

PROCEDURES

TRENCH SAFETY

8.0 PURPOSE

Excavations performed by Operator personnel or others present potential hazards. The following Best Excavation Practices shall be adhered to whenever excavation is to take place on or around the gas system:

8.1 SCOPE

- A. Competent Person
- B. Excavation Exit & Entry
- C. De-Watering
- D. Adjacent Structures
- E. Placement of Spoils
- F. Shoring & Sloping
- G. Pavement Cutting

8.2 GENERAL

- A. The operator/contractor shall be responsible to mark planned excavation area and call the appropriate **One-Call System**. Appropriate time shall be allowed for applicable locates to take place before any excavation begins.
- B. The company/contractor shall remove all foreign water entering the trench. **Refer to Section E-10.**
- C. All excavations shall be clearly marked with barricades / cones / caution tape to protect the general public and keep unauthorized individuals from entering work site.

8.3 TRENCH INSPECTION

An OSHA approved competent person (i.e., Supervisor, Crew Leader or other appropriately trained employee assigned by the Operator) shall personally inspect any trench or excavation for cave-in potential, hazardous atmosphere and condition of shoring (when used) prior to

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anyone entering. Daily inspections shall be made on excavations or trenches left open overnight. Periodic inspections are required on excavations or trenches exposed to wet conditions from running water, ground water or rain. Employees may not enter a trench or excavation if during the inspection, it is found to be unsafe.

8.4 ENTRY-EXIT

A ladder, stairway or sloped ramp shall be used for entering and exiting all trenches 4 ft. or more in depth. Travel distance to the way of exit shall not exceed 25 ft. Ladders shall be in good condition and shall extend 3 rungs above the top of the trench. A ramp used for entering or exiting the trench must be sloped so as to allow an employee to walk upright when using it.

8.5 FOREIGN TRENCH

Entry into a non-complying foreign (excavation dug by others) trench or excavation is prohibited until the excavation has been properly sloped or a protective system (shoring, trench box) has been provided.

8.6 UNATTENDED EXCAVATIONS

Excavations and trenches that are unattended or remotely located from the actual work site shall be covered or barricaded to protect the public.

8.7 WATER IN TRENCHES

Employees shall not work in trenches or excavations in which there is an accumulation of water unless adequate precautions have been taken to protect against hazards posed by the water. Diversion ditches, dikes or other suitable means shall be taken to prevent water from entering a trench or excavation and to provide adequate drainage next to the excavation. The Competent Person shall periodically monitor water removal equipment to ensure proper operation. **Refer to Section E-10.8, Dewatering.**

8.8 PLACEMENT OF SPOILS

Spoils shall be placed a minimum of 2' from the edge of the trench or excavation or effectively retained so that employees in the excavation will not be exposed to falling or rolling objects. When hand excavating, a safe distance between employees in the excavation shall be maintained to avoid injuring a fellow employee with shovel, digging bars,

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appropriate hand excavation tools, etc.

8.9 ADJACENT STRUCTURES

When the stability of adjoining buildings, walls or other structures is endangered by an excavation, shoring, bracing, underpinning or other effective means shall be used to protect against a collapse.

8.10 SHORING AND SLOPING

Soil classification is an important part of the proper sloping or shoring technique used. Three soil types are recognized in addition to stable rock. They are listed below in decreasing order of stability:

- A. Type "A" (most stable) soil means cohesive soils with an unconfined compressive strength of 1.5 tsf (ton per square foot) or greater. Examples of cohesive soils are clay, silty clay, sandy clay, clay loam and in some cases, silty clay loam and sandy clay loam, as well as cemented soil such as caliche and hardpan. However, no soil is Type A if it is:
1. Fissured.
 2. Subject to vibration.
 3. Previously disturbed or is part of a sloped, layered system where layers dip into the excavation or a slope of four horizontal to one vertical or greater.
 4. Subject to other factors that would require it to be classified as a less stable material.
 5. Trench slope may be from ½:1 or ¾:1 or benched to same slope.
- B. Type "B" (less stable) soil means cohesive soil with an unconfined compressive strength greater than 0.5 tsf, but less than 1.5 tsf, or:
1. Granular noncohesive soils including angular grave, silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
 2. Previously disturbed soils, except those that would otherwise be classified as Type C soil.
 3. Soil that meets the unconfined compressive strength or cementation required for Type A, but is fissured or subject to vibration.
 4. Dry rock that is not stable.
 5. Material that is part of a sloped, layered system where the layers dip into the

