

Contents

Before you begin	v
Introduction: Installing trench support	1
Element 1: Planning and preparing	3
Section 1.1 Accessing, interpreting and applying compliance documentation to the work activity	4
Section 1.2 Obtaining and confirming safety requirements and applying to the allotted task	7
Section 1.3 Identifying, obtaining and implementing traffic control signage requirements	10
Section 1.4 Selecting plant, tools and equipment consistent with job requirements and checking them for serviceability	12
Section 1.5 Identifying and confirming environmental protection requirements and applying to the allotted task	14
In ACTION	16
Assessment activity 1	18
Record your employability skills	18
Element 2: Installing trench shoring	19
Section 2.1 Communicating with plant operator to ensure trench excavations comply with site plan, line and depth	21
Section 2.2 Determining and preparing shoring method	23
Section 2.3 Setting out the positioning of shoring	26
Section 2.4 Positioning or erecting shoring within the trench	28
Section 2.5 Securing shoring in position and checking to ensure structural conformity with regulations	31
Section 2.6 Cleaning out the excavation	33
Section 2.7 Providing ladders for access and egress	34
In ACTION	35
Assessment activity 2	37
Record your employability skills	37

Element 3: Removing trench shoring	39
Section 3.1 Releasing jacking mechanisms and removing ladders	40
Section 3.2 Checking shoring and preparing it for lifting from the trench	42
Section 3.3 Removing shoring from trench and storing on-site	44
In ACTION	46
Assessment activity 3	48
Record your employability skills	48
 Element 4: Cleaning up	 49
Section 4.1 Clearing work area and recycling or disposing of materials	50
Section 4.2 Cleaning, checking, maintaining and storing tools and equipment	52
In ACTION	54
Assessment activity 4	56
Record your employability skills	56
 Final assessment	 57
 Employability skills	 59

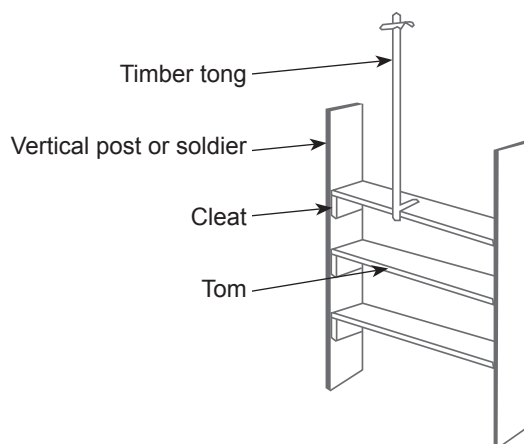
Section 2.4: Positioning or erecting shoring within the trench

Positioning or erecting shoring is a specialised operation and only persons deemed competent should be permitted close to the site. Each state has a code of practice specific to excavations and these must be correctly applied at all times.

When erecting the more common soldier sets system of shoring, there are two methods that can be used.

Method one – using timber tongs

Two vertical posts or soldiers of required length have support blocks or cleats nailed in position. These cleats will support the toms. The trench width is measured, and a series of toms are cut to the required length. The soldiers are lowered in the trench, making sure the cleats are facing the opposite soldier. The toms are then lowered by tongs into position onto the supporting cleats, starting with the bottom pair of cleats. If soldier sets are used as the only form of ground support in stable soils, the distance between each set must not exceed 1.5 metres.



