



# Excavations

Subpart P

One-hour

# Why the Training?

- People die in excavations!
  - See Fatal Facts
- Regulations
  - 29 CFR 1926, Subpart P



# What We Will Cover



- Regulations
- Competent Person
  - ◆ Qualifications
  - ◆ Responsibilities
- Hazards of Excavations

# What We Will Cover



- Soil Classifications
- Protective Systems
  - ◆ Sloping
  - ◆ Shoring
- Inspections
- Emergency Response

# Regulations

- 29 CFR 1926 Subpart P - Excavations

- ◆ Appoint Competent Person

- Soil evaluations by Competent Person
- Daily Inspections by Competent Person
- Shoring and sloping evaluations by Competent Person
- Stop Work Authority of Competent Person



# Competent Person

- "Competent person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

# Competent Person

- Qualifications
  - ◆ Knowledge of soils and soil classification
  - ◆ Understands design and use of protective systems
  - ◆ Ability to recognize and test hazardous atmospheres
  - ◆ Documented training
  - ◆ Prior excavation experience



# Competent Person

- Responsibilities
  - ◆ Site safety briefings on excavation safety
  - ◆ Daily excavation inspections
    - More frequent if conditions change (e.g. freeze/thaw, rain, vibration)
  - ◆ Physically located at the excavation



STOP WORK AUTHORITY!!!

# Excavation Hazards

- ◆ Surface encumbrances
- ◆ Utilities
- ◆ Access/Egress
- ◆ Vehicle traffic
- ◆ Falling loads
- ◆ Mobile equipment
- ◆ Hazardous atmospheres
- ◆ Water accumulation
- ◆ Adjacent structures
- ◆ Loose rock or soil
- ◆ Falls
- ◆ Cave-in

# Surface Encumbrances

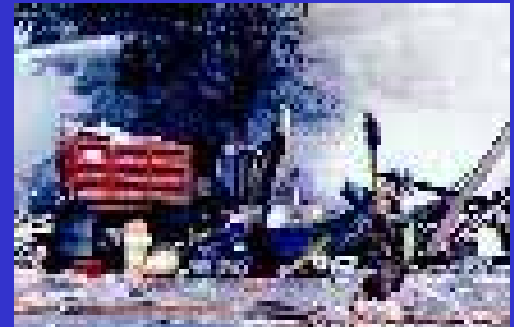
- Need to be removed or supported
- e.g. fencing, piping, structure, materials



# Utilities

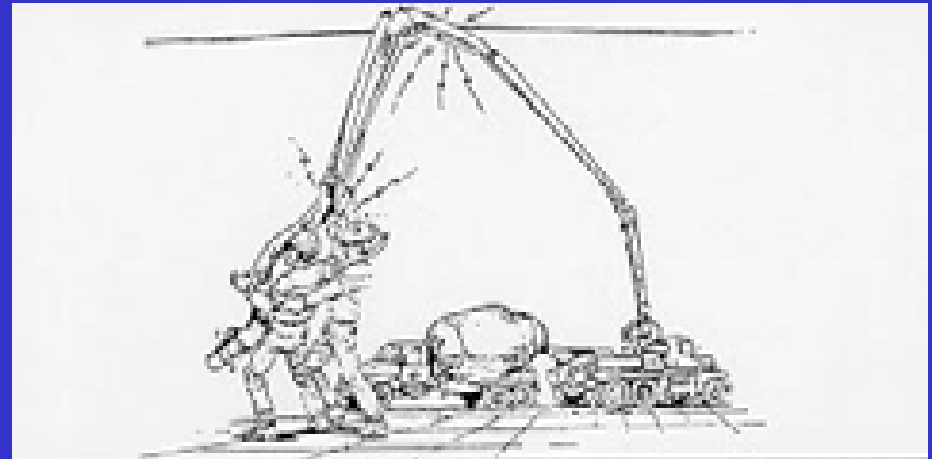
- Underground
  - ◆ Locate prior to digging
  - ◆ Certify deactivation
  - ◆ Protect, support, or remove

