# Learner Guide

## Earthmoving Course

## RIIMPO319E Conduct Backhoe/Loader Operation

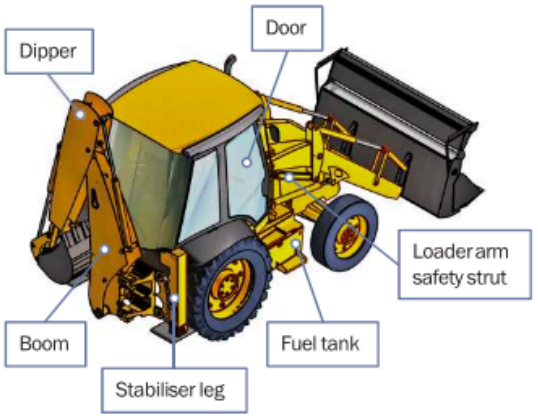
## Learner Guide

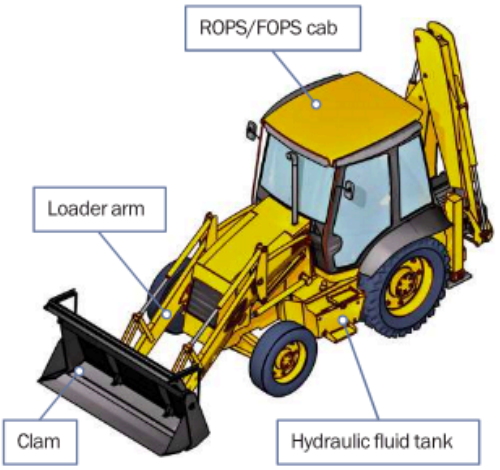
National Courses PTY LTD

# 1.1 Introduction

## 1.1.1 What is A Backhoe/Loader?

A backhoe/loader is a machine with a front bucket and also a rear boom and attachment. You can use a backhoe/loader as a lifting machine if the boom has a proper lifting lug and safe working load (SWL).



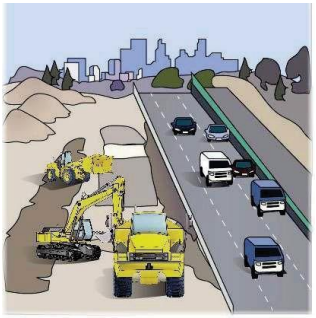




## 1.1.2 What Do You Use A Backhoe/Loader?

- Agriculture – farming
- Construction
- Clean up
- Moving dirt/rocks etc
- Can use for lifting purposes
- Trenching
- Loading trucks

## 1.1.3 What Industries Do You Use A Backhoe/Loader?

- Civil construction
- Farming
- Irrigation
- Mining



# 1.1.4 Who Has Duty of Care?

You have a duty of care. So does anyone who has something to do with the worksite. Duty of care applies to:

| | |
|---|---|
| Employers/persons conducting a business or undertaking (PCBU). This includes managers, manufacturers/suppliers, importers, designers, inspectors, etc. | Workers. This includes employees, contractors and sub-contractors, employees of labour hire companies, outworkers, volunteers, etc. |
|  |  |

## 1.1.4.1 Worker's Duty of Care

As a worker you must take care of your own health and safety – and the health and safety of others at the workplace. You must not put your own or other people's health and safety at risk. Never work where you believe a hazard is a serious risk to your health and safety. You must also:

- do your best to follow reasonable health and safety instructions from your boss (PCBU)
- follow workplace health and safety policies and procedures
- do not work where you believe a hazard would be a serious risk to your health and safety.

### 1.1.4.2 PCBU/Employer's duty of care

The PCBU must:

- Provide a safe workplace
- Train workers and make sure they know what to do on the job
- Try to get rid of risks, or find ways to minimise risks
- Tell workers about any hazards or risks. Workers must know what to do in an emergency.
- Have a workplace safety plan. For example, workers should be trained in the use of fire fighting equipment and first aid equipment.

**Penalties**

If you are PCBU/employer or a worker, the government can fine you or imprison you for failing your duty of care.

# 1.2 General Information

## 1.2.1 The Basics of Road Construction

A surveyor will stake out the site according to the site plan. The stakes mark where the road will go and any drains or pits, which will help to drain water away from the road area.

An excavator or dozer removes the trees, shrubs and other plants and levels the area. Some trees may be protected with padding or fencing.

Sometimes contractors may use a borrow pit (also called a sand box). A borrow pit is an area where soil, sand or gravel (material) is dug out to be used in another area. Sometimes the borrow pit will become the drains, or water catchment areas at the end of the work.

The excavator or dozer may use material from the borrow pit to build up low areas in the road. They may also build up diversion blocks. Diversion blocks divert water away from the road and into drains.

As the operator shapes the ground, they will usually create drainage at the sides of the road area. They will also make sure there is enough fall (scope) on the road so that water drains away from the road.

Drains are installed to help take water away from the worksite.

A front end loader or dozer shapes the road base. This helps smooth out the surface ready for grading.

A water truck may wet down the ground. This helps the soil to bond.

The grader grades the road to produce a much smoother surface.

A roller or compactor then compacts the road. This breaks up lumps and smooths the surface out.

A site supervisor or roller operator tests the compaction. Sometimes they will use a deflectometer or penetrometer. Some rollers/compactors can test the compaction as they drive.

Many layers of the ground material are built up. This is called the subgrade. Each layer is compacted and tested.

Trucks then deliver subbase. Haul trucks or tip trucks
sometimes tip the subbase, and front end loaders spread it.

A water truck may spray water on the subbase to help the soil bond. This makes the particles stick together and make it compact better.

Several layers of subbase are laid. The subbase is compacted and tested.

Once the subbase is at the right thickness and is compacted properly, trucks deliver the course road base. The road base is built up in many layers. Water trucks may wet down the road base if it helps the roller/compactor compact the base.

When the road base is thick enough, and is compacted properly, the road is finished.

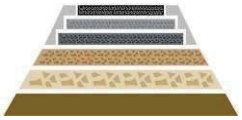
If asphalt is being laid, more layers will go on top of the road base. There will be an asphalt base course, then a binder course, and finally, a surface course.

Finally the planting, erosion control and drainage work is completed.

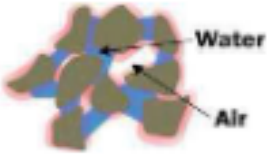
## 1.2.2 Principles of Soil Technology for Civil Works

One of the most important jobs you will do, as a machine operator, is to help lay foundations. Foundations are the base for roads, railway lines, swimming pools and buildings. If you do not have a solid foundation, you cannot build something solid on top of it.

When soil is firmly compacted it has an increased density, this provides a stronger foundation to build on.

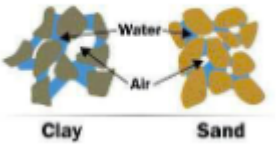


In civil construction, moisture content means how much water is in a soil, rock, aggregate or road base. Moisture is very important in earthmoving. Moisture affects the weight of soils. It makes soils swell, and it also affects the handling properties of the soil. Handling properties means how easy or hard it is to work with that soil.



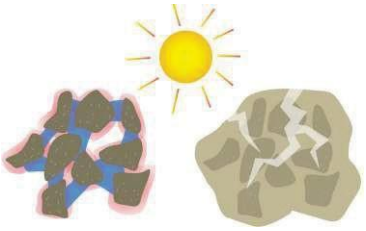

The amount of water in soil affects its viscosity. Viscosity is how thick the soil is. For example dry loose soil has a low viscosityand is easy to work with. Wet muddy soil has a higher viscosity and can be more difficult to work with.

All soils usually contain moisture. How much moisture the soil has depends on many things. The weather, drainage, and the soil's ability to hold water all affect the moisture in a soil. Retention properties mean how much water a soil can hold. Different soils can hold different amounts of water. Sometimes you can treat a soil to change its moisture content. To do this you mix a chemical with the soil.




Different types of soils can cause problems with foundations. Wet, boggy soil can cause foundations to sink. That is why it is important to make sure water can run or drain from the site. It is also important that the foundation is built up to the right level. You can sometimes treat wet boggy soil with lime. Lime helps dry out the soil, and helps it 'clump' together.

Clay soils can also cause problems under foundations. This is because clay attracts water. When this happens, the clay expands and swells. Later, when it is hot and sunny, the water dries up and the clay cracks.



Over time, this swelling (expanding) and cracking (while shrinking) can warp your foundations. This can cause cracks and potholes in roads, cracked walls or ceilings in buildings, or swimming pools to crack and leak.

You can treat clay soils with chemicals that stop clay from attracting water. Once you treat the clay, you can compact it. This makes a much better foundation that won't swell and crack as much.

Before you use any chemicals, you must make sure they are safe. Check the safety data sheet (SDS) to find out how to safely use, store and handle the chemical. Check the site's environmental management plan. If you are not sure about using a chemical, talk to your site supervisor.


# 1.2.3 Earthmoving Site Hazards

## 1.2.3.1 Checking for Underground Services

You should always check where services are before you start work. You may phone 'Dial before you digon 1100'. You may look at the site plan or talk to your supervisor. You may need to look at the location of pits and meters to get an idea of where the services run. You may need to check with the local council or service company. You may even need to get underground detection equipment.

If you hit a service line, contact the provider immediately. You may need to organise to get the service

disconnected while a qualified person fixes the problem.

You can sometimes tell there are services below by the types of ground. Some services are surrounded by a different type of soil, rock or sand. You may notice that the soil is looser,
or does not match the soil around where you are digging. There may be a line of tape alerting you to the services. If you suspect there are services underground, stop working. Check the ground. You may need to excavate the area by hand, or dig in another area.

# 1.2.4 Operating Techniques

## 1.2.4.1 Building A Stockpile

A stockpile is a pile of material (soil, sand, rock, etc) that you use for earthmoving work. You must choose a good location for your stockpile. If you choose the wrong location, your stockpile could get washed away or become dirty (mixed with other materials).

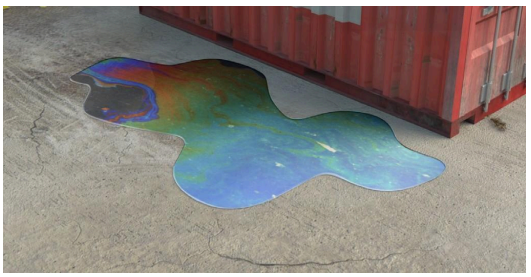
| | |
|---|---|
| If you can, choose an area of well drained, firm level ground.<br>  | You should set up drainage so that rainwater does not cause the stockpile to wash away or slide.<br>  |
| Make sure the stockpile is close to the area you are working. You don't want to drive too far to work with the stockpile.<br>  | Make sure you have clear access to the stockpile.<br>  |
| Clear the area of any rubbish or debris, so it doesn't get mixed in the stockpile.<br>  | When you fill out a stockpile, start by filling the area closest to the back of the stockpile area.<br>  |

| | |
|---|---|
| Don't work too close to the edge of the stockpile as it could give way.<br>  | Keep filling out the stockpile one row at a time or by dozing material to the correct position on the stockpile.<br>  |

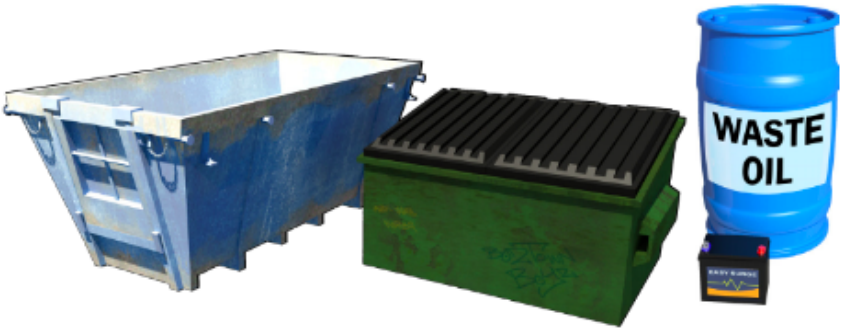
### 1.2.4.2 Taking from A Stockpile

| | | |
|---|---|---|
| When you take from a stockpile, try and work neatly.<br>  | Take from the top, working down in layers.<br>  | Do not undercut the stockpile. It might collapse on you.<br>  |
| You may need to maintain the stockpile by neatening it up.<br>  | To do this, you push material up that has been spread out. Keep the loadingarea clean and level.<br>  | |

## 1.2.5 Environmental Management Plan (EMP)

| | |
|---|---|
| The Environmental management plan (EMP) tells you important things about the environment at the worksite. It explains how the work you are doing could damage the environment. The possibility that you will cause this damage is called the environmental risk. | The EMP tells you what you must do so you do not damage the environment. It tells you how to work in a way that reduces damage to the environment.<br>  |


The EMP also tells you how the worksite meets all environmental protection laws and what to do with waste.




## 1.2.5.1 Example of an Environmental Management Plan

| | | | |
|---|---|---|---|
| **Company Details:** | EGA Earthworks - 19 Chandler Road, Boronia. Vic. 3155. | | |
| **Work description:** | Soil removal | | |
| **Date** | 12/12/2015 | **Contact** | Dick Osborne - 0455 555 555 |

| Environmental concerns for the site | Risk Level | Risk likelihood | Protection measures |
|---|---|---|---|
| Excessive noise generation associated with the construction and operation of support infrastructure. Public nuisance /complaints. | Minor | Possible | Work on site to be carried out between 7:00am and 6:00pm. |
| Vegetation loss leading to increased runoff during wet periods. | Moderate | Almost certain | Use cut off drains to direct water away from area being worked on. Put silt cloth barrier on high side of trench. Put straw bales in trench to filter water. |
| Mud on surrounding roads near entry and exit points. | Moderate | Possible | Use rumble grids and wash wheels of vehicles leaving site. |
| Dust generation due to removal of top soil. | Moderate | Likely | Use water carts to keep soil moist. |
| Combustion products from exhaust pipes. Air emissions. | Moderate | Likely | Check that catalytic converters fitted to machinery. |
| Damage to remaining trees on site. | Moderate | Possible | Use temporary fencing and/or safety mesh to isolate trees from surrounding work. |

| | | | |
|---|---|---|---|
| **Approved by:** | TJ Crossbow | **Signed:** | TJ Crossbow |

## 1.2.5.2 Working with an Environmental Management Plan

When preparing an Environmental management plan (EMP) there are three things you must decide:

1. How serious is the environmental risk?

2. How likely is it to happen?
3. How can you control the risk?

**How can you control the environmental risk?**

Here are some examples of environmental risks and the controls that could be used. They can be written into an environmental management plan.

Example 1

Risk : Soil and clay spread on residential streets.

Cause : Not cleaning wheels of vehicles leaving the worksite.

Control : Wash wheels or use rumble grids or put gravel at exit points.

Example 2

Risk : Noise.

Cause : Engine noise from heavy machinery.

Control : Work on site to be carried out between 7 am and 6 pm.

Example 3

Risk : Loss of topsoil.

Cause : Driving across a paddock or over vegetation.

Control : Go around the paddock even if it increases the time the job takes.

## How serious is the environmental risk?

You can use the following table to rate how serious the environmental risks are.

| Level | Rating | Examples of impact on the environment |
|---|---|---|
| **1** | **Catastrophic** | **Death, injury or illness to humans or animals. Destruction of a heritage site. Toxic release into waterway and groundwater.** |
| **2** | **Major** | **Release leading to measurable change to storm water quality. Soil contamination over a wide area. Damage to a heritage site.** |
| **3** | **Moderate** | **Short term minor change to ecosystems. On site release that is contained with little contamination. Localised, short-term change in storm water quality.** |

| | | |
|---|---|---|
| **4** | **Minor** | **On-site release immediately contained. Isolated complaints from the community.** |
| **5** | **Insignificant** | **Impact on the environment is too small to measure.** |

### How likely is the environmental risk?

You can use the following table to rate how likely it is that an environmental incident may happen.

| Level | Rating | Examples of impact on the environment |
|---|---|---|
| **A** | **Almost certain** | **Environmental concerns that you expect will happen.** |
| **B** | **Likely** | **Environmental problem that has happened in the past and is likely to happen again.** |
| **C** | **Possible** | **Environmental concern that has sometimes been a concern and may happen.** |
| **D** | **Unlikely** | **Environmental concern that has sometimes been a concern but is not expected to happen.** |
| **E** | **Rare** | **Environmental issues that are very unlikely to happen.** |

## 1.2.6 Earthmoving Hazards and Risks

The most common hazards and risks with earthmoving work are:

| Falls from plant or machinery | Traffic and other mobile plant | Overhead or underground power |
|---|---|---|
|  |  |  |

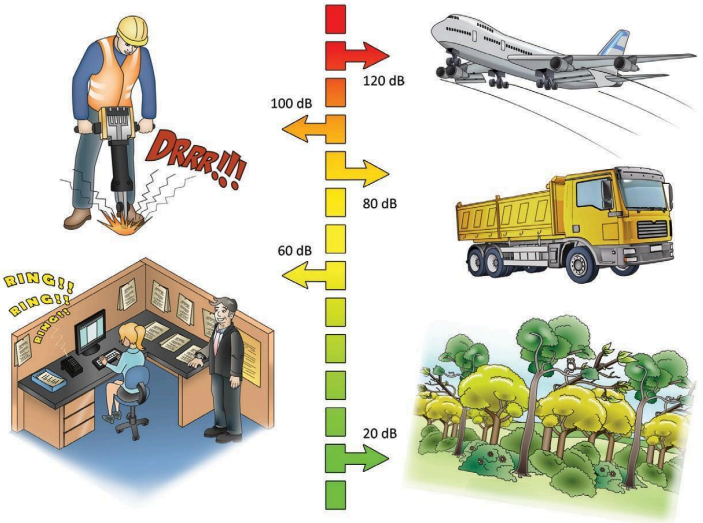
| | | |
|---|---|---|
| Underground gas lines  | Water and sewage piping  | Rollovers  |
| Noise  | Dust  | Manual handling  |
| Contaminated soil  | Falling into trenches or excavations  | UV rays (radiation) from working in the sun  |

## 1.2.7 Decibel Levels of Common Sounds

You must wear hearing protection when operating heavy equipment. This is important because 8 hours of noise at 85 db (decibels), or noise levels of 140 db even briefly can permanently damage your hearing.

Hearing loss is:

- Slow
- Painless
- irreversible.




Here are some examples of levels of noise in different environments.

- A forest has about 20 db of noise
- In an office there might be around 60 db
- Standing outside a truck generates about 80 db
- A jackhammer generates around 100 db
- A jet taking off generates about 120 db

## 1.2.8 Chemicals and Solvents


Chemicals should always have a label, so that you can easily tell what you are working with. They should be stored in a safe place where nobody may accidentally come in contact with them.

Always check the safety data sheet (SDS) before handling any chemicals.

An employer must provide an SDS to a person using chemicals in the workplace. They must make sure the person using the chemical knows how to read and understand the SDS.

If you are not sure about a chemical, put the chemicals in a safe, isolated area and talk to your supervisor.

## 1.2.9 Fatigue

Fatigue is an acute, ongoing state of tiredness that leads to mental or physical exhaustion and prevents people from functioning normally. It is more than feeling tired and drowsy, it is a physical condition that can occur when a person's physical or mental limits are reached.

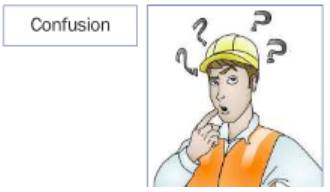
Fatigue can happen because of work or lifestyle related factors. Fatigue is a significant hazard and can lead to poor concentration, slow reaction times and increased mistakes.

| Work related factors | Lifestyle related factors |
|---|---|
| • Working time<br>• Scheduling and planning<br>(for example: rosters, length and timing of shifts)<br>• Inadequate rest breaks<br>• Lengthy periods of time being awake<br>• Insufficient recovery time between shifts<br>• Payment incentives that may lead to working longer shifts<br>• Environmental conditions<br>(for example: climate, light, noise)<br>• Type of work being undertaken<br>(for example: physically or mentally demanding)<br>• Work demands placed on the person<br>(for example: time frames, deadlines)<br>• The organisation's culture<br>• The person's role within the organisation. | • Inadequate or poor quality of sleep due to sleep disorders<br>• Social life<br>• Family responsibilities<br>• Other employment<br>• Travel time<br>• Health and wellbeing<br>(for example: nutrition and diet, exercise, pain, illness). |

### 1.2.5.1 Signs of Fatigue

You should be able to identify signs of fatigue in yourself and others. A person who is affected by fatigue may display the following signs:

- Headaches and/or dizziness
- Wandering or disconnected thoughts, daydreaming, lack of concentration
- Blurred vision or difficulty keeping eyes open
- Constant yawning, a drowsy relaxed feeling or falling asleep at work
- Moodiness, such as irritability
- Short term memory problems
- Low motivation
- Hallucinations
- Impaired decision-making and judgment
- Slowed reflexes and responses
- Reduced immune system function
- Increased errors
- Extended sleep during days off work
- Falling asleep for less than a second to a few seconds, and being unaware they have done so (otherwise known as micro-sleeps)
- Drifting in and out of traffic lanes or missing gear changes and turn offs when driving.





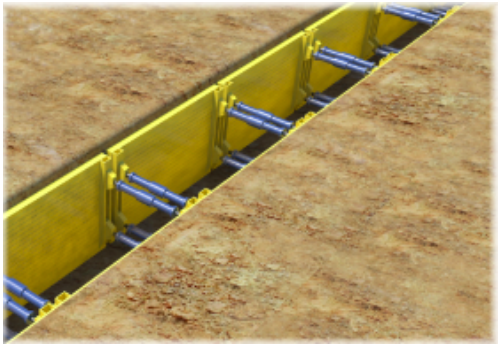
## 1.2.5.2 Managing Fatigue

Sleep is the only effective long term strategy to prevent and manage fatigue. While tired muscles can recover with rest, the brain can only recover with sleep. The most beneficial sleep is a good night's sleep taken in a single continuous period.

# 1.2.10 Safety around Trenches

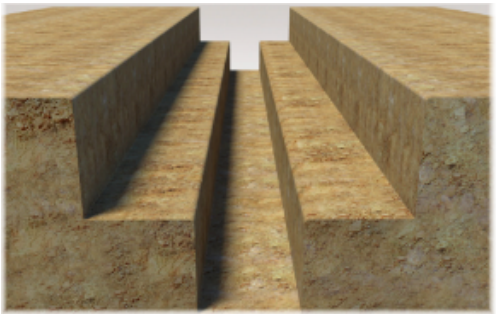
There is a risk that a person could fall into an open trench or excavation on a worksite. People working in trenches are at risk of being crushed or trapped if the trench caves in. You must try to reduce this risk. Isolation is a good way to reduce the risk. You could put up para-webbing, barriers or temporary fencing. You may put trench shields with guard rails.
You also need to consider operating machines in and around trenches when workers are in the trench. Where possible, always have workers removed from the trench if you are working around it. If the worker must remain in the trench. Ensure the machine is kept a minimum distance of the trench depth away from the edge (if trench is 1m deep, the closest grounded part of the machine should be at least 1m from trench edge). If the machine needs to get closer to the trench with the worked in the trench, trench shoring should be set up to protect the worker.

## 1.2.10.1 Trench Shields and Shoring



If a trench is 1.5 metres deep (some sites are 1.2m) or more you must use trench shields or shoring. You should use trench shields that have approved lifting points. The shields weight must be permanently marked on the shield. If the shield does not have its weight marked, it must be rigged by a licenced dogger or rigger. The shoring must meet Australian Standard 4744: Steel shoring and trench lining equipment. It must also come with an instruction manual. You should secure a ladder for workers to get in and out of the trench.

## 1.2.10.2 Benching



Benching is where you cut levels in the soil to reduce the fall risk. For example, instead of having a single 2 metre trench, this area is excavated in two (2) levels. The first level is a 1 metre drop and is 1 metres wide. The second level is 1 metre × 1 metre.

## 1.2.10.3 Battering

Battering is where the edges of a trench are 'tapered' back on a gentle slope. Battering means that instead of a straight drop off, you have a more gentle slope. In this example, the drop off has been 'battered' back so the fall hazard is reduced. Benching and battering reduce both the fall risk and the risk of collapse.

## 1.2.11 Confined Space

A confined space is an enclosed or partially enclosed area. It is an area that was not designed for people to go into. It may have no natural or mechanical ventilation. There are also hazards (such as a gas or flammable substance) that makes it dangerous.

Gases in the atmosphere such as LPG, which are heavier than air, may enter spaces like trenches, underground tanks or pits displacing oxygen.

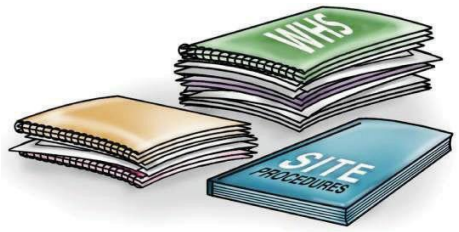
When you drive a petrol, gas, or diesel machine into a space like this you create a hazard. The exhaust gasses can fill the space. Dangerous gases like carbon monoxide can build up in the area. You can't smell all the dangerous gasses or fumes. You might breathe in a dangerous gas and not even know it. The gas could make you unconscious or even kill you.

You must be trained to work in a confined space, you must also have a permit. The permit makes sure you have thought about all hazards and controls, including a rescue plan, and that you have a team there to help you in case something goes wrong. You must get your permit approved by a supervisor.
If you are going to work a machine in a confined space, you might need a catalytic converter installed. A catalytic converter takes out harmful gasses (like hydrocarbons, carbon monoxide and nitrogen oxides) and turns them into harmless gasses (like carbon dioxide, water and oxygen).

## 1.2.12 Worksite requirements

Examples of documents and training your employer should provide include:

- Safety plan for the site
- Emergency procedures, for example a site evacuation plan
- Environmental management plan for the job.

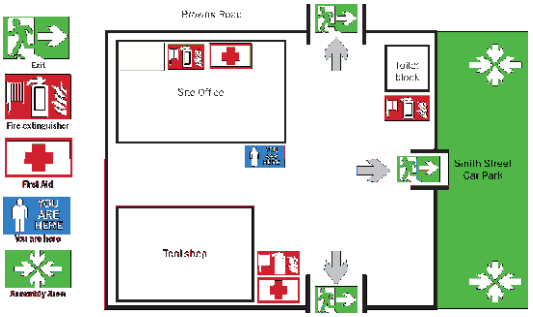



## 1.2.13 Emergency Evacuation Plan

Many worksites have an emergency evacuation plan which is displayed on the noticeboard.

You should make sure you know how to interpret this plan.

For example, start by looking for a 'You are here' sticker on the plan drawing. Note how nearby areas are shown on the plan. Then work out where the emergency exit is – on the plan and in real life.




