

SAFETY AND HEALTH PROGRAM

EXCAVATION SAFETY PROGRAM

1.0 PURPOSE

The purpose of this program is to prevent injuries and accidents from occurring during excavation work Campus Facilities (CF) performs. This policy will set forth the official practices required for excavations made by the employees on property owned by the University Of Missouri (MU).

2.0 SCOPE

The program applies to any and all CF employees who perform excavation type work, or who work around utility construction job sites.

3.0 DEFINITIONS

Aluminum air shoring - An engineered shoring system comprised of aluminum air cylinders (crossbraces), used in conjunction with vertical rails (uprights) or horizontal rails (walers). Such a system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.

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

Cave-in - The separation of a mass of soil or rock material from the side of an excavation, or the 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.

Competent person - One who is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. All competent persons must complete the trenching and shoring class, and be certified by the department for successful completion of the class. A competent person should have and be able to demonstrate the following:

They have the Training, experience, and knowledge of soil analysis, protective systems, and the requirements of OSHA 29 CFR 1926 Subpart P. A Competent Person must have the authority to exercise prompt corrective measures to eliminate existing and predictable hazards and to stop work when required. They must have the ability to recognize the following:

1. Conditions that could result in cave-ins,
2. Failures in protective systems,
3. Hazardous atmospheres,
4. Other hazards including those associated with working in confined spaces.

Excavation - Any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal

Registered professional engineer (PE) - A person who is registered as a professional engineer in the state of Missouri

Shield (shield system) - A structure that is able to withstand the forces imposed on it by a cave-in and has the ability to protect employees within the structure. Shields can be a permanent structure or can be designed to be portable (trench box) and moved along as work progresses.

Shoring (shoring system) - A structure such as a metal hydraulic, mechanical, or timber shoring system that supports the sides of an excavation and is designed to prevent cave-ins.

Sloping (sloping system) - A method of protecting employees by sloping away from the sides of a trench or excavation so as to prevent cave-ins. The angle of slope will vary based on factors such as soil type, environmental conditions of exposure, and application of surcharge loads.

Trench (trench excavation) - A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet. If forms or other structures are installed or constructed in an excavation as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet or less, the excavation is also considered to be a trench.

4.0 PROCEDURES

A competent person shall be assigned to all excavations or trenches 4 feet or greater in depth and excavation shall be appropriately benched, shored, or sloped according to the procedures and requirements set forth in OSHA's Excavation standard, OSHA 29 CFR 1926.650, .651, and .652. Excavations or trenches 20 feet deep or greater must have a protective system designed by a registered professional engineer.

4.1 GUIDELINES

- Underground utilities must be located and marked before excavation begins.
- Employees are not permitted in the excavation while heavy equipment is operated in or near the trench.

4.2 INSPECTIONS

The competent person shall conduct inspections:

- Daily and before the start of each shift.
- As dictated by the work being performed in the trench.
- After every rain storm.
- After other natural events occur that could increase hazards or change conditions, such as snowstorm, windstorm, thaw, earthquake, dramatic change in weather, etc.
- When fissures, tension cracks, sloughing, undercutting, water seepage, bulging at the bottom, or other similar conditions occur.
- When there is a change in the size, location, or placement of the spoil pile.
- When there is any indication of change or movement in adjacent structures or heavy equipment.

For excavations occurring 4 feet or greater in depth, a trench inspection form shall be completed daily. The completed form must be forwarded to the CF Project Supervisor. **(APPENDIX A)**

4.3 SOIL CLASSIFICATIONS

Type A - Most stable: clay, silty clay, and hardpan (resists penetration). No soil is Type A if it is fissured, is subject to vibration of any type, has previously been disturbed, or has seeping water.

Type B - Medium stability: silt, sandy loam, medium clay and unstable dry rock; previously disturbed soils unless otherwise classified as Type C; soils that meet the requirements of Type A soil but are fissured or subject to vibration.

Type C - Least stable: gravel, loamy sand, soft clay, submerged soil or dense, heavy unstable rock, and soil from which water is freely seeping.

Layered geological stratifications (When soils are configured in layers) - The soil must be classified on the basis of the classification of the weakest layer. Each layer may be classified individually if a more stable layer lies below a less stable layer, i.e. where a Type C soil rests on top of stable rock.

