Grader Guide

Plant and Equipment Course

RIIMPO324F Conduct Civil Construction Grader Operations

Learner Guide

2.11.5 Grader Learner Guide V4

Course Induction

You are doing this course with National Courses Pty Ltd (RTO 41072). We trade as:

National White Card Courses | HCA Hospitality Courses Australia | National Courses | noc.edu.au National Online Courses | National First Aid Courses

1) Identification (ID)

You must complete the state body official ID document and requirements.

2) Student Handbook

The Student Handbook was sent with your booking confirmation email.
The student handbook is an important document that explains our processes and systems and includes the following information:

- **Your rights & responsibilities**
- **Complaints, appeals & feedback**
- **Code of conduct**
- **What happens If you are caught cheating**
- **Support options**
- **Fees and refunds**
- **Privacy and data handling**
- **Certification & record keeping**

3) Training & Assessment Requirements

Your trainer will explain:

- how today's training and assessment will work
- timeframes for assessment
- assessment methods
- that training and assessment is completed in English

4) Certification Outcome

If you complete all assessment tasks satisfactorily, you will be deemed Competent and you will receive:

- A Statement of Attainment: RIIMPO324F Conduct Civil Construction Grader Operations

Before leaving today, check your full name and date of birth are correct.

5) The venue

Your trainer will explain:

- Toilets and facilities
- Emergency exits and procedures
- Where to refill water bottles
- Rules regarding smoking and vaping i.e. smoking/Vaping are not allowed inside the venue. If you need to smoke or vape, you must go outside the venue.

6) Mobile Phones

During the assessment, mobile phones are strictly forbidden. All assessment answers must be completed in English without the use of a mobile phone.

7) Attendance

100 percent attendance is required for this course

8) Questions & Support

If you have questions or need support, speak with your trainer at any time.
Your Learner Guide was sent via email as a downloadable link and will also be emailed again after the course with your certificate.

Your enrolment should be complete. If not, you must complete your enrolment now. If you did not provide us with a USI on enrolment it is essential you have this to us today.
Please do this in your own time today and supply it to the trainer by the end of the day to not hold up and delay the class. It is not possible to get your certification without having a USI. If you have issues with the USI not matching your name, please call **1300 857 536.**

Get a USI	Find My USI
	

1.1 Introduction

This course is based on the unit of competency **RIIMPO324F Conduct Civil Construction Grader Operations.**

You will learn about:

- Planning and preparing for grading activities.
- Conducting pre-operational checks.
- Selecting, removing and fitting attachments.
- Operating the grader.
- Relocating the grader.
- Carrying out machine operator maintenance.
- Site clean-up.

1.1.1 What is a Grader?

A Grader is a self-propelled vehicle that is used to move and place construction materials using a centrally mounted blade.

Standard models have three axles, with the cab and engine above the rear axles at one end, a third axle at the front end, and the blade in between.

Graders may have a forward and rear mounted blade, rippers or scarifying points.

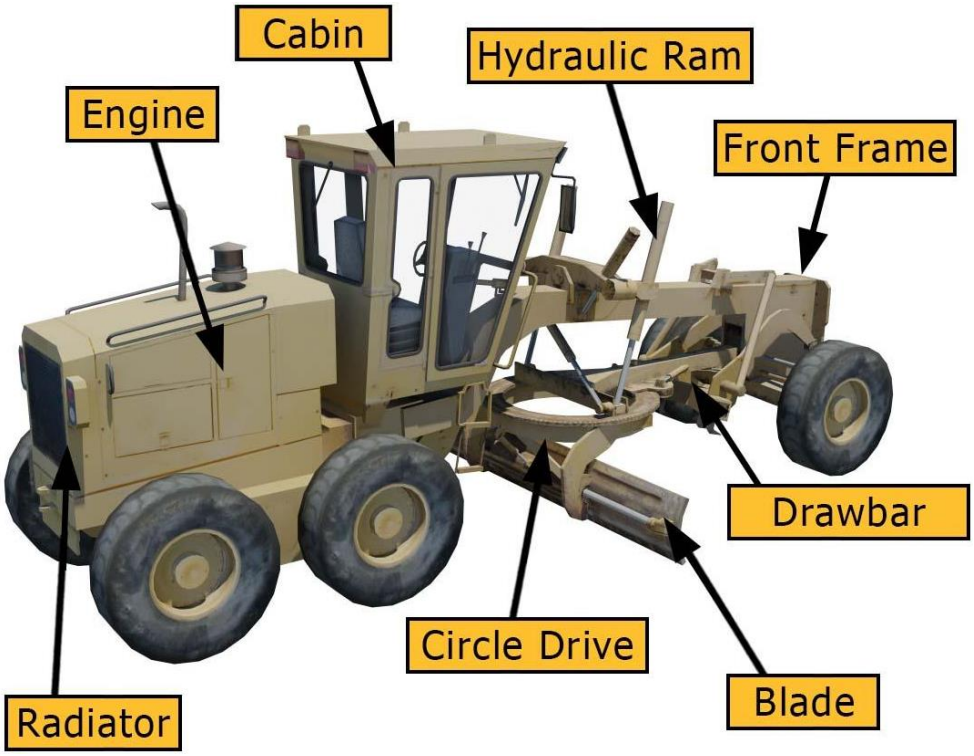
On most graders the blade and attachments controls are hydraulic but some may be mechanical. It is important to note that it is not permissible to carry a passenger on the grader.

On a civil construction site a grader will be used to:

- Level materials.
- Form and carry windrows.
- Cut and maintain drains.
- Form, upgrade or maintain a road.
- Mix or spread materials.
- Perform scarifying or ripping.
- Cut and trim batters.
- Trim road sub-grades and pavements.
- Strip or spread topsoil and materials.
- Perform cutting and boxing.
- Cut and fill.
- Clean-up the site.

The materials that a civil construction grader will commonly work with include clay, mud, topsoil and organic materials, stones, rocks and gravel, silts and sand, and construction site materials such as bituminous mixes and waste materials.

1.1.2 Common Grader Components



Component	Explanation
Engine	Engine of the machine. With a grader this is located behind the cab.
Radiator	Helps to maintain the temperature of the engine.
Cabin	Part where operator sits and operates the machine. Controls include: joy stick or control levers, transmission controls, brakes, emergency stop controls.
Blade	The pushing implement on the machine. It is used to push, level and shape materials.
Hydraulic Ram	Generic name given to all hydro-static drive units including hoses and rams.
Front Frame	The front frame is connected to the front wheel axle, and supports the structure of the entire grader. The front frame is designed to allow for the movement of the blade underneath.
Drawbar	Part of the blade and circle drive assembly system for the grader. Acts as a support system for the blade. Sometimes called a 'saddle'.
Circle Drive	Allows the blade to be rotated. May also be nicknamed a 'turn table'.

