Shoring of Excavations – Know The Laws Of Your Province

When is shoring required to prevent an excavation cave-in or collapse'

Perhaps the greatest hazard posed by excavation work is the risk of cave-in or collapse. OHS laws require the use of temporary protective structures to prevent cave-in, depending on soil type, excavation depth and work conditions. The most common form of temporary protective structure is shoring, a system in which aluminum, steel, or wood panels supported by screws or hydraulic jacks are installed to support the sides or walls of the excavation. Rules dictating when shoring is necessary vary by jurisdiction. Here's a summary of the rules in each part of Canada.

Excavation Shoring Rules Across Canada

FEDERAL

(a) A tunnel or in an excavation or trench that's over more 1.4 m deep and whose sides are sloped at an angle of 45ø or more to the horizontal, both the walls and roof must be supported by shoring and bracing that's installed as the tunnel, excavation or trench is being excavated; (b) **Exception:** Shoring and bracing requirements don't apply to a trench where the employer provides a system of shoring

composed of steel plates and bracing, welded or bolted together, that can support the walls of the trench from the ground level to the trench bottom and can be moved along as work progresses; and (c) Installation and removal of shoring and bracing must be performed or supervised by a qualified person (*COHS Regs*., Secs. 3.12(3), (4), (5))

ALBERTA

Soil Stabilization: (a) Employer must stabilize the soil in: (i) an excavation by shoring or cutting back, or (ii) a tunnel, underground shaft or open pit mine by shoring; (b) **Exception:** Employer may stabilize the soil in an excavation, tunnel, underground shaft or open pit mine using an artificial soil stabilization technique, including freezing soil by artificial means or grouting if the process is designed by a professional engineer to control soil conditions, and performed in accordance with the professional engineer's specifications; and (c) Natural freezing of the soil not allowed as an alternative or partial alternative to a temporary protective structure, or to stabilize the soil in an excavation, tunnel or underground shaft (*OHS Code*, Sec. 443)

Methods of Protection: (a) Employer must ensure that before a worker begins working in an excavation more than 1.5 m deep and closer to the wall or bank than the depth of the excavation, the worker is protected from cave ins or sliding or rolling materials by: (i) cutting back the walls of the excavation to reduce the height of the remaining vertical walls, if any, to no more than 1.5 m for 'hard and compact soil' and 'likely to crack or crumble soil', (ii) installing temporary protective structures, or (iii) using a combination of the methods in clauses (i) and (ii); (b) Previous requirement doesn't apply if a trench is constructed in solid rock throughout the entire trench (*OHS Code*, Sec. 450); and (c) If the walls of an excavation are cut back, an employer must ensure that: (i) if the soil is classified as 'hard and

compact soil’, the walls are sloped to within 1.5 m of the bottom of the excavation at an angle of no less than 30 degrees measured from the vertical, (ii) if the soil is classified as ‘likely to crack or crumble soil’, the walls are sloped to within 1.5 m of the bottom of the excavation at an angle of no less than 45 degrees measured from the vertical, and (iii) if the soil is classified as ‘soft, sandy or loose soil’, the walls are sloped from the bottom of the excavation at an angle of no less than 45 degrees measured from the vertical (*OHS Code*, Sec. 451)

BRITISH COLUMBIA

Sloping & Shoring: (a) Before a worker enters an excavation over 1.2 m deep or, while in the excavation, approaches closer to the side or bank than a distance equal to the depth of the excavation, employer must ensure that the sides of the excavation are: (i) sloped as specified in writing by a qualified registered professional, (ii) sloped at angles, dependent on soil conditions, ensuring stable faces, but in no case may the slope or combination of vertical cut and slope exceed that shown in Figure 20-1 of the Regulation, (iii) benched as shown in Figure 20-2, (iv) supported as specified in writing by a professional engineer, (v) supported in accordance with the minimum requirements of section 20.85 of the Regulation, or (vi) supported by manufactured or prefabricated trench boxes or shoring cages, or other effective means; (b) If the end of a trench over 1.2 m deep isn’t adequately sloped, end shoring must be installed unless (a) a worker in the trench isn’t required to approach closer to the end of the trench than a distance equal to the depth of the trench at that end, (ii) where, for the prevailing soil conditions at the end of the trench, the permissible spacing of uprights equals or exceeds the width of the trench, or (iii) otherwise authorized in writing by a professional engineer or professional geoscientist; (c) If end shoring is required, the walers for the end shoring must be installed to