Because most excavations on MU property will be conducted in order to repair / replace existing pipelines or equipment (i.e. the soil has been previously disturbed), excavations shall be made to meet the requirements for Type C soil unless designated otherwise by the competent person.

4.4 SPOIL and MATERIAL PLACEMENT

Spoil piles on jobsites will require an erosion and sedimentation control plan if there's a possibility for runoff. Contact Environmental Health and Safety at (573) 882-7018 for assistance

4.4.1 Temporary spoil shall be placed no closer than 2 feet from the surface edge of the excavation, measured from the nearest base of the spoil to the edge of the cut. This distance should not be measured from the crown of the spoil deposit, but from nearest spoil pile edge. This distance requirement ensures that loose rock or soil from the temporary spoil will not fall on employees in the trench or affect the stability of the trench wall.

4.4.2 Permanent spoil should be placed in accordance with the Erosion & Sedimentation Plan for the job so that it channels rainwater and other run-off water away from the excavation. Spoil should be placed so that it cannot accidentally run, slide, or fall back into the excavation. Permanent spoil should be placed at least 2 feet from the edge of the excavation.

4.4.3 Job materials shall be placed at a safe distance not less than 2 feet from the trench so as not to create similar types of hazards. Job materials can include pipe, tools, vehicles, equipment, or any other material that will be used in completion of the work.

4.5 SURFACE CROSSINGS

Surface crossings of trenches should not be made unless absolutely necessary. When necessary, they are only permitted under the following conditions:

- **Vehicle crossings** must be designed by and installed under the direction of a registered professional engineer.

- **Walkways or bridges** must:
 - o have a minimum clear width of 40 inches,
 - o be fitted with standard rails (32 inches high)
 - o extend a minimum of 36 inches past each surface edge of the trench.

4.6 TRENCH EGRESS

- Trenches 4 feet or more in depth shall be provided with a fixed means of egress.
- Spacing between ladders or other means of egress must be such that a worker will not have to travel more than 25 feet laterally to the nearest means of egress.
- Ladders must be secured and extend a minimum of 36 inches above the landing.
- Metal ladders should not be used when electric utilities are present in the trench.

4.7 PROTECTION FROM VEHICULAR TRAFFIC

- Employees exposed to vehicular traffic shall be provided with and required to wear vests or other suitable garments marked with or made of reflective or high-visibility materials.
- Only personnel who have been trained in Work Zone and Traffic Control procedures shall be permitted to control traffic by use of flags, barricades and other traffic control devices.
- Work occurring in or adjacent to any University street, city street, or state highway shall not commence without an approved Traffic Control Plan. A hard copy of the Traffic Control Plan shall be kept on site and readily available throughout entire duration of the work.
- The Traffic Control Plan for work in or adjacent to University or city streets shall conform to the current standards and requirements as defined and set forth by the City of Columbia. Contact the Community Development Department (573) 874-7474 for further direction.
- The Traffic Control Plan for work in or adjacent to state highways/roadways shall conform to the current standards and requirements as defined and set forth by the Missouri Department of Transportation (MODOT). Contact MODOT for further direction by phone at (866) 275-6636 or on their website http://epg.modot.org/index.php?title=616.23_Traffic_Control_for_Field_Operations
- For work occurring near but not in or directly adjacent to any University street, city street or state highway, a Traffic Control Plan may still be required to ensure implementation of proper signage to warn or inform drivers of the associated construction zone. Consult appropriate authority having jurisdiction as defined above for further direction.

4.8 EXCAVATION SAFETY REQUIREMENTS

- All employees on an excavation site must wear a hard hat and safety glasses.
- High visibility vests are also required when equipment is being operated on or near an excavation.
- Employees are not permitted to work under loads being lifted or moved by heavy equipment. Employees are required to stand away from equipment that is being loaded or unloaded to avoid being struck by falling materials or spillage.
- Equipment operators or truck drivers may remain in their equipment during loading and unloading if the equipment is properly equipped with a cab shield or adequate canopy.
- Barricades shall be installed where necessary.
- Hand or mechanical signals are to be used as required.