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

1.1.3 Grader Abilities

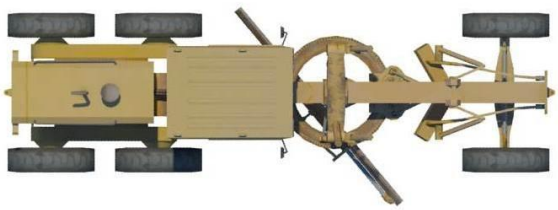
As the grader is such a versatile machine, they can perform many specific movements to complete a task. Most of these movements happen with the front half of the grader.

Some of the main movements include:

Straight

Uses front wheel drive steering.

Most often used for long straight passes, finishing surfaces, small windrows and scarifying/ripping.



Articulated

Uses front wheel drive steering and the frame.

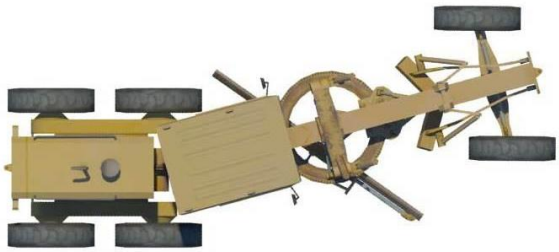
Often used on the side of windrows and to alter the blade cutting width.

Crab Steer

Both front and rear wheels travel in the same direction.

The front frame travels in an angled direction.

Most often used for levelling dumped materials without driving over the dumped pile in front.



1.2 Site Policies and Procedures

You must follow all safety rules and instructions when performing any work. If you are not sure about what you should do, ask your boss or supervisor. They will tell you what you need to do and how to do it in a safe way.

Before starting your work you need to make sure you have access to all operations documentation for the job. This will help you to do your work in the safest way and make sure all work is compliant.

Operations documentation includes:

Site Details
The information and safety requirements of the workplace environment (where you will be working).

Hazard Details
Any hazards in the work area or related to the work. This could also include instructions on how to handle dangerous or hazardous materials.

Task Details
Instructions of what the work is or what you will be doing (this can include diagrams or plans). Also instructions on how to safely do the job.

Faulty Equipment Procedures
Isolation procedures to follow or forms to fill out.

Signage
Site signage tells you what equipment you need to have, or areas that are not safe to be in.

Emergency Procedures
Instructions on what to do in emergency situations, for example if there is a fire, accident or emergency where evacuation or first aid is needed.

Equipment and Work Instructions
Details of how to operate plant and equipment and the sequence of work to be done.

Your worksite will also have instructions for working safely including:

- Emergency procedures, including using fire fighting equipment, first aid and evacuation.
- Handling hazardous materials.
- Safe operating procedures.
- Personal protective clothing and equipment.
- Safe use of tools and equipment.

1.3 Work Instructions

You need to be clear about what work you will be doing. Make sure you have everything about the job written down before you start. This includes what you will be doing, how you will be doing it and what equipment you will be using.

Make sure you have all of the details about where you will be working. For example:

- **The Site** – Is there clear access for all equipment? Are there obstacles in the way? What are the ground conditions like? Is the site ready for your work to begin? Are there structures, workers, traffic or areas that you need to avoid?
- **The Weather** – Is there wind, rain or other bad weather? Is it too dark?
- **Facilities and Services** – Are there power lines or other overhead or underground services to think about?
- **Traffic** – Are there people, vehicles or other equipment in the area that you need to think about? Do you need to get them moved out of the area? Do you need to set up barriers or signs?
- **Hazards** – Are there dangerous materials to work around or think about? Will you be working close to other people?

You also need to make sure you have all of the details about the kind of work you will be doing:

- **The Task** – What kind of materials are being moved? How much is there? How long do you have to complete the work? Does the job need a special type of attachment?
- **Plant** – What type of plant will be used? How big is it? How much room does it need?
- **Attachments** – What equipment will you need to shift the materials safely? Is the equipment available?
- **Communications** – How are you going to communicate with other workers?
- **Procedures and Rules** – Do you need any special permits or licences for the work? Are there site rules that affect the way you will do the work e.g. traffic control requirements?

1.3.1 Reading and Checking Your Work Instructions

All work needs to follow worksite, environment and company safety procedures.

Procedures help to make sure that all work is done in a safe way, without damaging equipment or putting people in unsafe situations. They also help to make sure that work is done in the correct order and doesn't interrupt or get in the way of other work that is happening on the site. This is especially important in civil construction projects that need to be completed in a particular sequence.

Your work instructions will tell you the safest way to do the job, and the equipment that you will need to use. It is a good idea to check your work instructions with your boss or supervisor to make sure you know exactly what you need to do.

If you don't know where to get your instructions or you can't understand the language or civil construction terminology being used in them, you can ask your boss or supervisor. They will tell you where to find your work instructions and explain what they mean.

1.3.2 Work Method Statements

Many worksites require a work method statement before any work can start. A work method statement is a list of steps that outlines how a job will be done. It also includes any hazards that occur at each step, and what you need to do about them.

These statements can also be known as Safe Work Method Statement (SWMS), Job Safety Analysis (JSA) or Safe Operating Procedure (SOP).

Work method statements are a great tool for organising your work activities and making sure you have completed everything. This is because they outline the details of all tools, equipment and coordination requirements with other workers relating to your job. Make sure all of these are available and ready before you start.

1.3.3 Project Quality Requirements

Every civil construction project will have quality requirements. These outline when tasks need to be completed and the required standard of the work.

Your work instructions and plans or drawings will guide you, and help you to make sure you are achieving the quality standard for the project.

They can include:

- Project dimensions.
- Project tolerances.
- Standards of work.
- Material standards.

1.3.3.1 Site Product Characteristics

Make sure you are familiar with the site product or materials before you start to move them around. Have a look at the composition of the materials to see what kind of equipment you will need to move them, and what techniques to use.

Some materials are more cohesive or sticky while others may be much less stable to work with, or create hazards like dust, contamination or damage to equipment if they are not handled just the right way.

1.3.3.2 Checking Level and Grade Requirements

You need to check the floor clean up procedures to make sure you are able to achieve the specified levels and grades. These will be outlined in the project details and your instructions.

This could also include other areas such as the pad, road, ramps, and bench clean up procedures.

1.3.3.3 Plans, Drawings and Sketches

Some of your work instructions might be given to you in drawings and sketches. You will need to get the information out of these and use it to do your job.

Project plans and drawings give you an overview of the site, for example:

- Location of the site and earthworks in relation to the surrounding area.
- The position of structures, roads, access areas.
- Layout of drainage lines.
- Foundation details and landscaping features.

