

# **CPC - Construction, Plumbing and Services Training Package**

## **Construction Units**



### **Unit**

**CPCCCM2006**

**Apply basic levelling procedures**

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**Trainer/Teacher Manual**

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LANE

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## **STUDENT/TRAINEE DETAILS**

**Student/Trainee Name**

**Student/Trainee Email**

**Teacher / Trainer Name**

**School / Institution / Training Organisation / Employer**

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## INTRODUCTION

This manual is developed to provide training content that addresses the specific 'Unit of Competency' as outlined on the following pages.

It provides the teacher and/or trainer with a document that includes all that the student and/or trainee manual content plus guidance notes as well as answers to the learning activities in the student/trainee manual.

This manual can be packaged with various manuals addressing other 'Units of Competency' in order to meet the 'Packaging Rules' of a particular Australian Training Package Qualification.

This resource has been designed to be delivered in a form that is conducive to the learning environment including:

- ☆ Online delivery
- ☆ Classroom delivery
- ☆ On the job training

The documents are designed in a 'landscape' format in order to make reading on a computer screen easier as well as reduces the need to scroll down pages. Documents can be easily printed if the learning environment requires the student or trainee to have hard copies of the learning materials.

## INTRODUCTION—CONT'D

### LEARNING ACTIVITIES

The learning activities in the student and/or trainee manuals are 'Form Enabled' so that if the resources delivered online, the activities can be filled in using the computer keyboard.

Each learning activity is identified with the following icon.

**Learning  
Activity**

Learning activities come in the following forms.

- ☆ Questions
- ☆ Research
- ☆ Tasks
- ☆ Interviews

#### **Questions**

Questions would relate to the information presented on previous pages.

#### **Research**

This type of learning activity would require the student or trainee to locate information by using research methods. The information they would be required to locate would be in line and/or support the information that the manual had outlined in previous pages.

## INTRODUCTION—CONT'D

### **Tasks**

This learning activity type would require the student/trainee to actually do or undertake something and would be reinforcing the knowledge they have gained from reading the manual's previous pages.

### **Interviews**

This learning activity type would require the student/trainee to interview person(s) in an actual workplace environment or a person(s) who are experienced in the industry sector which the student/trainee is currently undergoing training.

The student/trainee is made aware of the type of learning activity by noting the learning activity type displayed under the learning activity icon.

**Learning  
Activity**

**Research**

### **SELF ASSESSMENT**

At the end of each manual is a series of questions that the student/trainee should review and answer.

This self assessment is to ensure in the student's or trainee's mind that they have reviewed and understood the information that was presented in their manual.

If they are unsure of their understanding in any of the topics reviewed, they are encouraged to go back and review the information again and/or seek the assistance of their teacher or trainer.

**UNIT OF COMPETENCY OVERVIEW**

The following pages are extracts from Training.gov.au website and outlines this specific 'Unit of Competency' including the 'Elements' and the 'Performance Criteria'. The content within this manual has been developed to address this unit.

**CPCCCM2006 - APPLY BASIC LEVELLING PROCEDURES**

ELEMENT	PERFORMANCE CRITERIA
<p><b>1. Plan and prepare</b></p>	<p>1.1 Job requirements are obtained, confirmed with relevant personnel, and applied to planning                      1.2 Work site is inspected, and conditions and hazards are identified within scope of own role and reported according to workplace procedures                      1.3. Health and safety requirements for levelling procedures are confirmed and applied to planning                      1.4. Levelling tools and equipment are selected according to job requirements, checked for serviceability, and faults are rectified or reported before starting work                      1.5. Team roles and verbal and non-verbal communication signals are confirmed, as required</p>
<p><b>2. Set up and use levelling device</b></p>	<p>2.1. Required heights or levels are identified from work instructions                      2.2. Levelling device is set up, and levelling device tolerance is checked according to manufacturer specifications                      2.3. Levels are shot and heights are transferred to required location and marked according to job requirements                      2.4. Results of levelling activities are documented according to organisational requirements</p>
<p><b>3. Clean up</b></p>	<p>3.1. Work area is cleared and materials sorted and removed or recycled according to statutory and regulatory authority requirements                      3.2. Tools and equipment are cleaned, checked, maintained and stored according to manufacturer specifications</p>

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# Section One

## Plan and Prepare

# APPLY BASIC LEVELLING PROCEDURES

## SECTION ONE—PLAN AND PREPARE

### INTRODUCTION

Basic levelling procedures is a common activity in the building and construction industries. They can range from levelling a brick wall being built, to determining 'levels' at a building site for formwork.

In this training manual we look at the various types of levelling and how they are done and what tools are used.

### SECTION LEARNING OBJECTIVES

At the completion of this section you will learn information relating to:

- ☆ Obtaining and confirming job requirements with relevant personnel, and applying to planning
- ☆ Inspecting work site and conditions and identifying hazards within scope of own role and reporting hazards according to workplace procedures
- ☆ Confirming health and safety requirements for levelling procedures and applying to planning
- ☆ Selecting levelling tools and equipment according to job requirements, checking for serviceability, and rectifying or reporting faults before starting work
- ☆ Confirming team roles and verbal and non-verbal communication signals as required



## JOB REQUIREMENTS ARE OBTAINED, CONFIRMED WITH RELEVANT PERSONNEL, AND APPLIED TO PLANNING

In all areas of the construction industry including those associated with levelling procedures, workers are provided 'work instructions' before the commencement of any job.

These work instruction can be provided in a few ways which include:

- ☆ **Verbal** - this could be the supervisor providing the work instructions on the worksite to the workers in person, or by way of a mobile phone to a specific worker at the worksite.
- ☆ **Written** - this could be done using an email, text or handing workers a written overview of the job.

Of course, work instructions could be provided using both verbal, as well as written methods. A supervisor may provide the work instructions on the worksite and also provide each worker a summary of the job in a written form.

