

# **Weekly Safety Talks: Excavation & Trenching**

## **Application**

Review when we need to go into a trench.

Ask can we do it any other way?

Review soil types in the area and prevention methods preferred.

Discuss protective systems before entering excavation or trench.

# Overview

- Several sectors of construction encounter excavations (man-made cut) and trenches (a hole deeper than it is wide) in order to accommodate underground services such as plumbing, utilities, etc.
- If an employee must enter an excavation or trench that is deeper than 5 feet for any reason, it must be appropriately protected.
- Protection can be achieved by benched or sloped walls, or by shoring or shielding.
- However you need to understand what is best for your specific task.
- Trenches 20 feet or deeper require that a protective system be designed by a professional engineer.

# Preparation

- **Underground Utilities**
  - Before digging an excavation or trench, 811 must be contacted to discover and mark existing utilities.
- **Gas Monitoring**
  - Trenches should be tested to rule out hazardous atmospheres.

# Soil Types

- **Soil Types**

- 29 CFR 1926 Subpart P Appendix A is based on site and environmental conditions and on the structure and composition of the soil deposits. The soil classification system means 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.
- 1) Stable rock means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.
- 2) Type A means cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) 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.
- 3) Type B means: Cohesive soil with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf. Examples of granular cohesionless soils included: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
- 4) Type C means cohesive soil with an unconfined compressive strength of 0.5 tsf or less; or 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 system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H: 1V) or steeper.

# Soil Testing

- **Soil Analysis**

- One manual and one visual soil analysis shall be done before entering the trench or excavation.

## Manual

Thumb penetration test, ribbon test, penetrometer



## Visual

Observation of cracks, fissures, and loose soil.

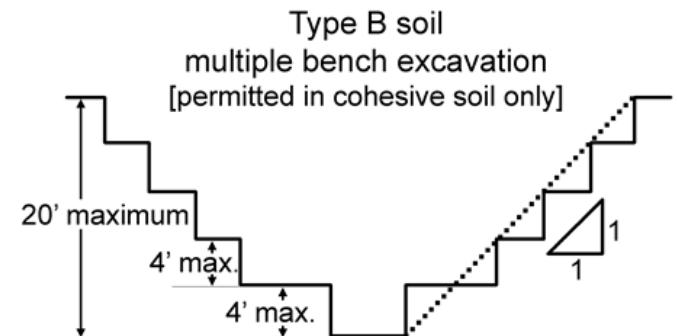
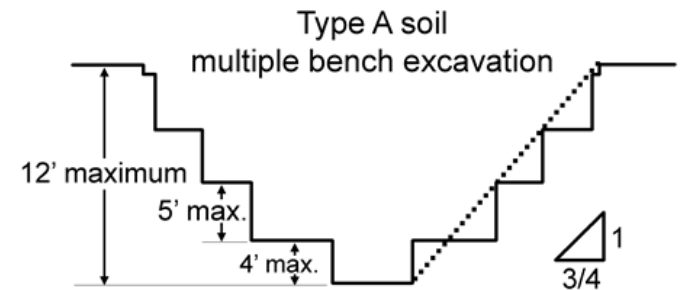
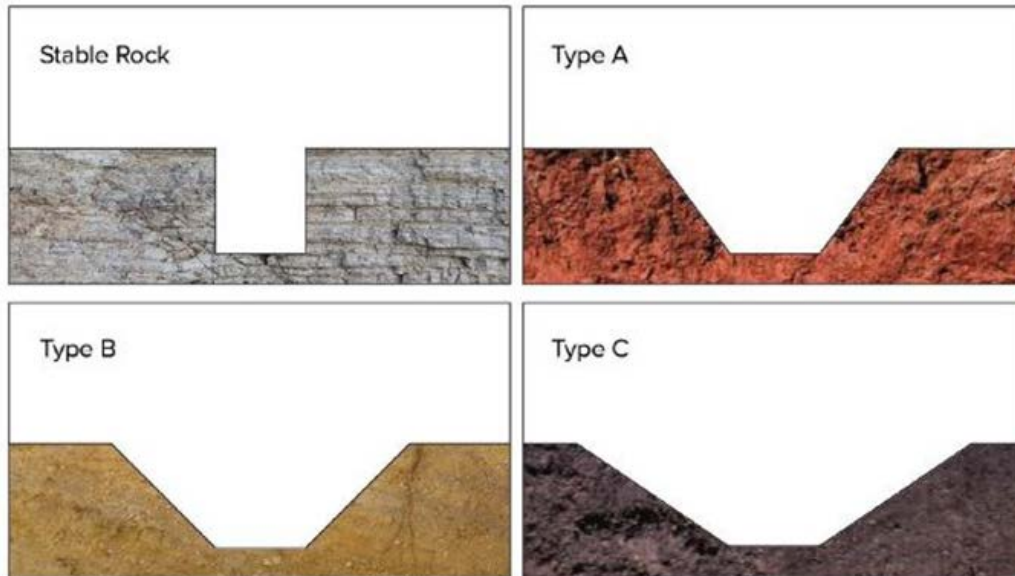


# Protective Systems

- **Benching/Sloping**

- Sloping is one way of keeping an excavation wall / trench from collapsing. The angle of slope depends on the soil conditions and depth of trench.
- Type A soils: Cut the walls back at an angle of 3/4-to-1 from the bottom of the trench.
- Type B soils: Same 1-to-1 slope angle from the bottom of the trench.
- Type C soils: Slope the walls at 1 ½ to 1. That's 1 1/2 feet back for every 1 foot up from the bottom of the trench.

