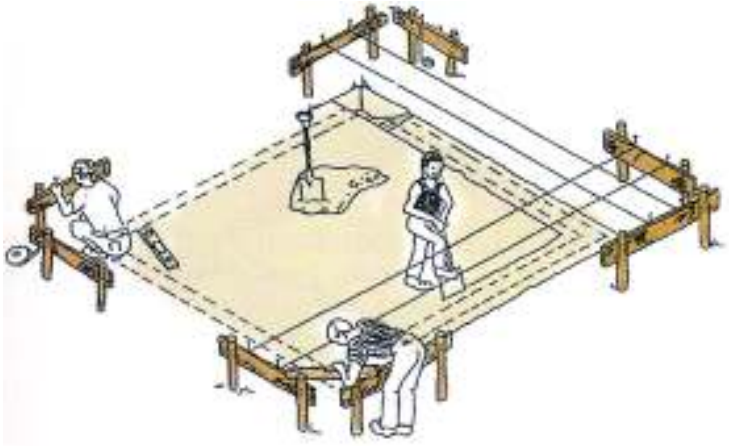
Structural construction work

Level-I

Based on March 2021, Curriculum Version 1



Module Title: - Setting-out Profile Set-up for Building Works

Module code: EIS SCW1 M070322

Nominal duration: 90Hour

Prepared by: Ministry of Labour and Skill

April, 2022

Addis Ababa, Ethiopia

Table of Content

Ministry of Labor and Skills wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development of this Teaching, Training and Learning Materials (TTLM).

Acronym

Introduction to the Module

In Structural construction work filed; the Setting out is of marking the position, shape and size of a building on a construction site.

The details provided by the architect and surveyor on the project plans and drawings are transferred to the ground on which the structure will be built. As with any other tasks on building project you need to prepare for setting out by identifying and organizing the task detail and the work environment, the tools and material you will be using, safely and environmental requirements.

This module is designed to meet the industry requirement under the Setting out . Occupational standard, particularly for the unit of competency: **Set- out Profile Set- up for Building Works**

This module covers the units :

- work instruction
- site boundaries
- Setting out first line
- Setting out right angle corners
- Install other building lines
- Building lines are checked for squares
- Clean up

Learning Objective of the Module

- Apply work instruction
- Indicate site boundaries
- Sett out first line
- Setting out right angle corners
- Install building lines
- Building lines are checked for squares

- Clean up

Module Instruction

For effective use this modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” giver at the end of each unit and
5. Read the identified reference book for Examples and exercise

Unit one: Plan and prepare

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

- work instruction
- Safety requirements.
- Tools and equipment.
- Commencement date
- Material quantity requirements
- Plans and specifications.
- Setting out material
- Environmental protection

This unit will also assist you to attain the learning outcomes stated in the above module. Specifically, upon completion of this learning guide, you will be able to:

- Apply work instruction
- Follow safety requirements.
- Select tools and equipment.
- Take commencement date
- Calculate material quantity requirements
- Apply plans and specifications.
- Prepare and obtain safely handling and locating setting out material.
- Identify environmental protection requirements

1. Work instruction

Work instructions are the plan that includes requirements and operational details of relevant information to prepare for setting -out activities. it may include plans, specifications, quality, working procedures legislation including equal gender employment opportunity and disability inclusive.

Setting out is a very precise process that determines the exact position of the building on the property and the base measurements that all other workers will follow. Any errors made when setting out a building will affect the outcome of the entire project. It's extremely important to get accurate information and instructions about how to complete a setting out task effectively and safely before you start.

1.1.1 Plan

7.1.1 A drawing showing technical details of a building, machine, etc., with unwanted details omitted, and often using symbols rather than detailed drawing to represent doors, valves, etc.

7.1.2 Specification

7.1.3 Specifications describe the nature and the class of the work; materials to be used in the work, workmanship etc. It is very important for the execution of the work

7.1.4 Quality

As with all construction tasks there are quality requirements related to carrying out setting out 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.

Because setting out involves transferring information from plans to the actual worksite, it's a good idea to complete an initial inspection of the site before you begin.

The work environment itself will determine the conditions that you have to prepare for and will affect the way you complete the task.