Work instructions (also known as job sheets when written) could include:

- ☆ Expected completion date
- ☆ Names of those working on the site
- ☆ Supervisor's name and contact details
- ☆ Tools and equipment to be made available
- ☆ Contact details of appropriate personnel

Work instructions will also refer to written supporting documentation and other types of information that could include:

- ☆ **Plans** - drawings and layouts that detail the levelling requirements
- ☆ **Specifications** - this generally includes the information that was not able to be communicated on the drawings/plans
- ☆ **Quality specifications** - depending on the type and size of the job, there could be a separate quality specification document that workers would refer to ensuring the quality of the work being performed is meeting the expected quality requirements.



## UNDERSTANDING AND CONFIRMING WORK INSTRUCTIONS

It is important that all workers both individually and as a team, fully understand what is expected of them on the job site.

As we have learned on the previous pages, workers will often receive a significant amount of information relating to the job they are about to commence.

We learned that this information is generally conveyed verbally and supported with written instructions, plans/drawings, specifications and operational information.

A construction job on site that is to be completed efficiently and be of the quality expected needs to have all workers quite clear on the work instructions.

This may require each worker to 'clarify' some instructions that may not be fully understood. To clarify information is to ask questions of the person providing the information. This requires two basic communication skills:

- ☆ Questioning skills
- ☆ Listening skills

Examples of clarifying questions could be:

***Could you explain that to me again?  
Does this instruction refer to....?  
Where could I find this information?***

Another method of clarifying information is to repeat back to the person providing the information in your own words what you think the instructions or information means to you. The person can then let you know that you do have an understanding of the instructions/information and where you may not, they can further explain the instructions/information.

'Attentive' listening skills are essential. This means you give the person providing you the instructions/information and clarification your full and undivided attention.

Not listening to the instructions/information and answers provided to your questions will most likely mean you will not perform your work properly.

**Learning  
Activity****SAMPLE ONLY****Question****LEARNING ACTIVITY ONE**

1) What were the three methods that work instructions could be conveyed?

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2) What are written work instructions also known as?

--

3) What were the five examples of information that could be included in work instructions as we outlined in this Section?


4) What were the three examples of supporting documents we mentioned in this Section that would be provided with work instructions?

--	--	--

5) What were the two basic communication skills required when clarifying work instructions and other job information?

--	--

**SAMPLE ONLY**

**TEACHER/TRAINER GUIDANCE NOTES**

- 1) Verbal, written and a combination of both.
- 2) Job sheets
- 3)
  1. Expected completion date
  2. Names of those working on the site
  3. Supervisor's name and contact details
  4. Material suppliers and details of materials delivery
  5. Equipment to be made available on site
  6. Contact details including suppliers, office, emergency
- 4) Plans, specifications, quality requirements
- 5) Questioning and listening skills



## WHS Requirements

### WORK SITE IS INSPECTED, AND CONDITIONS AND HAZARDS ARE IDENTIFIED WITHIN SCOPE OF OWN ROLE AND REPORTED ACCORDING TO WORKPLACE PROCEDURES AND HEALTH AND SAFETY REQUIREMENTS FOR LEVELLING PROCEDURES ARE CONFIRMED AND APPLIED TO PLANNING

*(Over the next few pages we cover two 'Performance Criteria' points at the same time to avoid repetition)*

Every workplace in Australia requires the employer by law to ensure all workers are performing their duties in a safe manner and the employer must ensure that the working environment is safe.

This includes those worksites that are involved in basic levelling activities.

Not only do workplace health and safety (WHS) laws and regulations in Australia require employers to ensure safe working environments, it is also the responsibility of the workers to follow the safety requirements as set out in those WHS laws and regulations.

Generally, most building and construction companies will have WHS policies and procedures in place that workers would need to learn and follow. This ensures that both the employer and the workers are complying with WHS laws and regulations.

So as a worker, you would need to locate, learn and follow any company WHS policies and procedures.

Common building and construction activities will have common risks and hazards associated with each activity. For example, working on a site with natural hazards while taking 'levels' and this means this site like all other worksites needs to be assessed and all hazards identified. This is because not all worksites will have the same hazards.

These too would need to be documented and the procedures would need to be followed by the workers specific to the worksite.

On the following pages we look at how building and construction businesses document worksite safety requirements.

SAMPLE ONLY

## SAFE WORK METHOD STATEMENT

As we mentioned earlier, it is often a requirement that a building or construction business do hazard and risk assessments of general and common construction activities and this is then recorded and kept on file to be referred to when any construction activity is being done that has that risk identified and assessed.

Risk assessment document for common 'high' construction activities is the '**Safe Work Method Statement**'.

A Safe Work Method Statement (SWMS) is a document that outlines the high risk construction work activities to be carried out, either at a workplace or job site and includes all the identified hazards that may arise from these activities, as well as the measures to put in place to control the risks.

SWMS's are required for high risk construction work activities, as defined in the WHS Regulations.

On the next page we show an example of a SWMS template.

NSW SafeWork NSW High Risk Construction Work Safe Work Method Statement Template	
<p>NOTE: Work must be performed in accordance with this SWMS. This SWMS must be kept and be available for inspection until the high risk construction work to which this SWMS relates is completed. If the SWMS is revised, all versions should be kept. If a notifiable incident occurs in relation to the high risk construction work in this SWMS, the SWMS must be kept for at least 2 years from the date of the notifiable incident.</p>	
Principal Contractor (PC) Name, contact details:	Principal Contractor (PC) Date SWMS provided to PC: [Name, contact details]
Works Manager: Contact phone:	Workplace location:
Work activity: [Job description]	
High risk construction work:	<input type="checkbox"/> Risk of a person falling more than 2 metres (note in some jurisdictions this is 3 metres) <input type="checkbox"/> Likely to involve disturbing asbestos <input type="checkbox"/> Work in or near a shaft or trench deeper than 1.5 m or a tunnel <input type="checkbox"/> Work on or near chemical, fuel or refrigerant lines <input type="checkbox"/> Tilt-up or precast concrete elements <input type="checkbox"/> Work in areas with artificial extremes of temperature
	<input type="checkbox"/> Work on a telecommunication tower <input type="checkbox"/> Temporary load-bearing support for structural alterations or repairs <input type="checkbox"/> Use of explosives <input type="checkbox"/> Work on, in or adjacent to a road, railway, shipping lane or other traffic corridor in use by traffic other than pedestrians <input type="checkbox"/> Work in or near water or other liquid that involves a risk of drowning
	<input type="checkbox"/> Demolition of load-bearing structure <input type="checkbox"/> Work in or near a confined space <input type="checkbox"/> Work on or near pressurised gas mains or piping <input type="checkbox"/> Work in an area that may have a contaminated or flammable atmosphere <input type="checkbox"/> Work in an area with movement of powered mobile plant <input type="checkbox"/> Diving work
Person responsible for ensuring compliance with SWMS:	Date SWMS received:
What measures are in place to ensure compliance with the SWMS?	Note: How do you intend to monitor SWMS Compliance
Person responsible for reviewing SWMS control measures:	Date SWMS received by reviewer:
How will the SWMS control measures be reviewed?	Reviewer's signature:
Review date:	