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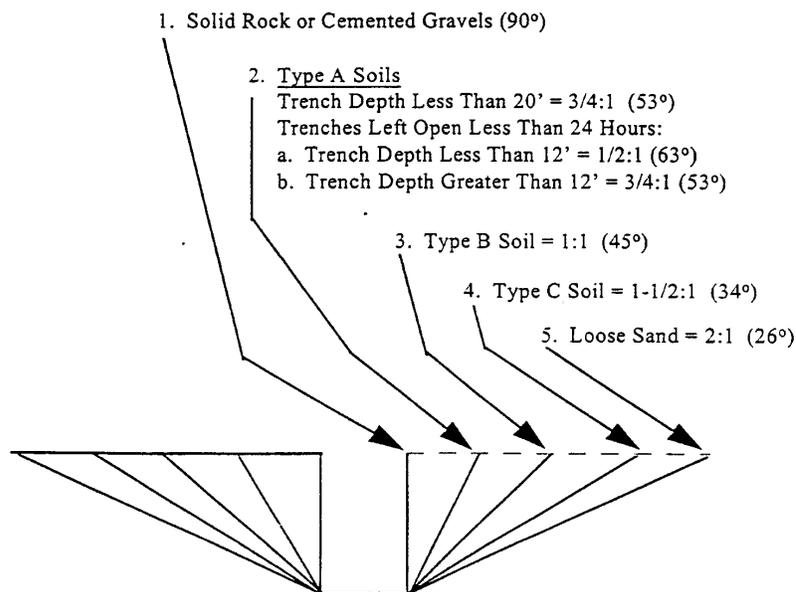
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- excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.
6. Trench slope 1:1 or benched to same slope.
- C. "Type C" (least stable) means cohesive soil with an unconfined compressive strength of 0.5 tsf or less, or:
1. Granular soils including gravel, sand, loamy sand.
 2. Submerged soil or soil from which water is freely seeping.
 3. Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.
 4. Trench slope may be from 1½:1 or benched to same slope.
- D. At least one visual and one manual test must be conducted by the "competent person" to determine the appropriate soil classification during excavation
- E. Shoring and Sloping Requirements - General
1. Banks more than 5' high shall be shored, sloped back to stable slope, or some other equivalent means of protection shall be provided where employees may be exposed to moving ground or cave-ins.
 2. Trenches located in stable rock do not require shoring or sloping.
 3. Sides of trenches in unstable or soft material, 5' or more in depth, shall be shored, sheeted, braced, sloped, benched, or otherwise supported by means of sufficient strength to protect the employee working within them.
 4. Trenches less than 5' in depth shall also be effectively protected when examination of ground indicates that there may be unstable ground.
 5. Materials used for sheeting, bracing, shoring and underpinning shall be in good serviceable condition, and timbers used shall be sound and free from large or loose knots, and shall be designed and installed so as to be effective to the bottom of the excavation.

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FIGURE 1
ANGLE OF REPOSE FOR SLOPING EXCAVATIONS



Note Sloping or benching for excavations greater than 20' must be designed by the Engineer.

Sloping requirements are to be determined by qualified “competent person”.

Contractor-installed shoring or sloping must comply with minimum Operator /OSHA requirements. Soil classification is an important part of the proper sloping or shoring technique used.

8.11 FOREIGN LINES (UNDERGROUND)

- A. Before any excavation is started, all available means shall be used to detect foreign lines such as telephone, water, underground electric power lines, etc. Appropriate and applicable one-call systems shall be notified allowing for appropriate advance notification of any excavation.
- B. The location of existing underground utility lines shall be plainly marked and the

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excavator informed so he can take steps to avoid them. Pneumatic tools or any other tools having a metal handle shall not be used to uncover cables or conduits carrying high voltage.

Note: Color codes are used to indicate existing facilities:

Red	Electric
Orange	Telephone and Cable TV
Yellow	Gas
Green	Sewer
Blue	Water
White	Proposed Excavation

- C. When using booms or excavating equipment under or near overhead power lines, where there is a possibility of touching the line, the following boom clearance shall be maintained:
1. For lines 50KV or less, ten feet (10').
 2. For lines over 50 KV, ten feet (10') plus 0.4 inches for each 1 KV over 50 KV.
- D. The electric utility shall be contacted for instructions when the voltage is unknown.
- E. Exposing foreign lines shall be done manually rather than with machine. Digging tools with non-metallic handles shall be used. Follow local requirements for the distance that hand excavation is required around a facility.

8.12 PAVEMENT CUTTING

- A. All work done in connection with pavement cutting and excavation shall be done with the standard specifications of the state, city, county or other authority involved
- B. When engaged in pavement cutting or core drilling excavations, foot guards, goggles or safety glasses, and ear protection shall be worn.
- C. Edges of cuts shall be left square and as free from jagged edges as possible in order to prevent hazardous working conditions.

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- D The practice of undermining pavement and then breaking it down is prohibited.