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RIIMPO319E

Conduct Backhoe/Loader Operations



Learner Guide

Introduction

This course is based on the unit of competency RIIMPO319E Conduct Backhoe/ Loader Operations.

In this course you will learn how to use a backhoe/loader in civil construction including:

- Planning and preparing for work.
- Operating the backhoe/loader
- Load, carry and placing materials
- Relocating the backhoe/loader
- Maintenance and other housekeeping tasks.



If you have any questions, please consult with your Trainer.

Plan & Prepare for Work

What is a Backhoe/loader?

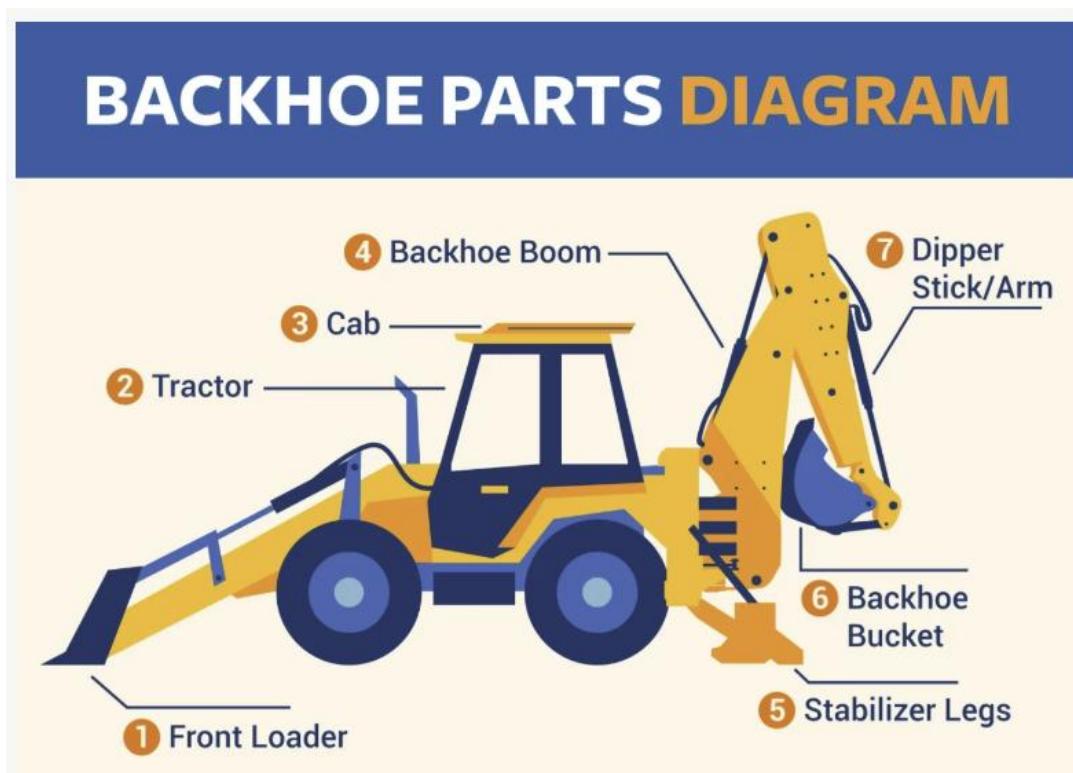
You may be familiar with backhoe loaders if you work in construction, mining or landscaping (among other industries). These versatile pieces of equipment are also known as diggers and can be found on all work sites around Australia. A backhoe loader performs various tasks, including digging, lifting and carrying heavy materials.

Not to be confused with a standard loader, the backhoe loader has attachments on both ends and performs multiple functions. A standard loader only has an attachment on the front of the machine. So, with that in mind, let's look at all you need to know about backhoe loaders



Backhoe/loader Components

The following diagram and table outline the basic components of a backhoe/loader:



COMPONENT	DESCRIPTION
① Front Loader	Loads and moves materials such as construction debris and soil
② Tractor	Core structure of the backhoe and contains rugged tires, a cab, and a turbocharged engine
③ Cab	Enclosed with glass windows and is used to protect the operator from flying debris
④ Backhoe Boom	Attached to the rear end of the loader and swings left or right and can lift and lower
⑤ Stabilizer Legs	Stabilizes the loader and helps transfer the load from the backhoe to the ground surface
⑥ Backhoe Bucket	Contains teeth-like edges and is used for digging into soil or construction debris
⑦ Dipper Stick/Arm	Attached to the boom and bucket and is used to stabilize the weight of the materials inside the bucket



Compliance Documentation

Documentation is essential to all aspects of every worksite. Whether it is environmental plans through to construction plans, documentation outlines what to do, when to do it and the manner in which the task is to be done.

Compliance documentation is the name given to the documents that outline the requirements for the tasks and site. Every mining worksite will have site-specific requirements that will be outlined during your initial inductions.

Staff should be notified of changes to compliance documentation during toolbox meetings, through staff newsletters or other established forms of communication used on the site.

Some forms of compliance documentation relevant to backhoe/loader can include:

- Legislative requirements e.g. WHS requirements, and equal employment opportunity.
- Organisational policies and procedures e.g. Workplace relations and sick leave requirements.
- Site-specific policies and procedures e.g. Emergency policies and evacuation procedures.
- Australian guidelines and specifications e.g. Codes of practice. For example, SafeWork NSW document 1213 – Moving plant on construction sites.
- Australian Standards. E.g. AS/NZS 4240.2:2009 Remote Control Systems for Mining Equipment - Operation and Maintenance for Underground Metalliferous Mining.
- Manufacturer's guidelines and specifications e.g. Pre-start checklists, service requirements and vehicle operations manuals.
- Vehicle specifications e.g. Operating limits.
- Training records e.g. Your own training record or licensing requirements.



Being able to access, interpret and apply the requirements of the documents is part of the job for any plant operator.

During your site induction you will be told how to access the documentation relevant to your site and duties.

Interpretation of compliance documentation includes getting the key information out of the document that will allow you to make correct decisions for each situation. It includes understanding what is required of you and how you are expected to perform the tasks.

When interpreting documents it is vital that you understand the difference between words such as 'should', 'consider' and 'must.'

- 'Should' indicates the preferred course of action. For example: "In the event of a certain situation the following procedures should be conducted."
- 'Consider' means that you have a choice of actions and will need to select the action that will give the best and safest result.
- 'Must', shall, requires, and mandatory all indicate that the action is a legal requirement and MUST be complied with.



Applying the information in these documents involves following the directions in the documents. If you are in any doubt as to what you should do after reading the documentation, it is essential you speak with your supervisor or other designated personnel for further instructions or clarification.

Legislative Requirements

WHS Legislation is defined as laws and guidelines to help keep your workplace safe. These can be broken down into four main types:

Acts	Laws to protect the health, safety and welfare of people at work.
Regulations	Gives more details or information on particular parts of the Act.
Codes of Practice / Compliance Codes	Are practical instructions on how to meet the terms of the Law.
Australian Standards	Give you the minimum levels of performance or quality for a hazard, work process or product.

It is important that you are familiar with the WHS laws that exist in your state or territory. Each state in Australia has its own WHS legislation and regulations that must be followed.

The following WHS Legislative Requirements will affect the way that you work in the construction industry:

- Australian Standards.
- Industry specific WHS Standards, Codes of Practice and Guidelines.
- Duty of Care.
- Health and Safety Representatives, Committees and Supervisors.
- Job Safety Analysis (JSA) and Safe Work Method Statements (SWMS).
- HRW Licences or Certificates of Competency.

Talk to your WHS officer or representative if you have any questions about legislative requirements.



Duty of Care

All personnel have a legal responsibility under duty of care to do everything reasonably practicable to protect others from harm by complying with safe work practices, including activities that require licences, tickets or certificates of competency or any other relevant state and territory WHS requirements.

This includes:

- Employers and self-employed persons.
- Persons in control of the work site.
- Supervisors.
- Designers.
- Manufacturers.
- Suppliers.
- Workers/employees/personnel.
- Sub-contractors.
- Inspectors.



Safe Work Practices

Safe work practices are methods that must be implemented to make sure a job is carried out as safely as possible.

Safe work practices include:

- Day to day observation of WHS policies and procedures.
- Emergency procedures.
- Risk assessment.
- Use of basic fire-fighting equipment.



Safe work practices are governed by legislative requirements and workplace procedures.

Safe work practices relate to:

- Access to site amenities, such as drinking water and toilets.
- Drugs and alcohol at work.
- General requirements for safe use of plant and equipment.
- General requirements for use of personal protective equipment and clothing.
- Housekeeping to ensure a clean, tidy and safer work area.
- Preventing bullying and harassment.
- Smoking in designated areas.
- Storage and removal of debris.



Safe work practices should be referred to, and documented, when completing Safe Work Method Statements as a guideline for how to carry out a task safely.

Safe Work Method Statements

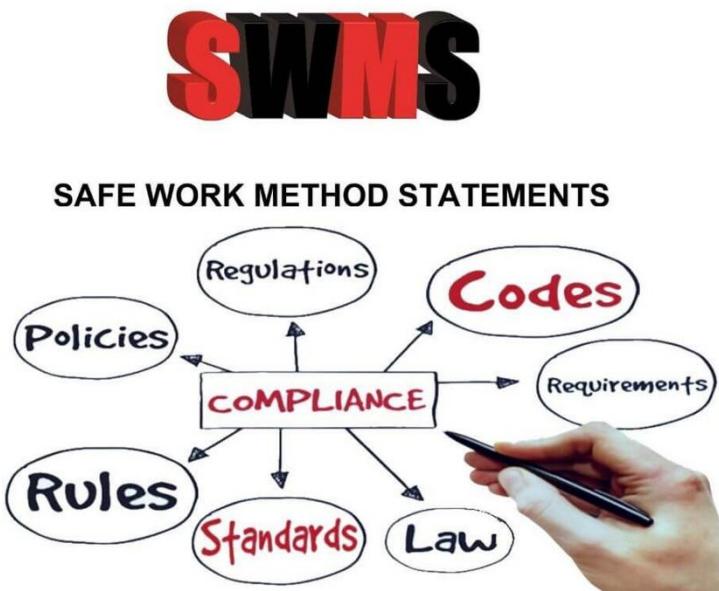
A Safe Work Method Statement (SWMS) details how specific hazards and risks, related to the task they are completing, will be managed and is developed by the employer for their workers.

They fulfill a number of objectives:

- They outline a safe method of work for a specific job.
- They provide an induction document that workers must read and understand before starting the job.
- They assist in meeting legal responsibilities for the risk management process, hazard identification, risk assessment and risk control.
- They assist in effectively coordinating the work, the materials required, the time required and the people involved to, achieve a safe and efficient outcome.
- They are a quality assurance tool.



Completing a SWMS:



"A SWMS must be prepared in consultation with those people who will be doing the job."

The Safe Work Method Statement must be available for inspection at any given time. It must also be reviewed each year and amended if necessary.

Safe Work Method Statements may also be referred to as Safe Work Procedures (SWP) or Job Safety Analysis (JSA).