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SafeWork NSW

High Risk Construction Work Safe Work Method Statement Template

**NOTE:** Work must be performed in accordance with this SWMS.  
 This SWMS must be kept and be available for inspection until the high risk construction work to which this SWMS relates is completed.  
 If the SWMS is revised, all versions should be kept.  
 If a notifiable incident occurs in relation to the high risk construction work in this SWMS, the SWMS must be kept for at least 2 years from the date of the notifiable incident.

<b>PCBU Name, contact details</b>		<b>Principal Contractor (PC) Name, contact details</b>	
Works Manager:		Date SWMS provided to PC:	
Contact phone:		Workplace location:	
Work activity:	[Job description]		

High risk construction work:	<input type="checkbox"/> Risk of a person falling more than 2 metres (note: in some jurisdictions this is 3 metres)	<input type="checkbox"/> Work on a telecommunication tower	<input type="checkbox"/> Demolition of load-bearing
	<input type="checkbox"/> Likely to involve disturbing asbestos	<input type="checkbox"/> Temporary load-bearing support for structural alterations or repairs	<input type="checkbox"/> Work in or near a confined
	<input type="checkbox"/> Work in or near a shaft or trench deeper than 1.5 m or a tunnel	<input type="checkbox"/> Use of explosives	<input type="checkbox"/> Work on or near pressure mains or piping
	<input type="checkbox"/> Work on or near chemical, fuel or refrigerant lines	<input type="checkbox"/> Work on or near energised electrical installations or services	<input type="checkbox"/> Work in an area that may be contaminated or flammable
	<input type="checkbox"/> Tilt-up or precast concrete elements	<input type="checkbox"/> Work on, in or adjacent to a road, railway, shipping lane or other traffic corridor in use by traffic other than pedestrians	<input type="checkbox"/> Work in an area with mobile powered mobile plant
	<input type="checkbox"/> Work in areas with artificial extremes of temperature	<input type="checkbox"/> Work in or near water or other liquid that involves a risk of drowning	<input type="checkbox"/> Diving work

Person responsible for ensuring compliance with SWMS:		Date SWMS received:	
What measures are in place to ensure compliance with the SWMS?	Note: How do you intend to monitor SWMS Compliance		
Person responsible for measures:			
How will the SWMS be reviewed?			
Review date:			

Temporary load-bearing support for structural alterations or repairs		
--	--	--

Name of Worker(s)	Worker signature(s)

What are the tasks involved?	What are the hazards and risks?	What are the control measures?
List the work tasks in a logical order.  Note: HRCW activities are listed in this column	Identify the hazards and risks that may cause harm to workers or the public.  Note: These hazards and risks refer to High Risk construction work as defined in Clause 291	Describe what will be done to control the risk. What will you do to make the activity as safe as possible?  Keep it simple and practical – this is what you will need to monitor your compliance against.
Work in or adjacent to a road, railway, shipping lane or other traffic corridor that is in use by traffic other than pedestrians.		
Movement of powered mobile plant.		
Falling more than 2 metres		

DOCUMENT HAS CONCLUDED AND IS NOW BEING REVIEWED. THE CONTROLS ARE INDICATIVE ONLY AND WILL BE REVISED.

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**Learning  
Activity****SAMPLE ONLY****Question****LEARNING ACTIVITY TWO**

- 1) When a building or construction company has developed and put WHS policies and procedures in place for workers to learn and follow, what does that ensure?

- 2) Why does each building or construction worksite need to have a hazard and risk assessment?

- 3) What does the letter JSA stand for and what is this document used for?

**TEACHER/TRAINER GUIDANCE NOTES**

- 1) This ensures that both the employer and the workers are complying with WHS laws and regulations.
- 2) Because all worksites will have different hazards and risks.
- 3) JAS means Job Safety Analysis and this document outlines the work to be performed, the tools to be used and the work environment the work is being done in, identified hazards and risks and the steps or procedures are then put in place to eliminate or at the very least reduce the risk and/or hazard to prevent injuries.

**SAMPLE ONLY**

## LEVELLING TOOLS AND EQUIPMENT ARE SELECTED ACCORDING TO JOB REQUIREMENTS, CHECKED FOR SERVICEABILITY, AND FAULTS ARE RECTIFIED OR REPORTED BEFORE STARTING WORK

There are a variety of levelling tools and equipment, each designed to do a specific levelling task. Over the next few pages we look at some of those tools and equipment.

**Spirit levels** - these are one of the most common and widely used levelling device. These are rules fitted with glass bubble-tubes so that work can be checked in the horizontal and vertical planes for level and plumb. The two most common types are the 'carpenter's level' and the 'mason's level'. They are basically the same, except the mason's level comes in longer lengths.



**Line spirit levels** - these are mini spirits levels that are clipped onto a tight string line. The string line is lifted or lowered until the line level shows 'level'. Not the most accurate method of levelling.



