Excavations

10-Hour Construction Outreach

Excavations

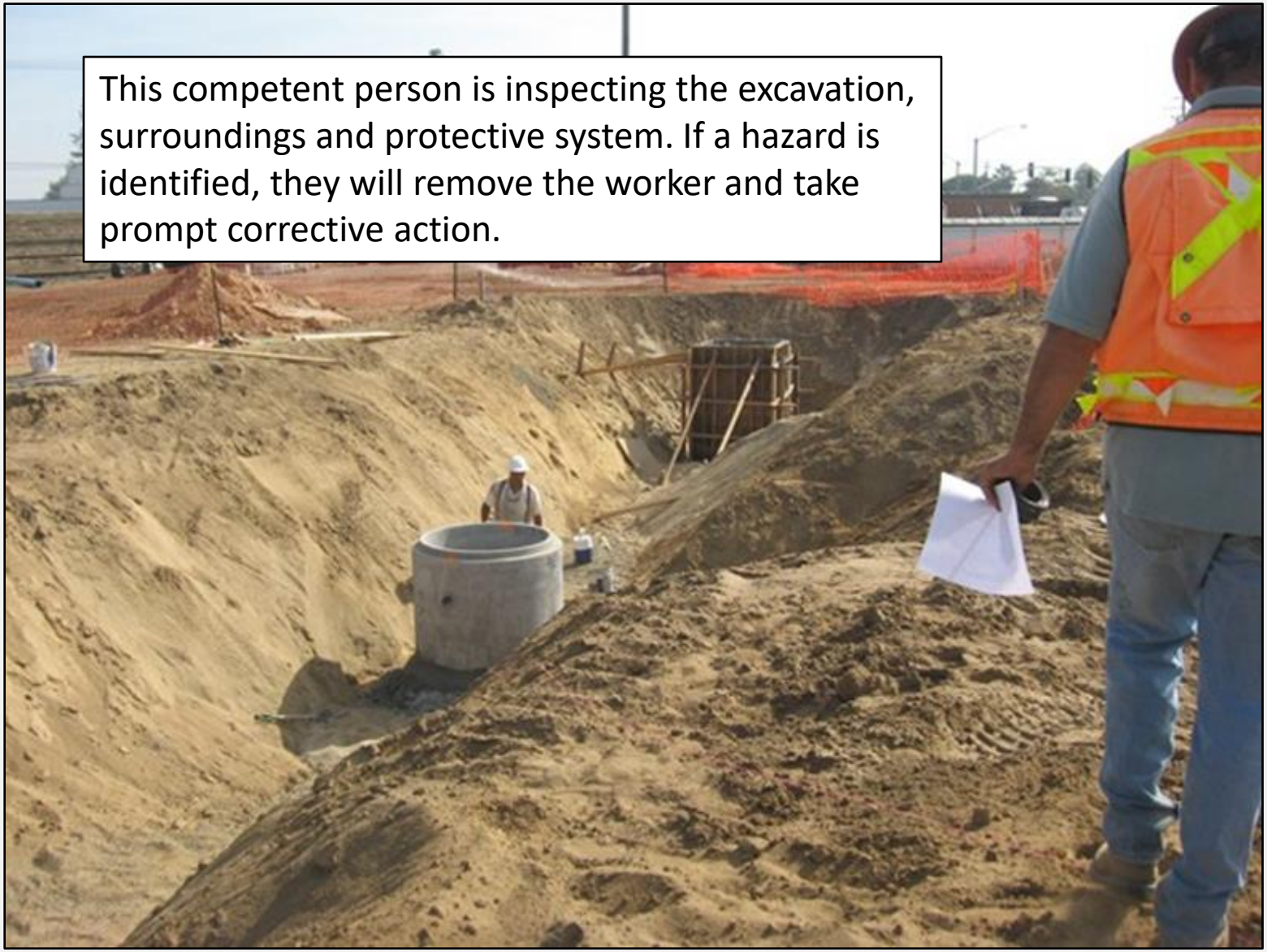
Source of photos: NIOSH /John Rekus

Excavations

- Lesson Overview
  - Role of Competent Person
  - Excavation Hazards
  - Protection from Cave-ins
  - Protection from other Excavation Hazards
  - Employer Requirements

Role of Competent Person

- Required training and knowledge
  - Soil classification
  - Use of protective systems
  - OSHA's requirements for excavation
- Able to identify hazards and have the authority to eliminate hazards