- Trenches left open overnight shall be fenced and barricaded.
- Employees shall not be permitted to work in hazardous and/or toxic atmospheres. Such atmospheres include those with less than 19.5% oxygen, greater than 23.5% oxygen a combustible gas concentration greater than 10% of the lower flammable limit, no greater than 35ppm carbon monoxide (CO), no greater than 20ppm hydrogen sulfide, or concentrations of hazardous substance that exceed those specified in the Threshold Limit Values for airborne contaminants established by the ACGIH or the OSHA Permissible Exposure Limits.
- When the excavation operation approaches the estimated location of underground utility installations, the exact location of the installation shall be determined by safe and acceptable means (such as hand digging).
- When the excavation is open, underground utility installations shall be protected, supported, or removed as necessary to safeguard employees.

4.9 ATMOSPHERIC TESTING

Employees are required to perform atmospheric testing before entering and provide continual monitoring while working in trenches. If employees are required to wear respiratory protection to complete the job, the employee must be trained, fit-tested, and enrolled in the CF Respiratory Protection Program

Some trenches qualify as permit-required confined spaces. When this occurs, compliance with the CF Confined Space Program is required.

4.10 STANDING WATER

Methods for controlling standing water and water accumulation must be provided and should consist of the following if employees must work in the excavation:

- Use of special support or shield systems approved by a registered professional engineer.
- Water removal equipment, such as pumps, must be used and monitored by a qualified person. Equipment with internal combustion engines should be located as far from the trench as possible. If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation. **Reference the University of Missouri's Permissible Storm Sewer Discharge Guidance Document.**
- Trenches are to be carefully inspected by a competent person after each rain and before employees are permitted to re-enter the trench. Employees are not permitted to work in or around the trench during rainstorms.

4.11 EXCAVATIONS AROUND FOUNDATIONS

- Where the stability of adjoining buildings, walls, or other structures is endangered by excavation under the base of footing, foundation or walls, a support system designed by a PE shall be provided to ensure the stability of such structure for the protection of employees.
- Sidewalks and pavement shall not be undermined unless a support system or another method of protection is provided to protect employees and pedestrians from their possible collapse.

4.12 SLOPING/BENCHING (1926 Subpart P Appendix B)

- a. **Scope and application.** This appendix contains specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protective systems is to be performed in accordance with the requirements set forth in § 1926.652(b)(2).
- b. **Definitions.**
 - Actual slope** means the slope to which an excavation face is excavated.
 - Distress** means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and ravelling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.
 - Maximum allowable slope** means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).
 - Short term exposure** means a period of time less than or equal to 24 hours that an excavation is open.
- c. **Requirements –**
 - 1. **Soil classification.** Soil and rock deposits shall be classified in accordance with appendix A to subpart P of part 1926.
 - 2. **Maximum allowable slope.** The maximum allowable slope for a soil or rock deposit shall be determined from Table B-1 of this appendix.
 - 3. **Actual slope.**
 - i. The actual slope shall not be steeper than the maximum allowable slope.
 - ii. The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope shall be cut back to an actual slope which is at least ½ horizontal to one vertical (½H:1V) less steep than the maximum allowable slope.
 - iii. When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person shall determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such reduction is achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with § 1926.651(i).
 - 4. **Configurations.** Configurations of sloping and benching systems shall be in accordance with Figure B-1.

TABLE B-1 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)	3/4:1 (53°)
TYPE B	1:1 (45°)
TYPE C	1 ½:1 (34°)

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

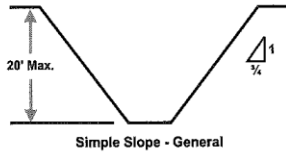
Footnote(2) A short-term maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53°).

Footnote(3) Sloping or benching for excavations greater professional engineer

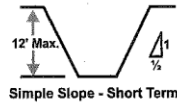
FIGURE B-1 SLOPE CONFIGURATIONS

(All slopes stated below are in the horizontal to vertical ratio)
B-1.1 EXCAVATIONS MADE IN TYPE A SOIL

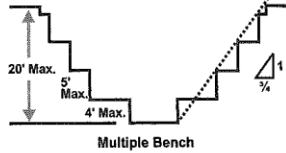
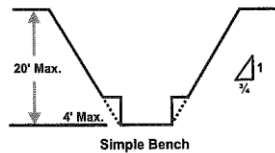
1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 3/4:1



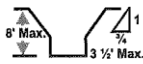
Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of 1/2:1.



