

Wherever possible, side hill travel should be avoided, as there is a greater chance of turning the machine over.



If you must drive the backhoe/loader down a sloping surface you **should drive directly down the slope**, not across or diagonally down. This will ensure the machine is as stable as possible.

On approach to downhill or uphill travel you should reduce the speed of the backhoe/loader and select an appropriate gear for the grade.

During downhill travel always select a low gear to help control the descent. Often this is the same gear that would be used to climb the hill.

If you need to cross a ditch you should slow your speed and approach the ditch

at an angle.

DO NOT coast (put into a neutral gear and roll) the backhoe/loader downhill.

4.2.4 Backhoe/Loader Techniques

When operating a backhoe/loader it is important for you to feel confident in your machine and to know its capabilities.

This is best achieved by reading the operator's manual.

Also spend the time to work out engine rev performance, what speeds are appropriate for which tasks, at what height the bucket performs best and other factors for the backhoe/loader you are operating.

This will help you to operate safely in all terrains and to adjust your operating techniques effectively.



- ◆ Load discharge.

Operating techniques include:

- ◆ General driving.
- ◆ Reversing.
- ◆ Manoeuvring.
- ◆ Braking.
- ◆ Attachment operation.
- ◆ Bucket loading.
- ◆ Load carrying.

4.2.4.1 General Driving

General driving techniques include:

- ◆ Be alert to hazards and dangers at all times.
- ◆ Be careful not to drive over or too close to trench areas or be in a position that the machine may be exposed to an open or unprotected edge of a trench, bench or batter.
- ◆ Watch the terrain for hazards such as tree stumps.
- ◆ Keep clear of holes and soft areas.
- ◆ Travel downhill in gear and do not travel across steep slopes.
- ◆ If you are tired, sick, medicated or have drugs or alcohol in your system – don't drive.
- ◆ Do not carry passengers.
- ◆ Have the bucket close to the ground.
- ◆ Cross rail lines at an angle.



4.2.4.2 Reversing



Reversing techniques include:

- ◆ Make sure the way is clear before starting to reverse.
- ◆ Look behind you and keep looking in the direction you are travelling.
- ◆ Turn the seat to face the direction of travel or work (if possible). This will help you to avoid neck injuries as well as make the task safer and more efficient.

4.2.4.3 Manoeuvring

Manoeuvring techniques include:

- ◆ Room and space for movement are often limited but techniques can improve with practise.
- ◆ Look out for other plant, structures, stockpiles and roadways.
- ◆ Be familiar with the worksite and your work area.
- ◆ Know the limitations of machine.
- ◆ Talk to other operators about tips for improving operation and manoeuvring.



4.2.4.4 Braking

Braking techniques include:



- ◆ Have machine sympathy.
- ◆ Don't brake too suddenly unless in case of accident.
- ◆ Allow enough distance to stop, particularly with a loaded bucket.
- ◆ Don't put the machine off balance when braking.
- ◆ Watch out for braking while turning, especially if locking brakes are fitted.
- ◆ Read the operator's manual – know your machine's capabilities.

4.2.4.5 Attachment Operation

Every piece of equipment has design limits and operational recommendations. This applies both to the attachment and the backhoe/loader as a vehicle.

Operating within the specifications, recommendations and design limits ensures you do not damage either the backhoe/loader or the attachments.

How each attachment is used will be outlined in the operator's manual and shown to you during your equipment induction and familiarisation process.

It is important that you follow and respect the usage recommendations and the design limits for attachments, as this will guide you in using attachments safely and efficiently to achieve the desired results.

If you are unsure of how you should fit, use or remove an attachment, read the operator's manual or speak with an authorised mechanic or fitter or other members of your team.



4.2.4.6 Bucket Loading



Bucket loading techniques include:

- ◆ Apply the correct technique for the type of bucket you are using.
- ◆ Talk to more experienced operators and ask for mentoring if you feel you need help.
- ◆ Don't overload the bucket.
- ◆ Efficiency and effectiveness in loading comes with practice.

4.2.4.7 Load Carrying

Load carrying techniques include:

- ◆ Carry the load low to the ground wherever possible.
- ◆ Travel at a safe speed.
- ◆ Keep the machine balanced.
- ◆ Try to avoid spillages.



4.2.4.8 Load Discharge

Load discharging techniques include:



applicable.

- ◆ Discharge the load on level ground or surface to avoid rollover.
- ◆ Have machine sympathy.
- ◆ Raise the bucket to the correct height for discharge before starting to roll the bucket.
- ◆ Roll the bucket to ensure clean discharge of materials.
- ◆ Ensure correct braking (or use of hand/load brake) to stop movement if

4.3 Backhoe/Loader Operations

Identifying and applying techniques that will help you achieve optimum output is a matter of knowing your backhoe/loader, the attachments you are using and the terrain you are operating in.

One of the best methods for developing operational techniques is to ask a more experienced operator to mentor you.

Due to the high centre of gravity of a backhoe/loader unit, you must be able to adapt to different terrain conditions. It is necessary to raise or lower the boom on the backhoe/loader and use the bucket to balance the machine.



Backhoe/loader operations include:

- Mixing materials.
- Stripping and spreading materials.
- Cutting and boxing.
- Trench excavation.
- Backfilling.
- Levelling.
- Loading vehicles and equipment.

4.3.1 Mixing Materials



Backhoe/loaders can be used to mix materials as they have a large bucket and are able to move large amounts of materials quickly.

A tiller attachment is useful for this kind of work. You can use one to break up the ground and mix topsoil or clay with other materials to prepare the ground for future work.

Rippers and scarifiers can also be used to break up the ground before mixing materials.

4.3.2 Stripping and Spreading Materials

Backhoe/loaders can be used to strip back the top layer of earth to excavate or level an area. This is achieved by the blade of the bucket as it is used to cut and lift a small amount of the topsoil.

This topsoil can be transported to another area and spread out. Spreading topsoil can be done a number of ways. You can discharge the soil from the bucket bit by bit as you move along, or scrape a small pile of topsoil over an area using the blade of the bucket or a 4-in-1 bucket.



4.3.3 Cutting and Boxing



Cutting involves the 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.

4.3.4 Trench Excavation

Backhoe/loaders are often used for digging trenches and holes, i.e. excavations. If you are excavating or digging it is important to remember some points including:



- ◆ Check for underground services (power, telephone, gas, water, sewer, drainage and fibre optic cable lines) before starting to excavate. Talk to the site supervisor who will contact the supply authorities for council maps of the site.
 - ◆ Cut a trench to required specifications and deposit full buckets of material away from the trench.
 - ◆ If cutting a trench across a footpath:
 - ◇ Obtain information and permits from relevant authorities who may run services under the footpath.
 - ◇ Excavate slowly towards any underground services.
 - ◇ Provide appropriate barricades and signs.
 - ◆ Remove any large rocks from a trench where required.
 - ◆ If trench excavations are deeper than 1.5m, or the material is likely to collapse, the backhoe/loader operator is required to bench and batter the sides then lower trench shields before the excavation is entered.
 - ◆ Do not undercut a trench, bank or stockpile, as it could collapse and cause the backhoe/loader to overturn and trap the operator underneath.
 - ◆ When operating on soft or uneven ground the load that you can safely raise or carry will be reduced.
 - ◆ Loads should be placed a safe distance from the trench – not closer than 1m with material coming to rest no closer than 0.5m from the excavation.
 - ◆ Use barricades, guard rails or fencing and warning signs to prevent workers falling into a trench or vehicles/machines getting too close. Nobody should be standing within operating radius of the backhoe/loader.
 - ◆ Monitor indication signs that you are getting close to a previous excavation or an underground service when excavating. 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.
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- ◇ Broken tiles.
 - ◇ Moisture.
 - ◇ Any other unusual material.

4.3.5 Backfilling

The backhoe/loader can be used to backfill trenches or small excavations after work has been completed. When backfilling it is important that you ensure the right materials are deposited into the excavation, and 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.

When backfilling trenches remember to:

- ◆ Keep a 90 degree angle unless your site plans say otherwise.
- ◆ Keep clear of edges and drop-offs.
- ◆ Avoid soft edges and deep holes.

Trenches over 1.5m must be shored to prevent collapse. This is required if people will be working in the trench area or alongside.

4.3.6 Levelling

Levelling with the backhoe/loader is performed by having the bucket placed flat on the ground and the machine move backwards, dragging the bucket.

It is important to remember the following points:

- ◆ Work to the designated grades in the required manner. This will include the type of levelling, the grade and slope, and the fall (for water to shed off).
- ◆ Levelling information and procedures will be discussed during your task briefings.
- ◆ 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 must be checked against site reference points such as pegs, benchmark points or other defined levels.



4.3.7 Loading Vehicles and Machinery

Backhoe/loaders can load materials into site vehicles and machinery, such as dump trucks, wagons, hoppers and chutes.



When loading materials and loads into vehicles it is important that you know where the driver is and coordinate your approach with them. You don't want to accidentally run into them.

Approach the side of the vehicle or machinery slowly once it has stopped in position.

Avoid contact with the vehicle or machinery by leaving enough room to raise the bucket.

Once the bucket is high enough you can move in closer and roll it forward to deposit the load into the vehicle or machinery.

4.4 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 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 such as landscaping or preparing road base you will be working with different materials, attachments and personnel.



4.5 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. The backhoe/loader end of the machine should be used for this kind of work. Using the front bucket for lifting should only be done if using a bucket attachment that is specifically designed for lifting (has an approved and rated lifting lug).

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



4.5.1 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 sheets.
- ◆ Check the weighbridge certificate.
- ◆ Calculate the weight of the load or material.



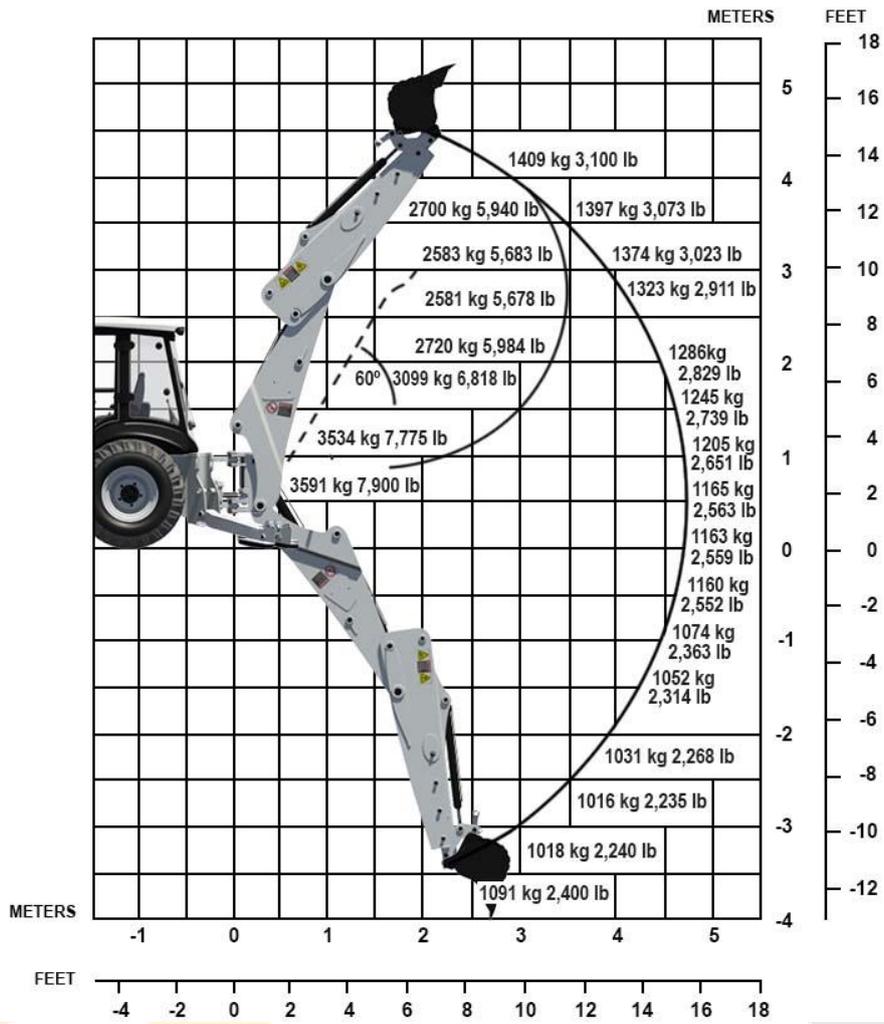
If you cannot be sure of the weight and cannot calculate it, do not lift the load.