Source of photo: OTIEC Chabot Las Positas

Excavation Hazards

Source of photo: OSHA

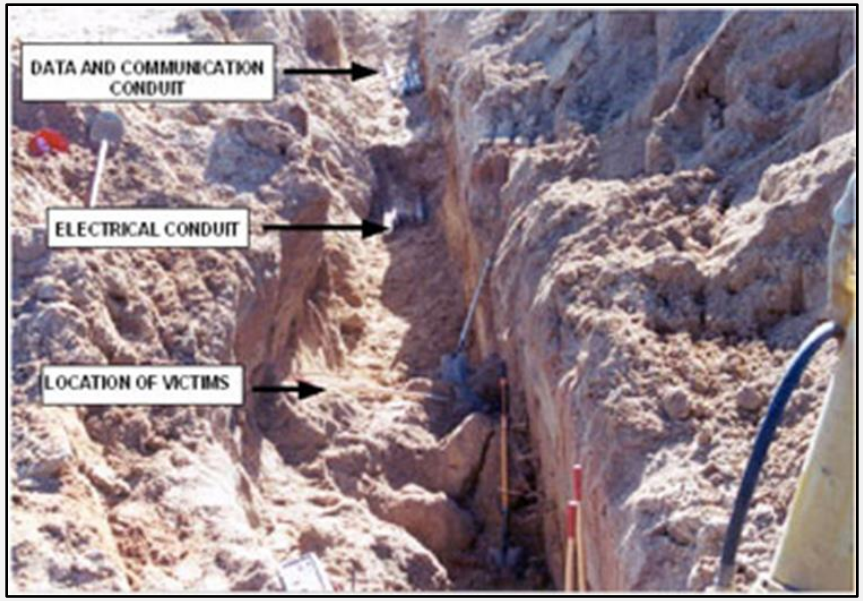
Cave-Ins

- Greatest hazard
- It is natural for a trench to try to fill itself
- One cubic foot of soil weighs between 90-130 lbs.
- It will entrap, bury, or otherwise injure you

Source of photo: OSHA

They Both Died

- A crew was installing conduit in an 8’ deep by 2’ wide trench.
- The trench collapsed.
- Two workers were buried.
- They both died!



Source of photo: CDC/NIOSH/FACE

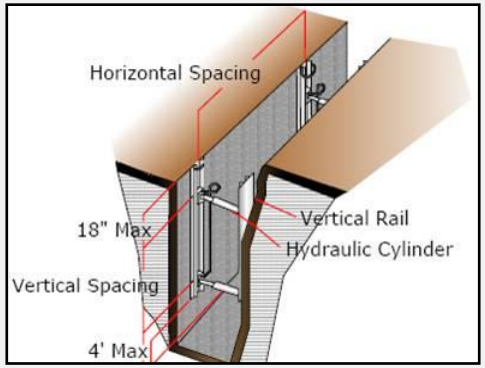
Protection is Required

- Never enter an unprotected trench that is 5 or more in depth
- The competent person must first choose and implement a protective system
- Even excavations less than 5 feet deep need to be deemed safe by the competent person
- Cave-ins can happen without warning

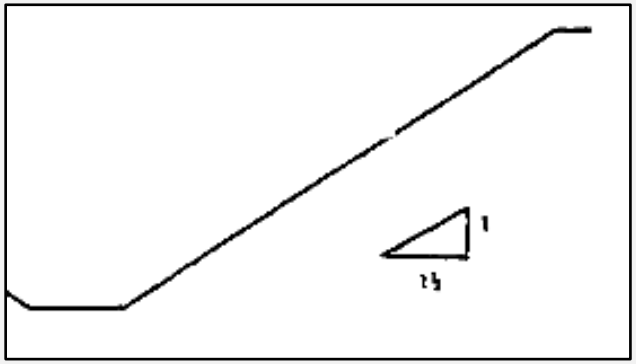
Source of photo: OTIEC NRC WVU

Protective Systems

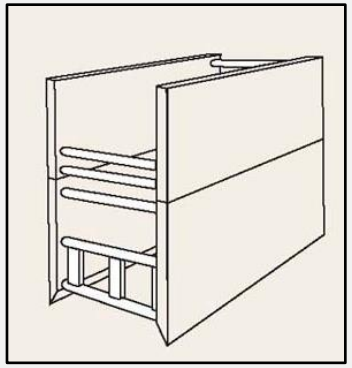
- Support/shoring systems
- Sloping and benching
- Shielding systems (trench boxes)



