



Ground Disturbance Protocol

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Owner: VP, EHS	Applies to: Field Sites	Doc. ID: 112936339
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1. ABOUT THIS PROTOCOL

Purpose	This protocol was established to mitigate the hazards encountered by personnel when performing ground disturbance activities.
Objective	This 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 includes requirements for pre-job planning, one-call notification, underground facility owner/operator, excavation operation, excavation inspections/entry, and damage reporting.
Applicability	<p>This protocol applies to personnel involved in, responsible for, or affected by ground disturbance activities at Devon operated facilities.</p> <p>Contractors are required to follow site-specific requirements and have their own programs which comply with applicable laws and regulations.</p>
Variances	None
Superseded Documents	Excavation and Trenching Implementation Plan 360-IP



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3. ROLES

Field/Business Unit Leadership	Reinforce adherence to this protocol and provide resources for application of the protocol. Ensure employees responsible for ground disturbance, excavation or trenching duties receive required training.
Line Supervisor	Understand how this protocol applies to personnel in their area of responsibility. Ensure personnel have the training, skills, knowledge and understanding to comply with this protocol. Check periodically to ensure the requirements of this protocol are being met.
EHS	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 this protocol.

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4. PROTOCOL PREREQUISITES

4.1 PROTOCOL OVERVIEW

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

4.2 APPLICABLE STANDARDS

OSHA – 29 CFR 1926 Subpart P – Excavations
 PHMSA – 49 CFR Subchapter D – Pipeline Safety
 New Mexico Pipeline Safety Excavation Damage Prevention (Title 18, Chapter 60, Part 5, Section 18)
 New Mexico Excavator Handbook
 North Dakota One-Call Excavation Notice System (Century Code 49-23) Oklahoma Underground Facilities Damage Prevention Act (Section 142.2)
 North Dakota One-Call Handbook
 Oklahoma Underground Facilities Damage Prevention Act (Section 142.2)
 Oklahoma Excavator Handbook
 Texas Underground Pipeline Damage Prevention (Title 16, Part 1, Chapter 18)
 Texas – Underground Facility Damage Prevention and Safety Act (Chapter 251)
 Texas Excavator Guide
 Wyoming Damage to Underground Public Utility Facilities (Title 37, Chapter 12, Article 3, Section 37)
 Wyoming Excavator Handbook
 APWA – Uniform Color Code
 Devon Hazard Assessment and Personal Protective Equipment Protocol
 DOT Devon Natural Gas Pipeline Operations & Maintenance Manual
 Devon Mechanical Lifting and Rigging (MLR) Protocol
 Devon General Electrical Safety Protocol
 Devon Fall Protection Protocol
 Devon Confined Space Protocol
 Devon Hot Work Protocol
 Devon Event Reporting and Investigation Protocol

4.3 REQUIRED MATERIALS, EQUIPMENT, INFORMATION, OR OTHER RESOURCES

Minimum required Personal Protective Equipment (PPE) per the [Hazard Assessment and Personal Protective Equipment Protocol](#). Line locating equipment.

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5. PROTOCOL

5.1 PRE-JOB PLANNING

A variety of ground disturbance activities are commonly performed across Devon. Some states have more specific and strenuous requirements. This protocol does not exempt operations from these regulatory requirements.

Step	Required Action	Role
5.1.1	<p>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.</p> <ul style="list-style-type: none"> • Determine if the type of ground disturbance that will occur is mechanical excavation or manual digging. • Determine if a locate request to the One-Call notification system is required (see section 5.2 for additional details). • Determine if the Mechanical Excavation Permit is required for the task (see step 5.4.9 for additional details). • Determine if a non-conductive material barrier should be utilized with manual digging tools. • Assign a competent person when personnel will enter a trench excavation 4 feet deep or greater (see section 5.5 for excavation entry requirements). • Assign a registered professional engineer to design excavations greater than 20 feet deep (only needed when personnel will be entering). <p>Note: Manual digging tools with a non-conductive material barrier between the tool and the user should be utilized when there is potential for exposure to electrical hazards.</p>	Employee / Contract Company Representative
5.1.2	<p>Consult with a registered professional engineer to review or plan where the excavation has the potential to affect the stability of adjacent structures.</p> <p>Note: Support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for protection of the workers.</p>	Employee / Contract Company Representative

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- 5.1.3 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 Department of Transportation (DOT) Devon Operations and Maintenance (O&M) Manual.

Employee / Contract
Company
Representative

Note: Refer to the [DOT Devon Natural Gas Pipeline O&M Manual](#) for requirements on jurisdictional natural gas lines.

- 5.1.4 Indicate the proposed ground disturbance area for One-Call responders, using white marking products (e.g., paint, flags, stakes, whisksers).

Excavator

Note: Mark the proposed excavation with white marking products before contacting the One-Call notification system.

- 5.1.5 Conduct a pre-job walkthrough of the proposed excavation area with the excavator and Devon Person in Charge (PIC) for all mechanical excavation projects.

Employee / Contract
Company
Representative

Note: The Devon PIC must be a person capable of identifying potential excavation hazards at the facility or location where the proposed excavation will occur.

