

EXCAVATION SAFETY

OCCUPATIONAL SAFETY AND HEALTH MANUAL



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DEFINITIONS

Excavation: An excavation is any human-made cut, cavity, trench or depression in an earth surface, formed by earth removal. All excavations five feet or more in depth are required to have a protective system in place to protect employees from injury unless:

- The excavation is made entirely in stable rock; or
- The excavation is less than five feet in depth and a competent person has examined the ground and determined there is no indication of a potential cave-in.

Acceptable Protective Systems: Systems are based on factors such as soil type, water content, excavation depth and width, the nature of the work and nearby activities. These systems include:

- Sloping (Sloping System):** a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.
- Benching (Benching System):** a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels
- Shoring (Shoring System):** a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.
- Shielding (Shielding System):** a structure that designed to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with §1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as “trench boxes” or “trench shields.”

Competent Person: Someone 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. This person must have specific training in, and be knowledgeable about, soils analysis, the use of protective systems and the requirements of the occupational safety and health rules.

- At every excavation where employee exposure can be reasonably anticipated, Oregon OSHA requires that we (or our contractor) assign a competent person to conduct a daily inspection of the excavation.

- b. That inspection should include the adjacent areas and protective systems utilized (i.e., shoring, shielding, benching or sloping) for evidence of situations that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres or other hazardous conditions.
- c. An inspection must be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections must also be made after every rainstorm or other hazard-increasing occurrence.

MINIMUM REQUIREMENTS FOR EXCAVATIONS

1. The estimated location of underground utility installations must be completed before any digging or excavation is started.
2. Excavations deeper than 5 feet requires cave-in protection (shielding, benching or shoring).
3. A Competent Person is required at all excavations.
 - i. The competent person is trained, authorized and responsible to ensure that the excavation or trench remains stable, the personnel working in the excavation can quickly exit, that the atmosphere is safe, that spoils are placed so they can't shift, that personnel work safely near heavy equipment, and that the work area remains safe until the excavation is back-filled.
 - ii. Conduct frequent and regular inspections of the jobsite, materials and equipment for unsafe or unhealthy conditions or practices.
4. Sloping and benching techniques must be evaluated by the competent person.
5. Trenches or pits 4 feet deep or greater must be tested for atmospheric hazards before entering if there is potential for these hazards to be present and continuously monitored if there is a chance they could develop.
6. Any excavation deeper than 20 feet must have cave-in protection designed by a qualified engineer.
7. A safe means of egress will be located in trench excavations that are 4 feet or more in depth.

GENERAL HAZARDS OF EXCAVATIONS

The Competent Person must evaluate all the following conditions and specify methods of control:

1. Unstable soils, cave in, sloughing, shifting soils, water in the excavation
2. Underground and overhead utilities
3. Vehicle traffic
4. Nearby structures, sidewalks, roadways that could collapse from vibration, water flow or soils changes
5. Heavy equipment operations
6. Atmospheric hazards: low oxygen, flammable gas, toxics, vehicle and equipment exhaust
7. Falls and other physical hazards
8. Spoils piles
9. Flying debris (kicked off from heavy equipment, dump trucks)

SAFETY RULES FOR EXCAVATION OPERATIONS

1. Hi-visibility outerwear is required when working around heavy equipment.
2. Means of egress (ladders) must be available to every worker in the space within 25 feet of their work locations. (Place ladders every 25 feet along the length of the excavation).
3. Ladders must be secured and extend 3 feet above the top of the trench.

4. Spoils piles must be set back at least 3 feet from the edge of the trench or excavation. Optimal distance for heavy spoils or equipment is as far back from the edge as the trench is deep.
5. Workers should be aware of these hazards and alert the Competent Person if changes develop; exiting the space until hazards can be properly controlled.
6. The Competent Person is responsible for atmospheric testing. See Confined Space Atmospheric Testing Procedure.
7. No work is permitted in a trench or excavation with accumulated or flowing water.
8. Workers must stay back at least 3 feet from the swing zone of heavy equipment.
9. Working below a suspended load is prohibited.
10. Hard hats are required when working near heavy equipment.
11. Using an excavator bucket to lift or lower personnel is prohibited.
12. Be aware of vehicle and equipment exhaust accumulating in trenches and confined spaces. Use continuous monitoring as necessary.
13. When working in or near an excavation, keep alert to changes in conditions including shifting soils, changes in soil appearance or odor, water flowing in, vehicle exhaust, vibration and other conditions that could cause cave-in, atmospheric hazards or other problems to develop. Exit immediately and reassess if conditions change while working in an excavation.
14. The water is being removed and kept at a safe level; or a safety harness/lifeline is available and used.
15. Ensure control of loose rock or soil, one of the following methods have been implemented:
 - i. Scaling of the face of the excavation has been done to remove any hazardous loose material;
 - ii. Protective barriers are installed to contain the loose material; or any other effective means is in place and there is no danger from loose materials.

EXCAVATION EQUIPMENT

Equipment operators must be specifically trained and authorized before operating excavation equipment. Operators must conduct pre-use and work site inspections. Operators are responsible for ensuring safety in the work area.

HYDRO-EXCAVATION (VAC) TRUCKS

Vac Trucks have additional hazards of high volume suction hoses, pressure wands, high-pressure air and water, tanks that are confined spaces, hydraulic tip-beds, hoppers and doors. Operators must be trained and authorized on the equipment.

1. Any person working near or operating a Vac Truck must have additional training to recognize and control hazards.
2. Special blocking procedures must be followed when elevating beds, hoppers, tanks or doors to ensure that the equipment (bed or door) does not fall.
3. Tanks and Hoppers on Vac Truck are Confined Spaces. Do Not Enter.
4. Stay clear of the vacuum end of the stinger. Tremendous suction power can cause serious injury.
5. Do not point the pressure nozzle towards any person.
6. Positively stop and lockout vacuum pressure, air and water pressure before servicing or un-jamming equipment.
7. Required PPE includes hardhat, eye protection, hearing protection, steel toe boots, gloves.

SPEED SHORE

1. Speed Shore shielding must be installed and removed from the ground level only. See Speed Shore Manual for requirements on installation, inspection and removal.
2. Speed shore must be installed under the direction of a Competent Person, and must be inspected daily and periodically throughout the work shift.
3. Always install shoring from the top down and remove from the bottom up.
4. Shielding must extend above the ground level and be within 24 inches of the bottom of the trench.
5. Trench protectors must extend 4 feet past side shielding.
6. Structures outside of the trench must be braced or protected from cave-in (i.e. poles, buildings, sidewalks).

WATER IN EXCAVATIONS

Do not enter a trench or excavation that has accumulated or flowing water.

1. Identify source of water (surface runoff or line break).
2. Shut off the source upstream (as close as possible to line break).
3. Pump water out of excavation without entering (Competent Person must monitor this).
4. Divert or capture pumped water and surface water.
5. Brace adjacent structures as needed based on conditions.
6. Inspect and protect for a cave-in before entry.
7. Competent person ensures appropriate shielding or shoring before employees enter.

TRENCH EMERGENCIES AND RESCUE

1. If an emergency occurs in an excavation, contact 9-1-1 immediately.
2. Trench rescue can be extremely hazardous because of conditions ranging from unsafe atmosphere to cave-in. Co-workers often become victims of secondary collapse during rescue attempts. Call 9-1-1 right away for emergency help.
3. When calling 9-1-1, be specific about the exact nature of the emergency to mobilize the correct technical rescue resources as quickly as possible