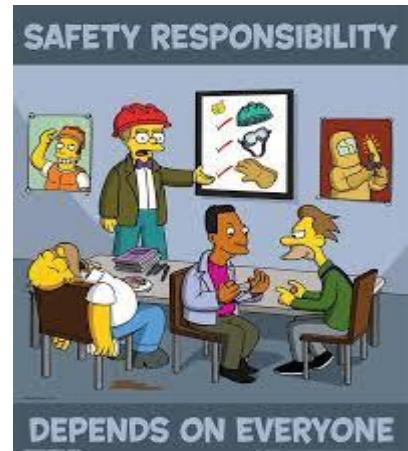
Work requirements



Work requirements or work instructions, and procedures are the details of how a task or job is completed. How each site communicates their work requirements and procedures is different and will be detailed during your induction. Requirements can be detailed in writing or verbally through:

- Briefings.
- Toolbox meetings.
- Work handovers/transitions.
- Work orders.

How the requirements are communicated will depend upon the process and the complexity of the task.



Information contained in the work requirements and procedures could include:

- Product, process or procedural identification – Products or equipment to be used, task requirements and materials to be shifted e.g. gravel, clay, rock or topsoil.
- Nature and scope of tasks – The type of job being undertaken in a broad sense, as well as breaking the job down into the tasks to be completed.
- Achievement targets – Required or estimated productivity targets.
- Operational conditions – Relevant site conditions and terrain that may affect the operation of the machine e.g. slopes, soft ground, bulky materials, haul road access, steepness of roads, and weather conditions which can determine travel time and driving hazards.
- Obtaining permits required – Such as excavation permits from management or local authorities, vehicle permits, utility lines and placements.
- Site layout – Defined worksite areas that are set out for the required task.
- Out of bounds areas – Areas that are designated as outside of the given site layout. Out of bounds areas may be shown by fencing, taped and barricaded areas, para- webbing, and signs.
- Worksite inspection requirements – Requirements for inspection of the worksite in regards to WHS at the site, as outlined in your site specific and task specific inductions.
- Lighting conditions – Weather conditions that may affect the worksite or shaft lighting in an underground environment.
- Plant or equipment defects – Workplace procedures for plant inspection, reporting defects, and maintenance requirements.
- Hazards and potential hazards – Site specific hazard and risk assessment procedures that identify hazards and risk in the workplace.
- Coordination requirements or issues – Reporting and work coordination. This may include traffic management or vehicle movement plans or working with more than one loader.



In order to understand the requirements of your job as a whole or its specific tasks, you may need to interpret these plans, reports, maps, and specifications. For any requirements that you are unsure of, you should check with your supervisor or other authorised personnel outlined in your induction.



Organising work tasks



Your daily and weekly work tasks should be scheduled in order to complete all assigned tasks in the most efficient manner and in the given timeframe for the work site. Some work site will have task schedules set out, while others will require you to structure your own scheduling. Methods of scheduling will also vary depending upon the work site, but could include handwritten checklists, computer programs, and verbal instruction. If you are unsure of the scheduling requirements of your work site speak with your supervisor or other authorised personnel.

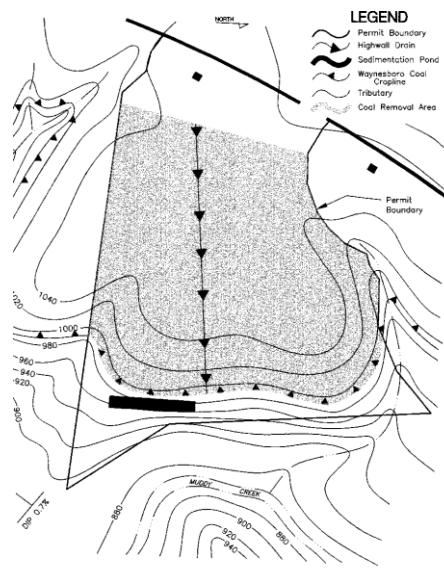
Geological and survey data

In order to complete the allocated job, you may need to access, interpret and apply geological and survey data. You may need to use diagnostic skills and techniques in order to interpret and apply the information. If you are unsure how to interpret documents, consult other qualified personnel.

Geological data may provide information relating to:



- Material types – Material density and characteristics need to be identified to ensure the correct equipment and attachments are used, and in the correct manner.
- Wet and dry areas – the moisture levels of the material can affect the capabilities of the machinery, or cause machinery to become difficult to manoeuvre. The load shifting potential of wet materials is higher than with dry materials. This can cause the load to move unexpectedly and pull the machinery off balance.
- Water tables – knowledge of the water table for the area being worked upon is important because of potential seepage or salinity that can affect the machinery. If blasting has occurred prior to Tracked loader operations starting, the area may be wetter than originally expected.
- Broken ground, faults and joints – the geological data for these makes the operator aware of material seams, ground faults, and other features of the work zone to ensure the operator is able to make correct work decisions about production levels or hazardous areas.
- Other job specific requirements – such as environmental plans and waste material plans.
- Compaction levels of the ground – the degree of compaction is important because it can determine the production quantities, the number of loaders needed to finish the task and the type of Tracked loader needed.



Survey data may provide information relating to:

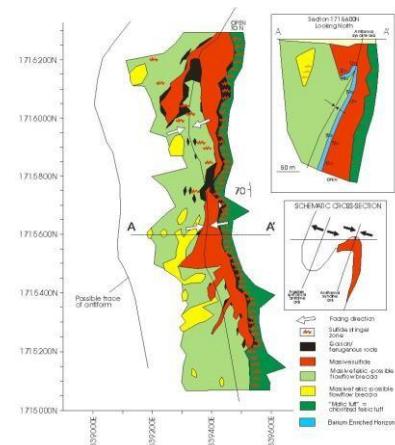
- Floor heights – the height of the floor needs to be defined to ensure the structural stability of the mine area.
- Bench heights and widths – are where cuttings are present. These may form roads or entry and exit points within the work area or quarry. They are important also in the stability of cut faces, and must be maintained to a high level.
- Floor and bench grades – are important for the operator to know in advance, as being too steep can cause too much strain on the machinery or cause undue movement with the materials. The bench grades need to be suitable so that the risk to people and plant are minimised. For example a steep grade could increase that chance of a vehicle (either loaded or empty) getting out of control or the brakes failing on the downward slope.
- Voids – and other underground situations or circumstances such as old mine shaft areas, public utilities (phones, power lines gas pipes), sinkage areas or areas where ground stability may be an issue.



Survey data, marks and information can also be used to define work circuits, pick up areas, dump areas, spill zones, routes or traffic ways. Knowing where these areas are is essential for the safety of all personnel working or moving in the work zone and for the smooth operation of machinery and completion of tasks.

Vehicle movement plans and circuit plans need to be defined clearly before the works begin. Movement and circuit plans may change regularly depending upon the worksite layout and changing work requirements. These plans are usually discussed at site inductions, site toolbox meetings, pre-start meetings or team briefings.

Accessing, interpreting and applying technical geological or survey data that will define your tasks, the requirements of the task or other relevant information is essential. Access arrangement will be defined during your site-specific induction.



Determining the appropriate path of movement for loads and vehicles

Loaders and other construction vehicles are very large. This makes moving loads, equipment or the vehicle itself problematic if you have not planned the move carefully. The planning process for moving loaders (loaded or unloaded) includes:

- Walking the route (if possible) looking for sloping, soft or rough terrain, and obstructions such as trees, rocks and underground services. Underground services can be located from supply authority or council maps.
- Ensure you will have enough space to safely and sensibly make any turns and that there is adequate space for braking and slowing.
- Following policies and requirements such as:
 - Movement plans for the site.
 - Codes of practice for vehicle movements.
 - Legislation and regulations for vehicle movements.
 - Licensing requirements.



Some of the work areas that you may need to plan a move through could include:

- Quarries and mine sites.
- Manufacturing plants.
- Construction, building or demolition sites.
- Road or rail construction sites.
- Warehouses, factories or wharfs.



Risks and Hazards



A RISK is the chance of a hazard hurting you or somebody else or causing some damage.

A HAZARD is the thing or situation that causes injury, harm or damage.

If you can remove or at least control a HAZARD you can reduce the RISK involved.

Risk Management

Risk management is the process of reducing or managing the risks when working with or with a hazard or in a hazardous situation.

Risk management is made up of the following stages:

1. Hazard Identification.
2. Risk Assessment.
3. Consultation and Reporting.
4. Hazard Control.
5. Review.



Step 1 – Hazard Identification

Checking for hazards is the first step in Risk Management.

If you don't identify the hazards you can't control them!

Being familiar with your worksite will allow you to identify a hazard quickly. When you start working on a new site, take the time to look around the site and identify where structures, parking areas, and work zones are. Participating fully in your site induction will also help you to familiarise yourself with what potential hazards are onsite.



You can also check records of injuries and incidents, safety tags or talk to other workers.

Make a note of any hazard you identify in the area. Remember, a hazard can also be a situation so keep an eye on how the people around you are working too!

Each worksite has its own specific hazards. A site induction needs to inform you if any of these hazards exist on site. Some of these hazards can be removed through staff training, better equipment and safe work methods. Talk to the WHS officer for more information.



Potential Hazards and Risks

Potential hazards and risks that may be identified during the inspection of the work area may include:

- **Installed services** – underground or above ground power lines, telephone lines, gas pipes, cables. To find out the location of underground services you may need to contact the site supervisor, local authorities, dial before you dig or the council
- **Damaged or defective equipment** – could include pressurised hoses and fastenings, non-pressurised hoses, ancillary machinery equipment, vandalised equipment.
- **Equipment/product** – other vehicles, conveyors, fixed plant, overhead structures and services, abandoned equipment, unattended equipment, lifting equipment, moving vehicles and equipment.
- **People** – site personnel, non-inducted personnel, site visitors, others authorised or unauthorized.
- **Environmental hazards** – uneven ground, excavations, holes and pot holes, recently filled trenches, sinkage areas, dust and noise, unstable terrain, trees.
- **Structural hazards** – buildings, structures, facilities, bridges, suspended pathways, walkways, service drains, fences, structural obstructions, adjoining pit walls or structures, ramps.
- **Weather conditions** – storms, heat, floods, fires, gas leaks, humidity.
- **Chemical hazards** – fuel, chemicals, contaminants, gases, dusts. Specific training may be required to deal with chemical hazards. Speak with your supervisor if you are unsure if you need specialised training for the chemical hazards on your worksite.
- **Energy** – any system or equipment that stores any form of energy could become a hazard or risk. Some energy hazards that can be found on worksites include:

- Engine components.
- Radiators and cooling systems.
- Hydraulic tanks and reservoirs.
- Air tanks and reservoirs.
- Hydraulic hoses.
- Air hoses and tyres.
- Air conditioning components.
- Electrical, braking or centrifugal forces and systems.



Risk Assessment

Risk assessments should be performed by competent individuals who are familiar with assessing hazard injury severity, likelihood, and control measures.

A risk assessment is not required for excavation and trenching under the WHS Regulations; however, it is required for certain situations, such as working with asbestos.

In many cases, a risk assessment will help to determine which control measures should be implemented. It will aid in:

- determine which workers are at risk, and
- identify the sources and processes causing the risk.
- determine whether and what type of control measures should be implemented, and
- Check the effectiveness of existing control measures.