	ELECTRIC
	GAS-OIL-STEAM
	COMMUNICATION CATV
	WATER
	SEWER



# Utilities

- Aboveground
  - ◆ De-energize or
  - ◆ Isolation from power lines



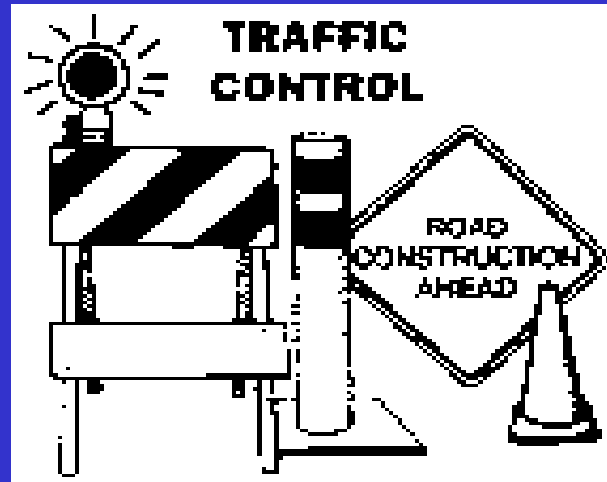
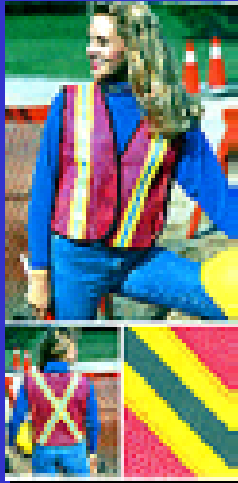
# Access/Egress

- Note: Poor housekeeping --- # 1 cause of slips, trips and falls on construction projects
  - ◆ Debris kept cleared from work areas
  - ◆ Mark hazards
  - ◆ Barricade or cover holes
- Egress provided-
  - ◆ 25' travel distance
  - ◆ ladders
  - ◆ ramps
  - ◆ stairs



# Vehicle Traffic

- Traffic Control
- Traffic Safety Vests



# Exposure to Falling Loads



- No work under loads
- Operators remain in cab



# Mobile Equipment

- Warning system
  - ◆ Barricades
  - ◆ Hand signals
  - ◆ Mechanical signals
  - ◆ Stop logs
  - ◆ Grade away from excavation



# Hazardous Atmospheres

- Test @ 4' if suspected
  - ◆ LEL
  - ◆ Oxygen
  - ◆ CO
  - ◆ H<sub>2</sub>S
  - ◆ Petroleum
  - ◆ Other toxics



# Ventilation

- Displace hazardous gases and vapors
- Considerations
  - ◆ Heavier than air or lighter than air contaminant
  - ◆ Exhausting or blowing in
  - ◆ Volume/time required to lower concentrations to acceptable levels



# Water Accumulation



- Protection from hazards associated with water accumulation
  - ◆ Protection against cave-in
  - ◆ Water removal (pumping)
  - ◆ Run-off protection
  - ◆ Consider temporary shut-off of water lines

# Adjacent Structures

- Ensure structure stability
  - ◆ Shoring
  - ◆ Bracing
  - ◆ Underpinning
  - ◆ Or evaluation by P.E.



# Loose Rock and Soil

- Protection of employees from loose rock or soil
  - ◆ Scaling
  - ◆ Protective barriers
  - ◆ Placing material at least 2' from edge
  - ◆ No work on slopes above workers



# Fall Protection

- Any surface 6 feet or more above a lower level shall be protected by:
  - ◆ walkways with guardrail systems
  - ◆ personal fall arrest systems
- Other options include:
  - ◆ warning lines systems
  - ◆ safety monitoring systems

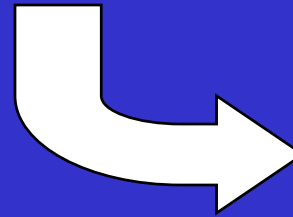


# Cave-in

- Protection from cave-in requires a systematic approach including:
  - ◆ Soil classification
  - ◆ Protective systems
  - ◆ Inspection
  - ◆ Employee training



An oh  
sh\_t!





