



# Don't dig yourself into a hole

Trenching is a high-risk work activity in Ontario. Workers continue to be seriously injured or killed because proper procedures were not put in place or followed.

Last summer, the Ontario Ministry of Labour (MOL) conducted a two-month blitz on trenching hazards. MOL inspectors made 994 field visits to 862 workplaces and issued 1,683 orders—151 of which were stop-work orders.

These were the most frequent issues they found:

- Trenches that were 1.2 m (4 ft) or deeper did not have the proper support systems to prevent the walls from collapsing.
- Material, excavated soil, and equipment was not kept at a safe distance from the upper edge of the trench wall.
- Workers were not wearing hard hats to protect against falling debris.
- Workers did not have a safe way to enter or exit the trench (e.g., a ladder).
- Written emergency procedures were not posted at the project.

## Legislation

A trench is a type of excavation where the depth of the hole exceeds the width. The health and safety requirements for trenching can be found in the Excavations section (Part III) of the Construction Projects regulation (213/91, s. 222 to 242).

The legislation defines the different soil types. Each type has different shoring and timbering requirements to prevent the trench walls from collapsing. Some trenches may require an engineered, hydraulic, or prefabricated support system designed by a professional engineer.

## Soil types

The type of soil in the trench will determine its strength and stability. Identifying soil types requires knowledge, skill, and experience. Even hard soil can contain faults that make it unstable when excavated. Be aware that soil types and conditions can change within a short period of time (due to weather conditions) or over short distances.

### Type 1

It is hard to drive a pick into Type 1 soil. In fact, the material is so hard, it is close to rock.

### Type 2

A pick can be driven into Type 2 soil relatively easily. It can easily be excavated by a backhoe or excavated by hand with some difficulty.

### Type 3

Much of the Type 3 soil encountered in construction is previously excavated material. Type 3 soil can be excavated by hand.

### Type 4

Type 4 soil can be excavated with no difficulty using a hydraulic backhoe. The material will flow very easily and must be supported and contained to be excavated to any significant depth.

## Cave-ins

Even after you determine the soil type, other factors can affect the stability of trench walls. These include moisture, vibration, weather, surcharge (heavy loads placed near the trench), previous excavation, and being too close to existing foundations.

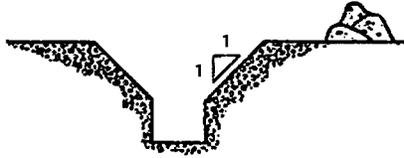
There are three basic methods of protecting workers against trench cave-ins:

1. **Sloping**
2. **Trench boxes or shields**
3. **Shoring.**

## Sloping

Sloping can reduce the risk of a trench collapsing by cutting back the walls at specific angles, depending on the soil type. Sloping is also used with shoring or trench boxes to cut back any soil above the protected zone.

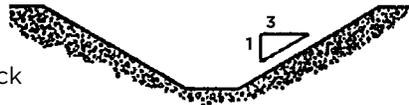
Type 1 and 2 soils require walls to be sloped at a 45-degree angle beginning 1.2 m (4 ft) above the bottom of the trench. This works out to 1 m back for every 1 m up (i.e., a 1-to-1 gradient).



Type 3 soil also requires a 1-to-1 gradient, but from the bottom of the trench.



Type 4 soil requires a 1-to-3 gradient from the bottom of the trench. That's 3 m back for every 1 m up.



## Trench boxes or shields

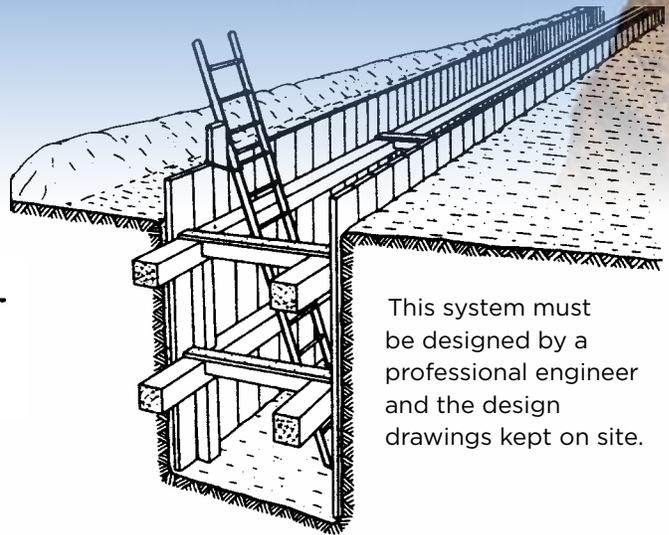
These are prefabricated systems made of aluminum or steel that are placed inside the trench. They do not provide support for the trench walls, but they will protect workers from a cave-in.



Design drawings and specifications for these systems must be done by a professional engineer and kept on site.

## Shoring

Shoring is an engineered support system that “shores up” the trench walls. It consists of a sheathing material (typically wood, aluminum, or steel) with a support system typically made with posts, wales, and struts or an internal frame support system.



This system must be designed by a professional engineer and the design drawings kept on site.

## Safe work practices

- Never work alone in a trench.
- Always have a ladder or other safe way to enter and exit a trench. Ladders must be securely tied off at the top and extend at least 1 m (3 ft) above the shoring or trench box. Keep the top and base of the ladder free of debris and puddles of water.
- Keep trenches dry. If required, use a pump and wear rubber boots.
- Keep a level area 1 m from the upper edge of each trench wall clear of equipment, excavated soil, and building materials. This will prevent material and equipment from falling into the trench. Also, the weight can put pressure on the trench wall, causing it to collapse.
- Use barricades, barriers, or signallers to help equipment operators stay clear of trenches. This will protect workers from being struck by moving machinery.
- If a person could fall into a trench that is more than 2.4 m (8 ft) deep, provide a barrier at least 1.1 m (42 in) high at the top.
- Never enter a trench deeper than 1.2 m (4 ft) unless the walls are sound, made of solid rock, properly sloped or shored, or protected by a trench box.
- Wear a hard hat and eye protection to prevent injuries from falling and flying objects.
- Ensure that all gas, electrical, and other services around the excavation area are located and marked. Most locates can be arranged by contacting Ontario One Call at [on1call.com](http://on1call.com)
- If a utility service poses a hazard, it should be shut off. If it can't be shut off, ask the utility owner to supervise the work.

## How IHSA can help

Visit the **Trenching and Excavation** topic page on the [ihsa.ca](http://ihsa.ca) website. It contains safety information and links to products and downloadable resources.