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Ground Disturbance Protocol					

Overview

Purpose

This Devon Energy EHS protocol establishes minimum requirements for performing ground disturbance activities, as well as, requirements to work safely in and around excavations and trenches.

Scope

This protocol applies to all Devon operated equipment, facilities and all Devon employees.

Contractors are required to follow site-specific requirements, and have their own programs which comply with applicable laws and regulations.

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1.0 RESPONSIBILITIES

Field/Business Unit Leadership

- Reinforce adherence to this protocol and provide resources for application of the protocol.
- Ensure employees responsible for excavation or trenching duties receive required training.

Line Supervisor

- Understand how this protocol applies to personnel in their area of responsibility.
- Ensure employees have training, skills, knowledge and understanding to comply with this protocol.
- Check periodically to ensure the requirements of this protocol are being met.

Environmental, Health and Safety

- Provide technical resources and tools for protocol application.
- Monitor compliance through the audit process.

Devon Employees

- Adhere to the requirements of this protocol.
- Identify and report gaps in this protocol.
- Complete required training.

Contract Company Representative

- Comply with regulatory requirements and follow the Devon EHS protocols.

2.0 TERMS AND DEFINITIONS

2.1 Ground Disturbance Terms and Definitions

American Public Works Association (APWA) Uniform Color Code - a marking guide that provides for universal use and understanding of the temporary marking of subsurface facilities to prevent accidents and damage or service interruption by contractors, excavators, utility companies, municipalities or any others, working on or near underground facilities.

Backfilling - to refill a trench or other excavation.


Bell Hole - a type of hole or excavation where the cross section of the top is larger than the cross section of the bottom.



Benching - a method of protecting people 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.

Blind Sweep - the use of electronic line finding equipment, and visual scan to locate unmarked underground facilities in the path of ground disturbance activities. The use of witching sticks is not approved for blind sweep activities.

Competent Person - for excavation safety, a person who is capable of identifying existing and predictable hazards in the surroundings, or working conditions, that are hazardous, unsanitary or dangerous to workers, soil types and protective systems required, and who is authorized to take prompt corrective measures to eliminate these hazards and conditions. See the training requirements in section 5.0 for additional requirements.

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Damage - includes at a minimum,

- (A) defacing, scraping, displacement, penetration, destruction, or partial or complete severance of an underground facility or of any protective coating, housing, or other protective device; or
- (B) weakening of structural or lateral support of an underground facility that affects the integrity of the facility.

Specific states may have a more stringent definition of damage.

Emergency One-Call - notification to the One-Call system when an emergency situation endangers life, health or property and requires excavation operations to begin immediately, providing reasonable precautions are taken to protect underground facilities. Also applies in a situation requiring immediate corrective action to continue the operation of, or to assure the continuity of, public utility service or public transportation.

Excavation - any man-made cut, cavity, trench or depression formed by earth removal.

Excavator - the individual or company performing the excavation activities.

Ground Disturbance - any work, operation or activity that results in a disturbance of the earth, rock or other material in the ground.

Jurisdictional Pipeline - pipeline(s) identified by Devon as regulated under the Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHSMA) and/or state requirements.

Manual Digging - any movement of earth using non-mechanized tools or equipment. Including soft digging or digging with shovels, and manual post-hole diggers.


Positive Response - response by the underground facility operator where they have either marked the location of their facilities, or confirmed the area is clear. The clear response can be painted on the ground, called in or submitted to the state One-Call organization in certain states.

Pot Holing - a method of physically locating underground facilities by digging small holes in the ground, this can be done manually or with the use of a hydrovac and is sometimes called "daylighting."

Shield (Shield System) - shielding refers to the literal use of a pre-constructed box that acts as a shield. Shielding differs from shoring in that shielding functions as a shield from collapse, while not always supporting the trench wall itself. This means shielding is generally an indirect support system. Braces in different sizes and lengths are available to suit a variety of widths. The side shield components or wales are also available in a variety of heights and widths, to suit differing site conditions as well.



Shoring (Shoring System) - the method of sliding vertical supportive panels downward along the face of the trench wall. Crossmembers, or braces, are placed perpendicular to the trench wall face, at a 90-degree angle, or level. The use of shoring applies pressure on the trench wall face, acting as a direct support system. OSHA specifies vertical shoring must extend three feet past the opening of the trench.

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Sloping (Sloping System) - a method of protecting personnel from cave-ins by excavating to form sides of an excavation that is inclined away from the excavation to prevent cave-ins. The angle of incline carries with differences in such factors as soil type, environmental conditions of exposure and application of surcharge loads.

Spoil - earthen material removed during ground disturbance activities.

Soft Digging - movement of earth and/or soil, rocks, etc., by soft means such as hydrovac.

Surface Crossing - a structure for equipment and people to cross a trench or excavation.

Tolerance Zone - comprised of the width of the underground facility, plus a specified distance on both sides of that facility. Specific tolerance zones distances are listed below.

New Mexico: 18 inches

Texas: ½ the diameter of pipe plus 18 inches; e.g., 20-inch pipe, tolerance zone is 18 inches plus 10 inches = 28-inch tolerance.

Oklahoma: 24 inches

Wyoming: 24 inches

Canada: 1 meter

The tolerance zone is the width of an underground utility plus a specified tolerance distance on both sides of that utility. Do not use mechanical-digging equipment within this zone. The zone provides a margin of error in case the locator marks are slightly off. It also provides a buffer zone to prevent damage resulting from nearby excavation.

Trench - 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.


Underground Facility - any underground installation, pipe, utility line(s) which may be encountered during ground disturbance activities (e.g., underground storage tanks, pipelines, flowlines, electric / cable/ telephone lines, water / gas / sewer lines, etc.).

2.2 General Terms and Definitions

Area - individual operating fields or components that collectively comprise a region; areas normally include an area office.

Area Office - field office with assigned employees that support an area (e.g., Beaver Creek, Riverton, etc.).

Business Unit - individual components that collectively comprise a Division. Business units may also be referred to as basins.

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Contract Company Representative - a contractor who is assigned responsibilities and oversight for a specific task that requires adherence to Devon EHS protocols, e.g., contract inspector, "company man," rig consultant.

Division - the division operations of Devon are Canada, Strategic-Services, Corporate, Facilities and Pipeline and U.S.

Division EHS - titled position that provides EHS guidance and support within a division. This could be EHS manager, EHS supervisor, EHS advisor, EHS representative, EHS specialist and/or EHS technician.

Facility - the collection of tangible structures, piping, valves, vessels, tanks, compression and processing equipment located in close geographic proximity, that are involved directly in the development, production, processing or delivery of oil and gas to market (e.g., a tank battery, drill site, well-site, compressor station, pipeline and gas plant).

Line Supervisor - titled position that has assigned authority and responsibility for financials, production, maintenance, projects and personnel for a defined area. In Devon, this could be any supervisor, superintendent, foreman or assistant foreman.

Person-in-Charge (PIC) - a person that has been authorized by Devon to perform specific tasks to comply with this Devon protocol and/or regulatory requirements related to EHS. The PIC is defined in all protocols in the second column of the protocol section.