# Soil Classification

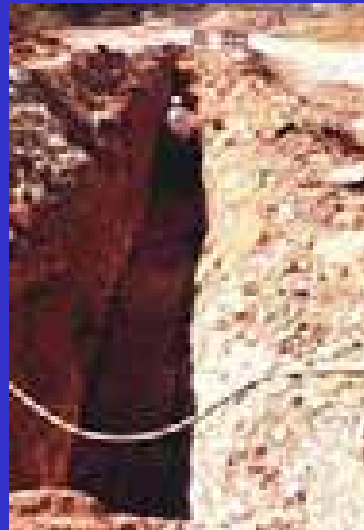
- Soil Classification (Type A,B,or C) determines construction of protective system:
  - ◆ Sloping or benching
  - ◆ Shoring
    - Timber shoring
    - Aluminum shoring

# Protective Systems

- Required unless:
  - ◆ Excavation in stable rock
  - ◆ Excavation less than 5 ‘ (4’ some states) and examination by Competent Person determines no potential for cave-in



- YO!



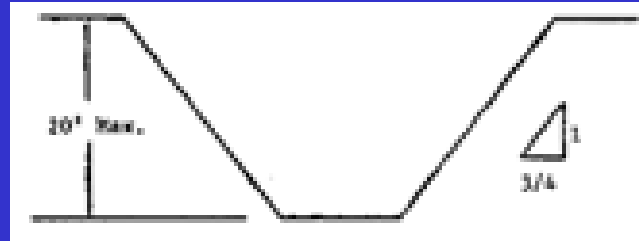
# Protective Systems

- Options Include:
  - ◆ Sloping and benching
  - ◆ Shoring/sheet piling/shielding (e.g.trench boxes)
  - ◆ Designed by P.E. if deeper than 20'

