

Trench Excavation Safety Guide



Division of Occupational Safety and Health
lni.wa.gov/go/F417-325-000 | 1-800-423-7233



Washington State Department of
Labor & Industries



**Dig a trench —
not a grave.**

**Slope it. Shore it.
Shield it.**

The nature of trench excavation work is uniquely hazardous, making strong protective measures necessary to safeguard workers from serious injuries, and in some cases, even death.

A trench excavation work plan helps keep workers safe by identifying hazards, preparing the site, and implementing controls like shielding, sloping, or benching. Following these steps reduces the risk of cave ins, injuries, and emergencies.

The purpose of this safety guide is to assist with the completion and implementation of a trench excavation work plan. It helps employers and workers understand the hazards and follow safe steps while digging. This guide does not replace the requirements found in state rule, [chapter 296-155 WAC, Part N](#), and is intended as a general educational resource to use alongside those requirements.

Definitions

The following definitions have been simplified from definitions found in the rule. [WAC 296-155-652](#). Please see that section for more descriptive definitions.

- Accepted engineering practices — Safety methods that match what a trained engineer would approve.
- Aluminum hydraulic shoring — Aluminum supports that use hydraulic pressure to hold trench walls in place.
- Bell bottom pier hole — A deep hole with a bottom wider than the top.
- Benching — Cutting trench walls into steps to help stop cave ins.
- Cave in — When dirt or rock suddenly falls into a trench and can trap or injure someone.
- Competent person — A trained person who can spot dangers and has the authority to stop work and fix them right away.

- Cross braces — Horizontal bars that push against trench walls to help support them.
- Faces or sides — The walls of the trench excavation.
- Failure — When a support breaks or bends so much that it can't hold the trench safely.
- Hazardous atmosphere — Air that is unsafe to breathe, which includes air that may be toxic, explosive, or low in oxygen.
- Kickouts — When a cross brace pops out or fails suddenly.
- Protective system — Any method used to keep workers safe from cave ins or falling material.
- Ramp — A sloped surface used to walk or drive into or out of a trench.
- Sheeting — Boards or panels that hold back the dirt in a shoring system.
- Shield (trench box, uprights, or walls.) — A strong structure placed in a trench to protect workers if the walls collapse.
- Shoring — Supports that hold up trench walls to prevent cave ins.
- Sides — Another word for trench walls.
- Sloping — Cutting trench walls at an angle so they lean away from the trench to prevent collapse.
- Stable rock — Solid rock that can stand straight without falling apart.
- Structural ramp — A strong ramp made of wood or steel for vehicles.
- Support system — Structures that support nearby buildings, utilities, or trench walls.
- Tabulated data — Engineer approved charts that show how to build safe protective systems.

- Trench (Trench excavation) — A narrow, deep excavation where the depth is greater than the width (15 feet wide or less at the bottom).
- Trench box / trench shield — Another name for a shield used to protect workers in a trench.
- Uprights — Vertical pieces in a shoring system that press against the trench walls.
- Wales — Horizontal pieces that help hold uprights in place.
- Work plan — A written plan explaining how trench work will be done safely.

Hazards in Trench Excavation

Trench excavation work can be very dangerous if hazards are not identified and controlled. Workers must understand the risks before entering or working near a trench.

Hazards include:

- Cave ins, which can trap or crush workers when trench walls collapse.
- Falling objects, such as tools, loose soil, or equipment dropping into the trench.
- Underground utilities, including gas, water, or electrical lines that may be struck during digging.
- Water buildup, which weakens the soil and increases the chance of collapse.
- Hazardous atmospheres, such as low oxygen or harmful gases that make it unsafe to breathe.
- Moving equipment, which can come into contact with workers or cause trench walls to collapse.
- Fall exposures, which can happen if the trench excavation area is not properly marked and guarded.

- Unstable soil, which can shift or slide unexpectedly inside a trench excavation.
- Weather conditions, like rain or freezing temperatures that make the trench less stable.
- Lack of inspection, which allows dangerous conditions to go unnoticed if a competent person is not checking the trench regularly.

Locating, Identifying, and Marking Utilities

Locating utilities before trench excavation work begins is required by state law and is critical because it:

- Prevents serious damage, such as hitting underground lines like gas, electric, water, and communication cables.
- Provides knowledge that helps protect workers from serious hazards, such as fires, shocks, or flooding.
- Helps crews know exactly where it is safe to dig and where extra caution is needed.

Identifying and Appointing a Competent Person

Before developing, completing, and implementing a trench excavation work plan, you will need to identify a competent person.

A competent person is appointed by the employer and has training, experience, knowledge, responsibility, and authority to adequately identify and mitigate risks associated with the trench excavation work. They are the first line of defense for protecting workers by:

- Providing necessary training to all workers involved in trench excavation work.

- Inspecting trench excavations daily and as needed because weather or working conditions can suddenly change.
- Spotting early signs of danger like cracks in the soil or water accumulation due to weather or possible broken pipes.
- Stopping dangerous work immediately, by having the authority to shut down a job site and remove workers from a trench before someone gets hurt.
- Making sure all safety and health rules are followed by completing the trench excavation work plan, checking trench boxes, shoring, and ladders, and ensuring other protections are used correctly.