5.2 ONE-CALL NOTIFICATION

Step	Required Action	Role
5.2.1	<p>Make the locate request to the One-Call notification system for the following:</p> <ul style="list-style-type: none"> Mechanical excavations regardless of depth, excluding routine maintenance activities (grading/blading lease roads/pads, backfilling, snowplowing, etc.) where allowed by state regulation. When driving ground rods. When required by state regulations for all other ground disturbance activities. 	Excavator
<p>Note: Making a locate request for mechanical excavations regardless of depth (excluding routine maintenance activities) and when driving ground rods is in addition to state-specific requirements.</p>		

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- 5.2.2 Wait adequate time to allow underground facility owner(s) / operator(s) (UFO) to respond to the locate request and ensure a positive response is received by each UFO notified by the one-call notification system. Excavator

Note: State regulations have specific waiting period requirements:

- New Mexico:
 - Requests submitted prior to 4:00 pm: 48 hours from 12:00 am the following business day
 - Requests submitted after 4:00 pm: 48 hours from 12:00 am the second business day
- North Dakota: 48 hours from 12:01 am the following business day after request was submitted
- Texas: 48 hours after excavator gives notice excluding weekends and holidays
- Oklahoma: 48 hours after excavator gives notice excluding weekends and holidays
- Wyoming: 2 full business days after excavator gives notice

- 5.2.3 Complete the [One-Call Responder Log](#) (Attachment A) or maintain equivalent proof on location, documenting the responses received, notes provided by the responder, as well as UFO(s) included in the One-Call. Excavator

Note: Electronic One-Call notification system documents can be used to track the same information.

- 5.2.4 Contact the One-Call notification system when a UFO has not responded to a locate request within the state regulation waiting period requirements. Excavator

Note: See step [5.2.2](#) for state specific waiting period requirements.

5.3 UNDERGROUND FACILITY OWNER/OPERATOR

Step	Required Action	Role
5.3.1	Respond to locate request(s) and mark any known underground hazards, in the ground disturbance area with flagging or paint. Marking will be done in accordance with state regulation.	Employee / Contractor



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Note: All states Devon operate in have adopted the use of the American Public Works Association (APWA) color code. Refer to [Appendix A](#) for the APWA uniform color code.

5.3.2	Assign a Devon representative to oversee line crossings made by a third party over or under Devon lines. At a minimum, pipelines / flowlines off location will be witnessed, unless they will not be uncovered.	Line Supervisor
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5.3.3	Follow all applicable requirements listed in the respective DOT Devon O&M Manual for specifics when a third party is crossing a Devon operated jurisdictional pipeline.	Line Supervisor
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Note: Refer to the [DOT Devon Natural Gas Pipeline O&M Manual](#) for requirements on jurisdictional natural gas lines.

5.4 EXCAVATION

Step	Required Action	Role
5.4.1	If the excavation is going to extend beyond the pre-determined dig zone, communicate the change(s) to the excavator, Devon PIC, and UFO locator.	Employee / Contract Company Representative / Excavator
5.4.2	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.	Line Supervisor
5.4.3	Protect and preserve the staking, marking or other designations for underground facilities until no longer required for proper and safe excavation. Contact the One-Call notification system for re-marks if any facility mark is removed or no longer visible.	Excavator
5.4.4	Do not work under or walk under suspended loads from digging or lifting equipment.	Employee / Contractor

Note: Refer to the [Mechanical Lifting and Rigging \(MLR\) Protocol](#) for mechanical lifting requirements.

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- 5.4.5 Use a spotter to assist the operator when operating machinery in proximity to overhead power lines. Excavator

Note: Refer to [General Electrical Safety Protocol](#) for specific distance requirements.

- 5.4.6 Prohibit workers from being in the excavation during mechanical excavation or when backfilling. Employee / Contractor

Note: See section [5.5](#) prior to entering an excavation 4 feet deep or greater.

- 5.4.7 Prior to excavation, perform a blind sweep along the path of ground disturbance when a Mechanical Excavation Permit is required. If the blind sweep detects an object along the excavation path, an attempt must be made to determine the source. If the source is stray metal, the object should be removed when possible, and a blind sweep performed again in the area where the source was removed. Excavator

Note: See step [5.4.9](#) for Mechanical Excavation Permit requirements.

- 5.4.8 Do not operate mechanical excavation equipment within the tolerance zone of existing underground facilities. Use manual digging methods when excavating in the tolerance zone. Use soft digging methods to expose all live underground facilities that will be crossed during excavation. Excavator

Note: State regulations have specific tolerance zone requirements. Tolerance zones are the width of an underground facility plus the state specific distance on each side of that facility:

- New Mexico: 18 inches
- North Dakota: 24 inches
- Texas: ½ the diameter of underground facility plus 18 inches
- Oklahoma: 24 inches
- Wyoming: 24 inches

- 5.4.9 Complete the [Mechanical Excavation Permit](#) (Attachment B) for mechanical excavation activities greater than 16 inches deep. Excavator

Note: A Mechanical Excavation Permit is not required for driving ground rods.

- A permit can only cover ground disturbance activities identified in a single One-Call notification.

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- A new permit is required if the One-Call ticket has expired.

Note: Where state regulations allow for the extension of an existing locate, the mechanical excavation permit must be updated with the new expiration date.

