



BAR BENDING AND CONCRETING

Level-II

Learning Guide -19

Unit of Competence: Apply basic leveling procedures

Module Title: Applying basic leveling Procedures

LG Code: EIS BBC2 M06 LO1-LG-19

TTLM Code: EIS BBC2 TTLM 1019v1

LO 1: Plan and prepare

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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Obtaining, confirming and applying work instructions.
- Following Safety (OHS) requirements
- Identifying and implementing signage/barricade requirements
- selecting tools and equipment to carry out leveling tasks
- Identifying environmental protection requirements

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to:**

- Obtain, confirm and apply work instructions.
- Follow Safety (OHS) requirements
- Identify and implement signage/barricade requirements
- select tools and equipment to carry out leveling tasks
- Identify environmental protection requirements

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 5.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3, Sheet 4 and Sheet 5” **in page 3, 12 ,18,21 and 29** respectively. .
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3, Self-check 4 and Self-check 5” **in page -11, 17, 20, 28 and 30** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “LO2 of this unit of competence

Information Sheet-1	Obtaining, confirming and applying work instructions
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1.1 Introduction of Planning and preparing for work instructions/leveling

work instructions is the Plan that includes requirements and operational details of a relevant information to prepare for basic leveling activities. It may include plans, specifications, quality, working procedures.

As with all jobs in building and construction, the task of leveling requires careful planning and preparation – not only because it helps to get the task done efficiently, but it also ensures that it's done accurately and precisely. The leveling process helps create a geographic profile of the site, so it's very important that this is carried out correctly. It's one of the very first steps in the building process, and all aspects of the construction rely on it. Mistakes made at this point will affect later stages of the construction process and can be very costly.



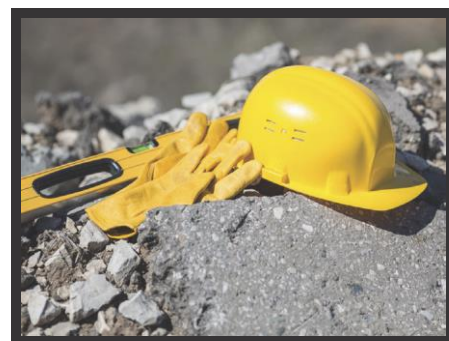
Later sections of this guide cover the actual processes involved in carrying out leveling operations. The things that must be considered before the process begins, such as:

- Work instructions and task requirements
- Your materials, tools and equipment
- Environmental requirements.

1.1 Safety on the worksite

Safety is the most important issue in all construction tasks. All workers, no matter what task they're completing, must comply with all site safety Regulations and procedures.

You may think that carrying out leveling operations is low risk; however, it has some specific safety issues that you need to be aware of.



•**Movement around the site** – Constant moving around the site presents safety risks such as trip hazards, uneven or unstable ground. You also run the risk of bumping into obstacles.

•**Manual handling** – Although the equipment you use for leveling tasks is small and easy to transport, you may need to interact with other equipment and materials on a

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building site which are large, heavy and awkward to move.

•**Focus and concentration** – Because leveling requires you to focus and pay close attention to what you’re doing to ensure you’re being precise, it can be easy to lose awareness of your surroundings and what’s happening around you.

•**Environment** – Leveling operations take place outside, and often before any building structures are up to provide shade or shelter. You may be exposed to elements such as sun, wind and rain.

•**Dust** – The quality of the air on site may cause you respiratory problems and it can obstruct your vision while you’re leveling.

•**Noise** – Building sites can be noisy at times, which may make it hard for you to concentrate. Noise is also a safety issue because you may not be able to hear what’s happening around you.

•**Human traffic** – Building sites are often busy with lots of workers moving around. It’s inevitable that people will get in each other’s way sometimes.

•**Mechanical traffic** – There will be times when you’ll be positioned in a place where you may not be easily seen by others – particularly if someone’s driving a large vehicle. You may also have to take a level from a point on the kerb or roadside of the site, which puts you at risk from moving vehicles.

•**High-risk situations** – There are always areas of high risk such as demolition, excavation, confined spaces and heights that you’ll need to be aware of. For example, you may be required to complete a leveling task for services and footings in an open trench.



1.2 Minimizing safety risks

As you know from the OHS unit you’ve already completed, the risk from safety hazards can usually be minimized if you take some basic precautions as part of your planning and preparation for the work task



1.3 Establishing the task

Before you start a leveling task, you’ll need to make sure that you’ve got all the information required.

This information usually comes from the project plans, drawings and specifications. Interpreting these documents accurately is particularly important, because leveling must be very precise.



1.4 Work instructions

Work Instructions are documents that clearly and precisely describe the correct way to perform certain tasks that may cause inconvenience or damage if not done in the established manner. That is, describe, dictate or stipulate the steps that must be followed to correctly perform any specific activity or work.

A document describing specific activities and tasks within the organization. It contains the greatest amount of detail.