Creating and Implementing a Trench Excavation Work Plan

A trench excavation work plan is a written document that is completed by a competent person, and outlines safety and health procedures, steps, hazards, and protective system(s) such as sloping, shielding, or shoring to prevent cave-ins. The work plan includes things like soil classification, utility location, safe access/egress, and inspections. The trench excavation work plan must be kept on the job site and be available for inspection by L&I.

You may use the trench excavation work plan available on L&I's website (Lni.wa.gov/go/F417-324-000), or you may develop your own work plan, as long as it:

Identifies:

- All trench excavations that require a protective system to prevent cave-ins.
- The soil and rock type for each trench.

- All underground utilities and explain how sidewalks, pavement, or nearby structures will be protected from collapsing.
- Any potentially hazardous atmospheres, such as low oxygen or harmful gases.

AND describes how:

- Underground utilities will be supported while the trench is open.
- Workers will be protected from hazards on the surface, such as equipment or spoil piles.
- Nearby structures will be stabilized so they do not shift or collapse.
- Any potentially dangerous atmospheres, such as low oxygen or harmful gases, will be identified.
- A protective system will be used and include the type (sloping, shoring, trench box, etc.).
- Safe installation and removal of the protective system will be implemented.
- Often the trench, nearby areas, and protective systems will be inspected.
- Workers will be protected when entering or exiting areas inside trench shields.
- Workers will be protected from loose soil, rocks, or equipment that could fall or roll into the trench.
- Water buildup will be controlled or removed.
- Workers will get in and out of the trench safely (like using ladders or ramps).

Additional Safety and Health Requirements in Trench Excavation

In addition to appointing a competent person, completion of the work plan will address the following:

- **Job Site Hazards**

- Exposure to vehicle traffic
 - > Workers near moving vehicles must wear high visibility clothing so drivers can see them.
- Exposure to falling loads
 - > No worker may stand under a load being lifted.
 - > Workers must stay back from vehicles being loaded or unloaded.
- Warning systems for mobile equipment
 - > If equipment is working near a trench or hole and the operator can't see the edge, a warning system must be used. Warning systems can include barricades, hand signals, or mechanical signals.
- Remove or support anything on the surface that could fall or cause harm.
- Spoil piles, materials, and equipment must be kept at least two feet from the edge of the excavation unless retaining devices are used.

- **Soil Classification**

- A competent person must test and classify the soil. [WAC 296-155-66401, Appendix A](#) provides information about the following four soil types:
 - > Stable Rock
 - > Type A
 - > Type B
 - > Type C

■ Surface Encumbrances

- Remove or support anything on the surface that could fall or cause harm.

■ Underground Utilities

- Find all underground lines (water, sewer, electric, gas, phone) before digging.
- Contact utility companies to mark their lines.
- As you get close to utilities, locate them exactly using safe methods.
- Support or protect utilities while the trench is open.

■ Access and Egress:

- Ramps
 - > Ramps for workers need to be designed by a competent person.
 - > Ramps for equipment need to be designed by a structural engineer.
 - > Ramp boards must all be the same thickness and securely connected.
 - > Cleats must prevent slipping and tripping.
- Trenches four feet or deeper must have a safe way out (ladder, ramp, or stairs).
- Workers must not have to travel more than 25 feet to reach an exit.

■ Hazardous Atmospheres

- Test the air before entering trenches deeper than four feet where hazardous atmospheres may exist.
- Atmospheres containing less than 19.5% oxygen or greater than 23.5% oxygen are hazardous.
- Use ventilation or respirators if needed.
- Re-test air often if controls are being used.

- Additional information regarding hazardous atmospheres can be found at [WAC 296-155-655\(7\)\(a\) and \(b\)](#).

■ Water in Trench Excavations

- Do not work in trenches with standing or rising water unless protections are in place. Protection may include:
 - > Water pumps,
 - > Special shields or support.
 - > Safety harness and lifeline.
- A competent person must watch water-removal equipment.
- Use ditches or dikes to keep rainwater out.
- Inspect after heavy rain.
- Stability of Nearby Structures
 - Use shoring, bracing, or underpinning if nearby buildings or walls could shift.
- Do not dig below a foundation unless:
 - > A support system is installed;
 - > The soil is stable rock; or
 - > An engineer approves it.

■ Fall Protection

- Provide walkways with guardrails when crossing trenches four feet or more above lower levels.
- Put barriers around remote or unattended excavations.
- Cover or backfill pits, wells, and shafts when work is done.
- Additional information regarding fall protection requirements and exceptions for trench excavations may be found at [WAC 296-880-30005](#).



We're Here to Help

With proper planning, protective systems, competent supervision, and daily inspections, you can help prevent serious injuries and fatalities in trench excavation work.

For more information on trench excavation safety, visit: [Lni.wa.gov/TrenchSafety](https://lni.wa.gov/TrenchSafety).

Additionally, L&I Consultants can help you develop your health and safety work plans, find and fix hazards, and provide technical assistance at no cost to you. Consultations are risk-free and completely confidential. Check it out: [Lni.wa.gov/Consultation](https://lni.wa.gov/Consultation).

Upon request, language support and formats for persons with disabilities are available. Call 1-800-547-8367. TDD users, call 711. L&I is an equal opportunity employer.