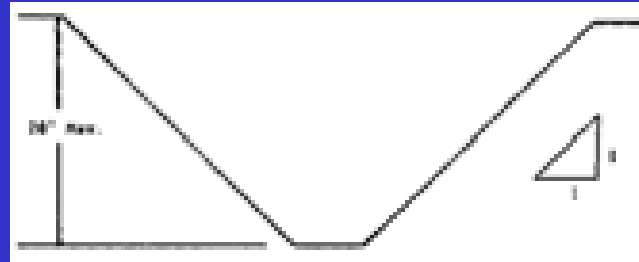


# Simple Sloping

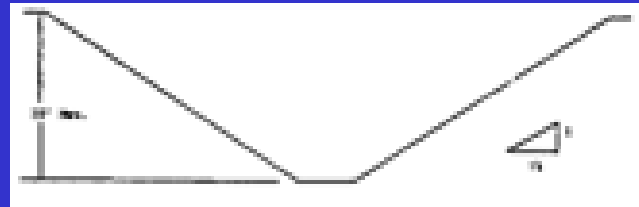
- Type A - 3/4:1



- Type B - 1:1

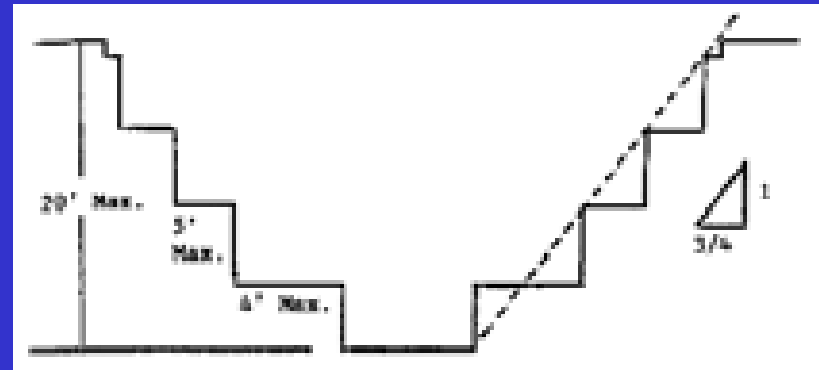


- Type C - 1½ :1

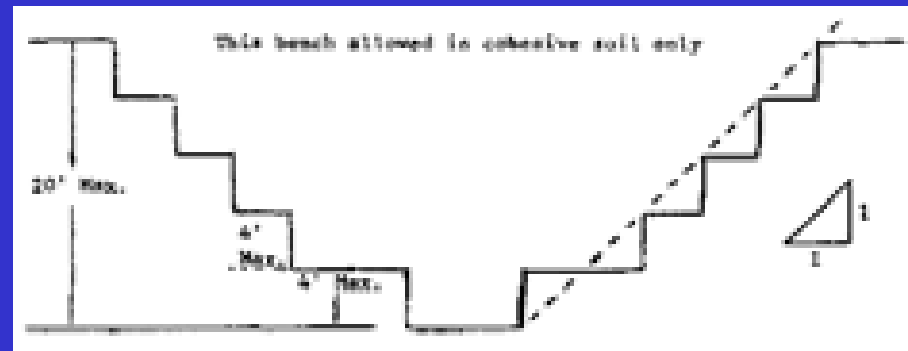


# Benching

- Type A



- Type B
  - (cohesive soil)



- Type C

NA

# Shoring

- Based on OSHA Appendices
- Based on Manufacturer data
- Designed by a P.E.



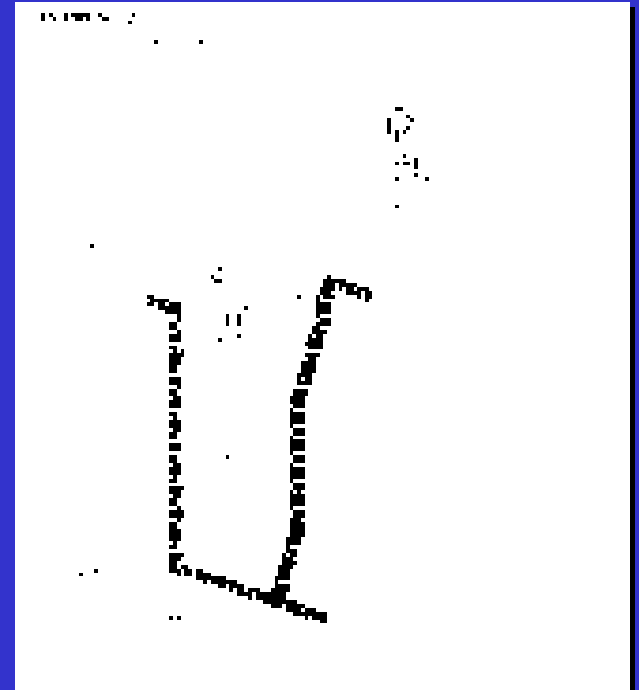
# Timber Shoring Installations



- Appendix C of OSHA regulations
- Requires soil classification
- Based on depth and width of trench
- Consult tables for specs on
  - ◆ Cross braces
  - ◆ Wales
  - ◆ Uprights

