form;
- include a plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and
- identity of the registered professional engineer who approved the design.

At least one copy of the design must be kept at the job site during the construction of the protective system. After that time, the design may be stored off the job site, and maintained by [Responsible Person].

### Other general requirements for protective systems

- Employees may not work above other employees in the faces of sloped or benched systems, except



when employees at lower levels are protected from falling, rolling, or sliding materials or equipment.

- Shield systems shall not be subjected to loads that are greater than those they are designed to withstand.
- Install shields in a manner that restricts lateral or other hazardous movements during unexpected soil shifting or cave-ins.
- Use shields to protect employees from cave-ins when entering or exiting the excavation.
- Do not allow employees in trenches when shields are being installed, removed, or moved vertically.
- Excavation of material to a level no greater than 2 feet below the bottom of the shield system is allowed, but only if the system is designed to resist the forces calculated for the full depth of the trench.



- No signs of possible loss of soil from behind or below the bottom of the shield system are allowed while the trench is open.

## Maintain materials and equipment

- Materials and equipment used for protective systems must be free from damage or defects that might affect their proper function.
- Manufactured materials and equipment used for protective systems must be used and maintained according to the manufacturer's recommendations, and in a manner that prevents employee exposure to hazards.
- When materials or equipment used for protective systems are damaged, *they* must ensure that these systems are examined by a competent person before returning them to use. If the competent person cannot assure that the material or equipment can support the intended loads or is otherwise suitable for safe use, then these items must be removed from service. The material or equipment shall then be evaluated and approved by a registered professional engineer before returning to service.

## Safely install and remove supports

- Securely connect all support system members to prevent sliding, falling, kickouts, or other potential hazards.
- Install and remove support systems in a way that protects employees from cave-ins, structural collapses, or struck-by accidents.



- Coordinate the Installation of support systems closely with trench excavation.

- Do not subject Individual support system members to loads exceeding those that they were designed to support.

- Before temporary removal of individual

support members begins, *the worker* must take any additional precautions needed to ensure the safety of employees. An example may include the installation of other structural members to carry the loads imposed on the support system.

- Remove support systems starting from the bottom of the excavation and moving upward. Release members slowly. If there is any indication of a possible cave-in on the sides of the excavation halt work immediately until it can be examined by *the competent person*.

- Backfill while removing support systems to help prevent cave-ins.
- Excavation of material is allowed no more than 2 feet below the bottom of the support system members, but only if the system's design:
  - resists the forces calculated for the full depth of the trench and
  - indicates no possible soil loss behind or below the bottom of the support system while the trench is open.



## Accident Investigations



Report and investigate all incidents that result in worker injuries, as well as near misses, regardless of their nature.

Employers must investigate as soon as possible after an incident to identify the cause, eliminate the hazard, and prevent future injuries.

In the event of such an incident, employers must reevaluate the Excavation and Trenching Safety Program to determine if additional practices, procedures, or training are needed to prevent similar future incidents.

## Changes to Program

Any changes to the Excavation and Trenching Safety Program must be approved by the employer and reviewed by a qualified person to determine if added practices, procedures, or training are needed to prevent injuries. Affected employees shall be notified of the procedure of all changes and trained if needed. The employer must maintain a copy of the Excavation and Trenching Safety Program on the job site.



# Appendix A:

## Slope Configuration by Soil Type

(See 29 CFR 1926, Subpart P, [Appendix A](#) and [Appendix B](#))

### Maximum Allowable Slopes

Soil or rock type	Maximum allowable slopes (H:V) (1) for excavations less than 20 feet deep (3)
Stable rock	Vertical (90°)
Type A (2)	¾:1 (53°)
Type B	1:1 (45°)

#### Notes:

(1) Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

(2) A short-term maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that is 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be ¾H:1V (53°).

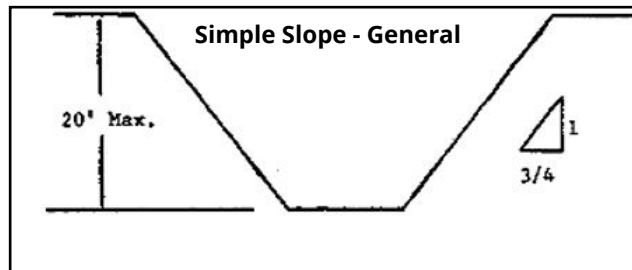
(3) Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