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 machine 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.

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

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



4.5.2 Select Lifting Gear



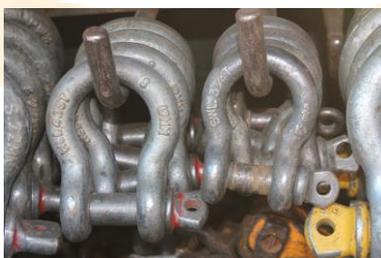
When using the backhoe/loader for lifting, make sure it is fitted with the correct lifting attachment or that the machine has the appropriate lifting lugs. Always use an approved lifting lug or lift connection that is clearly marked with the Safe Working Load (SWL).

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.

4.5.2.1 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.

4.5.3 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.

4.5.4 Position the Backhoe/Loader

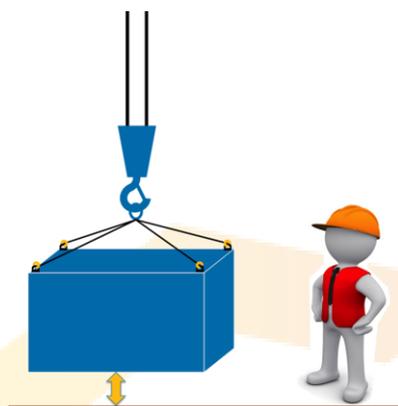
Before lifting a load with slings you need to get the backhoe/loader into the right position. Make sure:

- ◆ The machine is on firm level ground.
- ◆ The load, backhoe/loader and lifting gear can all be safely accessed.
- ◆ Any other 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, especially if you need to travel with it.
- ◆ The backhoe/loader is in line with the load so it will not swing when it is lifted. This could include being at a 90 degree angle to the excavation area.
- ◆ You have a clear line of sight to the excavations and areas you will be lifting loads into.
- ◆ You have enough swing room to operate the backhoe/loader safely.
- ◆ You are using extended or engaged stabilisers for additional support.



4.5.5 Lifting Techniques

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



- ◆ Follow directions from the dogger to position the lifting point over the centre of gravity of the load to keep the load from swinging.
- ◆ 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.
- ◆ Keep all movements smooth and slow.
- ◆ Stop the lift immediately if the weight of the load causes the machine to tilt or if the hydraulics begin to strain.
- ◆ Check the hydraulic hoses and rams before and after lifting to make sure no damage has been done to the equipment.
- ◆ Materials should be moved the shortest distance possible to maintain effective and efficient control of the machine and the load.
- ◆ Constantly monitor the load during any moving activities.
- ◆ Keep the load as low as safe and practical if travelling with the load.
- ◆ The swing zone of the backhoe/loader attachment should be clear.
- ◆ Monitor your speed of travel and stay within safe speed limits.
- ◆ Maintain a safe distance from exposed edges.
- ◆ Follow all hand signals or other designated signals.
- ◆ 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.
- ◆ Make sure that if lowering objects such as pipes into trenches that the trench is shored and workers are standing a safe distance away.
- ◆ Land the load at the designated location. Ensure that it is secure and stable.
- ◆ Make sure lifting equipment is properly detached before moving off.

4.6 Monitoring Systems and Alarms

Each machine has its own set of alarms, monitoring systems and gauges to help you safely and efficiently operate it, and warn you if something is wrong. Each make and model of the same type of machine can be different so it is important that you are familiar with all of the systems for the equipment you are using. Check the operator's manual for a full list of devices, alarms and warnings.



Here are some examples of the gauges and warning systems for a backhoe/loader:



- ◆ Fuel.
- ◆ Engine oil pressure.
- ◆ Engine temperature.
- ◆ Hydraulic oil pressure.
- ◆ Hydraulic oil temperature.
- ◆ Electrics.

Generally, alarms and warnings fit into 3 categories:

Warning Type	Category	Examples	What You Should do
Category 1	These types of warnings let you know that the machine needs some attention, but it is still safe to operate.	<ul style="list-style-type: none"> ◆ Low fuel. ◆ Low system voltage. 	Keep operating as long as it is safe to, and report the problem once you stop work.
Category 2	These warnings indicate that there is a problem caused by the way you are operating that may lead to problems with the equipment.	<ul style="list-style-type: none"> ◆ Equipment is overheating. ◆ Equipment is overloaded. 	Change the way you are operating and if the problem is not fixed, stop operating and report the issue.
Category 3	This is the most serious warning level. Continuing to operate while this warning is sounding will cause damage to the machine.	<ul style="list-style-type: none"> ◆ The park brake is on. ◆ Low engine oil pressure. 	Stop operating and shut down the equipment immediately. Report the problem straight away.

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.

If you hear an alarm while you are operating the plant.

- ◆ **Stop operating and consult the operator's manual or the dealer to identify the problem.**
- ◆ **If the problem cannot be fixed, stop operating, tag out and report the issue to your employer.**

Various hazards including operator fatigue are discussed in the previous sections of this Learner Guide.

4.7 Checking Completed Work



The key to completing tasks efficiently is good time management and knowing how to use your equipment properly.

Once you have completed your work you will need to check it against:

- ◆ Your work instructions and project plans and drawings.
- ◆ Project quality requirements and timelines.

Speak to your supervisor when the work is completed to see if there are any other tasks that need to be done to complete the job.

4.8 Park and Shutdown the Backhoe/Loader

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



4.8.1 Parking the Backhoe/Loader

Backhoe/loaders need 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 refueling 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 shut down 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.

4.8.2 Shutting Down the Backhoe/Loader

Shut down 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 movement of the backhoe/loader.
- ◆ Ensuring 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.

4.9 Post-Operational Checks

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

General maintenance activities are done to keep all plant and equipment working safely for longer.

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



4.10 Prepare the Backhoe/Loader for Transportation

Before a backhoe/loader can be moved from one site to another, it will need to be prepared for transport. On most sites it is necessary to:

Clean the Machine Thoroughly	Cross-contamination is an issue for sites. Most will not allow a dirty machine onto site because of cross contamination of weed seeds, dirt particles, bacteria, fuels, or oils.
Empty the Fuel Tank	Fuel should be emptied from the machine as a safety issue if required or if specified in site procedures.
Secure any Moving Parts	Security pins, locking pins and plates applied where appropriate. These pins are designed to keep movable parts from moving.
Lock and Lower the Bucket for Relocation	Sometimes the bucket may need to be removed altogether if the backhoe/loader is a large model.
Remove Attachments	These may need to be removed from the backhoe/loader and stowed appropriately for transporting with the machine.

4.10.1 Move Backhoe/Loader between Worksites



Moving larger plant and equipment between worksites is normally done on a float (trailer) because the machines are too slow, or not allowed to drive on the road.

Make sure that an approved traffic management plan is in place. This may include:

- ◆ Stopping other traffic to allow the equipment to move freely.
- ◆ Using escort vehicles where needed.
- ◆ Sometimes a haul vehicle crossing will be established to allow materials movement across public roadways. Always follow designated traffic control and maintain communication with other workers involved.

When transportation is required, you will need to drive the machine onto the float. The safest way to do this is to use a spotter to make sure you are moving onto the float as straight as possible and that you stop in the right position to secure the equipment onto the trailer.

Once the equipment is in place on the back of the float, locking pins will need to be engaged and it will be tied down and secured onto the float.

A spotter would also be used when unloading the vehicle once it gets to the next place.



4.11 Carry Out Maintenance Tasks



Maintenance activities could include:

- ◆ Cleaning the backhoe/loader.
- ◆ Authorised servicing and minor replacements or repairs.
- ◆ Refuelling.
- ◆ Recording and reporting of faults through workplace procedures.

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.

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



4.11.1 Servicing and Minor Replacements



Replacements that the operator can make will vary with the backhoe/loader and worksite but could include filters, fluids, wiper blades, attachments, accessories and ancillary items.

If you need to remove the radiator cap on a machine that has not completely cooled off, slightly loosen the cap to release the pressure and then slowly remove the cap. Make sure you use gloves and safety goggles and a rag or cloth when removing the cap.

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

4.11.2 Clean and Store Backhoe/Loader Attachments

Attachments need to be kept in good working order. This requires correct maintenance such as cleaning the attachments, and storing them in designated storage locations.



with care.

Things to consider if your attachments require manual cleaning:

- ◆ Some materials that you work with can become extremely hot and sticky, and could possibly burn through your clothing and skin. Use appropriate cleaning instruments and wear personal protective equipment (PPE) as required.
- ◆ Backhoe/loader attachments such as ripping tynes can be sharp. Clean

Most attachments will have designated storage locations as outlined in the site requirements.

This is to ensure the attachment can be found quickly and easily the next time it is needed, and so that it is kept free from damage.

Storage requirements could include:

- ◆ Must be stored in a padded hard case box – particularly with laser levels.
- ◆ Must be stored in particular environmental conditions such as a certain temperature.



Reading, knowing and understanding the particular requirements for each attachment is the only way of ensuring items are correctly cleaned and stored.

Refer to the manufacturer's guidelines, operator's manual and worksite procedures for each item.

PART 5: SKID STEER LOADER



5.1 Skid steer loader

5.1.1 What is a Skid Steer Loader?

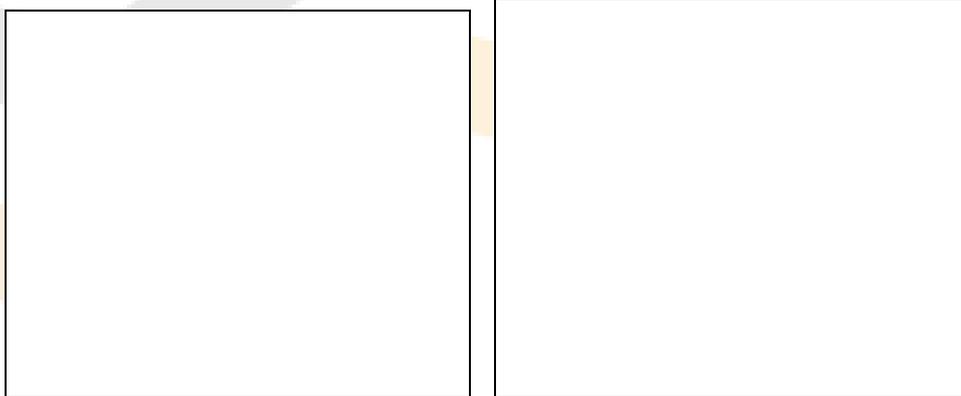
A skid steer loader is a self-propelled wheeled or tracked machine that turns by skidding or reversing the wheels or tracks on one side of the machine.

It has a front-mounted bucket-supporting structure and linkage and is used to excavate, lift, transport and discharge material.



5.1.2 Skid Steer Loader Components

There are many models of skid steer loaders, but they share the same main components. The following diagram illustrates the basic components:



Component	Description
Hydraulic Arms	Attached to the rear of the machine to provide counter balance to loads. Hydraulic arms operate the bucket.
Bucket	A scoop at the front of the loader, with hydraulic arms that can lift and lower the bucket for excavating, pushing, lifting and tipping.
Cabin	Protected with a safety cage, the driver and controls are in the cabin.
Chassis	Provides the base for the loader, drive train and engine.

5.1.3 Skid Steer Loader Operations

The tasks performed by a skid steer loader may include:



- ◆ Rock breaking.
- ◆ Excavations.
- ◆ Backfilling.
- ◆ Compacting.
- ◆ Cutting batters and benches.
- ◆ Lifting and carrying materials.
- ◆ Loading vehicles.
- ◆ Mixing materials.
- ◆ Site clean up.
- ◆ Stripping/spreading topsoil and materials.