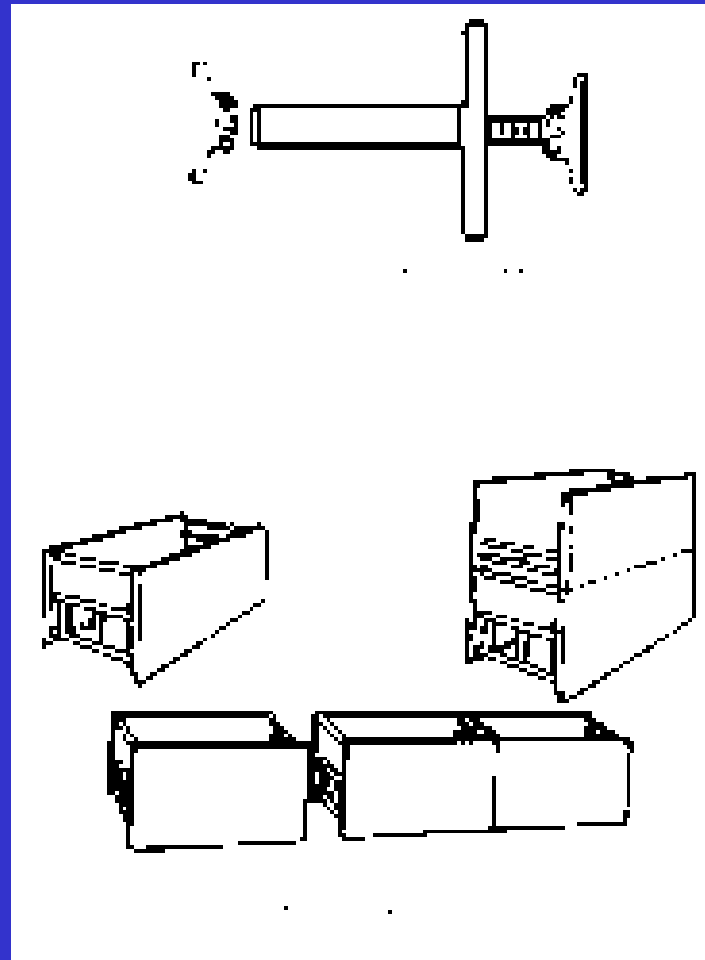
# Aluminum Shoring Installations

- Appendix D of OSHA regulations
- Requires soil classification
- Based on depth and width of trench
- Consult tables for specs on
  - ◆ Hydraulic cylinders
  - ◆ Wales
  - ◆ Uprights





# Shields (i.e. Trench Boxes)



# Protective Systems



- Installation
  - ◆ Securely connected
  - ◆ Employees clear of area under shields during installation
  - ◆ Installed to prevent movement
  - ◆ Must protect employees while entering excavation

# Protective Systems

- Removal
  - ◆ Employees clear of area under shields during removal
  - ◆ Shoring removed from the bottom up, **SLOWLY!**
  - ◆ Backfill with removal



# Excavation Inspections

- Daily Inspections of ALL excavations by Competent Person
  - ◆ Start of shift, as needed, following rainstorms or other hazard-increasing event
    - Possible cave-ins
    - Protective system failure
    - Water accumulation
    - Hazardous atmospheres
  - ◆ Competent person has authority to remove workers from the excavation

# Excavation Rescue



# Excavation Rescue



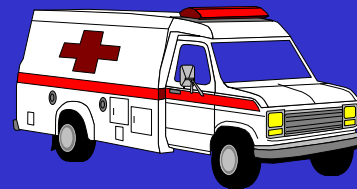
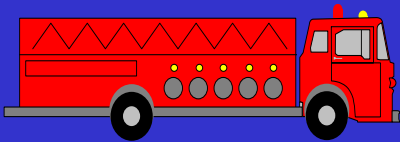
# Excavation Rescue



- Initial Size-up
  - ◆ Type of incident?
    - Cave-in, flooding, medical, fire, spill
  - ◆ Injuries?
    - Number and type
  - ◆ Missing personnel?
  - ◆ Chemical (or sewage) exposures?
  - ◆ Safety of excavation for rescuers?

# Excavation Rescue

- Notify:
  - ◆ Field personnel
  - ◆ HSO = Emergency Coordinator
  - ◆ Fire Department
  - ◆ Police Department
  - ◆ Emergency Medical Services (EMS)/Hospital





# Excavation Rescue

- Stabilize cave-in
- Control flooding
- Hazardous Atmospheres?
  - ◆ Ventilate
  - ◆ SCBA
  - ◆ Safety harness and line
  - ◆ Basket stretcher



# Excavation Rescues

- The best rescue is the one you never have to make!
  - ◆ Practice proper procedures
    - Make sure everything is safe before anybody goes in!

**DON'T ROLL THE DICE!!!**