Shoring

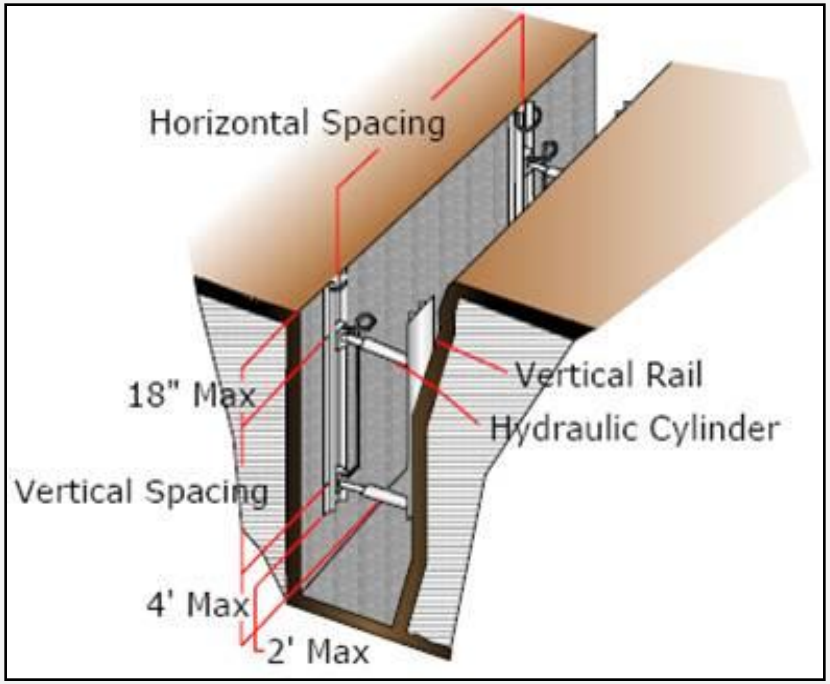


Sloping



Shielding

Support/shoring Systems



Source of photos: NIOSH /John Rekus

The Theory of Shoring

- Shoring prevents cave-ins
- Shoring, if designed and installed correctly, prevents movement of the excavated wall.
- In order for the shoring to do its job, you must stay within the protection of the shoring even when entering and exiting

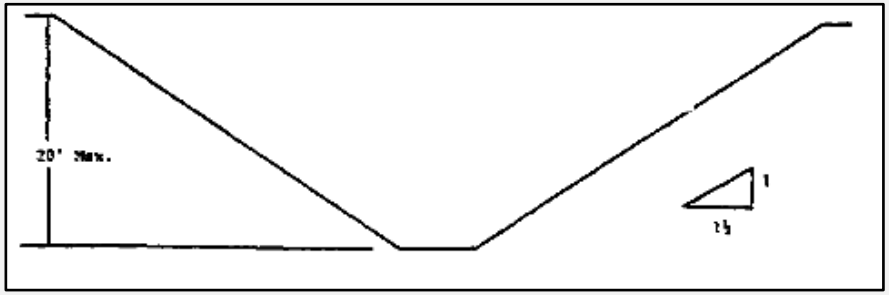
Improper Shoring

Make-shift, improperly designed shoring does little other then provide a false sense of security!

Source of photos: OSHA

Sloping and Benching

This slope is safe for any soil classification!



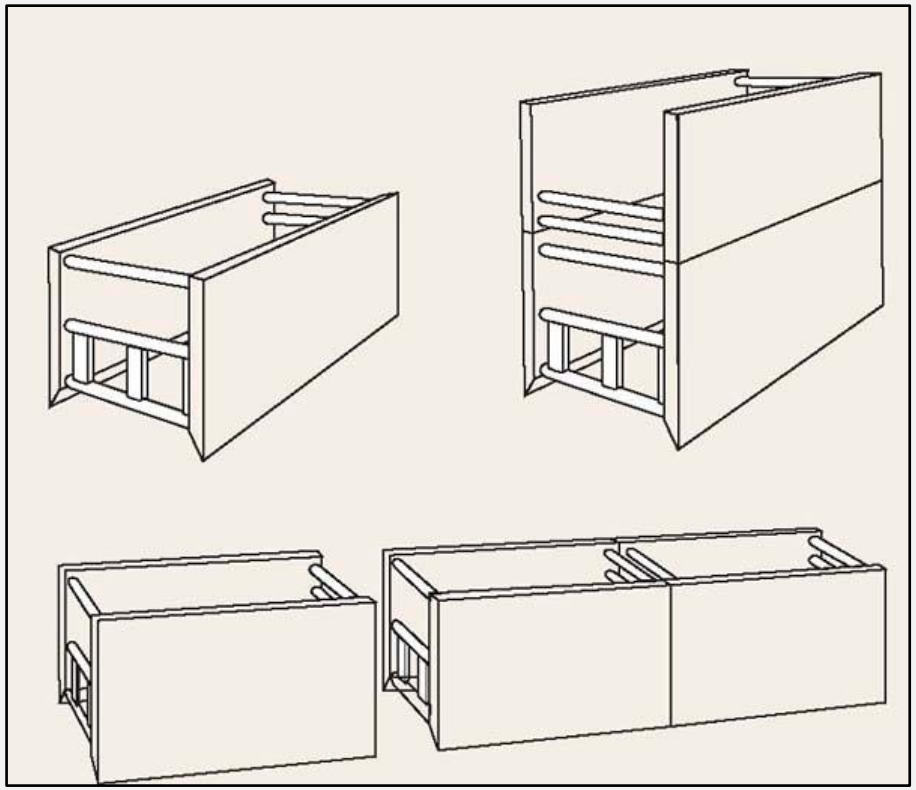
SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V)(1) FOR EXCAVATIONS LESS THAN 20 FEET DEEP(3)
STABLE ROCK	VERTICAL (90°)
TYPE A (2)	3/4:1 (53°)
TYPE B	1:1 (45°)
TYPE C	1 ½:1 (34°)