## 1.2.14 Disposing of Environmentally Sensitive Fluid

There are times when you will need to dispose of environmentally sensitive fluids. You may have to deal with oil spills or chemical spills.

There are disposal companies who remove used oil, oily water and emulsions, waste grease, filters, rags, brake fluids and coolants.

Oil is a good example of an environmentally sensitive substance that needs to be disposed of properly.

### 1.2.14.1 The Damage Oil and Chemicals Can Do

If oil ends up in landfill, it will slowly leach into surrounding land and underground water. Storm water and sewage, polluted by oil, can cause long term damage to coastal and marine habitats and ecosystems, seabirds, mammals, fisheries and people.

## 1.2.15 Clean Up

### 1.2.15.1 Recycling Items

Many environmentally sensitive items can be recycled. Items such as batteries, oil and gas cylinders can sometimes be recycled and reused.
Some oils can be taken to a recycling centre. With oil, bring your materials to the recycling centre in a clean, plastic container with a lid. The original container is a good container to return the oil in.

### 1.2.15.2 Pressure Clean

You may need to pressure clean the wheels, tyres, or attachments.

## 1.2.16 First Aid and Emergencies


Employers should make sure there are trained first aiders and first aid kits available.
The employer should make sure:

- The first aid kits are checked, maintained and kept in a clean dry place.
- There are clear signs indicating the location of first aid kits.
- They have recorded and displayed the numbers and location for emergency services (or local doctors or hospitals).

### 1.2.16.1 Reporting Incidents

As a PCBU, employer or self-employed person you must report serious incidents to the SafeWork authority in your state. You must give a written report within 48 hours if any of the following happen on a site you are controlling.

- A death
- An injury that requires medical treatment
- Exposure to a substance that requires treatment
- Other injuries or health issues caused from a workplace incident.

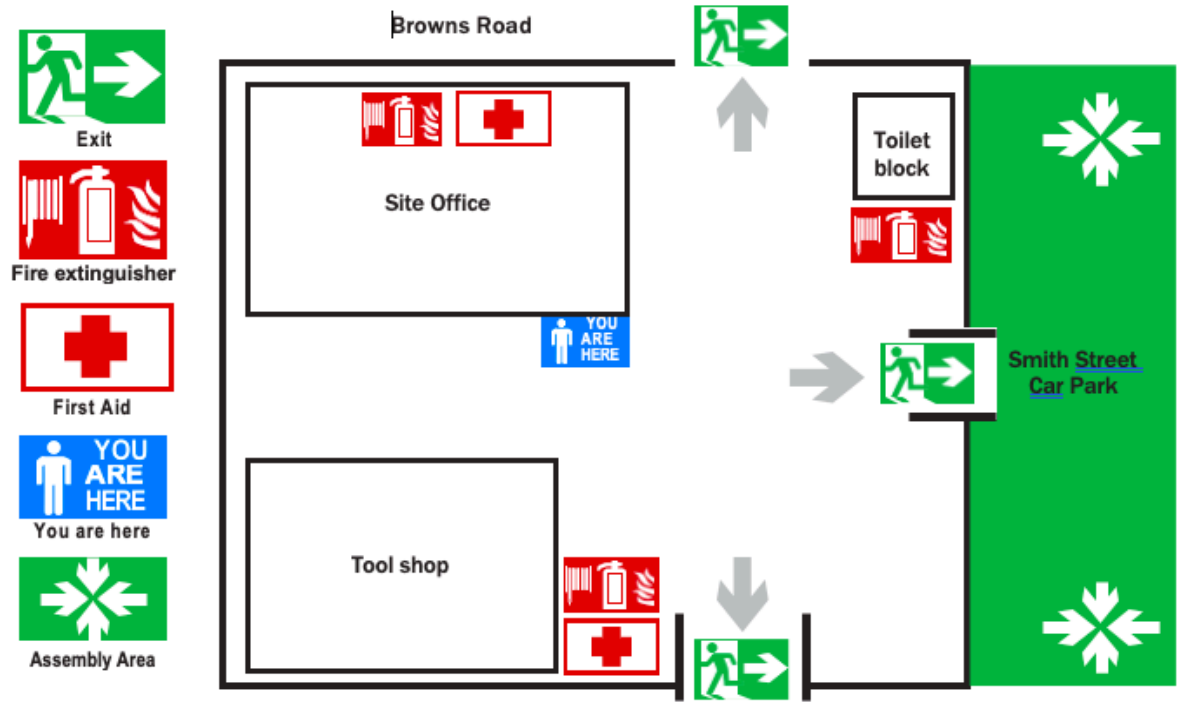
The SafeWork authority may send an inspector to come and examine the site. You must leave the site as it is, unless you need to; protect people, help an injured worker, make the site safe, or stop other incidents happening. The inspector will tell you when you can continue working normally.

# 1.2.17 Safety Plan

The safety plan may tell you things like:

- How to use tools and equipment safely
- How hazards and risks need to be controlled
- Emergency procedures
- Emergency exits and assembly areas
- What PPE to wear
- Safe areas to park machinery.


## 1.2.17.1 Site Evacuation Plan (Example)



# 1.2.18 Tools and Equipment

Here are some typical tools and equipment you might need. Remember, if your workplace has a policy about what PPE you need to use, you must use it.

**Personal protective equipment (PPE)**

- Steel cap boots
- High visibility safety vest
- Hearing protection
- Hard hat
- Goggles/glasses
- Gloves
- Dust mask

**Hand tools**

- Shovel and levels
- Socket sets
- Screwdrivers or wrenches
- Wire brush

**Maintenance equipment**

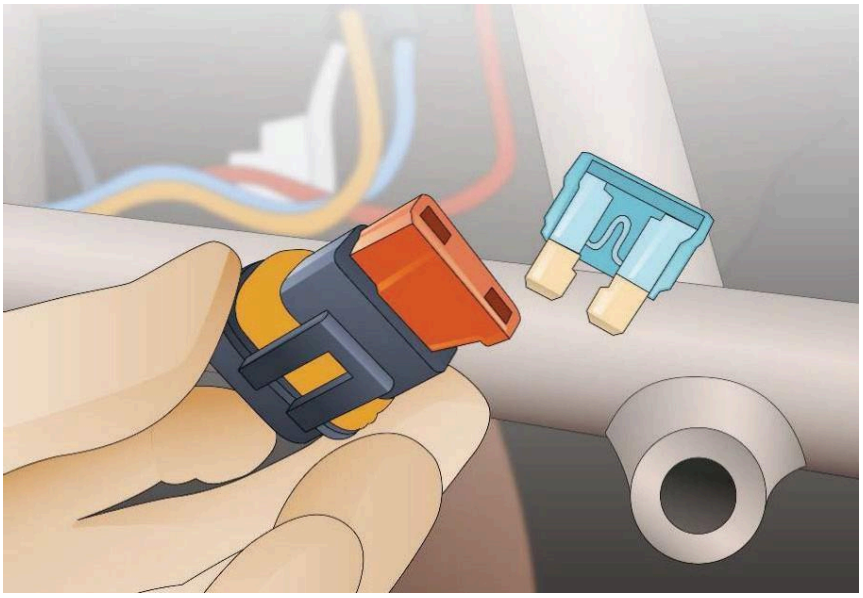
- Grease gun
- Tyre pressure gauge

**Lifting equipment**

- Slings
- Chains
- Shackles

## 1.2.19 Defective Parts

If you notice a defective part, for example, a fuse is blown or not working, you should arrange to have it replaced immediately. You must check the rules for your site and your state or territory. In some states only licenced mechanics are allowed to do any repairs.



## 1.2.20 Job Safety and Environment Analysis (JSEA) or Safe Work Method Statement (SWMS)

These forms help you plan for the work you will do. It is very important you fill these out before you start work. They help you work out the tools, equipment and PPE you need to do the job safely. All workplaces should have these types of forms.

Example:

**Job safety and environment analysis (JSEA)/Safe work method statement (SWMS)** 123456

| 1. ACTIVITY/TASK INFORMATION AND LOCATION | |
|---|---|
| Location/Project: | 123 Belmaine Highway, Roseville |
| Activity or Task Description: | Load spoil from excavation right hand turn lane |
| Competency/Qualification needed to do work safely: | All operators have current tickets |

**2. HAZARD IDENTIFICATION**

| Location/Area Hazards | | Rate | Work/Task Hazards | | Rate | Work/Task Hazards | | Rate |
|---|---|---|---|---|---|---|---|---|
| **Area** | | | **Visibility and hearing** | | | **Plant/machinery** | | |
| Entry or exit is difficult | | | Poor lighting | | | Plant or Machinery | X | 8 |
| Engulfment/entrapment | | | Poor visibility | | | Tools/equipment | | |
| Work at heights | | | Bright lights/UV | | | Traffic | X | 8 |
| Confined space | | | High noise levels | X | 7 | Pedestrians | | |
| Remote location | | | Communication difficulties | | | Railway | | |
| Rescue could be difficult | | | **Services** | | | Pneumatics | | |
| Temperature extremes | | | Multiple electrical feeds | | | Process lines | | |
| Hazardous/Toxic substances (attach MSDS) | | | Electrical hazards - LV | | | Suspended loads | | |
| | | | Electrical hazards - HV | | | **Slips/trips/falls** | | |
| **Gasses/oxygen/chemicals** | | | Overhead power | X | 8 | Slips/trip hazard | | |
| Poisonous gas/es | | | UG services (gas, power, water) | | | Fall hazard | | |
| Explosive/flamable gas | | | **Hazardous/toxic substances** | | | **Other** | | |
| Oxygen levels (high or low) | | | Pressurised fluids | | | Sharp materials | | |
| Inhalable dusts/fibres | | | Gas cylinders | | | Confined space | | |
| Hazardous/toxic substances (attach MSDS) | | | Flammable materials | | | Work at heights | | |
| | | | Toxic materials | | | Welding/Grinding | | |
| **Exposure** | | | Acids/solvents | | | Manual handling | | |
| Heat/Cold | | | Other chemicals | | | Using ladders | | |
| Sunlight/ Radiation | X | 4 | Inhalable dusts/fibres | | | Using EWPs | | |

| 3. PPE | | 4. ACCESS/EQUIPMENT/ISOLATION | | 5. ENVIRONMENTAL | | |
|---|---|---|---|---|---|---|
| **Hands, feet and body** | | **Access equipment** | | **Environmental Hazards** | ✓x | **Rate** |
| Gloves: (type)..... | X | Scaffold | | Air pollution (dust, fumes) | X | 5 |
| Safety boots | X | Ladders | | Noise (plant and equipment) | X | 5 |
| Long sleeves/pants | X | EWP | | Spills to drains/waterways | | |
| High visibility vest/clothing | X | | | Spills to ground | X | 5 |
| **Head and face** | | | | Soil erosion | | |
| Safety glasses/sun glasses | X | **Static plant/equipment:** | | Hazard to flora/fauna | | |
| Full face shield | | | | Other: | | |
| Hearing protection | X | | | | | |
| Hard hat | X | **Mobile plant/equipment:** | | | | |
| Dust gas mask | | Excavators, Loaders, | X | | | |
| Breathing apparatus | | Trucks, Machine | X | | | |
| Welding face shield | | **Safety/emergency equipment:** | | | | |
| **Fall protection and access** | | | | | | |
| Safety harness | | | | | | |
| Fall protection equipment | | | | | | |
| Fall arrest equipment | | **Isolation and warnings** | | | | |
| Other: | | Barricades | X | | | |
| | | Group isolation | | | | |
| | | Personal locks or lock out tags | | | | |
| | | Warning signs | X | | | |
| | | Area lighting | | | | |
| | | Other: | | | | |
| | | Traffic controllers | X | | | |

**Risk Rating Table:** *Use the following table to rate the risk.*
• 1-2 = Low • 3-4 = Medium
• 5-6 High • 7-8 Extreme

| Likelihood: (How likely is it to occur) | Consequences: Catastrophic | Major | Moderate | Minor |
|---|---|---|---|---|
| **Almost Certain** | 8 | 7 | 6 | 5 |
| **Likely** | 7 | 6 | 5 | 4 |
| **Possible** | 6 | 5 | 4 | 3 |
| **Unlikely** | 5 | 4 | 3 | 2 |
| **Rare** | 4 | 3 | 2 | 1 |

| 6. PERMITS (Attach and record number) | | | | | |
|---|---|---|---|---|---|
| Hot work | | Excavation | | Hazardous work | |
| ~~Access to work area~~ | | High voltage | N/A | Confined space | |
| | | | | | |

## Job safety and environment analysis (JSEA)/Safe work method statement (SWMS) 123456

**7. JOB STEPS, HAZARDS AND CONTROLS**

| Step (No.) | Job Step (Describe each step) | Hazard/Environmental Issue | Risk Rating (Before control) | Control | Risk Rating (after control) |
|---|---|---|---|---|---|
| 1 | Set up traffic control | Traffic in busy intersection | 8 | Barriers and flag person supplied by ABC Traffic | 1 |
| | | Noise of traffic and plant | 7 | Hearing protection must be worn at all times. | 1 |
| | | Sunlight | 4 | Long sleeve pants, tops, hard hats with visor and sunglasses | 1 |
| 2 | Unload excavator from float | Excavator sliding on ramps | 5 | Pedestrian exclusion zones 1.5 x excav. height. Operator wear seat belt. | 3 |
| 3 | Excavate turn lane | Powerlines overhead | 8 | Power will be isolated. This must be confirmed before starting | 1 |
| 4 | Load tip truck | Location of tip truck and drivers while loading. | 8 | Traffic controllers will direct drivers where to safely park. Drivers must remain in truck while being loaded. | 1 |
| 5 | Load excavator on float | | | | |
| | | Dust and noise | 5 | Noise restrictions limit work to between 9am-5pm. Water truck available to reduce dust if needed. | 2 |
| | | Spills to ground | 5 | Pre-op checks on excavator before work. Spills kit on site if needed. | 2 |

**8. CONSULTATION AND WORKER OFF**

*By putting my signature below I confirm that I have attended a briefing and understand and will comply with all environmental and safety issues, as described in this JSEA/SWMS. I have reviewed and will comply with all necessary paperwork including permits, MSDS, isolation plants etc.*

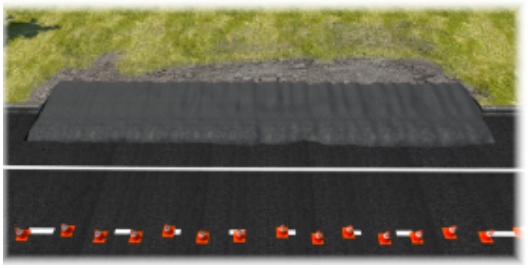
| Name | Signature | Date | Name | Signature | Date |
|---|---|---|---|---|---|
| Dick Osborne | Dick Osborne | 2/4 | | | |
| Leon Boracs | Leon Boracs | 2/4 | | | |
| Sal Boncero | Sal Boncero | 2/4 | | | |
| Noel Scarbo | Noel Scarbo | 2/4 | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**9. FINAL APPROVAL/SIGN OFF**

| | Name | Signature | Date |
|---|---|---|---|
| **Approved by:** | Mark Alabaster | Mark Alabaster | 2/4/15 |
| **Approved by:** | Duncan Morton | Duncan Morton | 2/4/15 |
| **Customer/Client** | N/A | | |

# 1.2.21 Calculation

## 1.2.21.1 Working Out How Much Material You Need



The work plan has an area which is 4 metres × 20 metres that must be covered by a layer of road base of 150 mm depth.

**How many square metres of road base are to be laid?**
**How many cubic metres of road base will you need?**

**Step 1:**

To work out the square metres, multiply the Length (L) by the Width (W).

L × W = Square metres

4 m × 20 m = 80 square metres

This can also be written as:

80 $m^2$ or 80 square metres

**Step 2:**

Convert the layer thickness from millimeters to metres.

To do this divide the layer thickness by 1000

150 mm ÷ 1000 = 0.15 m

**Step 3:**

Multiply the square metres by the layer thickness to get the cubic metres.

80 square metres × 0.15 m

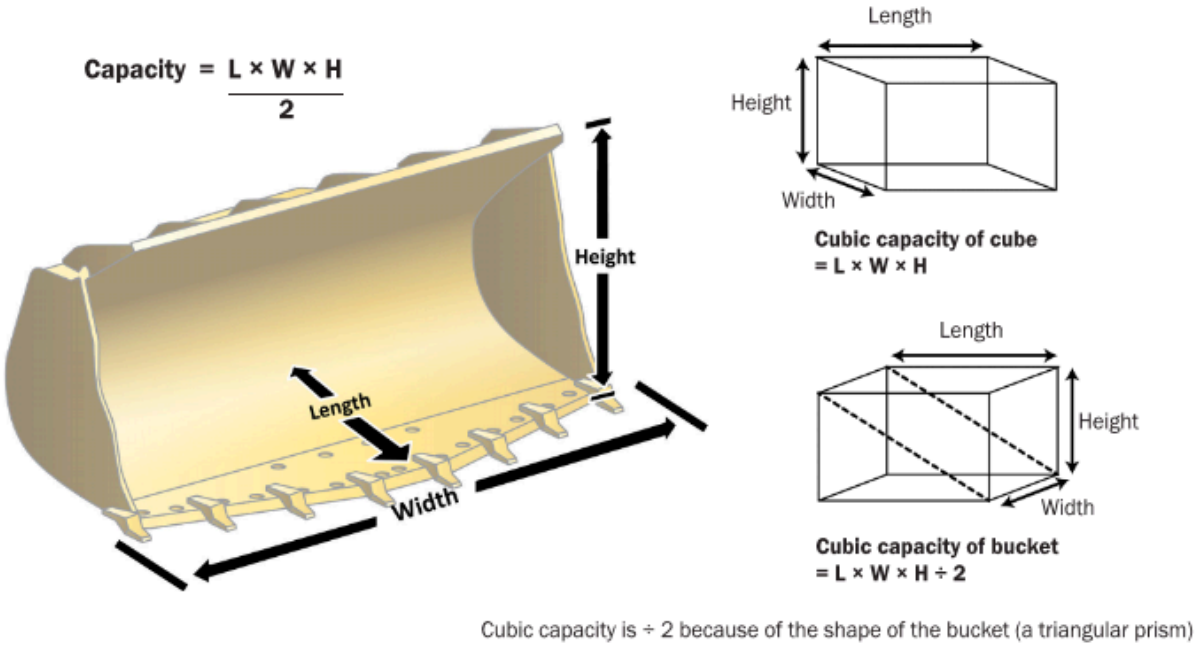
= 12 cubic metres

This can also be written as:

12 $m^3$ or 12 cubic metres

Answer:
There are 80 square metres of road base to be laid.
You will need 12 cubic metres to cover the area to 150 mm depth.

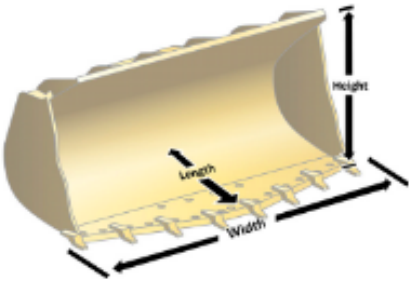
## 1.2.21.2 How to Find the Cubic Capacity of A Bucket




Cubic capacity is ÷ 2 because of the shape of the bucket (a triangular prism)

## 1.2.21.3 Loading A Truck to Capacity

This truck has an 8 tonne load capacity. Dry beach sand weighs 2 tonnes per cubic metre.




**How many buckets will it take to fill the truck to capacity using a bucket with these dimensions?**
Bucket dimensions:
- Length = 2 metres
- Width = 1 metre
- Height = 1 metre

| Step 1: | Step 2: | Step 3: | Step 4: |
|---|---|---|---|
| To calculate the capacity of the bucket, use the formula:<br>L × W × H ÷ 2<br>2 × 1 × 1 ÷ 2<br>= 1 cubic metre<br>Capacity of the bucket<br>= 1 cubic metre | The weight of dry sand is known (see Table of Common Weights).<br>Dry sand weighs 2 tonnes per cubic metre<br>Weight of material<br>= 2 tonnes (per cubic metre) | The bucket has a capacity of 1 cubic metre. So a full bucket of dry sand will weigh 2 tonnes.<br>Bucket capacity<br>× Weight of material<br>(per cubic metre)<br>1 × 2 = 2 tonnes<br>Each full bucket of dry beach sand weighs 2 tonnes. | Truck load capacity is 8 tonnes.<br>8 tonnes (truck)<br>÷ 2 tonnes (per bucket)<br>= 4 buckets |

Answer:
It will take 4 buckets of sand to fill the truck to capacity.

## 2.1.1 Work Health & Safety Legislative Requirements


**'Laws to keep your workplace safe'**
WHS/OHS requirements are outlined in Acts, Regulations, Codes of Practice and Australian Standards.

**WHS/OHS Acts**
*'WHS/OHS Acts'* are laws that explain how to improve health and safety in the workplace.
For example: Model National WHS Act, June 2011.
WHS has the same meaning as OHS in this document.

**Regulations**
*'Regulations'* explain specific parts of the Act.
For example: Part 4.3 – Confined spaces, Part 4.4 – Falls.

**Codes of Practice/Compliance Codes**
*'Codes of Practice'* are practical guidelines on how to comply with (meet the rules of) legislation.
For example: HAZARDOUS MANUAL TASKS Code of Practice, 23rd December 2011.

**Australian Standards**
*'Australian Standards'* are work guidelines that set the minimum accepted performance or quality for a specific hazard, process or product.
For example: AS 2550 – Cranes, hoists and winches – safe use set.

## 2.1.2 Where to Find WHS Information

You can check these websites for more information about workplace health and safety. The National WHS Act started in some states/territories on January 1, 2012.


**What are the National Work Health (WHS) and Occupational Health and Safety (OHS) Acts about?**


The Acts explain how to keep your workplace safe and healthy. They explain what you need to do to meet your duty of care. For example:
You must make sure you do earthmoving work in a way that won't put yourself or others at risk. You must use earthmoving equipment according to instructions.

Note:
Check your state requirements as Acts may vary from state to state.

**What do regulations explain?**

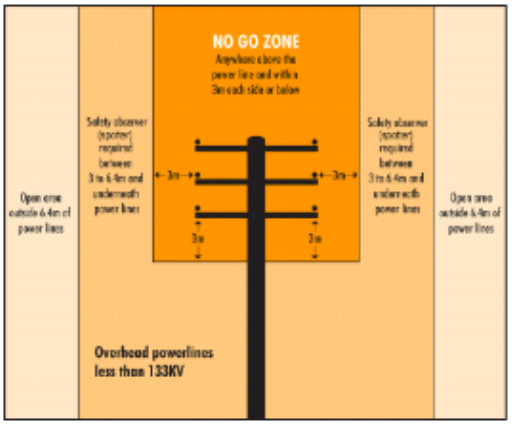

Regulation explains the detail of the Acts. For example:
The regulations in Queensland give you examples of control measures when an excavation might create a risk. Example of control measures:

- Plant fitted with suitable overhead protection against the collapse of the excavation
- Benching, battering or shoring the sides of excavation
- A hoarding to prevent access by persons
- A secure cover over the excavation
- Filling the excavation as soon as possible

**What do codes of practice explain?**


Codes of practice are practical guidelines on how to comply or follow the rules in legislation/laws.
For example:
A traffic management code of practice will tell you all the rules a traffic controller must follow. For example, a traffic controller must have a zero percent blood/ alcohol concentration/ reading while performing traffic control duties.

**What do Australian Standards explain?**




Australian Standards are work guidelines that set the minimum accepted performance or quality for a specific hazard process or product.
For example:
A2250.1-2011 - Powerline distances
This standard tell you the distances you can safely work near powerlines on poles and towers.

**What are examples of documentation you need to read before doing earthmoving work?**

- Health and Safety Acts and Regulations
- Codes of practice
- JSA/SWMS
- Standards, eg: AS 2598-1995 Earthmoving machinery

- Manufacturer's specifications
- Operator's manual
- Site requirements and procedures
- Work and/or quality requirements
- Drawings and sketches of the work to be done
- Company policies and procedures for employment and workplace relations, Equal opportunity and disability.

**Why should you check the operator's manual before using earthmoving equipment?**

The operator's manual tells you how to operate your machine. The manual also tells you about maintenance (how to keep your machine operating correctly).


**What are quality requirements?**

The quality requirements tell you the standards you must meet when doing earthmoving work. They tell you what you need to do and how to do it to satisfy the customer. You may need to follow codes of practice, regulations, national standards etc.

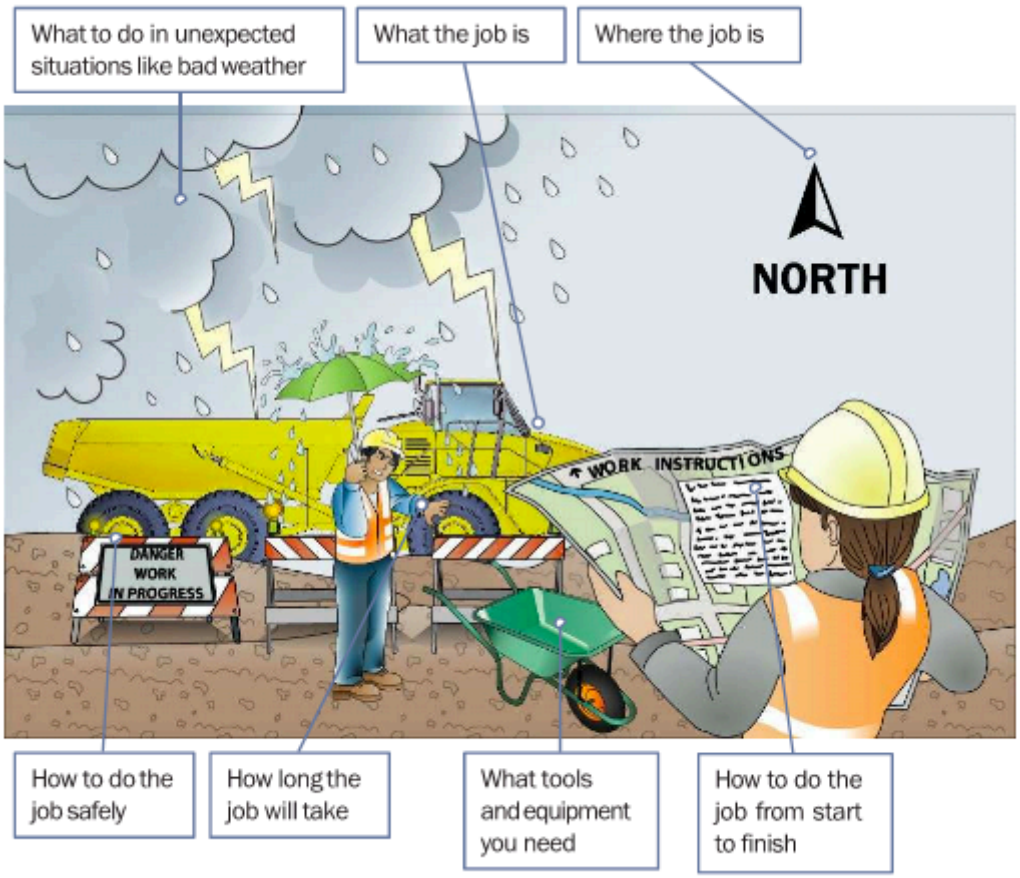


**What kinds of information do you need before starting work?**

- Plans – Drawings and sketches outlining what you need to do
- Specifications – rules and details about the job
- Operational details – how you will do the job
- Quality requirements of the job – the standards you are expected to meet.

