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Trenching and Excavating Safety Program

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Introduction

1.1 In order to prevent death, injuries and property loss, all employees, students, contractors and visitors of The Ohio State University must comply with the requirements of the Excavations, Trenching and Shoring standards (OSHA 29CFR 1926.650, 651 and 652).

1.2 This policy establishes requirements for safe trenching, excavating and shoring activities at The Ohio State University. The intent is to ensure any activity involving trenching and excavating is conducted in a manner to minimize risk to employees, property, students, visitors and contractors.

1.3 Authorized employees are required to perform excavating and trenching operations in accordance with the policies and procedures established herein.

2.0 Responsibilities

2.1 OSU Environmental Health & Safety - The Ohio State University Office of Environmental Health & Safety (EHS) is responsible for the following:

2.1.1 Updates and revisions to the written Excavating and Trenching Safety Program.

2.1.2 Provide program oversight and be a resource to implementing departments.

2.2 Department Supervisors – Supervisors or department heads of areas where trenching and excavating is conducted are responsible for the following:

2.2.1 Conduct periodic evaluations of the Trenching and Excavating program in place to ensure it meets all applicable requirements.

2.2.2 Ensure employees have been properly trained.

2.2.3 Provide sufficient equipment to ensure excavating and trenching can be conducted safely.

2.3 Authorized Employees – Those employees who have responsibility for conducting excavating and/or trenching are responsible for the following:

2.3.1 Comply with the regulations set forth by OSHA 1926.650-652.

2.3.2 Follow departmental procedures to ensure safe excavation and trenching procedures.

2.3.3 Follow specific excavating and trenching procedures.

2.3.4 Report violations to their supervisor.

2.4 Contractors – non-OSU personnel who are working on projects associated with OSU property are responsible for the following:

2.4.1 Be aware of the OSU Excavating and Trenching Safety Program.

2.4.2 Ensure project/building management is aware of any excavating or trenching being performed as part of contractor work.

2.4.3 Ensure contractor employees comply with all applicable OSHA excavating and trenching requirements.

3.0 Definitions

Aluminum Hydraulic Shoring: manufactured shoring system consisting of aluminum hydraulic cylinders (cross braces) used with vertical or horizontal rails designed to support sidewalls of an excavation

Bell-Bottom Pier Hole: shaft or footing excavation, the bottom of which is made larger than the cross section above to form a bell shape.

Benching: method of protecting workers from cave-in 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 entrap, bury, or otherwise injure and immobilize a person.

Competent Person: one who has been trained to identify existing and predictable hazards in the workplace, or working conditions that are unsafe for workers, and who has the authority to have these hazards corrected, stopping the work if necessary. The Designated Supervisor of an excavation is chosen by the department and serves as the Competent Person for the purposes of this program.

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 through breakage, displacement or permanent deformation 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.

Kick out: the accidental movement or failure of a cross brace.

*Layered Geological Strata: w*here soil types are configured in layers. The soil should be classified on the basis of the weakest soil layer classification. Each layer may be classified individually if a more stable layer lies below a less stable layer. (See Soil Types)

Protective System: a method of protecting workers 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 from structural materials such as steel or wood.

Registered Professional Engineer: a person who is registered as a Professional Engineer in the state of Maryland.

Soil Types:

> *Type A* - Most stable: clay, silty clay and hardpan. No soil is Type A if it is fissured, is subject to vibration, has previously been disturbed or has seeping water.

Type B - Medium stability: silt, sandy loam, medium clay and unstable dry rock. Previously disturbed soils, except those that would be classified as Type C. Soil that meets the requirement of Type A soil but is fissured or subject to vibration.

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

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 (Shield System): a structure used in an excavation that is able to withstand cave-ins and which will protect those 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 (Shoring System): a structure that is built or put in place to support the sides of an excavation and designed to prevent cave-ins.

Sloping (Sloping System): sloping the sides of the excavation away from the excavation to protect employees from cave-ins. The required slope or angle of incline 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 building, vehicles near the edge of the trench).

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 such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Uprights: the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that 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).

