


Excavation Safety for Residential Construction

Susan B. Harwood Grant Training Program



Developed under an OSHA Susan B. Harwood Grant, #46F4-HT01, by the
Associated Builders and Contractors-Central Texas Chapter

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So What, It's Just a Shallow Ditch

- Did you know that most people are killed in trenches less than 5 feet deep?
 - 56% in the State of Texas (2000)



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How Do We Stop the Deaths

- Inspection of excavations
- Protection of employees in excavations
- Education of workers and supervisors

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Inspection

- Safety practices for excavations require that every excavation be inspected by a person trained in identifying hazards before allowing anyone to enter

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What to Look For

- Soil type
- Cracks or fissures
- Spoil or materials at edge
- Existing utilities
- Water
- Vibration
- Bad air (Hazardous atmospheres)
- Any other hazards

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Soil Type


- OSHA recognizes 4 soil types
 - Stable Rock
 - Type A
 - Type B
 - Type C
- Stable rock is the most stable, Type C is the least stable

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Soil Type

- Even when we have to saw cut the material, it is not normally considered Stable Rock
- Most "rock" is Type B material at best



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Note the fissures in this "Solid Rock" but not "Stable Rock"

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Soil Types

- The most common soil is Type C
 - Type C is the most expensive to work in
 - Most fatalities involve Type C soil

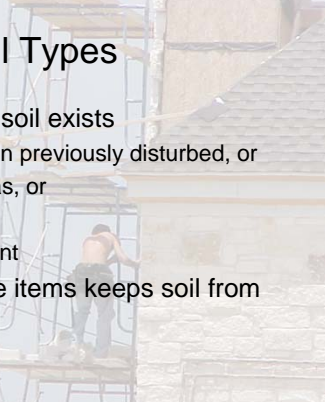


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Soil Types


- Very little Type A soil exists
 - Most soil has been previously disturbed, or
 - Has fissured areas, or
 - Has water, or
 - Vibration is present
- Each of the above items keeps soil from being Type A



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Cracks or Fissures



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Other Hazardous Conditions

- Crossing over excavations
- Water
- Employees working at road edge
- Hazardous atmospheres

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Spoils at Excavation Edge



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Methods of Protection

- Slope or Bench
- Shore
- Shields
- Engineered Systems

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Sloping

- Type C or Unclassified soil requires sloping at a 1½ to 1 slope
 - For every foot of depth, the slope must be cut back 1½ feet
 - Maximum depth of 20 feet, unless approved by a Registered Professional Engineer
- Steeper slopes are allowed for Type's A or B soil

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Sloping

TYPE C SOIL

Simple slope excavation

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Benching

- Benching is only allowed in Type B or Type A soils
 - Type B requires a 1 to 1 bench
 - Type A requires a ¾ to 1 bench
 - Maximum depth of 20 feet, unless approved by a Registered Professional Engineer

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Benching

TYPE B SOIL
Single bench excavation
(permitted in cohesive soil only)

TYPE B SOIL
Single bench excavation
(permitted in cohesive soil only)

Excavations in Type B soil

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Benching

- Benching is **NOT** allowed in Type C soil
 - Unless approved in writing by a Registered Professional Engineer

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Shoring

- Aluminum Hydraulic shores are the most common type of shoring
 - Must use 3 shores minimum
 - Spacing of shores to meet manufacturers specifications
 - Maximum depth 20', unless Registered Professional Engineer allows deeper
 - No blocking behind shores

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Shoring



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Shielding

- Shield systems, commonly called “trench boxes” are designed by a Registered Professional Engineer to provide protection to employees



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Shielding



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Shields



- Always follow Manufacturers instructions
- Keep trench walls tight to trench box
- Protect ends as well as sides

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Engineered Systems

- In some cases, normal protection methods will not work
- In those cases, a Registered Professional Engineer must be consulted for guidance



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Engineered Systems



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Education

- Supervisors are responsible for ensuring workers are kept safe
- Additional training programs are available for supervisors and workers through
 - Associated Builders and Contractors
 - OSHA Compliance Assistance Specialists
 - Manufacturers of protective equipment

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One Call Programs



- OSHA requires 24 hour notice to utility owners
- Most states require 48 or more hours notice

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One Call Programs



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Working Near Roadways

- Employees working near the road edge must wear vests
- Signage and traffic barricades are required



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Protection at Trench Edge



- Where the edge may be hidden (by grass or debris)
- Barricades must be used

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Soil Classification Workshop

- The foreman in the previous pictures stated the soil was Type A, yet the soil was
 - Previously disturbed,
 - Fissured,
 - Had vibration and water present
- With these disqualifiers, the soil should have been classified as Type C

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Soil Classification Workshop

- Even if it was Type A, the vertical slope should have been $\frac{3}{4}$ to 1
- Spoil pile should have been removed
 - At least 2 feet from the edge

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