The Theory of Sloping

- Sloping prevents cave-ins
- Sloping, if done correctly, removes the risk of cave-ins by sloping the soil of the trench back from the trench bottom

Source of photo: OTIEC NRC WVU

Shield System

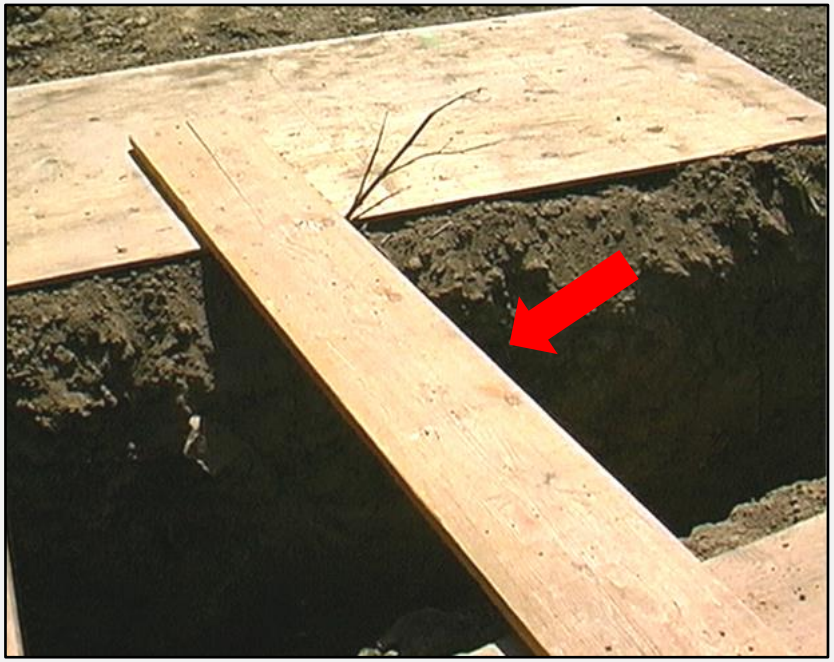


Source of photo: OSHA

The Theory of Shielding

- Trench shields and boxes, if installed correctly, are designed to protect workers from the forces of a cave-in
- In order for the shield to do its job, you must stay within the protection of the shield even when entering and exiting