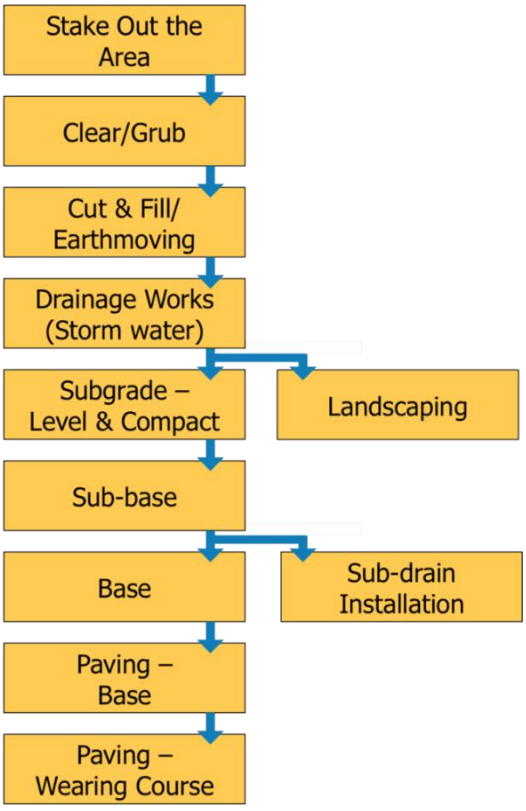
Depending on the project, drawings may be very detailed or they could be simple sketches.

You should learn about the conventions and symbols used in the plans and drawings so you can understand what the information means.

1.3.4 Civil Construction Sequences

Civil construction projects are made up of a range of smaller tasks or activities. It is important that these are done in the right order for the project to go smoothly.

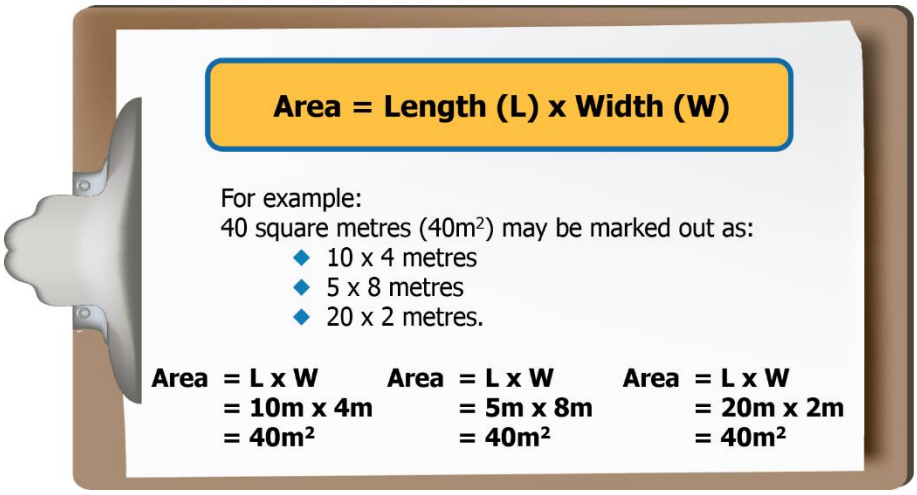
Here is a basic civil construction sequence from clearing the area through to preparing for road construction:



1.3.5 Basic Earthworks Calculations

As a grader operator, the main calculation you will need to be able to apply are for Area.

Area can be calculated using the following formula:



1.4 Emergency Procedures

Emergency procedures will vary depending upon the worksite. These procedures could include:

- Emergency shutdown.
- Evacuation.
- First aid.
- Fire fighting.

1.4.1 Emergency Shutdown of Equipment

If there is a fire, emergency or accident you might need to use the emergency stop on the equipment you are using. This will turn the equipment off immediately. You can also use the emergency stop if the equipment stops working properly or you lose control of the equipment.


EMERGENCY
STOP

1.4.2 Evacuation

Things to remember are:

1. Keep calm.
2. Move away from the danger to a designated evacuation point, sometimes called an emergency assembly area.
3. Do not let other people into the area.
4. Call emergency services in accordance with workplace procedures and policies.

1.4.3 First Aid

First Aid is the quick care given to an injured or ill person. Every site will have a First Aid Officer.

If somebody needs first aid you must tell your supervisor or First Aid Officer. Do not try to give first aid if you have not been trained.

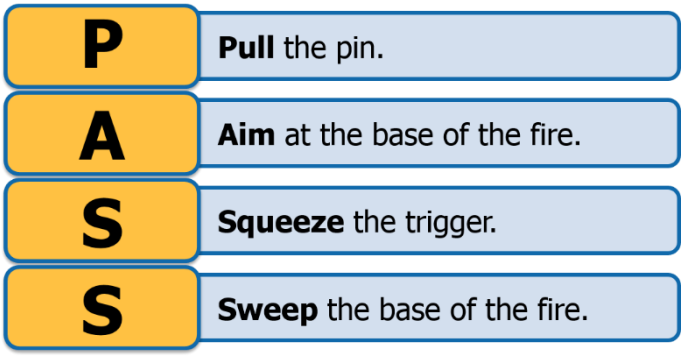
1.4.4 Fire Fighting Equipment

Fire fighting equipment on site could be anything from small fire extinguishers through to large water cannons. Different fire fighting equipment should be used for different types of fire. Always check the equipment for information on what type of fire it can be used on.

Steps for using a fire extinguisher:

1. Evacuate the area.
2. Isolate the area.
3. Call emergency services or other designated on site procedure.
4. If it is safe to do so, use an extinguisher to attempt to control the fire using the PASS system.

The **PASS** system:



Contact your site emergency management team as soon as possible and call the fire brigade on 000.

1.4.5 Incidents and Accidents

Common incidents and accidents that may face a grader operator, include:

Incident or Accident	What to Do

Contact with Electrical Services or Lightning Strike	• Stay calm and within the cab unless the vehicle has caught fire, and wait for electricity to be turned off.
	  ○ The electrical supply authority should be contacted immediately.
	• Warn others to keep away.
	• Try to break contact if possible.
	  ○ If it is not possible to break contact, lower all attachments if it is safe to do so, turn off the engine and avoid all contact with the cabin frame.
	• If the vehicle has caught fire, carefully open the door without touching metal objects and jump clear of the cabin.
	• Keep both feet together and jump as far away from the machine as possible.
	• Make sure a supervisor is notified.
	• Due to the possibility of fire explosion, it is recommended that a clear zone of 200–300 metres is put in place around the vehicle.
	• Keep all personnel clear of the area until an all-clear is given.

Collision	• Attempt to avoid a collision in any manner practical for the

	situation and site conditions. ● If it puts you at more risk by avoiding a collision, allow the collision to take place but brace yourself if possible. ● Once a collision has occurred, render any first aid that is necessary if you know how to, and wait for supervisors and team leaders to arrive onsite. ● Do not move the vehicles until given permission to do so and an investigation has taken place.
Out of Control Vehicle	● Apply emergency brake system. ● Fanning the brake pedal rather than a firm application may exhaust the air pressure faster than the compressor can replace it. The brakes will not work if the air pressure is too low. ● If brakes fail while travelling downgrade lower the blade or rippers to stop the grader.
Roll Over of Grader	● Ensure your seat belt is in place, stay within the cabin until assistance arrives. ● Do not try to jump clear. This can put you in more danger as roll over protection systems are in place in all graders within Australia.