3.0	PROTOCOL	
3.1	Ground Disturbance A variety of ground disturbance activities are commonly done across Devon. This section of the protocol covers job pre-planning, One-Call notifications, as well as actions that need to be completed and reviewed prior to starting ground disturbance work. Some states and provincial governments have more specific and strenuous requirements, this protocol does not exempt operations from these regulatory requirements.	
Step	Person in Charge (PIC)	Action
3.1.1	Employee / Company Contract Representative	Determine the scope and size of the ground disturbance during initial job planning. As part of the planning the following items must be addressed when they are applicable. <ul style="list-style-type: none"> • Determine what type of ground disturbance will occur, mechanical or manual. • Determine if a One-Call notification is required (see step 3.1.4 for additional details). • Determine if the Mechanical Excavation Permit is required for the task (see step 3.2.1 for additional details). • Assign a competent person when personnel will enter an excavation 4 feet deep or greater. • Assign a registered professional engineer to design excavations greater than 20 feet deep (only needed when personnel will be entering).
3.1.2	Employee / Company Contract Representative	Consult with a registered professional engineer to review or plan where the excavation has the potential to affect the stability of adjacent structures. Note: Support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for protection of the workers.



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3.1.3	Employee / Company Contract Representative	Use the risk assessment process to review alternates to mechanical excavation or hydrovacung.
3.1.4	Employee / Company Contract Representative	Determine if ground disturbance activities are being performed on, or could potentially affect the safety or integrity of a jurisdictional pipeline. If so, follow all applicable requirements listed in the respective Devon DOT O&M Manual.
One-Call		
3.1.5	Excavator	Make the One-Call notification when required by state and provincial regulations, and when driving ground rods. The Devon Mechanical Excavation Permit is not required for ground rods. Note: Driving ground rods is in addition to any other state-specific requirement for making the One-Call notification.
3.1.6	Excavator	Communicate the proposed ground disturbance area for One-Call responders, using one of the methods listed below. <ul style="list-style-type: none">• White lining• White Flagging• Verbally communicating with One-Call responder Consult state and provincial government regulations for specific requirements. Note: Complete white lining and flagging, when used, before making the One-Call notification.
3.1.7	Excavator	Complete the One-Call Responder Log (Attachment C) or maintain equivalent proof on location, documenting the responses received, as well as, facility operators included in the One-Call. <ul style="list-style-type: none">• Responses• Notes provided by responder Note: Electronic One-Call system documents can be used to track the same information.
3.1.8	Excavator	Contact the One-Call center when an underground facility operator has not responded to a locate request within 48 hours.
3.1.9	Excavator	Perform a blind sweep along the path of ground disturbance when a Mechanical Excavation Permit is required. Note: See step 3.2.1 for Mechanical Excavation Permit requirements.
3.1.10	Excavator	Protect and preserve the staking, marking or other designations for underground facilities until no longer required for proper and safe excavation. Notify One-Call for re-marks if any facility mark is removed or no longer visible.
3.1.11	Excavator	Notify One-Call and Devon when the underground facility is not located where the responder had marked it.
3.1.12	Excavator	Contact One-Call to renew the ticket when excavation continues past the life of the ticket.



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One-Call Notifications and Third Party Line Crossings

3.1.13	Employee/Contractor	Respond to locate request(s) and mark any known underground hazards, in the ground disturbance area with flagging or paint. Flagging will be done in accordance with provincial, state and local government requirements.
3.1.14	Line Supervisor	Assign a Devon representative to oversee line crossings made by a third party over or under Devon lines. Refer to the Devon Department of Transportation Operations and Maintenance Manual for specifics when a third party is crossing a Devon operated Department of Transportation regulated line.

3.2 Excavation

Step	Person in Charge (PIC)	Action
3.2.1	Excavator	Complete the Mechanical Excavation Permit (Attachment B) for mechanical excavation activities greater than 16 inches deep. <ul style="list-style-type: none"> • A permit can only cover ground disturbance activities identified in a single One-Call notification. • A new permit is required if the One-Call ticket has expired or has to be extended. • Each day of excavation the permit must be discussed as part of the pre-task tailgate. • Review and confirm the One-Call Responder Log (Attachment C) is complete. An equivalent document can be used to document the responses. • Drawings, maps, etc., need to be included and attached if hazards are present. • PIC and contract supervisor are required to sign permit, if either of these change, the replacement must also sign the permit.
3.2.2	Excavator	Place the temporary spoil pile's leading edge at least two feet from the surface edge of an excavation that will be entered by a worker. <ul style="list-style-type: none"> • If possible place spoil pile so that it channels rainwater and other run-off water away from the excavation. • Keep the spoil pile away from all above ground lines of any type. • Keep the spoil pile away from line markings.
3.2.3	Excavator	Use a spotter to assist the operator when operating machinery in proximity to overhead power lines. Refer to Electrical Safety Protocol for specific distance requirements.
3.2.4	Excavator	Use a spotter when appropriate to monitor the distance between the excavation and underground facility (e.g., pipeline or electrical cable) during excavation activities and cease mechanical excavation within tolerance zone.
3.2.5	Excavator	Do not operate mechanical excavation equipment within the tolerance zone of existing underground facilities. Use soft digging methods when excavating in the tolerance zone.



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		<p>Note: Provincial, state or local governments have specific tolerance zone requirements:</p> <p>New Mexico: 18 inches</p> <p>Texas: ½ the diameter of pipe plus 18 inches; e.g., 20-inch pipe, tolerance zone is 18 inches plus 10 inches = 28-inch tolerance.</p> <p>Oklahoma: 24 inches</p> <p>Wyoming: 24 inches</p> <p>Canada: 1 meter</p>
3.2.6	Excavator	Ensure vehicles, equipment and other materials are kept at least 2 feet away from the edge of an excavation.
3.2.7	Excavator	<p>Install barricades, warning devices and/or fencing in the following situations:</p> <ul style="list-style-type: none">• When needed to alert equipment operators of the edge of an excavation to protect personnel and equipment.• Where necessary in public areas or near roadways to prevent people and vehicles from entering the excavation area.• Where necessary to prevent livestock or other animals from entering or falling into the excavation area.• When requested by landowner during the excavation. <p>Note: States and provincial governments may have specific requirements for barricades, warning devices and fencing. For excavation activities which are not regulated, the risk and hazards must be evaluated to determine if these controls are necessary.</p>
3.2.8	Line Supervisor	Verify equipment and PPE are adequate for site-specific hazards. Examples include high-visibility vest for workers exposed to traffic or construction equipment in the right-of-way for a road, or back up alarms on excavation equipment.
3.2.9	Excavator	Slope all ramps so that entry and exit can be accomplished standing upright without using hands for assistance.
3.2.10	Employee/Contractor	<p>Prohibit workers from being in the excavation during mechanical excavation or backfilling.</p> <p>Note: See section 3.3.1 prior to entering an excavation greater than 4 feet deep.</p>
3.2.11	Excavator	<p>Do not reduce the structural stability or excavate below the level of the base / footing of any foundation, retaining wall, sidewalk, structure, or equipment (e.g., process vessels, buildings, separators, rig anchors) which could reasonably be expected to pose a hazard to personnel.</p> <p>Note: Allow an exception to the requirement only when a support system or other method of protection is used to protect personnel from the possible collapse of the sidewalks, pavements and connected structures.</p>
3.2.12	Excavator	<p>Use surface crossing when necessary. Surface crossings are only permitted under the following conditions:</p> <ul style="list-style-type: none">• design and install public vehicle crossing under the supervision of a registered professional engineer,

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		<ul style="list-style-type: none"> provide walkways where personnel or equipment are required or permitted to cross over excavations, and provide guardrails (handrails, mid-rails and toe boards as needed) where walkways are 4 feet or more above the lower levels.
3.2.13	Line Supervisor	Consult with environmental team when excavation activities include environmental remediation activities or contaminated soil. The environmental team will provide guidance to ensure that the contaminated soil is tested and remediated/disposed of according to federal, state and local regulations.
3.2.14	Excavator	Backfill trenches, pits and holes in a manner that provides firm support for the underground facility, and prevents damage to the underground facility or facility coating. Follow specific Devon DOT Operations and Maintenance Manuals, state and provincial requirements where applicable.