7.1.5 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

7.1.6 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

7.1.7 Methods of Obtaining, confirming and applying work instructions

Obtaining work instructions is the process collection of information for dealing with the setting-out activities. More information Obtained the minds of those who will use the information to easily confirm and apply for activities. New and additional ideas come more easily if there are lots of facts Obtained as bases. Gathering additional information means an event and activities that collects different data, facts, figures, and information through employing different methods which intended to the setting-out activities intended objectives. There is a document required when we performing setting-out. like

- Setting-out book
- No of equipment required
- No of tools required
- Safety equipment
- Instruments etc

2. Safety requirements

The word safety refers to your freedom from danger, injury and damage, and to your personal security. General Safety on construction site

A neat and tidy site safes time, eases the work, avoids accidents. If things like not used tools, battens, boards, stones, cables, steel bars etc. are lying around, somebody may trip up and fall down.

7.1.8 What Safety Means:

1. Safety means a complete understanding of your work and knowledge of every step that must be taken and the realization that mistakes could be costly to yourself and to the company.

2. Safety means good judgment. Never rely on luck; always be prepared to cope with unexpected situations and being alert when following your routine.

3. Safety means remembering the safety rules set up by your company and applying them every minute when you are on th

7.1.9 Personal safety

It is dangerous to work with sharp edge tools and talk at the same time. Be agreeable with your neighbor workman. Respect his right and privileges. Remembering accidents prevented today will help make a living tomorrow. Some safety procedures should be followed at all times. Pay close attention to what is being done.

The primary important to protect the workman from accidents is to identify possible hazards and take the necessary safety measures to eliminate the hazardous. Before you go to work on any job, make sure your entire body is properly protected and provided other personal protective equipment.

Safety elements or hard hats should be wearing by workers in all construction sites where they might be exposed to head injury from falling objects.

7.1.10 Safety equipment

Helmet Protects**:-** the carrier from down falling items. It should be a must for everybody who works or moves on a building site.

Figure… 1

Ear protection:- Protects the carrier from damages of the ears continuously working in very noisy environment harms the eardrums forever. Once the eardrums are damaged there is no way of restoring the sense of hearing again.

Figure 2…

Safety boots: - Safety boots are equipped with three safety measures.

It must have:

1. Toes protection hoods a steel hood to protect the toes from down falling heavy things;

2.A steel layer inside the soles protects the carrier from Stepping into a turned up nails.

3. Benzene and oil resistant soles

Figure---3

Safety goggles:- Necessary during chiseling and grinding work, protects. Against chips sparking around from the work piece.

Nylon webbing with locking device and drop D-ring, adjustable length, to be used also with tool pockets, to meet recognized safety standard, (has width of 45mm)

Figure-----4

Wearing clothes:-These are generally worn as a means of protecting. Such protective clothing should be changed and washed quickly and is best kept in a locker or store at the place of work.

7.1.11 Factors that Contribute to the Occurrence of Accidents in the Construction Industry:

1. Fall from heights is the predominant causes of accidents

2. Lack of supervision for workers working at heights
3. Workers lack awareness on OSH
4. Workers have limited trainings
5. Due to lack of training, workers
    a. Build improper temporary structures
    b. Tolerate improperly guarded floors
    c. Work with unstable/unsecured/scaffolds
6. Accident reports lack relevant information
7. Proper investigations are hardly conducted

7.1.12 Safety plans and policies.

1. Identifying and applying necessary requirements

- Safety precautions have to be followed
- Economic aspects has to be taken into account
- Environmental protection has to be considered
- Should ensure that adequate support personnel are available
- Should be checked adequate tools, equipment's and other auxiliary tools are on site.

2. Requirements of safety

Setting out is the establishment of the marks and lines to define the position and level of the elements for the construction work so that works may proceed with reference to them. This process may be contrasted with the purpose of surveying which is to determine by measurement the position of existing features.

Setting out is the process of locating or transferring a point from paper to ground.

3. Regulatory requirements

Leading Causes of Fatal Accidents in Construction Sites

1. Falls from Heights
    - Temporary Structures
    - Excavation
    - Roof
    - Moving Vehicle and Equipment

2.Excavation and Trench Work Cave - in
    - Falling of persons, materials and equipment Asphyxiation
    - Construction Machineries and Equipment
    - Power Tools
    - Woodworking Machine
    - Heavy Machines

3. Cranes and Elevators
    - Overloading

- Lifting and Carrying of Load
- Erection and Dismantling

4. Electrical Accidents

- Electrical Shock and Burns
- Contact with Electric Lines and Underground Cables

7.1.13 Environmental protection

General Provisions: - Protection to every workingman against the dangers of injury, sickness or death through safe and healthful working conditions, thereby assuring the conservation of valuable manpower resources and the prevention of loss or damage to lives and properties.

