

### Mandatory Shoring Cost and Impact Additional Information

Excavations for Edmonton are typically dug to 1.5 metres (5 feet) or more below grade to allow adequate basement ceiling height. Requiring mandatory shoring for excavations deeper than 1.2 metres, without accounting for local conditions, would apply to the vast majority of homes.

Excavation means the space created by the removal of soil, rock or fill for the purposes of construction, and includes removal of a basement upon building demolition. Once soil is removed to create an excavation, it no longer supports the soil left behind in the excavation wall. If not properly supported, the soil may fall into the excavation. Excavation wall collapse is a hazard to workers in the excavation and potentially to the public and property in the near vicinity of the edge of the excavation.

Proven measures to assess and mitigate the risk of excavation collapse are found in Occupational Health and Safety (OHS) Code. Excavation stability may be achieved by cutting back excavated walls in specific ways (depending on OHS soil classification), installing temporary protective structures such as shoring, or using a combination of both these methods.

The soil classification that informs excavation stability strategy must be performed by a person competent in the principles and practices of the OHS Code soil classification system. This person may be a registered geotechnical engineer or other competent registered professional.

The OHS Code presently prescribes mandatory professional involvement, typically in the form of an authenticated site-specific report outlining appropriate strategies for creating an excavation and maintaining its stability, including any temporary excavation support plans and specifications, if any of the following applies:

- excavation depth will be greater than 3 metres below ground level at any point, including any void resulting from existing foundation removal;
- excavation abuts or adjoins an adjacent building or structure;
- excavation is within the 'angle of repose' of the soils below any adjacent or adjoining building or structure foundation or base, including any floor-on-ground or driveway;
- any vehicular traffic, working machinery, heavy object or dirt pile may be present within a distance equal to the depth of the excavation as measured from the bottom of the near edge of the excavation;
- the lot contains engineered fill;

- to confirm that an excavation of unsupported vertical (not cutback) depth not exceeding 3 metres at every point is stable and will remain free from cave-ins, sliding or rolling materials and other hazards associated with the workings for the purposes of the proposed work up to and including backfill time.

Further, the OHS Code allows for a professional or other competent person to confirm for an excavation up to 3 metres in depth that

- no temporary support system is required where applying the OHS-specified cutback parameters;
- an installed temporary excavation support system is adequate for the excavation.

Occupational Health and Safety (OHS) legislation requires that an employer ensure stabilized soil in an excavation by sloping the walls (cutting back) or installing temporary support structure, or combination of the two, recognizing three OHS-categorized soil types. These protective measures are required so that a worker may be able to approach, and work at a distance closer to the walls than the depth of the excavation. For example, in a 3 metre deep excavation, protective measures are required if the worker is working within 3 metres of the walls of the excavation. OHS requires engineering once an excavation exceeds 3 metres in depth.

While OHS legislation is intended for worker safety, its full and consistent application in excavations serves the purpose of the objectives in Part 8 of the building code for protection of adjacent properties and of the public. OHS rules are enforced by the Government of Alberta, though COE regulatory officials report unsafe conditions when they are evident.

Shoring is the use of temporary structural supports on the sides of an excavation to reduce the possibility of a cave-in endangering a worker. There are different types of shoring techniques, some generic and some proprietary. All techniques provide continuous support along the walls of the excavation.

Administration consulted local industry associations, contractors and professionals for input when estimating additional cost and time of mandatory shoring. Additional costs vary depending on the type of project (single family, multi family, infill, greenfield, etc.), site conditions, extent of excavation, contractor costs, engineering costs (if applicable), geotechnical study costs and carrying costs. Administration estimates the additional cost for engineered shoring for a typical single family home to be \$30,000-\$50,000.

The cost estimate for non-engineered shoring for excavations less than 3 metres deep provided by a local industry association is \$400 per lineal foot. As an example, a home with a 40 foot wall along the side property lines would require 40 feet of shoring on each side for a total of 80 feet to protect side yards only. This increases the cost of construction by \$32,000.

Requiring mandatory shoring increases construction timelines. Industry associations and shoring contractors were consulted with consensus estimates of a few weeks to a month for a typical single family home, with longer timelines for more complex projects. These timelines would apply to both engineered and non-engineered shoring.

An engineer can ensure the design is met and provide oversight, but there remains a risk of adjoining property damage during active excavation, or the process of installing the temporary stabilization measure such as shoring. Examples include vibration from installing some types of shoring, a fence could be struck during excavation, or there could be an unexpected collapse of the excavation wall. Typically an engineer would not supervise the actual construction, or dictate the means and methods of construction, which is the responsibility of the constructor.

In Manitoba, the *Manitoba Workplace Safety and Health Act and Regulation* requires shoring for excavations greater than 1.5 metres deep only if there is a danger of cave in, collapse, or material sliding or rolling into the excavation due to soil or work conditions at the construction project site. This is similar to the Alberta regulation cited above.

The jurisdictional scan did not reveal any other major municipalities with specific requirements in place.