3.3 Inspections and Excavation Entry		
3.3.1	Competent Person	Conduct inspections before personnel enter an excavation greater than 4 feet deep. Inspections will be conducted daily, when personnel will be entering the excavation. Document the inspection using the Excavation Inspection Report (Attachment D). List an explanation for all "No" responses on the inspection report, including corrective actions taken.
3.3.2	Competent Person	Identify the soil type and determine the appropriate protective system. Information on soil classification and requirements for protective systems can be found in the following appendices. <ul style="list-style-type: none"> Soil Types and Soil Testing - Appendix A Protective System Requirements - Appendix B Sloping and Benching Requirements - Appendix C Shoring and Shielding Requirements - Appendix D
3.3.3	Competent Person	Re-inspect the excavation when the following occur: <ul style="list-style-type: none"> conditions change that might result in a new hazard, damage resulting in possible failure of the protective system, after every rainstorm and other hazard-increasing occurrence.
3.3.4	Competent Person	Brief excavation and trenching personnel on the methods of eliminating or controlling hazards as part of a pre-task tailgate prior to entering an excavation or trench.
3.3.5	Competent Person	When entering an excavation of greater than 4 feet, test the atmosphere and document results on the Excavation Inspection Report (Attachment D) before entry and continuously monitor while occupied. Follow Confined Space and Hot Work protocols if air monitoring is outside any of the following ranges. <p style="text-align: center;">Oxygen levels 19.5-23.5%, LEL 0%, CO 0 PPM, and H2S 0 PPM.</p>


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		<p>Note: Refer to the Confined Space Entry Protocol if the excavation exhibits hazardous atmosphere or other conditions which pose hazards.</p> <p>Note: Hot Work Protocol is only required when hot work activities will be performed.</p>
3.3.6	Competent Person	<p>Verify that ladders, ramps or other means of egress are placed no more than 25 feet from personnel working inside the excavation.</p> <p>Note: Ladders will extend a minimum of 3 feet above the top of the excavation.</p>
Water Accumulation Requirements		
3.3.7	Competent Person	Do not allow entry into excavations 4 feet deep where water is accumulating. Use pumps, berms or other means to keep water out.
3.3.8	Employee	Do not work in excavations in which there is accumulated water, unless precautions have been taken to protect employees against the hazards posed by water accumulation or during rainstorms.

3.4	Damage Reporting	
Step	Person in Charge (PIC)	Action
3.4.1	Excavator	<p>Shut down work and report any damage caused or discovered to underground facilities to the following:</p> <ul style="list-style-type: none"> Devon Energy Underground facility owner/operator
3.4.2	Excavator	<p>Ensure required regulatory notifications are made.</p> <p>Note: Regulatory agencies could include the One-Call center, and / or the regulating pipeline authority.</p>
3.4.3	Line Supervisor	Ensure Devon personnel make required notifications when a company operated underground facility is struck by a third party or contract excavator.

4.0	RECORDKEEPING		
Step	Person In Charge (PIC)	Action	
4.1	Employees	Keep records listed below and forward records to the designated individual for filing,	
	Record	Retention Time	Records Management Enterprise Classification Structure Code
	Mechanical Excavation Permit	CY+3	EH45

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One-Call Responder Log	CY+3	EH45
Excavation Inspection Report	CY+3	EH45
One-Call Tickets	Job Completion	


Note: The Records Management Enterprise Classification Structure Code is listed as a reference, which should be used when records are sent to stored records.

5.0 TRAINING REQUIREMENTS

Step	Person In Charge (PIC)	Action
5.1	Line Supervisor	Verify Devon employees involved in excavation and trenching operations have completed the Ground Disturbance Protocol training.
5.2	Competent Person	Verify that employees and contractors designated to oversee excavation work have competent person training including the follow topics: 1. OSHA excavation regulations 2. State-specific One-Call regulations 3. Planning, conducting, monitoring and overseeing excavations 4. Identifying and classifying soil conditions
5.3	Line Supervisor	Verify people operating equipment involved with excavation and trenching have been trained on the use and operation of equipment.
5.4	Line Supervisor	Verify Devon line locator operators are properly trained on the equipment they are using, including the equipment's limitations.
5.5	Line Supervisor	Evaluate re-training when field verification shows knowledge gaps with the protocol or competent person requirements.

6.0 REFERENCES

<p>OSHA - CFR 1926.651 Excavations</p> <p>PHMSA - Pipeline and Hazardous Materials Safety Administration</p> <p>APWA - American Public Works Association</p> <p>Devon - Natural Gas Pipelines Operations & Maintenance Manual LINK</p> <p>Devon - Hazardous Liquid and CO₂ Pipeline Operations & Maintenance Manual LINK</p> <p>New Mexico - Excavator Handbook LINK</p> <p>New Mexico - Pipeline Safety Excavation Damage Prevention (Title 18, Chapter 60, Part 5, Section 18)</p> <p>Oklahoma - Excavator Handbook LINK</p> <p>Oklahoma - Underground Facilities Damage Prevention Act (Section 142.2)</p> <p>Texas - Underground Pipeline Damage Prevention (Title 16, Part 1, Chapter 18)</p> <p>Wyoming - Excavator Guide LINK</p> <p>Wyoming - Damage to Underground Public Utility Facilities (Title 37, Chapter 12, Article 3, Section 37)</p> <p>CT Trenching and Shorting Manual LINK</p>

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Appendix A - Soil Types and Soil Testing

This appendix describes a method of classifying soil and rock deposits based on the site and environmental conditions and on the structure and composition of the earth deposits. The following appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in Appendix C of this protocol, and if other protective systems are designed and selected for use.

Note: This is a reprint OSHA 29 CFR 1926, Subpart P, Appendix A

Cemented soil – a soil in which the particles are held together by a chemical agent (e.g., calcium carbonate), such that a hand-size sample or individual soil particles cannot be crushed into powder by finger pressure.

Cohesive soil – clay (fine-grained soil), or soil with high clay content, that does not crumble, can be excavated with vertical side slopes, and is plastic when moist. Cohesive soil is hard to break up when dry and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

Dry soil – a soil that does not exhibit visible signs of moisture content.

Fissured – a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

Granular soil – gravel, sand or silt (coarse-grained soil), with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

Layered system – two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

Moist soil – a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material exhibits signs of cohesion between particles.

Plastic – a property of a soil that allows the soil to be deformed or molded without cracking or appreciable volume change.

Saturated soil – a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or shear vane.

Soil classification system – a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the environmental conditions of exposure.

Submerged soil – a soil that is underwater or is free of seeping.

Unconfined compressive strength – the load-per-unit area at which a soil will fail in compression. It can be determined by laboratory testing or estimated in the field using a pocket penetrometer, thumb penetration tests, and other methods.

Wet soil – soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material slumps or begins to flow when vibrated. Granular material that would exhibit cohesive properties when moist loses those cohesive properties when wet.