### Slope Configurations

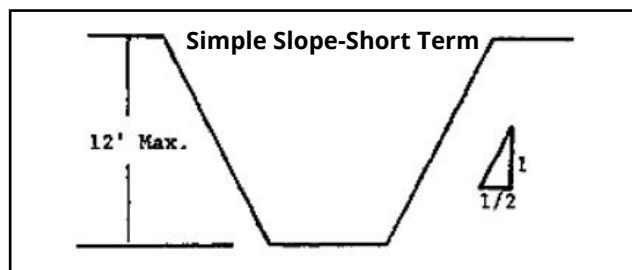
(All slopes stated below are in the horizontal to vertical ratio)

#### Excavations made in type A soil.

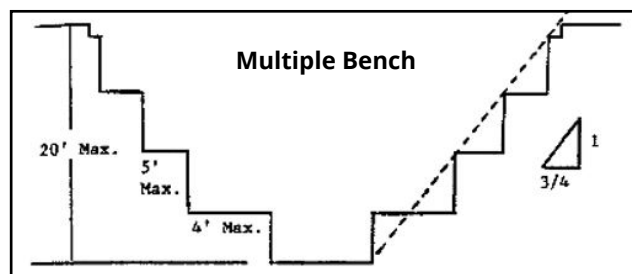
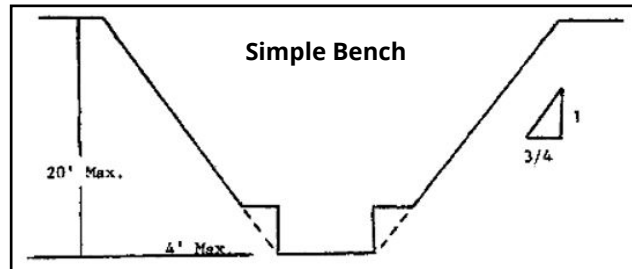
1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of ¾:1.



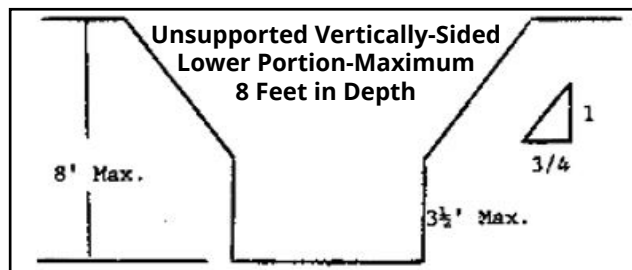
Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of ½:1.



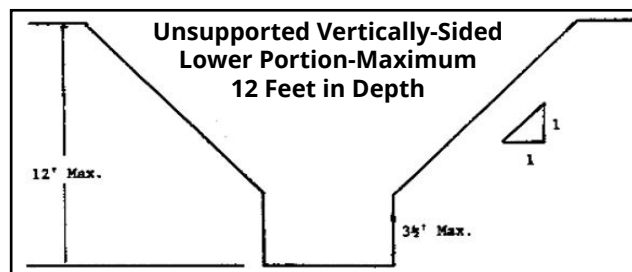
2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 3/4 to 1 and maximum bench dimensions as follows:



3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of 3½ feet.

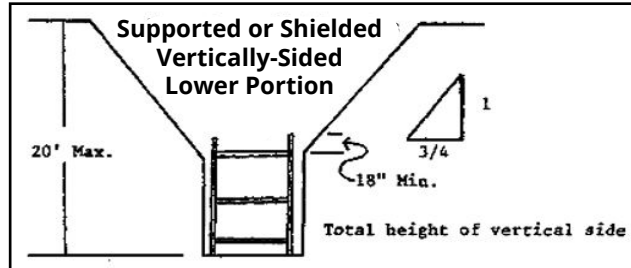


All excavations more than 8 feet but not more than 12 feet in depth with unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 3½ feet.





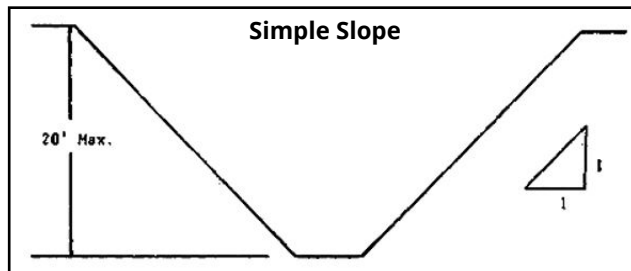
All excavations 20 feet or less in depth that have vertically-sided lower portions that are supported or shielded shall have a maximum allowable slope of  $\frac{3}{4}$ :1. The support or shield system must extend at least 18 inches above the top of the vertical side.



