

RIIMPO328D

Conduct Continuous Bucket Trencher Operations Learner Guide

Learner Guide Instructions

Who the document is for:

This is for the learner.

What it is for:

- This document contains the course materials for the learner.
- Use it to conduct training, supported by the PowerPoint presentation.

How to use it:

Give each learner a copy.

Before You Use the Learner Guide document for the First Time:

1. Rebrand the document.
2. Review this document with the personnel who will be delivering the training.



See "Read Me First" document for a complete set of resource instructions.

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EVALUATION COPY ONLY

1.1 Introduction

These materials are based on the national unit of competency **RIIMPO328D Conduct Continuous Bucket Trencher Operations**.

You will learn about:

- ◆ Planning and preparing for bucket trencher operations.
- ◆ Conducting machine pre-operational checks.
- ◆ Selecting, fitting and removing attachments.
- ◆ Operating the bucket trencher.
- ◆ Carrying out maintenance tasks.
- ◆ Cleaning up and clearing the site.



1.1.1 What is a Continuous Bucket Trencher?



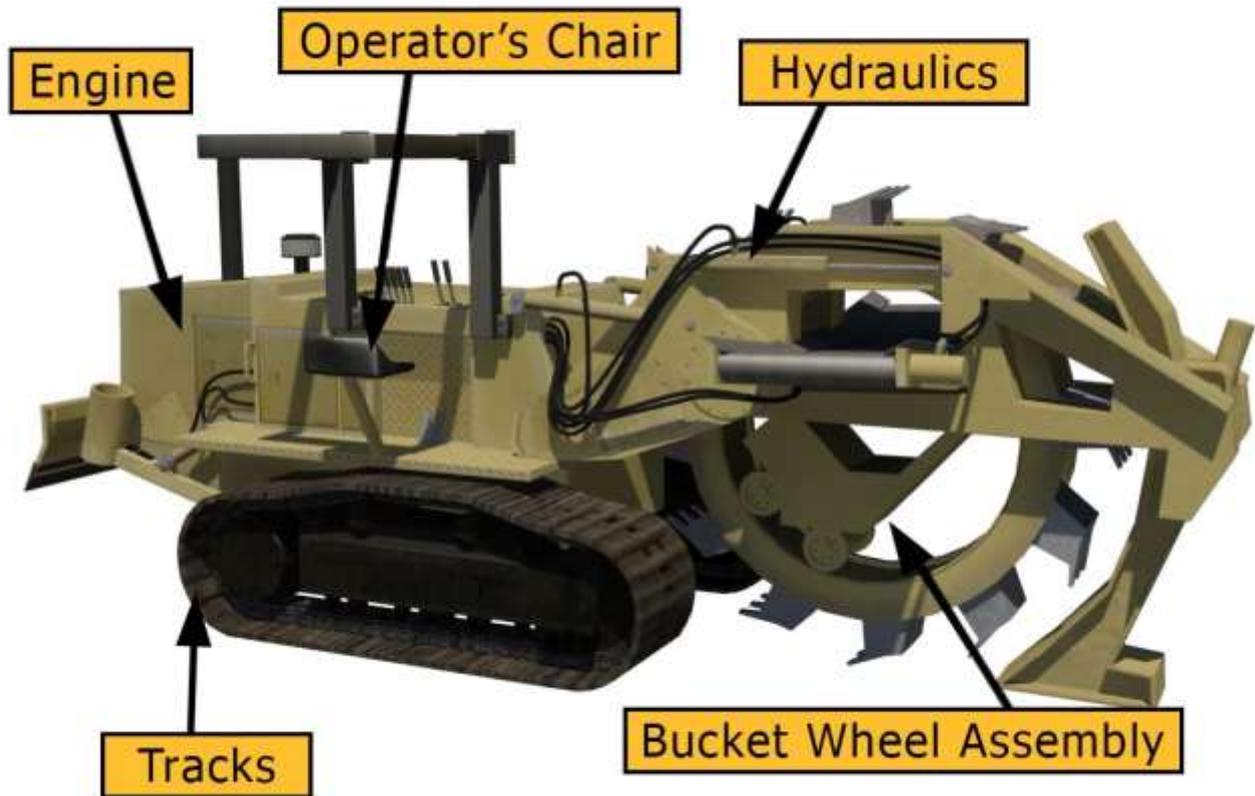
Continuous bucket trenchers are self-propelled, purpose-designed tracked machines with a continuous bucket assembly mounted on the front.