**What do the job's work instructions explain?**

In simple, they give you instructions on how to do your job. This may include:




**What does the safety plan tell you?**

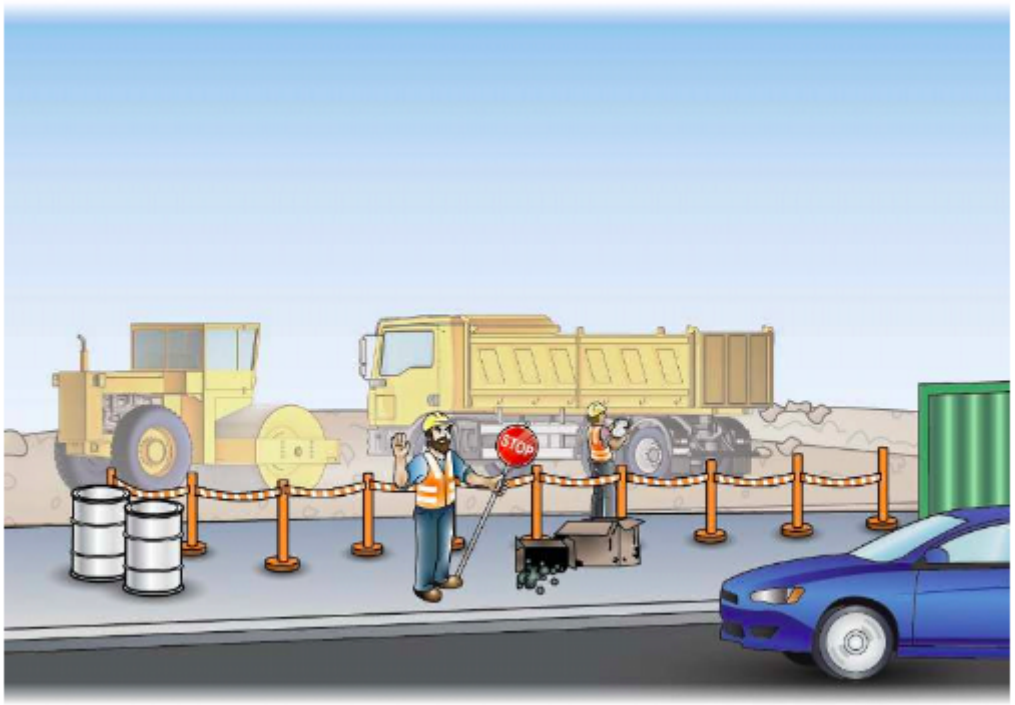
In Simple, The safety plan tells you how the worksite intends to meet all the safety rules. It tells you:

What personal protective equipment (PPE) to wear

| | |
|---|---|
| How to control hazards and risks  | Emergency procedures and exits   |
| Use tools, plant and equipment safely  | How to park safely and where to park  |

**What does the traffic management plan (TMP) tell you?**

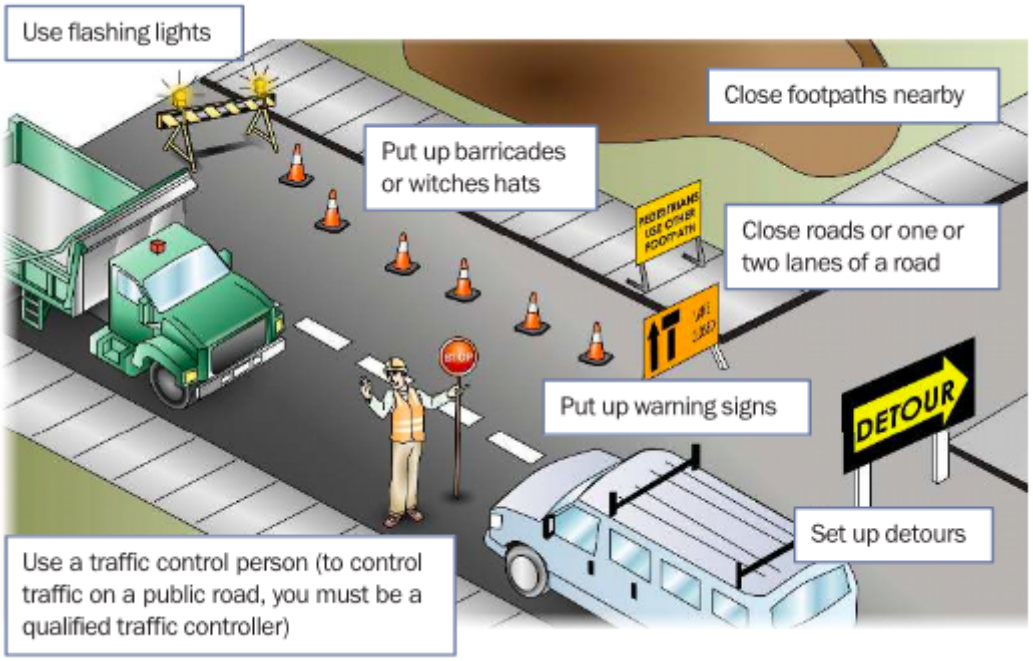
It tells you how to control vehicles in and around the worksite. It helps keep the site safe for you and others. You may require a traffic control licence in your state or territory.



**What can you do to control traffic in and around a worksite?**

**Any traffic controlling MUST be done by certified traffic controllers**

You can:



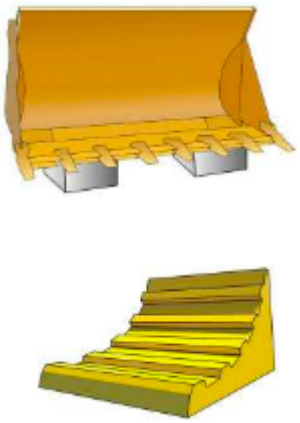

**Where do you put up warning signs?**

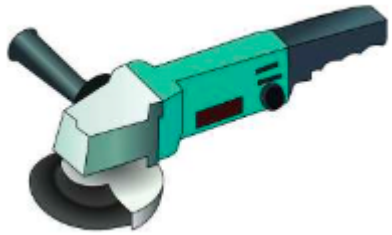
| | |
|---|---|
| Near underground services. For example, gas and water pipes<br>  | On the site fencing<br>  |
| In places you need to control traffic | Near trenches |


GIVE
WAY
STOP
50
AREA
SLOW


CAUTION

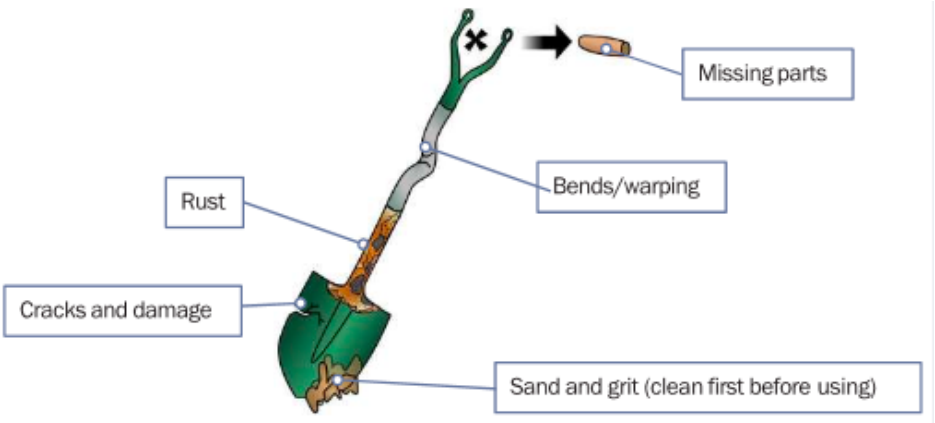
**What kinds of tools and equipment might you use when doing earthmoving work?**

| | |
|---|---|
| Chocks, blocks or safety bars to stop the bucket dropping.<br>  | Shovels<br>  |
| Hand tools such as spanners, ratchets, wrenches, screwdrivers and hammers.<br>  | Socket set<br>  |
| Clamps<br>  | Wire brush<br>  |
| Welder<br>  | Punch<br>  |

| | |
|---|---|
| Grinder  | Oxy set  |
| Portable lighting  | Grease gun  |
| | Laser level  |

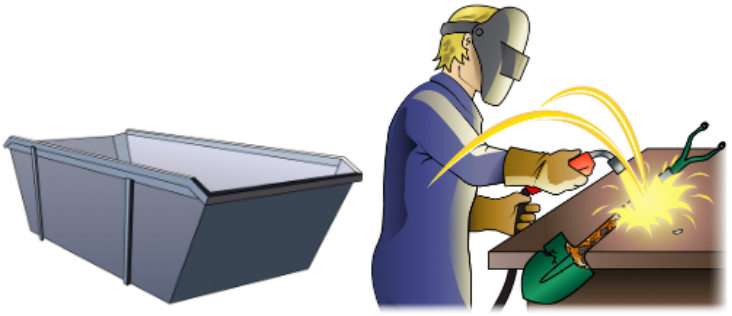
**What kinds of faults do you check hand tools for?**

You check for:



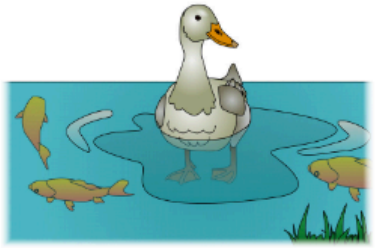
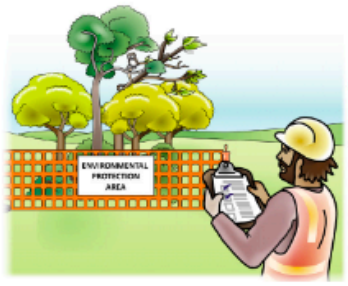
**What do you do with faulty hand tools?**

If you can, arrange to have them repaired. If that is not possible, tag them as faulty, or put them in the rubbish.

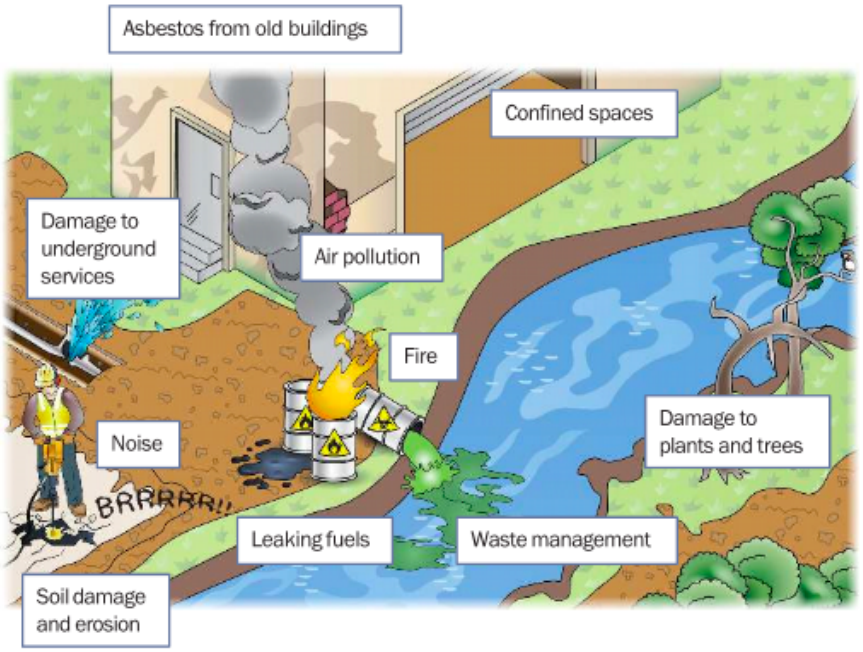


**What does the environmental management plan (EMP) tell you?**

The EMP tells you:

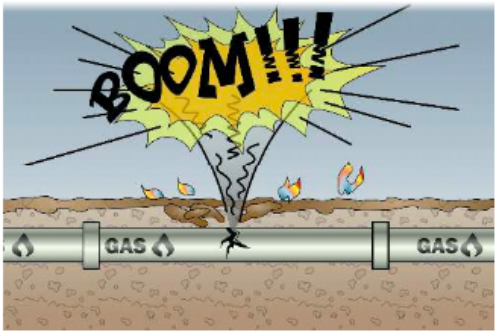
| | |
|---|---|
| Possible risks to the environment on the worksite<br>  | How to work in a way that reduces damage to the environment<br>  |
| Boundaries of the site<br>  | Who is responsible for each part of the environmental management plan (EMP)<br>  |

**What environmental challenges should you be careful of when working?**



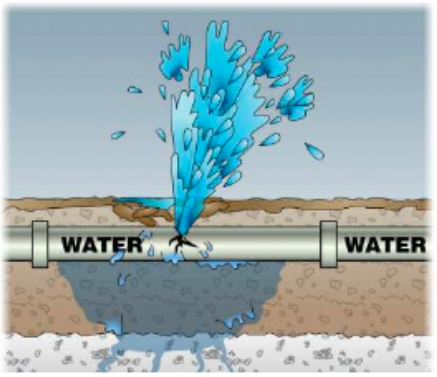

**What could happen if you damage an underground gas line?**

You could cause a gas leak, and maybe an explosion.



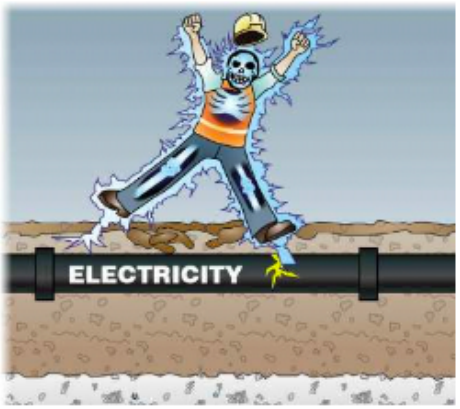

**What could happen if you damage an underground water pipe?**

You could cause a water leak, and the water could be polluted.



**What is the danger if you damage an underground electrical cable?**

There is a risk of an electric shock.




**Who do you talk to if you damage an underground cable, gas line or other service?**

You must tell your supervisor. Your supervisor will tell the relevant authority.


**Why should you check the noise laws for your state/territory before starting work?**

Because there are rules about how early or late you can work.

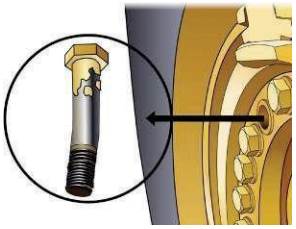
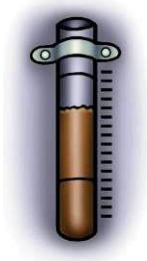
# 2.2 Operate the Backhoe/Loader in Line with Established Requirements

**When do you test and inspect the backhoe/loader?**

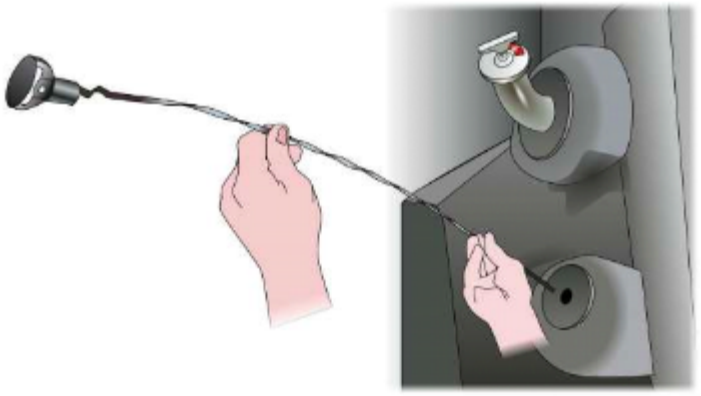
Every day. Always test and inspect before and after you use the backhoe/loader. You do this to make sure it's safe to use. Always follow workplace procedures for inspecting plant and equipment.

**What pre-operational checks do you do before using the backhoe/loader?**

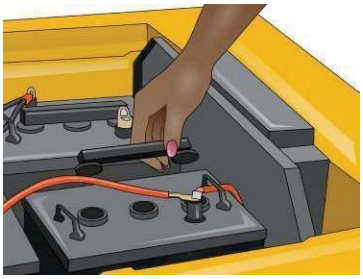
Checks may include:

<table>
<tr>
<td>Look for leaks under the machine<br>  </td>
<td rowspan="2">Check transmission oil<br>  </td>
</tr>
<tr>
<td>Check tyre condition, tyre pressure and wheel nuts.<br>  </td>
</tr>
<tr>
<td>Check hydraulic fluid<br>  </td>
<td>Check the fuel gauge to make sure the backhoe/loader has enough fuel.<br> 
</td>
</tr>
</table>

Check engine oil

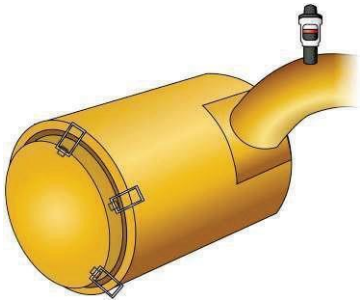


Check battery water level and terminals

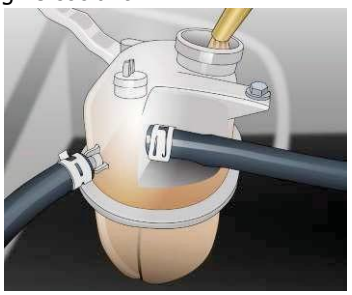


Check power steering fluid (if fitted)

Check air filter restriction



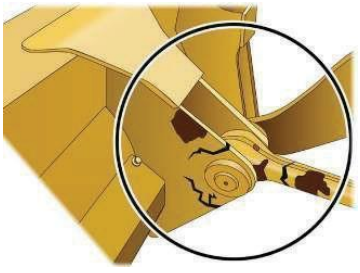
Check engine coolant



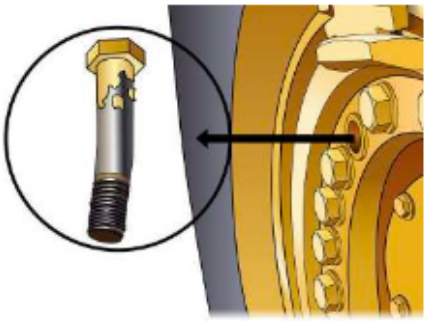
**What structural checks do you do? For example, safety features and mechanical parts. What checks do you do to the backhoe/loader's moving parts and safety features?**

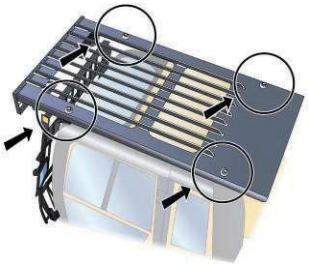
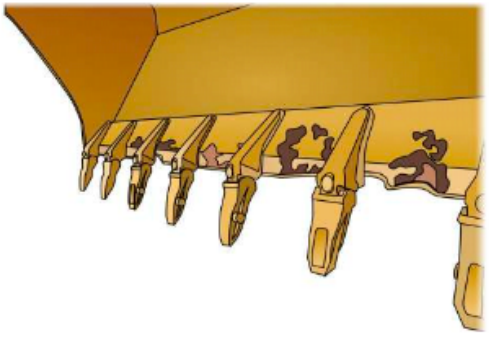
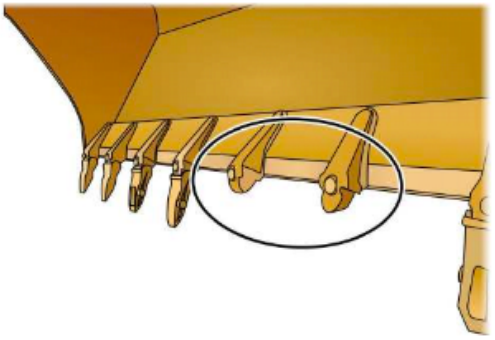
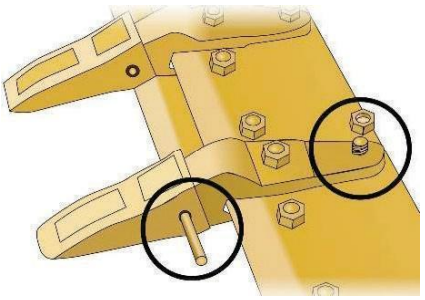
Check for:

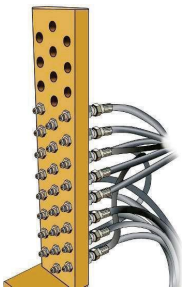
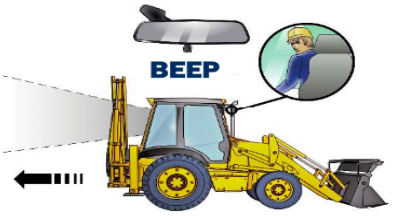
The condition of attachments



Broken or damaged parts



| | |
|---|---|
| Mounting bolts are attached on the falling object protective structure (FOPS)<br>  | Damage to the roll over protective structure (ROPS)<br>  |
| Worn cutting edge or skid plates<br>  | |
| Worn, loose or missing teeth<br>  | |
| Oil leaks from hoses, fittings and hydraulic rams<br>  | |
| Missing pins and keepers<br>  | |

| | |
|---|---|
| Check condition of grease nipples<br>  | Check remote grease nipple condition<br>  |
| Move forward and backwards slowly and check the brakes and steering operation<br>   | |
| Check the reversing alarm is working<br>  | |

**What must you do if you find a problem with the arms or connections?**

You must:

| | |
|---|---|
| 1. Park up the machine and Tag out the equipment and DO NOT USE IT.<br>  | 2. Remove the key<br>  |
| 3. Record the problem in the logbook.<br>  | 4. Report to your supervisor. |

| | |
|---|---|
| |  |

**What is the danger when pumping up a tyre on a split rim wheel?**

The locking rim could fly off and hit you. You could be injured or killed.

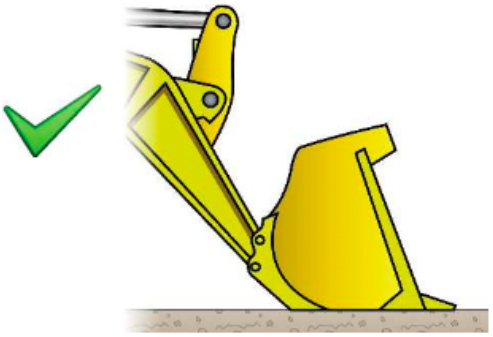
**WARNING:**
**Always follow workplace procedures for inflating tyres. This job may need to be done by an authorised fitter.**
**Check with your supervisor.**

**How can you pump up the tyre on a split rim wheel safely?**

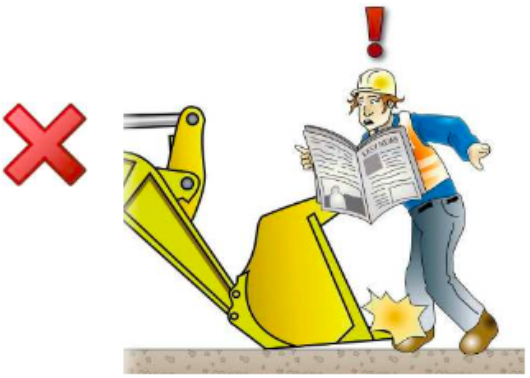
Never stand in front of the wheel. Pump up the wheel in a cage if you can.

**What do you do with the bucket before parking the backhoe/loader?**

Lower the bucket to the ground. Make sure the cutting edge is touching the ground.

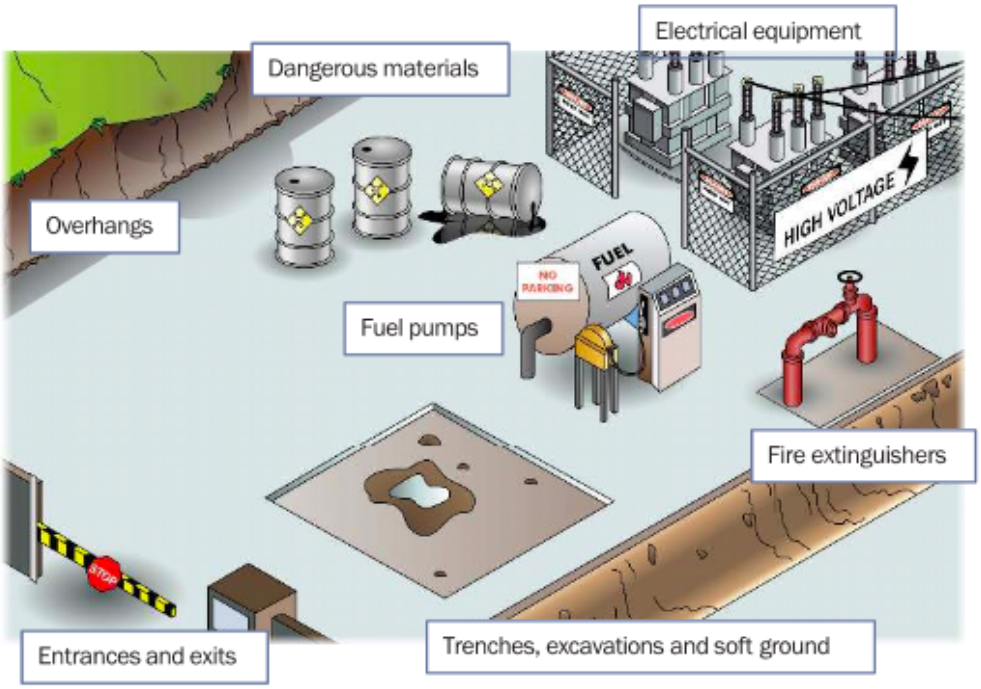


If the cutting edge is too high, it might injure someone if they walk into it.



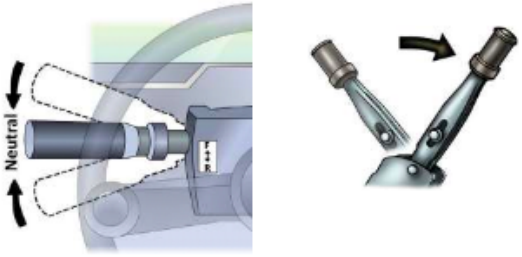
**Where would you not park the backhoe/loader?**

Always park in a safe place on firm, level ground. Do not park near:




**How do you shut down the backhoe/loader?**

1. Park the backhoe/loader in a suitable location. Place loader in neutral gear and apply the handbrake. Make sure attachments are lowered and hydraulic pressure is released.