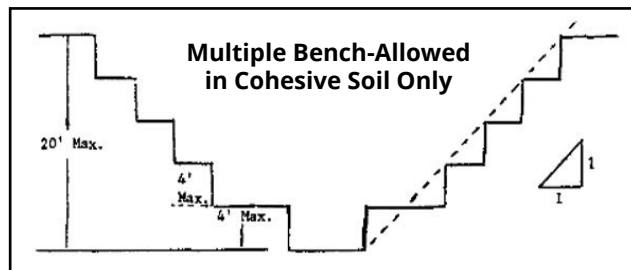
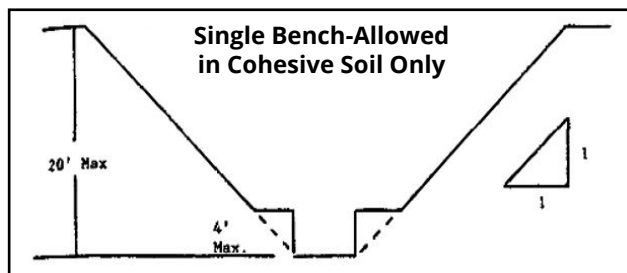
4. All other simple slopes, compound slopes, and vertically-sided lower-portion excavations shall be per the other options permitted under 29 CFR 1926.652(b).

### **Excavations made in type B soil.**

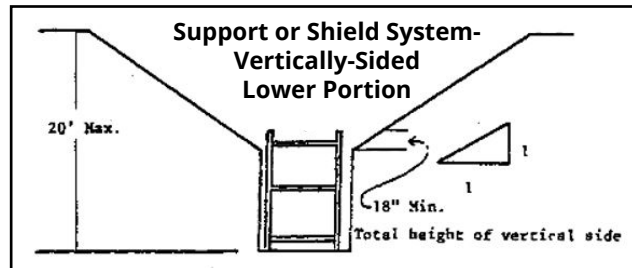
1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.



2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as follows:



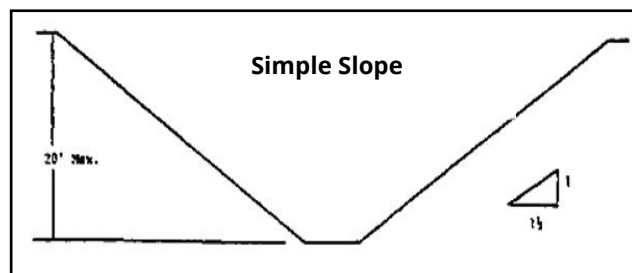
- All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.



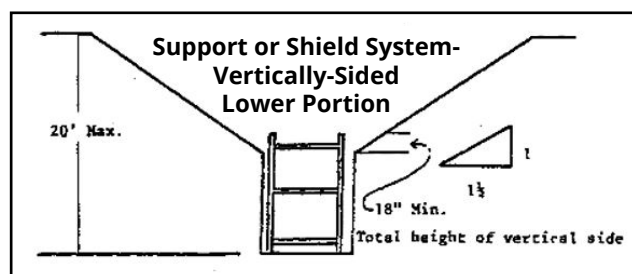
- All other sloped excavations shall be per the other options permitted in 29 CFR 1926.652(b).

### ***Excavations made in type C soil.***

- All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1½:1.