bear against the walers that extend along the sides of the trench, or in a way that provides equivalent structural restraint; (d) End shoring must be designed by a professional engineer if the end shoring waler length exceeds 1.8 m; (e) Shoring must extend from at least 30 cm above ground level to as close to the bottom of the trench as the material being installed will allow, but in no case more than 60 cm from the bottom; (f) Shoring need not extend above ground level where traffic crossing plates need to be used, provided that other measures are taken to prevent excavated or other material from entering the excavation (*OHS Reg*., Sec. 20.81); (g) Timber shoring materials must be lumber graded Number 2 or better from the following species groups: Douglas fir-larch, hemlock-fir, spruce-pine-fir or coast-Sitka-spruce; and (h) All lumber must be graded to the *National Lumber Grades Authority Standard Grading Rules for Canadian Lumber* (*OHS Reg*., Sec. 20.82)

MANITOBA

Open Excavations: (a) Employer who requires or permits a worker to enter an open excavation with a depth of 1.5 m or less must ensure the excavation has a support structure installed in it if there’s a danger of cave-in, collapse or material sliding or rolling into the excavation; (b) Employer who requires or permits a worker to enter an open excavation with a depth between 1.5 m and 3 m must ensure that (i) the walls are sloped at an angle no greater than 45ø measured from the horizontal plane, (ii) a combination of slope and vertical face is used for stabilizing the walls of the excavation, so that the vertical face is no more than one m high and the remaining walls are sloped at an angle no greater than 45ø measured from the horizontal plane, (iii) shoring constructed of components that meet the minimum requirements for the applicable soil conditions set out in the Schedule listed in the Regulation is installed, (iv) a support structure other than shoring is installed, or (v) the walls of the excavation

are stabilized in a manner that has been designed and certified by a professional engineer; (c) Subsection (b) applies to frozen ground, but not an open excavation cut in solid rock or other equally stable material; (d) Employer who requires or permits a worker to enter an open excavation with a depth of more than 3 m must ensure that: (i) a support structure or an alternative method for stabilizing the walls has been designed and certified by a professional engineer for the excavation, and (ii) as applicable, the support structure or alternative method is constructed, installed, used, maintained and dismantled in accordance with specifications provided by the professional engineer, (iii) the professional engineer's specifications for the support structure or alternative method for stabilizing the walls specify: (A) its size and specifications, including the type and grade of materials used in its construction, and (B) the loads and types of soil conditions for which it's designed, and (iv) the structure or alternative method is inspected and certified by a professional engineer before a worker begins working in the excavation (*WSH Reg*., Sec. 26.15)

Trenches: Employer who requires or permits a worker to enter a trench with a depth of 1.5 m or less must ensure that a support structure is installed in it, if there's a danger of cave-in, collapse or material sliding or rolling into the trench; (b) Employer who requires or permits a worker to enter a trench with a depth between 1.5 m and 4.5 m must ensure that: (i) shoring constructed of components that meet the minimum requirements for the applicable soil conditions in the Schedule in the Regulation is installed, or (ii) an alternative that is designed and certified by a professional engineer is used for stabilizing the walls of the trench; (c) Subsection (2) applies to frozen ground, but not a trench cut in solid rock or other equally stable material; and (d) Employer who requires or permits a worker to enter a trench with a depth of more than 4.5 m must ensure that the walls of the trench are stabilized using a method designed and

certified by a professional engineer (*WSH Reg*., Sec. 26.15)

Reshoring: Employer that installs reshoring in an excavation must ensure that, before a worker enters the excavation, the reshoring or any other support structure in the excavation is designed and certified by a professional engineer and constructed, used, maintained and dismantled in accordance with the professional engineer's specifications (*WSH Reg*., Sec. 26.16)

NEW BRUNSWICK

(a) Employer must ensure that the walls of an excavation or trench are supported by shoring, bracing or caging except when the excavation or trench: (i) is less than 1.2 m deep, (ii) subject to subsection (b), is cut in solid rock, (iii) is sloped or benched to within 1.2 m of the bottom of the excavation or trench with the slope or bench not exceeding 1 m of vertical rise to each 1 m of horizontal run, or (iv) is one that an employee isn't required to enter; (b) Where the walls or crests of an excavation or trench are cut in solid rock and aren't stable, employer must ensure that the walls and crests are adequately supported by rock bolts, wire mesh, shoring or a method that provides equivalent support; (c) Where powered mobile equipment or a mobile crane is used near the edge of an excavation or trench, employer must ensure that any shoring, bracing or caging is adequate to support the increased pressure; and (d) Employer must ensure that shoring, bracing or caging for an excavation or trench is certified as adequate by an engineer and make the proof of the certification available to an OHS officer on request. (*OHS Gen. Reg.,* Sec. 181)