- On each excavation day, the permit must be discussed as part of the pre-task tailgate.
- Review and confirm the [One-Call Responder Log](#) (Attachment A) 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.
- The Devon PIC and contractor supervisor are required to sign permit. If these change, the replacement must also sign the permit.

5.4.10	Use a spotter when appropriate to monitor the distance between the excavation and underground facility (e.g., pipeline or electrical cable) during excavation activities.	Excavator
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5.4.11	Contact the One-Call notification system and Devon when the underground facility is not located where the responder had marked it.	Excavator
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5.4.12	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.	Excavator
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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 sidewalks, pavement, and connected structures.

5.4.13	Place temporary spoil pile away from all above ground lines and away from line markings. For excavations that will be entered by personnel, place the spoil pile leading edge at least 2 feet from the surface edge of an excavation and if possible, so that it channels rainwater and other run-off water away from the excavation.	Excavator
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5.4.14	Ensure vehicles, equipment and other materials are kept at least 2 feet away from the edge of an excavation.	Excavator
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5.4.15 Install barricades, warning devices and/or fencing in the following situations: Excavator

- 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.

Note: State regulations 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.

5.4.16 Use surface crossings when necessary. Surface crossings must meet the following conditions: Excavator

- Design and install public vehicle crossing under the supervision of a registered professional engineer.
- Provide walkways where personnel or equipment are required or permitted to cross over excavations.
- Provide guardrails (handrails, mid-rails and toe boards as needed) where walkways are 4 feet or more above the lower levels.

Note: Refer to the [Fall Protection Protocol](#) for guardrail system requirements.

5.4.17 Contact the One-Call notification system to renew the ticket when excavation continues past the life of the ticket. Excavator

Note: State regulations have specific locate expirations:

- New Mexico: 15 working days
- North Dakota: 21 calendar days
- Texas: 14 calendar days
- Oklahoma: 14 calendar days
- Wyoming: 14 business days

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5.4.18 Consult with the 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. Line Supervisor

5.4.19 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 respective DOT Devon O&M Manuals and state regulation where applicable. Excavator

Note: Refer to the [DOT Devon Natural Gas Pipeline O&M Manual](#) for requirements on jurisdictional natural gas pipelines.

5.5 INSPECTIONS AND EXCAVATION ENTRY

Step	Required Action	Role
5.5.1	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.	Competent Person
5.5.2	Do not work in trench excavations 4 feet deep or greater where there is accumulated water, or where water is accumulating, unless precautions have been taken to protect personnel against the hazards posed by water accumulation or during rainstorms. Note: If water is controlled by water removal equipment, those operations must be monitored by a competent person.	Employee / Contractor
5.5.3	When an excavation 4 feet deep or greater will be entered by personnel using ramps, slope all ramps so that entry and exit can be accomplished standing upright without using hands for assistance.	Excavator
5.5.4	Verify that ladders, ramps, or other means of egress are placed no more than 25 feet from personnel working inside a trench excavation 4 feet deep or greater. Note: Ladders must extend a minimum of 3 feet above the top of the excavation.	Competent Person

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5.5.5 When a trench excavation 4 feet deep or greater will be entered by personnel, 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:

Competent Person

- [Soil Types and Soil Testing](#) – Appendix B
- [Protective System Requirements](#) – Appendix C
- [Slope and Benching Requirements](#) – Appendix D
- [Shoring and Shielding Requirements](#) – Appendix E

5.5.6 Prior to personnel entering a trench excavation 4 feet deep or greater, determine if atmospheric monitoring is required. If required, conduct the initial test using a monitor equipped with a pump and document the results on the [Excavation Inspection Report](#) (Attachment C). Follow the [Confined Space Protocol](#) if monitoring results are not within the following ranges:

Competent Person

- Oxygen levels 19.5% - 23.5%
- LEL 0%
- CO 0 ppm
- H₂S 0 ppm

Note: Refer to the [Confined Space Protocol](#) for requirements if the excavation exhibits other conditions which pose confined space hazards.

Note: Refer to the [Hot Work Protocol](#) for requirements when hot work activities will be performed in an excavation.

5.5.7 When working in a trench excavation 4 feet deep or greater, continuously monitor the atmosphere using a personal four-gas monitor. Follow the [Confined Space Protocol](#) if monitoring results are not within the ranges specified in step [5.5.6](#).

Employee /
Contractor

5.5.8 Conduct daily inspections before personnel enter a trench excavation 4 feet deep or greater. Document the inspection using the [Excavation Inspection Report](#) (Attachment C) or use an equivalent. List an explanation for all “No” responses on the inspection report, including corrective actions taken.