- ◆ Other activities that use specific attachments.

5.1.4 Skid Steer Loader Characteristics and Limitations



The two main differences between types of skid steer loaders are the size of the loader and whether it has wheels or tracks. The one you choose will depend on the work and the terrain to be worked in.

You should assess the ground conditions to decide whether or not you should be using a skid steer with tracks instead of tyres. Tracks can provide more stability and traction on soft or boggy ground.

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

- ◆ Load limits and operating capacities.
- ◆ Balance requirements with and without a loaded bucket.
- ◆ The limits on slopes that can be negotiated both loaded and unloaded.
- ◆ Maneuvering capability, such as turning radius and stopping distances.
- ◆ Attachment use.
- ◆ Use of slings.
- ◆ Materials and handling requirements.



5.1.5 Select Attachments

There are a range of attachments and equipment that can be fitted to a skid steer including:



- ◆ Bucket – for scooping and sometimes levelling uneven terrain.
- ◆ Multipurpose 4:1 bucket – can be used to scoop, carry, pick up and for levelling.
- ◆ Pallet forks.
- ◆ Dozer blade – can be used for levelling surfaces as well as clearing rubble/waste.



- ◆ Pavement milling devices – for removal of concrete or other surfaces in preparation for resurfacing.
- ◆ Hammer.
- ◆ Backhoe arm and bucket.
- ◆ Auger – for drilling holes.



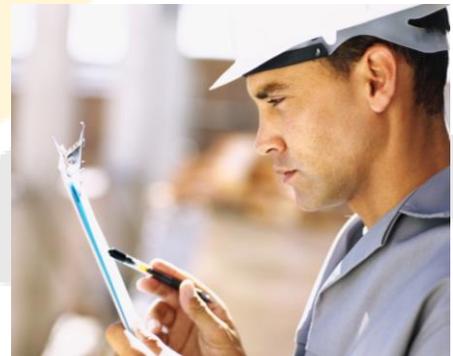
- ◆ Power broom.
- ◆ Concrete cutter or saw.
- ◆ Chain digger – used for digging trenches.
- ◆ Asphalt cutter or saw.
- ◆ Rotary hoe – for tilling ground.

- ◆ Profiler – to ensure surfaces match specific profiles.
- ◆ Tiller/mixer.

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 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 skid steer and the operator's manual for the attachment. Otherwise, you may need to check the workplace equipment procedures for your site.



5.1.6 Fit and Remove 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 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 skid steer 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.



procedures.

Generally, **to remove an attachment:**

1. Collect any required tools or equipment.
2. Ensure the 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

A manufacturer's approved and specially designed lifting lug attachment with SWL marked on the machine must be provided on a skid steer loader to attach slings so that the skid steer loader may be used as a crane.

5.1.7 Pre-Start Check

Pre-start checks are done before the engine is started. Walk around the loader and look for anything that is out of the ordinary.

Part or Component	What to Check
Structure	<p>Check the general condition of the loader.</p> <p>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.</p>
Bucket	<p>Check the bucket for worn or broken components e.g. teeth, blade, bolts.</p> <p>Inspect the hydraulics and connections for wear and tear.</p> <p>Check the condition of the pivot pins.</p>
Power Arms	<p>Make sure you check the power arms 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 loader dangerous to operate you need to inform your supervisor or an authorised person. Then isolate the loader and don't use it until it is repaired.</p>
Fluids and Lubrication	<p>Check that the oils (engine, transmission, hydraulic) and fuel are at the right levels.</p> <p>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.</p> <p>Check electrolyte levels.</p> <p>Check for any obvious signs of damage or wear.</p>
Hydraulic Rams and 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>
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 or bar are in good condition. Check that the cabin is clean.</p>
Service History and Logbook	<p>Check the machine hour meter, manufacturer's recommendation and logbook to find out if the skid steer 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>

5.1.8 Operational Checks

Operational checks are made once the engine is started.



Climb into the skid steer 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 loader.

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

Start up the loader 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 on the skid steer:

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 signalling any alarms or warnings.
Safety Devices	Test all lights and other warning devices.
Attachments	Check that the attachment is secured and connected to the 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.

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.

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.

5.2 Operate the Skid Steer Loader



During civil construction skid steer 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.



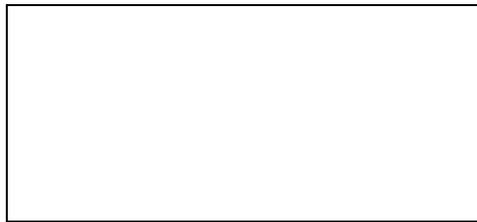
- ◆ Site safety personnel.

Workers you may need to coordinate with include:

- ◆ Supervisors and management.
- ◆ Other plant and vehicle operators.
- ◆ Traffic controllers or other workers on the site.
- ◆ Team leaders.

5.2.1 Assess Materials to be Shifted

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:



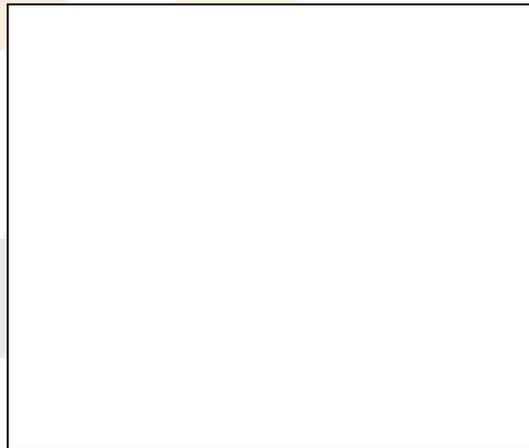
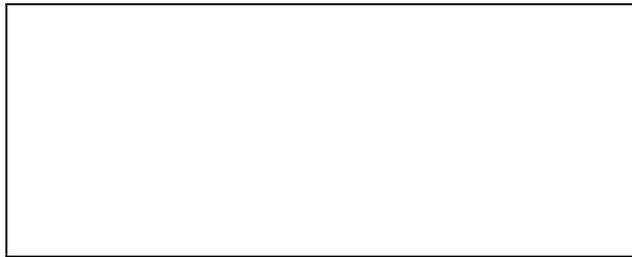
- ◆ Topsoil.
- ◆ Clays.
- ◆ Silts.
- ◆ Gravel.
- ◆ Mud.
- ◆ Stone.
- ◆ Rock, which might be:
 - ◆ Metamorphic.
 - ◆ Igneous.
 - ◆ Sedimentary.
 - ◆ Blended materials.
 - ◆ Organic materials.
 - ◆ Bituminous mixes.

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:



Check the weight of the materials against the manufacturer's specifications to make sure you don't overload the skid steer. Keep in mind that uneven, rough, boggy or sloping ground can all reduce the amount of material that the skid steer can safely carry.

5.2.2 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 skid steer loader is suitable for the ground conditions and that the bucket is suitable to the task.

Skid steer loaders are relatively easy to tip over because of their short wheel-base. Always keep to safe driving speeds for the conditions and terrain.

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

Always travel with the bucket as low as the ground conditions will allow.

Keep in constant communication with other personnel throughout your 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 skid steer you are using.

This will include information about:

- ◆ Safe operating speeds and techniques.
- ◆ Safe travel speeds.
- ◆ Monitoring systems and alarms.



Skid steer operators will usually use the following techniques to complete civil construction tasks:



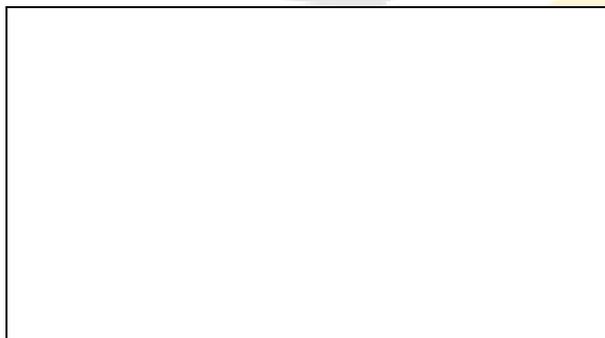
- ◆ Excavating, loading and transporting materials.
- ◆ Bucket discharge.
- ◆ Levelling.
- ◆ Striping and spreading.
- ◆ Backfilling.
- ◆ Site clean-up.
- ◆ Mixing materials.

- ◆ Levelling materials.

5.2.2.1 Safe Operating Speeds

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

Operating the loader too fast can cause instability.



5.2.3 Excavating, Loading and Transporting Material

Excavation is an important step in a lot of projects because it prepares the site for future work.



Excavating and loading with a skid steer is done by driving the bucket into the materials and scooping them up. This can include cutting into the ground or loading materials from a stockpile.

Don't overload the bucket – make sure you work out the capacity of the bucket and assess the material to be loaded.

Some points to remember when traveling with a load:

- ◆ Constantly monitor the load as you drive.
- ◆ Always travel with the bucket as low as possible and tilted back for

greater stability and vision and less spillage.

When loading trucks it is important that you know where the driver is and coordinate your approach with them. You don't want to accidentally run into them.

- ◆ Approach the side of the truck slowly once it has stopped in position.
- ◆ Avoid contact with the truck by leaving enough room to raise the bucket.
- ◆ Once the bucket is high enough you can move in closer and roll it forward to deposit the load into the truck.



5.2.4 Discharging Material from the Bucket



After you have excavated the required materials and transported them to the designated location, you will be required to discharge (or dump) the materials.

When discharging a load:

- ◆ Raise the bucket to the correct height for discharge before starting to roll bucket. Then roll the bucket to ensure clean discharge of materials.
- ◆ Place loads to ensure stability and avoid causing hazards.
- ◆ Constantly keep sight of the load that you are discharging.

- ◆ Keep a safe operating grade when placing a load.

5.2.5 Levelling

Often the skid steer will be used to level out uneven ground. This task may be completed using the blade of the bucket or other attachments, such as a spreader bar.

When levelling, you need to 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.



5.2.6 Stripping and Spreading Topsoil

Skid steer loaders can be used to strip back the top layer of earth to excavate or level an area. The blade of the bucket is used to cut and lift a small amount of the topsoil.

This topsoil can be transported to another area and spread out. Spreading topsoil can be done a number of ways. You can discharge the soil from the bucket bit by bit as you move along, or scrape a small pile of topsoil over an area using the blade of the bucket or a 4-in-1 bucket.



5.2.7 Backfilling Excavations



The skid steer can be used to backfill trenches or small excavations after work has been completed. When backfilling it is important that the right materials are deposited into the excavation, and 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.

5.2.8 Site Clean-Up

Skid steer loaders are useful for cleaning up work sites after major works have been completed, or preparing smaller 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.



5.2.9 Selecting and Using Attachments

- Bucket.
- Multipurpose 4:1 bucket.
- Pallet forks.
- Dozer blade.
- Pavement milling devices.
- Backhoe arm and bucket
- Stump Grinder
- Approved lifting jib
- Forks
- Rotary hoe.
- Profiler.
- Tiller/mixer.
- Auger.
- Power broom.
- Hammer.
- Mower Attachment
- Rake
- Smudge bar

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. Check the manufacturer's specifications or instructions for information.

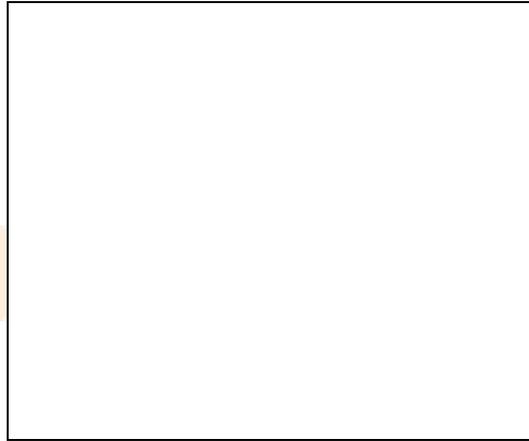
Make sure you have enough room to operate the attachment safely without putting other workers in danger.

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.

5.2.10 Mixing Materials

You may need to mix materials using the loader. A tiller is a useful attachment for this kind of work. You can use one to break up the ground and mix topsoil or clay with other materials to prepare the ground for future work.