NEWFOUNDLAND

(a) A worker may not enter an excavation over 1.22 metres deep unless the sides are sloped to a safe angle and have been secured by the use of sheet piling, shoring and bracing or a

trench box, or the worker is protected by other effective means (*OHS Regs*., Sec. 406); and (b) Where work is done in an excavation: (i) the slopes must be scaled and trimmed or otherwise stabilized to prevent slides of material or falls of rocks, (b) overhanging banks and trees or stumps and overburden must be removed in the area within 5 m from the edge of the excavation, and (iii) means must be provided to prevent the erosion of the slope by surface water (*OHS Regs*., Sec. 409)

NOVA SCOTIA

(a) Where a person may enter an excavation or trench and a wall of an excavation or trench is greater than 1.2 m high, employer must ensure that the wall is supported by adequate shoring or bracing, or that an adequate trench cage is used, except where the employer is able to establish that the excavation or trench: (i) is cut in sound and stable rock, (ii) is sloped: (A) to within 1.2 m of the bottom of the excavation or trench, or (B) where soil overburden is located above an excavation or trench excavated in sound and stable rock, for the entire overburden, and the slope doesn’t exceed 1 m of vertical rise to each 1 m of horizontal run, or (iii) is one that a person doesn’t enter within a horizontal distance from the walls of the excavation or trench that’s equal to the height of the walls; (b) Where the walls or crests of an excavation or trench are cut in rock, employer must ensure that the walls and crests are adequately supported by rock bolts, wire mesh or other means of adequate protection, if necessary, to ensure safe working conditions; (c) Where powered mobile equipment is used near the edge of an excavation or trench, employer must ensure that any shoring, bracing or caging for the excavation or trench is adequate to support the increased load; (d) Employer must ensure that the walls of an excavation or trench are stripped of loose rock or other material that could slide, roll or fall on a person in the excavation or trench and injure that person; and (e)

Despite subsection (a) above, employer may slope the walls of an excavation or trench at an angle that exceeds a 1 m vertical rise to each 1 m horizontal run if an engineer certifies in writing that the steeper slope will be stable and isn't a hazard to a person in the excavation or trench (*Occ. Safety Gen. Regs.*, Sec. 166)

ONTARIO

Support Systems: (1) The walls of an excavation must be supported by a support system except for an excavation: (a) that's less than 1.2 m deep; (b) that no worker is required to enter; (c) that's not a trench and in which no worker must be closer to a wall than the wall's height; (d) that's cut in sound and stable rock; (e) made in Type 1 or Type 2 soil and whose walls are sloped to 1.2 m or less from its bottom with a slope having a minimum gradient of one vertical to one horizontal; (f) made in Type 3 soil whose walls are sloped from its bottom with a slope having a minimum gradient of one vertical to one horizontal; (g) made in Type 4 soil whose walls are sloped from its bottom with a slope having a minimum gradient of one vertical to three horizontal; or (h) that's not a trench and isn't made in Type 4 soil and for which a professional engineer has given a written opinion that the excavation walls are sufficiently stable that no worker will be endangered if no support system is used; (2) A support system must consist of: (a) proper timbering and shoring, if no hydrostatic pressure is present in the soil, and if the width and depth of the excavation are equal to or less than the width and depth indicated in the Table to Section 238 of the Regulation; (b) a proper prefabricated support system; (c) a proper hydraulic support system; or (d) a proper engineered support system; and (3) Where the excavation is a trench exceeding 6 m deep or 3.6 m wide, the support system must consist of an engineered support system designed for the specific location and project (*Const. Proj. Reg.*, Secs. 234 and 235)

PRINCE EDWARD ISLAND

(1) Employer must ensure that the walls of an excavation or trench are supported by adequate shoring and bracing or caging except when an excavation or trench: (a) is less than 1 219 mm (4 ft.) deep; (b) is cut in solid rock; (c) is sloped to within 1 219 mm (4 ft.) of the bottom of the excavation or trench with a slope at the angle of repose that doesn't exceed 305 mm (1 ft.) of vertical rise to each 305 mm (1 ft.) of horizontal run; or (d) is one that workers aren't required to enter; (2) Employer must ensure that additional shoring and bracing is added to support the increased pressure due to the location of mobile equipment at the edge of an excavation or trench if necessary to protect workers working in a trench the employer; and (3) Employer must ensure that shoring and bracing for excavations or trenches is certified as adequate by a professional engineer and the proof of certification is made available to an OHS officer on request (*OHSA Gen. Regs*., Sec. 12.2)