Whenever you're given instructions for a task or project, you'll need to make sure that you clearly understand what you have to do. Instructions may be provided in written or verbal form, or sometimes a mix of the two. Being able to give and receive instructions effectively is an important part of communication on the worksite. Here are a few tips to help you out if you're given instructions that are unclear or incomplete or if you have trouble understanding them.

- **Take notes.** It's hard to remember everything by keeping it in your head. Writing a few notes helps remind you what needs to be done.
- **Ask questions.** Don't be afraid to ask for more information or for clarification on something. Something simple like, 'I don't quite get what you mean by...' or 'Could you tell me a bit more about how to...' is a good way to get the details you need.
- **Be aware of language.** You may be teamed up with people from other countries or cultures who don't speak English as well as you do. This can sometimes make communication difficult, but be patient. Listen carefully, speak clearly, take notes and ask questions until both you and the other person(s) are sure the instructions and/or information have been communicated correctly.
- **Confirm the instructions before you start the task.** Never walk away feeling unsure about what you've got to do. A good way of confirming is to say something like, 'OK, before I go, I'll just check I've got this right...', then refer to your notes, run through the key points or steps, and ask for confirmation that you've got all the information you need.
- **Sequence the instructions.** Putting instructions and/or steps into the order you'll be completing them makes them much easier to follow.

1.5 Quality requirements

As with all construction tasks there are quality requirements





related to carrying out leveling operations. These are generally covered in Standards. If you're unsure about quality requirements – whether in relation to the work you're doing, the materials you're using, or some other area

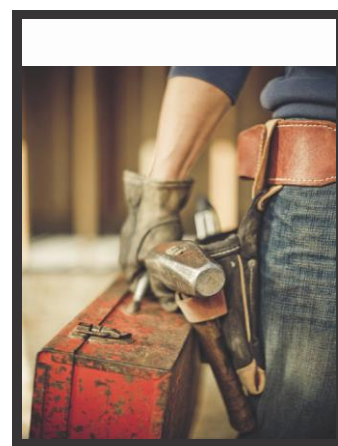
- Always check with your supervisor.

Although there is no specific Standard for leveling, information related to carrying out leveling operations can be found in some of the Standards for construction elements that rely on correct establishment of ground level, such as: *Residential slabs and footings*.

1.6 Tools, equipment and materials

A very important part of planning for a construction project is being able to identify the tools that are most appropriate for the task and making sure you have access to them where and when you need them.

You'll be looking at the tools, materials and equipment used to carry out leveling operations in more detail later in this guide, but here are some key points you need to remember when





Planning and preparing for a work task.

- Check the condition of all tools before you start any work, and rectify or report any faults.
- Always read the manufacturers' instructions for any tools, equipment and materials you're not familiar with.
- Be aware of materials that may be hazardous. Look for warning labels and, if there's a safety data sheet (SDS), read it carefully.
- Never use a tool or piece of equipment for any purpose other than what it's designed for.
- When you're calculating material quantities, always double-check the plan and/or instructions you're working from, and also your calculations. This will help you to avoid situations where you can't complete a task because you have either too much or not enough of a material you need.

1.7 Environmental issues

All construction projects have the potential to affect the environment negatively. Although leveling tasks are generally considered to have very little environmental impact as they don't use resources heavily, create a lot of waste or require much clean-up, environmental issues still need to be considered.

Most construction companies or worksites will have an environmental management plan (EMP) or policies and procedures for ensuring that projects have as little impact as possible. It's everyone's responsibility to work in a way that has as low an impact on the environment as possible.

As part of your planning and preparation, make sure you:

- check if there's an existing EMP for the company, worksite and project
- comply with waste management and clean-up procedures as require

1.8 Purpose of Obtaining, confirming and applying work instructions

Every step of the work instructions process must be carefully documented. The documents and records kept serve several purposes. They;

- Provide evidence that the process was completed.
- Enable decisions or processes to be monitored and reviewed.
- Demonstrate accountability. Enable accurate and consistent sharing of information

1.10 Sources of information for leveling activities

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- **diagrams or sketches**

A diagram is a symbolic representation of information using visualization techniques. Diagrams have been used since ancient times, but became more prevalent during the Enlightenment. Sometimes, the technique uses a three-dimensional visualization which is then projected onto a two-dimensional surface. The word graph is sometimes used as a synonym for diagram.

The term "diagram" in its commonly used sense can have a general or specific meaning:

1. Visual information device: Like the term "illustration", "diagram" is used as a collective term standing for the whole class of technical genres, including graphs, technical drawings and tables.
2. Specific kind of visual display : This is the genre that shows qualitative data with shapes that are connected by lines, arrows, or other visual links.

- **Manufacturer specifications and instructions**

Analysing technical information in an enterprise, including quality documentation, equipment manufacturer specifications, engineering data sheets and national standards. It also covers explaining and using the information, and identifying implications of changes to technical information.

Manufacturer specifications are an important element of cost and quality control for testing, calibration and other measurement processes. They are used for MTE (materials, tools and equipment) selection or establishing equipment substitutions for a given measurement application. MTE specifications should provide adequate details about the expected performance characteristics of a representative group of identical devices or items (i.e., a specific manufacturer and model). This information should be reported in a logical format, using consistent terms, abbreviations and units that clearly convey pertinent performance characteristics.



