



EXCAVATIONS

Potential Hazards

1. excavation collapse
2. electrical shock/electrocution
3. equipment/property damage
4. underground utility contact
5. shoring failure

Personal Protective Equipment Required

- | | | |
|-----------------|--------------------|----------------------------|
| Hard hat | CSA Boots | Eye protection |
| Hand protection | Hearing protection | Skin protection (clothing) |

PRELIMINARY ACTIVITIES

Where multiple trade activity is scheduled, the general contractor is to review in advance the priority of work and schedule the appropriate time frame to allow each trade to complete their scope of work. Prior to any work commencing supervisors must conduct a hazard assessment of all applicable work areas. Any hazards that are found during the hazard assessment must be addressed prior to any work commencing.

Before excavation begins, locate and identify utility services such as electrical, gas, steam, water, and sewer in the area. Any danger to workers from these utility services must be eliminated or controlled.

Pointed tools cannot be used to probe for underground gas and electrical services. If possible, blunt shovels should be used to expose the facility. Take caution especially if newer, sharper spade shovels are used.

Trees, utility poles, rocks, or similar objects near the edge of an excavation must be removed or secured to prevent workers from being injured.

DO'S:

1. Approved backfill material should be placed carefully along the pipe and compacted under the haunches. Material should be brought up evenly in layers on both sides of the pipe.
2. Backfill material should be readily compactible and job excavated material and should not contain large stones, boulders, frozen lumps or other objectionable material.
3. Backfill should be placed and compacted in layers as specified.
4. Aluminum hydraulic shores, when expanded, must "lock" in place.
5. Know and understand the operator's manual.
6. Wear your seatbelt at all times.
7. Use outriggers when applicable.
8. Know your equipment's rated capacity.
9. Workers must receive WHMIS training and MSDS's (Material Safety Data Sheet) must be on site.
10. Erect and maintain good warning signs.
11. Protect public and employees from falling objects.
12. Keep all plant and gear in good working order.
13. Be aware of all electric lines both overhead and underground.
14. Compact all fillings.
15. Seek professional advice if unsure.
16. Stay away from a damaged or exposed utility lines and inform the local service provider.

DON'Ts:

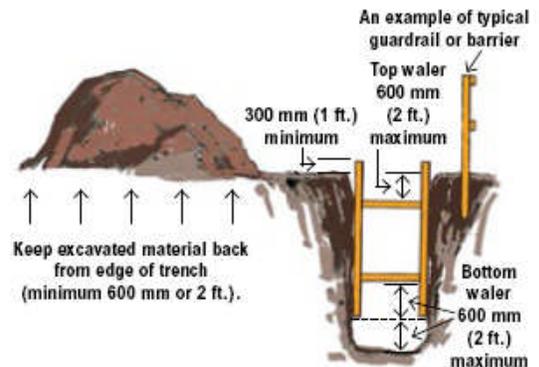
1. No vehicles should be within a distance equal to the depth of the excavation.
2. Never use pointed tools to probe for underground gas and electrical services. Shovels are recommended.
3. Do not leave signs up when not required.
4. Do not fire a blast before clearing everyone from the danger area.
5. Do not forget to wear a protective helmet.
6. Do not start digging before checking on all underground services.
7. Do not cause a dust nuisance.
8. Do not let drains block.
9. Do not allow hazards to develop.
10. Do not take chances on the weather.
11. Do not take shortcuts or risks.



SAFE WORK PROCEDURE

We recognize the severity of injury involved when not adequate shoring is not provided. Procedures for this process should be carried out in accordance with the specifications and requirements of a registered professional engineer and/or the WorkSafeBC Regulation.

1. Excavation work must be carried out in accordance with the written instructions of a professional engineer or professional geoscientist when:
 - a. the excavation is more than 6 m (20 ft.) deep, OR
 - b. Support structures other than those specified in the regulation are used in the excavation, OR
 - c. An improvement or structure adjacent to the excavation could endanger workers, OR
 - d. the ground slopes away from the edge of the excavation at an angle steeper than a ratio of 3 horizontal to 1 vertical, OR
 - e. The excavation is subject to vibration or hydrostatic (water) pressure.
2. A professional engineer's plan and written instructions to support or slope the sides of the excavation must include information on the subsurface conditions expected to be encountered. A copy of the plan and any written instructions—signed and sealed by the engineer—must be available at the site.
3. Prior to starting the excavation, the location of all utilities must be identified. Procedures for excavating adjacent to these utilities must be developed in conjunction with the responsible authority.
4. Prior to starting a bulk excavation, specifications and procedures must be developed, provided onsite and all workers involved in the bulk excavation shall be aware of the procedures involved.
5. All procedures and documentation regarding traffic control, street closure and public disruption must be developed and in place prior to the start of any excavation.
6. All workers who are required to work in excavations shall be familiar with the requirements for safe excavations and the WorkSafeBC Publication "Standard Practices for Excavation Work".
7. Before a worker enters any excavation over 1.2 m (4 ft) in depth or, while in the excavation, approaches closer to the side or bank than a distance equal to the depth of the excavation, the sides of the excavation are:
 - a. sloped as specified in writing by a qualified registered professional,
 - b. sloped at angles, dependent on soil conditions, which will ensure stable faces, but in no case may the slope or combination of vertical cut and slope exceed that shown in Figure 20-1,
 - c. benched as shown in Figure 20-2,
 - d. supported as specified in writing by a professional engineer,
 - e. supported in accordance with the minimum requirements outlined in section 20.85 of the OH&S Regulations, or
 - f. supported by manufactured or prefabricated trench boxes or shoring cages, or other effective means.
8. Vertical supports must extend above the ground level a minimum of 300 mm (1 ft.) and must be no more than 600 mm (2 ft.) up from the bottom of the trench.
9. The top waler must be set at 600 mm (2 ft.) down from ground level.
10. The bottom waler must be set at 600 mm (2 ft.) up from the bottom of the vertical support.