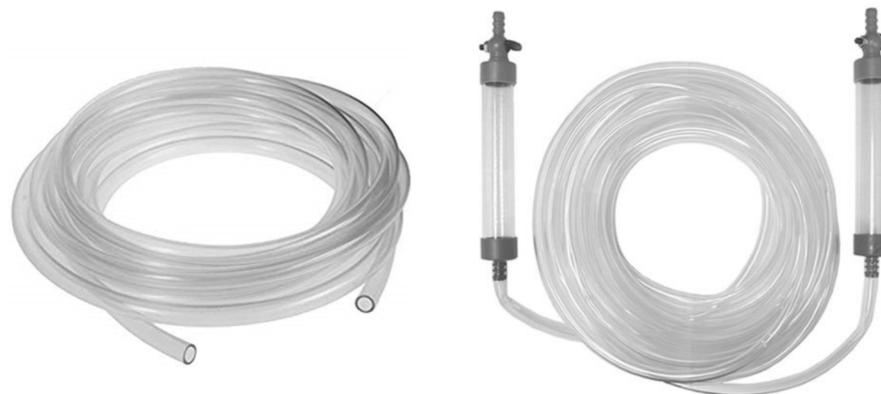
**Plumb lines** - simply a piece of string with a weight attached to one end, used to test if something is vertical.



**Water level** - this one of the simplest levelling tools and many believe most accurate. The concept behind a water level is that “water always finds its level”.

They work at great distances and work around corners so it does not need a ‘sightline’.

The simplest version is a flexible clear plastic hose or tubing and coloured water. Other versions can be purchased as ‘water level kits’.

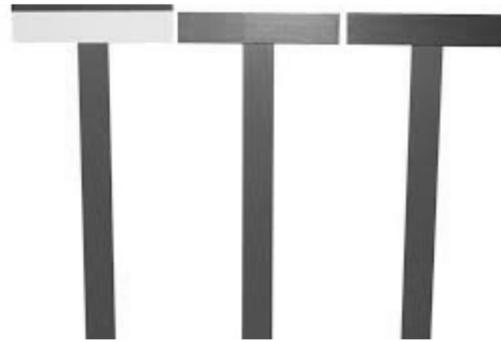


**SAMPLE ONLY**

**Boning rods** - a very old technique still used today. The 'boning rod kit' consists of three T-shaped staffs that are identical.

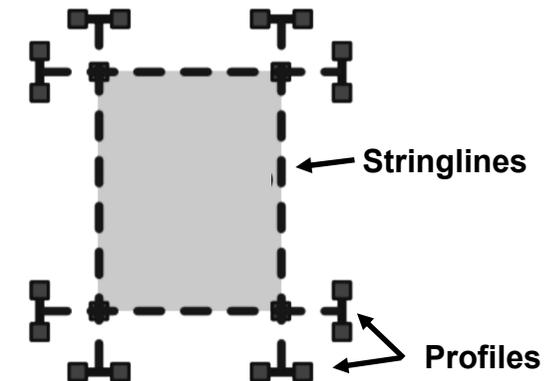
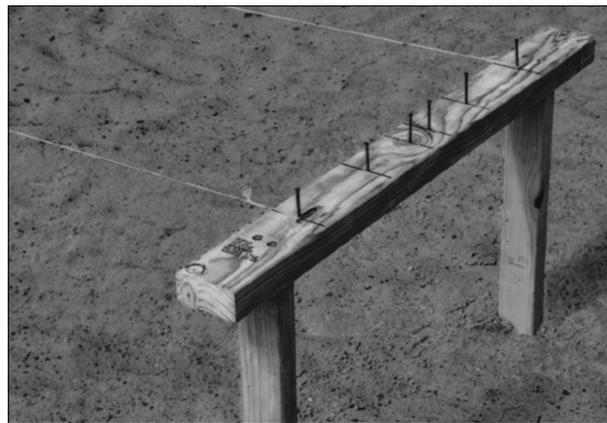
The top member is generally 500mm wide and the staff is generally 1000mm long. The top member and the staff must be exactly at right angles to be accurate.

Each crossmember of the set is painted a different bright colour to be seen easier. Mainly used in trench excavations.



**Profiles and stringlines** - profiles (also known as hurdles) consist of 2 timber pegs which are driven into the ground approximately 400mm apart.

On top of the pegs a timber plate is fixed and levelled. Nails are partly driven into the required to plate and the string line is attached to the further profile and continued until setting out is complete. The stringline is checked for 'level'.



**SAMPLE ONLY**

**Automatic level** - this is an optical device that has a mini telescope with 'crosshairs' to establish levels and 'stadia' marks to establish distances. Older models were called 'dumpy' levels (an old slang term). The 'dumpy' needed to be level itself before a measurement could be taken.

The newer 'automatic' levels (still often called dumpy) has inbuilt levelling so it itself does not need to be level, saving time.

These devices are used in conjunction with a tripod and levelling staffs.

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**Laser level** - there a number of different types of laser levels, each designed to do a specific job.

The two basic types are those used for outdoor tasks and would replace automatic or dumpy levels. They use a tripod, levelling staff and a receiver. The receiver is attached to the levelling staff.

**SAMPLE ONLY**

The other laser level type would be used indoors. These are used to determine and set level and plumb lines in an indoor setting.



However, some outdoor type laser levels are also suitable for indoor use.

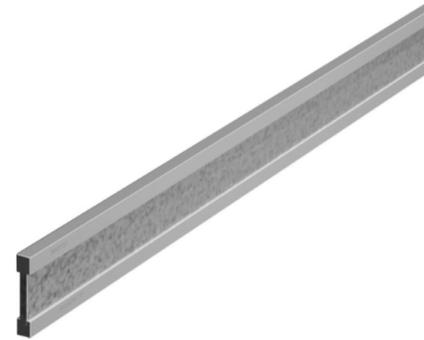
**Levelling staffs** - also called levelling rod, is a fibreglass or aluminium rod, used with a levelling instrument to determine the difference in height between points, or heights of points above a vertical datum. It cannot be used without a levelling instrument.