Emergencies happen very quickly, therefore knowing your emergency response plans is essential, and reacting with the intention of trying to improve the situation is vital.

1.5 Hazard Identification and Control

Before you start any work you need to look around the site. The inspection and preparation of the worksite includes:

- Working out the path of movement for plant, vehicles and materials.
- Identifying hazards, and taking suitable actions to deal with them.
- Making sure all equipment, resources and workers are available for the task.

It is important to coordinate with other workers when you are inspecting and preparing the site to make sure everyone knows what is going on, what you are planning to do and 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 includes:

- Other grader operators.
- Mobile plant operators.
- Maintenance personnel.
- Processing plant operators.
- Water truck operators.
- Service vehicle operators.
- Mechanics, repair staff, auto electricians.
- Crane and float operators.
- External contractors.
- Internal and external inspectors.
- Supervisors, environmental officers, WHS officers, QA officers.
- Site visitors.
- Training officers and assessors.

1.5.1 Identify Hazards

Part of your job is to look around to see if you can find any hazards before you start any work.

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

When you start checking for hazards, make sure you look everywhere.
A good way to do this is to check:

- Up high above your head.

- All around you at eye level.
- Down low on the ground (and also think about what is under the ground).

Some hazards you should check for in the work area:

- Overhead and underground services.
- Uneven, soft, slippery or unstable terrain.
- Trees.
- Fires.
- Bridges.
- Excavations.
- Buildings.
- Traffic.
- Embankments.
- Cuttings.
- Hazardous materials.
- Structures such as site offices and scaffolds.
- The weather and environment.
- Other workers or site visitors.
- Pedestrians and other public traffic.
- On site vehicles, plant, equipment and machinery.
- Poorly maintained or faulty equipment.
- Hazards from components of the grader (e.g. hoses under pressure, hydraulic tanks, cooling systems or braking systems).

- Handling characteristics of the grader.
- Effects of the materials as you shift them.
- Chemical hazards such as fuel, chemicals, contaminants, gases or dusts.

1.5.2 Control Hazards

The best way to control hazards is to use a simple problem-solving approach:

1. **Identify the problem.** What is the hazard?
2. **Identify the cause of the problem.** What is causing the hazard?
3. W**ork out the different options that you have to solve the problem.** What can be done to eliminate or minimise the hazard as much as possible?
4. **Choose the best option to solve the problem and apply it.** What is the best option to eliminate or minimise the hazard?
5. **Check to see if the problem has been solved.** Has the hazard been eliminated or reduced to a safe level? If not, you will need to use additional, or better options for fixing the problem (controlling the hazard).

The Hierarchy of Hazard Control is the name given to a range of control methods used to eliminate or control hazards and risks in the workplace. The Hierarchy has 6 levels.

It is important to understand what each level in the Hierarchy stands for and how they can be applied to your work.

Hierarchy Level	Action
1. Elimination	Completely remove the hazard. This is the best kind of hazard control.
2. Substitution	Swap a dangerous work method or situation for one that is less dangerous.
3. Isolation	Isolate or restrict access to the hazard.
4. Engineering Controls	Use equipment to lower the risk level.
5. Administrative Controls	Site rules and policies attempt to control a hazard.
6. Personal Protective Equipment	The least effective control. Use PPE while you carry out your work.

It is important to think about all of the options available when deciding on the best hazard controls. You may need to use more than 1 control measure to bring the risk level down to an acceptable level.

Check the situation after you have applied a control measure to see if more controls, or different controls are needed to make the job safe. If more controls are needed, make sure they are applied before you start or continue the work.

1.5.2.1 Personal Protective Equipment

Personal Protective Equipment (PPE) is clothing and equipment designed to lower the chance of you being hurt on the job. It is required to enter most work sites.

It includes:

- **Head protection** – hard hats and helmets.
- **Foot protection** – non-slip work boots.
- **Hand protection** – gloves.
- **Eye protection** – goggles, visors or glasses.
- **Ear protection** – plugs or muffs.
- **Breathing protection** – masks or respirators.
- **Hi-visibility clothing** – clothing that makes you stand out and lets other people know where you are.
- **Weather protection** – clothing that protects you from the sun or from the cold.

Make sure any PPE you are wearing is in good condition, fits well and is right for the job.

If you find any PPE that is not in good condition, tag it and remove it from service. Then tell your supervisor about the problem and they will organise to repair or replace the PPE.

1.5.2.2 Traffic Control Signage

On worksites it is often necessary to control the movement of traffic around and through the site. To do this there are 2 different types of traffic management plans:

Traffic Management Plan

Deals with traffic moving through the site, i.e. traffic on public roads and members of the public.

Vehicle Management Plan

Deals with on-site vehicle movements, haul circuits and dump runs, and material routes.

In the traffic or vehicle management plan, signs and the distances between signs will be listed. Reading the plans will show you where particular signs need to be placed. Signs and barriers may include:

- Danger or warning signs like speed limits, 'workmen ahead' or 'reduce speed'.
- Flashing lights.
- Barricades and fences.

1.5.3 Environmental Protection Requirements

Environmental protection requirements are part of every worksite. Make sure you check with your supervisor about what environmental issues need to be managed during your work.

All environmental details should be listed in an 'Environmental Management Plan' for the site. It can include details for:

- Waste management.
- Water quality protection.
- Noise control.
- Vibration control.
- Dust management.

The plan will outline the steps and processes needed to prevent or minimise damage to the environment through the use of machinery and equipment.

2.1 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.

When choosing equipment and attachments you need to think about:

- The task requirements, specifications and goals.
- The appropriateness of the equipment for the completion of the task.
- The characteristics, correct use, operating capacity and limitations of each item.
- The potential risks to yourself and others in the intended use of the equipment.

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

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

2.1.1 Select Attachments

Selecting the correct attachment that is most suitable to the task, materials and conditions is essential in order to complete the task safely and efficiently.

Attachments for a grader can include:

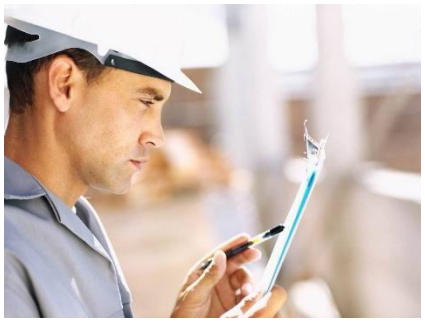
Attachment	Explanation
Blades	Some graders are able to operate with more than one blade.
Ripping Tynes and Scarifiers	For ripping the surface and loosening the materials when needed.
Slashers	Used to cut or slash vegetation.
Laser Levels	Ensures the grader operator is able to cut with extreme precision.
GPS	For machine guidance. Useful for keeping graders on particular paths.