Accident Prevention

- Real factor in the economic success of any construction job
- Methods of prevention
- Ample evidence
- Profitable
- Lower cost and greater efficiency

General Construction Site Requirements

- Accident prevention is a legal requirement
- Complete understanding between the owner and the contractor
- Practical experience in running construction jobs
- Accident prevention as part of advance planning
- Protection of workers and the public
- Applicable government standard regulations

Construction Hazards

- Open Excavation
- Falling Objects
- Welding Operations
- Dust Dirt
- Temporary Wirings
- Temporary Overhead Electrical Lines

Construction Site Safety Requirement

Construction premises shall have adequate fire, emergency or danger sign and safety instructions of standard colors and sizes visible at all times.

- Construction Safety Signage
- Warning / Safety Signs
- A visual alerting device in the form of a label, placard or other marking which advises the observer of the nature and degree of potential hazards which can cause injury or death.
- Should alert persons to the following:
    - Specific Hazards
    - Degree or Level of Seriousness
    - Probable consequence of involvement with the hazards
    - How hazards cab is avoided

Location

- Safety signs shall be placed such that they will:
- Be ready visible to the intended viewer
- Alert the viewer to the potential

Protection

- Against foreseeable damage, fading or visual obstruction caused by abrasion, ultra - violet light, or substance such as lubricants, chemical and dirt.

7.1.14 Warning Signs Dimension

Where:

S = Area of Safety Sign

L = Distance of Observation

Panel Signs

✓ Area of safety sign having distinctive background color different from adjacent areas of the sign, which is clearly delineated by a line, border or margin.

- **Signal Word Panel**

✓ Area of safety that contains the signal word and the safety alert symbol

- **Message Panel**

Area of the safety sign that contains the word messages which identify the hazard, indicate how to avoid the hazard and advises of the probable consequence of not avoiding the hazard.

- **Symbol/Pictorial Panel**

- Area of the safety sign that contains the symbol/pictorial

Safety Color Code

✓ Will supplement the proper guarding or warning of hazardous conditions.

Standard Color of Signs

- **SAFETY RED: FIRE PROTECTION**
  - ✓ To call attention to fire protection equipment apparatus and facilities.
- **SAFETY GREEN: DESIGNATING SAFETY**
  - ✓ Location of first aid equipment, safety devices, and safety bulletin boards.
- **SAFETY YELLOW : CAUTION**
  - ✓ To designate caution and for marking physical hazards, such as striking against, stumbling, falling, tripping and caught in between.

Fig-6 **safety color Signs**

Where Signage are Needed

- ✓ Usage of PPE prior to entry to the project site
- ✓ potential risks of falling objects
- ✓ Potential risk of falling
- ✓ Explosive and flammables substances are used or stored
- ✓ Tripping or slipping hazards
- ✓ Danger from toxic or irritant airborne contaminants/substances may exist
- ✓ Contact with or proximity to electrical/facility equipment
- ✓ Contact with dangerous moving parts of machineries and equipment
- ✓ Fire alarms and firefighting equipment
- ✓ Instructions on the usage of specific construction equipment

Periodic updating of man-hours lost

3. Tools and equipment

There are several type tools used by workers. Hand tools, in general, ease the work and accelerates the process, improves quality of work significantly and they are very important for everybody who wants to do decent work so that keep tools in perfect order. In addition tools and equipment also represents highly valued assets.

For this reasons it is crucial necessary to handle tools and equipment with extra care. That means cleaning after use, storing neatly, slightly greasing if necessary and regular maintenance.

Carefully handled hand tools are safe tools!

7.1.15 Measuring and Leveling Hand Tools

Measuring Hand tools and instruments are precise devices but needed to be handled with extra care,

TOOLS, MATERIALS AND EQUIPMENT

The nature of the work to be carried out will determine what is needed. You will need the following materials and equipment:

TOOLS,

- Measuring tapes/rules
- Sledge/lump hammers
- Hand/power saws
- Calculators
- Ranging pol
- Spirit levels, laser, optical or automatic levels
- Hose level/rubber water tub
- Carpentry hammers
- Bow sow

MATERIALS:

- Nail bags and nails/nails
- Peg
- String for string lines
- Straight edges
- Timber for hurdles/profiles and pegs
- Graphite pencil

EQUIPMENT/INSTRUMENT:

- Digital Theodolite
- Leveling instrument
- Bulldozer
- Excavator

E.g. Spirit level should be checked every day before use Spirit level

It is used to control the horizontal and vertical alignment of wall surface and edges. The length is at least 80 to 120cm long. It is made of metal, synthetic material or wood. It has two measuring bubbles: one is located at mid length is used to check horizontal positions. While the second one, at the end, is used to check vertical position. This tool requires always to be handled with care and needs to be checked from time to time weather it is still working accurate or not.