Today the staffs are 'telescopic' for varying heights and easier transport.



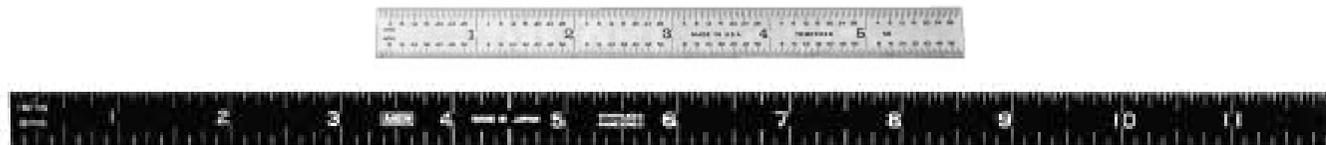
**Straight edges** - these are long pieces of material used to check the straightness of other materials or assemblies as well as used to extended the usefulness of spirit levels.

They can be made of aluminium or steel. In some cases builders may use milled hardwood.



**Steel rules** - these are also called rulers and are essential in any work activity when accuracy matters. Steel rules are inherently more accurate than folding rules because they are made in one piece.

Steel rules come in rigid and flexible versions. While their primary purpose is accurate measurement, they can also be used as guides for laying out lines (called straight edges). The thinner, more flexible rules can also be used to measure rounded or cambered work.



**SAMPLE ONLY**

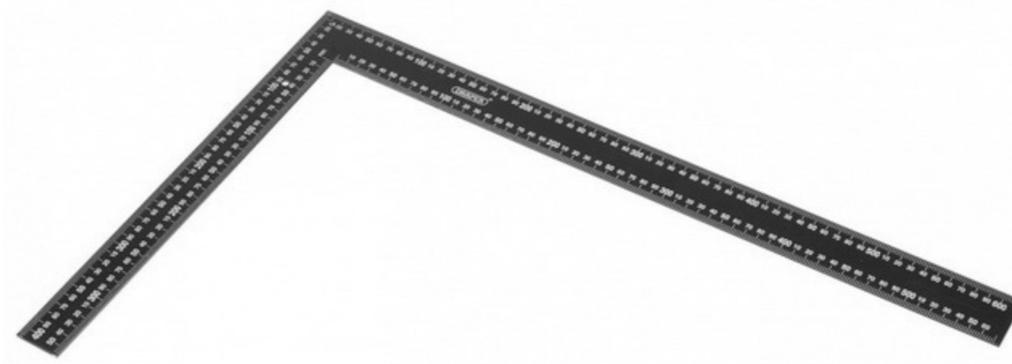
**Tape measure** - steel tapes are made from 2 to about 10 metres in length. The steel tapes are made with a curved, but rigid thin metal cross section that is flexible enough to be rolled up. The most common types of steel tapes have a hook at one end to let one person take all the readings. They have a spring retracting mechanism that pulls the tape back into the casing when unlocked.



For longer measurements, the commonly used tape measure is one made of strong fibreglass cloth. These go anywhere from 20 metres to 60 metres in length. These are required to be pulled from their casing and then wound up by hand when measuring has been completed.

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**Carpenter's square** - this is a largest of all squares used in the building industry. The short part of the square is called the 'tongue' and the longer edge is called the 'blade'.



**String lines** - strong string is used extensively in basic levelling projects. The area is measured out and the string is tied to stakes.



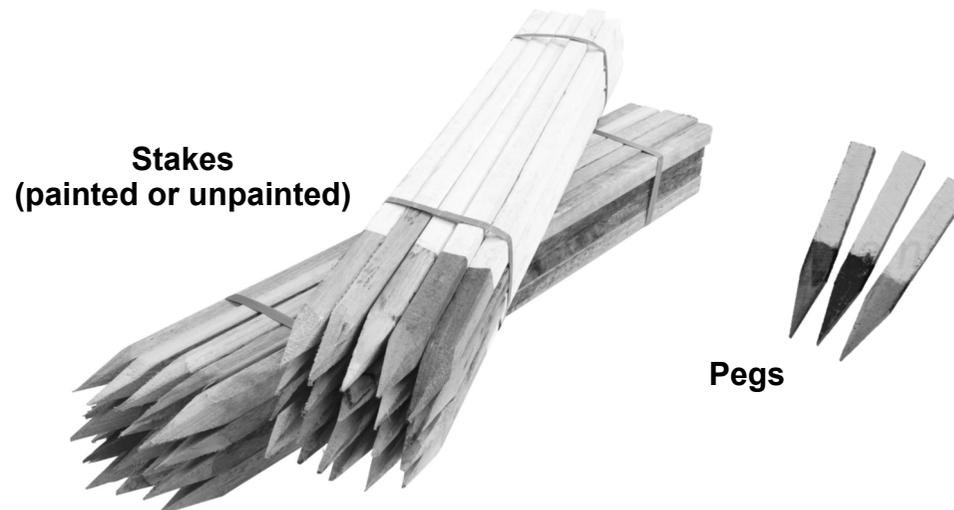
**Chalk line**—a chalk line is a tool for marking long, straight lines on relatively flat surfaces, much farther than is practical by hand, or with a straightedge. The string is stored in a box casing full of brightly coloured powdered chalk. The string is then pulled along the desired line and pulled very tight. The string is then pulled up and snapped, leaving a straight line mark.



**Surveying stakes and pegs** - the stakes and pegs are 'dressed' hardwood timber with a sharpened end. Some stakes or pegs are painted so they are easier to locate, especially in areas with grasses and other vegetation.

Stakes are longer than pegs. Stakes are used during the initial stages of setup to mark out precise locations and positions. They are generally 900mm to 1000mm long.

Pegs are used to mark boundaries. They are generally 300mm to 400mm long.



**Hammers** - when performing levelling procedures, there is often the need to hammer in stakes or pegs, as well as construct profiles. This requires hammers. Below are some examples of hammer styles that are often used in levelling activities.