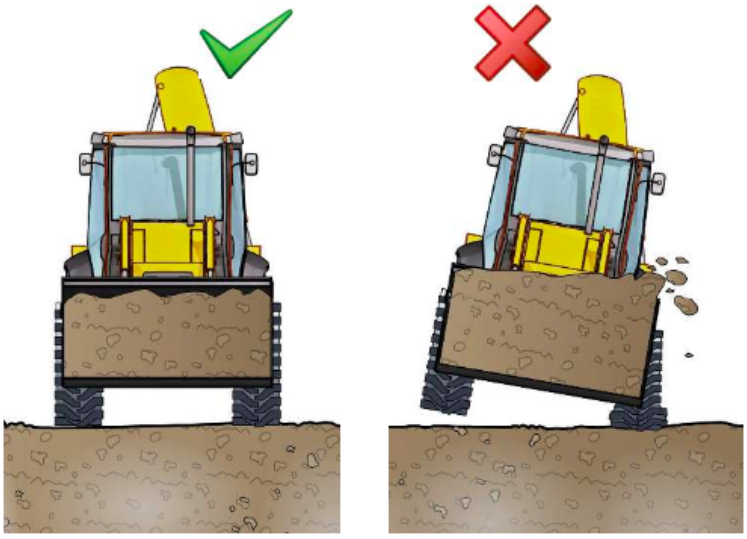



2. Switch off the engine. (If turbo charged you may need to allow the engine to cool first).

| | | |
|---|---|---|
| 3. Remove the key and dismount the loader (3 points of contact).<br>  | 4. Perform a post-operational check of the loader and complete the logbook.<br>  | 5. Secure the cabin to prevent anyunauthorised entry and/orvandalism.<br>  |

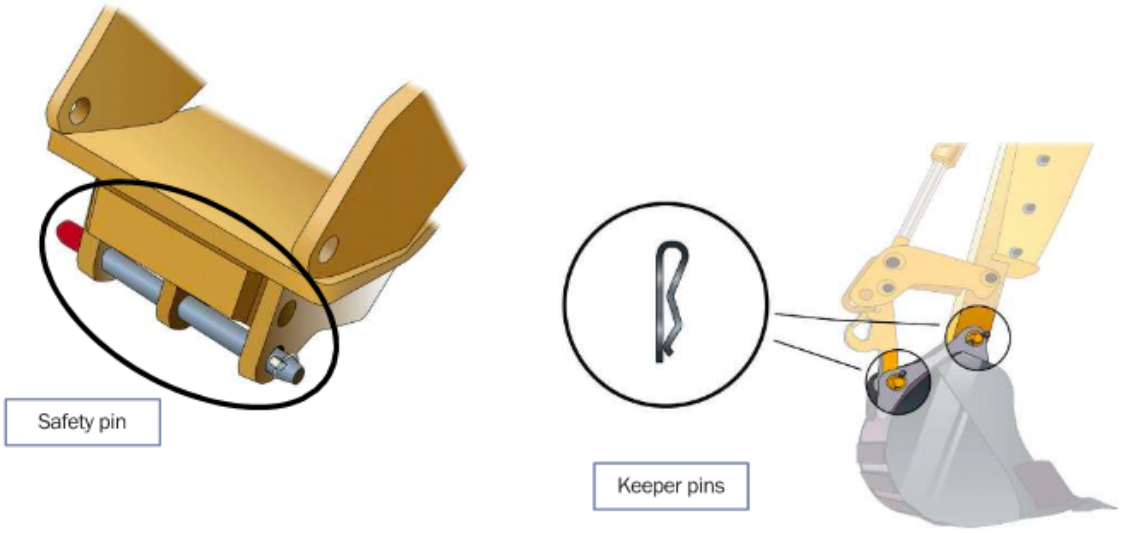
**Why do the tyres on a backhoe/loader need to be equal pressure?**

If the tyres are not equal pressure, the backhoe/loader could tip over sideways and injure you or someone else.



**How do you make sure the bucket is properly attached to the backhoe/loader?**

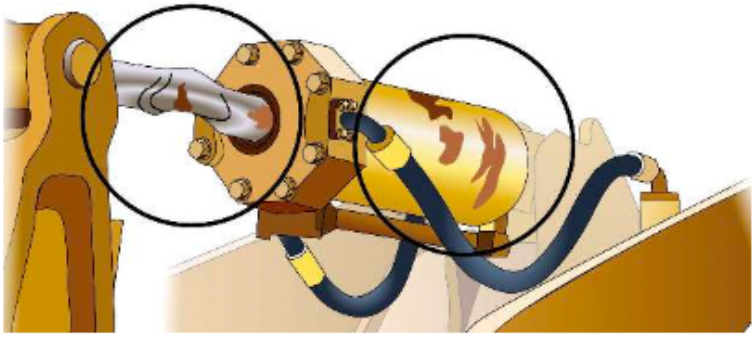
Check the safety pins and keepers are properly inserted.



**What problems do you check the hydraulic system for?**

Look for:

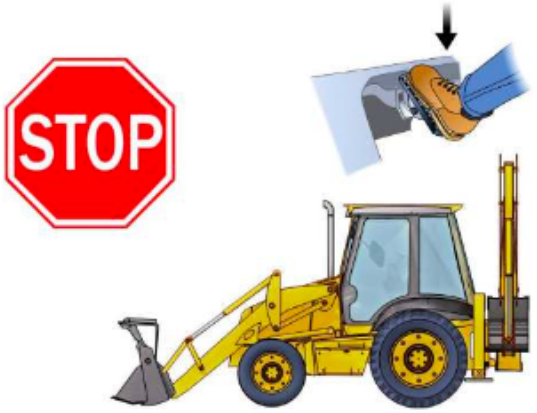
Damaged or bent hydraulicrams



Leaks

Cracked or split hydraulichoses

Test brakes

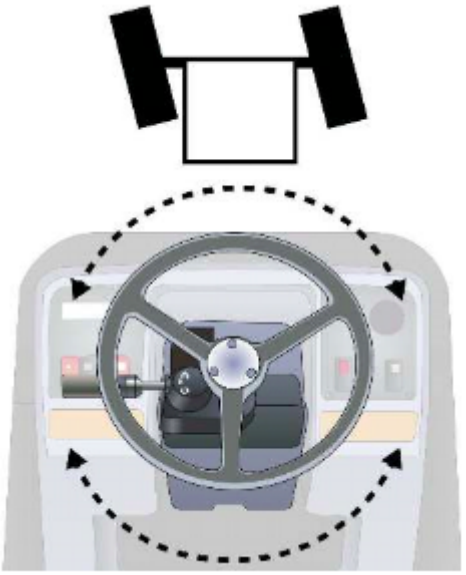



Test attachment movements

Test controls

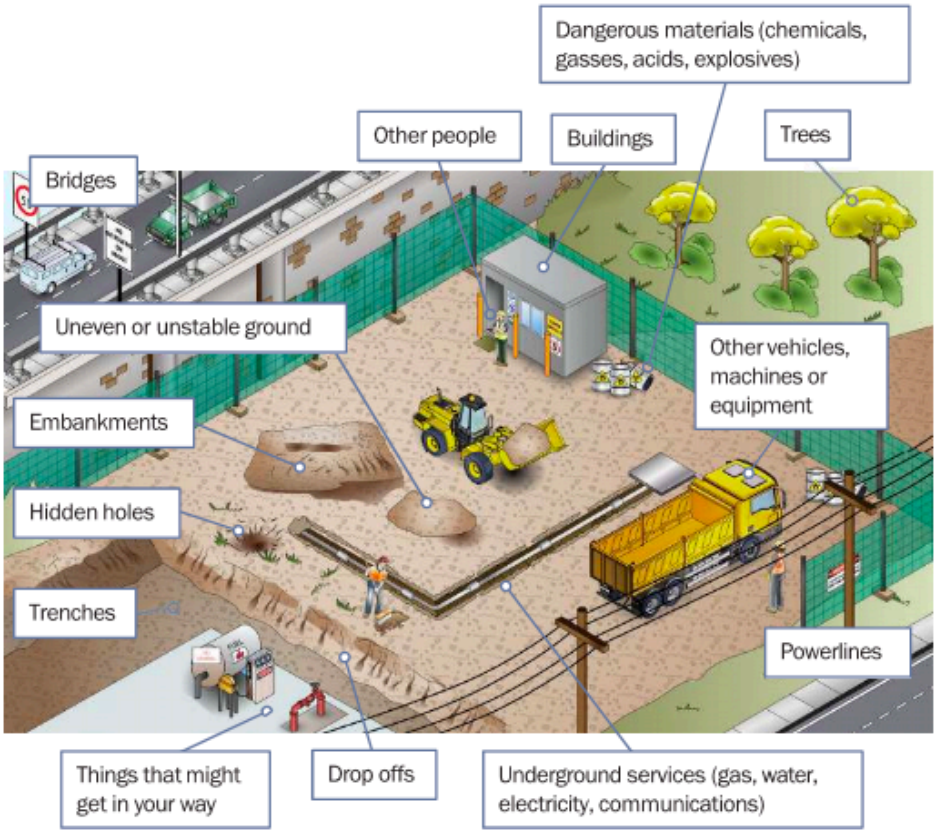
Drive the backhoe/loader a short distance to make sure it's okay

Test steering



**What are some hazards you must look for before starting work?**

Look for:



**The hierarchy of hazard control is a list of controls you can use to lower the danger from a hazard on the worksite. What are the six (6) levels in the hierarchy of hazard control from the first choice to the last choice?**

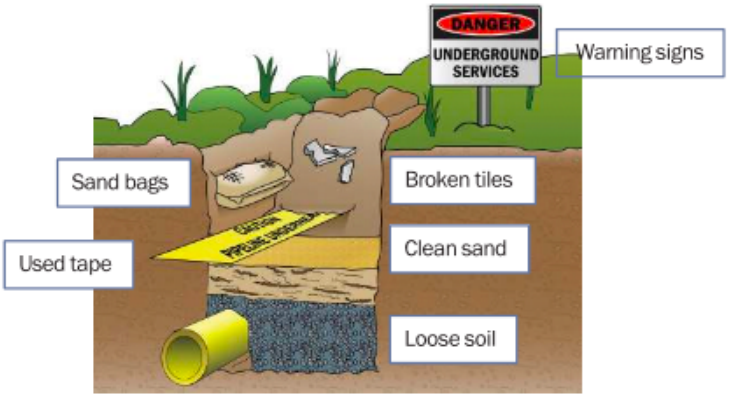
1. **Elimination:** If possible, remove (take away) the hazard.
2. **Substitution:** Use a safer method if you can't remove the hazard.
3. **Isolation:** Stop access to the hazardous (dangerous) area.


4. **Engineering Control Measures:** Change the tools, equipment or environment to make it safer.
5. **Administrative Practices:** Reduce the time the worker is exposed to the hazards by using training, job rotation, the timing of jobs, etc.
6. **Personal Protective Equipment (PPE):** Use PPE as your **last line** of defence.

**Memory aid:** **E**very **S**aturday **I** **E**at **A** **P**ie

**How can you tell you are near an underground service?**

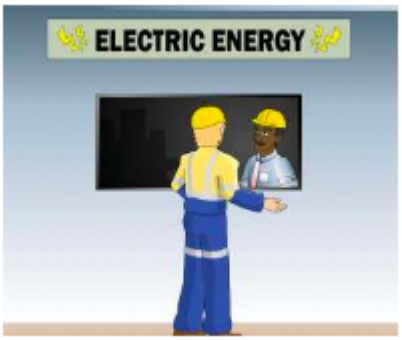
Look for:



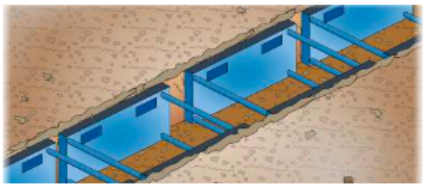
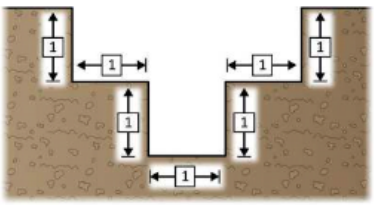
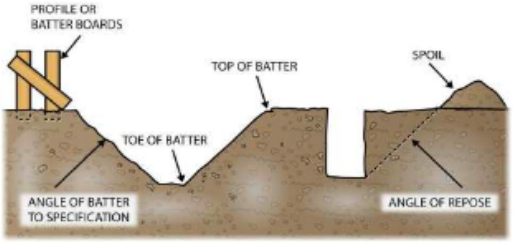

**What should you use to excavate if you think there's an underground service nearby?**

Stop. Use a hand tool to expose the service lines. Dig carefully so you won't cause damage.


**Who can you ask about underground services on the worksite?**

| | |
|---|---|
| Ask your site supervisor<br>  | Call 'Dial Before You Dig' on 1100 as a guide to services location only. Ask a specialist consultant to check the site.<br>  |
| Ask the local supply authority (for example, the electricity, gas or water company).<br>  | Check the council maps for the site<br>  |

**How can you prevent a trench or excavation from caving in on you?**

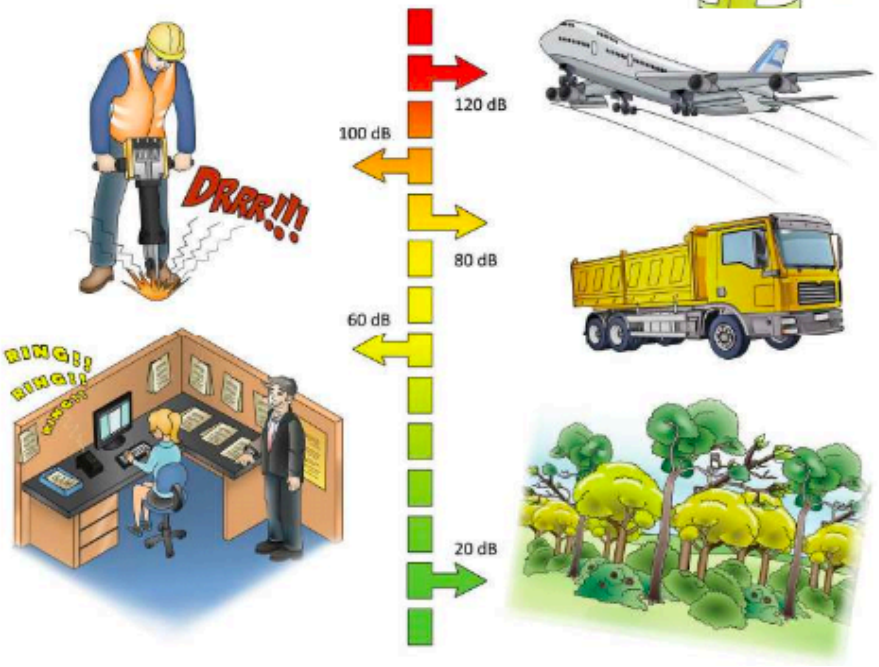
| | |
|---|---|
| Shoring or trench shields. You must use shoring if the excavation is more than 1.5 metres deep. Use shoring in any unstable ground. |  |
| Benching |  |
| Battering |  |

**What footwear must you wear when using any earthmoving equipment?**

Wear non-slip shoes that cover your whole foot (enclosed boot). Some sites require steel capped lace up boots.

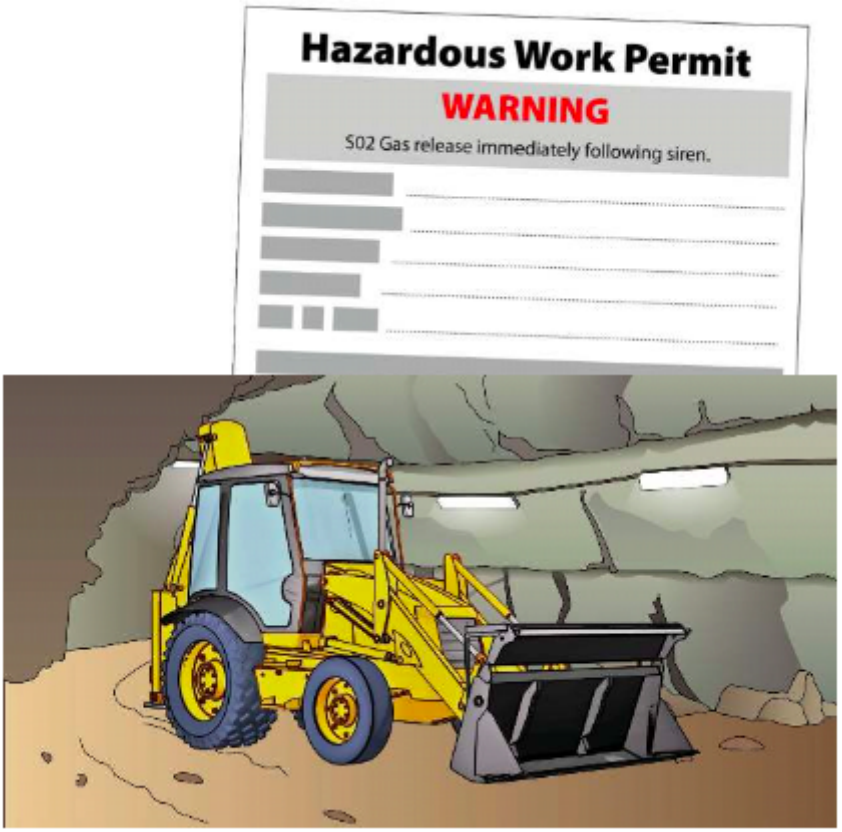
**When should you wear ear protection (such as ear muffs)?**

When the noise level could damage your ears. This is often considered anything over 85db



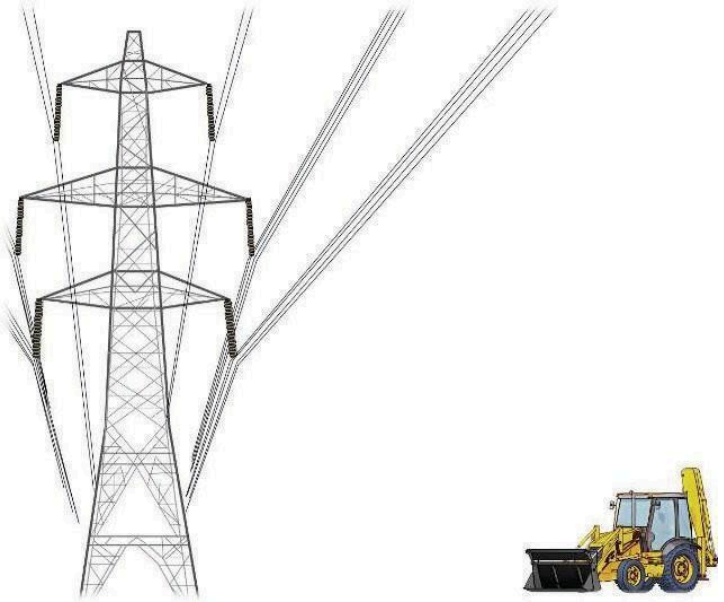
**You will work in a hazardous area, for example, a confined space. What type of permit might you need to get?**

You may need to get a hazardous work or confined space permit.




## 2.2.1 Powerlines

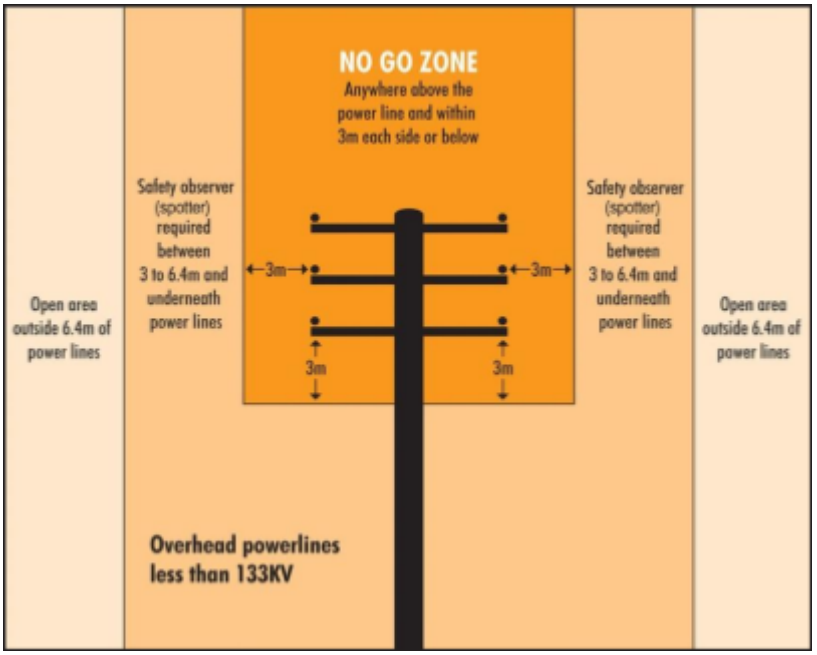
Sometimes you will work near uninsulated powerlines. Working near powerlines is very dangerous and can kill you. There are important rules you must follow – and the rules maybe different in your state/territory. In some states/territories you may be able to use a spotter and work closer to powerlines.



## 2.2.2 Overhead Powerlines on Poles (National Standard)

These are usually 'Low Voltage'. This means powerlines of less than 133KV. The information below is taken from the National Standard.
Always check the distances for your state or territory, as they may be different.

**AS2550.1**
**Powerline distances**




Powerline distances "Look up and live!"

Always check overhead for powerlines and make sure you and any equipment or materials you are using do not come into contact with them.

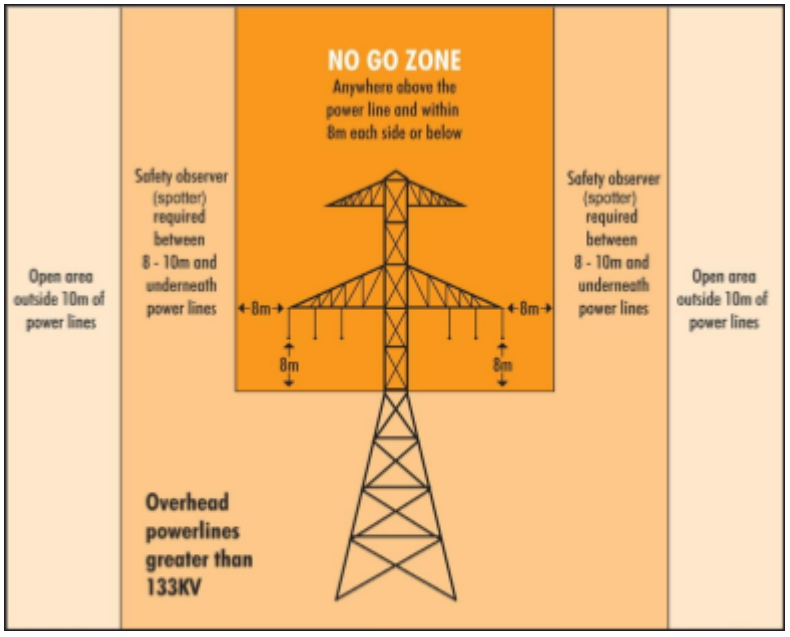
The safe operating distances for working near powerlines are outlined on the following pages. A spotter is required if you are working between 3 to 6.4 metres from distribution lines on poles.

The term 'spotter' is defined as a safety observer who is a person competent for the sole task of observing and warning against unsafe approach to overhead powerlines and other electrical apparatus.

(In Victoria the spotter must be registered by Energy Safe Victoria).

## 2.2.3 Overhead Powerlines on Towers (National Standard)

These are usually 'High Voltage'. This means powerlines of more than 133KV. The information below is taken from the National Standard.
Always check the distances for your state or territory, as they may be different.




**AS2550.1**
**Powerline distances**

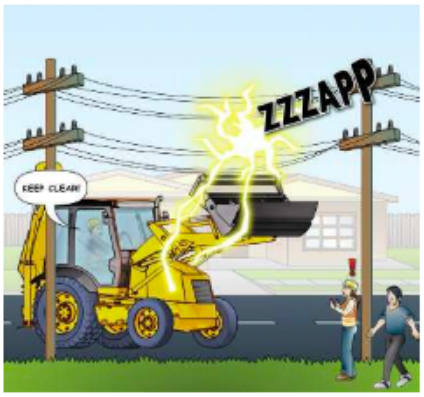
A spotter is required if you are working between 8 to 10 metres from transmission lines on towers.

The term 'spotter' is defined as a safety observer who is a person competent for the sole task of observing and warning against unsafe approach to overhead powerlines and other electrical apparatus.

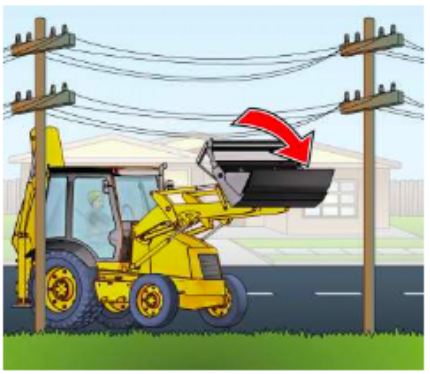
(In Victoria the spotter must be registered by Energy Safe Victoria).

**You are operating a backhoe/loader and it touches live powerlines. What do you do?**

Try to stay calm. Stay in your seat if possible. Tell other people to keep away.

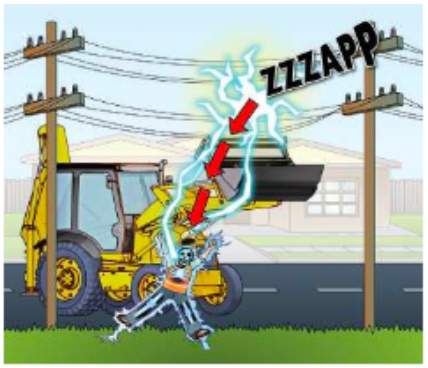



Try to lower the bucket away from the powerlines. Ask someone to get the power turned off.



In an emergency if you are alone or you think the machine might catch fire, jump well clear of the machine.


Never touch the ground and the machine at the same time – you may be electrocuted and killed.



