

TRENCHING AND EXCAVATIONS

LEARNING OUTCOME

Describe the duty of the employer to provide safe workplace and minimise the risk to workers arising from works in and around trenches and excavations.

ASSESSMENT CRITERIA

- Understand legislative requirements in relation to excavations and trenches.
- Identify hazards associated with excavations and implement controls to protect workers and others.

REFERENCES

- Work Health and Safety Act 2011 Part 2 Duties;
- Work Health and Safety Regulation 2011
 - 291 – High Risk Construction Work
 - 304 – Underground Services
 - 305 – Management of Risk
 - 306 – Additional Controls
- Excavation Work Code of Practice 2013

ATTACHMENT

[Excavation Work Code of Practice 2013](#)

TRENCHING AND EXCAVATIONS

EXCAVATIONS AND TRENCHES

Before excavation work is carried out, the person conducting a business or undertaking (PCBU) or principal contractor, for construction work, must:

- find out what underground services exist
- obtain relevant information about the service (location, type, depth, restrictions to be followed)
- record the information.

Dial 1100 Before You Dig is a useful service.

A PCBU must:

- consider the information
- follow any reasonable restrictions
- implement necessary control measures.

A PCBU is responsible for managing the risks associated with:

- an excavation collapsing
- objects falling into an excavation
- a person falling into an excavation
- substance exposure in an excavation, for example, carbon monoxide from plant.

A barricade or hoarding should be erected around an excavation unless it is not possible or no members of the public are likely to be in the area of the excavation.

A relevant person must implement any control measures necessary to prevent risk from the collapse of another structure such as an adjoining building or road.

TRENCHES

A barricade should be erected around a trench that is 1 metre or more deep unless it is not possible or only workers involved with the trench will be in the area; or another form of barrier exists, for example, excavated materials near the trench.

Relevant people need to ensure that if a person is entering a trench more than 1.5 metres deep it is either:

- shored or shielded
- benched
- battered

- approved in writing by a geotechnical engineer as safe to work in.

Note that soil type will have a big bearing on which type and control measures are implemented.

Written approval to vary the benching and battering requirements may be obtained from an engineer.

The approval must be kept on site at all times.

Ramps, steps or other appropriate access should be for persons accessing an investigation.

TRENCHING & EXCAVATION CHECKLIST

Underground Services

Before digging starts, make sure you know the exact location of any underground electrical cables, gas lines, water and sewerage and telecommunications cables. Do not rely solely on site plans and drawings as these are sometimes not accurate or complete. Seek assistance from the local services and distribution companies.

Earthmoving Plant Near the Opening

Check that operators are not undermining existing buildings or temporary structures such as scaffolds and falsework. Make sure spoil is being kept at least half a metre back from the edge of trenches and that earthmoving plant is a safe distance from the edge of excavations. Make sure unattended front-end loaders, backhoes and excavators are always left with the bucket fully lowered to the ground. When parked overnight alongside roads or on other public space, make sure earthmoving plant is locked up and barricaded with warning lamps to alert traffic.

Protecting Workers

Never allow workers to enter a trench or shaft which is greater than 1.5 metres deep unless it has been safely battered back, or it has been properly shored, or the workers are fully protected within a trench shield. Shoring should be positioned and fixed from above, never from below. All timber used in ground support should be at least F8 grade hardwood. Never use softwood because this can fail suddenly without warning, whereas hardwood will start to creak loudly when it is becoming overloaded, warning workers to leave the trench immediately. Make sure all workers in excavations always wear safety helmets.

Consider Confined Space Precautions

Where there is any possibility of a hazardous atmosphere within an excavation, the extra precautions for entry into confined spaces must be put in place.

Protecting Others Near the Trench

Make sure trenches, shafts and excavations are properly barricaded, covered or isolated to prevent people falling into them. Whenever an excavation is to be left unattended, make sure it is secured to prevent children or other people from wandering into danger.

Safe Access to Trench

Never allow workers to climb up and down the soldier sets used in trench shoring, because they can loosen or damage the support system, triggering a trench collapse. Make sure industrial-grade portable ladders are used to gain access to the excavation floor.

Never Work Alone

Never allow anyone to work alone in a trench or shaft. Make sure there is always another person close by who can provide help or get help if necessary.