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Appendix A - Soil Types and Soil Testing (continued)


Soil Type	Classification
Stable Rock	Natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed.
Type A Soil	<p>Cohesive soil with an unconfined compression strength of 1.5 tons/ft² (tsf) or greater.</p> <p>Examples: Type A Soil includes: clay, silty clay, sandy clay, clay loam, caliche and hardpan.</p> <p>Exceptions: Not Type A Soil if it:</p> <ul style="list-style-type: none"> • Is fissured • Is subject to vibration from heavy traffic, pile driving or similar effects • Has been previously disturbed • Is part of a sloped, layered system in which layers dip into the excavation at a slope of 4 horizontal to 1 vertical or greater • Is subject to other factors that would require it to be classified as a less stable material
Type B Soil	<p>Cohesive soil with an unconfined compressive strength greater than .5 tsf but less than 1.5 tsf.</p> <p>Examples: Type B Soils are listed below.</p> <ul style="list-style-type: none"> • Granular cohesion-less soils, including angular gravel (similar to crushed rock), silt, silt loam, sandy loam • Previously disturbed soil, except when it is determined to be Type C soil • Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration • Dry rock which is not stable • Material in a sloped, layered system in which layers dip into an excavation on a slope less than 4 horizontal to 1 vertical, but only if the material would be classified as a Type B soil
Type C Soil	<p>Cohesive soil with an unconfined compressive strength of 0.5 tsf or less.</p> <p>Examples: Type C Soils are listed below:</p> <ul style="list-style-type: none"> • Granular soils including gravel, sand and loamy sand • Submerged soil or soil from which water is freely seeping • Submerged rock that is not stable • Material in a sloped, layered systems in which the layers dip into an excavation or a slope of 4 horizontal to 1 vertical or greater

Classification Requirements

The competent person supervising the excavation will be responsible for determining whether the soil is type A, B or C.

The classification shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by the competent person using the tests described below.

In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.

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Appendix A - Soil Types and Soil Testing (continued)

If, after classifying a deposit, the properties, factors or conditions affecting its classification change in any way, the changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

Visual Test

Visual tests are conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation and the soil taken as samples from the excavated material.

Step	Action
1	Checks the items on the Excavation Inspection Report (Attachment D).
2	Observe the entire excavation site including the soil adjacent to the site and the soil being excavated.
3	Check for any signs of vibration.
4	Check for crack-line openings along the failure zone that would indicate tension cracks.
5	Look for existing utilities that indicate that the soil has been previously disturbed, and if so, what sort of backfill was used.
6	Observe the open side of the excavation for indications of layered geological structuring.
7	Look for signs of bulging, boiling or sloughing, and surface water seeping from the sides of the excavation or from the water table.
8	Check the area adjacent to the excavation for signs of foundations, or other intrusions into the failure zone.
9	Check for surcharging and the spoil distance from the edge of the excavation.

Manual Tests

Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information to classify soil properly.

-- Continued on Next Page --

Ground Disturbance Protocol

Appendix A - Soil Types and Soil Testing (continued)

The table below describes the various manual tests to be conducted by a competent person.

Test Type	Description								
Compression Strength Test	Estimate the unconfined compressive strength of the soil by using a pocket penetrometer, or a hand operated shear vane.								
Plasticity Test	Take a moist sample of soil, mold it into a ball and attempt to roll it into thin threads approximately 1/8 inch in diameter by two inches in length, and if the soil sample does not break when held by one end, it may be considered Type B.								
Dry Strength Test	Take a sample of dry soil, and use the table below to determine the soil type. <table border="1" data-bbox="350 741 1390 972"> <thead> <tr> <th>If the dry soil ...</th> <th>Then the soil ...</th> </tr> </thead> <tbody> <tr> <td>– crumbles freely or with moderate pressure into individual grains</td> <td>– is considered granular (Type C).</td> </tr> <tr> <td>– falls into clumps, but the smaller clumps can only be broken with difficulty</td> <td>– is probably clay in combination with gravel, sand or silt (Type B).</td> </tr> <tr> <td>– breaks into clumps, but does not break into smaller clumps and the soil is not fissured</td> <td>– may be considered un-fissured.</td> </tr> </tbody> </table>	If the dry soil ...	Then the soil ...	– crumbles freely or with moderate pressure into individual grains	– is considered granular (Type C).	– falls into clumps, but the smaller clumps can only be broken with difficulty	– is probably clay in combination with gravel, sand or silt (Type B).	– breaks into clumps, but does not break into smaller clumps and the soil is not fissured	– may be considered un-fissured.
If the dry soil ...	Then the soil ...								
– crumbles freely or with moderate pressure into individual grains	– is considered granular (Type C).								
– falls into clumps, but the smaller clumps can only be broken with difficulty	– is probably clay in combination with gravel, sand or silt (Type B).								
– breaks into clumps, but does not break into smaller clumps and the soil is not fissured	– may be considered un-fissured.								
Thumb Penetration Test	Take an undisturbed soil sample (a large clump of soil) as soon as practicable after the excavation to keep to a minimum the effects of exposure to drying influences. Press thumb into the clump of soil and use the table below to determine the soil type. <table border="1" data-bbox="350 1176 1390 1407"> <thead> <tr> <th>If the soil sample can be ...</th> <th>Then the soil is ...</th> </tr> </thead> <tbody> <tr> <td>– indented by the thumb, but only penetrated with a great effort</td> <td>– Type A.</td> </tr> <tr> <td>– Penetrated between Type A and Type B soil but no further than one inch</td> <td>– Type B.</td> </tr> <tr> <td>– penetrated several inches by the thumb and can be molded by light finger pressure</td> <td>– Type C.</td> </tr> </tbody> </table> <p>Important: If the excavation is later exposed to wetting influences, the classification of the soil must be changed accordingly.</p>	If the soil sample can be ...	Then the soil is ...	– indented by the thumb, but only penetrated with a great effort	– Type A.	– Penetrated between Type A and Type B soil but no further than one inch	– Type B.	– penetrated several inches by the thumb and can be molded by light finger pressure	– Type C.
If the soil sample can be ...	Then the soil is ...								
– indented by the thumb, but only penetrated with a great effort	– Type A.								
– Penetrated between Type A and Type B soil but no further than one inch	– Type B.								
– penetrated several inches by the thumb and can be molded by light finger pressure	– Type C.								

After Completing Visual or Manual Testing

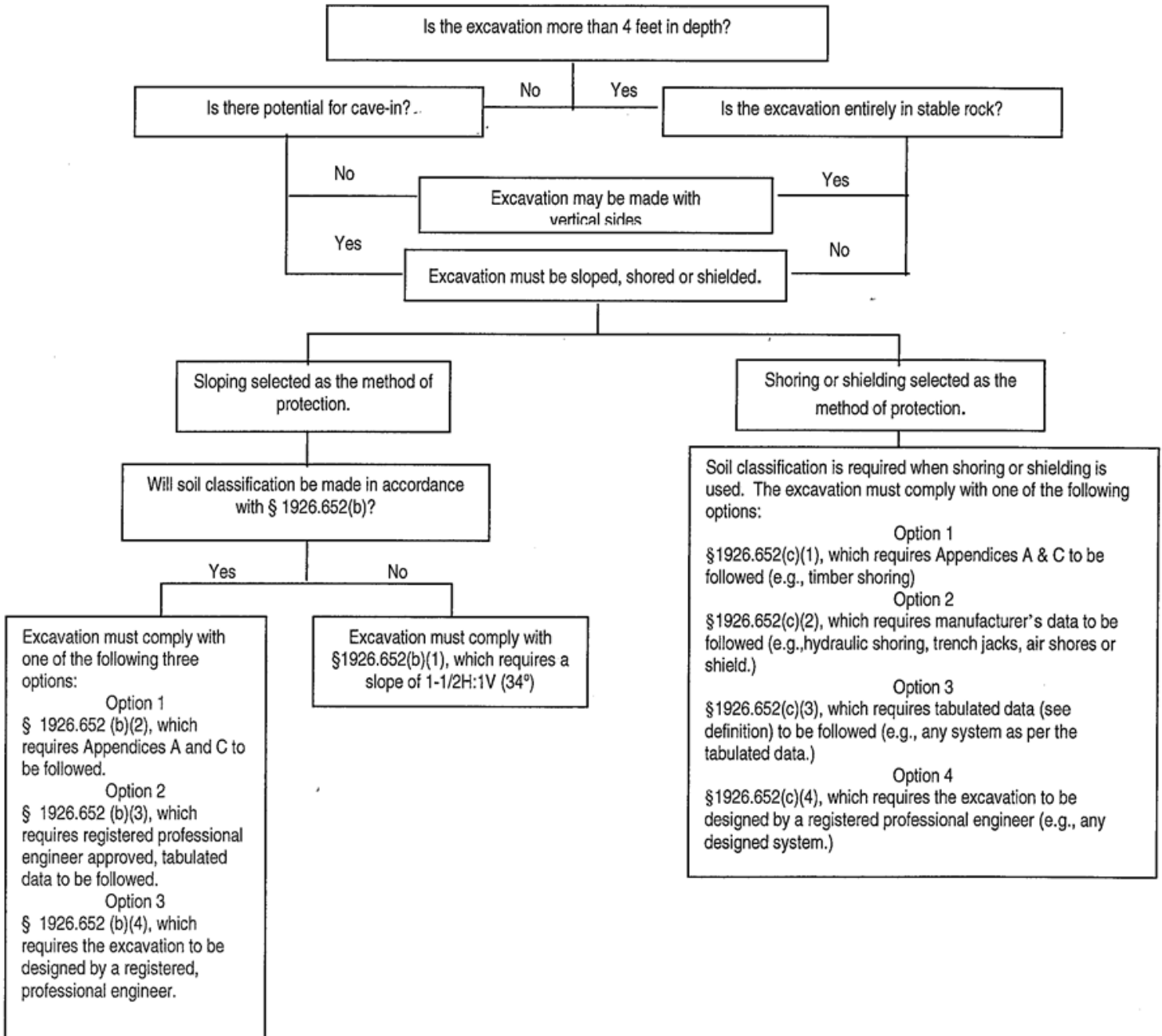
Upon completion of the visual and manual testing of the soil, compare the results to the definitions for determination of the soil type.