Falls

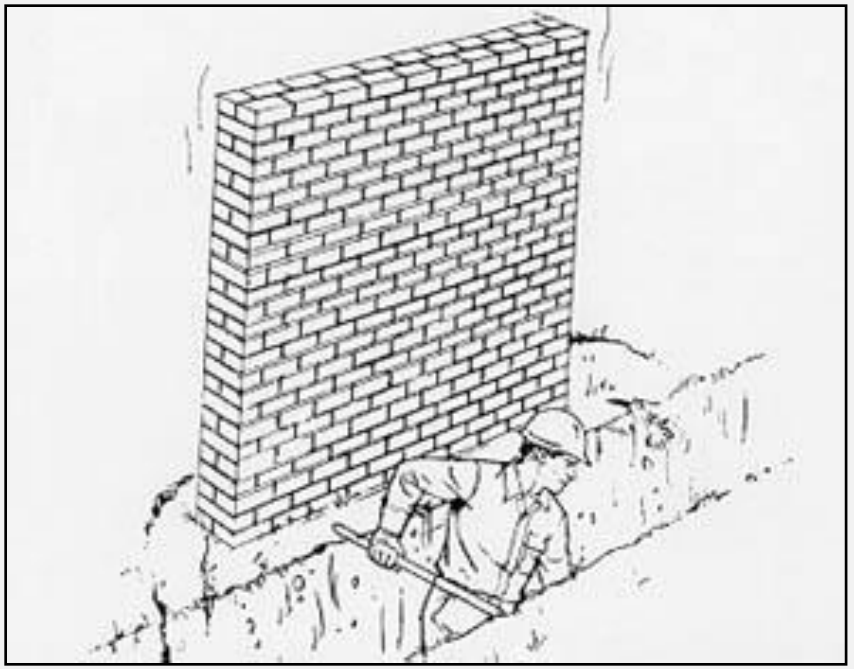


Safe Alternative

Source of photos: OSHA

Adjacent Structures

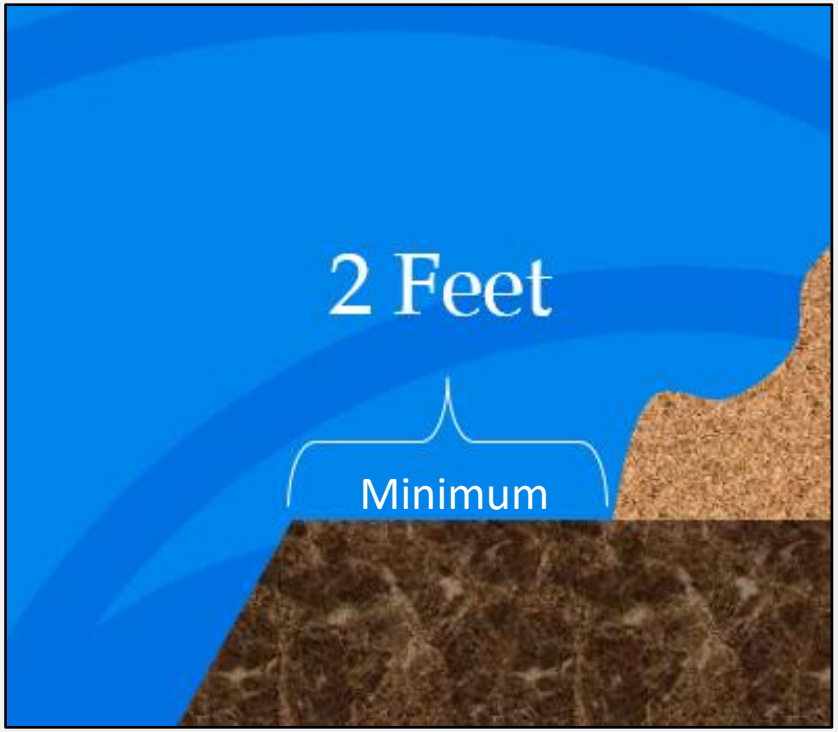
- Structures become unstable when earth next to them is removed
- For your safety, they must be supported
- A competent person must ensure precautions are implemented.