5.3 Monitoring Systems and Alarms

Each machine has its own set of alarms, monitoring systems and gauges to help you safely and efficiently operate it, and warn you if something is wrong.

Each make and model of the same type of machine can be different so it is important that you are familiar with all of the systems for the equipment you are using. Check the operator's manual for a full list of devices, alarms and warnings.



Here are some examples of the gauges and warning systems that may be found on a skid steer:



◆ Fuel.

- ◆ Engine oil pressure
- ◆ Engine temperature.
- ◆ Hydraulic oil pressure.
- ◆ Hydraulic oil temperature.
- ◆ Electrics.

Generally, alarms and warnings fit into 3 categories:

Warning Type	Description	Examples	What You Should Do
Category 1	These types of warnings let you know that the machine needs some attention, but it is still safe to operate.	<ul style="list-style-type: none"> ◆ Low fuel. ◆ Low system voltage. 	Keep operating as long as it is safe to, and report the problem once you stop work.
Category 2	These warnings indicate that there is a problem caused by the way you are operating that may lead to problems with the equipment.	<ul style="list-style-type: none"> ◆ Equipment is overheating. ◆ Equipment is overloaded. 	Change the way you are operating and if the problem is not fixed, stop operating and report the issue.
Category 3	This is the most serious warning level. Continuing to operate while this warning is sounding will cause damage to the machine.	<ul style="list-style-type: none"> ◆ The park brake is on. ◆ Low engine oil pressure. 	Stop operating and shut down the equipment immediately. Report the problem straight away.

5.4 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 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.

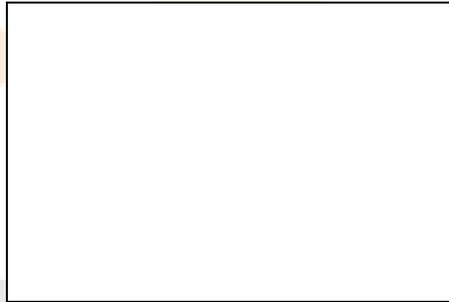


Changing Work Conditions – As more materials are moved around or removed from a site the work conditions may change. Materials that you are working with can change throughout a project. As you excavate deeper or move onto other stages of the civil construction project such as landscaping or preparing road base you will be working with different materials, attachments and personnel.

5.5 Lift, Carry and Place Loads Using Slings and Lifting Gear

In civil construction projects you may need to use the skid steer to lift and carry loads using slings and lifting gear for example, lowering pipes into trenches or moving equipment or construction materials around the site.

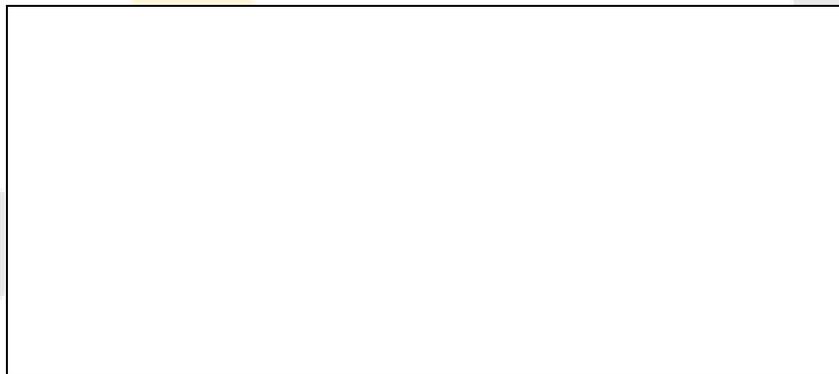
It is important that this work is conducted in coordination with authorised personnel such as a licensed dogger or rigger.



5.5.1 Determine the Weight of the Load in Coordination with Other Personnel

You need to coordinate with authorised personnel to work out the weight of the load to make sure your 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:



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



Once you know the weight of the load you need to make sure the loader you are using has the capacity to lift it safely. You can check the capacity of the 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 loader.

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

5.5.2 Select Lifting Gear



When using the 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.

Lifting gear that may be used with the skid steer 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 skid steer.



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.

5.5.3 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 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.

5.5.4 Positioning the Skid Steer Loader

Before lifting a load with slings you need to get the skid steer into the right position to access the load. This is important because a swinging load can cause the skid steer to tip over. Make sure:

- ◆ The loader is on firm level ground.
- ◆ The load, skid steer and lifting gear can all be safely accessed.
- ◆ Any other 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, especially if you need to travel with it.
- ◆ The loader is in line with the load so it will not swing when it is lifted.



5.5.5 Lifting Techniques

Follow these guidelines whenever using the loader to lift a load using slings and lifting gear:

Guidelines 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.
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.
Keep all movements smooth and slow.
If the weight of the load causes the machine to tilt or if the hydraulics begin to strain stop the lift immediately and lower the load back down.
Loads should be moved shortest distance possible to maintain effective and efficient control of the machine and the load.
Constantly monitor the load during the move.
Monitor your speed of travel and stay within safe speed limits.
Maintain a safe distance from exposed edges.
Follow all hand signals or other designated signals.
If the slings shift on the load being lifted stop the loader, warn workers in the area, carefully lower the load and have the slings re-positioned and secured.
Make sure that if lowering objects such as pipes into trenches that the trench is shored and workers are standing a safe distance away.
Land the load at the designated location. Ensure that it is secure and stable.
Make sure lifting equipment is properly detached before moving off.
Check the hydraulic hoses and rams before and after lifting to make sure no damage has been done to the equipment.

5.5.6 Checking Completed Work



The key to completing tasks efficiently is good time management and knowing how to use your equipment properly.

Once you have completed your work you will need to check it against:

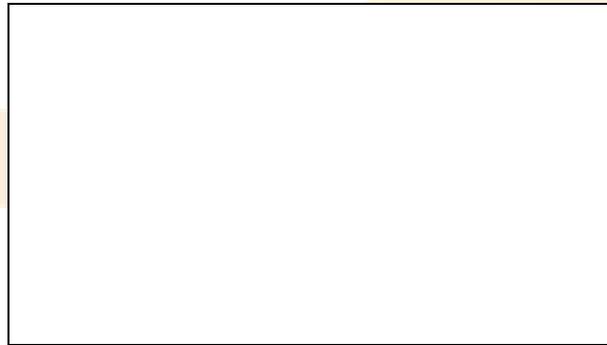
- ◆ Your work instructions and project plans and drawings.
- ◆ Project quality requirements and timelines.

Speak to your supervisor when the work is completed to see if there are any other tasks that need to be done to complete the job.

5.6 Park and Shut Down the Loader

Once all tasks are complete and the work for the day is done, it is important that you park and shut down the loader

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.



5.6.1 Parking the Skid Steer Loader

The skid steer needs to be parked in a safe way that will allow easy access to the vehicle.



across the slope.



barricades should be erected to warn people.

Safe parking practices:

- ◆ Stop the skid steer on a flat level surface in the designated area and keep the access points clear.
- ◆ Park the skid steer away from overhangs, excavations, access ways and tidal or flood areas.
- ◆ If the skid steer must be parked on a sloping surface it should be facing
- ◆ Keep the skid steer 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 skid steer has to be parked on a public access way, lights, signs and barricades should be erected to warn people.

5.6.2 Shutting Down the Skid Steer Loader

Shutdown procedures include:



manufacturer's requirements.

- ◆ Cooling of the engine before shutting it down. This depends on the 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 skid steer, using any applicable lock out or isolation devices and removing the keys. This will prevent any unauthorised movement of the loader.
- ◆ Making sure equipment is correctly stowed in accordance with site and

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

5.6.3 Post-Operational Checks

Post-operational checks need to be done to make sure the skid steer is ready for the next operator.

General maintenance activities are done to keep all plant and equipment working safely for longer.

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



5.7 Prepare the Skid Steer Loader for Relocation

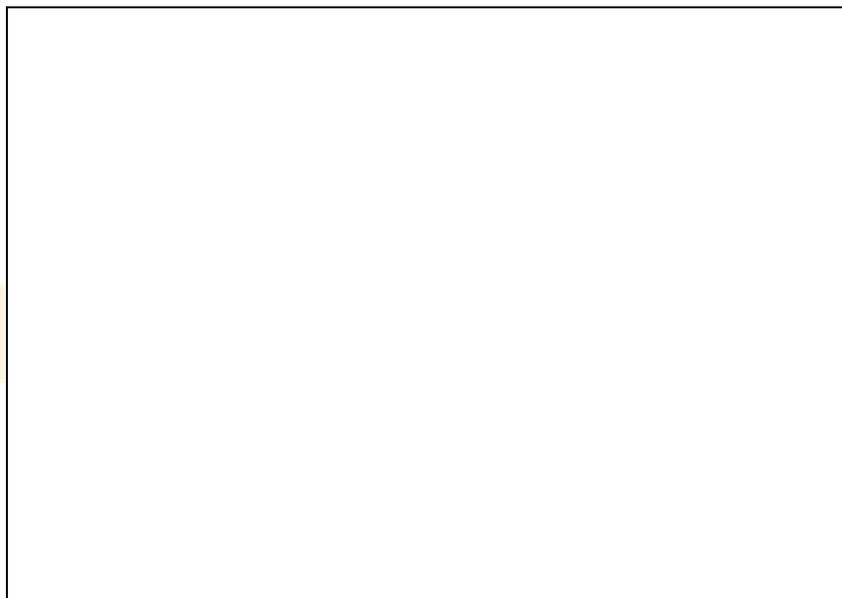


The skid steer will need to be prepared before it can be moved from site to site.

Some issues in moving the loader to another worksite may include:

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

Before relocating the skid steer you may need to do some or all of the following things:



5.7.1 Relocate the Skid Steer

Skid steer 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 skid steer onto the transport and use a spotter to help guide the loader up the ramps.

Once on board the loader must be securely locked down to prevent any movement.

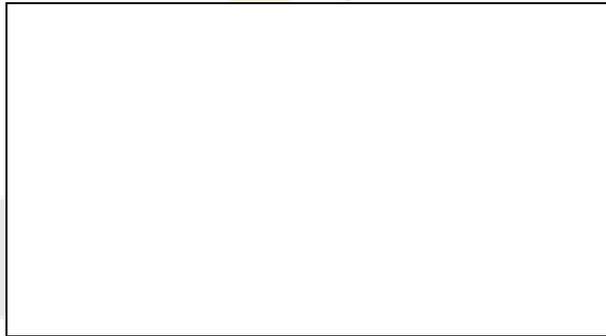


5.8 Clean and Carry Out Routine Maintenance

It may not be practical to clean the skid steer loader after every use but you should clean it 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 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.