When assessing the risks associated with the vehicle operations, you should consider things such as:

- local site conditions, such as access, ground slope, nearby buildings and structures, watercourses (including underground), and trees
- excavation depth
- soil properties such as variable soil types, stability, shear strength, cohesion, the presence of groundwater, and the effect of exposure to the elements
- fractures or faults in rocks, including bedding planes, joints, dip and strike directions and angles, clay seams
- any specialised plant or work methods required (e.g., ground support)
- the method(s) of transport, haul routes and disposal
- what exposures might occur, such as to noise, ultraviolet rays or hazardous chemicals
- the number of people involved;
- the possibility of unauthorised access to the work area; and
- the time frame for which the excavation will be open

Using a risk matrix to assess risk

During a risk assessment, a risk matrix is frequently used to measure the level of risk by taking into account the consequence/severity and likelihood of injury to a worker after being exposed to a hazard. The two measures can then be used to help determine the hazard's overall risk rating. When using a risk matrix, two key questions to ask are:

1. **Consequences:** How severe would the most serious injury be if you were exposed to the hazard?
2. **Likelihood:** How likely is it that the person will be injured if exposed to the hazard?

Risk assessment matrix					
Likelihood	Consequence				
	Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Catastrophic (5)
	Rare (1)	2	3	4	5
	Unlikely (2)	3	4	5	6
	Possible (3)	4	5	6	7
	Likely (4)	5	6	7	8
	Almost certain (5)	6	7	8	9
					10

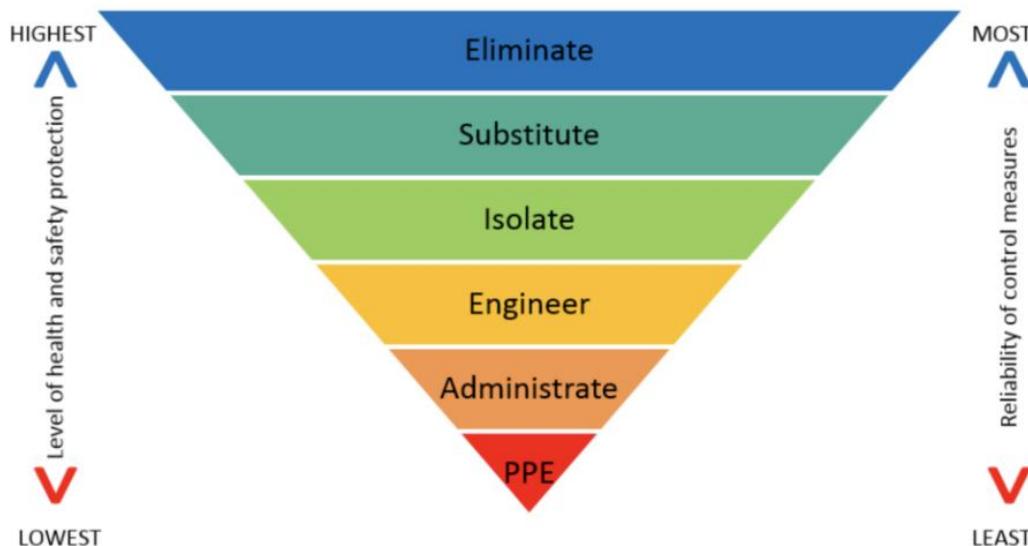
Control measures

Some methods of control are more effective than others. Control measures can be ranked from most secure and reliable to least secure and reliable.

This is referred to as the hierarchy of control.

The most effective control is to always aim to eliminate a hazard. If this is not feasible, you must mitigate the risk by doing one or more of the following:

- Substitution – Using an excavator equipped with a rock breaker, for example, rather than the manual method
- Isolation – For example, to reduce the risk of a collision, concrete barriers can separate pedestrians and powered mobile plants.
- Engineering Controls – Benching, battering, or shoring the sides of the excavation, for example, to reduce the risk of ground collapse.



If the risk remains, administrative steps such as placing warning signs near the excavation must be taken to limit it as much as feasible.

Any remaining threat must be addressed by providing workers with proper Personal Protective Equipment (PPE), such as hard helmets, hearing protectors, and high visibility vests.

Administrative control measures and personal protective equipment (PPE) rely on human behaviour and supervision, and when used alone, they are the least effective at reducing risks

Step 4 – Hazard Control

The Hierarchy of Hazard Control is the name given to a range of control methods used to eliminate or control hazards in the workplace.

Exclusion zones

Contact with overhead or subsurface electric lines can be fatal.

Exclusion zones are the shortest safe distance from live power lines that can be maintained to reduce the risk of electric shock.

Working near electricity wires might be dangerous. Touching them or going into their exclusion zone can result in a severe electric shock.

If you must work near powerlines, take the following precautions:

- Before you begin, create a safe work system.
- Create a safe system that maintains a safe distance from powerlines (stay outside the exclusion zone)
- Identify overhead and subsurface powerlines using maps and/or conversations with the property owner and the electrical company.

Conduct a site-specific risk assessment – consider the following:

- The type of machinery and equipment/tools utilised,
- The site and weather circumstances,
- The sort of work being done and the set-up and pack-up processes
- Install risk controls – the most effective technique to control risk is to de-energise the line for the length of work where there is a risk of contact.

Keep your employees and contractors up to date on electrical safety.

- Install and train your employees and contractors on safe work practices, emergency protocols, and exclusion zones.
- Plan the jobs conducted near powerlines carefully and work away from them wherever possible, rather than below them.
- Mark the safe distance from a powerline on the ground to show your workers.
- Make people aware that powerlines sag or wobble in hot or windy conditions.
- Harvesters may enter exclusion zones, elevating work platforms, irrigation pipes, grain drills, elevators, mobile grain silos, cranes, tippers, and excavators. Ascertain that operators are aware of the height and reach of any machinery or hand-held items employed.



Avoid entering exclusion zones.

- Draw attention to powerlines and poles. Request authorisation from your utility company to paint power poles and/or have them install markings or flags on powerlines.
- Plan your job so that no tree branches fall across powerlines.
- Use insulated or non-conductive tools and equipment whenever possible.
- Use a safety observer to ensure that you stay well clear of exclusion zones.
- Follow the safety instructions provided by your electrical entity.

Although the following are the minimum safe distances, staying as far away from powerlines as possible is the best way to stay electrically safe.

Hazard Control – Safeguarding Site and Non-Site Personnel

Protecting site personnel (employees, contractors, management, students, other inducted personnel) and non-site personnel (delivery drivers, training assessors, members of the public, site visitors) on the site is one of the primary responsibilities of all members of a work site. How people are protected will depend on the worksite policies and procedures and government legislation for the state or territory you are located in. As a minimum, barricades, signs and safe systems and procedures should be used.



Common safety systems and procedures can be broken down into the following groups:

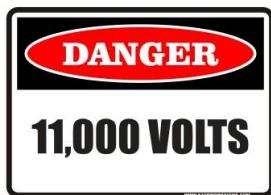
- **Loader/Equipment tasks** – operation of equipment safely and within capacity, use of a rollover protective structure and safety belts if the Tracked loader may overturn, correct maintenance of the Tracked loader in accordance with manufacturer's specifications, securing loads within the bowl area, only loading according to specifications for the machine (not overloading), proper task planning to identify and avoid obstacles, risks or hazards, observing loads at all times, using only approved attachments, using any site specific vehicle movement or Tracked loader circuit plans.
- **Personal tasks** – maintaining personal protective equipment properly, using PPE including sun, noise, dust protection, hearing protection, wearing high visibility clothing or reflective vests, having manual handling awareness, using lifting and carrying equipment in accordance with manufacturers specifications and guidelines, monitoring temperature extremes and responding appropriately, following site procedures as outlined in the site inductions.
- **Operational tasks** – hazard and risk identification and control through barricades or fences, having procedures for hazardous or high risk tasks, having access to appropriate training for handling, application or storage of chemicals and hazardous substances, appropriate training for confined spaces, awareness of site areas such as excavations, overhead utilities or structures, operation of the machine within the recommended manufacturers guidelines.
- **Document guidelines** – Australian standards such as 2550.1 2002 Cranes, hoists and winches – safe use general requirements, SafeWork NSW guides such as 1213 – Moving Plant on Construction Sites, organisational procedures, Manufacturers guidelines and specifications, material data safety sheets, safe work method statements, training programs. All site processes, procedures and policies for should be accessible on the worksite or through the site supervisor.
- **Physical protection** – having barricades, concrete barriers, safety zones, exclusion areas, signage warning of hazards or risks, equipment for protection from hazards or risks and the appropriate use of PPE related to the work tasks and site requirements.

The use of barricades, guardrails or fences within the work site is one of the most commonly used techniques for personnel protection. Some organisations will have contractors erect the barricades while others will have operators erect the barricades. Another important safeguard method is the use of appropriate signage within and around the work site.





Examples of Site Safety Warning Signs and Symbols



Danger Signs

AS 1319 specifies that these signs are to be used where conditions are likely to be life threatening. The sign is to incorporate the word Danger in white letters on a red oval shape inside a black rectangle.

Warning Signs

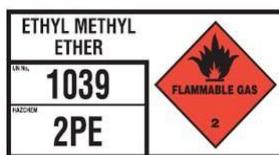
AS 1319 specifies that these signs warn of conditions that are NOT likely to be life threatening if the message is ignored. The symbol used is a yellow equilateral triangle with a black enclosure.

Prohibition Signs

AS 1319 specifies these signs are to have a red annulus and slash symbol on a white background. They indicate actions or activities that are not permitted.

Mandatory Signs

AS 1319 specifies these signs shall be a blue disc with the symbol in white. The word MUST is usually contained in the message.



Emergency Signs

AS 1319 specifies these signs shall comprise of a white symbol or text on a green rectangle with white enclosure. These signs indicate the location or direction to emergency related facilities and first aid or safety equipment.

Fire Signs

AS 1319 refers to fire signs which are covered in AS2444. These signs indicate the location of fire alarms and fire fighting equipment. Signs shall comprise a red rectangle sign with a white legend and enclosure.

AS 1216 specifies the relevant "designs, layout and size". These signs are prescribed in the "Australian Dangerous Goods Code" and various State Government "Dangerous Goods, Storage and Handling Regulations".

Safety Tags & Lockout Systems



Safety and Directional Signs

Speed Zone Signs

Warning Signs

Directional Signs

Hazard Control – Personal Protective Equipment

Before starting external checks on the vehicle it is necessary for the operator to be wearing appropriate personal protective equipment.

Personal protective equipment (PPE) is the equipment you can wear or use to protect yourself. Every worksite will have PPE requirements. For construction and mining worksites these pieces of equipment will need to be worn from the time you enter the site. For example, high visibility clothing and steel capped boots. Other pieces of PPE would need to be worn only when specific activities are undertaken, such as hearing protection need only be worn when undertaking high noise activities. Signs are usually placed in the workplace to indicate which specific item of PPE is needed.



Common PPE includes:

- Clothing – high visibility, protective, full body clothing, safety vests, sunscreen or sun protection.
- Head – hard hats, sun hats.
- Hearing protection – ear muffs, ear plugs.
- Face – face shield, respiratory protection, dust mask.
- Hand protection, eye protection.
- Footwear – non-slip footwear that encloses the foot.
- Safety harnesses, seat belts, and any other task specific protective equipment.



Personal protective equipment needs to be maintained in good condition, and replaced if it becomes damaged or defective. PPE is the last line of defence for protecting the individual from workplace hazards and risks but will only be effective if it is worn correctly and is adjusted to fit the individual.

Hazard Control – Selecting Environmental Control Measures

Working within the construction industry, you need to be aware of the environmental requirements of the work area, and any constraints that you are under. Environmental requirements are the procedures to be followed to protect or enhance the environment, or to comply with the environmental management plan. Within the environmental requirements are the environmental constraints. Constraints are those activities that must not be done or those activities that must be done in a particular way in order to protect or preserve the environment.