4.0 Excavation Procedures

4.1 Underground Utility Impact

4.1.1 Prior to any excavation or trenching operations, the project supervisor must determine if underground utilities may be present or impacted by the project. A pre-work site inspection should be completed by the site supervisor and utilities personnel.

4.1.2 Any underground utilities (gas, sewer, data, water and electric lines) must be clearly marked on the surface prior to any excavating.

4.1.2.1 The recommended marking colors (Ohio) for underground utilities are provided in Table 1.

Table 1: Underground Utility Marking Colors

	RED - Electric power lines, cable, conduit and lighting cables
	YELLOW - Gas, oil, steam, petroleum or gaseous materials
	ORANGE - Communication, alarm or signal lines, cable or conduit
	BLUE - Potable water
	PURPLE - Reclaimed water, irrigation and slurry lines
	GREEN - Sewers and drain lines
	PINK - Temporary survey markings
	WHITE - Proposed excavation

Source: Ohio Revised Code Section 3781.28

4.1.3 If utilities are present or impacted by the project, the designated supervisor must arrange to have the utilities protected, removed or relocated as directed by OSU Facilities.

4.1.4 Excavation must be done in a manner that does not endanger the underground installations or those engaged in the work. Barricades, shoring, suspension or other means as necessary can be utilized to project utilities left in place during excavations/trenching.

4.2 Stability of Adjacent Structures

4.2.1 The supervisor must take precautions as needed to protect workers, nearby buildings or other structures. A Registered Professional Engineer should evaluate these structures and recommend precautions such as shoring, bracing, or underpinning. The supervisor must ensure that the recommendations of the engineer are carried out. Plans that outline the design of such precautions approved by the engineer will be maintained on site while the work is in progress.

4.3 Protection of the Public

4.3.1 Barricades, walkways, lighting and signs must be provided for the protection of the public before the start of excavation operations. Guardrails, fences or barricades will be provided adjacent to walkways, driveways and other pedestrian or vehicle thoroughfares.

4.4 Protecting Workers in Excavations

4.4.1 The Supervisor must assure that workers are protected from hazards that may arise during excavation work.

4.4.2 Stairs, ladders or ramps should be provided when workers enter excavations over four (4) feet deep. Two (2) or more means of exit will be provided if the excavation is more than 20 feet in length. A means of exit will be provided every 25 feet of trench length.

4.4.3 A competent person, qualified in structural design, will design structural ramps used for egress or access of equipment. The ramp will be constructed in accordance with the design. Ramps with two (2) or more structural members will have the structural members that are uniform thickness and connected together to prevent displacement and will not present a tripping hazard.

4.4.4 Those workers exposed to vehicular traffic will wear warning vests made of high visibility material.

4.4.5 No one will work underneath loads handled by lifting or digging equipment. Workers will stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.

4.4.6 A warning system will be used when mobile equipment is operated next to the edge of an excavation if the operator does not have a clear, direct view of the edge of the excavation.

4.4.7 Materials and equipment should be kept at least two (2) feet from the edge of the excavation with the proper protective system in place.

4.5 Hazardous Atmospheres and Confined Spaces

4.5.1 Workers will not be permitted to work in hazardous and/or toxic atmospheres. Such atmospheres include those with the following:

4.5.1.1 Atmospheric oxygen concentration below 19.5% or above 23.5%.

4.5.1.2 A combustible gas concentration greater than 10% of the lower flammable limit.

4.5.1.3 Concentrations of hazardous substances that exceed those specified in the Threshold.

4.5.1.4 Limit Values (TLVs) for airborne contaminants established by the American Conference of Industrial Hygienists (ACGIH).

4.5.2 The above hazards are typically monitored with a confined space 5-gas air monitoring meter. Additional information regarding confined space entry and air monitoring can be found in the OSU Confined Space Safety Program, available at www.ehs.osu.edu.