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

2.1.2 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 grader. 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 equipment that may be needed, including hand tools.
2. Park the grader in the appropriate location.
3. Connect the attachment, making sure all bolts, nuts and locking pins are correctly applied.
4. Refer to the operator's manual or speak to your supervisor if you have any concerns with attachments.

Generally, **to remove an attachment:**

1. Collect any required tools or equipment.
2. Ensure the attachment is safe to remove.
3. Check that all points of attachment have been undone before removing the attachment.
4. Heavy attachments should be removed with good manual handling techniques. Use team lifts as much as possible.

2.1.3 Test Grader Attachments

Once the attachment is fitted, it is necessary to test it to ensure the correct fit, that it is secure, and that the attachment will function as required.

This is to ensure the attachment will not break or become unsafe during use or operation.

The testing procedure for each attachment will be outlined in the operator's manual for the machine or in site procedures.

To test the attachment for correct fit and use, turn the machine on and operate the attachment controls. Ensure that the attachment moves as it should, and has full range of motion (appropriate to the specific attachment).

Things to consider when testing an attachment for fit and operation include:

- Site procedures.
- Grader procedures.
- Safe operating procedures.
- Attachment operations manual.
- Grader operator's manual.
- Site plans i.e. don't do your test in the middle of a process or other activity.

2.1.4 Conduct Routine Checks

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

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

Routine checks are made up of:

Pre-Start Checks
Visual checks that are made before you start the equipment.

Operational Checks
Checks of all functions once the machine has been started.

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

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

2.1.4.1 Pre-Start Checks

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

Part or Component	What to Check
Structure	Check the general condition of the grader. Check for oil or other fluid leaks. Check for any signs of visual weaknesses, damage, stressed welds or paint separation.
Tyres	Check for mud, which may be thrown from the tyres and cause damage. Check the condition and air pressure of the tyres to make sure they are within the manufacturer's specifications.
Blades	Check the blades for worn or broken components. Inspect the hydraulics and connections for wear and tear. Check the condition of the pivot pins. Check the blade linkage and end bits for damage, wear, loose or missing bolts.

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.
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 or bar are in good condition. Check that the cabin is clean. Check for any damage or cracks in the ROPS (Roll Over Protection Structure).
Service History and Logbook	Check the machine hour meter, manufacturer's recommendation and logbook to find out if the grader 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 makes and models may have different requirements.

2.1.4.2 Operational Checks

Operational checks are made once the engine is started.

Climb up to the grader cabin 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 grader. Never jump from the grader.

Adjust the seat until comfortable and make sure you have maximum visibility.

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.

Always make sure your seat/safety belt is on and attachments are raised before moving off.

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

Part or Function	What to Check
All Controls	Test all blade movements.
Gauges and Instruments	Check that all instruments are displaying properly and are not signaling any alarms or warnings.
Safety Devices	Test all lights and other warning devices.
Attachments	Check that attachments are secured and connected to the grader properly. Check the condition of the attachments. Check that they work 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.

2.1.5 Report All Faults

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

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

Record the details of the problem in a fault report or the grader logbook.

2.2 Operate the Grader

During civil construction grader 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.

2.2.1 Assess Materials to be Shifted

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 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 excavate than topsoil.

Depending on the capacity of the grader you may need to perform multiple shallower runs of an area to better manage the materials.

Another option is to perform shorter runs so that the grader is not working too hard to push too much material.

Characteristics of the materials being moved will affect your work.

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

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

2.2.2 Drive the Grader to the Work Area

Prior to the shifting of any material the grader must be driven to the work area.

You should ensure 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.

A reverse warning device should indicate to others that you are intending to reverse.

When roading, the grader blade should be positioned as high as possible and inside the wheels. The blade should be pointed towards the front left wheel while travelling on the road.

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

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

On approach to downhill travel you should reduce the speed of the grader 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 ever coast (put into a neutral gear and roll) the grader downhill.

2.2.3 Grader Techniques

Grading techniques will vary depending on the materials to be moved, the conditions and the task requirements. Some grading procedures include:

- Always work at a safe and acceptable speed.
- Scarifying should be used to loosen the surface if needed. The materials should then be graded and spread.
- When grading across a sloping surface the front tyres should be leaned towards the uphill side, and the blade should be extended on the down slope side.
- Maintain communication with other personnel and vehicles on site at all times. Follow all directions and use the approved communication techniques for the site.
- Tyres may slip, be cut or blow out on shale or rock. Take extra care when grading on these surfaces.
- Generally, constant speed is controlled using the governor control lever and the accelerator.

2.2.3.1 Manoeuvring

Graders are relatively manoeuvrable machines. You need to become familiar with the turning capabilities of the machine you are using and the correct gearing for movement.

Ensure that you allow enough space for braking, stopping and turning, and that you take into consideration the articulation points and blade settings of the grader.

Manoeuvring skills often come with experience using the grader, but you can also read the operator's manual and talk to other experienced grader operators.

2.2.3.2 Braking

Learning the braking capacity and distance of the grader you are driving will often come with experience. As they are large machines their momentum will not allow them to stop quickly.

Braking techniques include:

- Don't brake too suddenly unless in the case of an accident.
- Allow enough distance to stop and apply the brakes in a manner that doesn't put the machine off balance.
- Monitor braking while turning, especially if locking brakes are fitted.

Operational techniques are best learnt through experience driving the grader.

Gain as much experience as you are able to, read the operator's manual and speak to experienced operators or your trainer if you would like further assistance or training.

2.2.3.3 Blade Operational Techniques

Blade operating techniques should be used to complete your job safely and within equipment limitations. Common blade operating techniques:

- Ensure that materials being pushed do not exceed the height of the blade, as this can cause instability as well as possible damage to the hydraulic arms.
- Make sure that you do not exceed the capacity of the machine for pushing.
- Engage the blade ensuring that it is at the correct height and angle for the task, and that you are able to manoeuvre it effectively.
- Push the blade full of material, or with sufficient material to level the surface.
- The blade should be tilted to finish the surface with the required camber.
- An obstruction to the blade which is outside the path of the wheels can be avoided using the side shift.
- The best blade position for:
  - Spreading of soil – tilted forward and at an angle.
  - Cutting hardpan clay and normal grading – set back at the top and at an angle.
  - Scarifying on a sloping surface – having the blade on the downhill side, crossways and low.

2.2.3.4 Operating Attachments

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

Operating within these specifications, recommendations and design limits ensures you do not damage either the grader or the attachment.

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.

2.2.3.5 Turnaround and Operating in Small Spaces

How the grader you are using moves will be outlined in the operator's manual. You will also work out the way the machine operates as you get more experience driving it.

When turning around on site, the grader cannot turn sharply. You will need to make sure you have enough room to articulate the front half of the grader and turn around in a loop shape. One of the benefits of being able to articulate the grader is that you don't need to stop the grader to turn around.

When working in small spaces such as single lane roads you may need to operate the grader in reverse. You will need to be able to steer the back half of the machine, which will allow you to work at higher speeds in reverse.