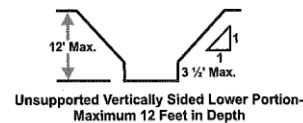
2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 3/4:1 and maximum bench dimensions as follows:



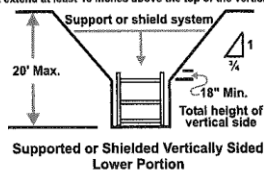
3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of 3 1/2 feet.



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 3 1/2 feet.



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

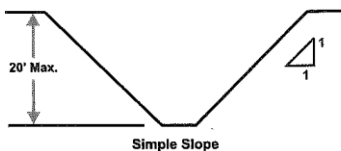


4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other options permitted under §1926.652(b).

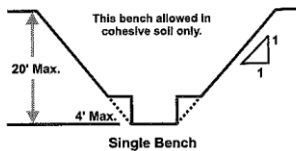
Editor's Note: In Figure B-1, the CFR contains text that states "2." As it appears clear based on the figure and its context that this was a typographical error, the text is corrected in Figure B-1 appearing above.

FIGURE B-1.2 EXCAVATIONS MADE IN TYPE B SOIL

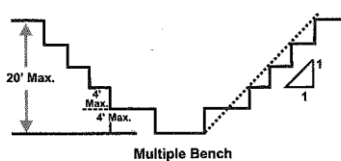
1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.



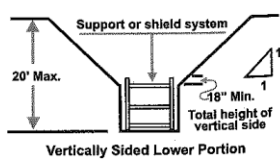
2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as follows:



This bench allowed in cohesive soil only.



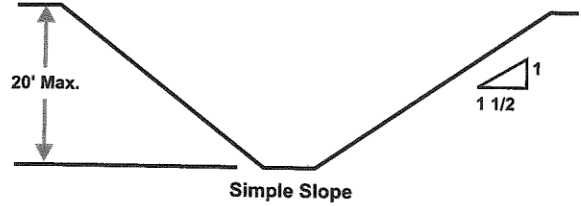
3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.



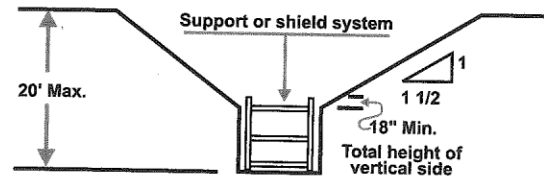
4. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

FIGURE B-1.3 EXCAVATIONS MADE IN TYPE C SOIL

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1 1/2:1



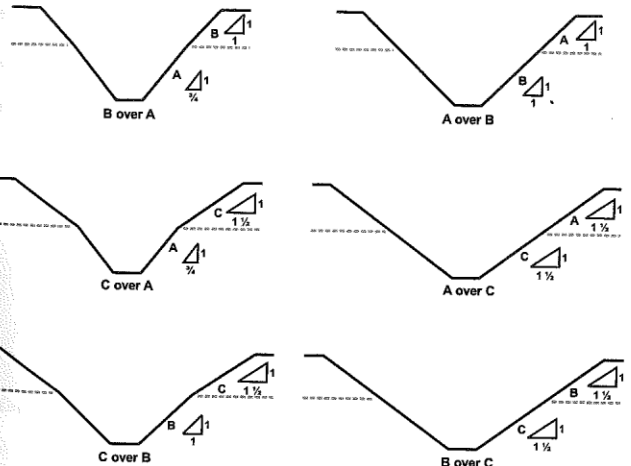
2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1 1/2:1.



3. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

FIGURE B-1.4 EXCAVATIONS MADE IN LAYERED SOILS

1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.



2. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

4.13 Design of support systems, shoring, shields and other protective systems

Option 1. Designed using the 1926.652 Appendices A, C and D.

- Designs for timber shoring in trenches shall be determined in accordance with the conditions and requirements set forth in appendices A and C to this subpart.
- Designs for aluminum hydraulic or air shoring shall be in accordance with in accordance with Appendices D.

