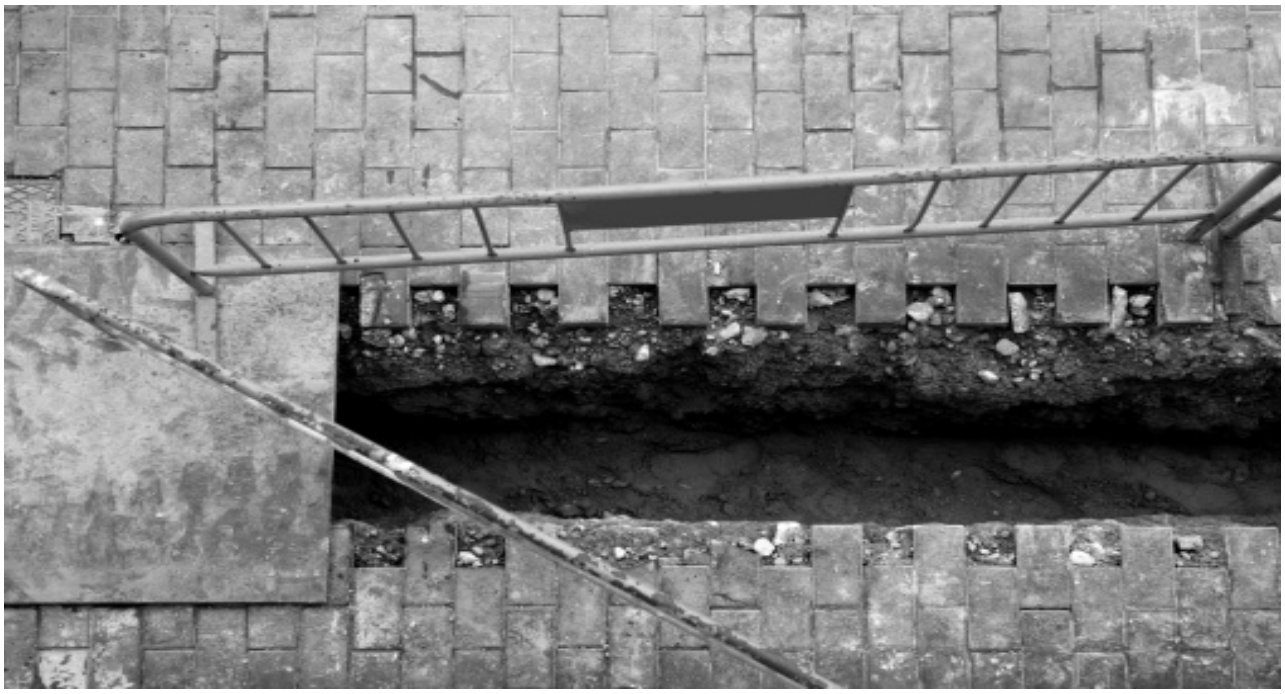
HAZARD PROFILE: Excavation and Trenching



- An Ontario worker was buried alive after the trench he was working in collapsed. The contractor was fined $120,000 and the supervisor $5,000.
- A 27-year-old Alberta worker laying cable was crushed to death when the spool around which the cable was wrapped broke free from a nearby truck and rolled into the shallow trench where he was working.
- The same trench at a New Brunswick excavation that had caved in three times during the day gave way a fourth time and fatally crushed a worker’s chest.

Cave-ins, unsafe air, falling equipment and other hazards make excavation and trenching among the most dangerous forms of work’and the most strictly regulated. The OHS regulations of every jurisdiction include detailed requirements covering all aspects of excavation and trenching. In fact, the very first C-45 charge was filed in connection with the death of a worker in a trench collapse. (The C-45 charge was later withdrawn and the Ontario supervisor pleaded guilty to failing to ensure that a worker didn’t enter an excavation that wasn’t properly shored or sloped. He was fined $50,000.)

This edition of HAZARD PROFILE looks at excavation and trenching hazards and

their regulation. There's also a chart below spelling out the principal sources of regulation on excavations and trenches in each part of Canada.

Defining Our Terms

When we use the term 'excavation' in this article, we mean any dug-out area of ground or earth, including foundations, trenches, tunnels and shafts. When we use the term 'trench,' we're referring to a type of excavation that's deeper than its width at the bottom.

THE HAZARDS & INJURIES

The most common hazards of excavation and trench work include:

- *Cave-ins or excavation collapses*'when you remove soil to make an opening, the remaining soil 'relaxes' and increases the pressure on the walls surrounding the opening, making the walls unstable;
- *Excavated material*'if soil dug out of an excavation is piled too close to the excavation, it can fall back into the opening or destabilize the opening's walls;
- *Falling objects or objects near an excavation*'tools, equipment and barriers around an excavation can fall into the opening if they're placed too close to the edge;
- *Powered mobile equipment*'back hoes, concrete trucks and the like can strike workers in and around excavations or collapse on top of workers inside them;
- *Slips, trips, and falls*'excavation entrances and exits and uneven ground can cause workers to fall;
- *Hazardous atmospheres*'the air in trenches is often dangerously lacking in oxygen and may also contain common atmospheric hazards, such as gasoline vapours, methane and other explosive gases;
- *Flooding/water hazards*'if an excavation is below the water table or near a water source or if it absorbs a lot of rain, the excavation can flood or collapse; and
- *Underground facilities*'workers in trenches and excavations may strike

Here's where to find the excavation and trenching requirements in the OHS laws of your jurisdiction:

FEDERAL: Sec. 3.12 of the *Canada OHS Regs.* covers excavations.