Environmental requirements and constraints can include:

- Methods for applying chemicals to a stockpile.
- Methods for creating a topsoil stockpile that keeps the seeds in the soil viable.
- Dust – dust can be a safety issue as well as an environmental problem. As a Tracked loader driver you will create dust. It is your task is to minimise the amount of dust you create.
- Safe work practices and procedures – designed to minimise the risks and hazards associated with particular tasks.
- Contamination control requirements – these requirements will outline what you need to do in the event of a contamination situation. Contamination could come from fluids leaking from the machine and spillage of fluids from service activities, but could also include contamination in the form of the wrong materials being placed in an area. Contamination control requirements are necessary and vital on every construction site. It is essential that you understand them.
- Start times for vehicles – of particular importance on projects impacting high density residential areas.



- *Assess site conditions including:*

- Work platforms – the actual work zone or surfaces.
 - Grades, slopes and terrain.
 - Haul circuits.
 - Dump sites.



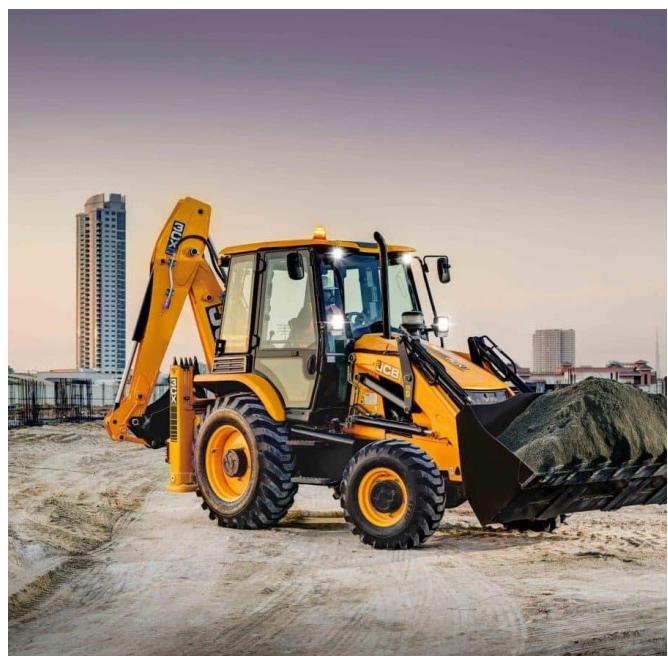
- Chemical and fuel safety – handling hazardous goods and materials such as chemicals and fuels requires specific training. If you are required to regularly handle goods that may be dangerous or hazardous, speak with your supervisor, training officer or assessor about appropriate training. Hazardous goods spills can cause massive damage to the relationship between the worksite and the surrounding community. All spills must be treated quickly, efficiently and with the aim of stopping any further damage.

If you discover a hazardous goods spill it is essential for you to:

1. **Report it** – to the appropriate person, generally your supervisor first, then your emergency response team.
2. **Isolate it** – keep others away from the area until the emergency response team or hazardous material team arrives.
3. **Apply first aid** – if you or someone else has come in contact with the substance apply appropriate first aid treatment, if you know how. If you are not trained call for medical or first aid assistance.
4. **Follow site procedures** – each type of hazardous material on site should have an emergency response procedure as well as a general site spill procedure. Make sure that you know these procedures.



Environmental management policies and procedures vary greatly within worksites depending upon the tasks being undertaken. It is important for each member of the work team to be aware of the requirements that apply to the tasks they are undertaking. For any requirements that you are unsure of, you should check with your supervisor or other authorised people outlined in your induction.



Step 5 – Review



Once a Hazard Control Strategy is in place you should review the situation to see if the risk has been reduced to a safer level, and if there is more you can do to reduce the risk. Often a number of strategies need to be used together to reduce risk.

Make sure you record any action you've taken and talk to your supervisor and WHS officer about the control strategies in place.

Coordination with other Personnel

All personnel on site must understand their role and the role of others before commencing work, and during the work process. Coordinating requirements with the appropriate personnel is important to ensure the work site operates efficiently, effectively and safely. It also ensures compliance with WHS and work site requirements and instructions.

Relevant site personnel may include:

- Other mobile plant operators.
- Maintenance personnel.
- Service vehicle operators.
- Mechanics.
- External contractors.
- Supervisors, environmental officers, WHS officers, inspectors/auditors.
- Site visitors.
- Trainers and assessors.



Communication is essential to coordination of activities. Communication can be both written and verbal. Communication needs to be a two way process with both sides being prepared to speak and listen to share ideas on how to effectively achieve the outcomes needed.

Choose and Check Plant and Equipment



Once you have confirmed your job requirements with your supervisor or site foreman you need to choose the right equipment and attachments to get the job done.

When choosing equipment and attachments you need to think

about:

- The task requirements, specifications and goals.

- The appropriateness of the equipment for the completion of the task.

- The characteristics, correct use, operating capacity and limitations of each item.

- The potential risks to yourself and others in the intended use of the equipment.

Information about technical capabilities and limits can be found in the operator manuals supplied by the manufacturer of each item.

It is not safe to operate plant, equipment or attachments outside site procedures and the manufacturer's specifications. This may cause the machinery to break and could also cause an accident or injury.

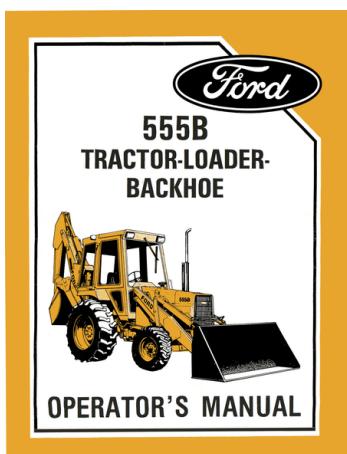


Backhoe/loader Characteristics and Limitations

Backhoe loaders come in all different shapes and sizes depending on your needs. One of the significant differences between all backhoe loaders is their lifting capacity. However, you can choose three distinct types according to your project requirements.

- **Standard:** A standard backhoe loader is also known as a centre pivot loader. They're very adaptable and have excellent stability for working on uneven terrain. The digging arm is fixed and can move from side to side from a centre pivot.
- **Side-shift:** The side-shift backhoe style features a digging arm that slides from side to side, allowing for more versatility.
- **Mini:** Mini backhoe loaders are a smaller version with lower lifting capacity. They're favoured when space is limited, and the digging/excavation work is not as extensive.

All backhoe loaders have stabilisers on each side for working on uneven surfaces, but their function varies slightly between the standard and side-shift models



Check the operator's manual and manufacturer's specifications for information about:

- Load limits.

- Balance requirements with and without a loaded bucket.

- The limits on slopes that can be negotiated both loaded and unloaded.

- Manoeuvring capability, such as turning radius and stopping distances.

- Attachment use.

- Use of slings and guide ropes.

- Materials and handling requirements.

Choosing Backhoe/loader Attachments

There are a range of attachments and equipment that can be fitted to your backhoe/loader including:

Attachment	Description
Ripper/Tynes	For ripping the surface and loosening materials where needed.
Augers	Used for drilling holes.
Buckets	Excavating bucket, tilt bucket, rock bucket, trench bucket.
Pallet Forks	Used for lifting pallets, similar to a forklift

When selecting an attachment, you have to work out if it is suitable for the tasks you need to complete by confirming:

What the attachment is designed for.

If it is an approved attachment that can be used with the backhoe/loader, you are operating.

The manufacturer's requirements for the attachment.

That you know how to use the attachment properly.

You will find this information in the operator's manual for the backhoe/loader and the operator's manual for the attachment.

Fitting and Removing Attachments

Once you have decided that the attachment is right, you need to attach it securely using approved attachment points and methods.

Each attachment will have its own requirements for how and where it is fitted on the backhoe/loader. You can find this information in the operator's manual or manufacturer's instructions.

Make sure you take appropriate safety precautions (such as releasing hydraulic pressures where needed) before fitting or removing attachments.



Generally, to fit an attachment:

1. Collect any required tools or equipment.
2. Make sure the backhoe/loader is safely parked and correctly located for attaching the equipment.
3. Follow manual handling procedures – attachments can be heavy and awkward to manipulate.
4. Connect the attachment using the manufacturer's guides and ensuring all connectors are correctly joined.

Generally, to remove an attachment:

1. Collect any required tools or equipment.
2. Ensure the backhoe/loader is safely parked and removal of the attachment will not cause a hazard.
3. Ensure any pressure couplings have the pressure released before detaching.
4. Disconnect connectors in correct order and using recommended safety procedures.



Conduct Routine Checks

Before you use any piece of plant or equipment, you need to conduct routine checks to make sure it is safe to use. Check the machine logbook before you start your inspection to see if there are any faults that still need to be fixed before you can use the backhoe/loader.

Also make sure you are wearing the correct PPE before you start checking the machine.

Routine checks are made up of:

Pre-Start Checks

Visual checks that are made before you start the equipment.

Operational Checks

Checks of all functions once the machine has been started.

Generally, routine checks are performed at the start of each day or shift.

You can use an inspection checklist to keep a record of the checks you have made.

Pre-Start Checks

Pre-start checks are done before the engine is started. Walk around the backhoe/loader and look for anything that is out of the ordinary. You should monitor all these during the day

Part or Component	What to Check
Structure	<p>Check the general condition of the backhoe/loader. Check for oil or other fluid leaks.</p> <p>Check for any signs of visual weaknesses, damage, stressed welds or paint separation.</p>
Tyres or Tracks	<p>Check for mud, which may be thrown from the tyres and cause damage.</p> <p>Check the condition and air pressure of the tyres to make sure they are within the manufacturer's specifications.</p> <p>Check the condition and tension of tracks. Check that the track pin is centered over the track roller, and that track sag is within acceptable limits. The track tension should be adjusted if it is too loose.</p> <p>To check the tension of tracks, place a straight edge on the track from the roller to the drive wheel/cog and measure the distance from the edge down to the track. As a general rule, the allowable track sag is 2.5-3.8cm but you need to check the manufacturer's specifications for the backhoe/loader you are operating to be sure.</p>
Bucket	<p>Check the bucket for worn or broken components e.g. teeth, blade, bolts. Inspect the hydraulics and connections for wear and tear. Check the condition of the pivot pins.</p>
Boom Arm	<p>Make sure you check the arm for damage or defects but be careful not to put yourself in a position where you could be crushed if there is a malfunction.</p> <p>If you find excessive wear in the power arms and connections that make the backhoe/loader dangerous to operate, you need to inform your supervisor or an authorised person. Then isolate the backhoe/loader and don't use it until it is repaired.</p>
Safety Pins	<p>Check all pins and keeper plates are in place and any loose bolts are</p>
Fluids and Lubrication	<p>Check that the oils (engine, transmission, hydraulic) and fuel are at the right levels. Check that the water or other approved coolant is at the right level.</p> <p>Transmission fluid needs to be checked in accordance with the manufacturer's specifications.</p> <p>Check that parts are lubricated to ensure smooth operation.</p>
Engine	<p>Check condition and security of battery. Check electrolyte levels. Check for any obvious signs of damage or wear.</p>
Hydraulic Rams & hoses	<p>Hydraulic rams and pressure hoses are checked for splits, leaks, fractures, bulges and bent piston rods.</p>
Decals and Signage	<p>Check that all decals and signage are present on the machine.</p> <p>This includes the load chart, which must be clearly readable for the backhoe/loader to be used.</p>
Windows	<p>Check that the windows are clean, and you have good visibility from the operator's chair.</p>
Cabin	<p>Check that the seat and safety belt is in good condition. Check that the cabin is clean.</p>
Service History & Logbook	<p>Check the machine hour meter, manufacturer's recommendation and logbook to find out if the backhoe/loader needs to be serviced. You can also check the instruments or computer for this information on later models.</p> <p>For exact details on the components for the machine you are operating, check the operator's manual as different brands may have different requirements.</p>

Operational Checks



Operational checks are made once the engine is started.