Area affected by electricity


Do not make contact with different ground areas at the same time


Shuffle away keeping your feet closely together


**What is the danger of driving on soft, unevenor sloping ground?**

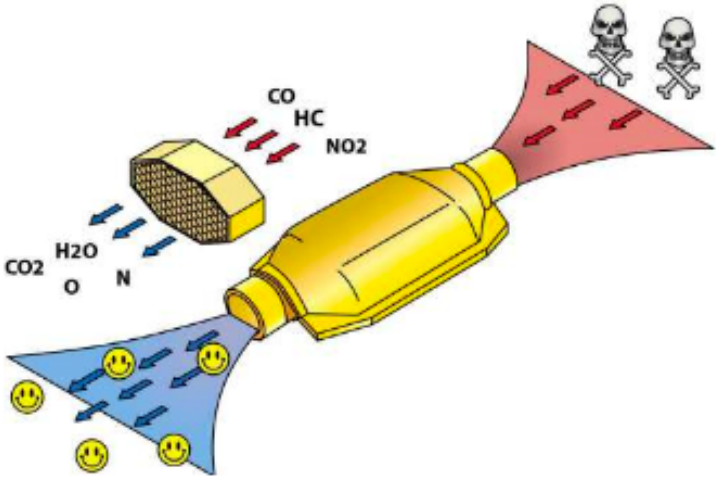
The backhoe/loader might tip over and injure you.

**Why is it dangerous to leave the engine running in an enclosed space?**

The exhaust fumes cannot escape the space, so the gasses might suffocate you or people in the enclosed space.

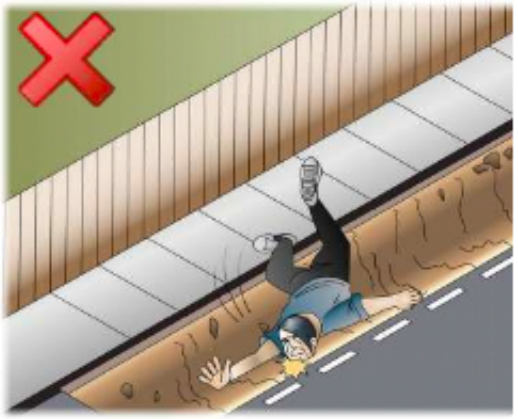
**If you must work in a tunnel or enclosed space, what must the backhoe/loader have?**

The backhoe/loader must have a catalytic converter or scrubber. Try to get as much fresh air as you can.




**There is a trench near a pedestrian footpath. How can you stop people falling into the trench?**

Put up barricades, guard rails or fencing. Use signs to warn people of the danger.



**What kinds of personal protective equipment (PPE) should you use when:**

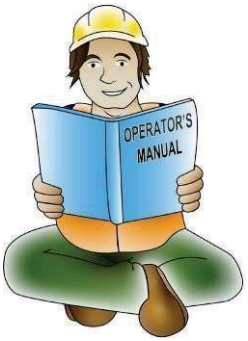
1. **The work area is noisy?**
2. **Something might fall on you?**
3. **You are operating equipment?**

| | | |
|---|---|---|
| 1. Ear muffs or other hearing protection.<br>  | 2. Safety helmet<br>  | 3. Non-slip footwear that covers all of your feet. Do not wear thongs!<br>  |

**How can you find out the specifications and limits of the machine you will use? Specifications include:**

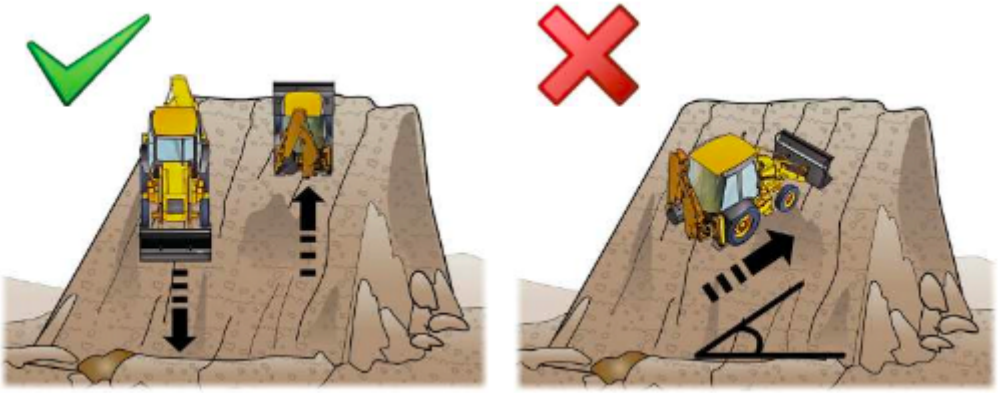
- **Load capacity**
- **Bucket height, volume and width**
- **Lift height**
- **Dump clearance**

Read the operator's manual to find out the limits.




**Which way should you travel when driving on sloping ground?**

Go straight up or down the hill, not at an angle.

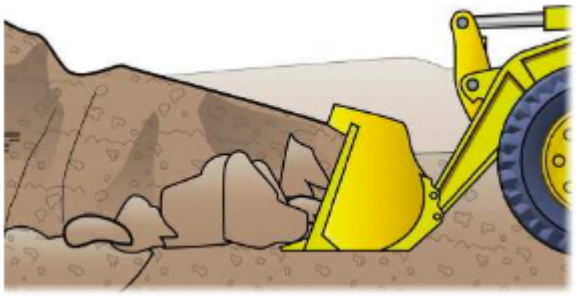


**When travelling down a steep slope, which gear do you use?**

Use the lowest gear you can.

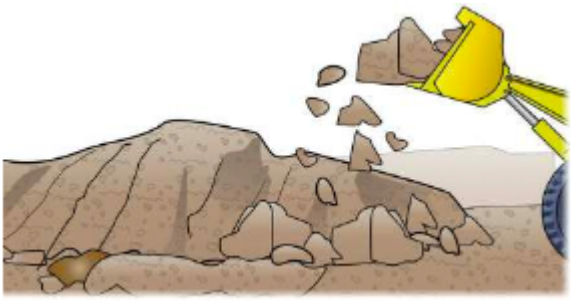

**How do you safely fill out a stockpile?**

1. Start by filling the area closest to the back of the stockpile area.



2. Try not to fill too close to the edge. The edge of the stockpile could give way.

3. Keep filling out the stockpile one row at a time.

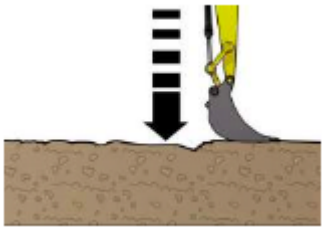


**How do you safely get in and out of the backhoe/ loader's cabin?**

Always use three (3) points of contact facing the machine. For example, use two hands and one foot or two feet and one hand.

3 Point Contact
(Both hands and foot)

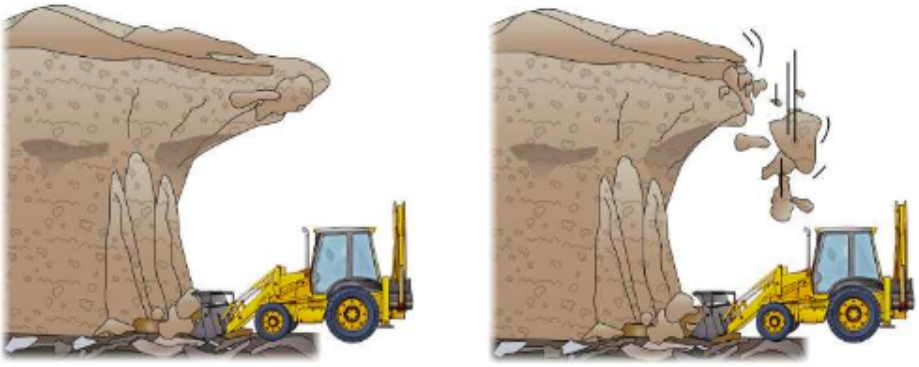
**The bucket is full and raised and a hydraulic hose starts to squirt fluid. What do you do?**

| | | |
|---|---|---|
| 1. Lower attachment to the ground.<br>  | 2. Park up machine. Tag out the equipment and DO NOT USE IT.<br>  | 3. Remove the key.<br>  |

| | |
|---|---|
| 4. Record the problem in the logbook.<br>  | 5. Report the problem to a supervisor.<br>  |

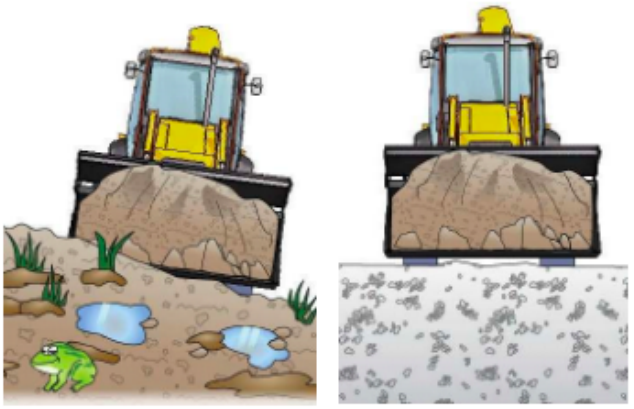
**What might happen if you undercut a stockpile, trench or bank?**

It could collapse.



**You are driving on uneven or soft ground. Does this reduce the load capacity?**

Yes, the load capacity is less when you are driving on uneven ground. You can carry more on hard, even ground because the load is more stable.

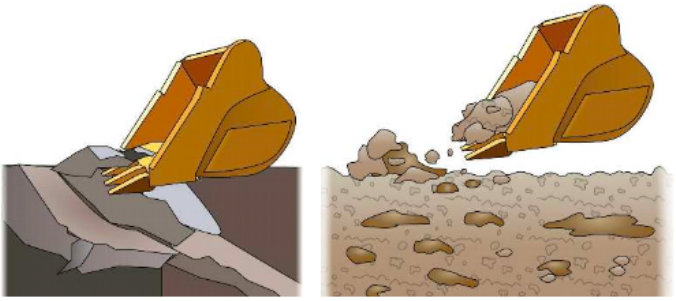


**You should never lift people in the bucket. Why?**

The bucket is not made to lift people. There is a risk of a person being injured in the bucket. This is also illegal and you may be prosecuted.

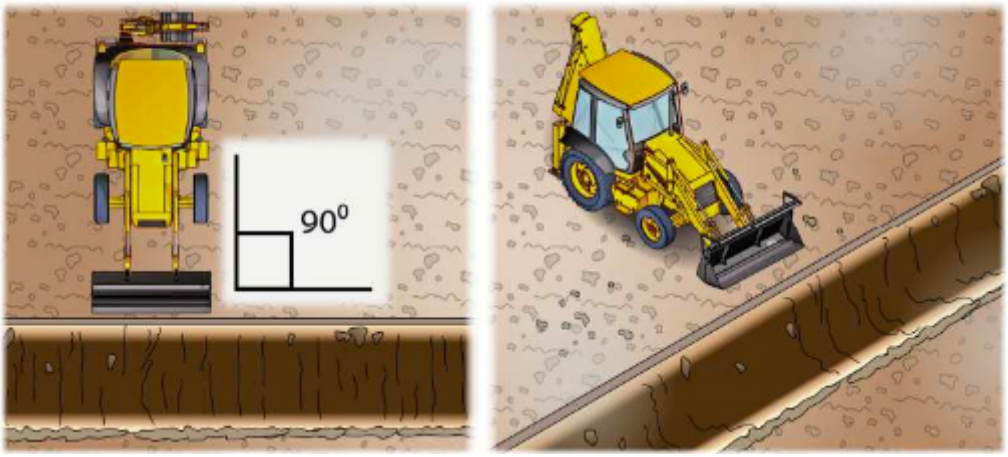
**Which is harder to excavate, top soil or clay? Why?**

Clay as it is denser and does not break up as easily as top soil.



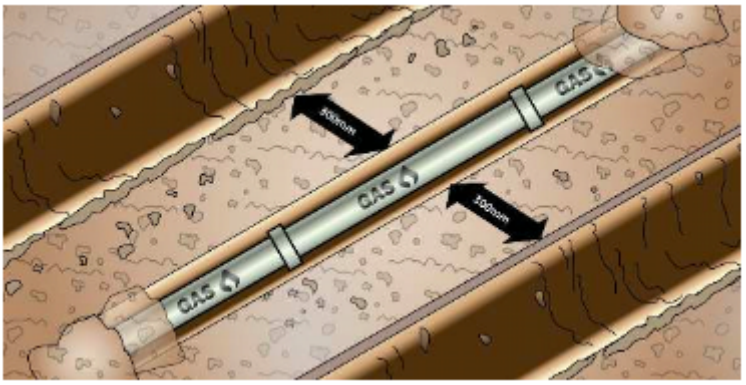
**You are filling a trench with the front bucket on a backhoe/loader. In which direction should you move towards the trench?**

Move towards the trench at a 90 degree angle (straight). This helps keep the backhoe/loader well-balanced.



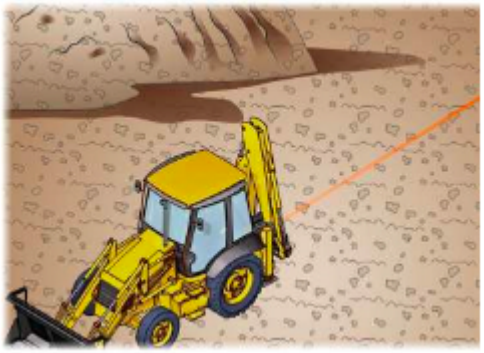

**How do you safely excavate around a water or gaspipe?**

Excavate around the pipe and keep 300 mm of clearance around it. Hand dig to expose the service. Use a spotter to guide digging.



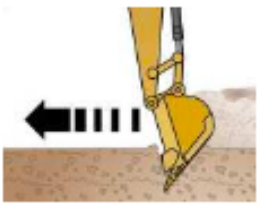

**How would you dig a trench with the backhoe/loader?**

1. Centre the backhoe/loader over the marked line. Make sure it is level.

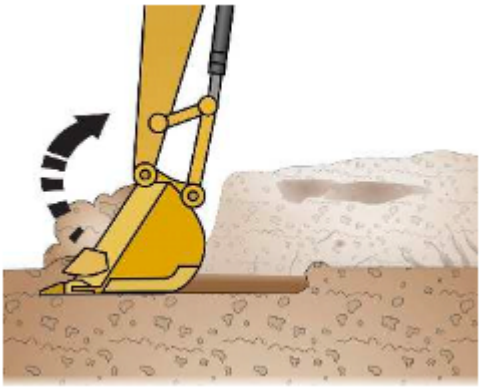


2. Extend the bucket and arm and insert teeth into the ground.

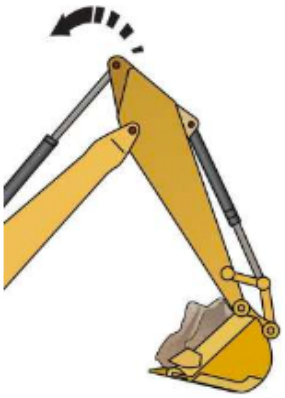
3. Move the dipperarm in to fill the bucket.



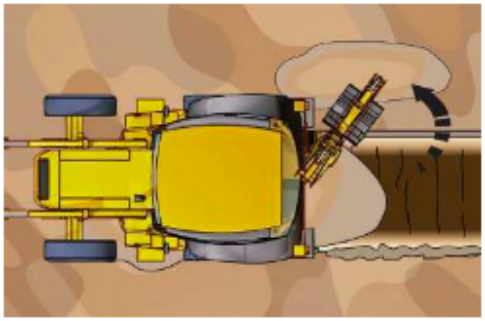
4. Crowd the bucket.



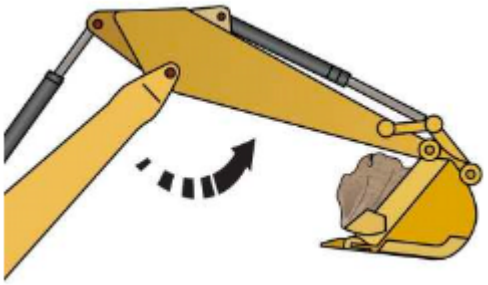
5. Raise the boom.



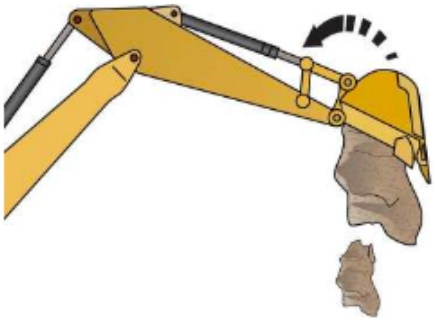
6. Slew to the dumpsite.



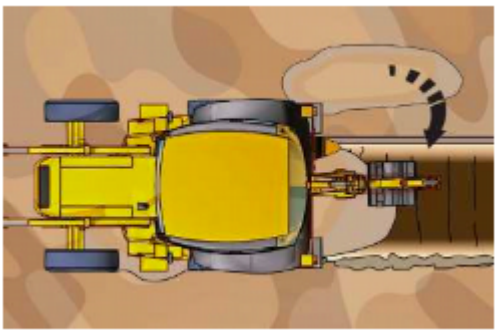
7. Push the dipper arm out.



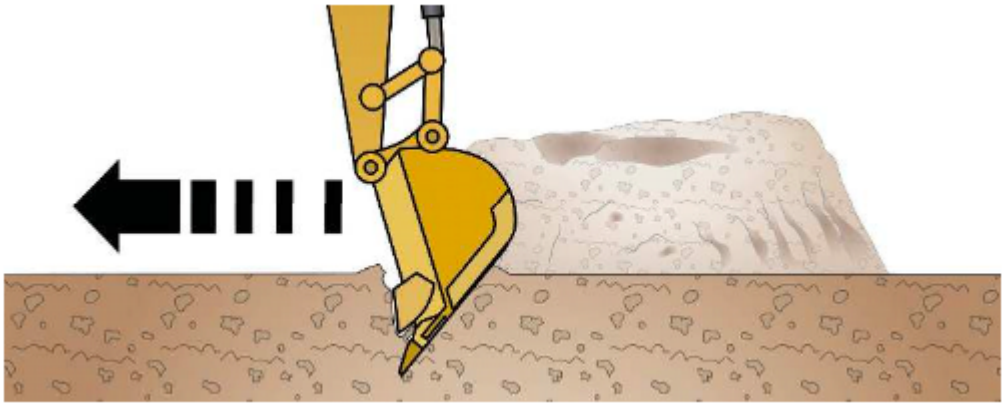
8. Tilt the bucket to empty.



9. Slew back to the trench.

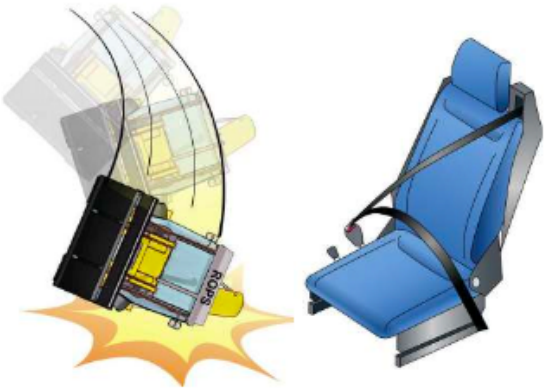


10. Repeat operations until the trench meets specifications.



**Which two safety devices on a backhoe/loader protect you from being squashed if it rolls over?**

The roll over protective structure (ROPS) and the seat belt. Always wear the seat belt when using a backhoe/loader!



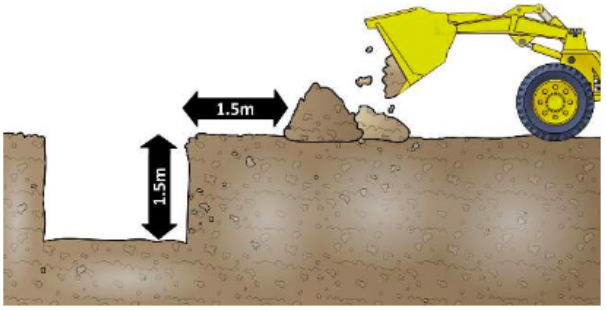

**You are using the backhoe/loader for demolition work. What extra protection do you need?**

A falling object protective structure (FOPS).

**When dumping materials near an excavation, how far away from the excavation must you dump the load?**

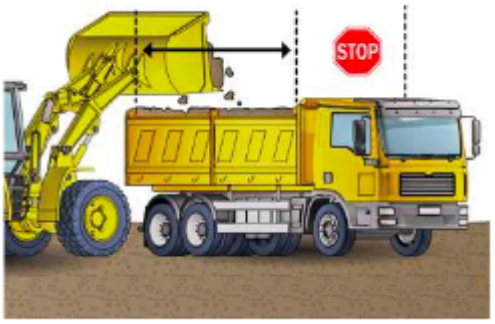
As a general rule of thumb, you should dump the load the same distance away as the depth of the hole.

*For example:*



**What safety precautions should you take when dumping a load into a truck?**

The load must not pass over the truck's cabin




The load must not be heavier than the SWL of the backhoe/loader's rated capacity

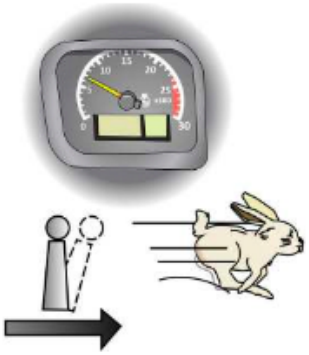

The bucket must hold the load completely

Put a layer of soil in the truck before dumping large rocks

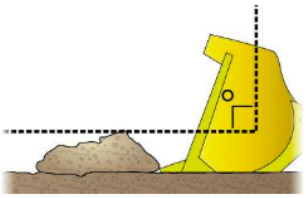
Position the truck safely

**What steps do you take to safely pick up, move, and dumpmaterials?**

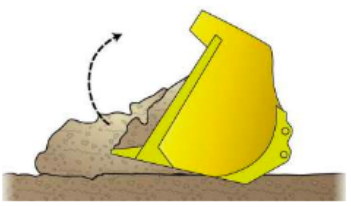
1. Build up engine RPM and correct speed. Try not to spin the wheels.



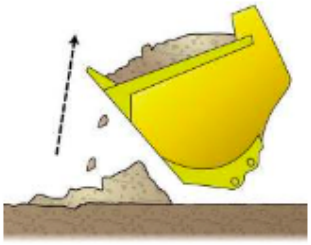
2. Make sure the bucket is at the right level and angle.



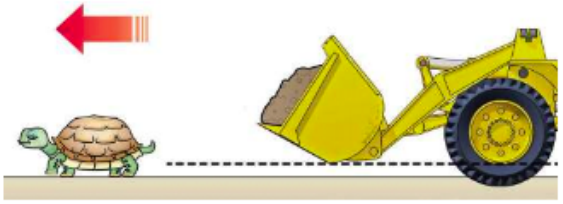
3. Crowd the bucket upwards.



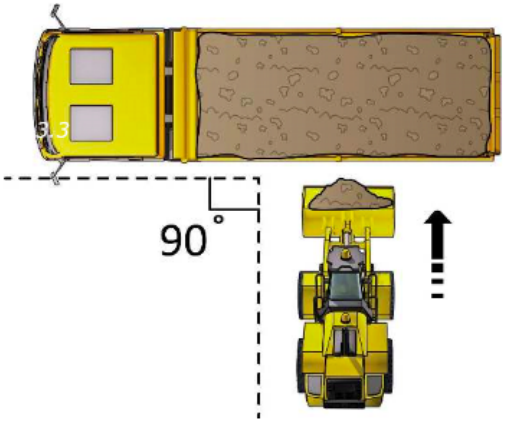
4. Pick up the load



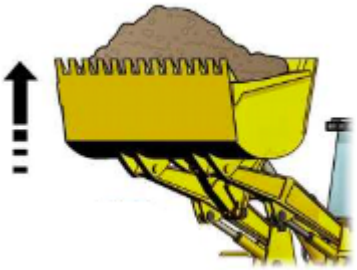
5. Move the load at low speed and with the bucket lowered.



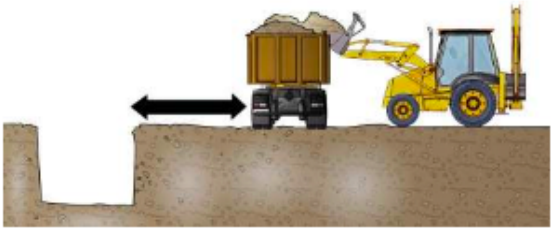
6. Approach the truck or trench from a 90 degree angle.




7. Raise the load.



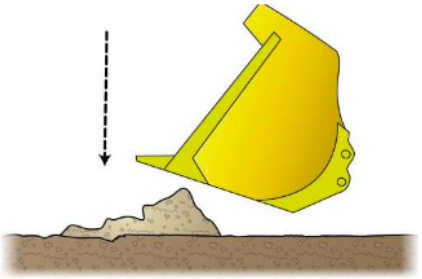
8. If dumping the load into a truck make sure you are on a flat level surface away from trenches and excavations.

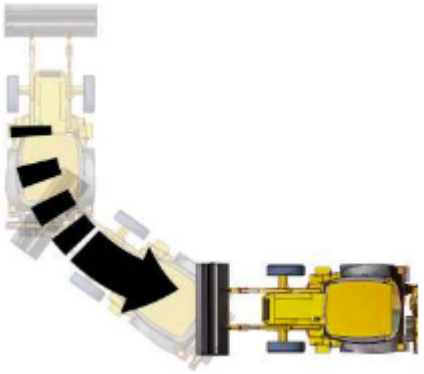


9. Look behind you

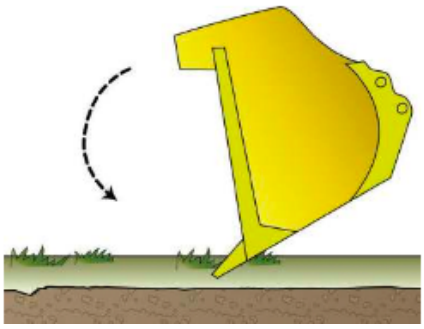
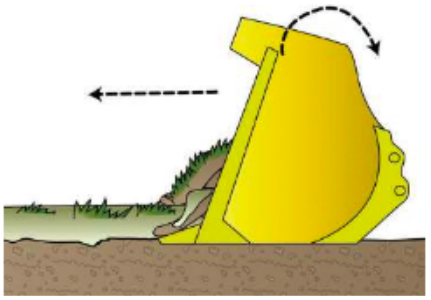
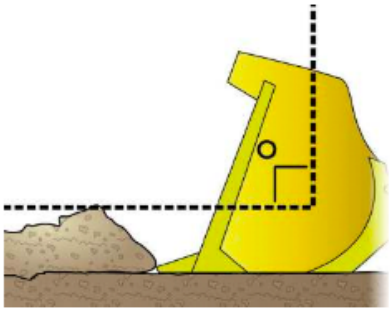
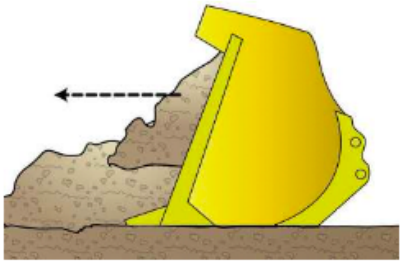
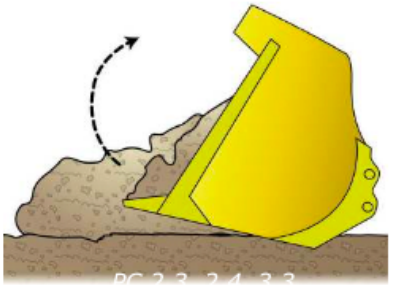
10. Reverse away from the truck.