- **Maps**

Is the source of information to know the place where the task is being performed. A simple guide to creating a site plan that will meet your council planning department's requirements. Includes information on Scale, Format, Size and Examples.

- **Material safety data sheets (MSDS)**

A Material Safety Data Sheet (MSDS) is a document that contains information on the potential hazards (health, fire, reactivity and environmental) and how to work safely with the chemical product. It is an essential starting point for the development of a complete health and safety program

- **Memos**

A memo is a type of document used to communicate with others in the same organization. Memos (or memoranda) are typically used for fairly short messages of one page or less, but informal reports of several pages may also employ memo format.

- **Organization work specifications and requirements.**

It includes functional requirements, performance requirements, interface requirements, design requirements, and development standards. So the requirements specification is simply the requirements written down on paper



- **Signage**

Signage is the design or use of signs and symbols to communicate a message to a specific group. Signs are any kind of visual graphics created to display information to a particular audience. This is typically manifested in the form of way finding information in places such as streets or on the inside and outside buildings. Signs vary in form and size based on location and intent, from more expansive banners, billboards, and murals, to smaller street signs, street name signs, sandwich boards and lawn signs. Newer signs may also use digital or electronic displays.

- **Verbal or written and graphical instructions**

verbal instruction = instructions given verbally, or spoken words , can be heard

written instruction = instructions which can be read words and pictures need the ability to interpret

1. When you're giving instructions

- ✓ **Think before you speak** - work out what you want to say before you say it, and make sure you cover all of the points that are relevant.
- ✓ **Avoid jargon** - don't use words that the listener won't understand.
- ✓ **Watch for body language signals** - see if the listener looks like they understand what you're saying.
- ✓ **Ask for feedback** - check that the listener has understood the message the way you intended it.

2. When you're receiving instructions

- ✓ **Listen to the whole message** - don't assume you know what the speaker is going to say before they say it.
- ✓ **Use positive body language** - show that you're taking in what they're saying.
- ✓ **Ask questions** - clarify any points you don't understand.
- ✓ **Give feedback** - restate in your own words what you think the speaker is saying, and check that they agree with you.

- **Work bulletins**



Self-Check 1

Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the quality requirements?(3 points)
2. Write the resources of information to leveling activities? (3 points)
3. What are the things that must be considered before the leveling process/activities begins? (4 points)

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

2.1 Introduction

Safety is the first essential requirement and every personnel must learn the safety measures even before he/she starts working on a machine or on equipment's. Safety is an attitude, a form of mind of worker. If the attitude of worker towards safety is good and he/she is safety conscious, then he/she him/her self will develop the safe working habits. Before you can use equipment and tools or attempt practical work in a workshop you must understand basic safety rules. These rules will help keep you and others safe in the workshop.

- **Safety** is a precaution to avoid accident, right way of doing to avoid accident , follows direction to prevent wastage of time, energy & money
- **Care** is a technique of properly handling tools, equipment's & materials.

To protect ourselves from the accidents of hand tools & machines in the workshop it's better to consider the following safety care and know safety sign.

2.1 classification of safety

safety can be classified as; personal safety(PPE & HSE), safety hand tools & equipment's, safety working area, safety rules & regulation of in the construction site and first aid.(plaster, destinficant, bandage , ointment)

2.1.1 Personal safety(PPE & HSE).

The primary important to protect the work man from accidents is to identify possible and take the necessary safety measures to the hazardous. Before you go to work on any make sure your entire body is properly protected



hazards
eliminate
job,

Fig.2.1. Personal Protective Equipment's

and provided other

personal protective equipment

and Healthy safety equipment.

Helmet; Protects the carrier from down falling items. t should be a must for everybody who works or moves on a building site

Ear protection; Protects the carrier from damages of the ears.



Safety shoes; Protects the workers feet from colds, chemical, and mud in the working area.

Safety glass; protects eye against chips and dust parking around from the work piece

Mask (respiratory equipment): Protects the worker from other endangering object and dust during construction.

Glove:-Protects the workers from oils, chemicals, and dust And other dangerous material that affect the skin.

2.1.2 safety hand tools & equipment's

- **Do not force the tool.** Use the correct tool for your application. The correct tool will do the job better and safer at the rate for which it is designed.
- **Do not use the power tool if the Power Switch does not turn it on or off.** Any tool that cannot be controlled with the Power Switch is dangerous and must be replaced.
- **Disconnect the Power Cord Plug from the power source before making any adjustments, changing accessories, or storing the tool.** Such preventive safety measures reduce the risk of starting the tool accidentally.
- **Store idle tools out of reach of children and other untrained persons.** Tools are dangerous in the hands of untrained users.
- **Maintain tools with care.** Keep cutting tools sharp and clean. Properly maintained tools with a sharp cutting edge are less likely to bind and are easier to control. Do not use a damaged tool. Tag damaged tools “Do not use” until repaired.
- **Check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the tool's operation.** If damaged, have the tool serviced before using. Many accidents are caused by poorly maintained tools.
- **Use only accessories that are recommended by the manufacturer for your model.** Accessories that may be suitable for one tool may become hazardous when used on another tool.