Regular inspections

The condition of soil surrounding trenches and shafts can change quickly due to the soil drying out, changes in the water table or water saturation of the soil. Make sure the soil condition and the state of shoring, battering and trenches walls is frequently checked for signs of earth fretting, slipping, slumping or ground swelling. Where necessary, repair the excavation or strengthen the shoring system from above before allowing work below ground to continue.

Control Measures

Persons responsible for carrying out trenching and excavation operations should ensure the risks associated with this type of work are eliminated or minimised. Some of the principles that should be considered are as follows:

- Eliminating the hazard - Complete as much of the work as possible without requiring people to enter the trench or excavation. Minimise the time an excavation is open (for example by backfilling or closing as soon as possible) to reduce the time the risk exists. Unattended excavations should be barricaded or covered.
- Shore, batter or bench all trenches and excavations where the soil or rock is unstable or prone to collapse. All trenches, bored pier holes and other open top excavations over 1.5 metres deep, which people have to enter, should be shored, battered or benched, unless a suitably qualified engineer confirms in writing that the walls are stable without shoring, battering or benching.
- Planning & Supervision – Ensure excavation work is planned and supervised by a person who is experienced and capable of assessing the risk of collapse. This person should be knowledgeable on the type of excavation being undertaken, appropriate control systems, and where possible should have experience relating to local soil and rock conditions.
- Inspections – A competent person should conduct regular inspections of the condition of the excavation or trench including the batter or bench and installed shoring. This should be done before people enter the excavation and at least on a daily basis.
- If deficiencies are detected in the excavation, shoring, bench or batter, work in the excavation should cease immediately and persons should not enter the excavation until rectification has been carried out.

Shoring Systems

Shoring is a system of temporary supports and sheeting material used to maintain the stability of the sides of an excavation. Proprietary shoring systems should be installed, used, maintained and dismantled in accordance with the manufacturer's specifications. Timber shoring should be installed by a competent person and be constructed from timber in sound condition and of adequate strength. Shoring systems should be designed by a geotechnical engineer.

GROUND CONDITIONS

In their natural condition, soils have varying degrees of cohesive strength and frictional resistance. Examples of materials with virtually no cohesive strength are dry sand, saturated sand and gravels with minimum clay content. Ground encountered in excavations can generally be categorised as one of three types:

- hard, compact soil
- soil liable to crack or crumble
- loose or running material.

Of these materials, hard compact soil is the type that can cause the most trouble because the face 'looks good' and this often leads to risks being taken. Loose or running material is often the safest, because the need for safety precautions is obvious from the start.

Soil liable to crack or crumble is doubtful and should be given careful consideration before the treatment to be given is determined. Useful information can often be obtained from local authorities.

Non-cohesive faces can be very hazardous. With the right amount of moisture they can look safe and solid. A little loss of water by evaporation from the face or an increase in water content from rain or other causes can make the soil crumble.

The stability of any excavated face depends on the strength of the soil in the face being greater at all times than the stresses it is subjected to. The following situations all increase soil stresses in an excavated face and may lead to failure under adverse weather conditions, additional load or vibration:

- deep cuts and steep slopes, by removal of the natural side support of the excavated material
- loads on the ground surface near the top of the face, such as excavated material, digging equipment or other construction plant and material
- shock and vibration, which could be caused by pile-driving, blasting, passing loads or vibration producing plant
- water pressure from ground water flow, which fills cracks in the soil, increases horizontal stresses and the possibility of undermining
- saturation of soil, which increases the weight and in some cases the volume of the soil.

The following may reduce soil strength:

- excess water pressure in sandy soil which may cause boils and saturate the soil and increase its plasticity
- dryness of the soil may reduce cohesion in sandy soil and soils high in organic content

which then crumble readily

- prolonged stress, may cause plastic deformity (squeezing or flowing)
- prolonged inactivity at an excavation site. An evaluation of the soil should be undertaken before work recommences.

There are three main types of ground collapse control measures that can be used where ground collapse may occur:

- benching and battering
- positive ground support (e.g. shoring)
- shielding – shields do not ensure ground stability but they protect workers inside the shield from ground collapse by preventing the collapsing material from falling onto them.

Version	Date	Author
1	30/06/2018	WHSQ