11. Lower the bucket.



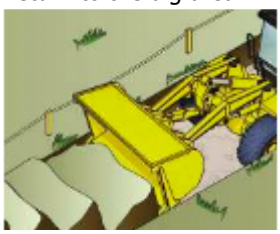
| | |
|---|---|
| 12. Turn  | 13. Move back to the stockpile.  |

**How do you strip topsoil? Explain the steps.**

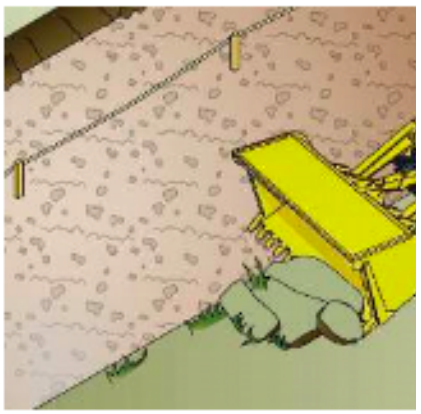
| | |
|---|---|
| 1. Tilt the bucket forward so the front of the cutting edge is in contact with the ground.  | 2. Drive forward to dig.  |
| 3. Roll the bucket back to level at the correct depth.  | 4. Move forward until the bucket is full.  |
| 5. Crowd the bucket when it is full.  | 6. Raise the bucket to travel height and move to the stockpile or truck.  |

7. Raise the arms and empty the bucket.

8. Return to the dig area.



9. Use about half to three quarters of the bucket on the previously dug area to maintain a level base.



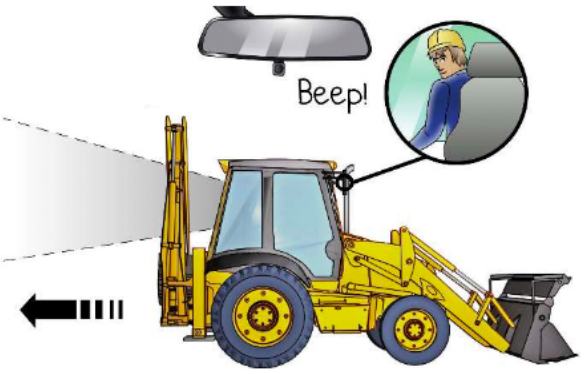
**When should you refuel your backhoe/loader?**

At the end of the days work as this cools the fuel in the tank quickly and reduces the amount of condensation that will be drawn into the fuel tank overnight with the fuel cooling.

# 2.3 Load, Carry and Place Materials to Complete Work Activity

**What do you do before reversing a backhoe/ loader?**

1. Check the area behind is clear.
2. Make sure the reversing alarm is working.



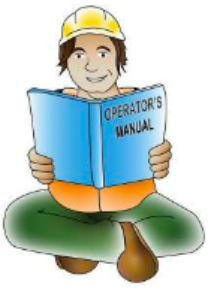

On mining sites:

- Beep/sound horn once (×1) to start the engine (wait 5 seconds)
- Beep/sound horn two times (×2) to go forward (wait 5 seconds)
- Beep/sound horn three times (×3) to reverse (wait 5 seconds).
  Do this even if you have reversing alarms. Check mirrors. Look over your shoulder and check for a clear path.

**How can you communicate and share information with your workmates?**

| | |
|---|---|
| Talk and ask questions  | Use radios  |
| Share instructions  | Put up warning and information signs   |
| Toolbox meetings  | Use hand signals  |

**How can you find out the maximum safe working load (SWL) of the backhoe/ loader?**

| | |
|---|---|
| Check that load chart<br>  <br> | Check the data plate<br>  |
| Read the markings on the backhoe/loaderitself<br>  | Read the operator's manual<br>  <br> |

**How can you find out the weight of a load?**

| | |
|---|---|
| Check the weighbridge note, consignment note, or other information.<br>  | Read the weight marked on the load<br>  <br> |
| Estimate the weight of the load. For example, 1 cubic metre of concrete = 2.4t<br>  | Check the machine load scales if it has them fitted<br>  <br> |

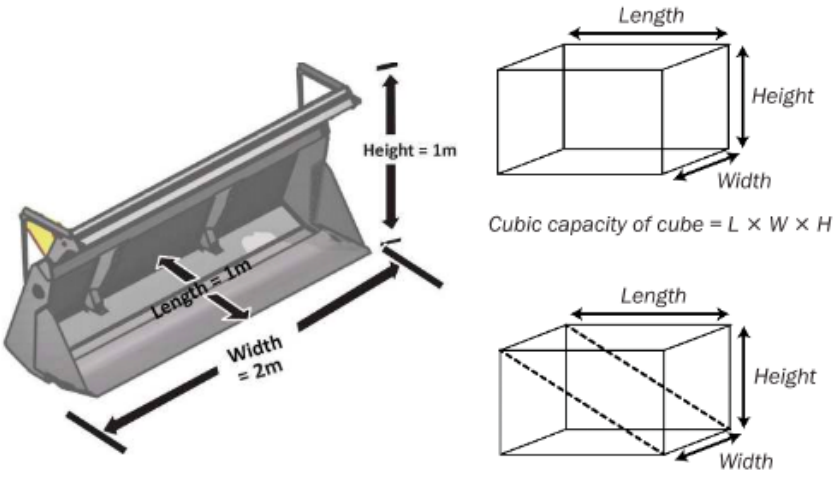
# 2.3.1 Table of Weight of Common Materials

1000 kilograms = 1 tonne

| Examples of the approximate weight of different materials: |
|---|
| 1 cubic metre of water = 1 metric tonne |
| 1 cubic metre of earth = 1.9 metric tonnes |
| 1 cubic metre of clay = 1.9 metric tonnes |
| 1 cubic metre of dry beach sand = 2.0 metric tonnes |
| 1 cubic metre of concrete = 2.4 metric tonnes |
| 1 cubic metre of coal ash = 0.8 (8/10) of a metric tonne |
| 25 bags of cement (40 kg each) = 1 metric tonne |
| 1000 common bricks = 4 metric tonnes |
| 1 cubic metre of steel = 7.3 metric tonnes |
| 1 cubic metre of copper = 9 metric tonnes |
| 1 cubic metre of lead = 11.4 metric tonnes |

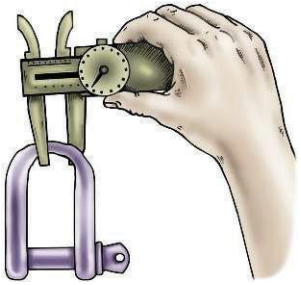
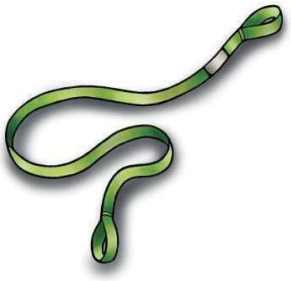
**How do you find out the cubic capacity of the bucket?**

$$\text{Capacity} = \frac{L \times W \times H}{2}$$




Cubic capacity of bucket = L × W × H ÷ 2
Cubic capacity is ÷ 2 because of the shape of the bucket (a triangular prism or half the cube).

**What lifting equipment checks do you do?**

| | |
|---|---|
| Check lifting lugs<br>  | Check chain slings for wear. Make sure tag is attached.<br>  |
| Check shackles for wear. No more than 10%.<br>  | Check other lifting gear<br>  |

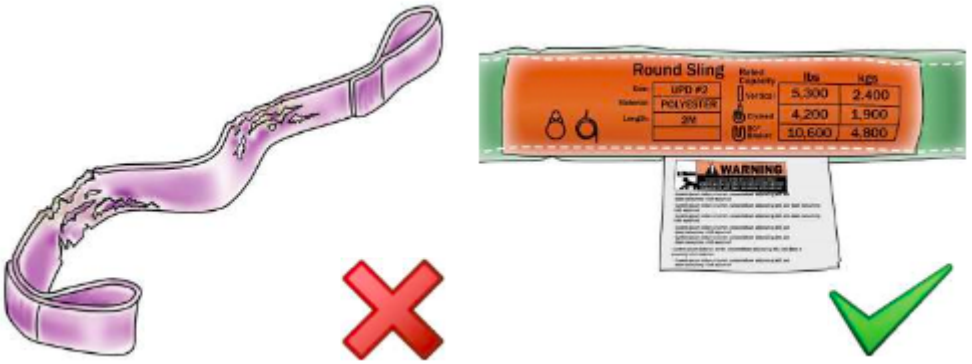
**What must a lifting sling have?**

The sling must have SWL marked. The SWL tag tells you how much weight the sling can hold.


Note: Flexible steel wire rope slings can have SWL/WLL stamped on the ferrule.

**What if the sling has no tag or it cannot be read?**

Do not use it! Send it to the manufacturer for retagging or throw it away.



## 2.3.2 Angle Factors When Using A Sling

Two grade T 6 mm chain slings lifting together in a straight (vertical) lift 0° angle between the slings can lift 2.2 tonnes. If the slings are attached so there is an angle between them then their capacity is reduced.
This simply means:

- if there is an angle of 60° between the slings they can only lift the same as 1.9 slings
- if there is an angle of 90° between the slings they can only lift the same as 1.4 slings
- if there is an angle of 120° between the slings they can only lift the same as 1.0 sling.

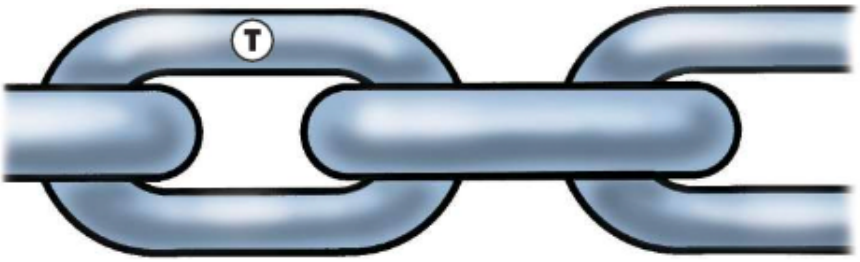
| Alloy Grade T 800 Chain Sling | | | |
|---|---|---|---|
| 2, 3 or 4 Leg Slings | | | |
|  |  | | |
| Chain size (mm) | Straight Sling | | |
| | 60 | 90 | 120 |
| 6.0 | 1.9 | 1.6 | 1.1 |
| 7.0 | 2.6 | 2.1 | 1.5 |
| 8.0 | 3.5 | 2.8 | 2.0 |
| 10.0 | 5.5 | 4.5 | 3.2 |

## 2.3.3 Chain Slings

A chain sling must have a metal tag attached, stating the chain grade and chain size. It must also show the safe working load (SWL) when using the sling in different configurations such as a straight sling or an angled sling. There are different types (grades) of lifting chain. The grade refers to the strength rating of the chain. High Tensile and Very High Tensile (Grade T. 80 and 100) are used most often for lifting. Low-grade chain (grade 30) is rarely used for lifting.

**Higher tensile, quenched and tempered chain**

Grade: 80
Branded: T. 8, 80, 800, PWB, or CM and HA800 alternately. (This is the common grade used for lifting purposes).




*Grade markings are either marked on every 20th link or one metre of chain length, whichever is shorter.*

## 2.3.4 Grade (T) 80 Working Load Limits (tonnes) Table

**Grade (T) 80 Working Load Limits (tonnes)**

| Chain | Single leg slings | | | Slings of 2, 3, or 4 legs | | | | | | Endless slings | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Straight sling | | | Reeved sling | | | Basket sling | | | |
| Diameter mm | Straight sling | Adjustable sling | Reeved sling | 60° | 90° | 120° | 60° | 90° | 120° | 60° | 90° | 120° | Reeved sling |
| 6 | 1.2 | 0.95 | 0.95 | 1.9 | 1.6 | 1.1 | 1.6 | 1.3 | 0.95 | 1.6 | 1.3 | 0.95 | 1.9 |
| 7 | 1.6 | 1.2 | 1.2 | 2.6 | 2.1 | 1.5 | 2.0 | 1.7 | 1.2 | 2.0 | 1.7 | 1.2 | 2.4 |
| 8 | 2.0 | 1.5 | 1.5 | 3.5 | 2.8 | 2.0 | 2.6 | 2.1 | 1.5 | 2.6 | 2.1 | 1.5 | 3.0 |
| 10 | 3.2 | 2.4 | 2.4 | 5.5 | 4.5 | 3.2 | 4.1 | 3.4 | 2.4 | 4.1 | 3.4 | 2.4 | 4.8 |
| 13 | 5.4 | 4.0 | 4.0 | 9.4 | 7.6 | 5.4 | 7.0 | 5.7 | 4.0 | 7.0 | 5.7 | 4.0 | 8.1 |
| 16 | 8.2 | 6.1 | 6.1 | 14.2 | 11.6 | 8.2 | 10.6 | 8.7 | 6.1 | 10.6 | 8.7 | 6.1 | 12.3 |
| 20 | 12.8 | 9.6 | 9.6 | 22.2 | 18.1 | 12.8 | 16.6 | 13.6 | 9.6 | 16.6 | 13.6 | 9.6 | 19.2 |
| 22 | 16.0 | 12.0 | 12.0 | 27.8 | 22.7 | 16.0 | 20.8 | 17.0 | 12.0 | 20.8 | 17.0 | 12.0 | 24.1 |
| 26 | 20.6 | 15.5 | 15.5 | 35.8 | 29.2 | 20.6 | 26.8 | 21.9 | 15.5 | 26.8 | 21.9 | 15.5 | 31.0 |
| 32 | 32.8 | 24.6 | 24.6 | 56.8 | 46.3 | 32.8 | 42.6 | 32.7 | 24.6 | 42.6 | 34.7 | 24.6 | 49.2 |

**Maximum Safe Working Loads in tonnes of 1000 kg under general conditions of use.**

- **DO NOT EXCEED SAFE WORKING LOAD**
- **DO NOT EXCEED 120°**
- **SWL at 60° must never be exceeded, even at smaller angles**

**IMPORTANT INSTRUCTIONS ON THE USE OF ALLOY GRADE T(80) CHAIN SLINGS**

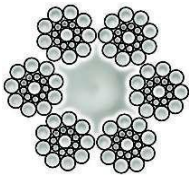
**SAFETY WARNING OF HAZARDOUS CONDITIONS**
Extreme care should be taken when using the Grade T(80) Chain Slings in close proximity of high temperature. It is therefore recommended that the user make ample provisions for reduced Safe Working Loads.

**TEMPERATURE CONTROL**
-30°C to 200°C No reduction in SWL
200°C up to 300°C Reduce SWL by 10%
300°C up to 400°C Reduce SWL by 25%
**Do not use above 400°C**

**ACIDIC CONDITIONS**
Alloy Grade T(80) slings should not be used in acidic solutions nor in any other corrosive environment.

**GALVANISING**
Alloy chains and fittings should not be hot-dip galvanised nor electro-plated as the Safe Working Load is reduced by 20% after galvanising.

## 2.3.5 Flexible Steel Wire Rope (FSWR) Slings

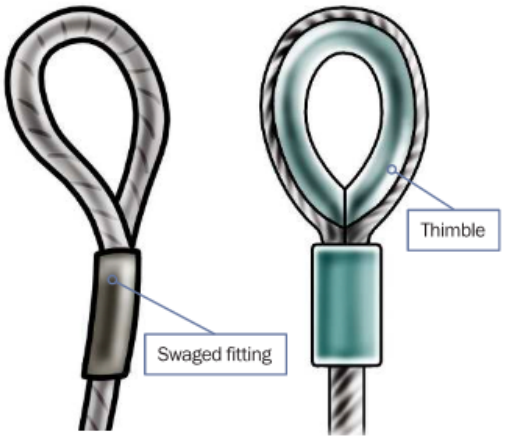


For FSWR to be used as a sling it should have a minimum construction of 6 strands with 19 wires in each strand (6 × 19 or 6/19). The smallest diameter FSWR is 5 mm.

It should also have these parts:

**Swaged fitting**
Swaged fittings are machine pressed to form a soft eye in a FSWR.
A thimble can be inserted to make a hard eye in the FSWR.

**Thimble**
A thimble is a fitting used in the formed eye of a rope and is designed to protect the eye of the sling from chafing and distortion.



# 2.3.6 Wire rope slings table

| Manufactured to AS1666 | | | | | | | | | Safety Factor 5:1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wire rope slings | | | | | | | | | | | | | | | | | | |
| Method of loading | | Direct load | Choke hitch | | Basket hitch | | | | | | | | Direct loaded | | | Choke hitch | | | |
| | | | Round load | Rectangular load | Round load | | | | Other than round load | | | | | | | Round load | | Other than round load | |
| Rope | | | | | | | | | | | | | | | | Single Wrap | Double Wrap | Single Wrap | Double Wrap |
| Nominal diameter mm | Minimum breaking force kN | | | | | | | | | | | | | | | | | | |
| Included angle | | - | - | - | 0° | 60° | 90° | 120° | 0° | 60° | 90° | 120° | 0° to 60° | 90° | 120° | 0° to 45° | 0° to 60° | 0° to 45° | 0° to 60° |
| Safe working loads in tonnes | | | | | | | | | | | | | | | | | | | |
| Safe working loads under general use with 1570 grade wire and fibre core with ferrule-secured eyes | | | | | | | | | | | | | | | | | | | |
| 8 | 28.2 | 0.55 | 0.41 | 0.27 | 1.09 | 0.94 | 0.77 | 0.55 | 0.55 | 0.48 | 0.39 | 0.27 | 0.94 | 0.77 | 0.55 | 0.71 | | 0.48 | |
| 9 | 35.6 | 0.69 | 0.52 | 0.34 | 1.38 | 1.19 | 0.97 | 0.69 | 0.69 | 0.60 | 0.49 | 0.34 | 1.19 | 0.97 | 0.69 | 0.90 | | 0.60 | |
| 10 | 44.0 | 0.85 | 0.64 | 0.43 | 1.70 | 1.47 | 1.20 | 0.85 | 0.85 | 0.74 | 0.61 | 0.43 | 1.47 | 1.20 | 0.85 | 1.11 | | 0.74 | |
| 11 | 53.2 | 1.03 | 0.77 | 0.52 | 2.1 | 1.78 | 1.45 | 1.03 | 1.03 | 0.90 | 0.73 | 0.52 | 1.78 | 1.45 | 1.03 | 1.34 | | 0.90 | |
| 12 | 63.3 | 1.23 | 0.92 | 0.61 | 2.5 | 2.1 | 1.73 | 1.23 | 1.23 | 1.07 | 0.87 | 0.61 | 2.1 | 1.73 | 1.23 | 1.59 | | 1.07 | |
| 13 | 74.3 | 1.44 | 1.08 | 0.72 | 2.9 | 2.5 | 2.0 | 1.44 | 1.44 | 1.25 | 1.02 | 0.72 | 2.5 | 2.0 | 1.44 | 1.87 | | 1.25 | |
| 14 | 86.2 | 1.67 | 1.25 | 0.83 | 3.3 | 2.9 | 2.4 | 1.67 | 1.67 | 1.45 | 1.19 | 0.83 | 2.9 | 2.4 | 1.67 | 2.2 | | 1.45 | |
| 16 | 113 | 2.2 | 1.64 | 1.09 | 4.4 | 3.8 | 3.1 | 2.2 | 2.2 | 1.90 | 1.55 | 1.09 | 3.8 | 3.1 | 2.2 | 2.8 | | 1.90 | |
| 18 | 143 | 2.8 | 2.1 | 1.38 | 5.5 | 4.8 | 3.9 | 2.8 | 2.8 | 2.4 | 1.97 | 1.38 | 4.8 | 3.9 | 2.8 | 3.6 | | 2.4 | |
| 20 | 176 | 3.4 | 2.6 | 1.70 | 6.8 | 5.9 | 4.8 | 3.4 | 3.4 | 3.0 | 2.4 | 1.70 | 5.9 | 4.8 | 3.4 | 4.4 | | 3.0 | |
| 22 | 213 | 4.1 | 3.1 | 2.1 | 8.3 | 7.1 | 5.8 | 4.1 | 4.1 | 3.6 | 2.9 | 2.1 | 7.1 | 5.8 | 4.1 | 5.4 | | 3.6 | |
| 24 | 253 | 4.9 | 3.7 | 2.5 | 9.8 | 8.5 | 6.9 | 4.9 | 4.9 | 4.3 | 3.5 | 2.5 | 8.5 | 6.9 | 4.9 | 6.4 | | 4.3 | |
| 26 | 297 | 5.8 | 4.3 | 2.9 | 11.5 | 10.0 | 8.1 | 5.8 | 5.8 | 5.0 | 4.1 | 2.9 | 10.0 | 8.1 | 5.8 | 7.5 | | 5.0 | |
| 28 | 345 | 6.7 | 5.0 | 3.3 | 13.4 | 11.6 | 9.4 | 6.7 | 6.7 | 5.8 | 4.7 | 3.3 | 11.6 | 9.4 | 6.7 | 8.7 | | 5.8 | |
| 32 | 450 | 8.7 | 6.5 | 4.4 | 17.4 | 15.1 | 12.3 | 8.7 | 8.7 | 7.6 | 6.2 | 4.4 | 15.1 | 12.3 | 8.7 | 11.3 | | 7.6 | |

# 2.3.7 Webbing Slings

There are a number of types of webbing slings used in lifting.

**Terminal attachment**
This type of sling has a triangle fitting on each end. These slings are used in vertical and basket hitches. Some have a choker fitting on either end for choker hitches.

**Endless slings**

Endless slings are very versatile. They can be used in all three types of hitches. When used in a choker or basket hitch the legs can be spread for improved load control and balance.

**Flat eye sling**

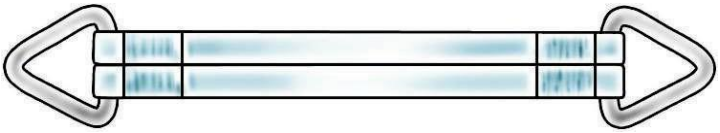
Flat eye slings can be used in vertical, choker, and basket hitches.

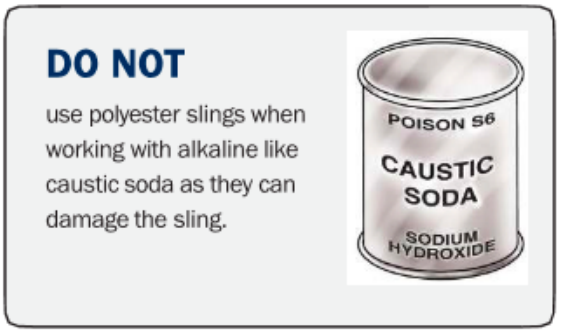
**Reversed eye sling**

Reversed eye slings have eyes that are twisted 90 degrees to form a better choker hitch. This type of sling also sits better in the crane hook.

**Wide load sling**

A wide load sling is an endless sling that has been joined together down its length. The eyes can be flat or reversed.



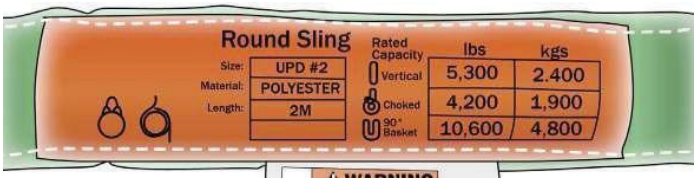

## 2.3.8 Synthetic webbing slings — working load limits (WLL)

There are two ways to find out the working load limit (WLL) for synthetic webbing slings:

1. Colour coding to Australian standards.

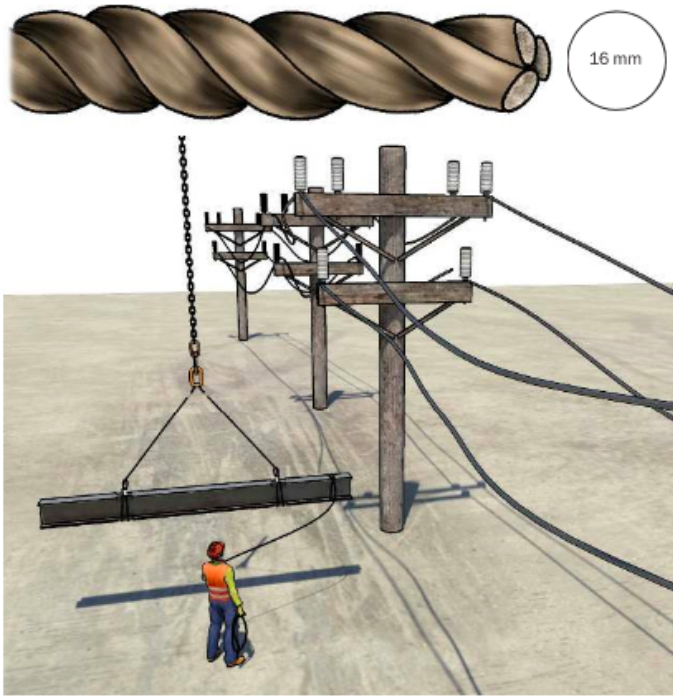
| FLAT WEBBING SLINGS MANUFACTURED TO AS 1353 SAFETY FACTOR 8:1 | | | | | | ROUND SLINGS MANUFACTURED TO AS4497 SAFETY FACTOR 7:1 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Flat Webbing & Round Slings | | | | | | | | | | |
| Webbing Slings & Round Slings 8:1 Safety Factor | | | | | | | | | | |
| Lifting Mode Capacity | | Vertical SWL | Choke SWL | Basket SWL | 30° SWL | 60° SWL | 90° SWL | 120° SWL | 60° SWL | 60° Choke SWL |
| Kg | Colour Code | Kg | Kg | Kg | Kg | Kg | Kg | Kg | Kg | Kg |
| 1000 | Violet | 1000 | 800 | 2000 | 1900 | 1700 | 1400 | 1000 | 1700 | 1400 |
| 2000 | Green | 2000 | 1600 | 4000 | 3800 | 3400 | 2800 | 2000 | 3400 | 2800 |
| 3000 | Yellow | 3000 | 2400 | 6000 | 5700 | 5100 | 4200 | 3000 | 5100 | 4200 |
| 4000 | Grey | 4000 | 3200 | 8000 | 7600 | 6800 | 5600 | 4000 | 6800 | 5600 |
| 5000 | Red | 5000 | 4000 | 10000 | 9500 | 8500 | 7000 | 5000 | 8500 | 7000 |
| 6000 | Brown | 6000 | 4800 | 12000 | 11400 | 10200 | 8400 | 6000 | 10200 | 8400 |
| 8000 | Blue | 8000 | 6400 | 16000 | 15200 | 13600 | 11200 | 8000 | 13600 | 11200 |
| 10000 | Orange | 10000 | 8000 | 20000 | 19000 | 17000 | 14000 | 10000 | 17000 | 14000 |

2. The label or tag attached to the sling.



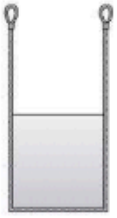
## 2.3.9 Dry Natural Fibre Rope

You can use dry natural fibre rope to control a load near powerlines. A fibre rope used as a tagline should be at least 16 mm in diameter.