Accidents may take place due to human causes, environmental causes and mechanical causes. These causes are discussed as under;

• Human Causes

- ✓ Accidents may occur while working on unsafe or dangerous equipments or machineries possessing rotating, reciprocating and moving parts.

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- ✓ Accidents occur while operating machines without knowledge, without safety precautions, without authority, without safety devices.
- ✓ Accidents generally occur while operating or working at unsafe speed.
- ✓ Accidents may occur while working for long duration of work, shift duty etc.
- ✓ Accidents commonly occur during use of improper tools.
- ✓ Accidents may occur while working with mental worries, ignorance, carelessness, nervousness, dreaming etc.
- ✓ Accidents occur because of not using personal protective devices.

• **Environmental Causes**

- ✓ Accidents may occur during working at improper temperature and humidity causes fatigue to the workers so chances of accidents increases with workers having fatigue.
- ✓ The presence of dust fumes and smoke in the working area may causes accidents.
- ✓ Poor housekeeping, congestion, blocked exits; bad plant layout etc. may cause accidents.
- ✓ Accidents occur due to inadequate illumination.

• **Mechanical Causes**

- ✓ Continued use of old, poor maintained or unsafe equipment may result in accidents.
- ✓ Accidents commonly occur due to use of unguarded or improper guarded machines or equipment's.
- ✓ Unsafe processes, unsafe design and unsafe construction of building structure may lead to accidents in the plant.
- ✓ Accidents occur due to improper material handling system and improper plant layout
- ✓ Accidents may occur due to not using of safety devices such as helmets, goggles, gloves, masks etc.

2.1.3 safety working area

Working place or area is whole building/construction/ site including tools, equipment, machines, storerooms, etc. Within the general working place there is a personal working area /space/, where someone is building up a wall or other related activities. Working space is essentially required for all construction workers, to accommodate materials and equipments for the process; therefore, it is a crucial and necessary to keep them all in proper manner.

A neat and tidy site safes time, eases the work and avoids accidents. If things like tools, battens, boards, stones, cables, steel bars etc. are not used or kept improperly they are obstacles for the construction process and can be the cause for accident.

What does an accident mean?

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Personally:

Consequences of the Accident may:-

Worries for the family

- For short times
OR



- Permanent pain
OR

In worst case
Dead

- Loss of salary so that financial deficiency for medical treatment & other expenses /unemployment/

result.

2.1.4 Safety Rules and regulations.

- **General Safety Rule**

General safety rule is very important to reduce the accident while you working in workshop. Some of them are listed below,

- ✓ **Follow directions:**-understanding the procedures of using by hand tools & machines.
- ✓ **Stay alert.** Watch what you are doing, and use common sense when operating a power tool. Do not use a power tool while tired or under the influence of drugs, alcohol, or medication. A moment of inattention while operating power tools may result in serious personal injury.
- ✓ **Use safety equipment.** Always wear eye protection. Dust mask, non-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.
- ✓ **Always dress properly:** - Dress properly for your work. While you must wear your aprons are provided so that you can work on the machines. Remove any jeweler, neckties, chains, bracelets, and rings. Roll up your sleeves and tie any hair back in a ponytail before beginning any work
- ✓ **Keep the shop clean:** - Put your tools back where they belong when you finished.
- ✓ **Keep the floor clear of debris and sawdust:-** the floor should be clear of scrap blocks, excessive material, and sawdust. Keep projects, sawhorses, and other equipment and materials you are using out of travel lanes. Wipe up any spilled liquids immediately.
- ✓ **Learn to use the tools correctly**
 - -Understanding using of hand tools in proper ways.
- ✓ **Avoid house play**
- ✓ **Report all accidents**

✓ **Practice lending a cheerful helping hand when requested by someone.**

Be thoughtful and helpful toward other students in the class. Caution them if they are violating a safety rule. This is one of the most important rules in that all of you have responsibility for each other's safety and well-being in the class.

2.1.4.1 First aid

A building site should have a first aid box which as minimum contents: -

Plasters;

Bandages;

Ointments;

Disinfectant.

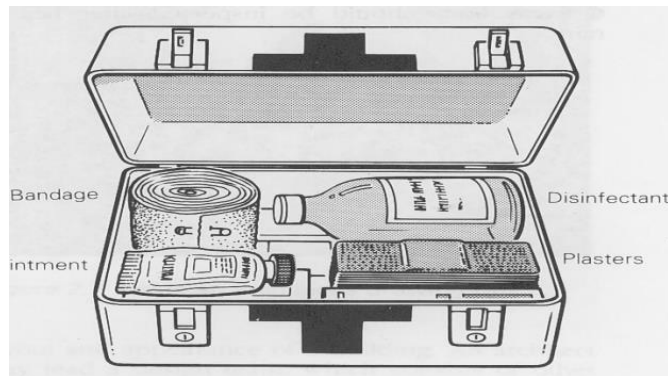


Fig 2.3 First aid



Self-Check 2

Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page.