All operations when driving the grader will come with experience and practice. Speak with more experienced personnel or your supervisor for some tips on driving the grader.

2.3 Grader Operations

When you are conducting, controlling and monitoring your operations you need to keep the equipment and attachment limitations in mind at all times.

These limitations will be outlined in the operator's manual for each grader you are using. Operator procedures for graders include:

- Levelling.
- Towing.
- Forming and carrying windrows.
- Mixing and spreading materials.
- Cutting and filling.

- Scarifying and ripping.
- Cutting and maintaining drains.
- Cutting and trimming batters.
- Forming, upgrading and maintaining roads.
- Trimming road sub-grades and pavements.
- Site clean-up.

2.3.1 Levelling

Levelling techniques are those actions taken to smooth or level materials on the worksite. Levelling is achieved by moving the blade to a pre-determined degree and level.

When levelling, ensure you are working to the designated grade, slope or fall.

GPS and laser levelling equipment has made the process of levelling much easier and more accurate, particularly when the levelling equipment is attached to the blade of the grader and controls the blade.

Levelling is a hands-on task that needs to be practiced regularly. Asking a senior operator to mentor you will improve your levelling techniques.

2.3.2 Towing

Graders are very powerful, and can be used to tow other machines or equipment. These machines and equipment could include brooms, ploughs, trailers or equipment that has been stuck or bogged.

When towing equipment or machines with your grader, it is important to remember to:

- Check the operator's manuals for your grader to determine the ability of the grader to pull or tow.
- Check site procedural manuals to determine the required techniques and methods.
- Check all equipment prior to connection to the grader, and conduct post-connection checks.
- Keep pedestrians out of the towing area or zone using barriers or signage.
- Use approved traffic movement plans and patterns if you are towing in a controlled planned manner. If you are towing due to an emergency situation such as removing another vehicle from mud and clay, clear the area of other vehicles (if possible) to minimise the chance of collision.
- Speak with an experienced operator if necessary for further advice or mentoring.

2.3.3 Forming Windrows

A windrow is formed as materials pass along the blade and then are unloaded or deposited to the side of the machine. Windrows are how a grader moves materials from one place to another.

Important points to remember include:

- Smaller volumes give better results. Don't attempt to move too much material in one run.
- Whenever the blade of the grader is engaged a windrow will be formed. If you do not want or need a windrow to form, lift your blade.
- Lift the blade when turning, unless your plans and requirements say otherwise.

- Position the blade at the required depth. The deeper the cut of the blade, the larger the windrow.
- The grader speed will determine how far the materials will 'carry' or travel forward of the grader.
- When you have created your windrow, adjust your blade to thin or 'tail' the materials so that nothing is left in front of the blade.
- If you need to create a large windrow you can form it by adding more materials to the one windrow. Large windrows can be used in mining environments to show the edges of cliffs or large drops.
- Machine sympathy should be used to reduce the stressors on the machine.

2.3.4 Mixing and Spreading Materials

You may need to mix and spread materials using the grader. The blade can be used to spread windrowed materials that have been dumped by trucks, or previously created by the grader.

As the grader moves forward, materials are 'rolled' up onto the blade and back over. Using the blade on the correct angle will make mixing and spreading easier as the grader does not require a lot of power to move through the materials.

Ripper and scarifier attachments can be used to break up the ground before mixing materials.

2.3.5 Cutting and Filling

Cut and fill are the two tasks that graders do regularly. Cutting is removing materials to a predetermined level while filling is moving materials into an area to a predetermined level. Cut and fill is one area where practice and mentoring is recommended.

It is important to remember:

- When cleaning or cutting a ditch, the front wheels should be tilted away from the ditch to compensate for slope. The blade should be extended at the correct pitch to clean or cut the ditch.

- Avoid driving near the edge of a fill as it may collapse.

2.3.5.1 Cutting and Maintaining Drains

Drainage construction is the process of creating methods of clearing surface water from the site into a designated catchment zone.

This zone could be a catchment basin, dam, drain lines, or other approved system.

Drainage systems should follow the natural slope of the ground where possible.

When examining the area watch for where water naturally flows, and look for signs of natural drainage areas like gullies, creeks and flow lines.

This will give you information regarding the lay of the land and the areas that will need to be protected from the runoff from the site, which is considered contaminated or dirty water.

This dirty water will need to be diverted away from clean water areas such as creeks and rivers.

Construction techniques for creating drains:

- When creating diversion drains or contour drains you should grade the area to create a gradient that will encourage runoff without causing erosion. This runoff will move into the diversion drain or line.
    - Where you need the runoff to change direction you will need to create an area where two or more diversion drains can join. This area is sometimes called a cut out drain. The runoff can then be channelled into the appropriate drainage system.
- Follow your site environmental and construction plans.
- Apply logic in the direction of drain creation. If you have any suggestions regarding drain direction talk to your supervisor.
- Never attempt drainage work when water is lying on the ground.

2.3.5.2 Cutting and Trimming Batters

For smaller batters approach the batter and position the grader in the crab steer position with the front wheels up on the batter and the rear wheels on the ground.

Angle the blade up so that you are cutting the materials on the correct angle to form the batter properly.

Keep the engine at a constant speed and make sure you are traveling straight along the edge of the batter.

The materials should form a small ridge at the edge of the batter after the grader has completed its run.

For larger batters the grader may need to be positioned with the front wheels on the angled surface.

Make sure the wheels are tilted back away from the batter so that they sit flat on the angled surface during travel.

Position the blade so that it is tilted back towards the downward angle to shift materials down off the batter and onto the ground.

Maintain a safe speed at all times and monitor the stability of the grader.

Move safely down from the batter as you approach the end of the run and reposition the blade to allow safe movement and repositioning of the grader.

2.3.5.3 Trimming Road Sub-Grades and Pavements

Sub-grade is the material that sits underneath a constructed road or pavement. The grader is used to trim this material to create the correct base or surface for the road to be constructed.

Roads may have a number of other levels of materials place on top of the sub-grade during the construction process.

You will need to make sure you follow all survey marks and trim the sub-grade to the correct level.

2.3.6 Scarifying and Ripping

This technique can be used to mix materials, loosen hard clays and soils and even rip up asphalt.

Specialised scarifying and ripping attachments are often used. They can be added at the front, underneath the front frame or at the back of the grader. Ripper-scarifiers have large teeth like blades (called shanks) that penetrate and rip ground materials.

Scarifying and ripping with the grader should generally be done in short, straight passes. Turning the wheels on the grader can cause the attachments to break which is dangerous to both you and other site personnel.

Front mounted ripper-scarifiers are generally used for light work. Care must be taken with front attachments as it can alter your ability to control the direction of the grader. Mounting at the front of the grader also makes it harder for you to see the teeth and how the attachment is handling the work.