Ground Disturbance Protocol

Appendix B— Protective System Requirements

The following graphic summarizes the requirements contained in OSHA 29 CFR 1926, Subpart P, for excavations 20 feet or less in depth. Protective systems used in excavations more than 20 feet deep must be designed by a registered professional engineer.



Ground Disturbance Protocol

Appendix C – Slope and Benching Requirements

Slope Configurations - Excavations made in Stable Rock.

Stable Rock | Slope Angle 90 degrees(vertical)

Slope Configurations - Excavations made in Type A soil.

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

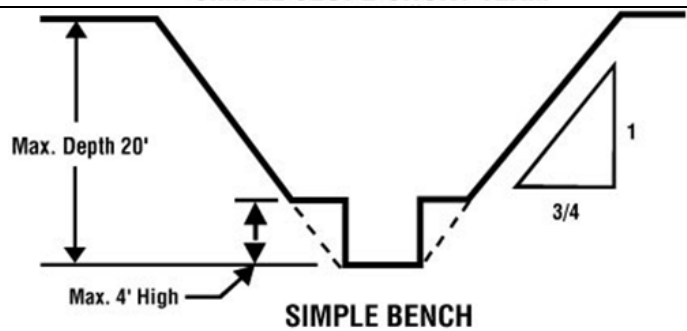
Slope Angle 53 degrees



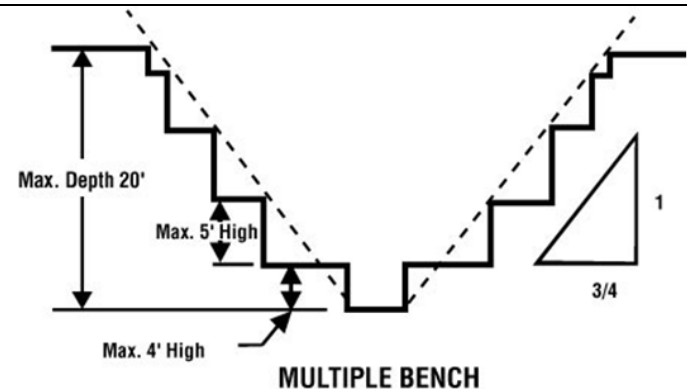
Simple Slope Short Term
Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of 1/2:1



Simple Bench
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:



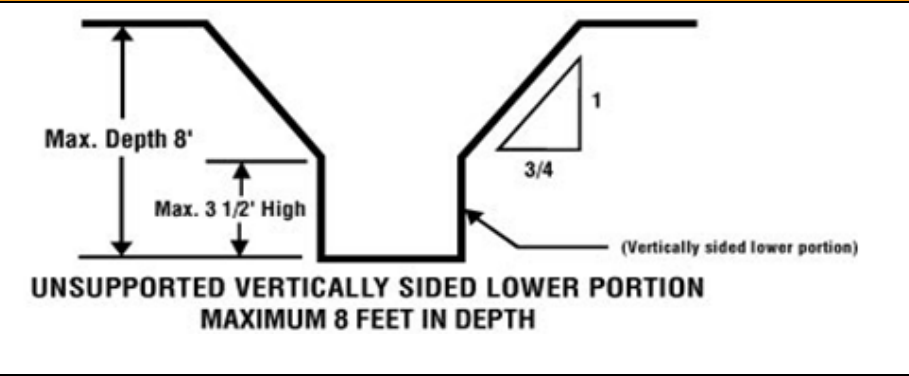
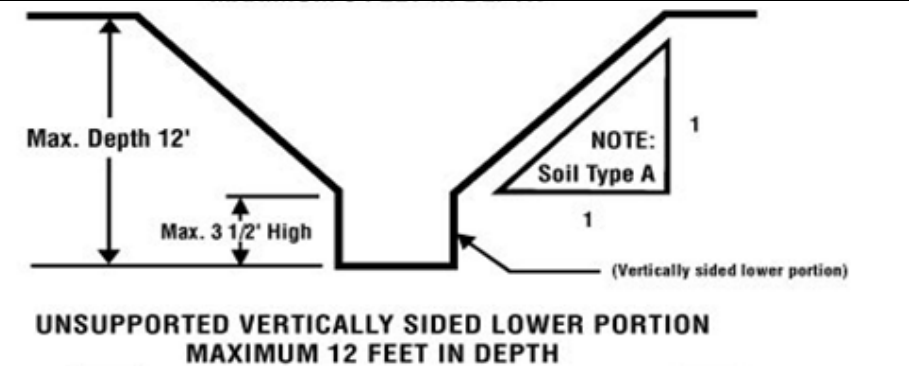
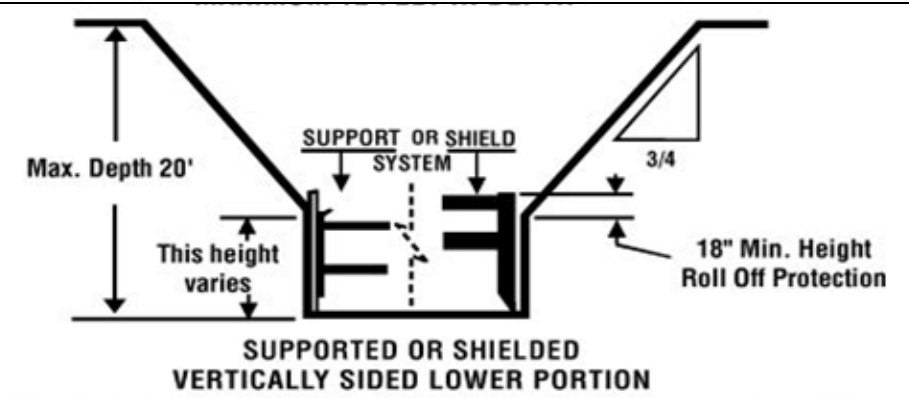
Multiple Bench
All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 3/4:1 and maximum bench dimensions as follows:



Ground Disturbance Protocol

Appendix C – Slope and Benching Requirements (continued)

Slope Configurations - Excavations made in Type A soil (continued)

<p>Unsupported Vertically Sided Lower Portion - Max 8 feet deep</p>	<p>All excavations eight feet or less in depth which have unsupported vertically sided lower portions (and are in Type A soil) shall have maximum vertical sides of 3 ½ feet.</p> <p>Maximum allowable slope of ¾:1</p>	
<p>Unsupported Vertically Sided Lower Portion - Max 12 feet deep</p>	<p>All excavations 12 feet or less in depth which have unsupported vertically sided lower portions (and are in Type A soil) shall have maximum vertical sides of 3 ½ feet.</p> <p>Maximum allowable slope of 1:1</p>	
<p>Supported or Shielded Vertically Sided Lower Portion</p>	<p>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 in Type B Soil will have a maximum allowable slope of ¾:1.</p>	

All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other options permitted under "Requirements of Protective Systems" (OSHA 29 CFR 1926, Subpart P).