1. What are Personal Protective Equipment's? (2 points)
 2. Mention causes of accidents. (3 points)
 3. What are safety rules and regulation? (5 points)
-

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10

points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____



Information Sheet-3	Identifying and implementing signage/barricade requirements
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3.1 Introduction

Clear and effective traffic signs are essential for the efficient operation of the work network, for the enforcement of traffic regulations and for work safety. This Traffic Signs Manual provides details of the traffic signs which may be used in construction of leveling.

3.2 Purpose

Traffic Management Plan requires the applicant to prepare a Communication Plan Upon approval of the Traffic Management Plan. The Communication Plan will be enacted by the applicant prior to the commencement of construction, at which time project information shall be provided to all stakeholders.

3.3 Classification

- signs (including construction markings) are divided into three broad types:
 - ✓ **Informatory signs** - which give directions and distances to destinations or which provide other information that may be relevant to users;
 - ✓ **Regulatory signs**- which give instructions, prohibitions or restrictions which
 - users must obey.
 - ✓ **Warning signs**- which warn of hazards on the site ahead. Whenever possible during work;
- Regulatory signs are:
 - ✓ Mandatory,
 - ✓ Restrictive and
 - ✓ Prohibitory,
- **Mandatory signs** - it indicate that a site user must take a certain action: for example 'Keep Left'. They generally have white symbols on solid blue discs.



Fig 3.1 Mandatory sign

- **Stop and Yield signs** - special types of mandatory signs with distinctive shapes. It helps to stop the vehicles.



Fig 3.2| Stop or yield sign

- **Restrictive signs** -it indicate that a limit must not be exceeded: for example '50km/h' or 'Weight Limit 7.5t'. They have black symbols and text on a white disc with a red border;



sign

- **Prohibitory signs**- indicate something which must not be done: for example 'No Right Turn' or 'No Parking'. They generally have black symbols and text on a white disc with a red border and a red diagonal bar.



Fig 3.4 Prohibitory or regulatory sign

**Self-Check 3****Written Test**

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Which one of the following traffic sign is give instruction or prohibition? (2 points)
 - A. Warning
 - B. Regulatory
 - C. Information
2. Regulatory sign is always mandatory(2 points)
 - A. True
 - B. False
3. Write types of traffic sign? (3 points)
4. What is the purpose of mandatory sign? (3 points)

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

- 1 _____
- 2 _____
- 3 _____
- 4 _____

Information Sheet-4	selecting tools and equipment to carry out leveling tasks
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Leveling tools

Depending on the task, leveling operations on a construction site are carried out using a variety of tools. Some of these tools are very simple and quick to use while others are more complicated and require greater control for precision leveling.

Spirit level

A spirit level consists of a body (generally made from aluminum) with an inset glass tube filled with a liquid that contains a bubble of air.

The position of the bubble in relation to permanent markings on the glass indicates whether a surface is plumb (vertical) or level (horizontal).



Line level

A line level is a miniature spirit level with a hook on each end to allow the instrument to be suspended on a taut string line. It's used to transfer height levels from one point to another. Line levels are not very accurate and are used mostly used to, for example, check falls in concrete paths.



Water level

Due to the effects of gravity, still water is level, so a clear plastic tube filled with water is a very simple tool that can be used to transfer heights on a construction site from one point to another.

Water levels are particularly useful to quickly transfer height measurements from one room to another when there is no clear line of sight.



String line

A string line is one of the oldest and most basic hand tools used in building and construction. It's typically used in the setting out of buildings to create a straight line between two level points.

Plumb-bob

Plumb-bobs (also known as plumb lines) are heavy metal objects with a pointed tip attached to the end of a string line. Using gravity, they accurately transfer points vertically, e.g. from ceiling to floor, and can be used to check that a surface is plumb (vertically straight). Plumb-bobs can be awkward to use in windy conditions.



Straight edge

Straight edges have a long, straight body made from wood or metal and can be used with spirit levels to transfer levels over short distances. They are generally available in lengths of 1.5–4 m.



Boning rod

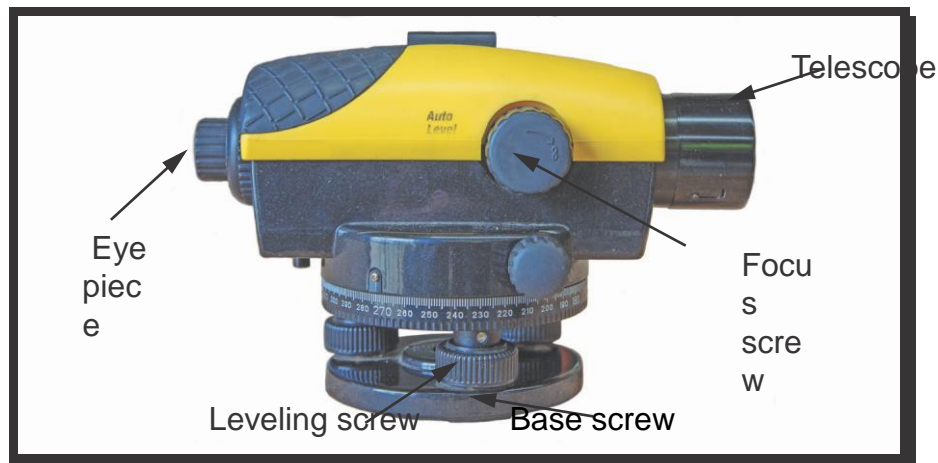
Boning rods are T-shaped devices used to check a straight line between two fixed points over long distances. They come in sets of three or four and are usually made from timber with their cross-rails painted in different colors – black, red and white – so that they can be seen easily.