Competent Person

5.5.9 Re-inspect trench excavations 4 feet deep or greater when the following occur:

Competent Person

- Conditions change that might result in a new hazard
- Damage resulting in possible failure of the protective system

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- After every rainstorm and other hazard-increasing occurrence

5.6 DAMAGE REPORTING

Step	Required Action	Role
5.6.1	Shut down work and report any damage caused or discovered to underground facilities to the following: <ul style="list-style-type: none"> • Devon Energy • UFO <p>Note: Refer to the Event Reporting and Investigation Protocol for requirements on reporting line strikes.</p>	Excavator
5.6.2	Ensure required regulatory notifications are made. <p>Note: Regulatory agencies could include the One-Call notification system, and / or the regulating pipeline authority. External reporting requirements for the regulating pipeline authority are included in the Event Reporting and Investigation Protocol.</p>	Excavator
5.6.3	Ensure Devon personnel make required notifications when a company operated underground facility is struck by a third party or contract excavator.	Line Supervisor

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6. TERMS AND DEFINITIONS

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.
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.
Cave-In	The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by failing or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure or immobilize a person.
Competent Person	For excavation safety, a person who can identify existing and predictable hazards in the surroundings, or working conditions, that are hazardous, unsanitary, or dangerous to workers, who can identify 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 8.0 for additional requirements.
Damage	Includes at a minimum: <ul style="list-style-type: none"> 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

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- Weakening of structural or lateral support of an underground facility that affects the integrity of the facility.

Note: Specific states may have a more stringent definition of damage.

Emergency One-Call	Notification to the One-Call system when an emergency 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.
Hand Digging	Movement of earth using hand tools including but not limited to shovels, manual post-hole diggers, etc.
Jurisdictional Pipeline	Pipeline(s) identified by Devon as regulated under the Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHSMA) and/or state regulation.
Manual Digging	Movement of earth using non-mechanized tools or equipment including hand or soft digging.
Mechanical Excavation	Excavation that utilizes a piece of equipment or a tool operated by mechanical power. Note: Hydro excavation is not considered mechanical excavation and is considered soft digging.
One-Call Notification System	A communication system that receives notice from an excavator of planned excavation or other requests for locates and transmits this notice to a participating underground facility owner/operator.

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Positive Response Response by the underground facility owner/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 system in certain states.

Protective System A method of protecting employees from cave-ins, from material that could fall or roll from 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 necessary protection.

Pot Holing A method of physically locating underground facilities by digging small holes in the ground, this can be done manually or by hydro excavation and is sometimes called “daylighting.”

Ramp Inclined walking or working surface used to gain access to one point from another and is constructed from earth.

Routine Maintenance Operation involving lease road/pad maintenance (grading/blading, snowplowing, backfilling, etc.) that does not change the original grade in or below the ground.

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 walls 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

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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.



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 by soft means such as hydro excavation.

Surcharge Loads

Generated by the weight of anything in proximity to the excavation; push starts for a cave-in (anything up top pushing down). Common surcharge loads include:

- Weight of spoil pile
- Weight of nearby buildings, poles, pavement, or other structural objects
- Weight of material and equipment

Tolerance Zone

Comprised of the width of the underground facility, plus a specified distance on each side of that facility. Specific state tolerance zones distances are listed below.

- New Mexico: 18 inches
- North Dakota: 24 inches
- Texas: $\frac{1}{2}$ the diameter of pipe plus 18 inches
- Oklahoma: 24 inches
- Wyoming: 24 inches

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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.).

Underground Facility Owner / Operator Locator An individual assigned with determining and marking the approximate horizontal location of underground facilities that may exist within an area specified by a notice from the one-call notification system or designated by white-lining.

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.

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

Contract Company Representative A contractor who is assigned responsibilities and oversight for a specific task that requires adherence to Devon EHS protocols.

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

Enterprise Classification Structure (ECS) Part of Devon's strategic plan for managing information assets. The ECS is the published list of all records classes, the period for retaining each and their designated disposition.



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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, or gas plant).

EHS Titled position that provides EHS guidance and support within a division.

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.

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7. DOCUMENT MANAGEMENT

7.1 REVISION DETAILS

The changes made to this Protocol during the latest revision can be found in the [Ground Disturbance Approval, Review and Modification History](#) document.

7.2 APPROVAL

This procedure has been approved by:

Name	Title
Garrett Jackson	VP, ESG & EHS

7.3 SEEKING AND APPROVING VARIANCES

Variances to this document will be submitted in accordance with the [EHS Document Control and Records Management Protocol](#).

7.4 RELATED DOCUMENTS

Document Name
Ground Disturbance One-Call Responder Log
Ground Disturbance Mechanical Excavation Permit
Ground Disturbance Excavation Inspection Report
Ground Disturbance Approval, Review and Modification History
Ground Disturbance Mechanical Excavation Permit Issuer Hands-On Checklist
Ground Disturbance One-Pager
Ground Disturbance Protocol Training
Ground Disturbance Protocol Exam

Ground Disturbance Protocol

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8. ADDITIONAL RELATED INFORMATION

8.1 TRAINING AND CERTIFICATION REQUIREMENTS

Step	Required Action	Role
8.1.1	Verify Devon employees involved in excavation and trenching operations have completed the Ground Disturbance Protocol training.	Line Supervisor
8.1.2	Verify that employees and contractors designated to oversee excavation work with entry by personnel have competent person training including the follow topics: <ul style="list-style-type: none"> • OSHA excavation regulations • State-specific One-Call regulations • Planning, conducting, monitoring, and overseeing excavations • Identifying and classifying soil conditions • Authority to identify, control, and correct hazards • Use of protective systems 	Line Supervisor
8.1.3	Verify people operating equipment involved with excavation and trenching have been trained on the use and operation of equipment. Note: Refer to the Mechanical Lifting and Rigging Protocol for equipment operator qualification requirements.	Line Supervisor
8.1.4	Verify Devon line locator operators are properly trained on the equipment they are using, including the equipment's limitations.	Line Supervisor
8.1.5	Verify permit issuers have successfully passed the Mechanical Excavation Permit Issuer Hands-On Checklist .	Line Supervisor
8.1.6	Evaluate re-training when field verification shows knowledge gaps with the protocol, competent person, line locator, or permit issuer requirements.	Line Supervisor
8.1.7	Ensure contract company representative understands the requirements of this protocol.	Line Supervisor