Climb into the backhoe/loader using 3 points of contact at all times (2 hands and 1 foot or 2 feet and 1 hand). This is the safest way to climb in and out of the backhoe/loader.

Adjust the seat until comfortable and make sure you have maximum visibility. Secure your safety belt.

Start up the backhoe/loader by following the manufacturer's instructions.

You will need to let the engine idle for the required amount of time. Depending upon the individual machine this idle time could range from 3 to 10 minutes.

Controls and functions that need to be checked and monitored on the backhoe/loader:

Part or Function	What to Check
All Controls	Test all arm and bucket movements.
Gauges and Instruments	Check that all instruments are displaying properly and are not signaling any alarms or warnings.
Safety Devices	Test all lights, alarms and other warning devices.
Attachments	Check that the attachment is secured and connected to the backhoe/loader properly. Check the condition of the attachment. Check that it works properly.
Travel, Turning and Brakes	Test all movements and brakes, including the emergency stopping device.
Ancillary Equipment	Test out all communications devices and any other systems or functions fitted, e.g. positioning instrumentation (GPS, auto levelling controls).

Once you have finished your operational checks it is a good idea to check for external signs of oil or fluid leaks. It is common for the start-up process to cause a leak through hoses breaking.

Recording and Reporting Faults

Once all routine checks are finished, you will need to report any problems, faults, defects and damage that you found during the inspection so that they can be repaired and the machine and equipment are safe for you or the next operator to use.

Make sure the backhoe/loader is tagged out (isolated from use) until the repairs have been made.

Record the details of the problem in a fault report or the backhoe/loader logbook.



Operate the Backhoe/loader

During civil construction backhoe/loader operations you will need to:

Assess the materials you are working with.

Use the equipment safely within the technical specifications and limits.

Use the equipment for tasks that it is specifically designed for.

Continuously monitor and check for hazards.



It is important to coordinate your activities with other workers when you are planning and carrying out the work to make sure everyone knows:

The work being completed.

How, when and where you will be operating.

What they need to do.

All workers on site must understand their own role and the roles of others before starting work. It helps to make sure work is done safely and efficiently.

Workers you may need to coordinate with include:

Supervisors and management.

Other plant and vehicle operators.

Traffic controllers or other workers on site.

Team leaders.

Site safety personnel.



Assessing Materials to be Excavated

You will need to assess the materials you are working with to figure out the best way to handle it. For example, clay is more cohesive and harder to excavate than topsoil.

There may be different types of materials being handled at the worksite. They may include:

Material	Description
Clays and Mud	Clay and mud can tend to be dense and sticky and may not discharge cleanly if wet or damp. Sometimes, particularly with damp materials, the dump process may be longer than normal. Mud can purge from the backhoe/loader, rather than discharge smoothly.
Topsoil and Organic Materials	Generally, these types of materials are loose and will dump cleanly. As topsoil can be reused in re-vegetation activities, it will normally be dumped in a quarantine area to keep it free from contaminants. It may be necessary to clean down the machine before starting work in other areas or prior to hauling topsoil or organic matter to prevent contamination.

Material	Description
Stones, Rocks and Gravel	<p>The operating techniques needed will depend on the type of rock, and the size of gravel and stones. For example:</p> <ul style="list-style-type: none"> Metamorphic rocks are heavy and hard. Igneous rock is volcanic and can be hard but may also be very light. Igneous rock can be very abrasive and may cause damage to the backhoe/loader or wear down ripping points quickly. Sedimentary rocks and shale could peel out when cut and removed.
Silts and Sands	Depending on the amount of moisture, silts and sands can move cleanly and easily or can be difficult because of the fine and sometimes crumbly nature of the materials.
Construction Site Materials	<p>Construction site materials can be blended materials, bituminous mixes and waste materials. How these materials handle will depend on the properties of the materials and the environmental conditions such as the moisture levels.</p> <p>Knowing the material and how it reacts during operational activities is essential in order to complete required tasks efficiently and achieve optimum output.</p>

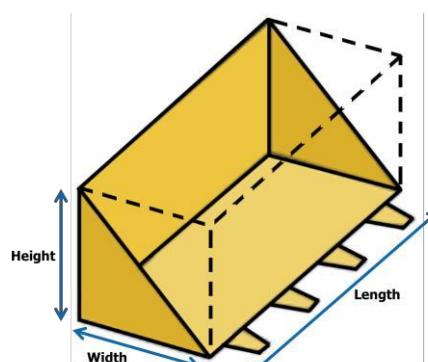
You will also need to assess the weight of the materials you are working with.

Material	Weight / Cubic Metre	Material	Weight / Cubic Metre
Bronze	8.5 t	Lead	11.4 t
Clay	1.9 t	Lime (stone)	2.6 t
Coal	864 kg	Sand, beach, dry	2.0 t
Concrete	2.4 t	Sand, beach, wet	2.3 t
Earth	1.9 t	Sand, river, wet	1.5 t
Granite	2.6 t	Shale	2.6 t
Gypsum	2.3 t	Terracotta	1.8 t
Iron Ore	5.4 t	Zinc	7.0 t

Think about the size of the bucket you are using and work out the weight of the load.

To work out the volume that the bucket can hold multiply the height (H), width (W) and length (L), then divide it by 2:

$$\frac{L \times W \times H}{2}$$



Checking the weight of the materials against the manufacturer's specifications, delivery dockets, weighbridge dockets or in some cases marked on the load, to make sure you don't overload the backhoe/loader. Keep in mind that uneven, rough, boggy or sloping ground can all reduce the amount of material that the backhoe/loader can safely carry.

Soil Technology



Characteristics of the materials being moved or loaded will affect your work.

You need to understand the basics of soils, clays and other materials so you are able to:

- Know how to best respond to them and handle them.
- Achieve the best outcomes in your work.
- Calculate load amounts.
- Understand conditions for moving the materials.

Safe Operating Techniques

To make sure your work is done in a safe way it is important to follow some basic safe operating techniques.

Make sure the backhoe/loader is suitable for the ground conditions and that the bucket is suitable to the task.

Keep clear of holes or soft ground areas. Be careful when driving along the high side of a trench as it could cave in.

Keep constantly communicating with other personnel throughout your backhoe/loader operations. Continuously monitor and check for hazards and warn other workers if there is danger.

Report your progress on a regular basis to your supervisor and modify your work to meet any new project or quality requirements or changing conditions.

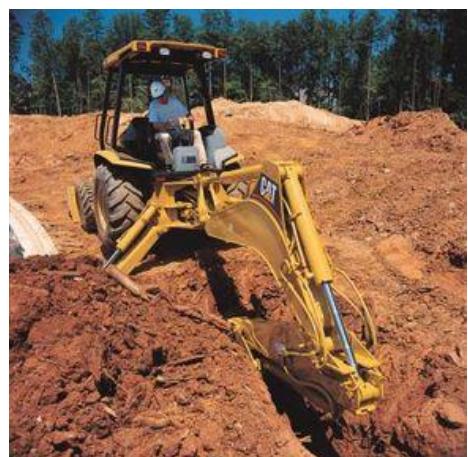


The operator's manual will outline the limitations of the backhoe/loader you are using. This will include information about:

- Safe operating speeds and techniques
- Safe travel speeds.

Backhoe/loader operators will usually use the following techniques to complete civil construction tasks:

- Excavating or loading materials.
- Dumping materials.
- Levelling materials.
- Stockpiling materials.
- Backfilling.
- Battering and benching.
- Site clean-up.
- Other tasks, e.g. mixing materials, cut & fill, pipe laying.



Safe Operating Speeds

While operating the backhoe/loader make sure movements are smooth, not jerky, and that you operate the backhoe/loader at a safe speed.

Operating the backhoe/loader too fast can cause instability.



Safe Travel Speeds

Going too fast will reduce the stability and control of the backhoe/loader, as well as putting yourself and other workers in the area in danger.

Your speed may be affected by a range of factors including:

- ◆ The age of the machine.
- ◆ The work environment.
- ◆ Ground conditions.
- ◆ Attachments fitted.
- ◆ Visibility.
- ◆ Site rules, policies and procedures.
- ◆ The amount of traffic, other vehicles or obstructions in the area.



Using Attachments

You need to know and understand the operational limits of the equipment you are using to make sure you don't damage it or put yourself in danger.

Each attachment has been designed to do a specific type of work, for a specific type or range of materials. Do not ever use an attachment for any job other than the one it is designed for.

Make sure you have enough room to operate the attachment safely without putting other workers in danger.

Keep all operations within the limits and capabilities of the equipment. You could damage the attachment if you push it too hard.

After you have finished using the attachment, check your work to make sure it matches the plan.



Excavating or Loading Material

When using the backhoe/loader for civil construction work make sure you work safely and follow the work plan, including:

Checking for underground services (power, telephone, gas, water, sewer, drainage and fibre optic cable lines) before starting to excavate.
Talking to the site supervisor, dial before you dig and engineers have contact with the supply authorities for council maps of the site.

Checking state or territory standards for safe operating distances from power lines.

Using barricades, guard rails or fencing and warning signs to prevent workers falling into a trench or vehicles and machines getting too close. No workers should be standing within operating radius of the backhoe/loader while you work.



If you are excavating a trench, deposit full buckets of material away from the trench. Loads should be placed at least 1m away with material coming to rest no closer than 0.5m from the excavation.

While you are excavating you need to check for signs that you are getting close to a previous excavation or an underground service. If you notice any of the following signs, stop operating immediately and hand dig to investigate:

Crushed blue metal or plastic tape.

Clean sand or sandbags.

Broken tiles.

Moisture.

Any other unusual material.



If cutting a trench across a footpath:

Gather information and permits from relevant authorities who may run services under the footpath.

Excavate slowly towards any underground services Set barricades and signs to isolate the area.

Dumping Material into Trucks

When dumping material into a truck:

Approach the truck slowly or wait until it is correctly positioned.

Make sure you know where the driver is at all times.

Make sure the turntable is level when slewing to prevent the machine from overturning.

Place a layer of soil in the truck to take the impact of large rocks.

Never slew a load over the cabin of the truck as the bucket could hit the cabin or load could drop onto the cabin.

Be careful of large boulders tipping out of the bucket onto the truck.

Make sure anyone in the area is at a safe distance from loading operations and that they stay within your view.



Levelling

Levelling materials can be done using the bucket or using a dozer blade fitted to the backhoe/loader.

When levelling, work to the designated grade, slope and fall (for water to run off). In many cases GPS and laser control systems are now used to provide a more accurate finish to the work. This eliminates the need to have a person standing close by, ready to take levels although this may still need to occur with some works.

Levelling equipment needs to be calibrated regularly and checked against site reference points such as pegs, benchmark points or other defined levels.