Ground Disturbance Protocol

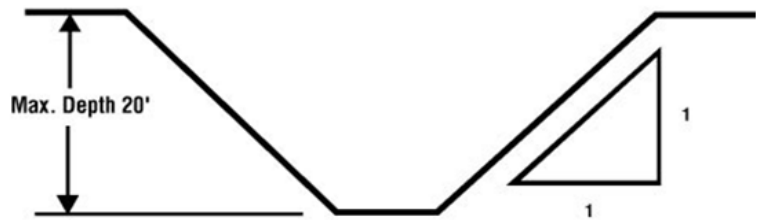
Appendix C – Slope and Benching Requirements (continued)

Slope Configurations - Excavations made in Type B soil

Simple Slope

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

Slope Angle 45 degrees

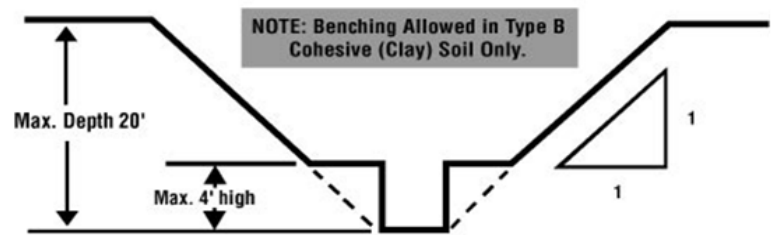


SIMPLE SLOPE

Single Bench

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

Example: A 10-foot deep trench must be benched back 10 feet in each direction, and a max of a 45-degree angle, and total distance across would be 20 feet, plus the width of the bottom of the trench itself.

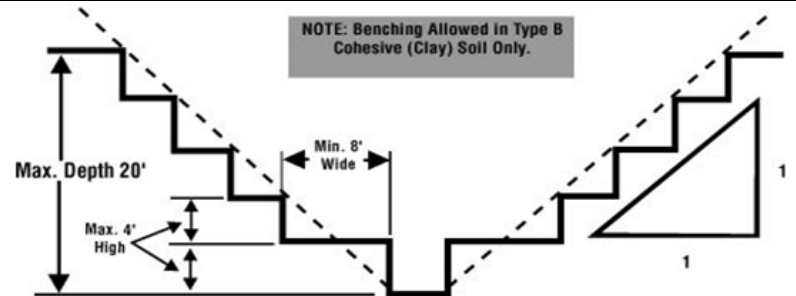


SINGLE BENCH

Multiple Bench

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

Slope Angle 45 degrees.

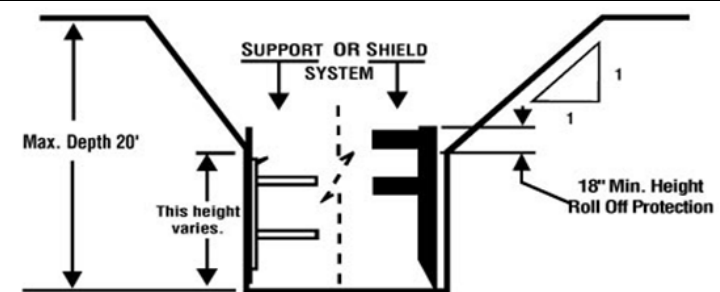


MULTIPLE BENCH

Supported or Shielded Vertically Sided Lower Portion

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 in Type B Soil will have a maximum allowable slope of 1:1.

Slope Angle 45 degrees.



SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION

All other slopes for excavations in Type B will be in accordance with the other options permitted under "Requirements of Protective Systems" (OSHA 29 CFR 1926, Subpart P).

Ground Disturbance Protocol

Appendix C – Slope and Benching Requirements (continued)

Slope Configurations - Excavations made in Type C soil

<p>Simple Slope</p>	<p>All simple slope excavations 20 feet or less in depth shall have a maximum allowable Slope of 1 ½:1.</p> <p>Slope Angle 34 degrees</p>	
<p>Benching</p>	<p>Not Allowed for Type C Soil</p>	
<p>Supported or Shielded Vertically Sided Lower Portion</p>	<p>All excavations 20 feet or less in depth in Type C soil 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 in Type B Soil will have a maximum allowable slope of 1 ½:1.</p> <p>Slope Angle 34 degrees</p> <p>Sloping Example for Type C Soil: A 10 foot-deep trench in Type C soil would be sloped to a 34-degree angle or sloped 15 feet back in both directions, and total distance across would be 30 feet, plus the width of the bottom of the trench itself.</p>	
<p>All other slopes for excavations in Type C will be in accordance with the other options permitted under "Requirements of Protective Systems" (OSHA 29 CFR 1926, Subpart P).</p>		



Field:
Corporate

Business
Unit/Area:
N/A

Protocol No.:
COR-3EHS15-PR

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Revision/Approval
Date: R1 1-22-2016

Ground Disturbance Protocol

Appendix D – Shoring and Shielding Requirements

Shoring

There are two types of shoring, hydraulic and timber. Use shoring or shielding when the location or depth of the cut makes sloping back to the maximum allowable slope impractical.

Use the table below for shoring requirements and limitations.

No.	Requirements/Limitations
1	Install all shoring from the top down and remove from the bottom up.
2	For hydraulic shoring, check at least once per shift for the following: <ul style="list-style-type: none"> • leaking hoses and/or cylinders, • broken connections, • cracked nipples, • bent bases and • any other damaged or defective parts.
3	Verify that the top cylinder of hydraulic shoring is no more than 18 inches below the top of the excavation.
4	Verify that the bottom of the cylinder is no higher than 4 feet from the bottom of the excavation. Note: Two feet of trench wall may be exposed beneath the bottom of the rail or plywood sheeting, if used.

Shielding

Trench boxes are different from shoring because, instead of shoring up or otherwise supporting the trench face, they are intended primarily to protect workers from cave-ins and similar incidents.

Use the table below for shielding requirements and limitations.

No.	Requirements/Limitations
1	Keep the excavated area between the outside of the trench box and the face of the trench as small as possible
2	Backfill the space between the trench box and the excavation side to prevent lateral movement of the box.
3	Verify that shields are not subjected to loads exceeding those which the system was designed to withstand.
4	Trench boxes may be used in combination with sloping and benching.
5	Extend the box at least 18 inches above the surrounding area if there is sloping toward the excavation. Note: This can be accomplished by providing a benched area adjacent to the box.
6	Do not modify trench boxes or shields without the approval from the manufacturer.
7	Shields may ride two feet above the bottom of an excavation, provided there is no caving under or behind the shield, and they are calculated to support the full depth of the excavation.
8	Workers must enter and leave the shield in a protected manner, such as by a ladder or ramp, and exit from the shield while it is being moved.