PART 6: WHEELED FRONT END LOADER



6.1 Wheeled front end loader

6.1.1 What is a Wheeled Front End Loader?

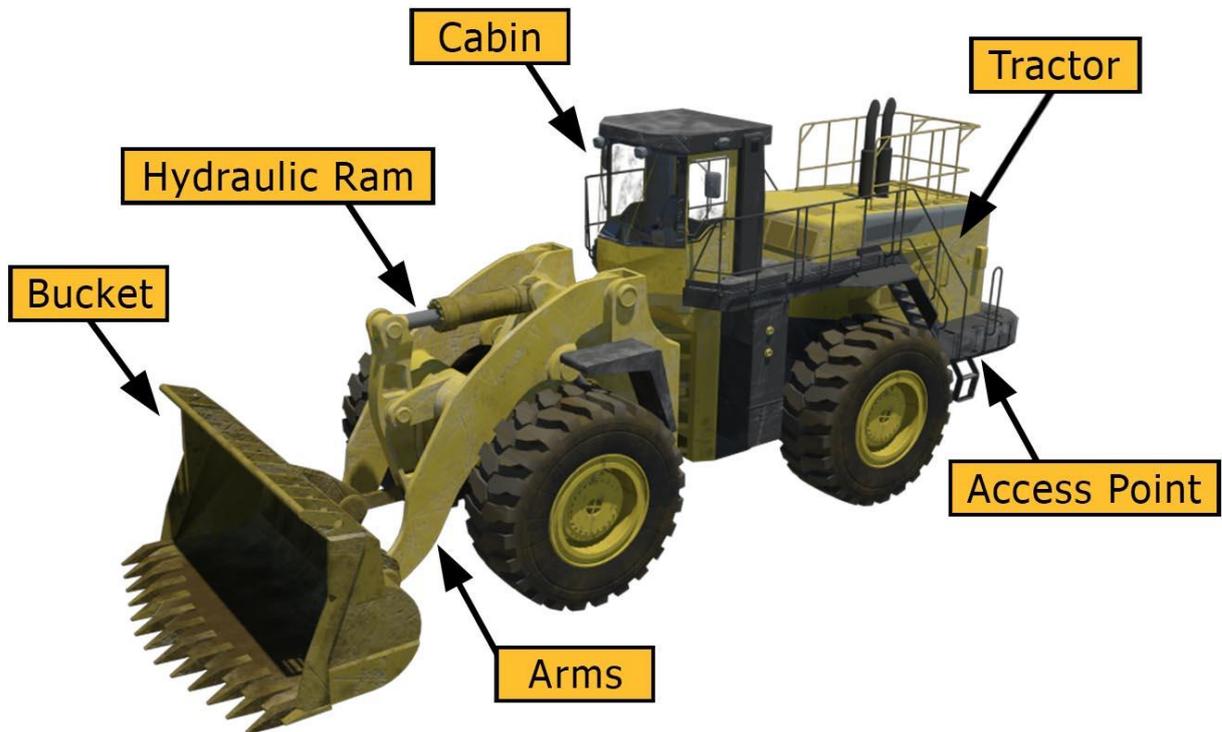
A wheeled front end loader is a self-propelled machine that has a front mounted bucket connected to the end of two booms (arms). The bucket has a very large capacity, and may be removable or permanently mounted.

The machine is self-propelled, meaning that it has a powerful engine and does not require pushing, pulling or towing.



6.1.2 Wheeled Front End Loader Components

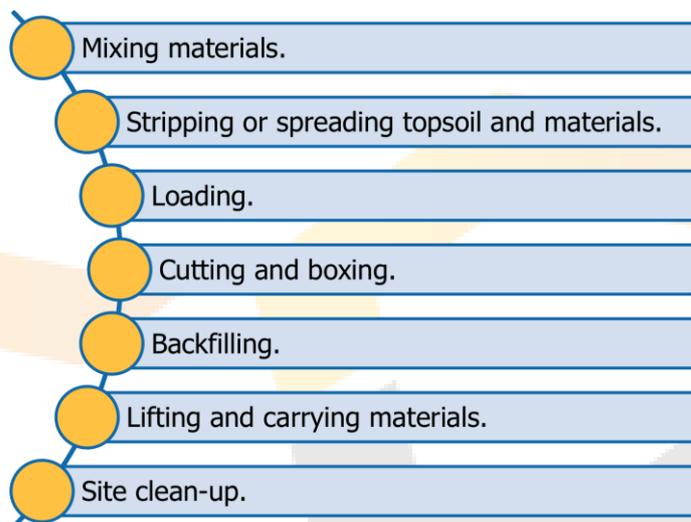
The following diagram outlines the basic components of a wheeled front end loader:



Component	Description
Cabin	Where the operator sits. Contains the controls for the operation of the wheeled loader.
Tractor	Contains the engine of the machine.
Access Point	The point where the operator can safely access the loader cab.
Arms	Raises and lowers the bucket.
Bucket	Used to move materials. The most common attachment.
Hydraulic Ram	Moves the arms and bucket/attachment.

6.1.3 Wheeled Front End Loader Operations

Most actions occur through the front end loader's forward movement. The loader is capable of:



A front end loader may also be used for levelling out surfaces.

6.1.4 Choosing Front End Loader Attachments

The most commonly used front end loader attachment is a multi-purpose 4:1 bucket, which can be used to scoop, carry, pick up and level materials.

Other approved attachments may include:

Attachment Type	Examples and Uses
Rippers or Scarifiers	For ripping the surface and loosening materials where needed.
Augers	Used for drilling holes and moving materials.
Lifting Devices	Slings, lifting gear, platforms.
GPS	For machine guidance and levelling.
Tillers	For mixing materials.



When choosing 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 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 loader and the operator's manual for the attachment. Otherwise you may need to check the workplace equipment procedures for your site.

6.1.5 Fit and Remove 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 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:



all connectors are correctly joined.

1. Collect any required tools or equipment.
2. Make sure the front end 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

Generally, to **remove** an attachment:

1. Collect any required tools or equipment.
2. Ensure the front end 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.



6.1.6 Pre-Start Check

Pre-start checks are done before the engine is started. Walk around the loader and look for anything that is out of the ordinary.

Part or Component	What to Check
Structure	<p>Check the general condition of the front end loader, including any loose nuts or bolts.</p> <p>Check for oil or other fluid leaks.</p> <p>Check for any signs of visual weaknesses, damage, stressed welds or paint separation.</p> <p>Make sure a Roll Over Protective Structure (ROPS) and a Falling Object Protective Structure (FOPS) are fitted to the loader.</p>
Tyres	<p>Check the condition and air pressure of the tyres to make sure they are within the manufacturer's specifications. If the loader has water-filled tyres check the pressure with the valve at the top of the wheel.</p>
Bucket	<p>Check the bucket for worn or broken components e.g. teeth, blade, bolts.</p> <p>Inspect the hydraulics and connections for wear and tear.</p> <p>Check the condition of the pivot pins.</p>
Safety Pins	<p>Check safety pins are in place where needed and loose bolts are tightened. Also check keeper plates and pins are in place.</p>
Power Arms	<p>Make sure you check the power arms 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 loader dangerous to operate tell your supervisor or an authorised person. Then isolate the loader and don't use it until it is repaired.</p>
Fluids and Lubrication	<p>Check that the oils (engine, transmission, hydraulic) and fuel are at the right levels.</p> <p>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.</p> <p>Check electrolyte levels.</p> <p>Check for any obvious signs of damage or wear.</p>
Hydraulic Rams, Hoses and Piston Rods	<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>
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 are in good condition.</p> <p>Check that the cabin is clean.</p> <p>Check that the floor plates are free from grease and oil.</p>
Service History and Logbook	<p>Check the machine hour meter, manufacturer's recommendation and logbook to find out if the loader needs to be serviced. You can also check the instruments or computer for this information on later models.</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.

6.1.7 Operational Checks

Operational checks are made once the engine is started.



Make sure all holding brakes are on and the loader is in neutral gear (where appropriate) before the loader is started.

Start up the loader following the manufacturer’s instructions. Where the machine has two pedals for independent rear brakes (designed for manoeuvrability), the pedals must be connected together.

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

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

Part or Function	What to Check
All Controls	Test all arm and bucket movements.
Switches and Gear Buttons	Check the master switch, isolation switches and start switch or key. Test gear change buttons or quick shift arrangements.
Gauges and Instruments	Check that all instruments are displaying properly and are not signalling any alarms or warnings.
Safety Devices	Test all lights and other warning devices.
Attachments	Check that it works properly.
Travel, Turning and Brakes	Test all movements and brakes, including the emergency stopping device.
Ancillary Equipment	Test all communications devices and any other systems or functions fitted, e.g. air-conditioning, radio, two-way radios, lights.

Once you have finished your operational checks it is a good idea to check for external signs of oil or fluid leaks.

6.1.8 Assess Materials to be Shifted

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	Characteristics
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 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.
Stones, Rocks and Gravel	The operating techniques used will depend on the type of rock, and the size of gravel and stones. For example: <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 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	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. Knowing the material and how it reacts during operational activities is essential in order to complete required tasks efficiently and achieve optimum output.

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

6.1.9 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 loader is suitable for the ground conditions and that the bucket is suitable to the task.
- ◆ Always keep to safe driving speeds for the conditions and terrain so that the loader doesn't tip over.
- ◆ Keep clear of holes or soft ground areas. Be careful when driving along the high side of a trench as it could cave in.
- ◆ Always travel with the bucket as low as the ground conditions will allow.
- ◆ Keep in constant communication with other personnel throughout your 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 front end loader you are using. This will include information about:

- ◆ Safe operating speeds and techniques.
- ◆ Safe travel speeds.
- ◆ Monitoring systems and alarms.

Front end loader operators will usually use the following techniques to complete civil construction tasks:



- ◆ Mixing materials.
 - ◆ Stripping or spreading topsoil and materials.
 - ◆ Levelling.
 - ◆ Cutting or boxing.
 - ◆ Backfilling.
- ◆ Site clean-up.

6.1.9.1 Driving to the Work Area

Check that the route and direction of travel is clear – check over both shoulders before reversing. If a reverse warning device is not fitted, sound the horn twice before moving off.

Raise attachments smoothly and keep the bucket at a safe travelling height (as low as possible) while moving to the work area.

Travel directly up or down a sloping surface, not across or diagonally down. This will ensure the loader is as stable as possible. Avoid side hill travel where possible.



On approach to downhill or uphill travel, reduce speed and choose an appropriate gear for the grade. During downhill travel always use a low gear to help control the descent. Often this is the same gear that would be used to climb the hill.

Take care when changing gears during uphill travel, especially when in a heavy loader. If you miss a gear you could lose control of the loader. If the loader does not have enough power to climb, reverse back down and choose the correct

gear to climb the hill.

Do not ever coast (put into a neutral gear and roll) the loader down a hill.

6.1.10 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. Check the manufacturer's specifications or instructions for information.

To use attachments safely and effectively you should:

- ◆ 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.



6.2 Excavating, Loading and Transporting Materials

Excavating and loading with a front end loader is done by driving the bucket into the materials and scooping them up. This can include cutting into the ground or loading materials from a stockpile.

Make sure you work safely and follow the work plan including:



while you work.

- ◆ Checking for underground services (power, telephone, gas, water, sewer, drainage and fibre optic cable lines) before starting to excavate. Talk to the site supervisor who will contact 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 your loader

When excavating you should 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 sand bags.
- ◆ Broken tiles.
- ◆ Moisture.
- ◆ Any other unusual material.



Don't undercut a bank or stockpile as it could collapse and the loader could overturn.

Don't overload the bucket – make sure you work out the capacity of the bucket and assess the material to be loaded.

Some points to remember when travelling with a load:

- ◆ Constantly monitor the load as you drive.
- ◆ Always travel with the bucket as low as possible and tilted back for greater stability and vision and less spillage.



6.2.1 Dumping Material into Trucks

When dumping material into a truck:



and that they stay within your view.

- ◆ Approach the truck slowly or wait until it is correctly positioned.
- ◆ Make sure you know where the driver is at all times.
- ◆ Place a layer of soil in the truck to take the impact of large rocks.
- ◆ Never 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

6.2.2 Mixing Materials



You may need to mix materials using the loader. A tiller is a useful attachment for this kind of work.

You can use one to break up the ground and mix topsoil or clay with other materials to prepare the ground for future work.

Rippers and scarifiers can also be used to break up the ground before mixing materials.

6.2.3 Stripping and Spreading Topsoil

Front end loaders can be used to strip back the top layer of earth to excavate or level an area. The blade of the bucket is used to cut and lift a small amount of the topsoil.

This topsoil can be transported to another area and spread out. Spreading topsoil can be done a number of ways. You can discharge the soil from the bucket bit by bit as you move along, or scrape a small pile of topsoil over an area using the blade of the bucket or a 4-in-1 bucket.



6.2.4 Levelling

Often the loader will be used to level out uneven ground. This can be done using the blade of the bucket.



When levelling, you need to 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.

6.2.5 Cutting and Boxing

Cutting 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.



6.2.6 Backfilling

The front end loader can be used to backfill trenches or 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.

Always approach a trench square-on (form a 'T' with the trench) and take care when working near the high side of the trench or on soft or sloping ground.

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.



6.2.7 Site Clean-Up

Front end 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.

6.3 Monitoring Systems and Alarms

Each machine has its own set of alarms, monitoring systems and gauges to help you safely and efficiently operate it, and warn you if something is wrong. Each make and model of the same type of machine can be different so it is important that you are familiar with all of the systems for the equipment you are using. Check the operator’s manual for a full list of devices, alarms and warnings.