4.5.3 If there is any possibility that the trench or excavation could contain a hazardous atmosphere, the Designated Supervisor will ensure that atmospheric testing is conducted before worker entry and continuously during work. Excavations near underground storage tanks or those that contain gas pipelines will be monitored. Suitable precautions will be taken as necessary to protect workers. These precautions may include the following:

4.5.3.1 Engineering controls such as ventilation;

4.5.3.2 Respiratory protection; those required to wear respiratory protection must be enrolled in the Ohio State University Respiratory Protection Program. Enrollment in the program requires workers to:

4.5.3.2.1 Complete respiratory protection training (EHS provides training for air purifying respirators);

4.5.3.2.2 Obtain a fit test provided by EHS;

4.5.3.2.3 Complete a medical examination; and

4.5.3.2.4 Maintain annual re-certification.

4.6 Fall Protection: Fully Body Harness and Lifelines

4.6.1 Trenches and excavations, which are classified as permit required confined spaces (those where atmospheric hazards exist) may be required to have rescue equipment on hand in the event of an emergency.

4.6.1.1 Rescue equipment can include a full body harness and lifeline to be used to raise personnel safely from an excavation during an emergency.

4.6.1.2 For additional information on rescue equipment used during confined space emergencies, consult the OSU Confined Space Entry Safety Program.

4.6.2 Another instance when fall protection may be necessary is for personnel working outside the excavation/trench where a fall hazard exists.

4.6.2.1 If a fall hazard of 6-feet or more is present on the side of an excavation/trench, personnel standing on the top of the trench are in a position where a fall hazard exists and should be tied off using a full body harness and either a retractable lifeline or lanyard of appropriate length.

4.6.2.2 For additional information regarding protection from fall hazards, please consult the OSU Fall Protection Safety Program.

4.7 Personal Protective Equipment

4.7.1 The Designated Supervisor will ensure that all workers wear required personal protective equipment (PPE) as detailed below. Hardhats, safety eyewear, gloves, hearing protection and fall protection devices will be furnished by the employee’s supervisor, the department or the contractor's employer. The department or employer must ensure that anyone conducting work in excavations wears PPE approved by the American National Standards Institute (ANSI).

4.7.2 The following PPE is required during excavation/trenching activities:

4.7.2.1 Personnel working in trenches or excavations will wear ANSI approved hardhats at all times.

4.7.2.2 Personnel working in trenches or excavations will wear ANSI approved steel-toed shoes or boots.

4.7.2.3 Where there is potential for exposure to flying fragments, dust or other materials produced by drilling, sawing, sanding, grinding and similar operations will wear ANSI approved safety glasses with side shields.

4.7.2.4 Where there is a potential for exposure to hazards produced through welding, cutting, or brazing must wear approved eye protection or a welding face shield/helmet and must be accompanied by a hot work permit supplied by OSU Environmental Health & Safety or the contract company performing the work.

4.7.2.5 Where fall hazards exist; or where rescue operations may be necessary, personnel must wear a full body harness and be tied off at all times to an approved lifeline or anchor point.

4.7.2.6 Hand protection must be made available to employees based on the hazards of the work being performed.

4.7.2.7 To determine the appropriate PPE to be utilized during a specific excavation or trenching activity, the supervisor should conduct a pre-work hazard assessment and ensure all hazard are addressed prior to personnel entering a trench.

4.8 Walkways and Guardrails

4.8.1 Walkways must be provided where workers or equipment are allowed to cross over excavations.

4.8.2 Guardrails must be provided on walkways used by the general public regardless of the height above the excavation.

4.8.3 Guardrails must be provided on walkways used only by on-site personnel if the walkway is six (6) feet or more above lower levels. This will protect personnel on the top/edge of an excavation from a fall hazard and eliminate the need for a full body harness and tie off when working outside of the trench.

4.8.4 Guardrails with toe boards must be provided when/if workers pass below a walkway.

4.9 Hazards Associated with Water Accumulation

4.9.1 Anytime a trench/excavation exists, there is a potential for water to accumulate, which may pose additional hazards to personnel entering the trench/excavation.

4.9.2 Personnel may not work in excavations with standing water or where water is collecting unless the Supervisor gives prior approval or instruction.