QU□BEC

(1) Employer must ensure that the banks of an excavation or trench are shored solidly with quality materials in accordance with the plans and specifications of an engineer unless: (a) the trench or excavation is dug out of solid rock that can't be excavated except by blasting; (b) no workers must descend into it; (c) there's no risk of the banks of the trench or excavation collapsing and they slope less than 45§ from a point less than 1.2 m from the bottom; or (d) there's no risk of the banks collapsing and an engineer attests that it's not necessary to shore up the banks, given the slope, nature and stability of the ground; (2) A copy of the engineer's attestation must be available on the construction site at all times; (3) The shoring must extend 300 mm above the excavation, except where the trench dug in on a public road and must be covered over to allow for the passage of traffic

during periods when works are not in progress (*OHS Safety Code for Construction*., Sec. 3.15.3)

SASKATCHEWAN

(1) If a worker is present in an excavation or trench more than 1.2 m deep and must be closer to the wall or bank than the distance equal to the depth of the excavation, employer or contractor must ensure that the worker is protected from cave ins or sliding material by: (a) properly cutting back the upper portion of the walls; (b) installing a temporary protective structure; or (c) a combination of cutting back the walls to the slope and installing a temporary protective structure that extends at least 300 mm above the base of the cut-back; (2) Employer or contractor must ensure that a temporary protective structure required is: (a) designed and installed using shoring made of number 1 structural grade spruce lumber having the dimensions set out in Table 14 of the Appendix for the type of soil and the depth of the excavation or made of material of equivalent or greater strength; or (b) designed by a professional engineer and constructed, installed, used, maintained and dismantled in accordance with that design; and (3) Employer or contractor must ensure that a temporary protective structure in an excavation over 3 deep is designed and certified as safe by a professional engineer and installed, used, maintained and dismantled in accordance with that design (*OHS Regs*., Secs. 17-6 and 17-7)

NORTHWEST TERRITORIES & NUNAVUT

(1) If a worker is present in an excavation or trench more than 1.2 m deep and is required to be closer to the wall or bank than the distance equal to the depth of the excavation, employer must ensure that the worker is protected from cave-ins or sliding material by: (a) properly cutting back the upper portion of the walls of the excavation; (b) installing a temporary protective structure; or (c) a combination of

cutting back the walls to the slope and installing a temporary protective structure that extends no less than 300 mm above the base of the cut-back; (2) Employer ensure that a temporary protective structure required is: (a) designed and installed using shoring made of number 1 structural grade spruce lumber having the dimensions set out in Schedule N of the Regulation for the type of soil and depth of the excavation or made of material of equivalent or greater strength; or (b) designed by a professional engineer and constructed, installed, used, maintained and dismantled in accordance with that design; and (3) Employer must ensure that a temporary protective structure in an excavation more than 3 m deep is designed and certified by a professional engineer and installed, used, maintained and dismantled in accordance with that design (*OHS Regs*., Secs. 269-270)

YUKON

(1) Before a worker enters an excavation or trench more than 1.2 m (4 ft.) deep, or where a worker approaches the side or bank within a distance equal to the depth of the excavation, the excavation sidewalls must be sloped or supported, as specified by a professional engineer, or the sidewalls of the excavation must be, at a minimum: (a) sloped at an angle no steeper than 37 degrees from the vertical; (b) sloped at an angle, dependent on soil conditions, which will ensure stable faces, but in no case may the slope or combination of vertical cut and sloping exceed that shown in Figure 10-1 of the Regulation; (c) benched as shown in Figure 10-2; (d) supported in accordance with minimum requirements of Section 10.68 of the Regulation; or (e) supported by manufactured or prefabricated trench boxes, shoring cages, or other effective means acceptable to the director; (2) End shoring must be installed if the end of a trench more than 1.2 m (4 ft.) in depth isn’t adequately sloped unless: (a) a worker in the trench isn’t required to approach closer to the end of the trench than a distance equal to the depth of the trench at

that end; (b) the permissible spacing of uprights equals or exceeds the width of the trench; or (c) otherwise authorized in writing by a professional engineer; (3) Where end shoring is required, the walers for the end shoring must be installed to bear against the walers that extend along the sides of the trench, or in a manner that provides equivalent structural restraint; (4) A professional engineer must design end shoring where the end shoring waler length exceeds 1.8 m (6 ft.); (5) Shoring must extend at least 0.3 m (1 ft.) above ground level to as close to the bottom of the trench as the material being installed allows, but in no case more than 0.6 m (2 ft.) from the bottom of the trench; and (6) Where traffic crossing plates must be used, shoring may not extend above ground level provided that other measures are taken to prevent excavated and other material from entering the excavation or trench (*OHS Regs.,* Sec. 10.65)