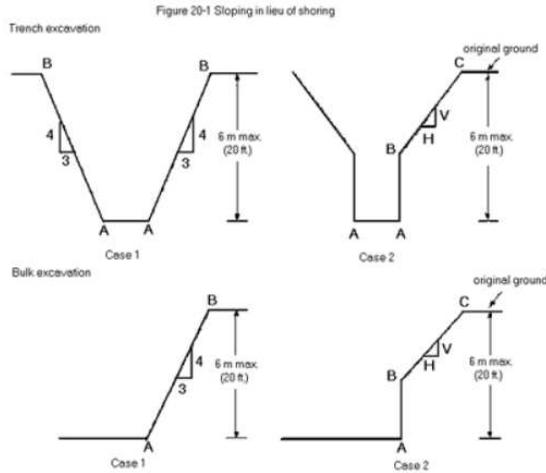


11. Aluminum hydraulic shoring, as well as timber shoring must be assembled “from the top down,” and disassembled from “from the bottom up.”
12. All spoils and excavated material must be kept back at least 600 mm (2 ft.) from the edge of any trench excavation and 1.2 m (4 ft.) from any other excavation.
13. A ladder must be provided when workers are required to enter excavations more than 1.2 m (4 ft.) deep.
14. The ladder must extend from the bottom of the excavation to at least 1 m (3 ft.) above ground level and be placed so that it is protected by the shoring.
15. When necessary, excavations must be covered, or substantial guardrails or barriers must be erected around excavations to prevent workers or other persons from falling into them.
16. Excavation slopes and/or supporting systems must be inspected daily by a competent person for erosion or deterioration. The inspection shall include, but not be limited to
 - changes in soil consistency
 - installation and structure of the shoring
 - placement of ladders and safety devices
 - location of spoils, materials and equipment
 - public safety issues
17. In addition, excavation must be inspected after each rainfall.
18. Persons working in trenches must not work in vicinity of excavating equipment or outside the area of the trench protected by shoring, sloping or other appropriate means.
19. Excavations, which present a hazard to workers, shall be covered or provided with guardrails around the exposed sides.
20. A walkway across an excavation must be at least 50 cm (20 in) wide, and if crossing an excavation over 1.2 m (4 ft) deep, be equipped with guardrails, meeting the requirements of OH&S Regulations, on both sides.
21. All workers must wear high visibility vests.
22. Covers on trenches must be fit in such a way to prevent the cover from falling into the trench. Cutting the cover to fit on the inside recess on either side of the trench will ensure the cover stays in position.
23. For trenches above 2 feet across 2x4 bracing may be required to ensure the cover does not break when a load is placed on it. Test the cover on the trench before applying any load to verify that the strength of the cover is adequate.



This is an example of ladder use in an excavation over 1.2 m (4 ft.) deep.

Figure 20-1: Sloping in lieu of shoring



Case 1 (trench or bulk excavation) - maximum slope of excavated face, shown as line AB, in hard and solid soil is 3 horizontal to 4 vertical.

Case 2 (trench or bulk excavation), maximum height of vertical portion, shown as line AB is 1.2 metres (4 feet).

For Case 2 (trench or bulk excavation), the maximum permissible slope of the excavated face BC for the corresponding height of the lower vertical cut AB is as follows:

Height of line AB		Maximum slope of line BC (in hard and solid soil)
centimetres	feet	
up to 30	up to 1	1 horizontal (H) to 1 vertical (V)
30 to 60	1 to 2	3H to 2V
60 to 90	2 to 3	2H to 1V
90 to 120	3 to 4	3H to 1V

Figure 20-2: Benching in lieu of shoring

Figure 20-2: Benching in lieu of shoring