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8.2 RECORDS/LOGS/REPORTS

Step	Required Action	Role
8.2.1	Keep records listed below and forward records to the designated individual for filing.	Employees

Record	File Location & Number	Retention Time
Mechanical Excavation Permit	See Field Office File Directory	1 Year
One-Call Responder Log	See Field Office File Directory	1 Year
Excavation Inspection Report	See Field Office File Directory	1 Year
One-Call Tickets	N/A	Job Completion
Ground Disturbance Mechanical Excavation Permit Issuer Hands-On Checklist	See Field Office File Directory	Superseded + 5 Years

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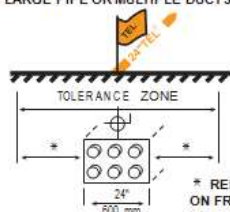
APPENDIX A: APWA UNIFORM COLOR CODE

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

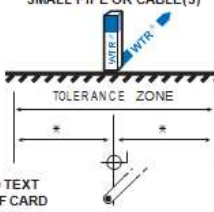
LARGE PIPE OR MULTIPLE DUCTS



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.

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APPENDIX B: 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 slope or benching system is designed in accordance with the requirements set forth in [Appendix D](#) of this protocol, and if other protective systems are designed and selected for use.

Note: This details the requirements in 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 tends 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 freely 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.

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- 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.

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

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Classification Requirements

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

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	Check the items on the Excavation Inspection Report (Attachment C).
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.

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

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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 2 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	<p>Take a sample of dry soil and use the table below to determine the soil type.</p> <table border="1"> <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>Penetrated several inches by the thumb and can be molded by light finger pressure</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)	Penetrated several inches by the thumb and can be molded by light finger pressure	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)								
Penetrated several inches by the thumb and can be molded by light finger pressure	May be considered un-fissured								
Thumb Penetration Test	<p>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.</p> <table border="1"> <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

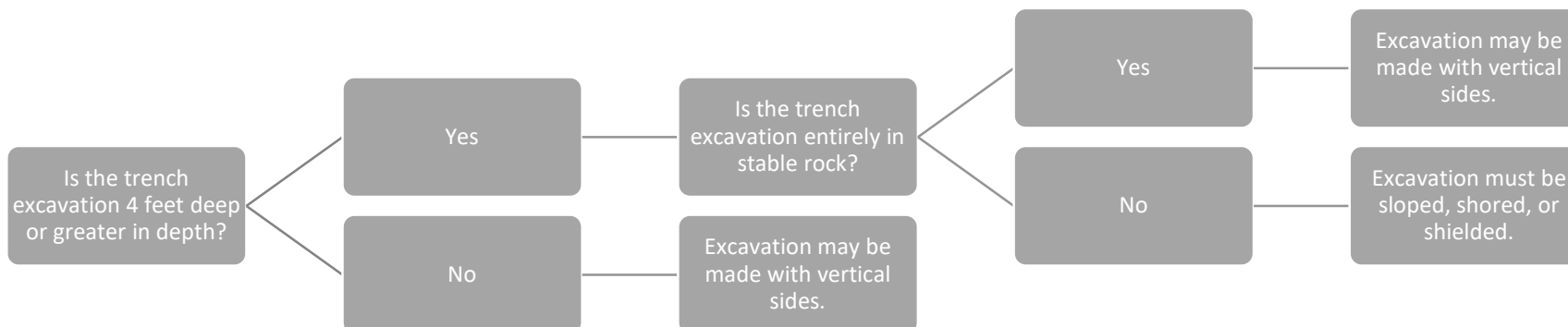
Upon completion of the visual and manual testing of the soil, compare the results to the definitions for determination of the soil type.

<div> <div>devon</div> <div>Ground Disturbance Protocol</div> </div>		
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APPENDIX C: PROTECTIVE SYSTEM REQUIREMENTS