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

4.9.3.1 Use of special support or shield systems approved by a Registered Professional Engineer.

4.9.3.2 Water removal equipment, such as a water pump, used and monitored by the Supervisor or a designated employee.

4.9.3.3 Use of safety harnesses and lifelines.

4.9.4 Work in excavations during a rainstorm is prohibited.

4.9.5 Trenches must be inspected by the Supervisor after each rain and before anyone is permitted to re-enter the excavation.

4.10 Protection of Workers from Falling Objects

4.10.1 The Supervisor must ensure that workers are protected from loose rock or soil that could fall or roll from an excavation face. Protective measures may consist of:

4.10.1.1 Scaling to remove loose material;

4.10.1.2 Installation of barricades such as wire mesh or timber as needed to stop and contain falling material.

4.10.1.3 Sloping may be used instead of barricades when practical.

4.10.2 Workers must be protected from excavated materials, equipment or other objects that could pose a hazard by falling or rolling into excavation. These materials or equipment must be maintained at least two (2) feet from the edge of the excavation or otherwise restrained. Materials piled, grouped or stacked near the edge of an excavation must be stable and self-supporting.

4.11 Inspections

4.11.1 The Supervisor must conduct daily inspections of excavations, adjacent area and protective systems for evidence that could result in a cave-in, failure of protective systems, hazardous atmospheres or other hazardous conditions.

4.11.2 Inspections must be conducted before the start of work and as needed throughout the shift. Inspections will also be made after every rainstorm.

4.11.3 Inspections are only required when the trench will be or is expected to be occupied.

4.11.4 When a hazardous condition is found, exposed workers will be removed from the area until precautions have been taken to assure their safety.

4.11.5 Inspections must be documented in writing and kept on-site.

5.0 Protective Systems

5.1 Selection of Protective Systems

5.1.1 Personnel working in an excavation must be protected from cave-ins by using an adequate sloping and benching system; or an adequate support or protective system.

5.1.2 The only exceptions are when the excavation is made entirely in stable rock or the excavation is

5.1.2.1 Less than four (4) feet in depth where examination of the ground by the Supervisor provides no indication of a potential cave-in.

5.1.3 Excavations 20 feet or less: The decision tree in 29 CFR 1926 Subpart P, Appendix F (See appendix F of this Plan) will be used to determine the appropriate section of protective systems used in excavations 20 feet or less in depth.

5.1.4 Excavations greater than 20 feet in depth: A registered professional engineer must design all excavations greater than 20 feet in depth.

5.2 Soil Classification

5.2.1 In order to design the most appropriate protective system, the Supervisor must determine the soil type using a visual test with one or more manual tests as required by 29CFR 1926 Subpart P. Additional information regarding soil classification can be found in Appendix A – Soil Classification.

5.2.1.1 Visual Test

5.2.1.1.1 During the visual test, the entire excavation site including the soil adjacent to the site must be observed.

5.2.1.1.2 The Supervisor will check for crack-line openings along the failure zone that indicate tension crack and observe the open side of the excavation for indications of layered geologic structuring.

5.2.1.1.3 Other conditions to look for are signs of bulging, boiling, or sloughing, as well as signs of surface water seeping from the side of the excavation or from the water table.

5.2.1.2 Manual Tests

5.2.1.2.1 Thumb Penetration Test.

5.2.1.2.1.1 The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. (This test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designation D2488 - "Standard Recommended Practice for Description of Soils (Visual - Manual Procedure).") Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.

5.2.1.2.2 Dry Strength Test.

5.2.1.2.2.1 If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured. Plasticity or Wet Thread Test.

5.2.1.2.2.2 Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8-inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8-inch thread can be held on one end without tearing, the soil is cohesive.

5.2.2 Specialized soil strength testing equipment including a penetrometer, shear vane or torvane may also be used to determine the unconfined compression strength of soils.

5.3 Types of Protective Systems

5.3.1 The following systems can be used to protect workers from cave-ins in trenches of more than four (4) feet deep. The Supervisor should select the method of protection that is most suitable for the particular job site, taking into consideration soil type and surrounding structures. If the soil is not classified, then the excavation must be sloped at an angle not steeper than one and a half horizontal to one vertical.