Underground Utilities

Source of photo: OSHA

Spoil Pile



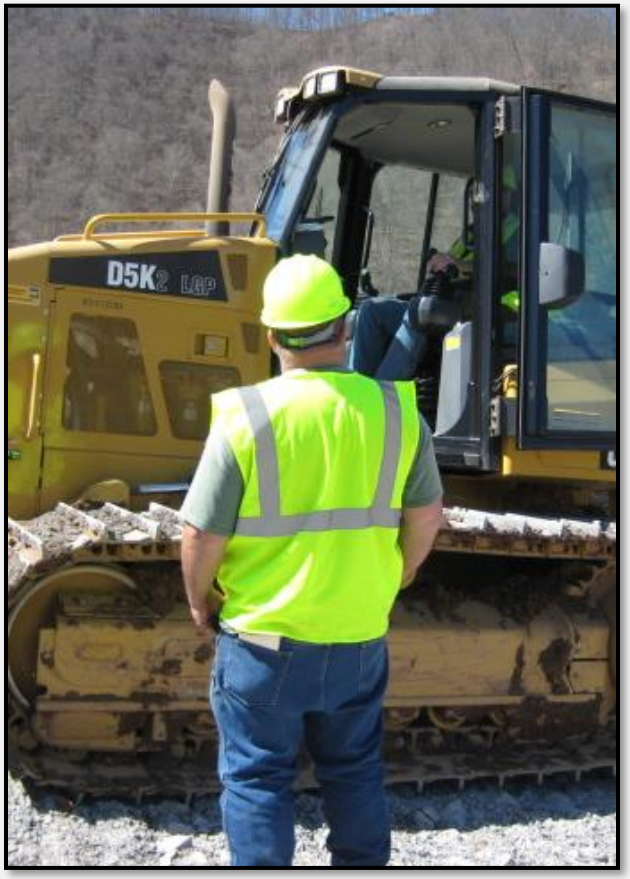
Source of photo: OSHA

Mobile Equipment

Safe Alternative

Source of photos: OSHA

Vehicular or Traffic Hazards



Source of photos: OSHA

Falling Loads

Source of photo: OSHA

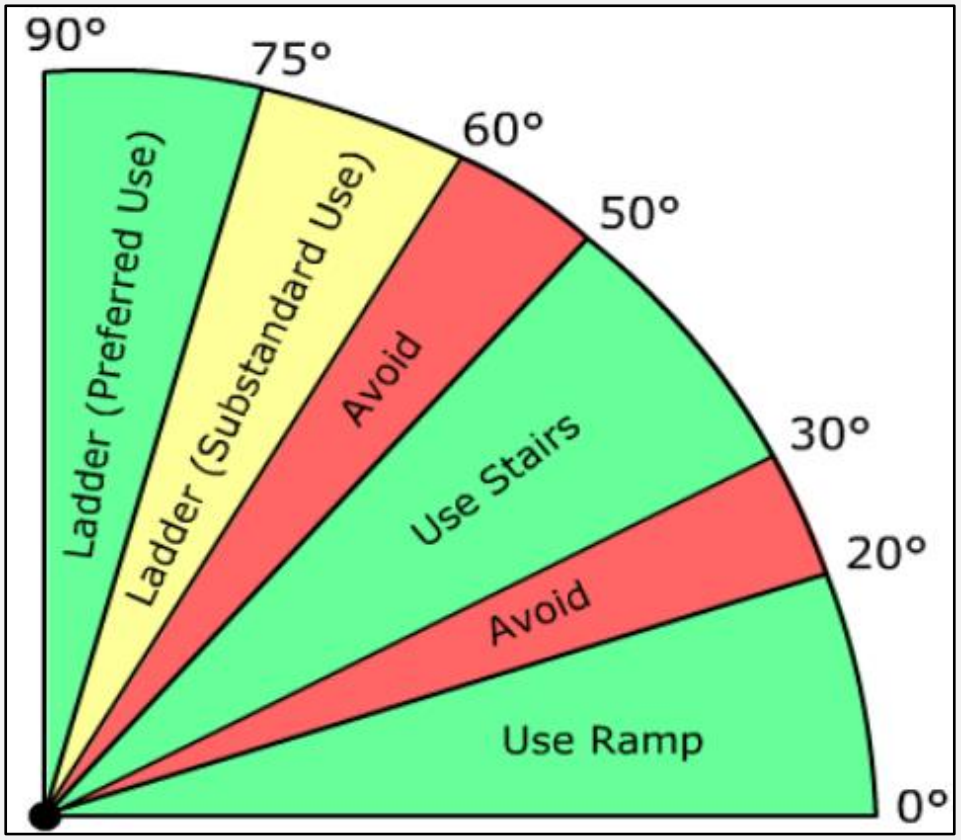
Hazardous Atmospheres

Source of photo: OSHA

Water Accumulation

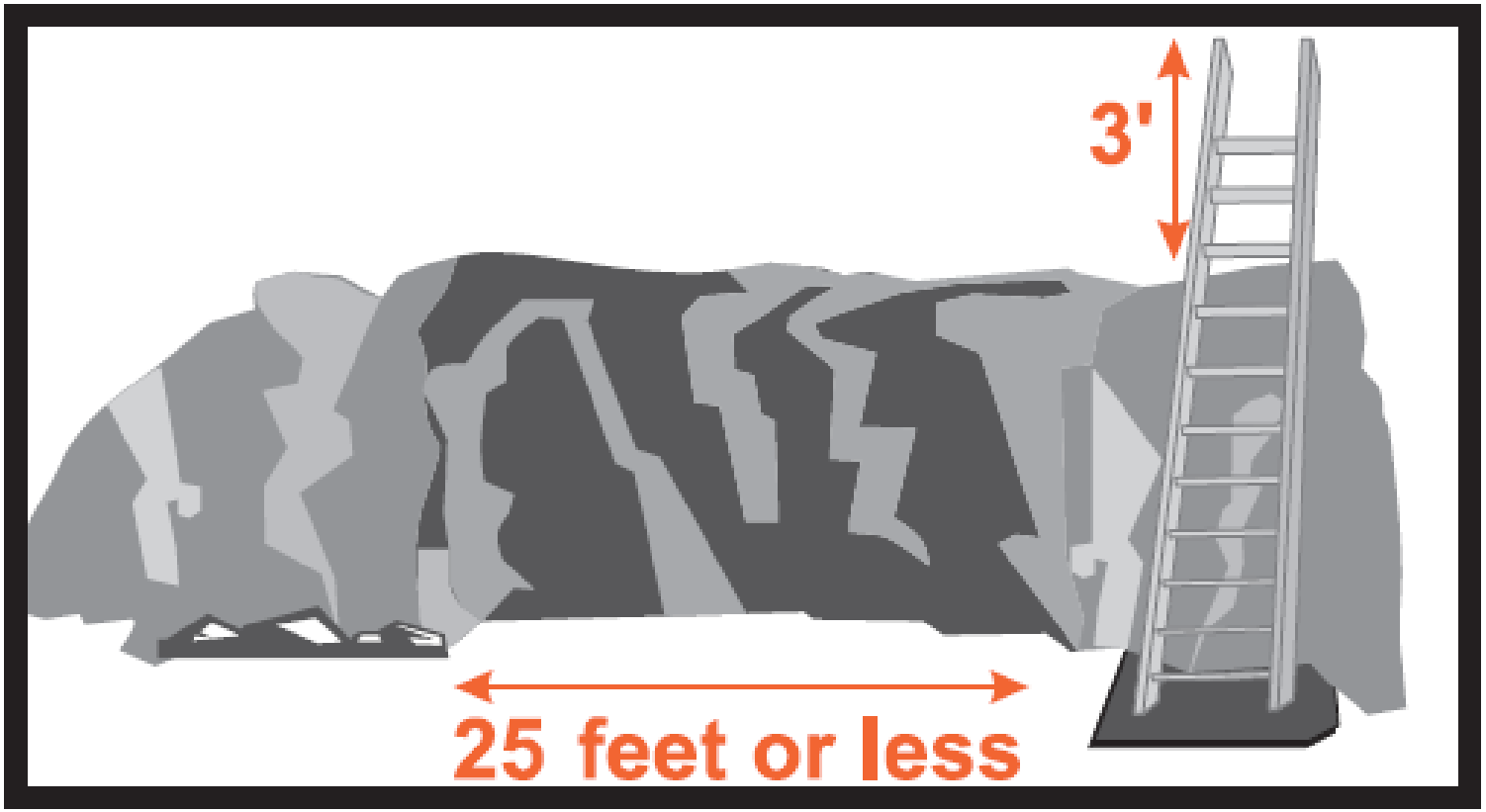
Source of photos: OSHA

Access/Egress



Source of photo: OSHA

Ladders



Hard Hats

- Working below grade, overhead hazards exist
- Hard hats must be worn in excavations because of overhead hazards

Source of photo: OSHA

Responsibilities: Employer

- Employers must:
  - preplan the work and use the one-call system to identify underground utilities
  - protect you from cave-ins and other excavation-related hazards
  - inspect the excavation at least daily and throughout the shift as needed
  - take prompt corrective action when a hazard is identified
  - respond to and correct hazards pointed out by you, the worker