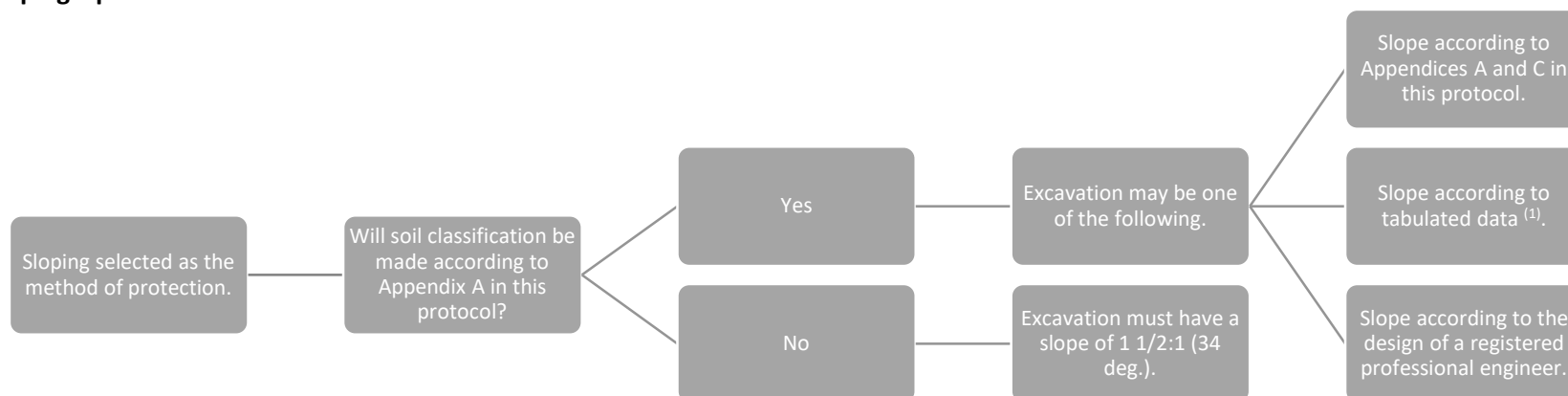
The following graphics summarize protective system requirements for excavations 20 feet or less in depth. Protective systems used in excavations more than 20 feet deep must be designed by a registered professional engineer.

Preliminary Decisions

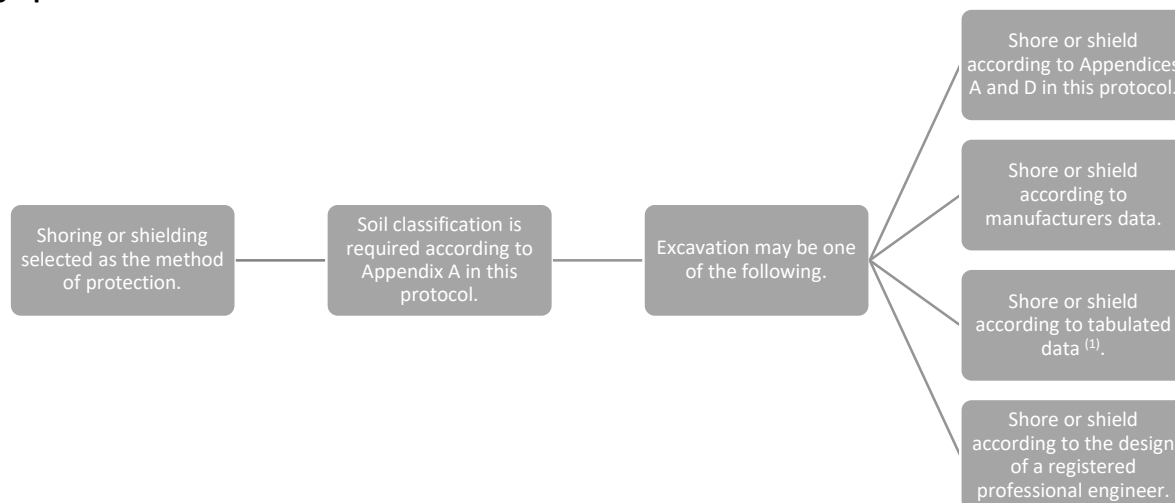


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Sloping Options



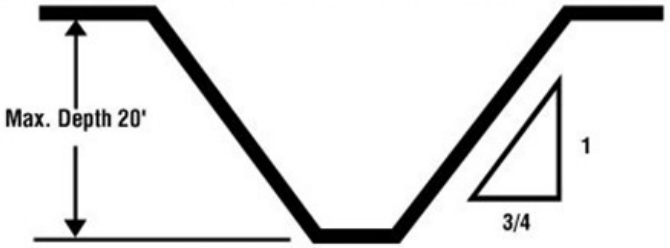

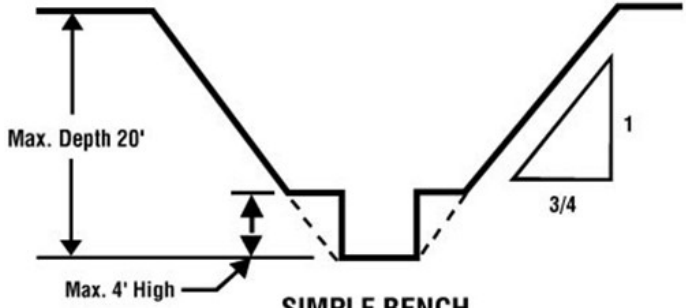
Shoring and Shielding Options



⁽¹⁾ Tabulated data means tables and charts approved by a registered professional engineer and used to design and construct a protective system.