Common tasks are primarily trenching and draining of sites but are also used in pipe and cable laying activities.

They are referred to as 'continuous' because the trenching device is designed in a wheel-like configuration that continuously cuts materials, while a conveyor system transfers the materials out of the trench. This allows the machine to continuously cut trenches without stopping to empty materials. It also makes cutting large trenches quicker than with using other excavating equipment.

1.1.2 Bucket Trencher Components

The following diagram shows some of the main components of a bucket trencher:



Component	Description
Engine	Engine that drives the machine.
Hydraulics	Generic name given to all hydro-static drive units including hoses and rams.
Bucket Wheel Assembly	The main component of the machine. The entire assembly allows for the bucket wheel to drop down into the ground. Buckets on the wheel cut the materials and transfer them into the conveyor equipment which shifts the materials out of the trench.
Operator's Chair	Where operator sits and operates the machine from using the controls. Controls include: joy stick or control levers, transmission controls, brakes, emergency stop controls.
Tracks	Tracks, made up of individual shoes, spread the weight of the trencher over a larger area than with tyres. This makes it easier for the trencher to move across soft ground without getting bogged.

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

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 buildings, structures, facilities or trees in the way? What are the ground conditions like?
- ◆ **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 power lines or 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 is the trench being created for? How big is it? How long will it take?
- ◆ **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 complete the task safely and efficiently? 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? Are there site rules that affect the way you will do the work?

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.

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 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 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 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.



1.3.3.2 Site Product Characteristics



Make sure you are familiar with the site product or materials before you start to dig into them. 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.

1.3.3.3 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.

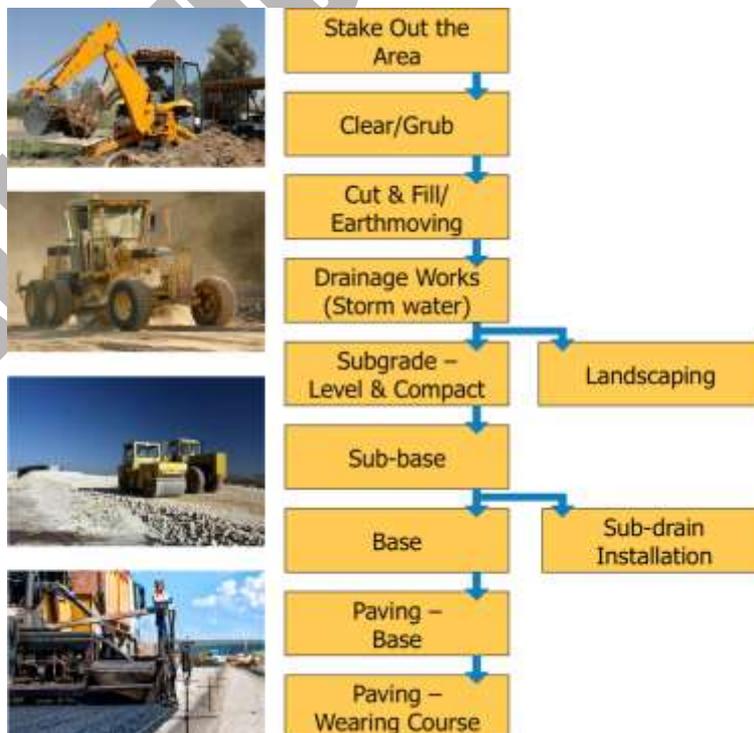
This could also include other areas such as the pad, road, ramps, and bench clean up procedures.



1.3.4 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:



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 plant, 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 and Fit Attachments

There are a 2 main attachments that can be fitted to a bucket trencher including:



Buckets.



Rock saws.

Bucket trenchers will also usually be equipped with single or double conveyors for moving excavated materials away from the trench.