5.3.2 Sloping (See Appendix B – Sloping and Benching for additional information)

5.3.2.1 Maximum allowable slopes for excavations less than 20 feet deep based on soil type and angle to the horizontal are as follows:

Soil Type	Height/Depth Ratio	Slope Angle
Stable Rock	Vertical	90^0
Type A	¾ : 1	53^0
Type B	1 : 1	45^0
Type C	1 ½ : 1	34^0

5.3.2.2 For Example: A ten feet deep trench in Type B soil would have to be sloped to a 45 degree angle, or sloped 10 feet back in both directions. Total distance across a trench ten feet deep would be 20 feet plus the width of the trench. In Type C soil, the trench would be sloped at a 34-degree angle or 15 feet in both directions for a total of 30 feet across plus the width of the trench.

5.3.3 Benching (See Appendix B – Sloping and Benching for additional information)

5.3.3.1 There are two types of benching:

5.3.3.1.1 Single. One level or step, not exceeding 4 feet in height.

5.3.3.1.2 Multiple. More than one level or step, each not to exceed four feet in height.

5.3.3.2 Benching can be used in conjunction with simple sloping. Benches must be below the maximum allowable slope for that soil type.

5.3.3.3 For example: A ten-foot deep trench in Type B soil must be benched back 10 feet in each direction with the maximum of a 45-degree angle.

5.3.3.4 Benching is not permitted in Type C soil.

5.3.4 Shoring - Shoring is used when the location or depth of the trench makes sloping back to the maximum allowable slope impractical. There are two basic types of shoring: timber and aluminum hydraulic. See Appendices C and D for additional information regarding shoring.

5.3.4.1 Timber Shoring

5.3.4.1.1 The Supervisor will use the information in the tables of Appendix C of this plan - Timber Shoring for Trenches to determine the appropriate manner to incorporate timber shoring.

5.3.4.1.2 The members of the shoring system that are to be selected using the tables are the cross braces, the uprights, and the Wales where Wales are required.

5.3.4.1.3 The Supervisor will select the size and spacing of members using the appropriate table. The selection will be based on the depth and width of the trench where the members are to be installed.

5.3.4.1.4 In most instances, the selection is also based on the horizontal spacing of the cross braces.

5.3.4.1.5 Where a choice is available, the horizontal spacing of the cross braces must be chosen before the size of any member can be determined.

5.3.4.2 Hydraulic Aluminum Shoring

5.3.4.2.1 Hydraulic shoring provides a critical advantage over timber shoring because workers do not have to enter the trench to install them. They are also light enough to be installed by one worker, they are gauge-regulated to ensure even distribution of pressure along the trench line and they can be adapted easily to various trench depths and widths.

5.3.4.2.2 Hydraulic Shoring Support Systems must be constructed and used in accordance with all specifications, recommendations and limitations issued by the manufacturer.

5.3.4.2.3 Hydraulic shores must be installed in accordance with the 1926 Subpart P Appendix D - Aluminum Hydraulic Shoring for Trenches. (See Appendix D to this plan). The Supervisor must use the tables in this standard to determine the maximum vertical and horizontal spacing that may be used with various aluminum member sizes and various hydraulic cylinder sizes.

5.3.4.2.4 All shoring must be installed from the top down and removed from the bottom up. The Supervisor will inspect all hydraulic shoring at least once per shift for leaking hoses and/or cylinders, broken connections, cracked nipples, bent bases, and any other damaged or defective parts. This inspection will be documented in writing. The top cylinder of hydraulic shoring will be no more than two feet from the top edge of the excavation. Two feet of trench may be exposed beneath the bottom of the rail or plywood sheeting, if used.

5.3.5 Shielding

5.3.5.1 Shielding differs from shoring because instead of shoring up or otherwise supporting the trench face, they are intended primarily to prevent cave-in of the trench walls. Trench boxes are generally used in open areas, but may be used in combination with sloping and benching. For additional information regarding alternatives to shoring refer to Appendix E.

5.3.5.2 The following safety measures must be followed during shielding operations:

5.3.5.2.1 Inspect trench boxes for good condition before each use.

5.3.5.2.2 Minimize the excavated area between the outside of the trench box and the face of the trench.

5.3.5.2.3 Backfill the space between the trench box and the excavation side to prevent lateral movement of the box.

5.3.5.2.4 Ensure the trench box is extending at least 18 inches above the surrounding area if there is sloping toward the excavation. Providing a sloped area adjacent to the box.

5.3.5.2.5 Ensure the shields ride two feet above the bottom of the excavation provided they are calculated to support the full depth of the excavation and there is no caving under or behind the shield.

5.3.5.2.6 Modifications to the shield must only be completed or approved by the manufacturer.

5.3.5.2.7 Workers must enter and leave the shield in a protected manner, such as by a ladder.

5.3.5.2.8 Workers may not remain in the shield while it is being moved.

5.4 Design by a Professional Engineer

5.4.1 A Registered Professional Engineer may design sloping, benching, shoring and shielding systems. The design will be written and must include the following:

5.4.1.1 A plan indicating the sizes, types and configurations of the materials to be used in the protective system.

5.4.1.2 The identity of the Registered Professional Engineer approving the design.

5.4.1.3 At least one copy of the design must be maintained at the job site during construction of the protective system.

5.4.2 A Registered Professional Engineer must approve all excavations more than 20 feet in depth.

6.0 Contractor Information

6.1 Contractors hired by the University to perform excavation or trenching operations must have their own trenching safety policies that comply with applicable federal and state OSHA regulations.

6.2 Contractors must coordinate with Facilities Design and Construction and FOD Utilities early in the programming and development stages to determine their project's impact to utilities and gain approval for all trenching and excavation activities indicating that the impact to utilities has been reviewed and approved before bidding the work or proceeding with excavation.

6.3 The contractor must coordinate with OSU the identification and marking of underground utilities including sewer, telecommunication, gas, water, steam electric, etc. The contractor will arrange to have these utilities protected, removed or relocated as directed by the appropriate OSU department.

7.0 Training and Recordkeeping

7.1 Training on the purpose, content and function of the Trenching and Excavation Safety Program is required for all employees who participate in or are affected by trenching/excavation operations. Training can be obtained through EHS and/or through department-specific training. Records must be kept showing training dates, attendance, items covered, and name of presenter.

7.2 Authorized Employees

7.2.1 Authorized employees are those who have received proper training and have been “authorized” by their department to conduct trenching/excavation operations when necessary. Training for authorized employees shall include all applicable areas of this program. Additional training outside of this written safety program and training may be necessary including equipment specific training provided

7.2.1.1 Affected Employees are those whose job may require being around trenches and excavations and should include all applicable areas of this safety program and training.

7.3 Retraining

7.3.1 Retraining or additional training is required whenever:

7.3.1.1 There is a new or revised trenching/excavating procedure.

7.3.1.2 An authorized employee's job duties change regarding trenching/excavating.

7.3.1.3 The Trenching and Excavation Program changes.

7.3.1.4 Additional unique hazards arise, such as new equipment or modified processes

7.3.1.5 Refresher training is recommended annually.

7.4 Recordkeeping

7.4.1 All records applicable to the Trenching and Excavation Safety Program shall be maintained on file. Records shall include:

7.4.1.1 Training session outlines.

7.4.1.2 Training attendance sheets.

7.4.1.3 Training exam scores.

7.4.1.4 List of authorized employees.

Appendix A – Soil Classification (29CFR 1926 Subpart P-App A)

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10931

Appendix B – Sloping and Benching (29CFR 1926 Subpart P-App B)

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10932

Appendix C – Timber Shoring for Trenches (29CFR 1926 Subpart P-App C)

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10933

Appendix D – Aluminum Hydraulic Shoring for Trenches (29CFR 1926 Subpart P-App D)

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10934

Appendix E – Alternatives to Timber Shoring (29CFR 1926 Subpart P-App E)

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10935

Appendix F – Selection of Protective Systems (29CFR 1926 Subpart P-App F)

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10936