Stockpiling



Backhoe/loaders are used to either create stockpiles by placing materials into the pile or to empty a stockpile by removing materials.

Do not undercut a bank or stockpile, as it could collapse and cause the backhoe/loader to overturn and trap the operator underneath.

Backfilling

The backhoe/loader can be used to backfill trenches or small excavations after work has been completed.

When backfilling make sure that you do two things:

- Check that the right materials are deposited into the excavation.
- Check that the right level of compaction is achieved.

Loose materials in a trench or excavation can settle over time and sink down.

Make sure there is enough material packed into the trench to keep the ground even after the work is completed.



Battering and Benching



Batters are the slopes to the side of constructed works – these could be cuttings or embankments.

Benches are steps that are dug into the materials to provide flat areas for safe working on slopes, or raising the equipment up to assist with excavating and loading materials.

Excavations deeper than 1.5m that workers need to enter or that are likely to collapse due to the material will require you to bench or batter the sides. Then trench shields can be lowered into position before workers enter the excavation.

Site Clean-Up

Backhoe/loaders are useful for cleaning up worksites after major works have been completed or preparing sites for other work.

Site clean-up includes removing unwanted materials from the area. You may need to stockpile them for later use, or deposit them in an area where they can be removed from the site.



Other Backhoe/loader Tasks

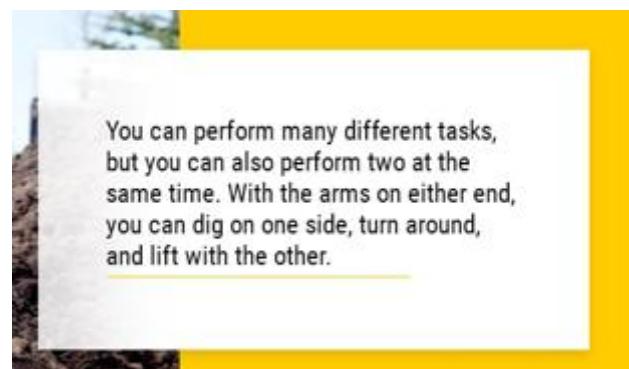
Backhoe/loaders can also be used for:

Mixing Materials – backhoe/loaders can be used to do this as they have a large bucket and are able to move large amounts of materials quickly.

Cutting and Boxing – this involves cutting or removal of material above a required level i.e. cutting down to create a floor or design level. Boxing is the technique of removing materials below a level and may involve trenching, or removing sections of pavement in a “box” type shape to a desired level.

Pipe Laying – this is completed after trenching. A pipe laying attachment could be used if necessary.

Cut and Fill – this involves removing (cutting out) materials and replacing them (filling in the hole).



Landscaping – These tasks include removal of trees and other obstacles and ripping of the ground. It may also include stripping or spreading of topsoil or other materials and compacting materials.

Adjust Techniques to Meet Changing Conditions

While you are working and moving materials, the site will change.

Lighting Changes – Twilight is the time when your eyes might become more tired and difficult to focus. It could be more difficult to see the terrain and to judge distances. Set up temporary lighting where possible and go slowly.

Weather Conditions – Rain, sleet, snow, wind and humidity can all affect both your backhoe/loader and the materials you are working with. Additional moisture from any source will change the composition of the materials, possibly making them heavier and slippery. This means you will not be able to lift or haul as much and you will need to adjust the quantities you are dealing with in each load.



Changing Work Conditions – As more materials are moved around or removed from a site the work conditions may change.

Materials that you are working with can change throughout a project. As you excavate deeper or move onto other stages of the civil construction project you will be working with different materials, attachments and personnel.

Lift, Carry and Place Loads Using Slings and Lifting Gear

In civil construction projects you may need to use the backhoe/loader to lift and carry loads using slings and lifting gear for example lowering pipes into trenches.

It is important that this work is conducted in coordination with authorised personnel such as a licensed dogger or rigger.



Determine the Weight of the Load

You need to coordinate with authorised personnel to work out the weight of the load to make sure your backhoe/loader can safely lift it without damaging the equipment, attachment or making it unstable.

The weight of the load can be found in a number of ways:

- Check for weight markings on the load.
- Check delivery dockets or information sheet
- Check the weighbridge certificate.
- Calculate the weight of the load or material



If you cannot be sure of the weight and cannot calculate it, do not lift the load.

To ensure a safe, secure lift ensure you have the correct lifting gear, you have set up exclusion zones, the ground is level and you have open lines of communication

Once you know the weight of the load you need to make sure the backhoe/loader you are using has the capacity to lift it safely. You can check the capacity of the backhoe/loader in the operator's manual or manufacturer's specifications.

If you are using an attachment to lift the load you need to check that it is also rated to be able to lift the load. Keep in mind that using an attachment may also reduce the overall capacity of the backhoe/loader.

Pass on any information about machine and equipment capacity to the person slinging the load.

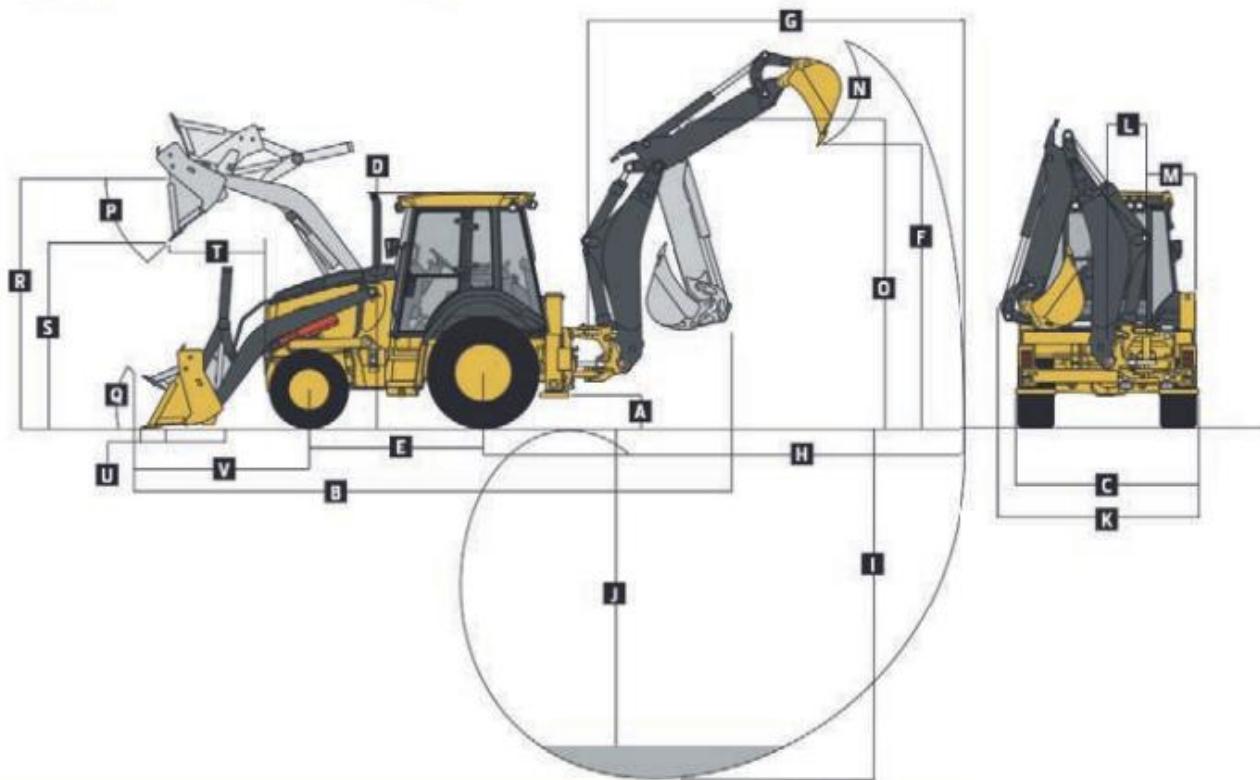


Check the Backhoe/loader Load Chart

Always check the backhoe/loader load chart to make sure that any load that is lifted is within the capacity of the backhoe/loader.

For example:

Overall Dimensions	315SL
A Ground Clearance, Minimum	351 mm
B Overall Length, Transport	5.96 m
C Stabilizer Spread	2.26 m
D Height to Top of ROPS/Cab	2.84 m
E Length From Axle to Axle	
Non-Powered Front Axle	2.16 m
MFWD Axle	2.19 m



Backhoe Dimensions and Performance

Backhoe specifications are with 610-mm x 0.21-m³ bucket; dipper lift specs are with a boom angle of 65 deg.

Bucket Range 305–762 mm

Digging Force

Bucket Cylinder 55.0 kN

With Heavy-Duty Cylinder Option 67.9 kN

Crown Cylinder 36.6 kN

Swing Arc 180 deg.

Operator Control 2 levers

With Optional Extendable Dipperstick

	With Standard Backhoe	Retracted	Extended
F Loading Height, Truck Loading Position	3.65 m	3.77 m	4.39 m
G Reach From Center of Swing Pivot	5.44 m	5.61 m	6.62 m
H Reach From Center of Rear Axle	6.80 m	6.98 m	7.98 m
I Digging Depth (SAE maximum)	4.08 m	4.24 m	5.29 m

Backhoe Dimensions and Performance (continued) 315SLBackhoe specifications are with 610-mm x 0.21-m³ bucket; dipper lift specs are with a boom angle of 65 deg.

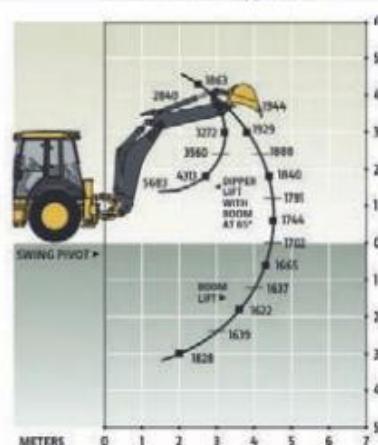
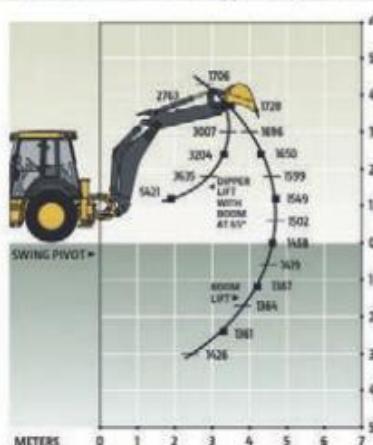
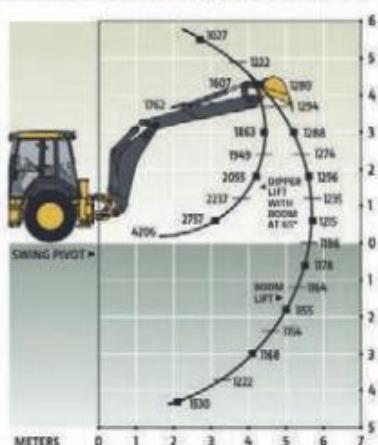
	With Standard Backhoe	Retracted	Extended
J Digging Depth (SAE)			
610-mm Flat Bottom	4.03 m	4.20 m	5.26 m
2440-mm Flat Bottom	3.68 m	3.87 m	5.00 m
K Overall Width (less loader bucket)	2.43 m	2.41 m	—
L Side-Shift From Tractor Centerline	537 mm	537 mm	537 mm
M Wall to Swing Centerline	604 mm	604 mm	604 mm
N Bucket Rotation	190 deg.	190 deg.	190 deg.
O Transport Height	3.71 m	3.72 m	3.72 m

Loader Dimensions and Performance

P Bucket Dump Angle, Maximum	45 deg.	
Q Rollback Angle at Ground Level	40 deg.	
Bucket Capacity	Heavy-duty	Multipurpose
Width	1.00 m ³	1.00 m ³
Weight	2337 mm	2337 mm
Breakout Force	521 kg	863 kg
Lift Capacity, Full Height	47.2 kN	43.5 kN
R Height to Bucket Hinge Pin, Maximum	3277 kg	2792 kg
S Dump Clearance, Bucket at 45 deg.	3.45 m	3.45 m
T Reach at Full Height, Bucket at 45 deg.	2.69 m	2.65 m
U Digging Depth Below Ground, Bucket Level	726 mm	768 mm
V Length From Front Axle Centerline to Bucket Cutting Edge	146 mm	142 mm
	2.05 m	2.10 m

Lift Capacity With Bucket

Dipper-lift specs are with a boom angle of 65 deg. Lift capacities are over-end values in kg of the maximum lift force available.