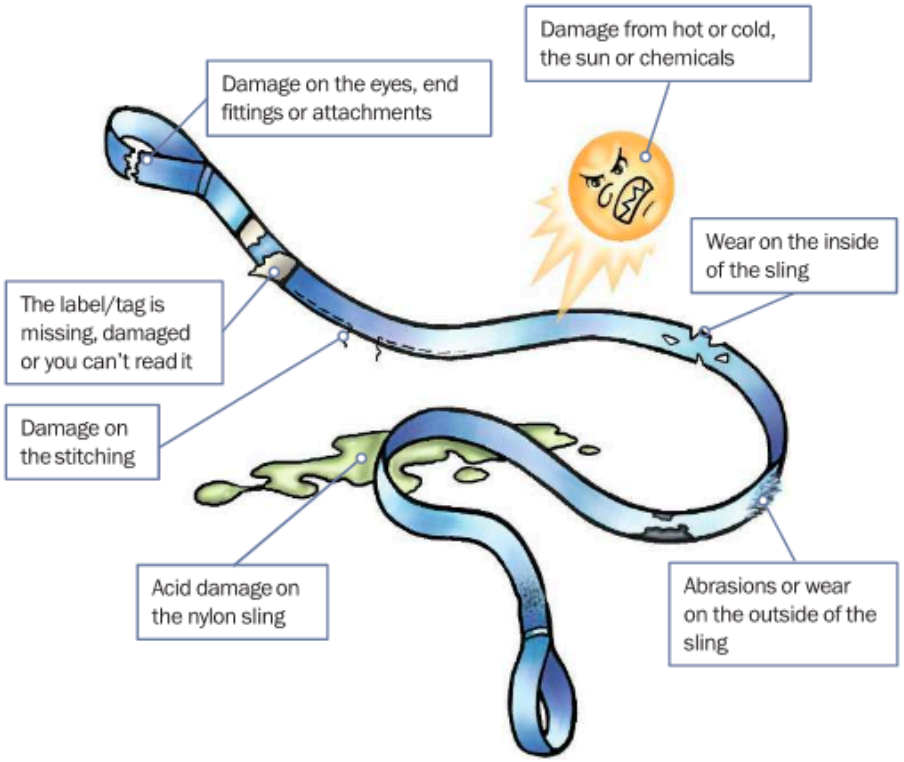

**Do not work closer than:**
**6.4 metres from low voltage**
**10 metres from high voltage lines**

## 2.3.10 Load Factors

| Methods of attachment | | | | | |
|---|---|---|---|---|---|
| **Type of attachment** | **Load shape** | **Load factor** | **Type of attachment** | **Load shape** | **Load factor** |
| Basket |  | = 2<br>*NB: a single sling with vertical legs doubles the load factor on a round load.* | Single sling |  | = 1<br>*NB: the load factor is one.* |
| Basket |  | = 1<br>*NB: the corners of the load creates a nip point which reduces the capacity of the sling by 50%. Thus 50% of a load which originally had a load factor of 2 (see round load above) is now reduced to a load factor of 1* | Reeve/choke |  | = 0.5<br>*NB: the lifting capacity of the sling is reduced by 50%.* |
| | | | Reeve/choke |  | = 0.75<br>*NB: the lifting capacity of the sling is reduced by 25%* |

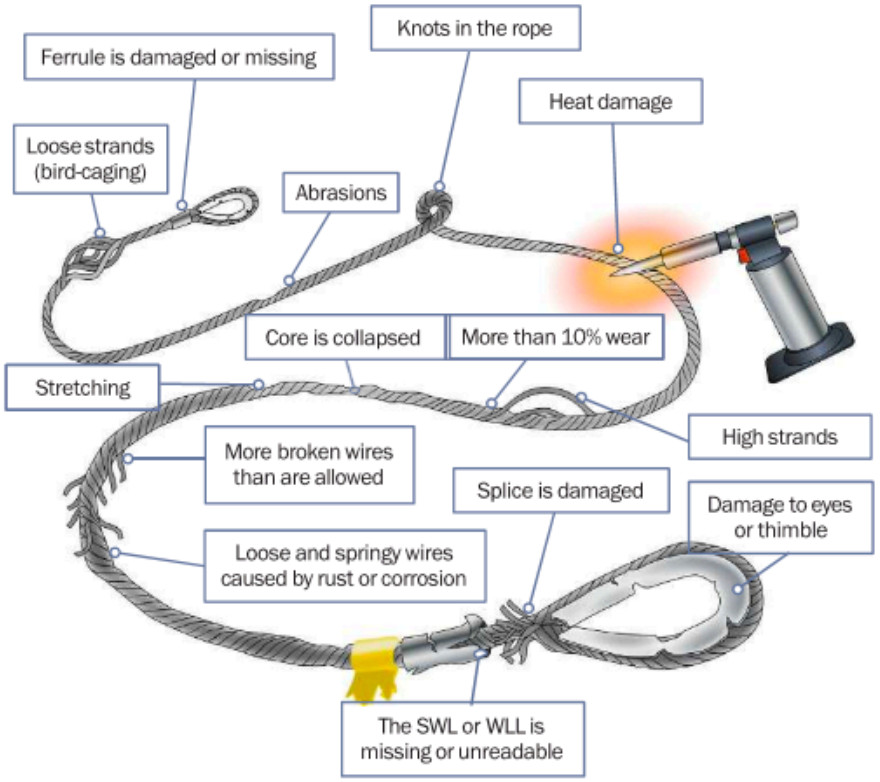
**What are some defects (problems) that stop you using a synthetic sling for lifting?**

Do not use the sling if you can see:



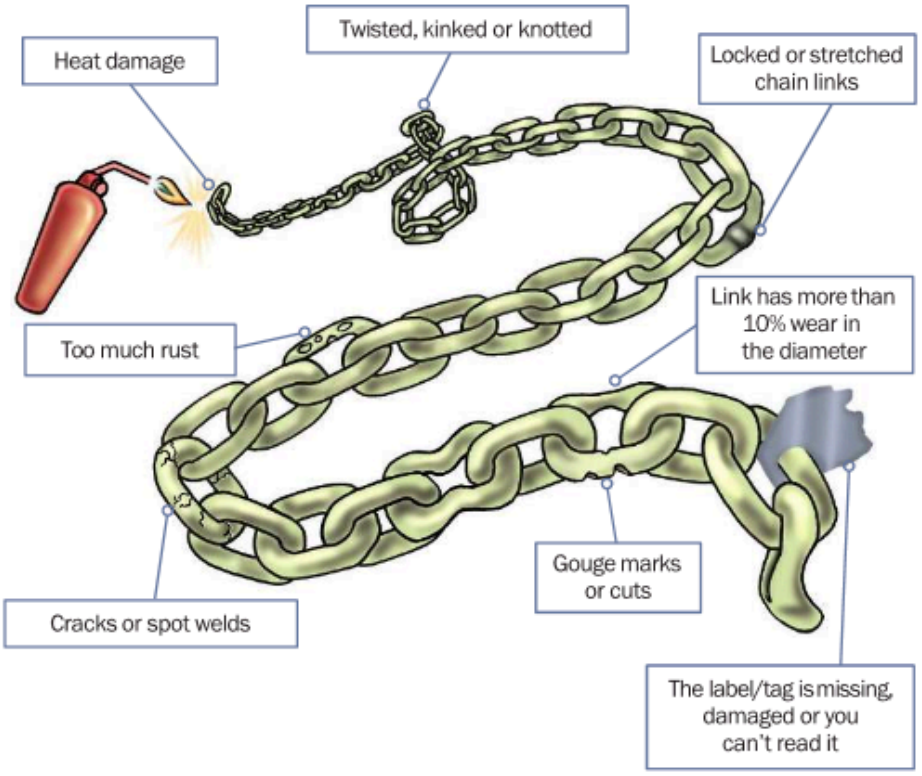

**What are some problems that stop you using a flexible steel wire rope (FSWR) for lifting?**

Do not use the FSWR if you can see:



**What are some problems that stop you using a lifting chain for lifting?**

Do not use the lifting chain if you can see:




**Not all backhoe/loaders can be used to sling a load. You want to use the backhoe/loader for slinging a load. What must it have?**

The backhoe/loader must have a lifting lug with a safe working load or be fitted with a jib attachment.

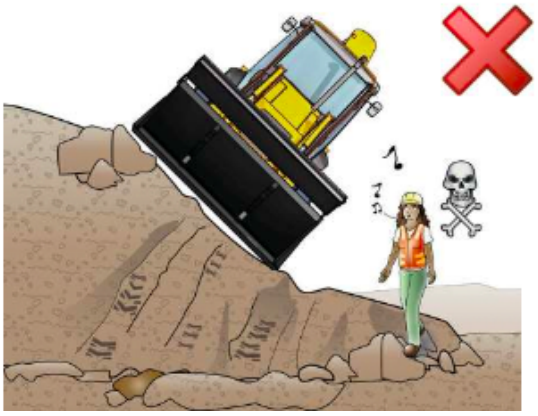
**What could happen if you attach slings to the bucket's teeth?**

This is very dangerous!

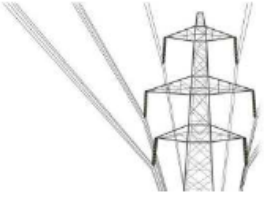
- The sling can slip off the teeth
- The teeth can come off
- The load can fall and injure or kill someone.

**What could happen if you use the machine on uneven or sloping ground?**

The backhoe/loader might overturn and injure you or a workmate. You should use the backhoe/loader on an even surface.

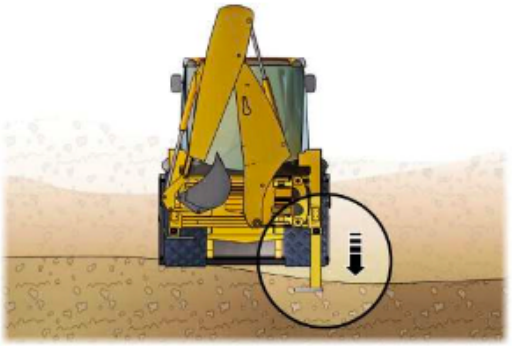


**What should you plan for before using the backhoe/ loader for lifting?**

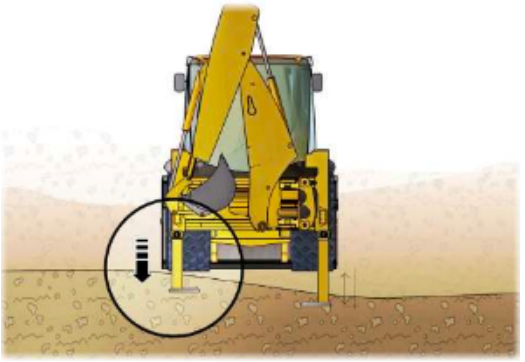
| | |
|---|---|
| 1. Your path of travel.<br>  | 2. Ground condition.<br>  |
| 3. How you will control other traffic and people on the site.<br>  | 4. Check lifting lug.<br>  |
| 5. Check lifting gear.<br>  | 6. Check for overhead services.<br>  |

**Stabilisers help the backhoe/loaderstay stable when you use the rearattachment. How do you setup the stabilisers?**

1. Lower the stabiliserover the lowest ground first.



2. Then lower the other stabiliser until the rear tyres lift off the ground.



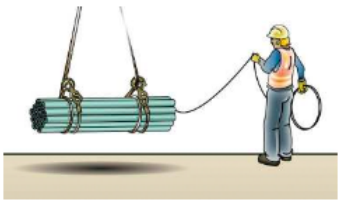
**You will lift and move a load of pipes. What steps do you take?**

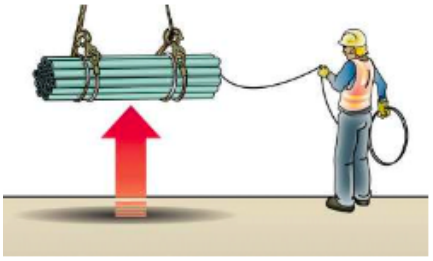
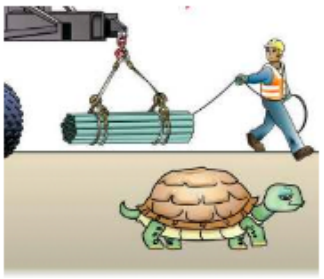
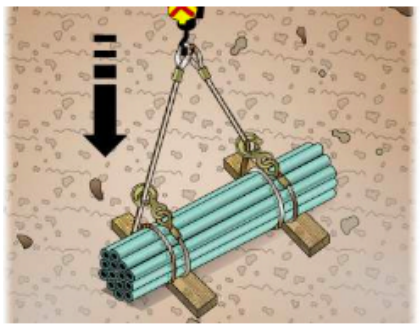
1. Check the SWL of the backhoe/loader and slings to make sure you can lift the load.


2. If your backhoe/loader has a lifting lug on the bucket, connect to the lug. If not, fit the jib attachment and use it.

3. Attach a tag line to help control load swing and ask a dogger to help you.

4. Lift the load clear of the ground, stop and check the load balance and sling attachment.



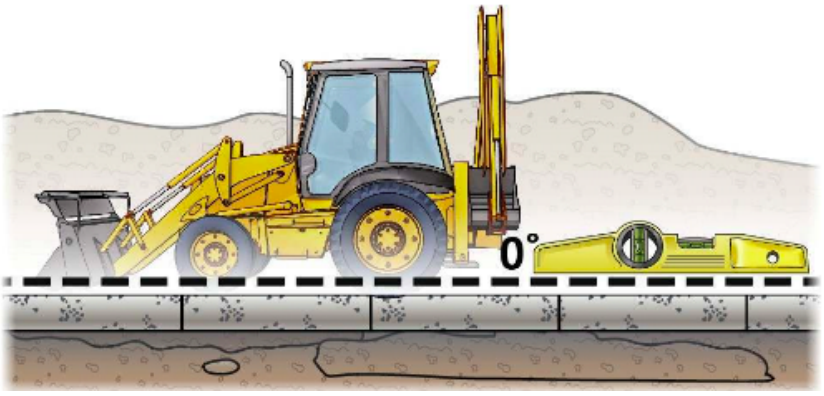
| | |
|---|---|
| 5. Continue the lift.<br>  | 6. Move or travel slowly with the load.<br>  |
| 7. Place and secure the load in a safe area.<br>  | 8. Remove the slings and tagline and store equipment.<br>  |

**You are moving a load and the slings shift. What do you do?**

Lower the load slowly and fix the slings.

**When travelling with a load, what kind of ground is the safest to travel on?**

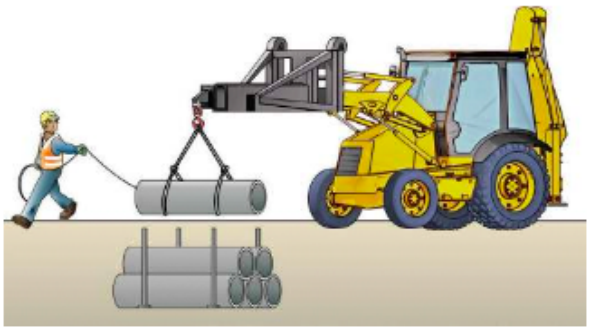
Firm, level ground because it gives the best stability.



**What are some things you should think about before placing a load on the ground?**

Make sure:

- it will stay where you place it
- it will not cause a hazard
- the ground is firm and level
- place the load so the lifting slings can be easily removed.

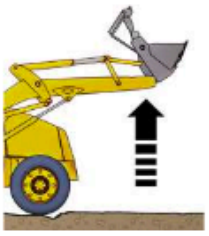


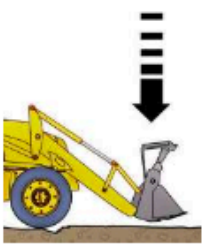
**One of your workmates is in a trench over 1.5 meters deep. They must remain in the trench no handle the pipes. How do you lower pipes safely into the trench?**

The closest grounded part of the machine (likely the front wheels) should remain as far away from the trench as it is deep. Put in shoring if necessary or if you need to be closer to the trench edge than mentioned above. Never lower or pass the load directly over someone. Have good communication methods and a spotter if necessary.

**Some of the standard hand signals are shown on the following pages. What does each of these signals mean?**

| Stop | |
|---|---|
| Motion | Hand signal |
|   |  |

| Boom up | |
|---|---|
| Motion | Hand signal |
|  |  |

| Boom down | |
|---|---|
| Motion | Hand signal |
|  |  |

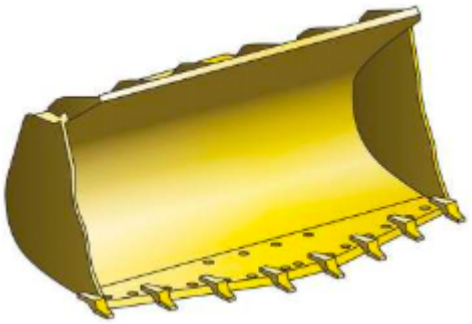
| Travel and traverse | |
|---|---|
| Motion | Hand signal |
| Indicate the direction you want the machine to go |  |

**How can you communicate with a fellow worker who is out of your line of sight?**

Use a two-way radio or whistle signals.

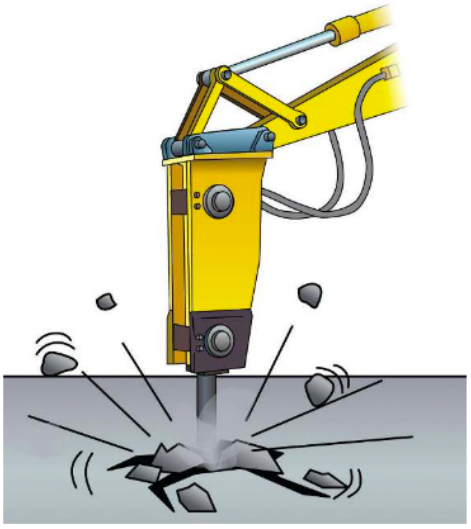
# 2.4 Select, Remove and Fit Attachments for A Backhoe/Loader

**What kinds of buckets can you use on a backhoe/ loader? What do you use them for?**

| | |
|---|---|
| **Rock bucket**<br>This bucket has a straight or spade edge. You use this bucket for moving rocks.<br>  | **Multi-purpose bucket (4-in-1)**<br>This bucket has teeth and a blade. You use this bucket for dozing, clamping, loading, scraping and back blading for levelling.<br>  |
| **Excavating bucket**<br>This bucket has teeth and is used for general digging.<br>  | **Trench bucket**<br>This bucket is narrower than the excavating bucket and is used to dig trenches suitable for pipe or cable laying.<br>  |

**What attachment doyou use to break concrete?**

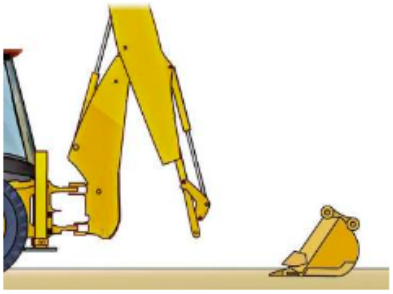
Use the hydraulic hammer attachment.



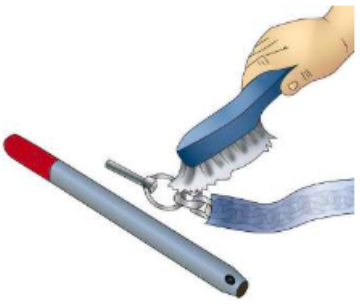
**What are the normalsteps for fitting an attachment?**

**WARNING:**
**The steps outlined in this question are of a general nature. Always refer to manufacturers instructions and workplace procedures for fittingattachments.**

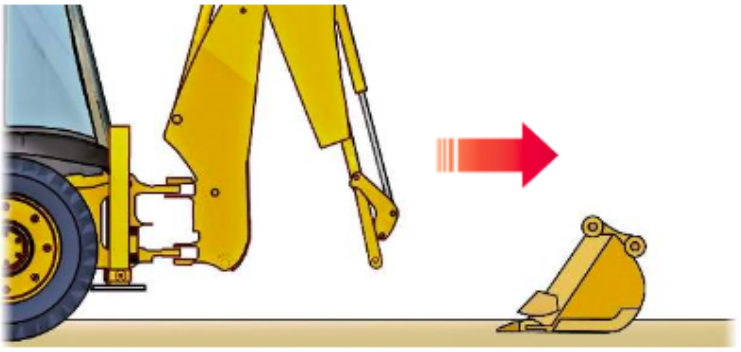
1. Put the attachment in position ready for mounting.



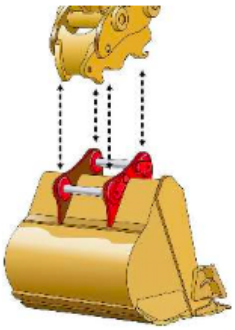
2. Clean all mounting equipment (for example, pins and bushes).



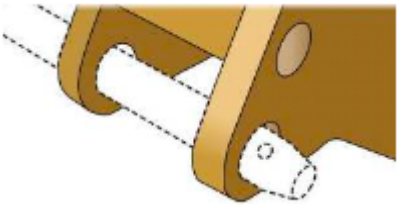
3. Start the engine and move slowly towards the attachment.



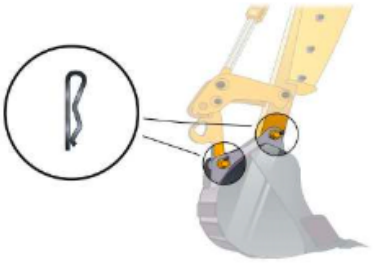
4. Line up the boom with the mounting points on the attachment.



5. Put in the safety pin.

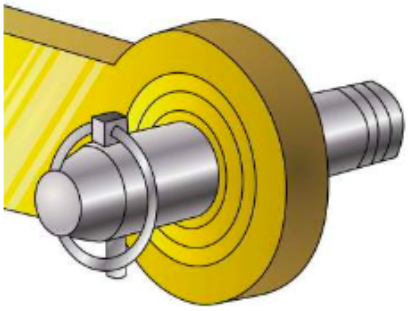


6. Put the retaining clip in the safety pin.



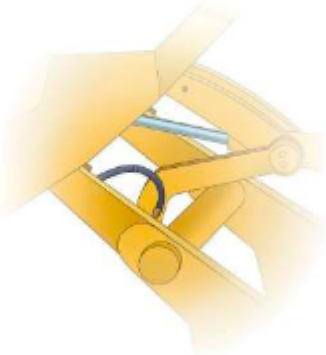
7. Turn off the engine.

8. Install the circlip and snap ring onto the pins.



9. Grease all joints and pivot points.

10. Connect hydraulic hoses (ifused).

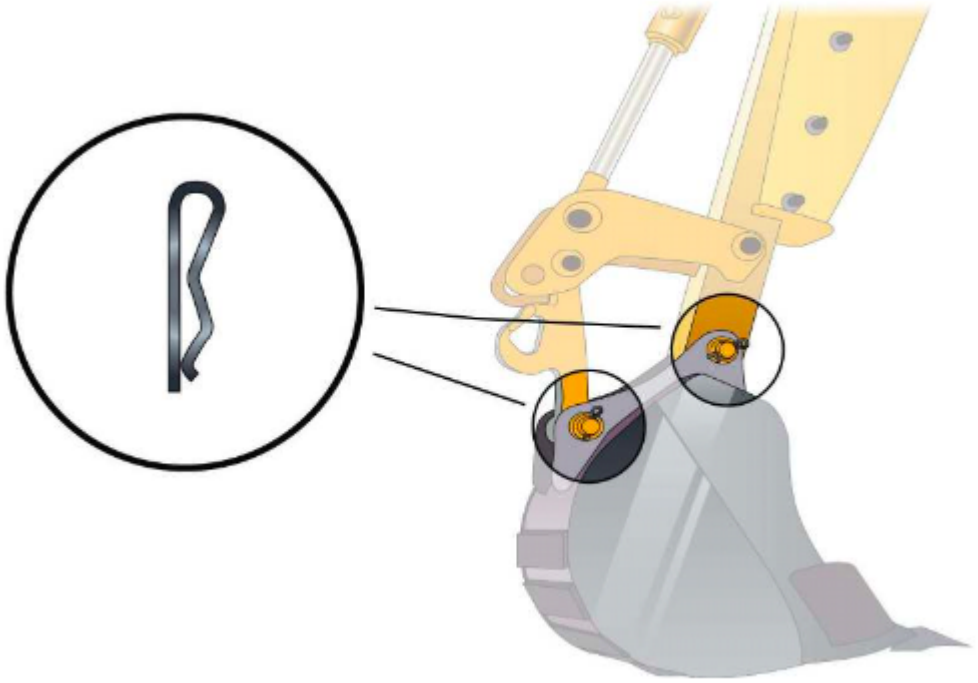


11. Start the engine.

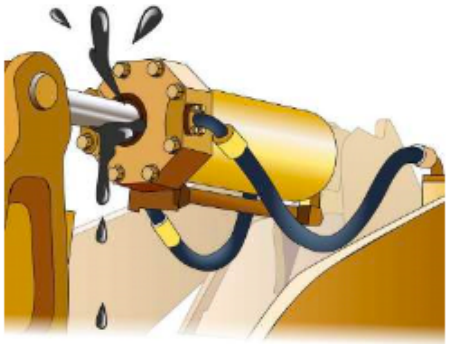
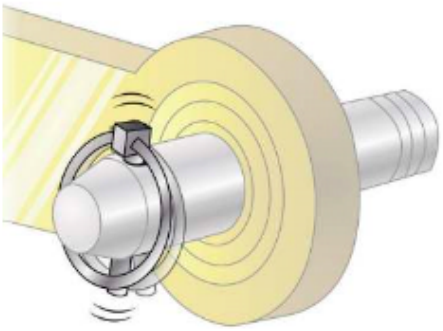
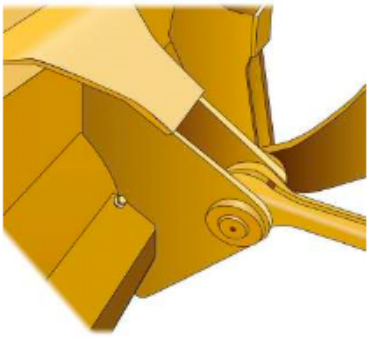
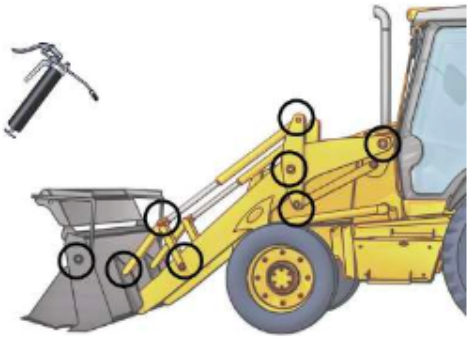
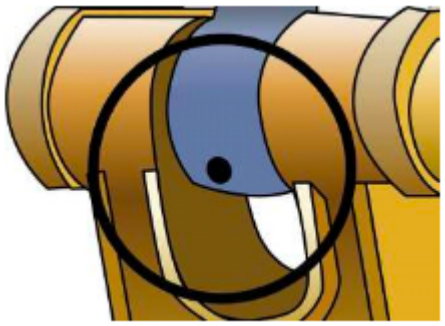
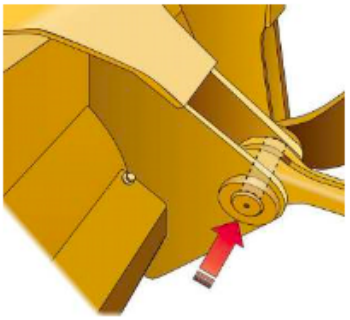
12. Test the operation of the attachment.