Here are some examples of the gauges and warning systems that may be found on a front end loader:



- ◆ Engine oil pressure
- ◆ Engine temperature.
- ◆ Hydraulic oil pressure.
- ◆ Hydraulic oil temperature.
- ◆ Electrics.

- ◆ Fuel.

Generally alarms and warnings fit into 3 categories:

Warning Type	Description	Examples	What You Should Do
Category 1	These types of warnings let you know that the machine needs some attention, but it is still safe to operate.	<ul style="list-style-type: none"> ◆ Low fuel. ◆ Low system voltage. 	Keep operating as long as it is safe to, and report the problem once you stop work.
Category 2	These warnings indicate that there is a problem caused by the way you are operating that may lead to problems with the equipment.	<ul style="list-style-type: none"> ◆ Equipment is overheating. ◆ Equipment is overloaded. 	Change the way you are operating and if the problem is not fixed, stop operating and report the issue.
Category 3	This is the most serious warning level. Continuing to operate while this warning is sounding will cause damage to the machine.	<ul style="list-style-type: none"> ◆ The park brake is on. ◆ Low engine oil pressure. 	Stop operating and shut down the equipment immediately. Report the problem straight away.

6.4 Lift, Carry and Place Loads using Slings and Lifting Gear



In civil construction projects you may need to use the front end loader to lift and carry loads using slings and lifting gear for example, lowering pipes into trenches or moving equipment or construction materials around the site.

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

6.4.1 Determine the Weight of the Load in Coordination with Other Personnel

You need to coordinate with authorised personnel to work out the weight of the load to make sure your 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 sheets.
- ◆ 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.



Once you know the weight of the load you need to make sure the loader you are using has the capacity to lift it safely. You can check the capacity of the 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 loader.

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

6.4.2 Choosing Lifting Gear



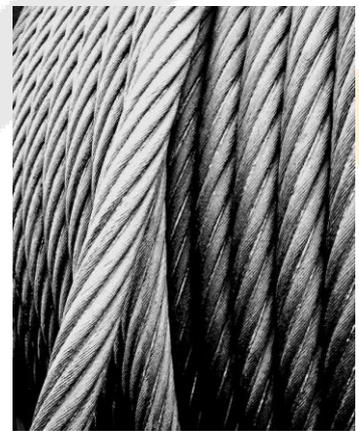
When using the loader for lifting, make sure it is fitted with the correct lifting attachment or that the machine has the appropriate lifting lugs. Always use an approved lifting lug or lift connection that is clearly marked with the Safe Working Load (SWL).

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.

6.4.2.1 Types of Lifting Gear

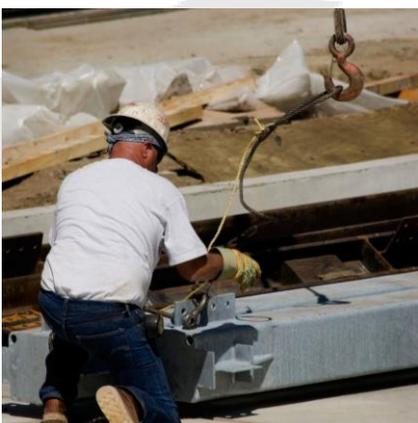
Lifting gear that may be used with the loader includes:

- ◆ 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 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.

6.4.3 Inspecting and Connecting Lifting Gear



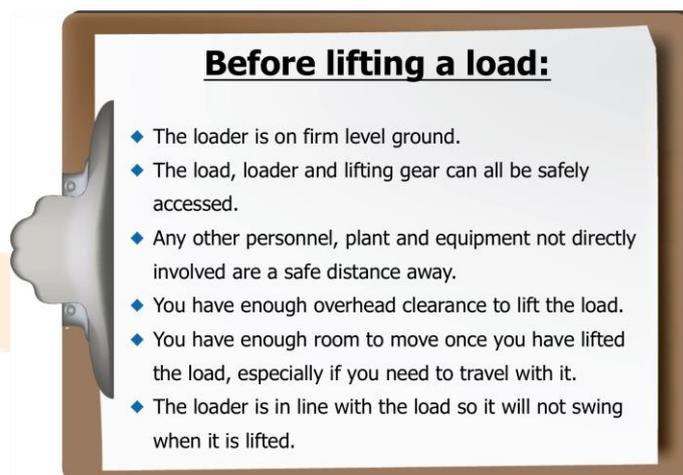
Slings and other lifting gear must be inspected before and after use for any signs of damage or wear. All faults must be reported in accordance with site procedures and the equipment must be isolated (removed from service).

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 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.

6.4.4 Positioning the Front End Loader

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



6.4.5 Lifting Techniques

Follow these guidelines whenever using the front end 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"/>
If the weight of the load causes the machine to tilt or if the hydraulics begin to strain stop the lift immediately and lower the load back down.	<input type="checkbox"/>
Loads 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"/>
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 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"/>
Check the hydraulic hoses and rams before and after lifting to make sure no damage has been done to the equipment.	<input type="checkbox"/>

6.4.6 Checking Completed Work



The key to completing tasks efficiently is good time management and knowing how to use your equipment properly.

Once you have completed your work you will need to check it against:

- ◆ Your work instructions and project plans and drawings.
- ◆ Project quality requirements and timelines.

Speak to your supervisor when the work is completed to see if there are any other tasks that need to be done to complete the job.

6.5 Park and Shut Down the Front End Loader

Once all tasks are complete and the work for the day is done, it is important that you park and shut down the loader.

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.



6.5.1 Parking the Front End Loader

The loader needs to be parked in a safe way that will allow easy access to the vehicle.

Safe parking practices:



- ◆ Stop the loader on a flat level surface in the designated area and keep the access points clear.
 - ◆ Park the loader away from overhangs, excavations, access ways and tidal or flood areas.
 - ◆ If the loader must be parked on a sloping surface it should be facing across the slope.
 - ◆ Keep the 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 loader has to be parked on a public access way, lights, signs and barricades should be erected to warn people.

6.5.2 Shutting Down the Front End Loader

Shutdown procedures include:

- ◆ Cooling of the engine before shutting it down. This depends on the 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 loader, using any applicable lock out or isolation devices and removing the keys. This will prevent any unauthorised movement of the 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.

6.6 Post-Operational Checks



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

General maintenance activities are done to keep all plant and equipment working safely for longer.

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

6.7 Prepare the Front End Loader for Relocation

The loader will need to be prepared before it can be moved from site to site.

Some issues in moving the loader to another worksite may include:

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

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

- ◆ Clean the loader thoroughly.
- ◆ Clean any attachments going with the 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.



6.7.1 Relocate the Loader



Front end 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 loader onto the transport and use a spotter to help guide the loader up the ramps.

Once on board the loader must be securely locked down to prevent any movement.

6.8 Clean the Loader and Carry Out Routine Maintenance

It may not be practical to clean the loader after every use but you should clean it 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 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.



PART 7: ROLLER



7.1 Roller

7.1.1 What is a Roller?

A roller is a self-propelled or towed machine used for the primary purpose of compacting a variety of types of construction materials. It may be rubber tyred, smooth drum, padded drum or grid (open) face type.

A roller achieves compaction by one or more of the following methods:

- ◆ Static weight.
- ◆ Kneading.
- ◆ Vibration.
- ◆ Impact.

A grid roller is used to break down oversized construction materials.

Padded drums may include sheepsfoot, padfoot, tamping foot or wedge foot.



7.1.2 Types and Applications of Rollers

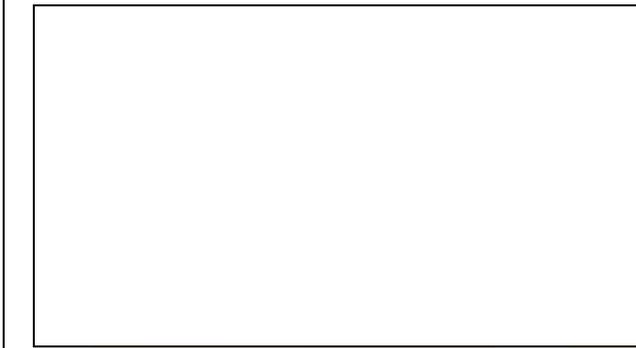
The types of rollers you may use while working on a civil construction site are:

Self-Propelled Rollers	
<p>Self-Propelled Pneumatic Tyred Roller</p> <p>Also known as rubber tyred roller. A roller type that is used to finish fresh sealed asphalt to produce a trafficked finish, and to bed down the asphalt or sealed surface. Spreads the compaction across the tyres and compacts the surface by pressing down on the surface with the weight of the roller and the rolling of the tyres.</p>	<p>Self-Propelled Smooth Drum Vibratory Roller</p> <p>Commonly identified as a basic roller. These rollers compact the surface by the roller's weight and the rolling and vibration of the roller drum.</p>
<p>Self-Propelled Padded Drum Vibratory Roller</p> <p>Rollers that are used for compaction and pulverising materials. They have a square or rectangular block attached to the drum of the roller in a pattern that enhances the ability of the roller to compact and pulverise the ground.</p>	<p>Self-Propelled Double Drum Vibratory Roller</p> <p>The drum vibrates at different speeds and frequencies to achieve greater compaction. At a half setting the vibrating is fast and achieves shallow compaction. At full setting the vibration is slower and achieves a much deeper compaction. A vibratory roller has an advantage over static rollers in that it can achieve greater compaction for the same weight machine.</p>
<p>Self-Propelled Smooth Drum Roller (Including 3 Pointers)</p>	

Sometimes called static rollers. Used in a similar way as smooth drum rollers utilising the weight of the roller to compact materials. These rollers compact the surface by the roller's weight and the rolling of the roller drums or wheels.

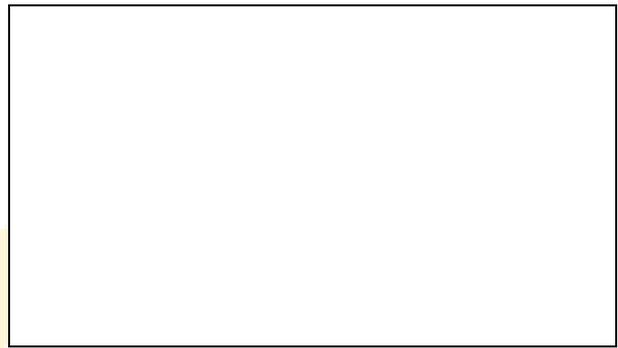


Towed Rollers



Towed Grid Roller

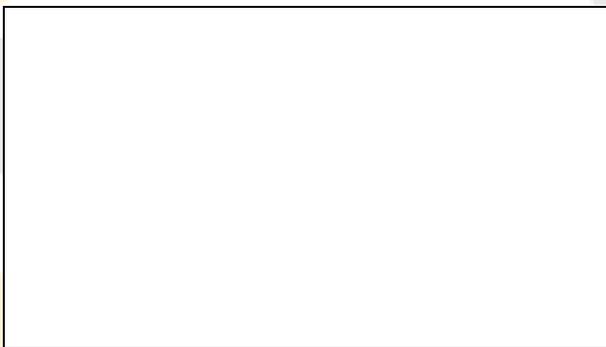
Used for breaking up rocky material while compacting the materials. These rollers are usually towed behind a tractor.



Towed Pneumatic Multi-Tyred Roller

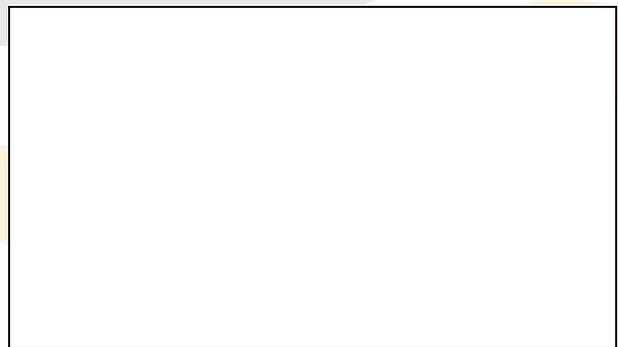
A series of pneumatic or rubber tyres that kneads and smooths the surface

These rollers compact the surface by kneading the material with the weight of the roller and rolling of the tyres.