ALBERTA: Part 32 of the *OHS Code 2009* covers excavating and tunnelling.

BRITISH COLUMBIA: Secs. 20.78 through 20.95 of the *OHS Regs.* cover excavations.

MANITOBA: Part 26 of the *Workplace Safety and Health Regs.* covers excavations and tunnels.

NEW BRUNSWICK: Part XIII of the *OHS Regs.* covers excavations and trenches.

NEWFOUNDLAND/LABRADOR: Part XVII of the *OHS Regs. 2012* covers construction, excavation and demolition; Part XVIII covers excavation, underground work and rock crushing.

NORTHWEST TERRITORIES/NUNAVUT: Secs. 396 through 432 of the *General Safety Regs.* cover excavations.

NOVA SCOTIA: Part 14 of the *OHS Regs.* covers excavations and trenches.

ONTARIO: Part III of the *Construction Project Regs.* covers excavations; Part IV covers tunnels, shafts, caissons and cofferdams.

PRINCE EDWARD ISLAND: Part 12 of the *OHS Regs.* covers excavations, trenches and construction.

QU□BEC: Sec. 3.15 of the *Safety Code for the construction industry*

electrical, oil and gas lines and suffer injuries as a result.

REGULATION OF EXCAVATION & TRENCHING

The OHS regulations in each jurisdiction have sections devoted to the safety requirements for excavations and trenches. (Québec's excavation and trench requirements can be found in its *Safety Code for the construction industry*.) Although there are some variations, these regulations generally cover the following key areas:

covers diggings, excavations and trenches.

SASKATCHEWAN: Part XVII of the *OHS Regs.* covers excavations, trenches, tunnels and excavated shafts.

YUKON: Secs. 10.62 through 10.72 of the *OHS Regs.* cover trenching and excavating.

Buried facilities. Before the ground is disturbed for an excavation, you must identify any buried facilities, such as underground pipes, electrical cables and oil or gas lines, and mark their locations. You may need the utility company to give you information about the location of facilities on your site. If workers hit a buried facility, they may not only cut off the service provided by that facility but also get injured or killed, particularly if they strike an electrical cable. So the excavation work must proceed around the locates.

Soil classification. It's critical to determine the type of soil in the area of the excavation *before* you start to dig. The type of soil will determine how stable the walls of the excavation will be and what, if any, shoring will be needed. Many OHS laws have soil classification categories. For example, Manitoba has a detailed classification system with five categories:

- Category 1a: stiff clays, stiff to hard clay tills and stiff fissured clays;
- Category 1b: stiff fissured soils and stiff clay fills;
- Category 2: soft cohesive soils and stiff to wet/loose silt soils;
- Category 3a: loose to medium dense soils; and
- Category 3b: dense to very dense soils.
- AB and BC have simpler systems, classifying soil as either:
- Hard and solid or compact;
- Likely to crack or crumble; or
- Soft, sandy, loose or filled.
- **Shoring.** Excavations that meet certain criteria must have 'shoring"that is, supports placed within the excavation to 'shore' or hold up the walls. The criteria for determining if shoring is required typically include:
- Depth of the excavation;
- Type of soil;
- Sloping of the excavation's walls; and
- Work conditions surrounding the excavation, such as the presence of vibrations.

These factors will also determine the *type* of shoring required and other requirements, such as the spacing of support beams. Some jurisdictions, such as BC and MB, include detailed charts in their OHS regulations spelling out the minimum shoring requirements for various types of excavations.

Excavated materials. Naturally, when you dig an excavation, you end up with a lot of excavated material that must go somewhere. If the excavation is going to be re-filled with that material once the work is complete, it may be tempting to

store the material close to the excavation. But doing so could endanger workers in the excavation. So the OHS laws typically bar you from piling excavated material closer than one metre from the excavation's edge. In addition, if the so-called 'spoil pile' is very deep (say, over 60 cm) and is adjacent to the excavation, the shoring in the excavation must take into account this additional lateral pressure.

Entry and exit. You must provide a safe means for workers to enter and exit an excavation, such as a ladder, stairway or ramp. The entry and exit areas must be located close to workers (generally within eight metres) and be safely shored and supported.

Guarding. Excavations pose the greatest danger to the workers that work inside them. But they also pose a risk to workers on the surface who could fall into an excavation as well as to passersby. So most OHS laws require excavations to be covered or protected with a barrier, fence or guardrail to prevent people on the surface from getting too close to the edge.

Powered mobile equipment. Powered mobile equipment, such as backhoes (and other heavy equipment such as the spool involved in the AB case previously discussed) could fall into the excavation'endangering the workers in the excavation as well as those operating the equipment. That's why the OHS laws generally require companies to erect barriers near the access points for powered mobile equipment that are high enough to keep such equipment from sliding or rolling into the excavation.

Hazardous atmosphere. The hazards posed to workers in excavations aren't always visible or apparent to the other senses. For example, workers could be overcome by toxic gases in an excavation before anyone even realizes the danger. Thus, the OHS laws require employers to take precautions to ensure that the atmosphere in an excavation contains sufficient oxygen and is free from hazardous levels of dust, vapour or gases. Required precautions may include testing the air in the excavation, ventilating the excavation and providing breathing apparatus for workers.

Conclusion

Excavation is a necessary evil. There's simply no other way to, say, build a foundation, install sewer lines and carry out other operations without digging deep holes in the ground. But although your company won't be able to completely eliminate the dangers that come with this type of work, it can'and must'take steps to control them. If you're the safety coordinator of a company that performs any kind of excavation work, you have the burden of ensuring that your company takes these steps and ensures that the work is done as safely as possible. This article will help you recognize and fulfill your duties.