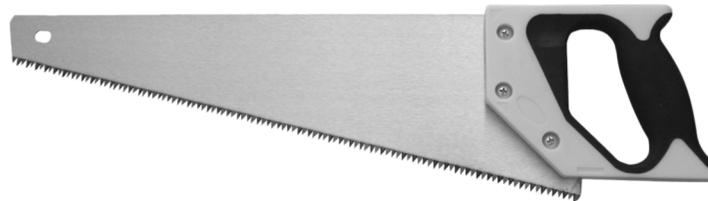
Standard claw hammer



Sledge hammers



**Hammers** - when performing levelling procedures, there is often the need to construct items, such as profiles. This may require a simple handsaw to cut timber members.



**SAMPLE ONLY**

**Utility knife** - the utility knife is used to cut banding or string. Most utility knives have an aluminium handle and have storage space for five interchangeable blades in the handle.



**Cordless hand drill** - arguably the most popular and used powered hand tool is the cordless drill. It is used for a wide range of tasks including drilling and fastening tasks. It comes with rechargeable batteries, a charger and a storage case.

**Cordless  
hand drill****SAMPLE ONLY**Teacher/Trainer  
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**SAMPLE ONLY**

**Sundry items** - below are examples of sundry items that could be required to mark out a site, construct profiles and so on.

**Nails****Screws****Spray marking****Timber****SAMPLE ONLY**

**SAMPLE ONLY**

## CARE AND STORAGE OF LEVELLING EQUIPMENT

Levelling is an exacting skill and accuracy is of utmost importance. The care and proper storage of the equipment, will ensure the information gathered is accurate.

Simple rules to remember when using, cleaning and storing levelling tools include:

- ☆ Never use a levelling tool/instrument for any other purpose other than what it has been designed for
- ☆ Always store and transport any levelling tool/instruments in the proper carrying case (if applicable) or in a separate location to other tools.
- ☆ Never lift levelling instruments by their external components such as the eyepiece or the adjustment levers and dials
- ☆ Make sure that accessories like tripods are compatible with the equipment
- ☆ Avoid exposing levelling instruments to shock, vibrations or extreme temperatures
- ☆ Use a plastic rain cover to protect levelling instruments when you're working in wet or damp conditions
- ☆ Never use the staff for any other purpose
- ☆ Never leave equipment unattended while it's set up
- ☆ Before using any levelling tool/instrument check for damage
- ☆ Before using any levelling tool/instrument, check the calibration or accuracy using simple test techniques
- ☆ Always clean any levelling tool/instrument immediately after use, following the operation or manufacturer's instructions
- ☆ Never use any levelling tool/instrument that is damaged or out of calibration

Should a levelling tool and/or any of its attachments or accessories were to be found damaged or not suitable for use, then this should be reported to the most appropriate person for action.

Often it is a policy to tag the damaged or unusable levelling tool, attachment or accessory "DO NOT USE" and then set it aside for repair or placement.

**SAMPLE ONLY**

## PERSONAL PROTECTION EQUIPMENT (PPE)

Most construction jobs can be hazardous. Although basic levelling activities are reasonably low risk, there are still some aspects that would require certain amount of personal protection equipment.

There is the use of tools and equipment, as well as the materials used which all require a level of personal protection equipment. Many of the jobs are outdoors, so there is also the need to protect oneself from the sun and insects.

Following are some examples of personal protection equipment used in basic levelling jobs.

**Gloves** - designed for handling materials to prevent cuts, abrasions and splinters



**Eye protection** - this would include safety glasses and sunglasses

**Safety glasses clear**



**Safety glasses tinted**



SAMPLE ONLY

**Safety boots** - steel toed and in many cases require waterproof safety gum boots.



**Work wear** - protect against sun and other hazards to the skin. Hi-Viz is also important as there are times when levelling tasks are taking place near traffic.



SAMPLE ONLY

**SAMPLE ONLY**

**Wet weather gear** - many times basic levelling tasks could be done in wet weather, so wet weather gear would be required.



**Hats** - protect against sun and in some sites, hardhats may be required.



**Hard hat with  
sun brim and  
neck protection**

**SAMPLE ONLY**

**Learning Activity**

**SAMPLE ONLY**

**Task**

**LEARNING ACTIVITY THREE**

Over the next few pages we have provided pictures that show tools (including PPE) and activities that we reviewed in this Section. Using the information in this Section tell us what is being depicted in each picture. (There could be more than one thing).

1



3

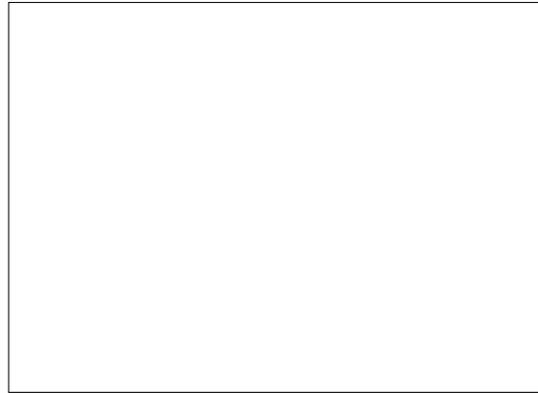


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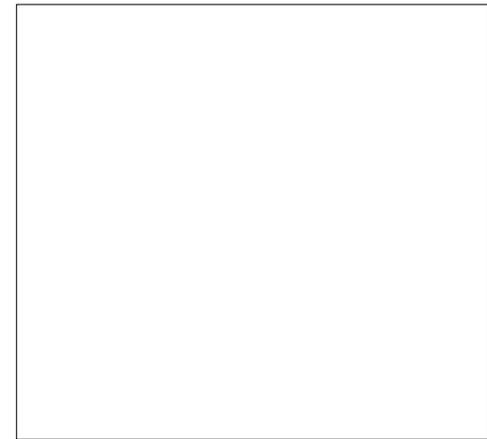