Ground Disturbance Protocol

Appendix E - APWA Uniform Color Code

APWA UNIFORM COLOR CODE

	WHITE - Proposed Excavation
	PINK - Temporary Survey Markings
	RED - Electric Power Lines, Cables, Conduit and Lighting Cables
	YELLOW - Gas, Oil, Steam, Petroleum or Gaseous Materials
	ORANGE - Communication, Alarm or Signal Lines, Cables or Conduit
	BLUE - Potable Water
	PURPLE - Reclaimed Water, Irrigation and Slurry Lines
	GREEN - Sewers and Drain Lines

TYPICAL MARKING

LARGE PIPE OR MULTIPLE DUCTS

TOLERANCE ZONE

24" / 600 mm

SMALL PIPE OR CABLE(S)

TOLERANCE ZONE

* REFER TO TEXT ON FRONT OF CARD

Customize with your center's phone and address information

GUIDELINES FOR UNIFORM TEMPORARY MARKING OF UNDERGROUND FACILITIES

This marking guide provides for universal use and understanding of the temporary marking of subsurface facilities to prevent accidents and damage or service interruption by contractors, excavators, utility companies, municipalities or any others working on or near underground facilities.

ONE-CALL SYSTEMS

The One-Call damage prevention system shall be contacted prior to excavation.

PROPOSED EXCAVATION

Use white marks to show the location, route or boundary of proposed excavation. Surface marks on roadways do not exceed 1.5" by 18" (40 mm by 450 mm). The facility color and facility owner identity may be added to white flags or stakes.

USE OF TEMPORARY MARKING

Use color-coded surface marks (i.e., paint or chalk) to indicate the location or route of active and out-of-service buried lines. To increase visibility, color coded vertical markers (i.e., stakes or flags) should supplement surface marks. Marks and markers indicate the name, initials or logo of the company that owns or operates the line, and width of the facility if it is greater than 2" (50 mm). Marks placed by other than line owner/operator or its agent indicate the identity of the designating firm. Multiple lines in joint trench are marked in tandem. If the surface over the buried line is to be removed, supplementary offset markings are used. Offset markings are on a uniform alignment and clearly indicate the actual facility is a specific distance away.


TOLERANCE ZONE

Any excavation within the tolerance zone is performed with non-powered hand tools or non-invasive method until the marked facility is exposed. The width of the tolerance zone may be specified in law or code. If not, a tolerance zone including the width of the facility plus 18" (450 mm) measured horizontally from each side of the facility is recommended.

ADOPT UNIFORM COLOR CODE

The American Public Works Association encourages public agencies, utilities, contractors, other associations, manufacturers and all others involved in excavation to adopt the APWA Uniform Color Code, using ANSI standard Z535.1 Safety Colors for temporary marking and facility identification.

Rev. 4/99

	Field: Corporate	Business Unit/Area: N/A	Protocol No.: COR-3EHS15-PR	Page 23	Revision/Approval Date: R1 1-22-2016
Ground Disturbance Protocol					

Attachment A - Approval, Review and Modification History

Revision Number	Approved/Revised/Reviewed By	Approval/Revision/ Review Date	Description (Initial Approval, Revision or Review along with further details of revision, if needed)
00	Richard Luedecke	11/25/2015	Initial Approval
01	Richard Luedecke	1/22/2016	Added the Thumb Penetration Test for Type B Soil in Appendix A. Removed a technical issue with the "above" wording in step 3.3.5, which could have been misread.

Attachment B - Mechanical Excavation Permit

Company Performing Excavation:			
Person In Charge:		Contact #:	
Competent Person (Excavation Safety)¹:		Contact #:	
Emergency Contact Name:		Contact #:	
Facility Worksite Location or Legal Description or GPS:			
Excavation Equipment:			
AUTHORIZED DURATION OF PERMIT: (Permits are only valid for the date indicated below - NOT to exceed expiration of One-Call ticket)			
Permit Issue Date:		Permit Expiration Date:	

Verification of the information below is required before any work begins.		YES, N/A or see deviations
1	The proposed excavation site has been clearly identified using white flagging, white lines and/or verbally communicated to responders; and underground facilities in the affected area have been identified and exposed.	
2	One-Call notifications and contacts have been made to identify and locate existing underground facilities. <input type="checkbox"/> One-Call ticket verified for site: LOCATE REQUEST #: _____ <input type="checkbox"/> Positive response from every identified operator/utility and second request for non-response (Verify One-Call Responder Log or Equivalent)	
3	Appropriate Devon operations personnel responsible for the facility (Facilities & Pipeline/Exploration & Production) have been consulted to discuss scope of project, location of facilities, and review system maps and/or facility drawings.	
4	A worksite inspection has been performed to identify all potential excavation hazards, including a complete survey of the area to identify any indications of unidentified underground facilities (R-O-W's, signage, fence crossings, above ground facilities).	
5	A blind sweep has been performed Type of line locating equipment used for blind sweep: _____	
6	Is a competent person for excavation safety on-site who will monitor excavations and perform required excavation inspections prior to anyone entering excavation 4 feet or greater in depth.	
7	Precautions have been taken to prevent contact with overhead power lines.	
8	Existing lines that may be crossed have been manually exposed by "pot-holing" or equivalent safe method.	
9	Mechanical excavation within the tolerance zone of existing underground facilities is prohibited and provisions for manual digging are in place.	
Note any deviation to the statements above:		
10	Any additional measures taken? <input type="checkbox"/> Review of available records (ROW surveys, agency public maps, company maps, construction drawings, aerial photos) <input type="checkbox"/> Contact has been made with the landowner or tenant to seek their knowledge of buried utilities. <input type="checkbox"/> Other: _____	

¹ When required.

Attachment B – Mechanical Excavation Permit (continued)

PERMIT AUTHORIZATION			
Site personnel involved in the mechanical excavation activities confirm by signature their understanding and agreement of the conditions of this permit: If transfer of control (i.e., PIC and/or contractor supervisor) occurs during authorized time, new signatures of personnel are required!			
Devon PIC: _____	Date: _____	Contractor Supervisor: _____	Date: _____
<i>Responsibility Transferred To:</i>		<i>Responsibility Transferred To:</i>	
Devon PIC: _____	Date: _____	Contractor Supervisor: _____	Date: _____
<i>Responsibility Transferred To:</i>		<i>Responsibility Transferred To:</i>	
Devon PIC: _____	Date: _____	Contractor Supervisor: _____	Date: _____
<i>Responsibility Transferred To:</i>		<i>Responsibility Transferred To:</i>	
Devon PIC: _____	Date: _____	Contractor Supervisor: _____	Date: _____

NOTE: This permit to be reviewed during each pre-task tailgate meeting.

Permit Requirements and Scope:

1. Permit can only cover ground disturbance activities identified in a single One-Call notification.
2. A new permit must be written if One-Call ticket expires or has to be extended.
3. Permit must be discussed during pre-task tailgate every day that excavation is planned.
4. Permit must be completed before any movement of earth by means of mechanical excavation 16 inches or deeper.
5. If hazards are present, attach alignment drawings, maps, etc. identifying all underground and overhead hazards associated with the excavation under this permit or draw a plot plan using the graph on page 2. Drawings must include all areas identified under worksite location on page 1.
6. Must be signed by PIC and contract supervisor. If during scope of permit either of these persons change, the new personnel must sign original permit (chain of custody for permit).

Definitions:

Blind Sweep - the use of electronic line finding equipment, and visual scan to locate unmarked underground facilities in the path of ground disturbance activities. The use of witching sticks is not approved for blind sweep activities.