Option 2. Designs using manufacturer Tabulated Data.

Option 3. Designed by a Professional Engineer.

Shoring supports the walls from caving. Shoring is installed from the top down. Below is Table D-1.4 in CFR 1926.652 Appendix D for aluminum hydraulic or air shoring. However, when available, Options 2. and 3. are the preferable methods for designing a shoring system.

Air shores must be installed with sheeting in accordance with Table D - 1.4 in Type C soil.

Table D-1.4
Aluminum Hydraulic / Air Shoring
 Waler Systems for Soil Type C

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS						TIMBER UPRIGHTS		
	VERTICAL SPACING (FEET)	*SECTION MODULUS (IN ³)	WIDTH OF TRENCH (FEET)						MAX. HORIZ. SPACING (ON CENTER)		
			UP TO 8		OVER 8 UP TO 12		OVER 12 UP TO 15		SOLID SHEET	2 FT.	3 FT.
			HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	6.0	2 IN.	6.0	**2 IN.	6.0	3 IN.	3x12	---	---
		7.0	6.5	2 IN.	6.5	**2 IN.	6.5	3 IN.			
		14.0	10.0	3 IN.	10.0	3 IN.	10.0	3 IN.			
OVER 10 UP TO 15	4	3.5	4.0	2 IN.	4.0	**2 IN.	4.0	3 IN.	3x12	---	---
		7.0	5.5	3 IN.	5.5	3 IN.	5.5	3 IN.			
		14.0	8.0	3 IN.	8.0	3 IN.	8.0	3 IN.			

OVER 15 UP TO 20	4	3.5	3.5	2 IN.	3.5	** <u>2 IN.</u>	3.5	3 IN.	3x12	---	---
		7.0	5.0	3 IN.	5.0	3 IN.	5.0	3 IN.			
		14.0	6.0	3 IN.	6.0	3 IN.	6.0	3 IN.			
OVER 20	<p>For applications other than those listed in the tables, refer to CFR 1926.652(c)(2) for use of manufacturer's tabulated data.</p> <p>For trench depths in excess of 20 feet, refer to CFR 1926.652(c)(2) and CFR 1926.652(c)(3).</p>										

*Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

** 2-inch diameter cylinders, at this width, shall have structural steel tube (3.5 x 3.5 x 0.1875) over sleeves, or structural over sleeves of manufacturer's specification, extending the full, collapsed length.

4.14 SHIELDING

- Trench shields or trench boxes are different from shoring because they are intended primarily to shield workers from cave-ins and similar incidents rather than support the walls from caving.
- The excavated area between the outside of the trench box and the face of the trench should be as small as possible. The space between the trench box and the excavation side must be backfilled to prevent lateral movement of the box. Shields may not be subjected to loads exceeding those which the system was designed to withstand.
- Trench boxes are generally used in open areas, but they also may be used in combination with sloping and benching.
- The trench box must extend at least 18 inches above the surrounding area if there is sloping toward the excavation. This can be accomplished by providing a benched area adjacent to the box.
- Any modifications to the shields must be approved by the manufacturer.
- Shields may ride two feet above the bottom of an excavation, provided they are calculated to support the full depth of the excavation and there is no caving under or behind the shield.
- Workers must enter and leave the shield in a protected manner, such as by a ladder or ramp.
- Workers shall not be permitted to remain in the shield while it is being moved.

Appendix A

REVISION	ISSUE DATE
INITIAL DEVELOPMENT	8/1/2006

CF Second Draft 6/21/2013

Third Draft 7/8/2013

Fourth Draft 9/13/13

Fifth Draft 3/17/14

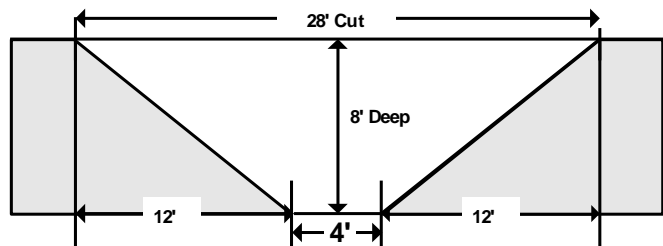
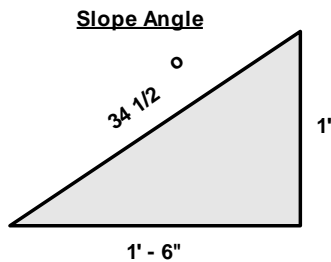
Sixth Draft 4/1/2014