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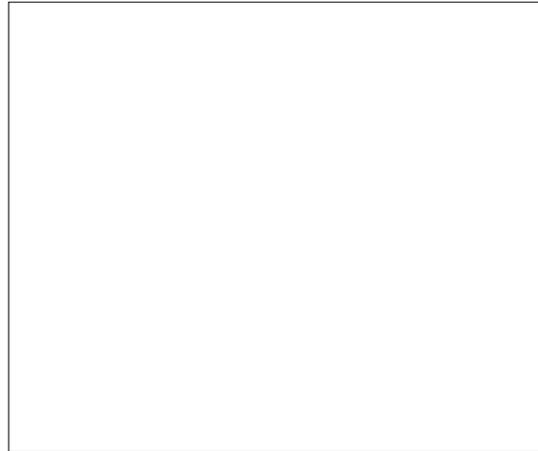
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7



5



6



SAMPLE ONLY

SAMPLE ONLY

**SAMPLE ONLY****TEACHER/TRAINER GUIDANCE NOTES**

- 1) Worker with wet weather gear, covering the instrument, a levelling instrument
- 2) Using a hammer, stake, Hi-Viz vest
- 3) Holding a levelling staff, Hi-Viz vests, hardhats
- 4) A profile (hurdle), using a spirit level, stringline
- 5) Using a water level
- 6) Using spirit level with straight edge
- 7) Levelling staff with laser receiver, wearing hardhat

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**Learning  
Activity**

**SAMPLE ONLY**

**Question**

**LEARNING ACTIVITY FOUR**

What were the twelve suggestions that related to the use and care of levelling equipment as we outlined in this Section?


**SAMPLE ONLY**

**SAMPLE ONLY**


**TEACHER/TRAINER GUIDANCE NOTES**

- 1) Never use a levelling tool/instrument for any other purpose other than what it has been designed for
- 2) Always store and transport any levelling tool/instruments in the proper carrying case (if applicable) or in a separate location to other tools.
- 3) Never lift levelling instruments by their external components, such as the eyepiece or the adjustment levers and dials
- 4) Make sure that accessories like tripods are compatible with the equipment
- 5) Avoid exposing levelling instruments to shock, vibrations or extreme temperatures
- 6) Use a plastic rain cover to protect levelling instruments when you're working in wet or damp conditions
- 7) Never use the staff for any other purpose
- 8) Never leave equipment unattended while it's set up
- 9) Before using any levelling tool/instrument check for damage
- 10) Before using any levelling tool/instrument, check the calibration or accuracy using simple test techniques
- 11) Always clean any levelling tool/instrument immediately after use, following the operation or manufacturer's instructions
- 12) Never use any levelling tool/instrument that is damaged or out of calibration

**SAMPLE ONLY**

**SAMPLE ONLY**

### **TEAM ROLES AND VERBAL AND NON-VERBAL COMMUNICATION SIGNALS ARE CONFIRMED, AS REQUIRED**

In most cases levelling procedures, especially those that are being done on a new building site, require two or more persons to perform.

This group of workers we could consider a team because as a team they are all doing some type of task that results in the 'end goal' of completing a basic levelling job.

As a team, each would need to be assigned a 'role' and be clear on what that role entails.

A simple example would be one person is operating the level instrument, another is holding the levelling staff and the other recording levelling data as it is being taken and communicated.

The assignment of each role could be given by the supervisor, or it could be negotiated amongst the 'team members' themselves.

Once the team members have been assigned their roles, the next important factor is communication. For example, a worker may be reading off a plan to the others who are locating the boundaries and staking them out.

The communication needs to be clear, concise and accurate. Industry terminology should only be used if all workers (team members) have a clear understanding on what the terminology means. This would include 'jargon'; slang versions of technical terminology.

**SAMPLE ONLY**

## HAND SIGNALS

There will be cases where the team will be working in an area where verbal communication would be impossible, or hard for other to hear or understand. This could be where there is traffic noise, or on windy days as examples.

There are industry standard hand signals for those doing levelling using levelling equipment. We go through the basic hand signals over the next few pages. The hand signals are from the person using the levelling instrument to the person holding the levelling staff.

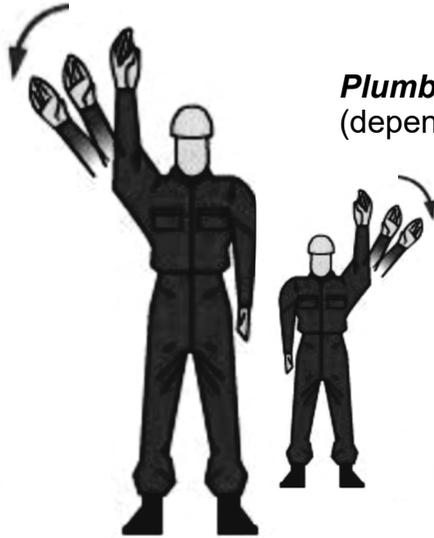


**Move left** - arm is extended outward from the shoulder. Slow motion means to move a long distance and sharp movements mean to move a short distance such as a step or two.



**Move right** - arm is extended outward from the shoulder. Slow motion means to move a long distance and sharp movements mean to move a short distance such as a step or two.

SAMPLE ONLY



**Plumb the staff** - this is to ask the person holding the staff to move the top of the staff either left, or right, (depending on the arm used) to straighten it (plumb).



**Wave the staff** - this is used to determine the lowest 'stadia' reading. One arm is extended with the palm facing out and the arm waved back and forth slowly.

SAMPLE ONLY

SAMPLE ONLY



**Face the staff** - this is to tell the person holding the staff that the staff is facing the wrong way and to turn it around. The person at the instrument holds both arms up and palms facing out.



**Extend the staff** - this is used to tell the person holding the staff to extend it. This is when extendable staffs are used. The arms are moved in an upwards direction palms out.

SAMPLE ONLY

SAMPLE ONLY



**“All right”** - this to tell the person holding the staff that the staff what he or she was instructed to do is “all right”. This signal is also used to tell others that the job is finished and to come in. The arms are extended and waved up and down.

These hand signals are standards in the industry, however any hand signals agreed to by the team can be used as long as everyone knows the meaning of the modified hand signals.