Damage - includes at a minimum,

(A) defacing, scraping, displacement, penetration, destruction, or partial or complete severance of an underground facility or of any protective coating, housing, or other protective device;

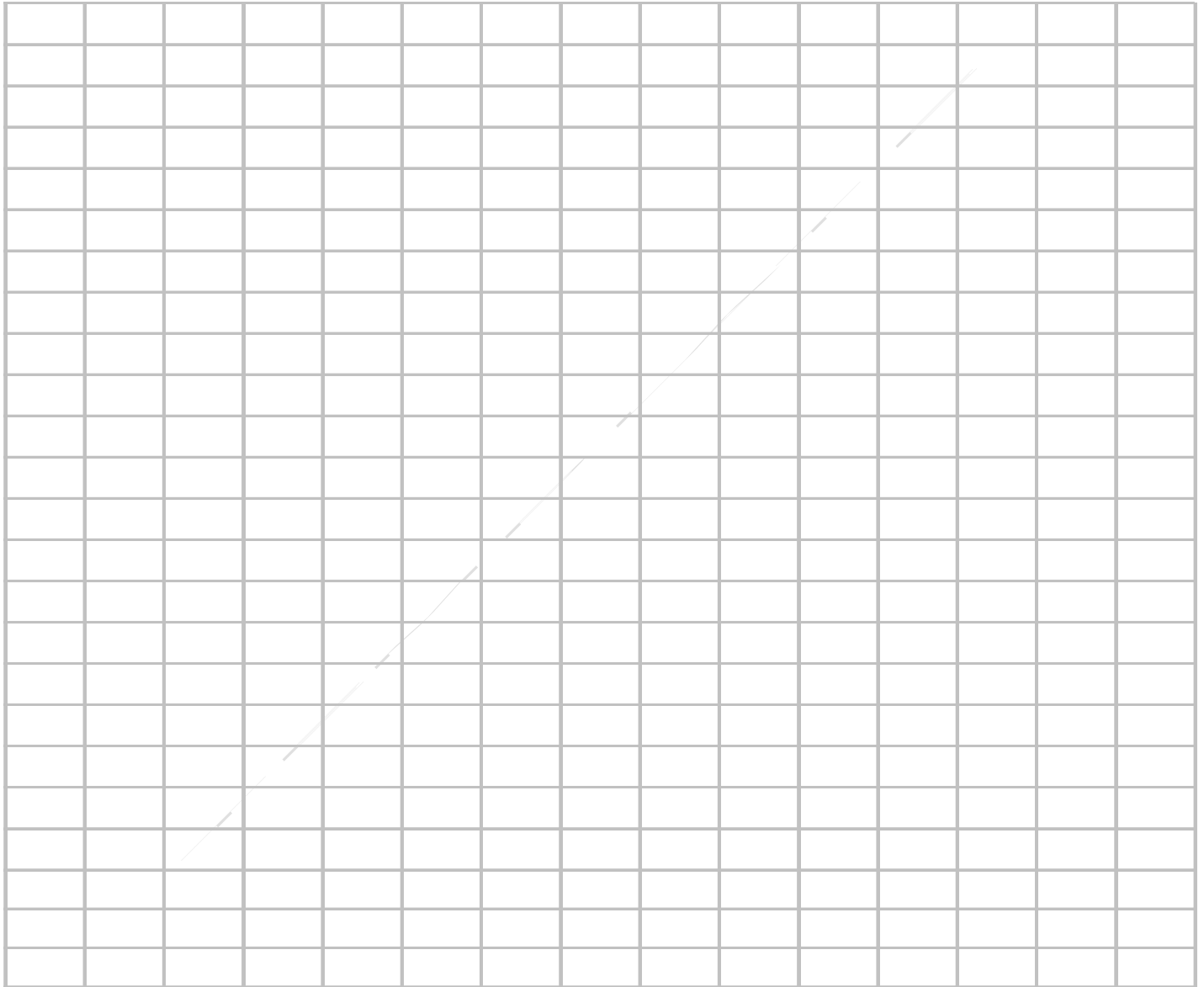
(B) weakening of structural or lateral support of an underground facility that affects the integrity of the pipeline; or\

Specific states may have more stringent definition of damage.







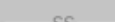


Manual Digging - any movement of earth using non-mechanized tools or equipment. Not limited to soft digging or digging with shovels, and manual post-hole diggers.

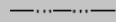
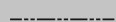




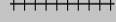
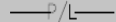
Positive Response - response by the underground facility operator where they have either marked the location of their facilities, or confirmed the area is clear. The clear response can be painted on the ground or submitted to the state One-Call organization.

Attachment B – Mechanical Excavation Permit (continued)



Color	Color Name	Item
	Red	Electric
	Yellow	Gas/oil/steam/chemical
	Orange	Communications/CATV
	Blue	Water
	Green	Sewer/storm drain
	Purple	Reclaimed water
	Pink	Temporary survey
	White	Proposed excavation

	WATER LINE
	FENCE
	TELEPHONE LINE
	FIBER OPTIC
	FOREIGN PIPELINE
	CABLE TV
	SANITARY SEWER
	STORM SEWER
	WATER WAY (MINOR)

	WATER WAY (MAJOR)
	SECTION LINE
	TOWNSHIP, RANGE LINE
	COUNTY LINE
	ROAD CENTER LINE
	RAIL ROAD
	PROPERTY LINE
	ELECTRIC/POWER LINE

Attachment C - One-Call Responder Log

Facility Operator	Name of Person Contacted/Company	Notes on Location of Underground Installations

Attachment D - Excavation Inspection Report

Excavation Inspection Report				
Date:		Time: <input type="checkbox"/> AM <input type="checkbox"/> PM		
Location:		Job Name:		
Inspection Type: <input type="checkbox"/> Daily <input type="checkbox"/> Post Rainstorm <input type="checkbox"/> Other _____				
Length:		Width:		Depth:
Soil Type: <input type="checkbox"/> Stable Rock <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C Soil Test Type: _____				
Competent Person (Required to complete inspection):			Competent Person Signature:	
Item	Description	Yes	No	N/A
1	Have all surface equipment and obstructions been identified and either supported or removed?			
2	Are active lines in the excavation properly supported?			
3	Are there signs of stress cracking or other cave-in signs?			
4	Are personnel protected from loose rock or soil?			
5	Are spoil piles, materials and equipment set back at least of 2 feet from edge of the excavation?			
6	Is a means of access & egress provided, within 25 feet of all workers? Describe method (e.g., steps, ladder, ramp):			
7	If the ladder is the means of egress from the excavation, is it secured and does the top of ladder extend at least 3 feet above edge of the excavation?			
8	Is sloping, benching, shoring and shielding system designed and installed per requirements?			
9	Is fall protection (e.g., guardrails) provided for walkways and bridges crossing over excavations that are 4 feet deep or greater?			
10	Are barriers, fencing or other protective measures needed at excavations to prevent the public or livestock from entering the excavation?			
11	Will personnel be working on faces of sloped or benched excavations above other personnel? If yes, other arrangements will be made.			
12	Are workers exposed to public vehicle traffic wearing highly visible vests or PPE as necessary?			
13	Are precautions taken to protect workers from water accumulation?			
14	Air monitoring results	Oxygen:	CO:	LEL:
15	Follow Confined Space and Hot Work protocols if air monitoring exceeds any of the following.	Oxygen: 19.5- 23.5%	H ₂ S: H ₂ S/CO: >0 ppm LEL: >0%	
16	Have completed Excavation Inspection Report and Mechanical Excavation Permit been reviewed and discussed during the pre-task tailgate with affected personnel?			
Comments:				