Some tips for using a ripper-scarifier:

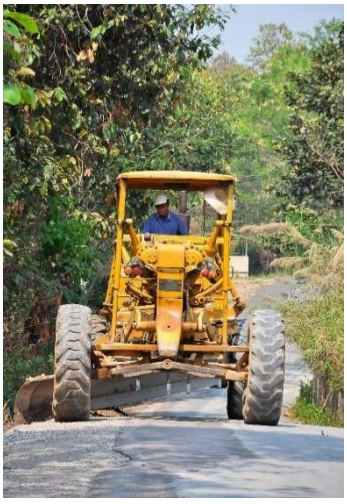
1. Drive the grader in straight passes to create more traction with the attachment and the materials.
2. Use low gears and less rpms to avoid the tires slipping.
3. Only ever use the correct amount of shanks for the work task, as specified in your work instructions. Too many shanks will make working with the materials harder and making it more difficult to control your grader.
4. Slowly lower the shanks of the ripper-scarifier attachment into the materials while travelling straight.
5. Only use one ripper shank when ripping extremely hard materials.
6. Never use a single scarifier shank in hard materials.
7. Do not use badly worn or missing shank tips as this will damage the attachment.

2.3.7 Forming, Upgrading and Maintaining Roads

It is important to form and maintain the crown of a road to ensure proper drainage. Some tips for forming and maintaining roads:

1. The main frame of the grader body should be driven directly straight (with the drawbar and circle drive underneath the front frame).
2. Keep the blade angle directly square with the frame to give the widest possible pass.
3. If materials start to collect or move around the edges of the blade, increase the blade angle.
4. Travel at the highest speed possible for maximum results (usually around 5-12km/h).
5. Make sure the correct grade is achieved on both sides of the road to assist with drainage.
6. Don't make the machine bounce, you can help prevent bouncing by articulating the machine slightly.
7. Crab steer mode can be used to re-open drains blocked by materials and waste by using the end of the blade and pushing material up onto the road.

Dirt, gravel or unpaved roads may require regular maintenance due to traffic or environmental conditions. The grader may be used to smooth out uneven surfaces or potholes by trimming the surface back or spreading new materials along the surface to create an even finish.



To upgrade or maintain gravel roads:

1. Cut the existing surface, mix and respread the materials to reform the road surface.
2. The blade should be angled at about 35˚ and tilted forward to promote mixing of materials and prevent too much from moving off to the side which will prevent proper drainage.
3. Work slowly – going too fast can create a waterboard or corrugation effect where ridges are formed along the surface. These get worse over time as water runs across the road surface.

2.3.8 Site Clean-Up

The grader may be used to perform some site clean-up activities. This includes:

- Collecting materials that have spread away from stockpiles or across an area over the course of construction.
- Clearing roads of debris or unwanted materials.
- Levelling or trimming surfaces in preparation for other work to begin.
- Collecting materials to be reclaimed or removed from the site by other equipment.

2.3.9 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.

Examples of the gauges and warning systems for a grader:

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

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.	• 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.	• 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.	• The park brake is on. • Low engine oil pressure.	Stop operating and shut down the equipment immediately. Report the problem straight away.

2.3.10 Adjust Techniques to Meet Changing Conditions

While you are working and shifting 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 shift 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 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.

2.4 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:

Structures and Clearances
Know how far you are from structures and clearances at all times. Use a spotter to guide you if you cannot clearly see. Be aware that the distance to various structures may be altered as ground conditions change or stockpiles are created.

Other Machines
At all times you need to know when other machines are working near the grader. Know and stick to your agreed 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 work area. Make sure they are not in danger and are a safe distance from the grader. If you are authorised, tell them to leave if they shouldn't be there, or call on someone who is authorised.

2.4.1 Operator Fatigue

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

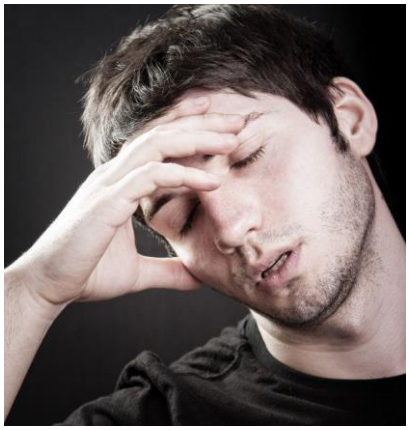
Fatigue can be caused by:

2.4.1.1 Warning Signs

Warning signs that you are suffering fatigue include:

Physical	• Slow reaction time. • Tiredness, yawning or sore eyes. • Headaches, stomach or other problems. • Micro sleeps (nodding off for a short period of time).
Mental	• Trouble concentrating and thinking clearly. • Shorter than normal attention span. • Boredom, irritability or lack of motivation.
Work	• Poor or careless performance. • Overlooking minor but potentially important details. • Lower levels of communication and cooperation with others.

2.4.1.2 How to Manage Fatigue



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

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

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

2.4.2 Reporting Hazards

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

Your worksite may have standard paperwork that needs to be filled out, for example:

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

2.5 Check 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.

3.1 Park and Shut Down the Grader

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.

3.1.1 Parking the Grader

Graders need to be parked in a safe way that will allow easy access to the vehicle.

Safe parking practices include:

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

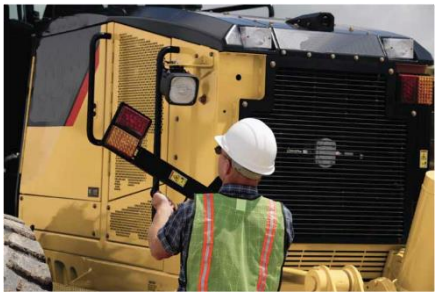
3.1.2 Shutting Down the Grader

Shutdown procedures include:

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

3.2 Post-Operational Checks



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

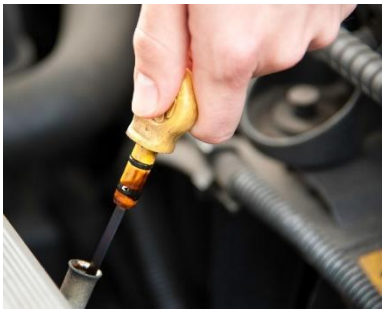
General maintenance activities are done to keep all plant and equipment working safely for longer.

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

Your inspection should include:

Visual Inspection	**Physically looking for anything odd, wrong, broken or damaged.**
Visual Inspection of the Environment	**Is any fluid leaking?**
Signals	**Alarms, lights, electronic indicators showing that something may be wrong.**
Gauges	**Showing temperatures and the levels of fuel, oil and other fluids.**

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



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

3.2.1 Fault Finding

During pre-start and operational checks you will be required to use fault finding techniques.

This involves looking for and identifying signs that the grader is not operating as well as it could.

These fault finding techniques could be as simple as using computerised monitoring equipment or may involve figuring out why the grader isn't responding as normal or other out of the ordinary indicators.