Today many teams use walkie talkies, especially where even hand signals can be an issue.



SAMPLE ONLY

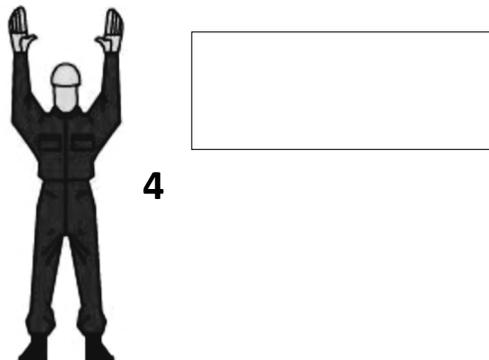
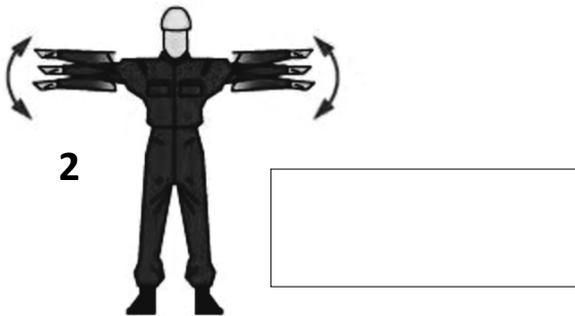
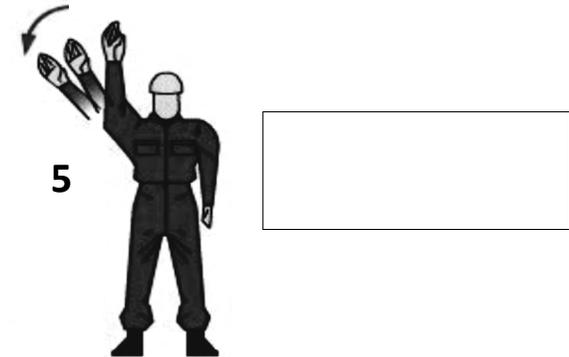
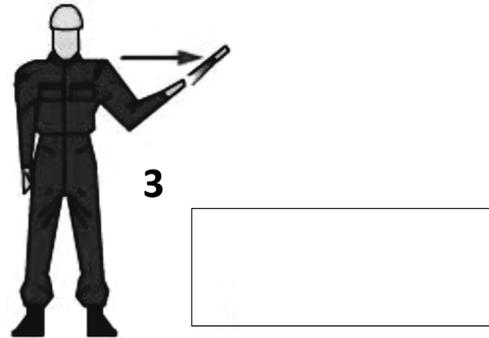
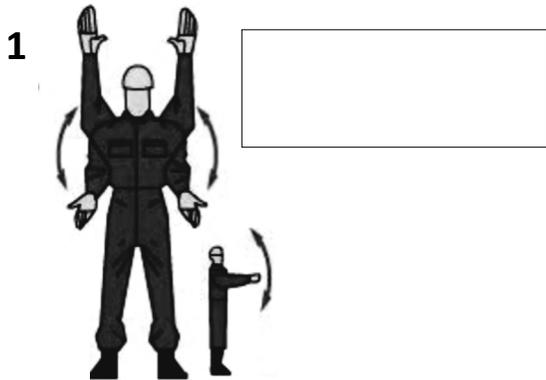
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**Learning  
Activity**

**Task**

**LEARNING ACTIVITY FIVE**

In this Section we went through some basic hand signals. Below are the illustrations we used. Next to each one tell us the name of the hand signal.



**TEACHER/TRAINER GUIDANCE  
NOTES**

- 1—Extend the staff
- 2—All right
- 3—Move right
- 4—Face the staff
- 5—Plumb the staff

# Section Two

## Set Up and Use Levelling Device

# APPLY BASIC LEVELLING PROCEDURES

## SECTION TWO—SET UP AND USE LEVELLING DEVICE

### INTRODUCTION

Basic leveling procedures cover a number of methods, some of which we provide information on what tools are used with some of those methods.

In this section we will start off by showing some those various methods and then going through the leveling procedures using a levelling instrument.

It should be noted that to successfully complete this 'Unit of Competency', you will be required to be assessed on your ability to perform basic levelling procedures. The assessment requirements state:

*The person must also transfer levels and record differences in height for three different projects as required by job specifications, using at least three of the following levelling devices:*

- ☆ *a spirit level and straight edge*
- ☆ *automatic/optical levelling device*
- ☆ *levelling with water technique*
- ☆ *laser levelling device*

We suggest that you as the student or trainee spend some time with your teacher or trainer and determine where and when these observations of your ability to perform basic leveling procedures will take place.

### SECTION LEARNING OBJECTIVES

At the completion of this section you will learn information relating to:

- ☆ Identifying required heights or levels from work instructions
- ☆ Setting up levelling device and checking levelling device tolerance according to manufacturer specifications
- ☆ Transferring shot levels and heights to required location and marking according to job requirements
- ☆ Documenting results of levelling activities according to organisational requirements

## REQUIRED HEIGHTS OR LEVELS ARE IDENTIFIED FROM WORK INSTRUCTIONS

In the first section of this training manual we went through receiving and clarifying work instructions. As a reminder, these work instructions could include:

- ☆ **Verbal and/or written instructions** - written instruction could include documents such as in a job sheet
- ☆ **Plans** - drawings and layouts that detail the levelling requirements
- ☆ **Specifications** - this generally includes the information that was not able to be communicated on the drawings/plans
- ☆ **Quality specifications** - depending on the type and size of the job, there could be a separate quality specification document that workers would refer to ensuring the quality of the work being performed is meeting the expected quality requirements.

When given a job to do basic levelling activities, you would need to refer to some type of information to determine what the required heights or levels are required.

Once this has been determined then the required tools and other resources, such as additional assistance can be organised.

Over the next few pages we look at some methods of basic levelling procedures, except for the use of levelling instruments. These tools we look at later in this section.

**This is the end of this sample**

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