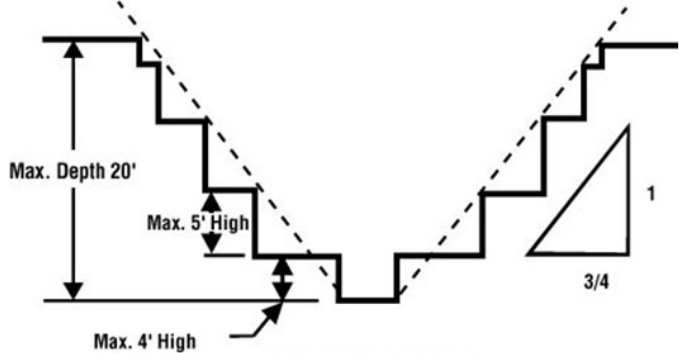
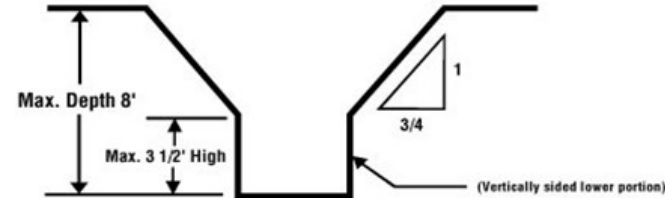
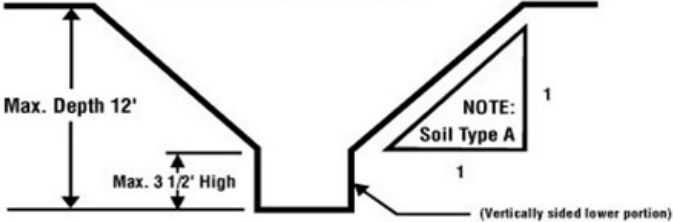
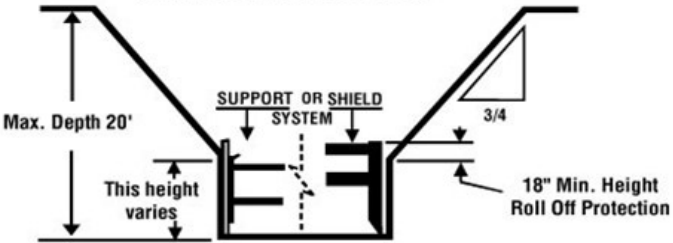
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APPENDIX D: SLOPE AND BENCHING REQUIREMENTS

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	<p>All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of $\frac{3}{4}$:1</p> <p>Slope angle 53 degrees</p>	 <p>Max. Depth 20'</p> <p>3/4 1</p> <p>SIMPLE SLOPE GENERAL</p>
Simple Slope Short Term	<p>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 $\frac{1}{2}$:1</p>	 <p>Max. Depth 12'</p> <p>1/2 1</p> <p>SIMPLE SLOPE-SHORT TERM</p>
Simple Bench	<p>Simple bench excavations 20 feet or less in depth shall have a maximum allowable slope of $\frac{3}{4}$:1 and a maximum simple bench dimension of 4 feet</p>	 <p>Max. Depth 20'</p> <p>Max. 4' High</p> <p>3/4 1</p> <p>SIMPLE BENCH</p>

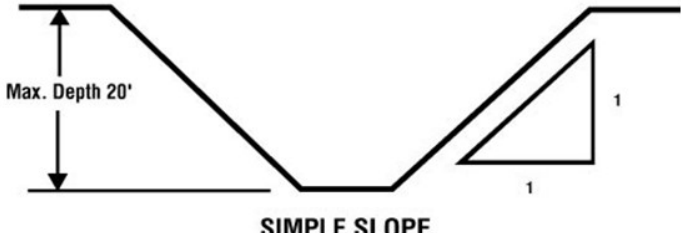
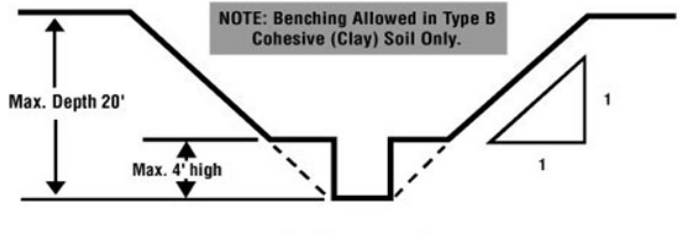
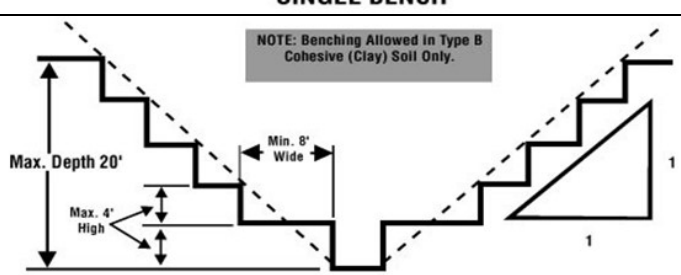
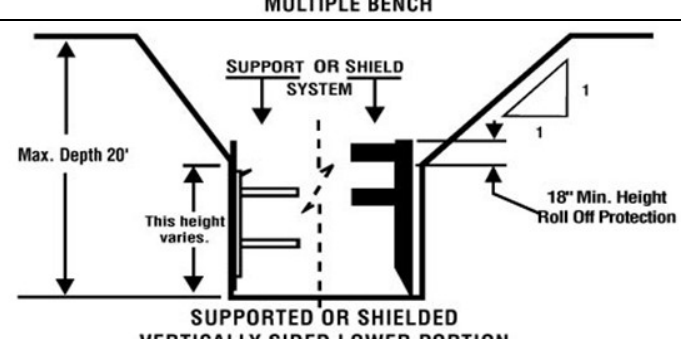
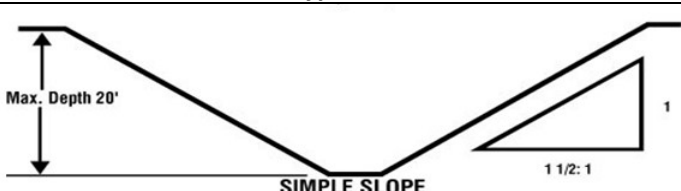
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Multiple Bench	Multiple bench excavations 20 feet or less in depth shall have a maximum allowable slope of $\frac{3}{4}$:1 and maximum bench dimensions as indicated in the example	 <p>MULTIPLE BENCH</p>
Unsupported Vertically Sided Lower Portion – Max 8 feet deep	All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have maximum vertical sides of $3\frac{1}{2}$ feet with a maximum allowable slope of $\frac{3}{4}$:1	 <p>UNSUPPORTED VERTICALLY SIDED LOWER PORTION MAXIMUM 8 FEET IN DEPTH</p>
Unsupported Vertically Sided Lower Portion – Max 12 feet deep	All excavations more than 8 feet but not more than 12 feet in depth which have unsupported vertically sided lower portions shall have maximum vertical sides of $3\frac{1}{2}$ feet with a maximum allowable slope of 1:1	 <p>UNSUPPORTED VERTICALLY SIDED LOWER PORTION MAXIMUM 12 FEET IN DEPTH</p>
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. Maximum allowable slope of $\frac{3}{4}$:1	 <p>SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION</p>
All other excavations in Type A soil shall be in accordance with manufacturers data, tabulated data, or as designed by a registered professional engineer.		
Slope Configurations – Excavations made in Type B soil		