STANDARD LIFT**With Standard Dipperstick****STANDARD LIFT****With 1.06-m Extendable Dipperstick, Retracted****STANDARD LIFT****With 1.06-m Extendable Dipperstick, Extended**

Lift capacities are over end with stabilizers down and tires tangent to ground.

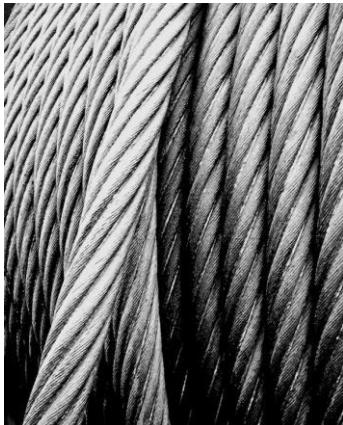
Choose Lifting Gear

When using the backhoe/loader for lifting, make sure it is fitted with the correct lifting attachment or that the machine has the appropriate lifting lugs. Always use an approved lifting lug or lift connection that is clearly marked with the Safe Working Load (SWL).

Lifting gear needs to be selected based on the type, size, weight and shape of the load to be lifted. Only a licensed dogger or rigger is authorised to select and inspect lifting gear, determine the weight of loads and select and apply slinging techniques.



Types of Lifting Gear



Lifting gear that may be used with the backhoe/loader includes:

- Wire rope slings – also known as Flexible Steel Wire Rope (FSWR).
- Chain slings.
- Synthetic slings.
- Eye bolts, shackles and hooks – used to attach lifting gear to the load and backhoe/loader.

Each piece of lifting gear is rated to a specific capacity known as a Working Load Limit (WLL). This WLL can change depending on how the lifting gear is connected and arranged. This is why a licensed dogger or rigger needs to decide what lifting gear is being used and how it will be used.

Inspect and Connect Lifting Gear

Slings and other lifting gear must be inspected before and after use for any signs of damage or wear. All faults must be reported in accordance with site procedures and the equipment must be isolated (removed from service).

Once the correct attachment and lifting gear has been chosen and inspected by a licensed dogger or rigger, you need to make sure it is connected to the backhoe/loader properly. Slings should only be attached to manufacturer approved lifting lugs using a shackle that is rated to lift the load.

Remember: Only a licensed dogger or rigger can select, inspect and apply slinging techniques and determine the weight of loads. You may only participate in these activities under the direct guidance of a qualified dogger or rigger.



Positioning the Backhoe/loader

Before lifting a load with slings you need to get the backhoe/loader into the right position. Make sure:

- The backhoe/loader is on firm level ground.
- The load, backhoe/loader and lifting gear can all be safely accessed.
- Personnel, plant and equipment not directly involved are a safe distance away.
- You have enough overhead clearance to lift the load.
- You have enough room to move once you have lifted the load.
- The backhoe/loader is in line with the load so it will not swing when it is lifted.



Lifting Techniques

Follow these guidelines whenever using the backhoe/loader to shift a load using slings and lifting gear:

Operating Techniques for Lifting Loads	
Follow directions from the dogger to position the lifting point over the centre of gravity of the load to keep the load from swinging.	<input type="checkbox"/>
When you are given the signal perform a test lift then lower the load again so that any changes to the slings and load can be made.	<input type="checkbox"/>
Keep all movements smooth and slow.	<input type="checkbox"/>
Stop the lift immediately if the weight of the load causes the machine to tilt or if the hydraulics begin to strain.	<input type="checkbox"/>
Check the hydraulic hoses and rams before and after lifting to make sure no damage has been done to the equipment.	<input type="checkbox"/>
Materials should be moved shortest distance possible to maintain effective and efficient control of the machine and the load.	<input type="checkbox"/>
Constantly monitor the load during the move.	<input type="checkbox"/>
Keep the load as low as safe and practical if travelling with the load.	<input type="checkbox"/>
Monitor your speed of travel and stay within safe speed limits.	<input type="checkbox"/>
Maintain a safe distance from exposed edges.	<input type="checkbox"/>
Follow all hand signals or other designated signals.	<input type="checkbox"/>
If the slings shift on the load being lifted stop the backhoe/loader, warn workers in the area, carefully lower the load and have the slings re-positioned and secured.	<input type="checkbox"/>
Make sure that if lowering objects such as pipes into trenches that the trench is shored and workers are standing a safe distance away.	<input type="checkbox"/>
Land the load at the designated location. Ensure that it is secure and stable.	<input type="checkbox"/>
Make sure lifting equipment is properly detached before moving off.	<input type="checkbox"/>

Communicating When Moving and Lifting Loads

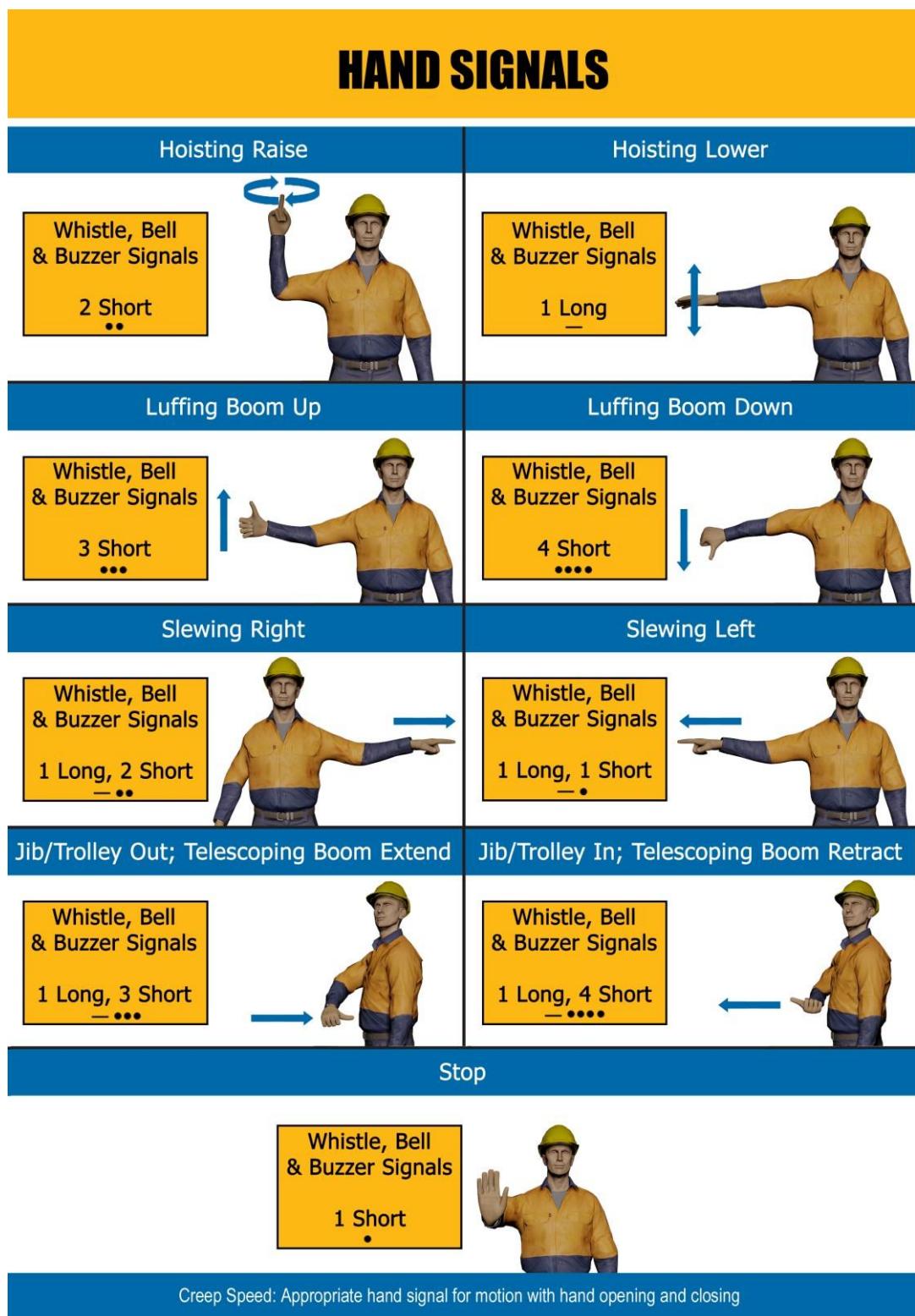
Communicating when transporting and lifting loads may involve communication equipment such as two-way radios. Whistles, bells or other devices may also be used as audible signals to assist with movement of loads. Communications can include; where the load is going, what the load is and what risks or hazards could be encountered.

There are also specific hand signals that apply to the lifting and movement of loads. Hand and audible signals are designed to make the lifting and placement of objects safer and more effective.

Make sure you confirm all signals with the dogger who is directing you before you start to shift the load. Make sure you follow all directions given to you by the person who is directing the lift.



Shown here are the hand and audible signals used in Australia:



Monitor and Check for Hazards

While you work it is important to always be on the lookout for new hazards, and to check that hazard controls are still in place and working effectively. This will help to ensure the safety of yourself, other personnel, plant and equipment.

Check the following things while you work:



Overhead Power Lines, Structures and Clearances – Know how far you are from overhead power lines at all times. Use a spotter to guide you if you cannot clearly see. Be aware that the distance to the overhead services may be reduced as ground conditions change or stockpiles are created. You also need to be aware of overhead clearances when dumping materials into trucks or other haulage units.

Other Machines – At all times you need to know when other machines are working near the backhoe/loader. Good communication between operators is essential to avoid collisions.

Live Stockpiles – Movement of materials in a live stockpile is likely. There is always the potential for the walls of a stockpile to collapse if it is incorrectly excavated.

Personnel – Good communication is the key to working with other personnel. Be aware of people in work area. Make sure they are not in danger and are a safe distance from the backhoe/loader. If you are authorised, tell them to leave if they shouldn't be there, or call on someone who is authorised.



Operator Fatigue – Fatigue is one of the leading causes of accidents for operators of all types of vehicles and equipment.