**How do you secure the attachment to the boom?**

Make sure the locking pins are in place.

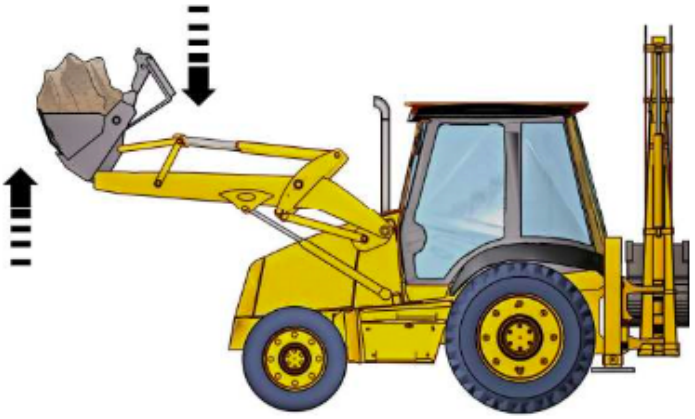


**Before testing the attachment, what joints and parts should you check?**

| | |
|---|---|
| Check for hydraulic leaks<br>  | Loose lynch pins and circlips<br>  |
| Check the attachment's condition<br>  | Check grease holes<br>  |
| Check grease nipples<br>  | Check the crowd cylinder is properly inserted and won't fall out<br>  |
| Check connections are secure. If the pins are missing, the attachment might fall off.<br>  | Check that pins, joints and pivot points are well greased.<br>  |

**How do you test the attachment before moving a load with it?**

Test all functions of the attachment. For example, lift it up and down and try to lift something.



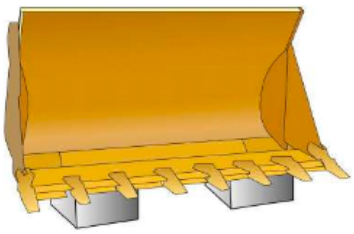
**What do you do if you find a fault while testing the attachment?**

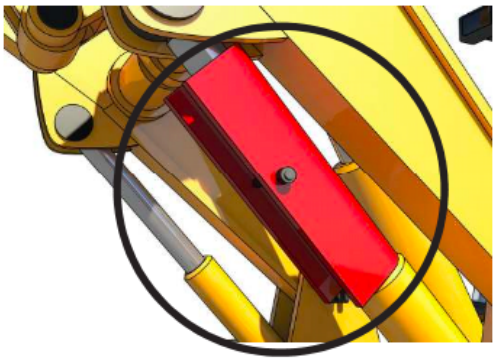
1. Tag out the attachment and DO NOT USE IT.


2. Report the fault and arrange to have the attachment repaired.

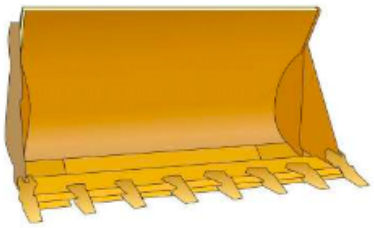
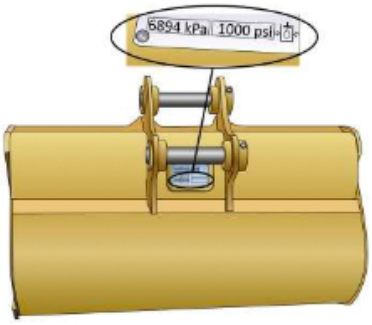
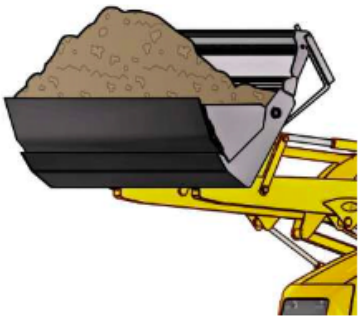
**What should you do when checking under a raised attachment?**

Use something to stop the attachment from falling on top of you. For example, you might use chocks, blocks or safety bars.

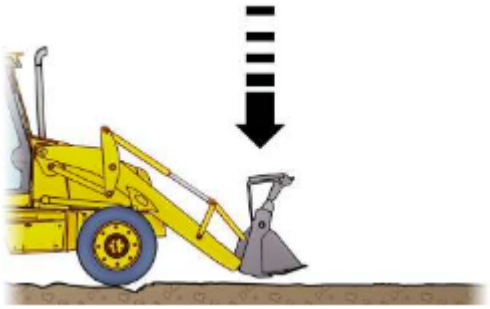




**What are some examples of safety limits to remember when using an attachment?**

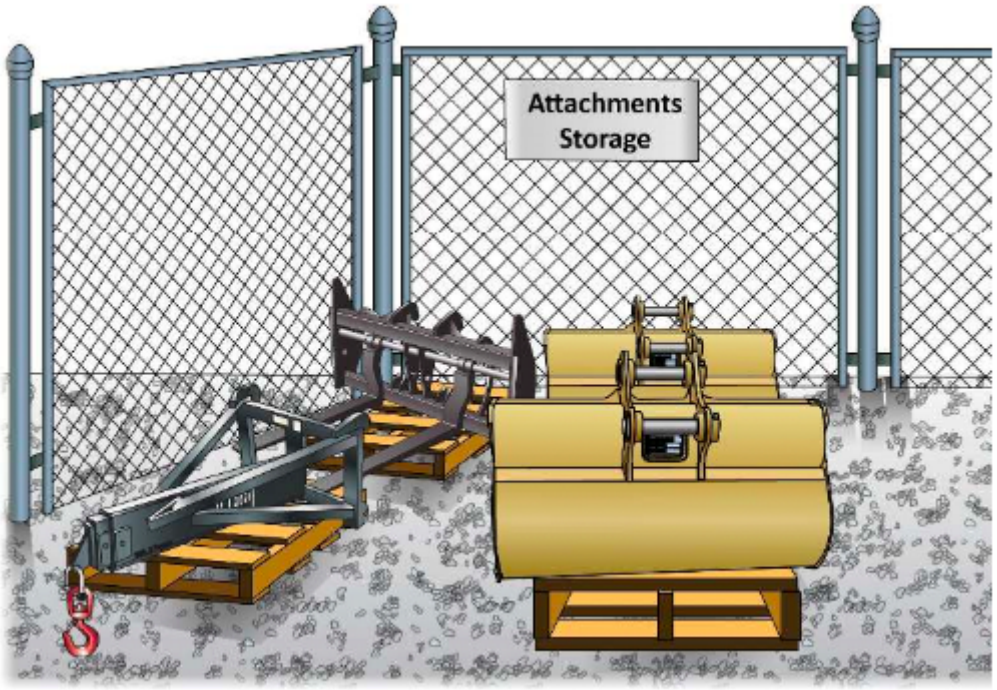
| | |
|---|---|
| Purpose of the attachment. The attachment should only be used to do the job it is designed for.<br>  | Safe working load (SWL)<br>  |
| Maximum hydraulic pressure the attachment can take<br>  | Capacity (how much the attachment can hold or lift)<br>  |

**What steps should you take when you're finished using an attachment?**

| | |
|---|---|
| 1. Lower the attachment to the ground. Release any hydraulic pressure.<br>  | 2. Remove the attachment if required. Always refer to manufacturers instructions and workplace procedures for removing attachments.<br>  |
| 3. Block off or cover the ends of any hydraulic hoses and check the attachment for damage.<br>  | 4. Clean any dirt and grit from the attachment. Store the attachment as per workplace procedures<br>  |

**Where do you store the attachment?**

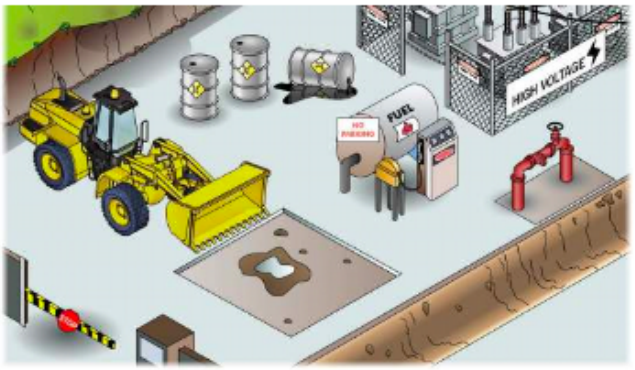
Your worksite should have a designated storage area for attachments. If you are unsure, ask your supervisor, a workmate or refer to workplace policies and procedures.



# 2.5 Relocate the Backhoe/Loader

**How do you prepare a wheeled machine for travel on a public road?**

Park the machine in a suitable cleaning area.



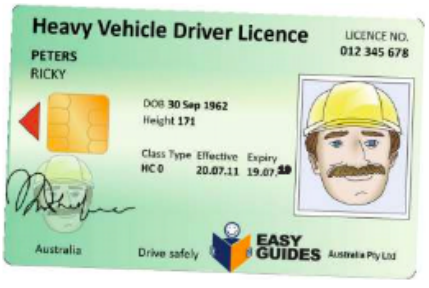

Clean the machine of mud, soil, and stones. Remove any vegetation.

**Do you need a permit to drive a backhoe/loader on a public road?**

You might if the backhoe/loader is too heavy, too long or too wide.
Check with your local transport authority (for example, VicRoads or the RTA).


**What kind of licence do you need to drive a backhoe/ loader weighing over 4.5 tonnes on a public road?**

In most states/territories you will need a heavy vehicle licence.
For example, a light rigid (LR) licence for 4.5–8 tonnes (8.5 in some states).
Check the rules for your state/territory.

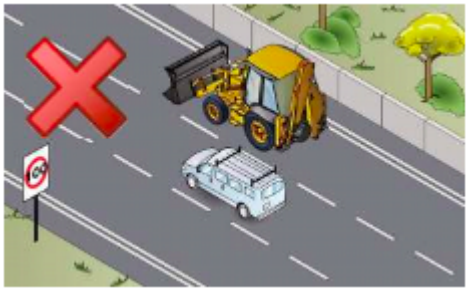
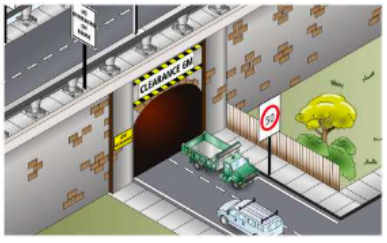


**Before you drive on a public road, what checks do you make on the backhoe/loader?**

| | |
|---|---|
| Make sure the backhoe/loader is roadworthy, and it is registered for road use. All brake lights, indicator lights, horn etc must be in working order.<br>  <br>  | Lift the bucket to a height that will clear the road but allow a good view of the road ahead.<br>  |
| Note:<br>If the backhoe/loader is not registered you may be able to get an unregistered vehicle permit (check with your relevant state/territory authority). | |

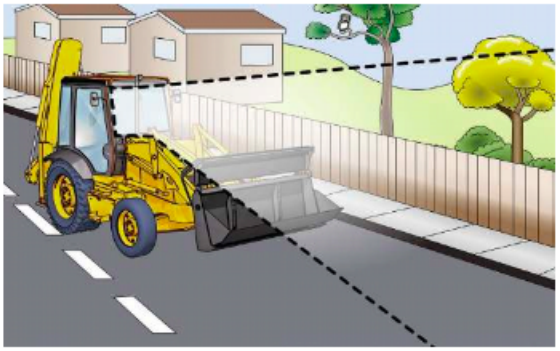
**Do you have to follow the same traffic rules as other vehicles on public roads?**

Yes. Sometimes larger vehicles have stricter rules, for example:

| | |
|---|---|
| Can't drive in the right lane on freeways<br>  | Can't travel on some roads because of weight limits<br>  |
| Can't travel through suburban areas at night because of noise<br>  | |
| Lower speed limits<br>  | Can't travel on some roads because of low bridges<br>  |

**What should you do with the bucket before driving on a public road?**

Make sure the bucket is rolled back and high enough above the road. Don't raise the bucket too high otherwise you might not be able to see the road. If the backhoe/loader has rippers installed, put them in the highest position so they are not a hazard.



**You need to drive the backhoe/loader on a public road. The backhoe/ loader has very large tyres. What do you need to do?**

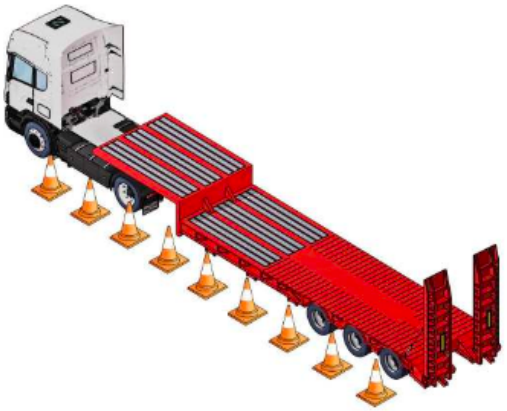
Reduce speed to prevent bouncing. You may need to let some air out of the front tyres. If the tyre pressure is high, the backhoe/loader might bounce and be harder to control.

## 2.5.1 Loading and Unloading from Float/Trailer

As the operator of a skid steer loader there may be times when you need to assist in loading or unloading the skid steer from a float or trailer. To perform this activity safely you should have completed, or be assisted in the loading/unloading by a person who has completed suitable training in loading and unloading plant. For example unit RIIHAN308F Load and Unload Plant or an equivalent unit would be suitable.

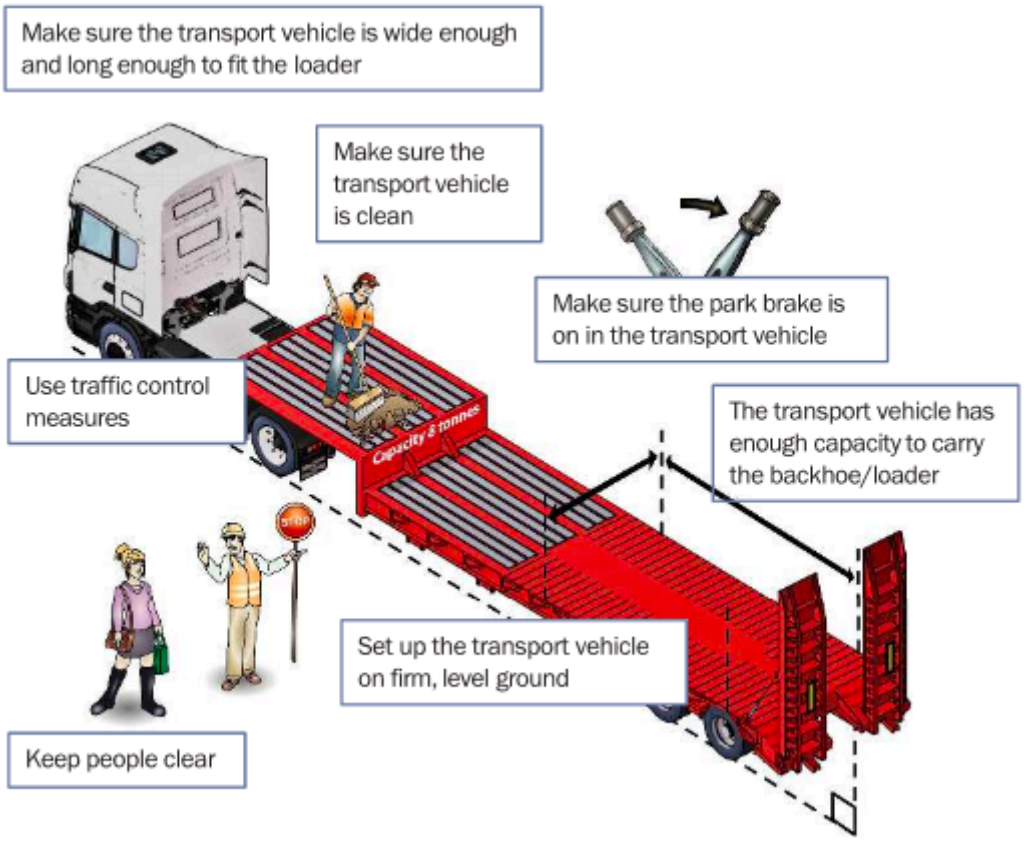
Anyone who loads or unloads a heavy vehicle is responsible for playing their part in the Chain of Responsibility which falls under Heavy Vehicle National Law. As a loader/unloader you have an influence over where and how goods are loaded and therefore have an ongoing responsibility to prevent breaches.
The key responsibilities of a loader/unloader may include ensuring that:

- Loads do not exceed vehicle mass or dimension limits*
- Goods carried are appropriately secured*
- You provide reliable weight information to drivers*
- Load documentation is accurate*
- Delays in loading/unloading are prevented
- Your loading/unloading do not require or encourage drivers to exceed the speed limits or regulated driving hours, fail to meet the minimum rest requirements or drive while impaired by fatigue.



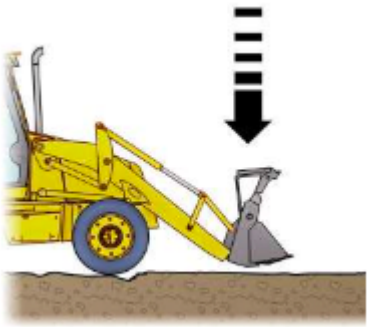
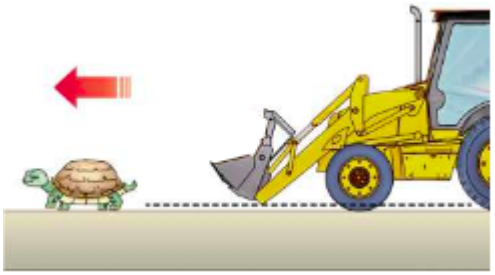
* Not relevant to an unloader

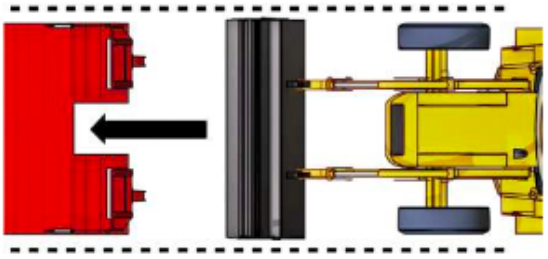
**A loader is to be transported. How is the preparation done by the person responsible?**



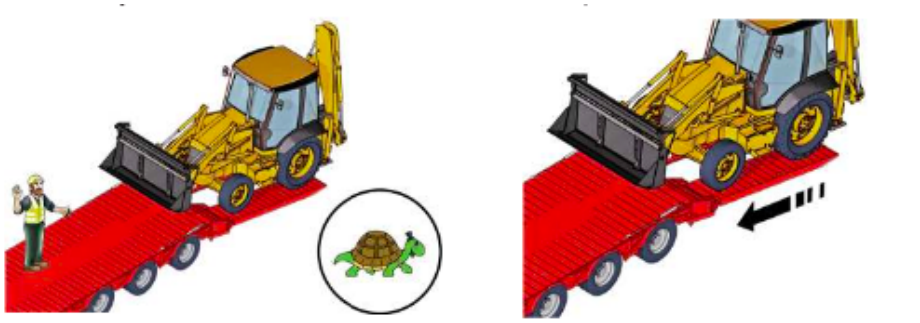

**How is a loader moved on to the transport vehicle?**

After the transport vehicle and the backhoe/loader have been prepared, the following steps are taken:

| | |
|---|---|
| 1. The bucket is lowered.<br>  | 2. Drive to the loading area.<br>  |
| 3. Line the machine up with the ramps. | |



4. Drive slowly forward until the wheels start to climb the ramp.



If visibility is restricted a guide may be required.

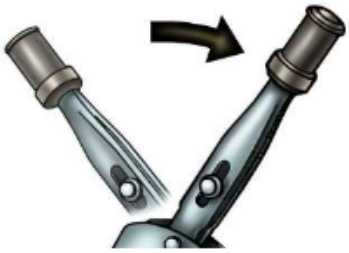
5. Move the bucket or attachment away from the machine to help balance the machine while climbing ramps.

6. Lower the bucket close to the vehicle deck.

7. As the machine rocks over onto the deck, raise the bucket slowly to prevent the machine coming down hard onto the deck.

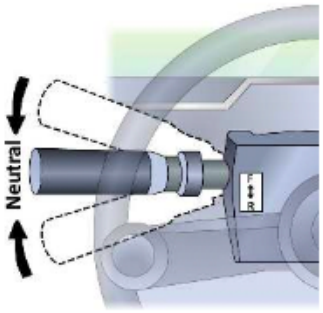
8. Raise the bucket to just clear the deck and position the machine on the vehicle to make sure the load is correctly shared by the vehicle wheels.

9. Switch off the machine and apply the park brake.

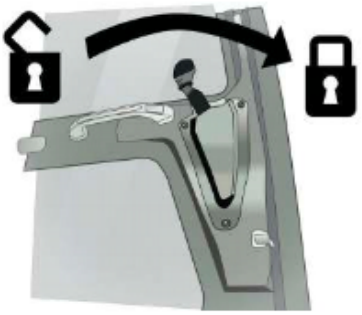


10. Release the hydraulic pressures

11. Apply the articulation lock by putting the forward and reverse sticks into neutral.




12. Secure the cabin.



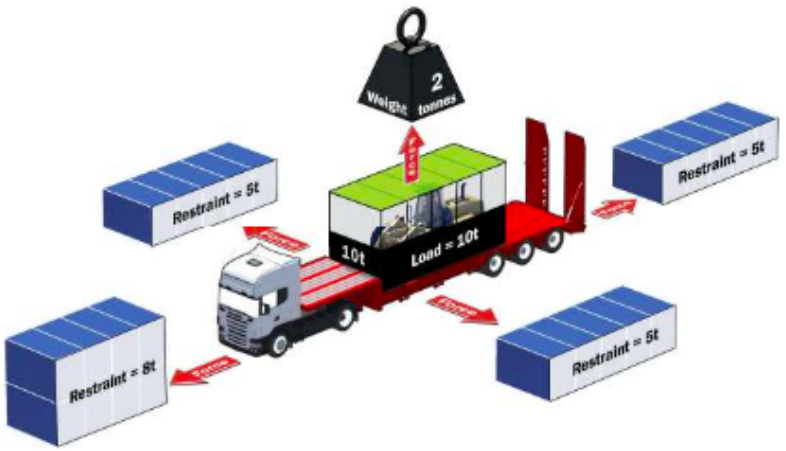
13. Temporarily chock the wheels until the vehicle is secure.

14. Use chains to safely secure the backhoe/loader to the transport vehicle. Remove and stow chocks when the machine is secured.

**Are there regulations about securing a load on a truck or trailer?**

Yes, the load restraints must be able to hold the load from moving as shown in the table.

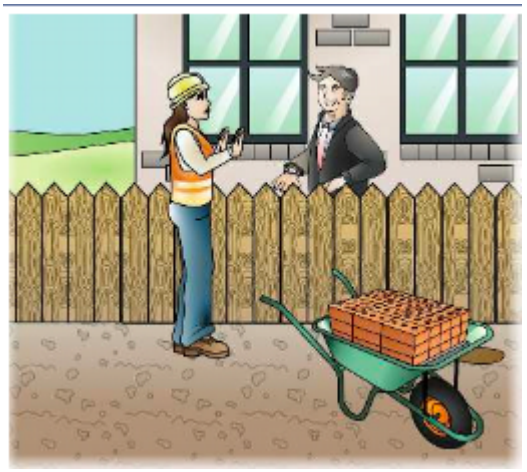
| Direction | Restraint needed |
|---|---|
| Forward | 80% of load weight |
| Rearward | 50% of load weight |
| Sideway | 50% of load weight |
| Bounce or upward | 20% of load weight |



# 2.6 Conduct Housekeeping Activities

**After you've finished the job, what should you do?**

Tell people who live in the area that the work is finished

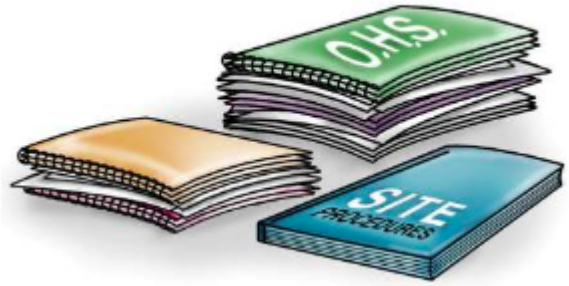


Clean the job site

Put any rubbish in the correct bin and recycle what you can

**What instructions do you follow when cleaning up?**

The environmental management plan and site procedures.




**What is the danger of leaving earth and rocks around the work site?**

Someone might trip on a rock and be injured. Rocks left on the road can damage cars.

**What do you have to clean on the backhoe/loader?**

| | |
|---|---|
| Clean the windows and cabin  | Clean the mirrors  |

**What do you do with other equipment and tools you've used?**

Clean tools and equipment, and put them back in their place.

**Where do you record the work done when repairing and maintaining service equipment during cleaning up the service area?**

Enter all repairs and maintenance on equipment in the site specific record book or system.


**What must you do with waste oil and grease when performing maintenance?**

Follow the site environmental plan for the safe disposal of waste oil, grease etc.