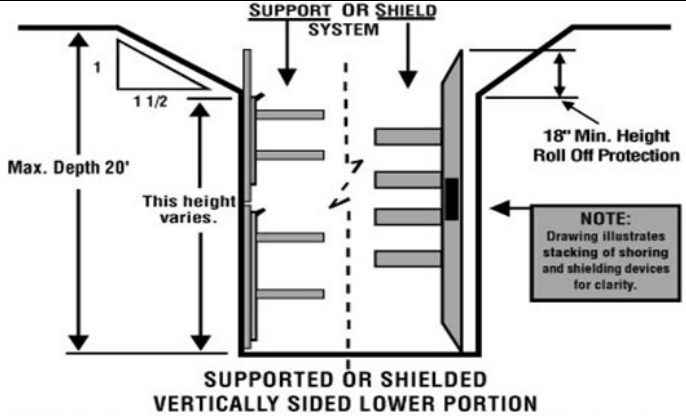
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Simple Slope	All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 Slope angle 45 degrees	 <p>SIMPLE SLOPE</p>
Single Bench	All single bench excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions of 4 feet	 <p>SINGLE BENCH</p>
Multiple Bench	All multiple bench excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as indicated in the example	 <p>MULTIPLE BENCH</p>
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 with a maximum allowable slope of 1:1	 <p>SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION</p>
All other excavations in Type B soil shall be in accordance with manufacturers data, tabulated data, or as designed by a registered professional engineer.		
Slope Configurations – Excavations made in Type C soil		
Simple Slope	All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1 ½:1	 <p>SIMPLE SLOPE</p>

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	Slope angle 34 degrees	
Benching	Not allowed in Type C soil	
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 with a maximum allowable slope of 1 ½:1	 <p>SUPPORT OR SHIELD SYSTEM</p> <p>1 1/2</p> <p>Max. Depth 20'</p> <p>This height varies.</p> <p>18" Min. Height Roll Off Protection</p> <p>NOTE: Drawing illustrates stacking of shoring and shielding devices for clarity.</p> <p>SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION</p>
All other excavations in Type C soil will be in accordance with manufactures data, tabulated data, or as designed by a registered professional engineer.		

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APPENDIX E: SHORING AND SHIELDING REQUIREMENTS

Use shoring or shielding when the location or depth of the cut makes sloping back to the maximum allowable slope impractical.

Shoring

There are two types of shoring; timber and hydraulic.

Timber shoring must be designed in accordance with one of the following:

- Appendix C of 29 CFR 1926 Subpart P
- Manufacturer's tabulated data
- Other tabulated data
- A registered professional engineer

Aluminum hydraulic shoring must be designed in accordance with one of the following:

- Manufacturer's tabulated data
- Appendix D of 29 CFR 1926 Subpart P

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 • 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. <p>Note: 2 feet of trench wall may be exposed beneath the bottom of the rail or plywood sheeting, if used.</p>

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.

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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 2 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.
9	The open end of the shield must be protected from the exposed excavation wall. The wall must be sloped, shored, or shielded.



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ATTACHMENT A: ONE-CALL RESPONDER LOG

[One-Call Responder Log](#)



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ATTACHMENT B: MECHANICAL EXCAVATION PERMIT

[Mechanical Excavation Permit](#)



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ATTACHMENT C: EXCAVATION INSPECTION REPORT

[Excavation Inspection Report](#)



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ATTACHMENT D: APPROVAL, REVIEW AND MODIFICATION HISTORY

[Approval, Review and Modification History](#)