FATIGUE CAN BE CAUSED BY:

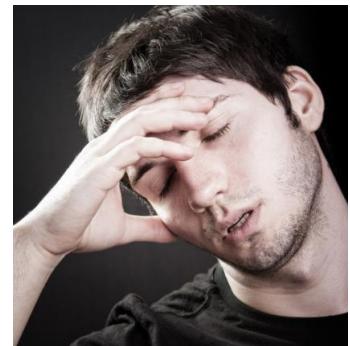


Warning signs that you are suffering fatigue include:

Physical	<ul style="list-style-type: none">➤ Slow reaction time.➤ Tiredness, yawning or sore eyes.➤ Headaches, stomach or other problems.
Mental	<ul style="list-style-type: none">➤ Trouble concentrating and thinking clearly.➤ Shorter than normal attention span.➤ Boredom, irritability or lack of motivation.
Work	<ul style="list-style-type: none">➤ Poor or careless performance.➤ Overlooking minor but potentially important details.➤ Lower levels of communication and cooperation with others.

It is very important that fatigue is managed properly. Here are some ways you can manage fatigue:

- Get enough sleep.
- Drink plenty of water.
- Take regular breaks.
- Keep a healthy diet.
- Keep a reasonable level of fitness.



Talk to your boss or supervisor about breaking up boring or monotonous tasks or rotating the work you are doing with other workers if possible.



Reporting Hazards

Any hazard or environmental issue that you identify during your work will need to be reported. If you have taken any action you will also need to report those details. This could include written or verbal reports.

- Hazard report forms.
- Work method statements.
- Other reports or documents.

Park, Shut Down & Prepare for Relocation

Every piece of machinery has slightly different park and shutdown procedures. For the exact procedure for the machine you are operating, check the operator's manual.



Parking the Backhoe/loader

Your backhoe/loader needs to be parked in a safe way that will allow easy access to the vehicle. Safe parking practices include:

- Stop the backhoe/loader on a flat level surface in the designated area and keep the access points clear.
- Park the backhoe/loader away from overhangs, excavations, access ways and tidal or flood areas.
- If the backhoe/loader must be parked on a sloping surface it should be facing across the slope.
- Keep the backhoe/loader away from refuelling sites and areas when parking or you can block the rest of the machines on the site from accessing fuel.
- Apply all locks and brakes.
- Move all attachments into the shutdown position and release any pressure from the lines.

If the backhoe/loader has to be parked on a public access way, lights, signs and barricades should be erected to warn people.



Shutting Down the Backhoe/loader

Shutdown procedures include:

Cooling of the engine before shutting it down. This depends on the backhoe/loader but is usually the same amount of time as the engine warm up time.

Monitoring the controlled lowering of temperatures and pressures.

Walking around the machine looking for any signs of damage or faults that may have occurred during the task.

Securing the backhoe/loader using any applicable lock out or isolation devices and removing the keys. This will prevent any unauthorised movement of the backhoe/loader.

Making sure equipment is correctly stowed in accordance with site and manufacturer's requirements.

Any problems found during the shutdown procedures need to be documented in the way required by the worksite.



Post-Operational Checks

Post-operational checks need to be done to make sure the backhoe/loader is ready for the next operator.

As part of your job as an backhoe/loader operator, you need to inspect your machine to find and report any faults or damage that may have occurred during your work activities.

Your inspection should include:

Visual Inspection

Physically looking for anything odd, wrong, broken or damaged.

Visual Inspection of the Environment

Is any fluid leaking?

Signals

Alarms, lights, electronic indicators showing that something may be wrong.

Gauges

Showing temperatures and the levels of fuel, oil and other fluids.

Post-operational checks should include all of the things you look for when conducting pre-start checks.

For example:

Fluid levels.

Condition of tracks or tyres.

Visibility (windows and mirrors).

Hydraulics (rams, hoses and connections).

Structure and attachments for damage or wear.



Reporting Faults

Once a fault has been found, it needs to be reported and fixed.

Most sites have a fault report form – out of service tag - that will need to be filled in with the details. The form will generally need the machinery or equipment make and model numbers, the site identification numbers, the type of fault and the person reporting the fault.

You also need to make sure the backhoe/loader is tagged out (isolated from use) until the repairs have been made.

Some sites will have a verbal system of reporting where you speak with a supervisor who then documents the fault, while others may require the operator to organise repairs of the fault directly.



Relocate the Backhoe/loader



The backhoe/loader will need to be prepared before it can be moved from site to site. Some issues in moving the backhoe/loader to another worksite may include:

- Cross-contamination between sites.
- Hazards from loose or detached parts.
- Movement of the backhoe/loader in transit.

Before relocating the backhoe/loader, you may need to do some or all of the following things:

- Clean the backhoe/loader thoroughly.
- Clean any attachments going with the backhoe/loader.
- Empty the fuel tank (if practical).
- Secure all moving parts.
- Remove and store any attachments going to the new site.
- Make sure all connectors are secure and locked.
- If possible, lower the bucket to rest position and lock it into place or remove the bucket if needed.



Moving an Backhoe/loader from Site to Site

Backhoe/loaders can be moved on special trailers or on the back of a truck. Any transport must comply with:



- Codes of practice.
- Traffic management requirements.
- Site regulations.
- Traffic codes and road rules.

Be careful when loading the backhoe/loader onto the transport and use a spotter to help guide the backhoe/loader up the correct ramps. Parking on firm level ground is advised for loading and unloading. Once on board the backhoe/loader must be securely locked down to prevent any movement.

Clean & Carry Out Routine Maintenance

It may not be practical to clean the backhoe/loader after every use but you should clean it as thoroughly as often as possible. Mud and other contaminants left for long periods will eventually damage the machine.

Cleaning is also a good way to do an even closer inspection of the backhoe/loader, and may highlight issues you didn't see during the walk-around inspections.

Cleaning will need to be done in a designated area to avoid any negative impact on the environment or contamination of the site.



Carry Out Maintenance Tasks

Before carrying out any routine maintenance and minor repairs make sure you have all of the tools and equipment you will need to finish the job.

When conducting maintenance activities, it is important to keep people in the area safe by using barricades or fences if necessary and locking out machines.

Tasks should be completed within designated areas and others should be informed of what you are doing.

You should conduct servicing, maintenance and housekeeping tasks to ensure the backhoe/loader stays at its operating capacity for as long possible.

Maintenance activities could include:

- Air filters – should be checked daily in dusty conditions.
- Clean or replace them as necessary.
- Greasing or lubricating attachments.
- Checking bucket teeth and replacing them as needed.
- Battery checks – clean the battery, check electrolyte levels.
- Fuel and other fluids – check and maintain levels.
- Refuelling.
- Recording and reporting of faults through workplace procedures.



You will also need to coordinate with mechanics, maintenance supervisors or other site workers to ensure the vehicle is serviced at regular programmed intervals.

Vehicle Refueling Procedures

All refueling of equipment needs to be done in line with safety procedures and workplace instructions.

Some sites may have refuelling areas for plant and machinery set up to make sure any spills or incidents can be contained without causing damage to the environment. Spill response procedures need to be clear and spill kits available to manage any incident.

Other sites use a service truck or fuel tanker that travels to each machine to refuel. On these sites it is very important that all procedures are followed to avoid any incidents (such as fires in a coal mine environment) or damage to the environment. For example, there may be site rules against refuelling plant and equipment near a waterway or sensitive area.

Refuelling can be a dangerous activity, so it is important that you know and understand the correct procedures and techniques. If you are not sure what to do, speak with your supervisor.



These are some general guidelines for refueling plant and equipment.

Always check the procedure for your worksite before any refueling is done.

Park the machine in an appropriate location or within a bunded area. This contains any environmentally sensitive fluids or spills from entering and causing damage to the environment.

Shut down the machine and apply all brakes and isolations.

Leave the cabin, or if company procedures do not allow this make sure you do not restart the machine until you have permission from the refueling operator.

If you are responsible for refuelling the machine, make sure you have the right PPE on before you start. This may include safety glasses, face shields, gloves or other approved gear.

Activate the fuel pump correctly and make sure all safety procedures are followed.

Shut down the fuel pump once the machine has been refuelled.

Roll up or safely tidy all fuel lines or hoses.



Conduct Housekeeping Activities

Processing Maintenance Records



Most sites have workplace forms, logbooks or checklists for writing down details of all machine maintenance work.

They are used to record the history of the machinery and equipment so that all operations and any problems can be monitored.

They are also a way of making sure that all repairs and maintenance are done correctly and on time.

Written maintenance records for your backhoe/loader may include:

- Inspection checklists.
- Fault reports.
- Fuel, oil, hydraulic and other fluid usage.
- Computer readings of various backhoe/loader functions.
- Diary entries.
- Service manuals or logbooks.
- Repair request forms.
- Part requisition forms.



You will usually need to include details like the backhoe/loader make and model number, site identification numbers, the type of maintenance carried out, the repairs or replacements that were done and the person who did the work.

Follow your site record keeping and reporting procedures. If in doubt about completing and processing written maintenance records, talk to your supervisor or an experienced worker.

Clean Up After Work

Once all your backhoe/loader tasks are finished, you will need to clean up the site. This includes removing any tools and equipment that have been used.



Clearing the Work Area

In clearing your work area, you will be carrying out housekeeping activities. Housekeeping procedures on your site may include:



Eliminating or controlling any potential hazards. Your duty of care means you shouldn't leave a possible source of danger or accident for others.

Using the correct PPE – Make sure you use appropriate PPE when dealing with waste or possible hazardous materials as you clear up. For example, chemicals used for cleaning can be dangerous unless used correctly.



Removing any hazard controls that are no longer needed, e.g. temporary fences, barricades and signage.



Recycling or disposing of materials to carry out site clean-up tasks, e.g. construction materials, stockpiled materials, stones, rocks, gravel and bituminous mixes, paper and site rubbish – Put any waste materials in the bins provided, and recycle where possible, in line with the site plans for environmental management or waste disposal.



Packing up, maintaining and storing plant, equipment and tools.

Good housekeeping will help you to see any problems or hazards on the worksite. This will help you to make sure the working environment is safe.

It is your responsibility to clean up after your work activities and not leave it to someone else to do.

Cleaning and Storing Attachments

Once the attachment has been removed it should be cleaned, inspected for wear or damage and maintained and stored according to the manufacturer's instructions and site requirements. This will help to make sure that they are kept in good working order.

While you are cleaning attachments, check each item for damage, wear and tear or defects. If anything is wrong report it, repair it, or have it fixed by a qualified person.

Most equipment will have specified storage areas and requirements so make sure you know where and what these are before you detach heavy attachments. This will allow you to offload the attachment where it is meant to be and minimise heavy lifting or handling.



Be careful when you are cleaning and maintaining attachments. They may be sharp or hot so make sure you are wearing PPE whenever handling them.

Process Written Records

Site record keeping procedures keep the site and running smoothly. Part of your role will include completing and processing records for your backhoe/loader and the tasks that you have completed.



As well as the maintenance records you have filled in, some other records, reports and paperwork that may be needed include:

Logs – supply logs, work activity logs, training logs, usage or driver logs. Shift documents – end of shift, end of process.

Fault reports.

Hazard reports.

Incident reports – accident forms, incident reports or environmental incident reports.

It is important that you keep detailed records of all your activities, especially any problems you had during your shift.

Make sure you keep notes about what happened and what you did to fix it. This includes faulty or broken equipment, operational issues (mistakes or not following procedures correctly for some reason) and any other unusual things.