Soil Type	Max. Slope (H:V)	Slope Angle (degrees)
Stable Rock	Vertical	90
Type A	3/4 :1	53
Type B	1 :1	45
Type C	1-1/2 :1	34



# Protective Systems

- **Shoring**

- Shoring is a system which supports walls to prevent soil movement. It also helps to support underground utilities, roadways, and foundations.
- The two types of shoring used most commonly are timber and hydraulic. Both consist of posts, wales, struts, and sheathing.



# Protective Systems

- **Shielding**

- Trench boxes are not meant to shore up or support trench walls. They're only meant to protect workers in case of a cave-in.
- The space between the box and the trench wall should be backfilled. Otherwise a cave-in or collapse may cause the trench box to tilt or turn over. It's also easier to enter the box if soil comes right up next to it.
- As long as you're in the trench, stay inside the box.





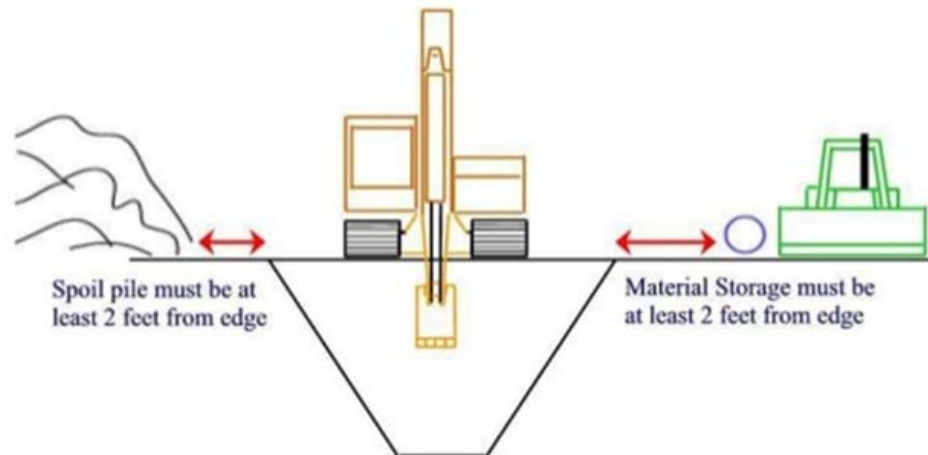
# Equipment and Material Placement

- **Spoil Piles, Equipment, ETC...**
  - Equipment and spoil piles must be at least two (2) feet away from the walls of a trench.

## Rule: 2 Feet

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1926.651(j)(2)



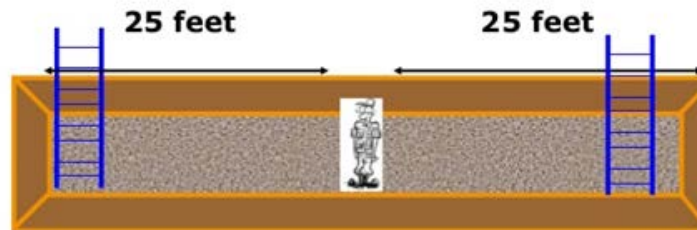
# Access and Egress

- **Ladders**

- Whether the trench is sloped, shored, or protected by a trench box, you need a way to climb in and out safely.
- Ladders must be no more than 25 feet away from any worker in a trench.
- Trenches must have ladders in the areas protected by shoring or trench boxes. The ladder must be securely tied off at the top, extend above the shoring or box by at least 3 feet, and be inspected regularly for damage.

## **Egress - Trench Excavation** 1926.651(c)(2)

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Ramp, ladder or stairs required at 4 feet or deeper.

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# Conclusion

- **Final comments**
  - Excavations are recognized as one of the most hazardous operations in the construction industry. Excavation cave-ins can cause serious and often fatal injuries to employees.
  - This safety talk is designed as general awareness training only. Some excavations and trenches require special equipment or additional hazard controls such as monitoring for hazardous atmosphere. Affected employees and managers need to understand the appropriate safeguards reach out to a competent person if further guidance is needed.

# Excavation & Trenching Safety Quiz

Employee Name:

Date:

Center Name:

Instructor:

Employee Signature:

Circle the correct answer

1. An employee can work for 30 seconds in trench that is 5 feet deep.

- a. True
- b. False

2. Equipment or spoil piles must be at least one (1) foot away from a trench?

- a. True
- b. False

3. You can work outside of the trench box just as long as you are working with someone that can pull you back in case the trench starts to collapse.

- a. True
- b. False

4. Ladders need to be at least 25 feet away from any worker in a trench?

- a. True
- b. False

5, Type C soil has s lope ratio of 1:1?

- a. True
- b. False