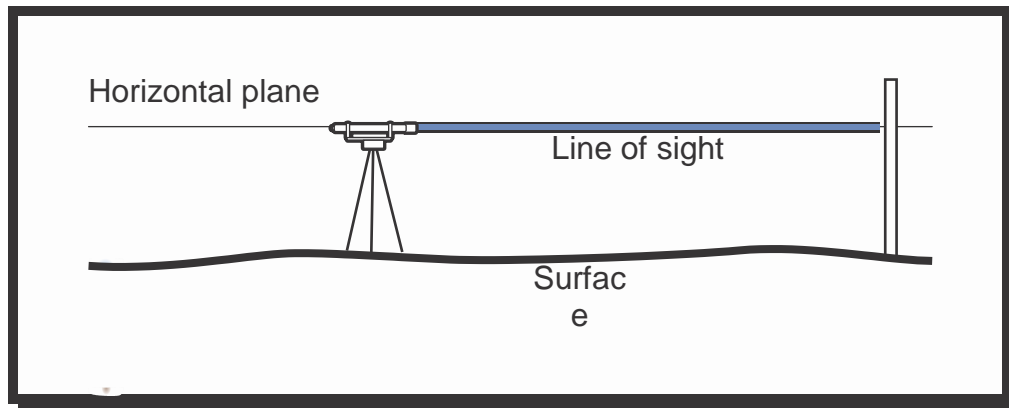
Boning rods are used to help in the setting out of horizontal surfaces or surfaces with a constant slope for excavation works, paths and drainage pipes.

Optical level

Optical levels are used to find precise height measurements and to check and transfer level information over longer distances than the simpler leveling tools described so far.

An optical level is basically a telescope (usually with a magnification of around 20×) mounted on a swivelling base. It's adjusted with an attached spirit level so that the view through the telescope (the line of sight) is straight along the horizontal plane.





By looking through the telescope toward a staff (a large rule), the operator can measure the distance between the surface and the line of sight. This measurement can then be compared to a measurement on a plan or at another location, or used to calculate the height of the surface at the position of the staff.

Optical levels are often referred to mistakenly as ‘dumpy levels’ which are only one of many types of optical levels. They include the following.

Dumpy level

A simple, compact device consisting of a telescope fixed to a levelling plate with three or four base plate adjustment screws that are used to level the instrument. When set up correctly, the dumpy level will remain level when rotated through 360°.

Tilting level

A variation on the dumpy level that is very accurate and used for top quality work. The telescope is leveled by a screw which tilts the telescope. It needs to be reset for each reading taken.

Automatic level

Also known as a ‘self-leveling level’, an automatic level requires only basic set-up as it has internal compensating mirrors that fine-tune the level of the instrument. Automatic levels are the most commonly used optical levels due to their speedy set-up time and ease of use.

Digital level

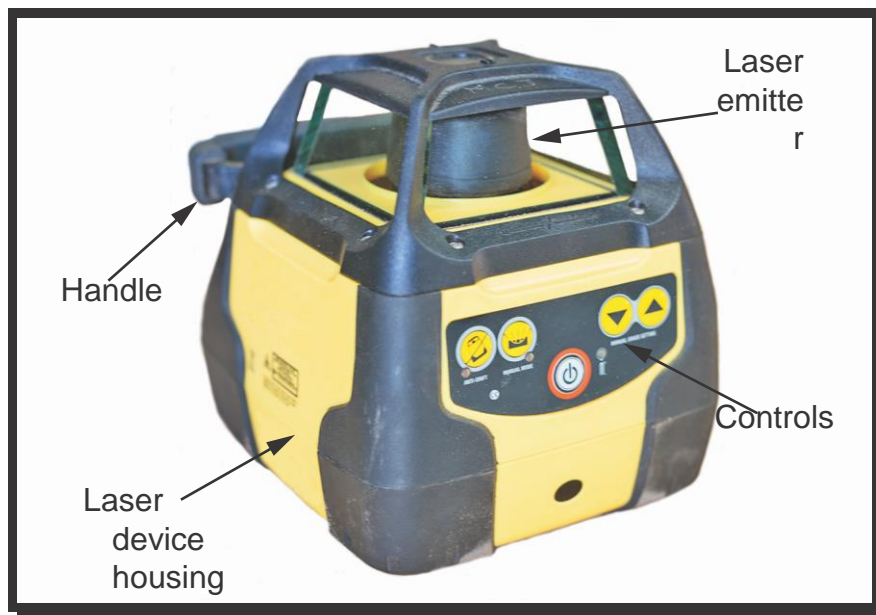
Similar to an automatic level; however, the readings are taken automatically by the instrument using a barcode. The instrument displays the reading and records the level measurements.