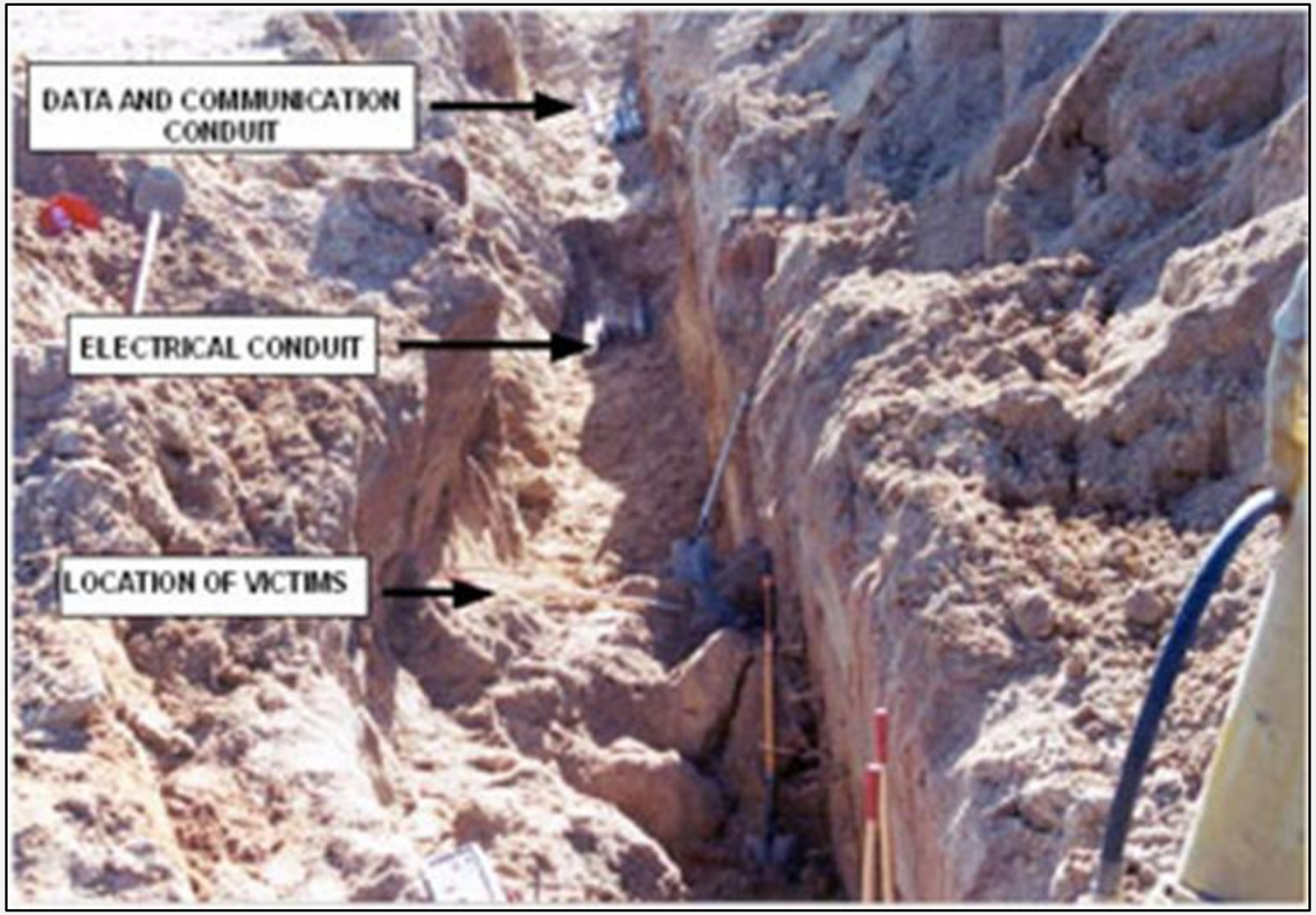
Responsibilities: Employer

- Employers must:
  - make sure a ladder is within 25’ of your work area when deeper than 4’
  - keep excavated dirt, rocks and other materials back 2’ from the excavation’s edge
  - Test and monitor the air within the trench in areas suspect to atmospheric hazards

Responsibilities: You

- You must:
  - work defensively
  - Follow you company's excavation and trenching safety rules
  - correct the hazards you are able to correct
  - report to your supervisor the hazards you are unable to correct

Case Study


DATA AND COMMUNICATION CONDUIT
ELECTRICAL CONDUIT
LOCATION OF VICTIMS

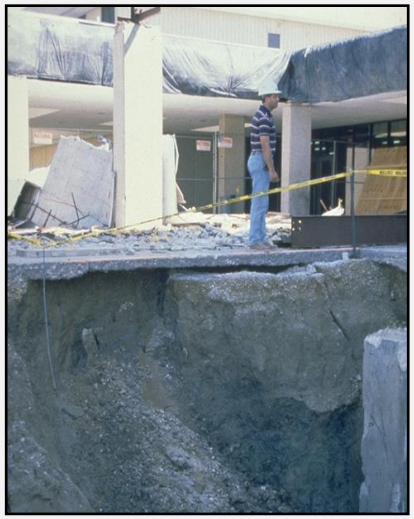
Hazard Recognition

- Identify hazards and what should be done

Source of photos: OSHA

Hazard Recognition

- Identify hazards and what should be done



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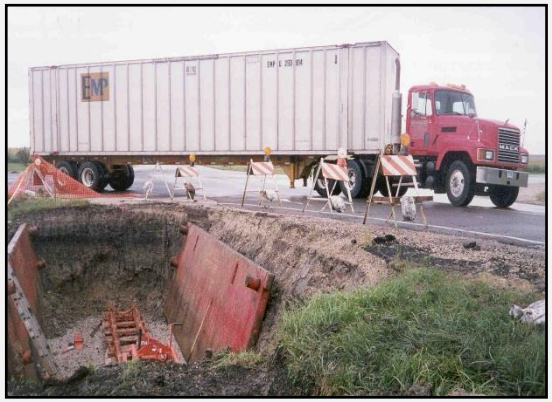
Hazard Recognition

- Identify hazards and what should be done



Source of photo: OSHA

Always Remember

- Never enter a trench 5’ or greater in depth unless a protective system is in place.
- Trenches less than 5’ deep still require the competent person’s “OK”
- If a trench box or shoring is used, never leave its protection while in the trench

Knowledge Check

What is the minimum distance that excavated materials, tools, and other supplies be kept back from the excavation's edge?

a. 1 foot
b. 2 feet
c. 7.5 feet
d. 25 feet

b. 2 feet

Knowledge Check

At what depth must a ladder, ramp, steps, or runway be present for quick worker exit:

a. 4 feet
b. 5 feet
c. 10 feet
d. It is never required

a. 4 feet

Knowledge Check

What is the greatest hazard facing a worker while working in a trench:

a. Hazardous atmospheres
b. Falls
c. Cave-ins
d. Falling Objects

c. Cave-ins

Knowledge Check

Unless made in entirely stable rock, at what depth is a protective system required for a trench:

a. Any depth if the competent person says so.
b. 5 feet deep and greater
c. Both a and b
d. A protective system is never required in trenches

c. Both a and b

Excavations in Construction

Questions?