Towed Padded Drum Vibratory Roller

Commonly towed behind another item of machinery such as a grader or tractor. Used for multi-tasking and for keeping onsite costs down.



Towed Smooth Drum Vibratory Roller

This tow behind attachment is used to compact materials using vibration.

7.1.3 Roller Components

The following diagram and table explains the basic components of a roller.



Component	Description
Cabin	Part where operator sits and operates the machine. Controls include: joy stick or control levers, transmission controls, brakes, and emergency stop controls.
Motor or Drive Unit	Engine of the machine.
Drum Unit	Can be single drum, double drum or rubber tyre.
Scrapers, Water Sprinklers and Mats	Used to prevent hot asphalt from sticking to roller drums. May not be present on all rollers.

7.1.4 Roller Operations

On a civil construction worksite, the primary task of the roller and roller operator is compaction of materials to the required amount. **A roll overprotective structure and safety belts (ROPS)** must be provided on the roller to protect the operator, if there is a likelihood of the roller being overturned.

When you are operating a roller, you will be expected to:

- 1. Compact the materials to the required density.** Also known as percentage of compaction.
- 2. Comply with the roller pattern.** This pattern is generally half a drum overlap from the last pass, but may be different in specific circumstances. The required pattern will be told to you during a toolbox meeting or other site meeting. If you are unsure of the required pattern, ask your team leader.
- 3. Seal and finish the surface.** This means you will be ensuring the final road surface is fit for purpose and safe to use. Generally, a multi-tyred roller is used for this task.



You may be working with:



Your roller pattern may vary and the type of roller you are operating will vary depending on the task you are doing and the material you are working with.

Limitations of a roller:

- ◆ Speed limitations
- ◆ Steep slopes

7.1.4.1 Roller Operations Documentation

Examples of details that will be included in your operations documentation:

Operations Details	Use
The Pattern and Density of Compaction Requirements	To ensure the task meets specifications.
Sealing or Finishing Compaction Percentages	Is required for quality assurance and to meet task specifications.
The Type of Materials Being Compacted	This makes it easier to predict the amount of time needed to complete the task.
Earthworks Calculations	Best described as knowing the capacity of the machine, how much material it can compact in each pass, how many passes can be done in an hour or the length of the pass circuit.

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

7.2 Choose and Check Plant and Equipment

Once you have confirmed your job requirements you need to choose the right equipment and attachments to get the job done. Rollers can be used to prepare areas for other work or to finish surfaces.



The type of roller you use will depend on:

- ◆ The type of material being compacted or worked.
- ◆ The size of the area you are working on.
- ◆ The finish (what the materials or area need to look like) required by the plan.

Information about technical capabilities and limits can be found in the operator manuals for each item.

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

7.2.1 Select a Roller Attachment

Attachments can be used to keep the roller cool, clean and able to function correctly. This is because the materials that a roller may be compacting could be very hot and sticky.

Once set, both asphalt and bitumen can be very difficult to remove from the drum, so it is best to avoid the materials sticking to the drum in the first place.



Some attachments used with a roller include:

Attachment	Description
Blade	This may be used to assist with levelling of the materials. It should be placed before the drum to level before rolling.
Scraper Bar	This is used to keep the drum free of debris or materials. They are commonly used on steel drummed rollers.
Spray Bar	This is a bar that sprays water onto the drum or wheels of the roller to keep the drum or the rubber wheels cool. It is particularly important when rolling asphalt and bitumen.
Wheel or Drum Broom	These are used to sweep materials from the drum or wheels. They are commonly used on rubber wheeled or multi-tyred rollers.
Drag Broom	This attachment is a broom that is pulled behind the roller. It is not a common attachment because most sweeping is done after the surface has had a chance to settle.
Padded Drum Attachment and Blade	In bitumen surfaces the padding is used to bed down the materials without shattering. They are often used to traffic the finished surface and ensure it is ready for vehicle movements.

If any attachments are used, ensure they meet the manufacturer's specifications and are approved for use with your roller. Any approved attachments should be listed in your operator's manual.

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 roller 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 roller and the operator's manual for the attachment. Otherwise you may need to check the workplace equipment procedures for your site.

7.2.2 Fit and Remove 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 roller. 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. Ensure these attachments are free from any faults before using them.

Fitting Attachments



operations and the bar blade must be facing the drum or wheels.

- ◆ Make sure the bolts, nuts or connecting pins are correctly applied.
- ◆ Hydraulic hoses must be connected correctly.
- ◆ Water hoses must be connected to the appropriate reservoir. Water jets must face in the right direction.
- ◆ Scraper bars must be positioned to remove the debris without obstructing

Incorrectly fitted attachments can damage the roller or the worksite and could void any insurances or warranties on the vehicle

Removing Attachments

- ◆ Ensure the attachment is safe to remove.
- ◆ Check for the temperature of the attachment and only remove it when the temperature is correct.
- ◆ Check that all hoses and points of the attachment have been undone before removing the attachment.
- ◆ Heavy attachments should be removed with good manual handling techniques. Use team lifts as much as possible.



7.2.3 Pre-Start Check

Pre-start checks are done before the engine is started. Walk around the roller and look for anything that is out of the ordinary.

Part or Component	What to Check For
Structure	Check the general condition of the roller. Look for any obvious signs of wear and tear. Check for oil or other fluid leaks.
Drums and Wheels	Check the drum condition and surface. Check the condition and air pressure of the tyres to make sure they are within the manufacturer's specifications.
Fluids and Lubrication	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. Transmission fluid needs to be checked in accordance with the manufacturer's specifications. Check that parts are lubricated to ensure smooth operation.
Engine	Check condition and security of battery. Check electrolyte levels. Check for any obvious signs of damage or wear.
Hydraulic Rams and Hoses	Hydraulic rams and pressure hoses are checked for splits, leaks, fractures, bulges and bent piston rods.
Attachments and Ancillary Equipment	Check the condition and security of any attachments.
Decals and Signage	Check that all decals and signage are present on the machine.
Windows	Check that the windows are clean and you have good visibility from the operator's chair.
Cabin	Check that the seat and safety belt are in good condition. Check that the cabin is clean.
Service History and Logbook	Check the machine hour meter, manufacturer's recommendation and logbook to find out if the roller needs to be serviced. You can also check the instruments or computer for this information on later models.

For exact details on the components for the machine you are operating, check the operator's manual as different brands may have different requirements.

7.2.4 Operational Checks

Operational checks are made once the engine is started.



Climb to the operator's seat 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 roller.

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

Start up the roller 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 on the roller:

Part or Function	What to Check For
Gauges and Instruments	Check that all instruments are displaying properly and are not signalling any alarms or warnings.
Safety Devices	Test all lights and other warning devices.
Attachments	Check that the attachment is secured and connected to the roller properly. Check the condition of the attachment. Check that it works properly.
Drum	The vibratory or compaction system will need to be checked to make sure it is operating 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.

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.

7.3 Operate the Roller



During civil construction roller operations you will need to:

1. Assess the materials you are working with.
2. Use the equipment safely within the technical specifications and limits.
3. Use the equipment for tasks that it is specifically designed for.
4. 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 the site.
 - ◆ Team leaders.
- ◆ Site safety personnel.

7.3.1 Site Conditions

Site conditions, terrain and grades will affect the operation of the machine.



This in turn requires the operator to be able to change operational styles and techniques based on the prevailing conditions.

If the ground is rough or stony you should slow down accordingly to a safe speed.

While compacting a large sloped area it is best to perform rolling up and down the slope as opposed to across or diagonally across.

If you need to cross a ditch while in the roller you should approach and cross it slowly, and **at an angle**.

7.3.2 Assess Materials to be Compacted

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

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

- ◆ Topsoil.
- ◆ Clays.
- ◆ Silts.
- ◆ Gravel.
- ◆ Mud.
- ◆ Stone.
- ◆ Rock, which might be:
 - ◇ Metamorphic.
 - ◇ Igneous.
 - ◇ Sedimentary.
 - ◇ Blended materials.
 - ◇ Organic materials.
 - ◇ Bituminous mixes.



7.3.2.1 Soil Technology and Compaction

In civil construction, compaction is where materials are compressed (squashed) into a given space to achieve a set amount of stability in the soil.



During the compaction process, the amount of air spaces, voids and moisture trapped within the materials is squeezed out and more materials are pushed into the space.

Different types of soils compact in different ways. Some, like sand, will need to be mixed with other materials before any compaction activities could start.

(not too wet or too dry).

Other materials, such as clay, will need to be at the correct moisture content

You will need to assess the type of materials to be compacted, the work area or circuit, and the grade of the site. This will help you determine if the machine you are operating is going to be able to achieve the level of compaction required.

Knowing the required compaction amount or percentage is essential to the process. You will be able to find the percentage of compaction that you need to reach in site plans, quality assurance plans, specifications or by speaking with your supervisor or site quality assurance officer.



If your machine is not able to achieve the level of compaction required, speak with your supervisor to develop a work pattern or plan which will achieve the percentage of compaction required.

Every civil construction project has very detailed and explicit specifications which outline acceptable ranges for all aspects of the project, including compaction percentages, acceptable materials and acceptable moisture contents.

7.3.2.2 Identify, Remove or Manage Contaminants

During roller operations you may come across contaminants in the materials you are rolling or compacting. It is important that contaminants are removed or managed to make sure the final surface meets quality requirements.

Contaminants found in materials on a civil construction site could include:

Safely remove all contaminants from the area. If it is not safe to remove the contaminants you need to isolate the area and report the situation to your supervisor who will organise for the safe removal of the contaminants.

7.3.3 Safe Operating Techniques

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

General safe operating techniques include:

- ◆ Continuously monitoring and checking for hazards, and warning other workers if there is danger.
- ◆ Making sure the roller is suitable for the ground conditions and to the task.
- ◆ Keeping to safe driving speeds for the conditions and terrain.
- ◆ Keeping the roller within tolerances and capacity.
- ◆ Keeping clear of holes or soft ground areas.
- ◆ Being careful when driving along the high side of a trench as it could cave in.
- ◆ Recognising defects or problems.
- ◆ Using the appropriate rolling or compacting techniques for the type of materials being compressed.
- ◆ Sticking with the rolling pattern established during site meetings.
- ◆ Keeping in constant communication with other personnel throughout your roller operations.



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 roller you are using. This will include information about:

- ◆ Safe operating speeds and techniques.
- ◆ Safe travel speeds.
- ◆ Monitoring systems and alarms.

Roller operators will usually use the following techniques to complete civil construction tasks:

- ◆ Levelling.
- ◆ Compacting.

7.3.4 Drive to the Work Area

Before compacting any surface the roller must be driven to the work area.



You should make sure that the route and direction of travel is clear and that you travel at a safe speed. Always check over both shoulders to ensure the direction of travel is clear before reversing.

Wherever possible, side hill travel should be avoided as there is a greater chance of turning the machine over.

If you must drive the roller down a sloping surface you should drive directly down the slope, not across or diagonally down. This will ensure the roller is as

stable as possible.

On approach to downhill travel you should reduce the speed of the roller and select an appropriate gear for the grade.

During downhill travel always select a low gear to help control the descent. Often this is the same gear that would be used to climb the hill.

Be cautious when changing gears during uphill travel, especially when in a heavy roller. Missing a gear could result in you losing control of the roller.

If the roller does not have enough power to climb the incline, reverse back down the hill and select the correct gear to climb the hill.

DO NOT ever coast (put into a neutral gear and roll) the roller downhill.



7.3.5 Roller Techniques



Roller operators need to be able to identify and use techniques that help achieve the best possible results on the worksite.

Each site has specific design specifications that need to be met and roller operators are crucial to the finished project.