The advantage of optical levels over other simpler leveling tools is that they're accurate and quick to use over long distances. Because there are no physical media involved, eg string lines, straight edges, they're relatively free from error – as long as the operator can read a staff correctly!

The main disadvantage is that they can't be used by a single operator as they require an assistant to position and hold the staff.

Laser level

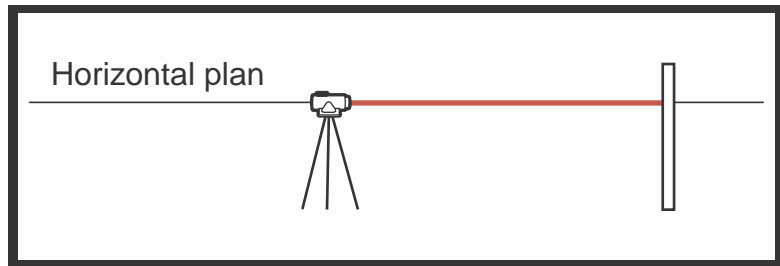
Laser levels are replacing optical levels on construction sites because they are more precise, easier to use and can be operated without an assistant.



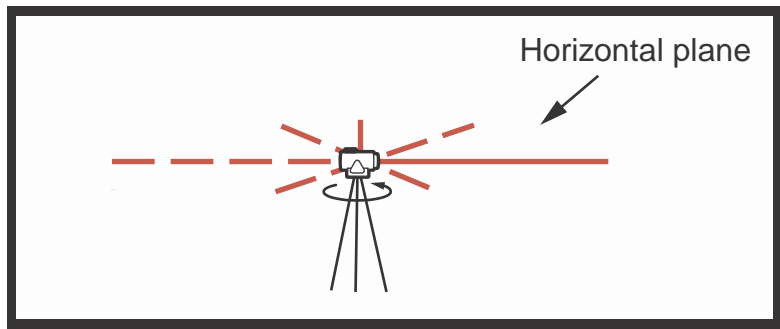
A laser level is a laser beam projector mounted on a tripod. It projects a beam of light along a horizontal plane. The light falls on a surface, eg a wall or a staff, and a mark, comparison or staff reading can be made.

The laser levels most commonly used in the construction industry include:

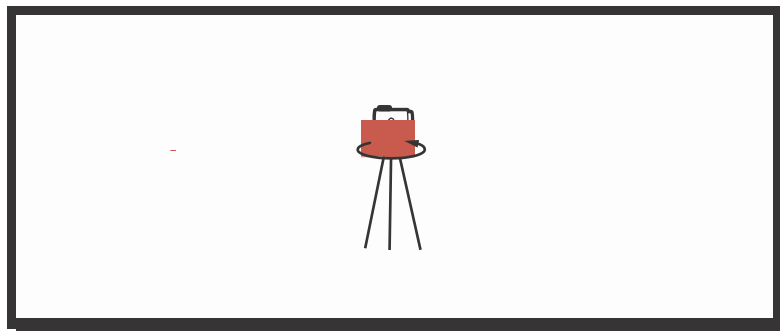
- **Aim able** – a stationary laser beam aimed at a target with a remote control handset



- **Rotating** – a rotating prism that sweeps the laser beam 360° around the horizontal plane; the speed of rotation can be varied from zero to very fast



- **Continuous plane** – the laser beam is reflected by an inverted cone and spreads a continuous plane of laser light through 360°.



Laser receiver

As the laser beam can't always be seen in brightly lit areas, a receiver (also known as a detector or target) is usually used to locate the beam.



Classification of lasers

Any equipment that generates a laser is classified by an Australian Standard[®]. Powerful lasers can cause injury (particularly eye damage) and can be used only by a licensed operator.

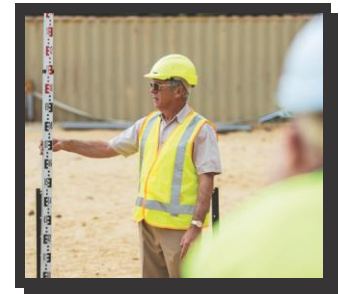
Most laser levels available for use in construction leveling, however, are very low-powered and classified as Class 1. These means that they're safe to use and an operating license isn't required.

Some classifications of laser levels require the operator to display safety signs warning that laser levels are being used.

