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 (The C-45 charge was later withdrawn and the Ontario supervisor pleaded guilty to failing to ensure that a worker didn't enter an excavation that wasn't properly shored or sloped.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

Here's where to find the excavation and trenching

When we use the term 'excavation' requirements in the OHS

in this article, we mean any dug-laws of your jurisdiction: out area of ground or earth, **FEDERAL:** Sec. 3.12 of the including foundations, trenches, Canada OHS Regs. covers tunnels and shafts. When we use the term 'trench,' we're referring excavations.

to a type of excavation that's ALBERTA: Part 32 of the OHS the Code 2009 covers excavating deeper than its width at bottom. and tunnelling.

THE HAZARDS & INJURIES

and

The most

excavation

include:

common hazards

trench

BRITISH COLUMBIA: Secs. 20.78 through 20.95 of the work^{OHS} Regs. excavations.

- MANITOBA: Part 26 of the • Cave-ins or excavation Workplace Safety and Health remove collapses'when you Regs. covers excavations soil to make an opening, the remaining soil 'relaxes' and tunnels. increases the pressure on NEW BRUNSWICK: Part XIII of the walls surrounding thethe OHS Regs. opening, making the walls_{excavations} and trenches. unstable:
- Excavated material'if soilNEWFOUNDLAND/LABRADOR: Part dug out of an excavation is XVII of the OHS Regs. 2012 piled too close to thecovers construction, excavation, it can fall backexcavation and demolition; orPart XVIII opening the destabilize the opening'sexcavation, underground work and rock crushing. walls:
- Falling objects or objects NORTHWEST near an excavation'tools, TERRITORIES/NUNAVUT: barriers 396 through 432 of the equipment and around an excavation can General Safety Regs. cover

fall into the opening ifexcavations.
they're placed too close to
the edge; NOVA SCOTIA: Part 14 of the

- Powered mobile OHS Regs. covers equipment'back hoes, excavations and trenches. concrete trucks and the like ONTARIO: Part III of the can strike workers in and Construction Project Regs. around excavations or covers excavations; Part IV collapse on top of workers covers tunnels, shafts, inside them; caissons and cofferdams.
- *Slips, trips, and falls'excavation entrancesPRINCE EDWARD ISLAND: Part and exits and uneven ground12 of the OHS Regs. covers can cause workers to fall; excavations, trenches and
- *Hazardous atmospheres'theconstruction.
 air in trenches is often
 dangerously lacking in Québec: Sec. 3.15 of the
 oxygen and may also contain Safety Code for the
 common atmospheric hazards, construction industry
 such as gasoline vapours, covers diggings,
 methane and other explosive excavations and trenches.

 gases;
- Flooding/water hazards'if anthe OHS Regs. covers excavation is below the excavations, trenches, water table or near a water tunnels and excavated source or if it absorbs a shafts. lot of rain, the excavation

can flood or collapse; and YUKON: Secs. 10.62 through

 Underground 10.72 of the OHS Regs. facilities workers incover trenching and trenches and excavations mayexcavating.

strike 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. (Qu_bec'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:

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.