Some of the techniques which an operator could use to achieve the best possible result can include:

- ◆ Keeping to the roller pattern as accurately as possible.
- ◆ Travel at optimum speeds.
- ◆ Monitor the ground for potential hard or uneven surfaces.
- ◆ Accurately identifying if attachments are required to achieve the finished result.
- ◆ Selection of the appropriate gears for the slopes of the ground – low gear for steep slopes.
- ◆ Ensure smooth compaction through steady, even speed.



Some techniques that may be used include:

- ◆ **Roller Patterns** – following a designated pattern or path.
- ◆ **Roller Repetitions** – Rolling the same area a designated number of times. Generally between 3 and 6.
- ◆ **Team Rolling** – Having two rollers working together to continually roll a section. This can be helpful but edges may need special consideration to achieve the appropriate degree of compaction.



Techniques for operation cannot be learnt from a book. They are something that can only be done on the site. For further assistance, speak with other experienced operators or your trainer to demonstrate specific techniques.

7.3.6 Operate Attachments



Every piece of equipment has design limits and operational recommendations. Operating within these specifications, recommendations and design limits ensures you do not damage either the roller or the attachment.

7.3.7 Compacting

During the compacting process there are a number of important points to remember. You must:

- ◆ Work at a safe and acceptable speed.
- ◆ Use an appropriate path of travel and ensure direction of travel is clear.
- ◆ When using a blade, position it at the correct depth, level and angle.
- ◆ Use the correct roller patterns. Generally 3-6 passes will be made on each segment of the work area, offsetting each pass by half a roller width.
- ◆ Engage and disengage the compacting device when required for the materials being compacted.



The correct use of the drum controls will assist in achieving the required compaction outcomes. The quicker the vibration the lighter the compaction. The slower the vibration the heavier the compaction.



Rollers must work within the designated roller pattern for the site to ensure that compaction degrees are achieved as efficiently as possible.

Sometimes to achieve the compaction levels within the designated timeframes, multiple rollers will be used to compact the same area, each staggered slightly to achieve the required roller pattern.

If too much water is used on the soil being compacted, rolling will bring excess water to the surface and prevent the soil from being compacted properly.

7.3.8 Levelling Procedures

Levelling with your roller is the removal of lumps and bumps from the work area. Roller levelling helps to achieve appropriate gradients for the specifications.

When levelling, work to the designated grades in the required manner. This could include the type of levelling, the grade and slope, and the fall (for water to shed 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 must be checked against site reference points such as pegs, benchmark points or other defined levels.

Levelling information and procedures will be discussed during your task

briefings.

7.3.9 Road Works

When using a vibratory roller, the first run against the kerb on uncompacted soil you should drive slowly without the vibrator.

Do not leave the vibrator on while the roller is not traveling, or it will potentially sink into the ground (**the roller would vibrate itself into the soil**).

Rolling operations on a road should begin on the **kerbside** and work in overlapping runs across towards the crown. All runs should overlap the previous run.

If cracks begin to appear after rolling with the vibrator on, perform another run with the vibrator off to remove the cracks. Always turn the vibrator off before stopping the roller.



7.3.10 Sealing and Finishing the Surface



Sealing and finishing is the last stage of road construction or maintenance and the roller is the last machine to move along the surface and complete the job. Once asphalt and aggregate has been deposited on the road the roller (usually a rubber tyre roller) forces the aggregate into the liquid asphalt without crushing it in the process.

Several passes are usually required to finish the surface properly and the roller should be driven slowly to get the best result. Rolling should stop once the asphalt has hardened to avoid damaging the bond between the aggregate and

the asphalt.

7.4 Monitoring Systems and Alarms

Each machine has its own set of alarms, monitoring systems and gauges to help you safely and efficiently operate it, and warn you if something is wrong. Each make and model of the same type of machine can be different so it is important that you are familiar with all of the systems for the equipment you are using. Check the operator's manual for a full list of devices, alarms and warnings.

Here are some examples of the gauges and warning systems that may be found on a roller:

- ◆ Engine oil pressure.
- ◆ Engine temperature.
- ◆ Hydraulic oil pressure.
- ◆ Hydraulic oil temperature.
- ◆ Electrics.
- ◆ Fuel.



Generally alarms and warnings fit into 3 categories:

Warning Type	Category Description	Examples	What You Should Do
Category 1	These types of warnings let you know that the machine needs some attention, but it is still safe to operate.	<ul style="list-style-type: none"> ◆ Low fuel. ◆ Low system voltage. 	Keep operating as long as it is safe to, and report the problem once you stop work.
Category 2	These warnings indicate that there is a problem caused by the way you are operating that may lead to problems with the equipment.	<ul style="list-style-type: none"> ◆ Equipment is overheating. ◆ Equipment is overloaded. 	Change the way you are operating and if the problem is not fixed, stop operating and report the issue.
Category 3	This is the most serious warning level. Continuing to operate while this warning is sounding will cause damage to the machine.	<ul style="list-style-type: none"> ◆ The park brake is on. ◆ Low engine oil pressure. 	Stop operating and shut down the equipment immediately. Report the problem straight away.

7.5 Adjust Techniques to Meet Changing Conditions

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



run.

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 roller 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 level or compact as much and you will need to adjust the quantities you are dealing with in each

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 compact more or move onto other stages of the civil construction project preparing the road base you will be working with different materials, attachments and personnel.



7.6 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:



Other Machines – At all times you need to know when other machines are working near the roller. Know and stick to your agreed speeds, travel paths or roads. Good communication between operators is essential to avoid collisions.

Personnel – Good communication is the key to working with other personnel. Be aware of people in the work area. Make sure they are not in danger and are a safe distance from the roller. 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.

7.7 Checking Completed Work

The key to completing tasks efficiently is good time management and knowing how to use your equipment properly.

Once you have completed your work you will need to check it against:

- ◆ Your work instructions and project plans and drawings.
- ◆ Project quality requirements and timelines.

Speak to your supervisor when the work is completed to see if there are any other tasks that need to be done to complete the job.



7.8 Park and Shut Down the Roller

Once all tasks are complete and the work for the day is done, it is important that you park and shut down the roller.

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.



7.8.1 Parking the Roller

The roller needs to be parked in a safe way that will allow easy access to the vehicle.

Safe parking practices include:



- ◆ Stop the roller on a flat level surface in the designated area and keep the access points clear. If the roller has to be parked on a sloping surface, the roller should face across the slope (note: only if no level area can be found).
- ◆ Park the roller away from overhangs, excavations, access ways and tidal or flood areas.

- ◆ Keep the roller away from refuelling sites and areas when parking to prepare for maintenance. This keeps the rest of the machines on the site able to access the fuel.



- ◆ Apply locks and brakes.
- ◆ Move attachments into the shutdown position. Make the attachments safe in the way needed for the worksite.

If the roller **MUST** be parked on a public access way, lights, signs and barricades should be erected to warn people.

7.8.2 Shutting Down the Roller

Shutdown procedures include:

- ◆ Cooling the engine before shutting it down. Dependent upon the vehicle but commonly the same amount of time as the engine warm up time.
- ◆ Monitor controlled lowering of temperatures and pressures.
- ◆ Walk around the machine looking for any signs of damage or faults that may have occurred during the task.
- ◆ Secure the vehicle and use any applicable lock out or isolation devices and remove the keys. This will prevent any unauthorised use or movement of the roller.
- ◆ Ensure equipment is correctly stowed in accordance with site and manufacturers requirements.



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

7.8.3 Post-Operational Checks

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

General maintenance activities are done to keep all plant and equipment working safely for longer.

As part of your job as a roller 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:



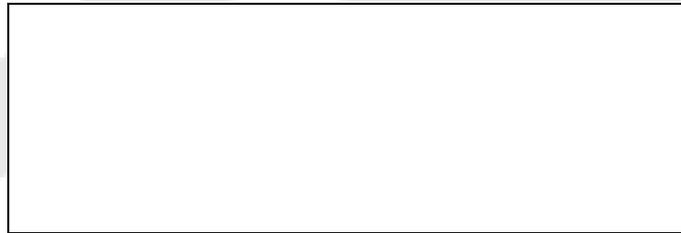
Post-operational checks should include all of the things you look for when conducting pre-start checks. For example:

- ◆ Fluid levels.
- ◆ Condition of drum or tyres.
- ◆ Hydraulics (rams, hoses and connections).
- ◆ Structure and attachments for damage or wear.

7.9 Prepare the Roller for Relocation

The roller will need to be prepared before it can be moved from site to site.

Some issues in moving the roller to another worksite may include:



Before relocating the roller you may need to do some or all of the following things:



- ◆ Clean the roller thoroughly.
- ◆ Clean any attachments going with the roller.
- ◆ 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.

7.9.1 Relocate the Roller

Moving a roller between worksites is normally done on a float (trailer), as most rollers are too slow and heavy to move on the road. Any transport must comply with:

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



Be careful when loading the roller onto the transport and use a spotter to help guide the roller up and down the ramps.



Once on board the roller must be securely locked down to prevent any movement.

If a roller is being moved across a public road ensure that all traffic rules are obeyed, traffic is stopped to allow the roller to move without other traffic, making sure that an approved traffic management plan and escort vehicles are in place.

Expect significant damage to road surfaces if a pad foot roller of any kind is moved across a sealed surface.

Expect significant damage to road surfaces if a pad foot roller of any kind is

7.10 Clean the Roller and Carry Out Routine Maintenance



It may not be practical to clean the roller after every use but you should clean it 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 roller, 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.



PART 8: MAINTENANCE, HOUSEKEEPING AND PROCESSING RECORDS

8.1 Maintenance and refuelling

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

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 piece of equipment stays at its operating capacity for as long possible. **Check the service manual** provided by the manufacturer to establish the service and the frequency of the service to be carried out on the machine you operate.

Maintenance activities could include:



- ◆ Air filters – should be checked daily in dusty conditions. Clean or replace them as necessary.
- ◆ Greasing or lubricating attachments.
- ◆ Checking drum parts and replacing them as needed.
- ◆ Checking bucket teeth and replacing them as needed.
- ◆ Battery checks – clean the battery, check electrolyte levels. When changing the battery of a plant, the **earth/negative battery clamp** should be removed first.
- ◆ 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.



All tools, equipment and attachments must be kept in good working order. This means cleaning, checking, maintaining and storing them correctly, by following worksite procedures and manufacturers' guidelines.

Clean all items by removing dirt, mud, moisture or other contaminants.



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

Tools, equipment and attachments need to be maintained in line with manufacturers' recommendations or your worksite procedures.

8.1.2 Vehicle Refuelling Procedures

All refuelling 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. (Bunding may be required)

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 refuelling plant and equipment. Always check the procedure for your worksite before any refuelling 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 refuelling 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.

8.2 Clean Up After Work

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



8.2.1 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. Stockpile them for later use, where possible.
- ◆ 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.

It is your responsibility to clean up after your work activities and not leave it to

8.2.2 Cleaning and Storing Attachments

Once the attachment has been removed it should be cleaned, checked or 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.



8.3 Process Written 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 piece of equipment may include:

- ◆ Inspection checklists.
- ◆ Fault reports.
- ◆ Fuel, oil, hydraulic and other fluid usage.
- ◆ Computer readings of various equipment functions.
- ◆ Diary entries.
- ◆ Service manuals or logbooks.
- ◆ Repair request forms.
- ◆ Part requisition forms.
- ◆ Hazard reports – including Take-5 forms.



- ◆ Incident reports – accident forms, incident reports, environmental incident reports, WHS investigation reports, quality assurance (QA) reports.

Some other records, reports and paperwork that may be needed include:



- ◆ Computer readings – from process monitoring, test results, activity reports, and materials readings.
- ◆ Logs – supply logs, work activity logs, training logs, stockpile logs, usage or driver logs.
- ◆ Shift documents – end of shift, end of process, quality information.

You will usually need to include details like the make and model number of the piece of equipment, together with 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.

Once all maintenance tasks or minor repairs are completed and the paperwork is signed off you can return the piece of equipment to service. This means it is safe and ready to use.

Notify your supervisor or other authorised personnel that the equipment is ready to be used again.

It is important that you keep detailed records of all your activities, especially any problems you had during your shift. You may need to explain what you say, or what you did, at a later time.

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.