Daily Excavation Checklist

Competent Person:	Date:
Site Location:	Job Number:
Soil Type:	Excavation Depth:
	Excavation Width:

Type of Protective System Used:			
Indicate for each item: Yes – No – or N/A for not applicable:			
1. General Information:	Yes	No	N/A
A. Is excavation less than five feet in depth?			
B. Is there a potential for a cave-in? *IF YES, excavation must be sloped, shored, or shielded.			
C. Is excavation deeper than five feet in depth? * IF YES, excavation must be sloped, shored, or shielded.			
D. Is sloping used as your protective system?			

Slope information to keep in mind:



Example of a Simple 34-degree Slope commonly used around the site for cave-in protection.

2. Inspection of Job-site:	Yes	No	N/A
A. Excavations, adjacent areas, and protective systems inspected by a competent person daily before the start of work.			
B. Competent person has the authority to remove employees from the excavation immediately.			
C. Surface encumbrances removed or supported.			
D. Employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation.			
E. Hard hats and safety glasses worn by all employees.			
F. Spoils, materials, and equipment set back at least two feet from the edge of the excavation.			
G. Adequate barriers provided at all excavations, wells, pits, shafts, etc.			
H. Warning vests or other highly visible clothing provided and worn by all employees exposed to vehicular traffic. It's a good practice to wear vests at all times around heavy equipment.			
I. Employees required to stand away from vehicles being loaded or unloaded.			
J. Warning system established and utilized when mobile equipment is operating near the edge of the excavation.			
K. Employees prohibited from going under suspended loads.			
3. Utilities:	Yes	No	N/A
A. Location of utilities marked.			
B. Prior to the use of equipment, underground utilities have been located by hand digging.			
C. Underground utilities are protected, supported, or removed when excavation is			

open.			

Daily Excavation Checklist Continued:			
4. Means of Access and Egress:	Yes	No	N/A
A. Travel distance to means of egress no greater than 25 feet in excavations four feet or more in depth.			
B. Straight ladders used in excavations extend at least three feet above the edge of the trench.			
C. Ramps being used for employee access have been designed by the competent person.			
D. Employees protected from cave-ins when entering or exiting the excavation.			
5. Wet Conditions:			
A. Precautions have been taken to protect employees from the accumulation of water.			
B. Water removal equipment monitored by a competent person.			
C. Surface water or runoff diverted or controlled to prevent accumulation in the excavation.			
D. Inspections have been made after every rainstorm or other hazard-increasing occurrence.			
6. Hazardous Atmosphere:			
The atmosphere within the excavation must be tested where there is a reasonable possibility of an oxygen deficiency, combustible or other harmful contaminant exposing employees to a hazard.			
A. Are there exposed sewer or natural gas lines in excavation?			
B. Is excavation near a landfill area, or are hazardous substances being stored close to the excavation?			
If you answered YES to A or B, then treat excavation as a confined space. See Confined Spaces Subject Area.			
C. Employees will contact Fire/Rescue Group at extension (631) 344-2222 prior to entry and in case of emergencies.			
7. Support Systems:			
A. Materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads.			
B. Materials and equipment used for protective systems inspected and in good condition.			
C. Materials and equipment not in good condition have been removed from service.			
D. Protective systems installed without exposing employees to the hazards of cave-ins, collapses, or threat of being struck by materials or equipment.			
E. Members of support system securely fastened to prevent failure.			
F. Support systems provided to ensure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc.			
G. Excavations below the level of the base of a footing have been approved by a Registered Professional Engineer.			
H. Removal of support systems progresses from the bottom and members are released slowly so you can note any indication of possible failure.			
I. Backfilling progresses with removal of support system.			
J. Excavation of material to a level no greater than two feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth.			
K. Shield system placed to prevent lateral movement.			
M. Employees are prohibited from remaining in shield system during vertical movement.			
8. Training:			

A. All employees have had Excavation Safety Awareness Training.			
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