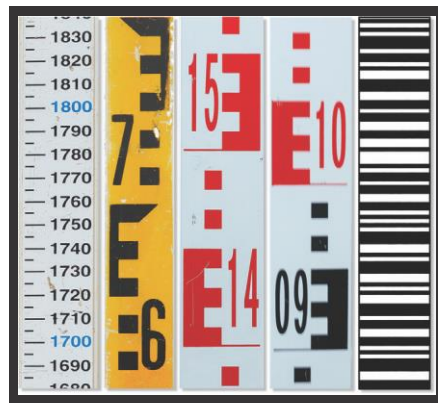


Leveling staff

Leveling staffs are long vertical rulers, usually made from wood or aluminum, which are marked with a graduated scale so that measurements can be at a distance. They're usually 3–5 m long and may have telescoping or hinged sections that expand or collapse as required.



Leveling staffs are available in a variety of measuring units, scales, graduations and patterns, including barcoded staffs that are used with digital levelling equipment.



The most commonly seen leveling staff on construction sites in Australia is the E-staff which has distinctive E-shaped markings.

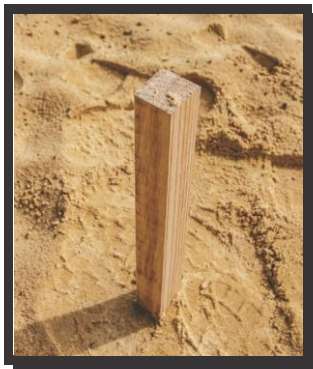
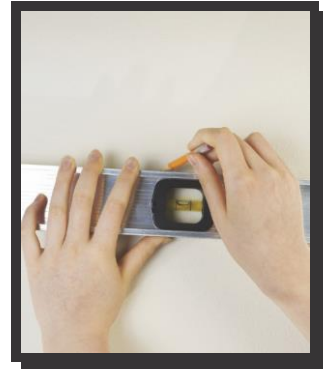
Miscellaneous equipment



Tripod
Marking tool



Measuring tape



Wooden peg



Steel peg

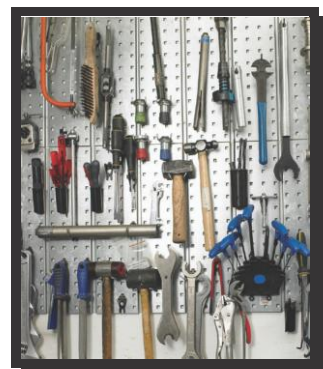


Fig 4.7

1. Equipment required for Leveling

- **Laser levels** –is an optical instrument used to establish or verify points in the same horizontal plane and to measure height differences.



Fig 4.8.

Laser levels



Self-Check 4	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the purpose of laser levels? (4 points)
2. Which one of the following helps to measure distance or length? (2 points)
 - A. String
 - B. Peg
 - C. Tape
 - D. Sprite level
3. -----is a tool used to prepare pig for leveling set-up. (4points)
 - A. Shovel
 - B. Trowel
 - C. Hand rammer
 - D. Pick Axe

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____
2. _____
3. _____

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Information Sheet -5	Identifying environmental protection requirements
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5.1 Identifying and applying environmental requirements.

All construction projects have the potential to affect the environment negatively. Although leveling tasks are generally considered to have very little environmental impact as they don't use resources heavily, create a lot of waste or require much clean-up, environmental issues still need to be considered. Most construction companies or worksites will have an environmental management plan (EMP) or policies and procedures for ensuring that projects have as little impact as possible. It's everyone's responsibility to work in a way that has as low an impact on the environment as possible. As part of your planning and preparation, make sure you:

- check if there's an existing EMP for the company, worksite and project
- Comply with waste management and clean-up procedures as required.

Environmental issue	Strategies to address the issue
Excessive noise	Limit work to specified hours, use sound-dampening devices, redesign the work procedures to avoid high-noise equipment or tools, regularly check noisy equipment, limit vehicle traffic and site access.
Excessive dust	Keep the traffic area dampened, ensure loads to/from the site are fully covered, erect screens around high-dust areas, use dust collection devices.
Vibration	Place portable equipment or plant on pads, use alternative low-vibration equipment (including hand tools if necessary).
Waste management	Use filter traps for waste water, segregate and store waste, regularly collect and dispose of waste including off-site disposal or re-use and recycle.
Hazardous goods	Identify and segregate hazardous goods, provide secure storage areas, use MSDS to ensure correct handling/storage, limit quantities on-site, provide PPE and specific training.
Spills	Provide on-site spills kits, use bunding, have designated wash-down areas.
Soils	Store or remove contaminated or waste topsoil, use erosion management methods.



Self-Check 5	Written Test
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Instructions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. Write your answers in the sheet provided in the next page.

1. What is the Environmental Protections? (10 points)

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____



REFERENCE

- <https://ginninderry.com/wp-content/uploads/2017/03/EPA-Guidelines-for-Construction-and-Land-Development-ACCESS.pdf>. Accessed on Oct 30/2017
- <https://en.wikipedia.org/wiki/Diagram>
- http://www.isgmax.com/Articles_Papers/Equipment%20Specs%20Paper.pdf
- <https://www.collate.co.nz> › BU622-Good-plans-and-specifications
- <https://en.wikipedia.org/wiki/Signage>

Name trainers who prepared the material

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