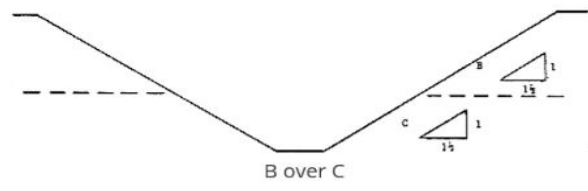
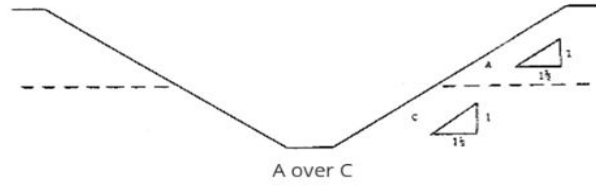
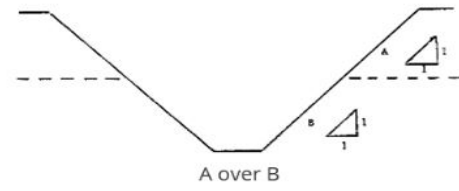
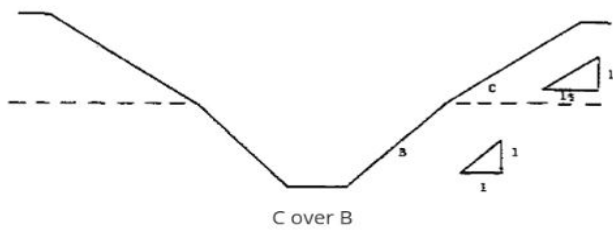
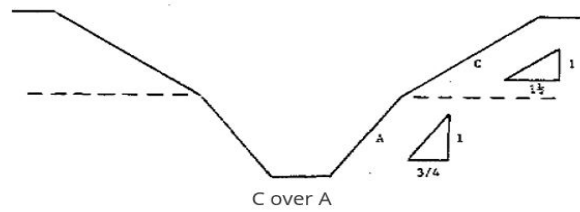
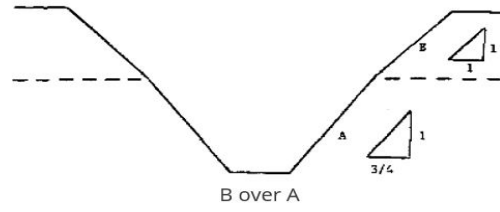
- All excavations 20 feet or less in depth that have vertically-sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1½:1.



- All other sloped excavations shall be per the other options permitted in 29 CFR 1926.652(b).



## Excavations made in layered soils.





# Appendix B:

## Glossary

**Accepted engineering practices:** the standards of practice required by a registered professional engineer.

**Aluminum hydraulic shoring:** a manufactured shoring system consisting of aluminum hydraulic cylinders (crossbraces) used with vertical rails (uprights) or horizontal rails (wales). This system is designed to support the sidewalls of an excavation and prevent cave-ins.

**Bell-bottom pier hole:** a type of shaft or footing excavation, the bottom of which is made larger than the cross-section above to form a bell shape.

**Benching system:** a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or more horizontal steps, usually with vertical or near-vertical surfaces between levels.

**Cave-in:** the movement of soil or rock into an excavation, or the loss of soil from under a trench shield or support system, in amounts large enough to trap, bury, or injure and immobilize a person.

**Competent person:** a person who has been trained to identify hazards in the workplace, or working conditions that are unsafe for employees, and who has the authority to have these hazards corrected.

**Cross braces:** the horizontal members of a shoring system installed from side to side of the excavation. The cross braces bear against either uprights or wales.

**Excavation:** any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal.

**Faces or sides:** the vertical or inclined earth surfaces formed as a result of excavation work.

**Failure:** the movement or damage of a structural member or connection that makes it unable to support loads.

**Hazardous atmosphere:** an atmosphere that is explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, that may cause death, illness, or injury.

**Kickout:** the accidental movement or failure of a cross brace.



**Program Manager:** the individual within the company who oversees excavation work and is responsible for assuring compliance with this program.

**Protective system:** a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

**Ramp:** an inclined walking or working surface that is used to gain access to one point from another. A ramp may be constructed from earth or structural materials such as steel or wood.

**Sheeting:** the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

**Shield system:** a structure used in excavation to withstand cave-ins, and which will protect employees working within the shield system. Shields can be permanent structures or portable units moved along as work progresses. Shields used in trenches are usually referred to as trench boxes or trench shields.

**Shoring system:** a structure that is built or put in place to support the sides of an excavation to prevent cave-ins.

**Sides:** see **faces**.

**Sloping system:** sloping the sides of an excavation away from the excavation to protect employees from cave-ins. The required slope will vary with soil type, weather, and surface or near surface loads that may affect the soil in the area of the trench (such as adjacent buildings, vehicles near the edge of the trench, etc.).

**Stable rock:** natural solid mineral material that can be excavated with vertical sides that will remain intact while exposed.

**Structural ramp:** a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

**Support system:** a structure used as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

**Tabulated data:** tables and charts approved by a registered professional engineer and used to design and construct a protective system.

**Trench:** a narrow excavation (in relation to its height) made below the surface of the ground.



**Trench box or trench shield:** see **shield**.

**Uprights:** the vertical members of a trench shoring system placed in contact with the earth and usually positioned so the individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with, or interconnected to each other, are often called sheeting.

**Wales:** horizontal members of a shoring system placed in the direction of the excavation face whose sides bear against the vertical members of the shoring system or earth (the uprights or sheeting).