Some indication of problems will come through gauges, monitors or alarms but can also come by using more or less fuel, oil, or other substances than you would expect.

Most situations are easily fixed if diagnosed before they cause major damage to the grader.

3.2.2 Reporting Faults

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

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

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

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

3.3 Prepare to Relocate the Grader

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

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

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

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

- Clean the grader thoroughly.
- Operate the blade underneath the grader to shake free any built up materials.
- Clean any attachments going with the grader.
- 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 blade to rest position and lock it into place or remove the blade if needed.

3.3.1 Move Grader from Site to Site

Moving a grader between worksites is normally done on a float (trailer) as most graders are too slow to move on the road.

The only exception to this would be when the grader needs to move very short distances (i.e. less than 20 metres) to get to the other side of a worksite.

If a grader is moving across a public road ensure that all traffic rules are obeyed. The blade must be lifted clear of the road surface and the shortest possible route taken to get the grader back onto a worksite quickly.
Make sure that an approved traffic management plan is in place.
This may include:

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

When transportation is required, the grader will need to be moved on a float.

No person is authorised to load and unload equipment independently without first completing the relevant competency (RIIHAN308F or its future equivalent). Mobile plant and equipment can only be loaded/unloaded by:

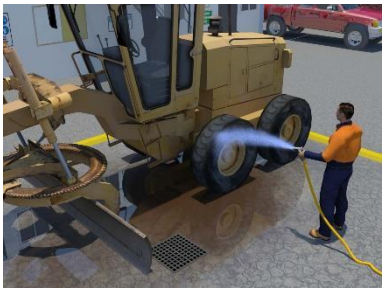
1. A person who currently holds the competency for RIIHAN308F (or its equivalent), or
2. A person who is being directly assisted by someone who currently holds the competency for RIIHAN308F (or its equivalent).

The safest way to load/unload plant is to use a spotter to make sure the grader is moving onto the float as straight as possible and that it is stopped in the right position to secure the equipment onto the trailer.

Once the grader 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.

3.4 Carry Out Maintenance Tasks

Before starting any maintenance on the grader you need to clean it and make sure you have all of the tools and equipment you need.



It may not be practical to clean the grader 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 grader, 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.

Maintenance activities could include:

- Cleaning the grader.
- 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 grader 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.

3.4.1 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.

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 work site 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.

3.5 Processing Maintenance Records

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

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

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

Written maintenance records for your grader may include:

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

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

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

3.6 Clean Up After Work

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

3.6.1 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**, e.g. clays, mud, topsoil, organic 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.
- **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.

3.6.2 Clean and Store Tools and Equipment

After using tools or equipment, it is important to ensure these are cleaned, checked for any damage and maintained in accordance with company or workplace procedures.

If anything is wrong report it, repair it, or have it repaired by a qualified person.

It is important to keep items of equipment in the best possible condition to prolong the working life of the piece of equipment.

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

Things to consider if your attachments require manual cleaning:

- Some materials that you work with can get extremely hot and sticky, and could possibly burn through your clothing and skin. Use appropriate cleaning instruments and wear PPE as required.

- Grader attachments such as blades or ripping tynes can be sharp. Clean with care.

Most attachments will have designated storage locations. This is to ensure the attachment can be found efficiently the next time it is needed, and so that it is kept free from damage.

Storing the attachment in the designated location is necessary to keep the attachment free from damage as well as to meet site requirements and the storage requirements of the attachment.

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 certain temperatures.

Reading, knowing and understanding the particular requirements for each attachment is the only way of adhering to the requirements for cleaning and storage.

3.7 Process Written Records

Site record keeping procedures keep the site running smoothly.

Part of your role will include completing and processing records for your grader and the tasks that you have completed.

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

- **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.
- **Fault reports.**
- **Hazard reports** – including Take-5 forms.
- **Incident reports** – accident forms, incident reports, environmental incident reports, WHS investigation reports, quality assurance (QA) reports.

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

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

Appendix A – Grader Inspection Checklist

Grader Inspection Checklist			
Company Name			**Date**
Operator Name			**Site**
Machine Number			
Check Type (please circle)	Pre-Start		Post-Operational
Component	**What to Check**	✔	**Comments**
External Check			
Tyres and wheels.	Inflation, pressure, damage, covers.		_____
Hydraulic cylinders, tubes, hoses, fittings.	Damage, leaks.		_____
Covers and guards.	Damage, wear, secured.		_____
Circle drive and articulation area.	Leaks, damage, dirt buildup.		_____
Windows and mirrors.	Cleanliness, damage.		_____
Blade linkage.	Damage, loose or missing parts.		_____
Blade.	Excessive wear, damage.		_____
Steps and handholds.	Cleanliness, damage, overall condition.		_____
Decals and signage.	Readability, wear.		_____
Overall machine.	Loose or missing parts, damage, wear, missing guards and safety devices.		_____ _____ _____ _____ **Out of Service Tag Attached? Yes / No**
Engine Check			
Fluids.	Engine oil, hydraulic oil, transmission oil, coolant, engine pre-		_____

	cleaner, brake fluid.		_____
Batteries.	Cleanliness, loose nuts, bolts.		_____
Air filter.	Damage, dirt buildup, indicators.		_____
Radiator.	Damage, leaks, dirt buildup.		_____
Hoses.	Leaks, wear, damage.		
Belts.	Tightness, wear or cracks.		_____
Overall engine.	Damage, dirt buildup, leaks.		_____ _____ **Out of Service Tag Attached? Yes / No**
Internal/Cabin Check			
Levers, controls and gauges.	Damage, cleanliness, labels, working.		_____
ROPS.	Damage, cracks, wear.		_____
Floor plates.	Clear and free of oil/grease.		_____
Seat and seat belts.	Adjustment, damage, wear.		_____
Fire extinguisher.	Damage, charge.		
Logbook, running/ service sheets, vehicle history.	Present, correct		_____
Overall cabin interior.	Cleanliness, damage, missing parts.		_____ _____ **Out of Service Tag Attached? Yes / No**

Component	What to Check	✔	Comments
Operational Checks			
Master switches, start switch or key.	Present, functioning, damage.		_____
Joy sticks or levers.	Functioning, damage, wear.		_____
Accelerator, brakes, emergency stopping device.	Working, damage, wear, dirt buildup on pedals.		_____
Blade.	Movements, smooth or jerky.		_____
Air-conditioning, radio, two-way radios, lights.	Functioning, damage, wear.		_____
Gauges.	Oil pressure, fuel level, engine temperature, hydraulics, speedometer.		_____
Gear change and/or quick shift arrangements.	Damage, wear, functioning.		_____
Start-up alarms.	Functioning, visible.		_____
GPS, auto levelling controls.	Working, visible, accurate, damage, wear.		_____ **Out of Service Tag Attached? Yes / No**
Action Taken to Repair Grader:			

Name:		Date of Repair:
Return to Service Authority by Supervisor		
Comments:		
Supervisor Name:	Signature:	Date: