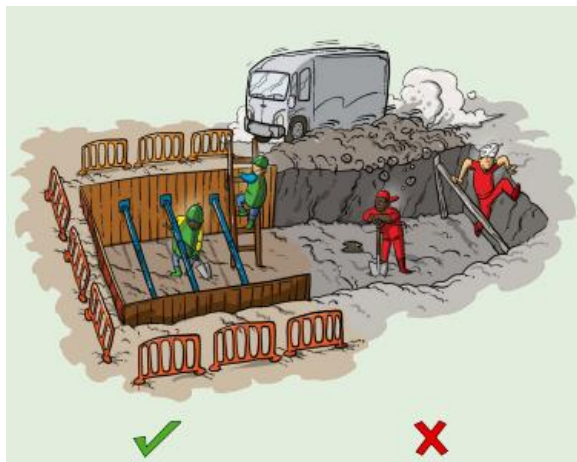


TRENCHING & EXCAVATION

Excavating or trenching work can be highly dangerous and may lead to death or severe injuries if not carried out safely. The hazards presented by this work include burial, falls from height or being struck by objects falling into the excavation, drowning, striking underground services (e.g. gas, electricity and water), as well as asphyxiation or poisoning caused by fumes entering the excavation. To reduce these risks, adequate precautions should be taken to include:

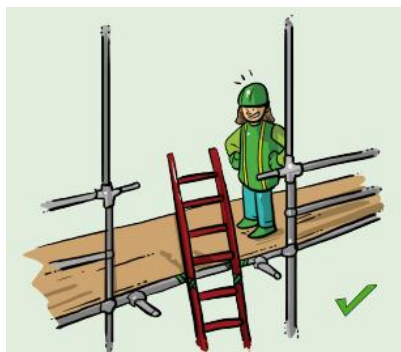
- Checking for underground services before work commences.
- Shoring of the excavation sides or ensuring they are at a suitable angle to prevent the sides collapsing or material falling onto workers in the excavation or trench.
- Measures to prevent persons, materials or objects falling into the excavation or trench or the inrush of water into the excavation / trench.
- Maintaining an atmosphere fit for respiration.
- Measures to enable workers to leave the excavation or trench safely.
- Avoiding vehicular traffic near the excavations or trenches or ensuring it is kept to a minimum.



The sides of the excavation or trench should be supported by timbering or other suitable means or sloped and battered back to a safe angle of repose to prevent a collapse. The type of support necessary and angle of repose will depend upon the type of excavation, the nature of the ground and the groundwater conditions.



To avoid the risk of workers falling into the excavation or trench, suitable barriers should be erected to prevent falls.



The collapse of the sides can result from:

- An angle of inclination greater than the natural angle of slope.
- An increase in weight due to overloads in the areas bordering the ridges of the slope.
- Infiltration of water.
- Vibrations due to machinery or vehicles
- Existence of overloads in neighboring areas.

To avoid a collapse, preventive measures should be taken:

- Change (decrease) the slope of the sides of the excavation.
- Prevent water from infiltrating (drainage systems).
- Install blankets to protect the embankment structures.
- Avoid vibration and overloads.
- Regularly inspect the slope and the surrounding areas.

Before beginning an excavation:

- All work should be planned, and the method of excavation and the appropriate type of support identified.
- The stability of the ground should be verified by a competent person.
- A competent person should check that the excavation will not affect adjoining buildings, structures, or roadways.
- The position of all the public utilities such as underground sewers, gas pipes, water pipes and electrical conductors should be verified.
- If necessary, the gas, water, electrical and other public utilities should be disconnected or rerouted.
- If underground pipes, cable conductors, etc., cannot be rerouted or disconnected, they should be fenced, supported, and adequately marked or otherwise protected.
- If necessary, land should be cleared of trees, boulders, and other obstructions.
- An analysis of possible contamination of the land by harmful chemicals or gases, or by any hazardous waste material such as asbestos should be made.