Individual buckets will often need to be manually attached to the bucket wheel assembly. This could be for a different cutting angle or grade, or it could be due to damaged buckets.

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



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

2.2.1 Assessing Materials to be Excavated



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.

The characteristics of materials will impact on the way you excavate the materials, and the amount of materials that can be spilled out into a stockpile alongside the trench. Lighter materials will often be thrown further from the trencher depending on the material characteristics.

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

Material	Description
Clays and Mud	Clay and mud can tend to be dense and sticky and may not discharge cleanly if wet or damp. Sometimes, particularly with damp materials, the dump process may be longer than normal. Mud can purge from the bucket trencher, 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 needed 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 bucket trencher 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.

2.2.4 Trenching to Specifications



At all times, trenching will need to meet the task specifications, without damaging any existing underground services.

This is important because bucket trencher operations are often undertaken when laying new underground services. You must always know where the services are located and at what depth.

If damage to the existing services occurs, you must report it immediately.

You always need to excavate, construct and clean the trenches or drains to the specification requirements.

Normally the specifications will outline the exact width and depth of the trench. The completed trench depth and width must be exactly to these specifications.

Sometimes it will be necessary to accommodate regulatory requirements when trenching. If necessary these requirements will be outlined in your work instructions.

If you are excavating a trench and depositing the materials in stockpiles alongside the trench, materials should be placed at least 1m away with material coming to rest no closer than 0.5m from the excavation.



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



- ◆ Crushed blue metal or plastic tape.
- ◆ Clean sand or sand bags.
- ◆ Broken tiles.
- ◆ Moisture.
- ◆ Any other unusual material.

Some work tasks may require you to use the bucket trencher to lay the cable as you are excavating the trench. Make sure you follow all site and operations manuals for completing this task. Also ensure you use a spotter to help guide you to ensure damage does not occur to the cabling or the trench.

2.3 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 machine 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 excavate and shift as much and you will need to adjust the quantities you are dealing with in each run.

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

2.3.1 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 bucket trencher:

- ◆ 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.

3.2 Post-Operational Checks

Post-operational checks need to be done to make sure the bucket trencher 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 bucket trencher operator, you need to inspect your vehicle to find and report any faults or damage that may have occurred during your work activities.



Your inspection should include:

Visual Inspection of the Machine	Physically looking for anything odd, wrong, broken or damaged.
Visual Inspection of the Environment	Is there fluid on the ground which can indicate the trencher is leaking?
Signals	Alarms, lights, electronic indicators showing that something may be wrong.
Gauges	Showing temperatures and the levels of fuel, oil and other fluids.

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

- ◆ Fluid levels.
- ◆ Condition of tracks.
- ◆ Visibility (windows and mirrors).
- ◆ Pumps and hoses.
- ◆ Structure and attachments for damage or wear.



3.2.1 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 machine 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 bucket trencher 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 the Bucket Trencher for Relocation

Before a bucket trencher can be moved from one site to another, it will need to be prepared for transport.

Some issues you need to consider before moving the bucket trencher to another worksite may include:

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

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



- ◆ Clean the bucket trencher thoroughly.
- ◆ Operate the buckets to shake free any built up materials.
- ◆ Clean any attachments going with the bucket trencher.
- ◆ 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.

3.3.1 Move Bucket Trencher Safely 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 before moving the bucket trencher. This may include:

- ◆ Stopping other traffic to allow the equipment to move freely.
- ◆ Using escort vehicles where needed – this may be required by law if the load is oversized.
- ◆ 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.

3.4 Carry Out Routine Maintenance

Part of concluding operations is preparing the bucket trencher for routine maintenance.

Maintenance activities could include:

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



It may not be practical to clean the bucket trencher 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 vehicle and equipment.

Cleaning is also a good way to do an even closer inspection of the bucket trencher, 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.

Before carrying out any routine maintenance on the compactor make sure you clean it and have all of the tools and equipment you will need to finish the job.

3.4.1 Maintenance Tasks

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 bucket trencher 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 machine is serviced at regular programmed intervals.



3.5.2 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.
- ◆ Bucket trencher 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.

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