Ground Disturbance

Trenching

An *excavation* is a hole in the ground as the result of removing material.

A *trench* is an excavation in which its depth exceeds its width.

Trenching is not a normal activity for our company. In the event it is required, ensure you and your crew are knowledgeable to prevent the very real hazards associated.

The Hazards

Working in trenches and excavations is hazardous to both the workers who work inside them, and to workers on the surface.

The hazards include:

- → Cave-ins or collapses that can trap workers.
    - ○ Possibility of death by suffocation or crushing.
- → Equipment or excavated soil falling on workers
- → Falling into the trench or excavation.
- → Flooding or water accumulation.
- → Exposure to a hazardous atmosphere
- → Contact with buried service lines
- → Contact with overhead electrical lines.
- → Slips, trips and falls from inappropriate access and egress methods.
- → Being struck by moving machinery, or by falling or flying objects.

Collapses can be caused by:

- → Failure of adequate shoring.
    - ○ Heavy loads on the shoring structure or ground surface at the edge of the trench.
    - ○ Failure from traffic vibration.
- → Use of defective shoring material.
- → Failure to maintain shoring after
    - ○ changes caused by operation or
    - ○ damage by washouts or heavy rains.
- → Failure to place removed soil at a safe distance from the edge of a trench.

  - ○ minimum 1 meter with minimum 45 slope).

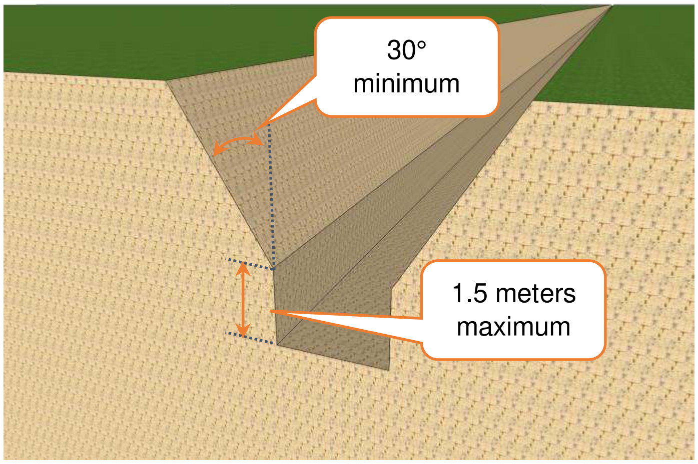
Hazard mitigation

Should trenching be required, stabilize the soil in an excavation site by shoring or cutting back as per legislated requirements, industry standard best practices or requirements set out by a professional engineer.

If the walls of an excavation are cut back, the guidelines vary depending upon soil classification.

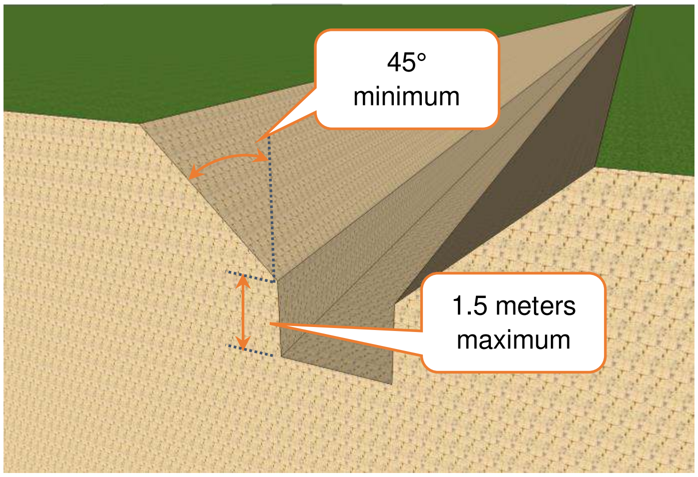
"Hard and compact soil"

The walls are sloped to within 1.5 meters of the bottom of the excavation at an angle of not less than 30 degrees measured from the vertical



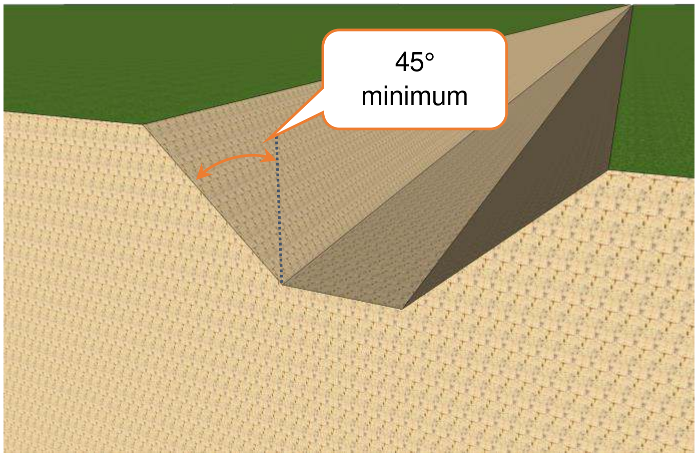
"Likely to crack or crumble soil"

The walls are sloped to within 1.5 meters of the bottom of the excavation at an angle of not less than 45 degrees measured from the vertical



"Soft, sandy or loose soil"

The walls are sloped from the bottom of the excavation at an angle of not less than 45 degrees measured from the vertical.



Ensure everyone onsite is made aware of the excavation through flagging, marking, safeguards, or other appropriate and effective means.

- → In all cases, the solution must be effective and its purpose clearly understood by workers.
- → This will normally be documented on the safety meeting notes or hazard assessment.

We will provide a safe means of entering and leaving an excavation. This could take the form of:

- → a ladder
- → a scaffold
- → a mechanical device such as a stairway
- → appropriate sloping of the ground or soil so you can safely walk into or out of the excavation.

An exit point should be within 25 feet (8 meters) of workers in the trench.

You are not required to enter (and you should refuse to enter) a trench that is deeper than 1.5 meters unless it is properly cut back, or protected by a trench box or cage designed by a professional engineer.

Cutbacks

It's important to attain the right cutback angle which is dependent upon soil quality, trench depths and widths. Use these tables for any trench 1.8 m or greater in depth.[1]

30° Cut-back

Width of trenches across top to provide a 30° cut-back.

	Width of Bottom		
Depth	1.2m	1.8m	2.4m
1.8	3.4	3.7	4.6
2.1	3.7	4.3	4.9
2.4	4.1	4.7	5.3
2.7	4.4	5.0	5.6
3.0	4.7	5.3	6.0
3.4	5.0	5.6	6.3
3.7	5.5	6.1	6.7
4.0	5.8	6.4	7.0
4.3	6.1	6.7	7.3
4.6	6.6	7.2	7.8
4.9	6.9	7.5	8.1
5.2	7.2	7.8	8.4
5.5	7.5	8.0	8.7
5.8	7.9	8.5	9.2
6.1	8.2	9.0	9.5
6.4	8.7	9.3	9.9
6.7	9.0	9.6	10.2
7.0	9.3	9.9	10.5
7.3	9.8	10.4	11.0
7.6	10.1	10.7	11.3
7.9	10.4	11.0	11.6
8.2	10.7	11.3	11.9
8.5	11.1	11.7	12.4
8.8	11.4	12.0	12.7
9.2	11.7	12.4	13.0

45° Cut-back

Width of trenches across top to give 45° cut-back.

	Width of Bottom		
Depth	1.2m	1.8m	2.4m
1.8	4.9	5.5	6.1
2.1	5.5	6.1	6.7
2.4	6.1	6.7	7.3
2.7	6.7	7.3	7.9
3.1	7.3	7.9	8.5
3.4	7.9	8.5	9.2
3.7	8.5	9.2	9.8
4.0	9.2	9.8	10.4
4.3	9.8	10.4	11.0
4.6	10.4	11.0	11.6

[1] To convert to Feet, multiply by 3.28

	Width of Bottom		
Depth	1.2m	1.8m	2.4m
4.9	11.0	11.6	12.2
5.2	11.6	12.2	12.8
5.5	12.2	12.8	13.4
5.8	12.8	13.4	14.0
6.1	13.4	14.0	14.6
6.4	14.0	14.6	15.2
6.7	14.6	15.2	15.9
7.0	15.2	15.9	16,5

	Width of Bottom		
Depth	1.2m	1.8m	2.4m
7.3	15.9	16.5	17.1
7.6	16.5	17.1	17.7
7.9	17.1	17.7	18.3
8.2	17.7	18.3	18.9
8.5	18.3	18.9	19.5
8.8	18.9	19.5	20.1
9.2	19.5	20.1	20.7

Buried Facilities

Major hazards can be encountered when digging or drilling into soil, whether with heavy equipment or hand tools.

The Hazards

The most deadly hazard is striking an underground pipeline or other buried energized facility. They can include:

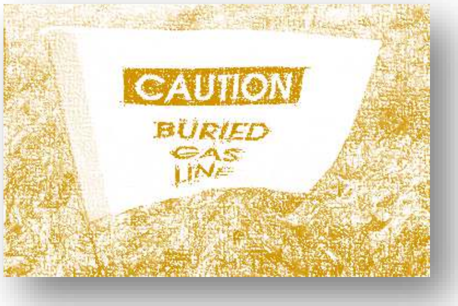
- major explosion or fire
- environmental spill
- electrical flash or electrocution.

Hazard mitigation

Only competent employees with proper training should perform any work pertaining to ground disturbance.

Before you dig

- Remove existing concrete from the working surface.
- Complete the ground disturbance safe work permit.
- Submit a request to mark the locations of all buried utilities
  - No further work can be performed until this has been completed.
  - All requests should be documented and kept for record keeping purposes.
  - Use BC 1-Call at:
    - 1-800-474-6886 or
    - Online at bc1c.ca
  - Allow at least two (2) full working days.
- Your supervisor or project manager must be present during the locate procedure.
  - Alternatively, if this is not possible, a competent worker can attend in substitution.
  - Immediately after meeting with the locator service onsite you should:
    - Mark locations of all buried electrical equipment on plans and drawings
    - Review the location slips before excavating
    - Post warning signs along the buried electrical equipment corridor(s)
    - Plan the location of spoil piles so as not to reduce clearances to power lines
- Contact the owner or the owner's designate of;
  - A pipeline that is within 30 meters of the work site, and
  - Any other buried or concrete-embedded facility that may be affected by the ground disturbance or removal of existing concrete,
- Advise the utility owner of the proposed activities,
  - Ask them to identify and mark the location of the buried or concrete-embedded facility.



- Do not begin digging or removing existing concrete until all buried or concrete-embedded facilities have been identified and their locations marked.

Preparation

Once all locates have been completed:

- Hold a pre-job safety meeting to discuss:
    - The job, and locations of all buried facilities/pipelines
    - Review the hazard assessment,
    - Review all workers roles and responsibilities,
    - Review the emergency response plan.
    - Complete the safe work permit and have the project manager or HSSE approve the permit.
- Use grade stakes / lathe to mark out a 1 meter buffer on each side of each buried utility in the work area.
    - The stakes should be painted or flagged with a bright highly visible color
    - The distance between stakes will vary.
- Overhead electrical equipment must also be identified and managed.
    - Utility pole pedestals or other electrical equipment foundations and systems must not be exposed or damaged during excavation.

Excavation

If the locate marks have been tampered with, or if you do not begin work within fourteen (14) days of the date locates were done, request relocates through BC One-Call.

- The "hand expose zone" is the zone lying within 1 metre of each side of the locate marks that identify the location of the buried facility.
    - Before using any mechanical equipment in this zone, the buried utilities must be exposed, using non-destructive excavation techniques i.e. hydro vac or other equivalent method.
    - There may be several utilities buried near each other, side by side, or at different depths.
- Use extreme caution within 5 meters of an electrical pedestal or box.
    - Do not use powered equipment such as a skid steer, loader, or back hoe.
    - The lines emanating could be buried at irregular depths and care must be taken to avoid contact.
    - Use a hydro vac or hand tools to mitigate the risk.
- If an underground utility is struck, IMMEDIATELY stop work, advise all workers to follow the site specific ERP as per the MANDATORY pre job safety meeting.
    - Notify the utility owners prior to backfilling any excavations of their utilities.