Method two – using a hydraulic support system

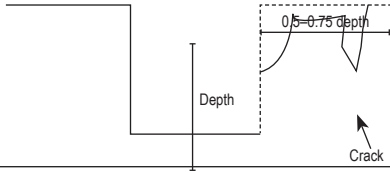
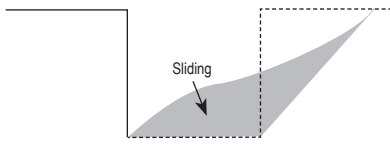
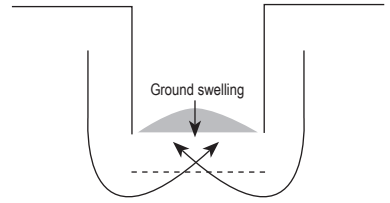
This method is mainly used to provide mobile ground support while soldier sets are being installed. Two hydraulic support sets are lowered into the trench no more than 1.5 metres apart. This provides the necessary support to the trench sides in this area to allow workers to enter the trench and install the soldier set in between the two hydraulic sets. One of the hydraulic supports is then moved and placed no more than 1.5 metres away from the other, allowing workers to install another soldier set in between. This process is repeated along the trench until all soldier sets have been erected.

It may be necessary for further ground support behind and between the soldier sets; for example, open/closed timber or metal sheeting reinforced with wales at specified distances apart. This depends on the worksite condition. These ground supports may be placed by crane or excavator, and pressed down into place. Shields may also be lowered into the trench as protection for the workers.

All shoring work is governed by safe work practices, which require that:

- a minimum trench length is progressively excavated before the shoring is installed
- extreme care is taken when attaching chains or slings to shoring items or shields near or above the excavation
- workers do not lean over the edge of the trench when placing or fixing components in position
- workers do not enter the trench until the shoring is securely in place
- a second person is in place who can give help or get help if necessary
- at least two cross braces are installed to prevent excessive pressure on a single brace
- vertical rails should be spaced no more than 1.8 metres apart and no more than one metre from the bottom of the trench
- cross braces (for example, toms and wales) should be no more than 1.5 metres apart vertically, no more than one metre from the bottom of the trench and no more than 0.25 metres from the top of the trench
- the soil condition and the state of shoring are frequently checked for signs of earth fretting.

Some examples of signs of earth fretting are outlined in the following table.

Example	Image
Tension cracks (usually form at a horizontal distance of 0.5 to 0.75 times the depth of the trench)	
Sliding or slumping may occur as a result of tension cracks	
Ground swelling (heaving or squeezing) caused by the downward pressure created by the weight of the adjoining soil.	

Section 2.7: Providing ladders for access and egress

Ladders need to be provided for access into and egress from any trench over 1.5 metres in depth from the ground level to the base of the trench. Workers should never be allowed to climb up and down the soldier sets used in trench shoring. These can become loose and could result in possible falls and injury, as well as destabilising the ground support.

To eliminate the need for a ladder the trench can be backfilled in part of the trench as soon as possible and sloped down to enter the shield at a depth less than 1.5 metres. Backfilling involves placing the removed soil back into the trench – after any necessary compression of bedding material around the pipelines is carried out – and requires care to ensure the weight and movement of the backhoe does not place excessive pressure on the trench support system. Workers should exit the trench while backfill is tipped into the trench, or stay within the shield when provided.

In all other situations, portable ladders should be provided. These should:

- be industrial standard, with 20 kg maximum loading weight rating
- be secured at the base of the trench; for example, to the soldier or embedded in the bottom of the trench, and also secured at the top of the trench
- extend from the base of the trench to a minimum of 900 mm above ground level
- have a hand rail or support at the top to allow safer access, particularly if carrying tools or equipment
- be placed along the trench at a maximum distance apart of nine metres where the trench depth exceeds 1.5 metres.

If used in a trench shield, a ladder should be firmly attached either inside (this method is preferred) or to the end of the shield. Where the trench depth exceeds two metres, a ladder should only be used outside the trench shield where the backfill gap is less than 1.5 metres.

Find out more

Resource	Why it is useful
Department of Commerce (WA) <i>Code of Practice – Excavation 2005</i> www.commerce.wa.gov.au/worksafe/PDF/Codes_of_Practice/code_excavation.pdf	Section 8 of this code of practice outlines the safety requirements for providing ladders for access to and egress from an excavation.

Section task 2.7

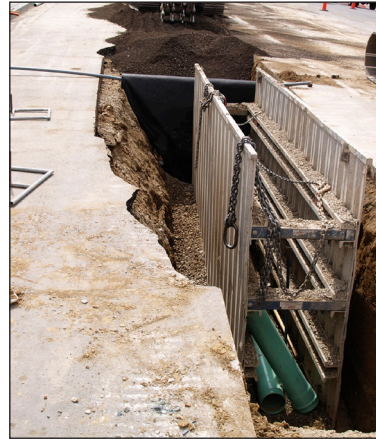
1. Why is safe ladder access necessary in trenches over 1.5 metres in depth?
2. What requirements would you advise in the selection and positioning of ladders?

In ACTION

Robert's story

Robert is given responsibility for installing shoring in a trench. The site supervisor has nominated a qualified person with suitable experience to oversee the operations, including selecting the most appropriate shoring method, and checking the excavation before the start of work each day.

Robert has checked with the local council and the supply authority to verify there are no underground services in the excavation area, and has discussed the specifications with the supervisor to ensure the requirements are fully understood. The trench is to be excavated by a local qualified contractor with considerable experience, and he and Robert spend some time checking the requirements and setting out. Because of the site restrictions, communication during the work includes hand signals and two-way radio.



Robert carries out a careful analysis of the worksite, including reference to soil test reports, and he agrees with the selection of soldier sets as appropriate for the trench depth of two metres in stable, reasonably level ground. He arranges for the materials and plant to be on the high side of the trench, and soil from the trench to be piled two metres from edge of the low side of the trench, with barricades to prevent entry to the trench from this direction. The soldier set timber and components are checked for compliance with specifications, and a number of ladders of suitable length are provided, together with a pump should there be excessive seepage. Whether trench shields are required is determined as the excavation proceeds.

The excavation work proceeds well, and the soldier sets are adjusted to the trench dimensions, using both toms and hydraulic struts and closed timber sheeting for maximum ground support. Regular checks show no indications of possible collapse, and trench shields are not considered necessary. Each set is positioned using timber tongs, and placed at the specified distances, and allowing for the necessary height above ground level. Sets are positioned as soon as possible as the excavation proceeds, and checked each time for structural stability.

Workers are required to enter the trench to finalise the excavation, only when the shoring has been correctly installed. They work within the shored section only, and keep a constant check for signs of possible trench collapse. Robert acts as observer, and ensures the backhoe operator and nearby workers are aware of the people in the trench. He also ensures the workers wear appropriate PPE and only use the ladders for entry to and egress from the trench.

Workers responsible for spreading the bedding material and laying the pipe work also work within the trench supports and use the ladder as required.

At the end of each shift, the trench is again checked for stability, and the use of warning signs and barricades continues, together with the placement of covers over the trench.

Revision

- Excavating trenches requires skill and expertise, and it is essential that the work requirements are clearly communicated to the plant operator during all stages of the work.
- Selection of the appropriate shoring method/s is based on a careful analysis of the site and soil conditions, and the trench specifications. Each type must comply with the relevant codes of practice and safety requirements.

Element 3: Removing trench shoring

Overview

After an excavation job is complete or an in-ground structure installed, the trench shoring must generally be removed. Given the significant load upon the shoring from the trench walls, particularly during and after backfilling, removal of the trench shoring can be difficult and dangerous. This is often done by lifting the trench shoring with an excavator – a process which can be time consuming, difficult and can in some circumstances result in damage to the trench shoring or in-ground structure.

Safety plans for the ground support system must include procedures for the safe removal of the structure, and comply with manufacturers' recommendations. No part of the shoring should be removed – or partly removed – until the trench is ready for final backfill and compaction. Shoring and all support systems should be removed in a manner that protects workers from cave-ins, structural collapse or being struck by structural members.

Removal of trench shoring is to be carried out carefully and slowly in deliberate stages and with close attention to signs of possible cave-in. Removal first requires release of the pressure against the trench walls by the struts, cross braces, or toms (also referred to as jacking mechanisms), usually commencing with the bottom levels. As far as possible, only authorised persons should be in the immediate area, and all work is to be closely supervised at all times.

Learning outcomes

You need to demonstrate competency in the following areas:

- Section 3.1 Releasing jacking mechanisms and removing ladders
- Section 3.2 Checking shoring and preparing it for lifting from the trench
- Section 3.3 Removing shoring from trench and storing on-site

In ACTION

Robert's story

Robert has completed the removal and recovery of shoring from the trench operation, and has set out his action list for cleaning the work area and for checking and storing the tools and equipment.

His first action is to confirm if the procedures set out in the original safe work method statement are still applicable, and if any unforeseen situations have occurred. During discussions with the site supervisor, a check was made of possible hazardous gases leaking in from a nearby landfill, and a respirator was made available together with other requirements for working in a confined space. This was removed once the workers finished removing the trench support system and the backfilling was complete and compacted.



Excess soil was removed by a front end loader with some relocated on-site for later use as the trench settled further. Further tidying and levelling was done by hand due partly to the fairly restricted work area. Once the soil pile was removed, the stacks of shoring, together with a shield used in part of the trench, were loaded on a truck for return to the hiring firm. Checks were made prior to removal from site in accordance with the hiring agreement. The plumbers responsible for the pipe laying provided the backhoe used for excavation and for recovery of the shoring.

Part of the work area remained in a muddy condition, and timber sheeting was spread out to provide a safer footing. Deep tyre marks were filled in with soil and compacted as far as possible. There were very few items remaining which could be recycled. Excess soil was checked for possible contamination prior to approval by the local council for use as land fill, while offcuts of pipework and timber were placed in a dumpmaster on the site for later sorting.

Cleaning and maintenance of equipment was limited to basic hand tools (shovels, hammer, power saw etc.) and required only basic cleaning, re-sharpening and simple maintenance as recommended by the manufacturer. All items were carefully dried before storage in the workshop.

Revision

- Completion of trench operations requires the work area to be cleaned up; shoring materials and excess soil no longer required on the job to be removed; tools and equipment to be cleaned, checked and stored; and the site restored to the agreed condition.
- Clean up includes the removal of unnecessary signs and restrictions, general tidy up of waste items, and clearing away any materials, equipment and tools that could be a safety hazard.
- Regulations by councils and environmental authorities apply in the disposal of waste materials, and where possible advantage should be taken for the re-use and recycling of materials. Strict compliance is necessary for the disposal of all hazardous materials.
- Tools and equipment represent a considerable investment and care should be taken to ensure these are properly cleaned, checked for damage and repaired or replaced, and given recommended or required maintenance. They should be stored in a suitable location to prevent damage or unauthorised access.

Are you ready?

Use this checklist to assess if you are ready for assessment activity 4.

I understand how to:

- ☐ Clear work area and recycle or dispose of materials
- ☐ Clean, check, maintain and store tools and equipment

Assessment activity 4

Cleaning up

The following table maps the assessment activity for this chapter against the element and performance criteria of Element 4 in *RIICCM210A Install trench support*.

Part	Element	Performance criteria
Whole activity	4	4.1, 4.2

Read the case study, then complete the tasks that follow.

Case study

Ground support systems have been removed from a trench on a typical residential site. The shoring included a series of soldier sets (constructed on-site) as well as pre-assembled hydraulic shoring that was recently purchased. The operation involved large size pipework and considerable amount of excess soil and bedding material remains alongside the filled trench. The trench was excavated by backhoe with cleaning out completed by hand.

1. What action could be required to clean up the work area on completion of the project?
2. Indicate shoring materials that could be disposed of, re-used or recycled.
3. What regulations may apply to the disposal of hazardous materials?
4. What forms of cleaning and maintenance of the tools and equipment could be necessary?
5. Where would you obtain advice for the correct storage of tools and equipment?

Record your employability skills

When you have completed the assessment activity, make sure you record the employability skills you have developed in the table at the end of the learner guide. Keep copies of material you have prepared as further evidence of your skills.