Fig-7-Spirit level

Plumb bob

A plum bob is made of metal. When suspended from a vertically attached string, it is employed to check the vertical alignment of corners and surface of walls. A freely hanging plumb bob gives exactly the vertical alignment, because any

Fig-8 **Alignment string /masons' line/**

Alignment string /mason line/, sometimes called, Fish line, is a rope used to transfer horizontal & vertical alignments or lines, i.e., use to mark base line on the floor or vertical point alignments of wall. In other words, it is used to align the walling blocks, (stone, bricks, concrete blocks, hydra form etc). It is available in different thickness & sizes in the market.

Fig-9 Mason line/alignment strin

Graphite Pencil

This is used for marking in wall construction. It is specially produced for this purpose in such a way that it will not wear out fast.

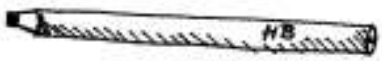


Fig-9 Graphite pencil

Folding meter/rule-2/

For measuring length in wall construction, it is convenient to use rigid scales. Such a measuring scale/ folding rule/ is made of 20cm separate wooden pieces joined together by pins. The scale has subdivisions in cm and mm.

Fig-10 **Folding meter/rule-2/**

Hose level/rubber water tub

It is a transparent PVC hose. It is used to transfer or mark vertical levels on surface of wall when it is filled with water, but without any air bubbles. The water level in each end of the hose is equal. It is an instrument to mark equal levels on site. It is very accurate but not eases to handle.

Fig-11 Hose level

Straight edge/Level/

This is a perfectly straight metal/aluminum/ with all long and short edges parallel to its centerline. It is employed to check straight alignments of walls.

Fig-12 straight edge

Its length ranges from 2m up to 4m. Together with the sprit level, it can be used to bridge over the point to be checked. A straight edge/Level/ can also be made from a wooden plank with perfectly parallel edges.

Angle / Try square

It is used to measure a right angle (90º) of a corner. Used in laying masonry units or blocks at corners of masonry wall.

Fig-13 Try square

Measuring tape

Tape is used to measure dimensions of building parts and distances in site. It is manufactured from steel, plastic or fiber in lengths of 1m, 2m, 3m, 5m, 30m, 50m and etc... In using tapes for measurements, the two points should be aligned perfectly. In addition, when long horizontal measurements are needed, care should be taken to avoid sag on the tape meters.

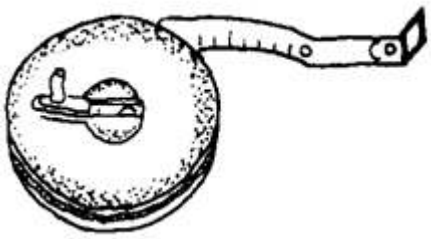


Figure – 14 measuring tape

Claw Hammer: It is used for nail pulling and driving general carpentry work.

Figure – 14 Claw bar

Bow Saw: Bow saws consist of a tubular steel frame and a saw blade for fast cutting of all woods. The bow saw's frame is important, since the thin blade, usually ¾" wide, must be held under high tension for fast cutting. A general purpose saw, it has the advantage of all-round utility and light weight.

Figure – 15 Bow Saw

EQUIPMENT/INSTRUMENT

It is assumed the site engineer is familiar with the use of the more common instruments used in setting-out works.

A sample of the more frequently encountered instruments is listed surveying instruments although the list changes frequently as new and innovative instruments come onto the market.

Although setting-out is greatly facilitated by modern instrumentation, their potential high accuracy should not be taken for granted and they must always be checked before use. Furthermore, accurate setting-out of works can still be achieved with less sophisticated instruments although the task may take longer. The choice of which instruments to use depends upon many factors including:

- size of the site
- complexity of the work
- precision/accuracy demanded
- Economics: the time a task requires may be a dominating factor.

The manufacturer's instructions must be studied and followed. Inexperienced site engineers should take every opportunity to work with more experienced engineers.

Figure -16- Example of Digital Theodolite

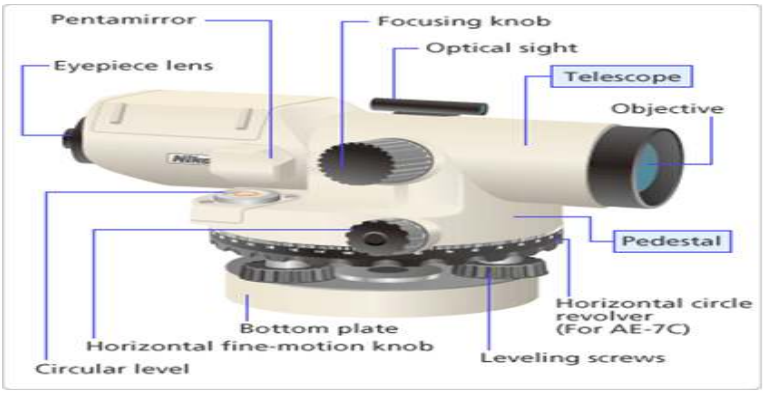


FIGURE.-17-- Leveling instrument

1. Leveling instrument

A level is basically a telescope attached to an accurate leveling device, set upon a tripod so that it can rotate horizontally through 360°. The following figure shows the level and its components.

2. Tripod

The tripod consists of three legs and a head where the level instrument is mounted. The tripod could be of aluminum or wood material. When leveling the level instrument, the tripod head must be set approximately level beforehand by adjust the tripod legs.

Figure – 18 Tripods

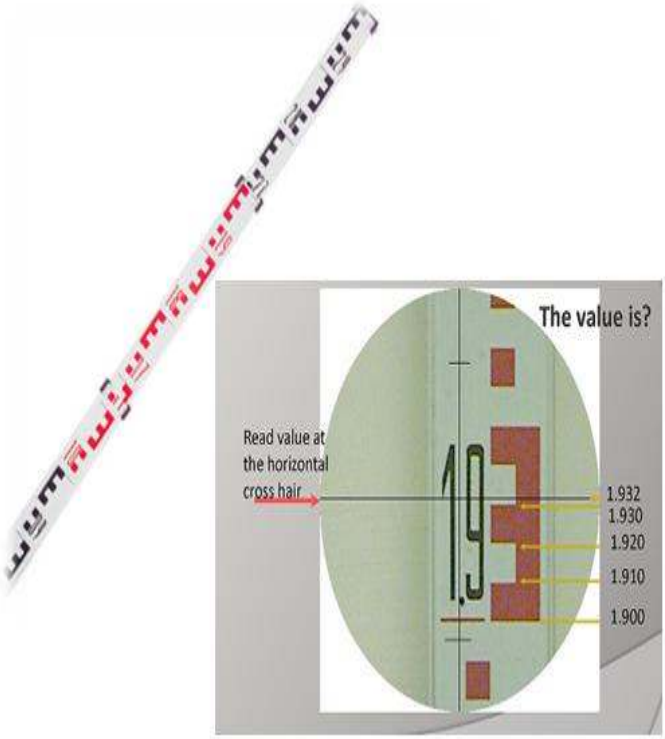


Figure – 19-Leveling staff

Leveling staff

The leveling staff is a box section of aluminum or wood, which will extend to 3 or 5 m in height by telescoping, hinging or addition of sections. One face has a graduated scale attached for reading with the cross-hairs of the level telescope.

4. Commencement date

7.1.16 Site work preparation

It is the significant amount of work done on the site to prepare new building and to complete it. On average, site work account for 40% and 60% of the total project cost. There are different works concerning a site wok, from them some are listed below.

7.1.17 Site Clearance and Removal of Top Soil

On small sites this could be carried out by manual means using hand held tools such as picks, shovels and wheelbarrows. On all sites mechanical methods could be used the actual plant employed being dependent on factors such as volume of soil involved, nature of site and time elements.

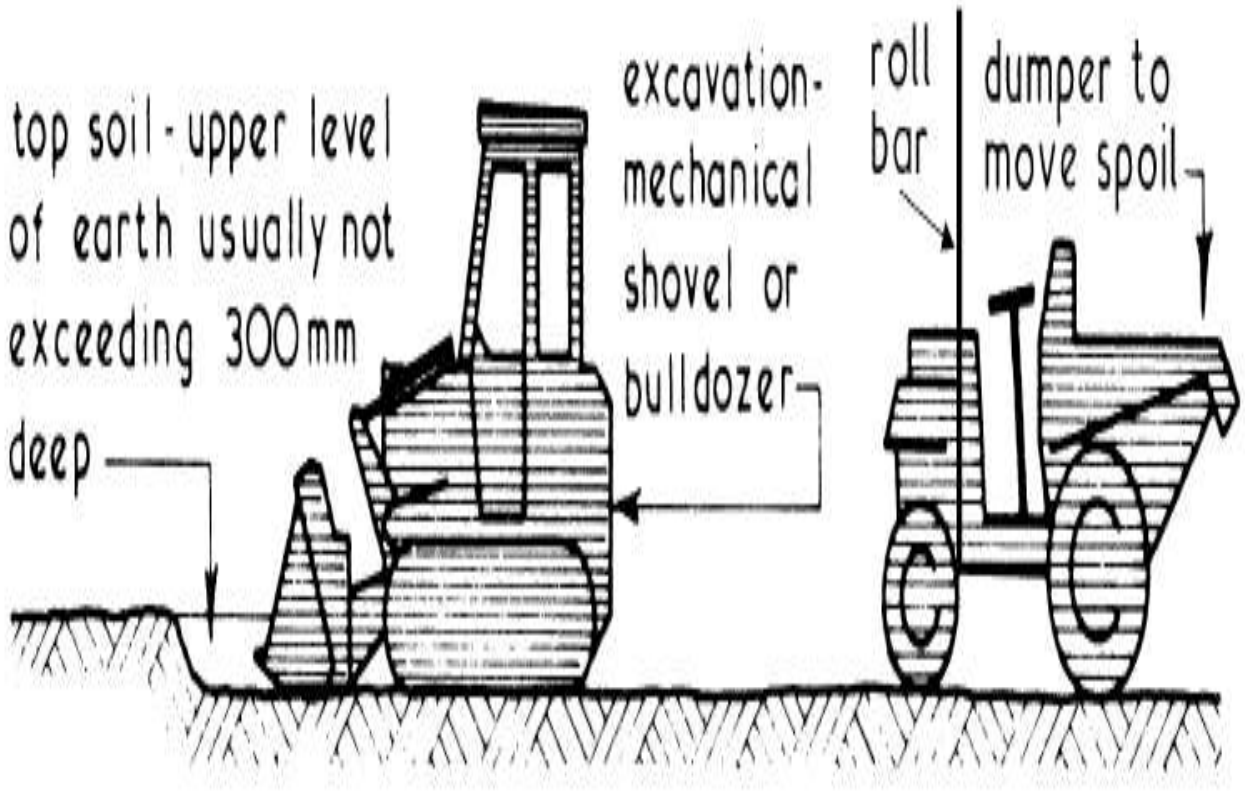


FIGURE-22- Excavation machine

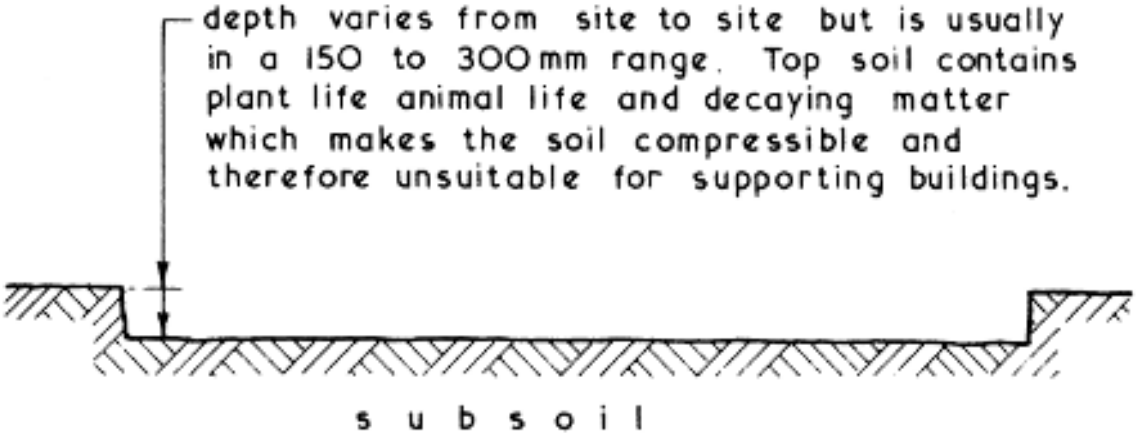
1.4.3. Reduced Level Excavations ~on small sites … hand processes as given above on all sites mechanical methods could be used dependent on factors given above.

1.4.4.Earth work/excavation

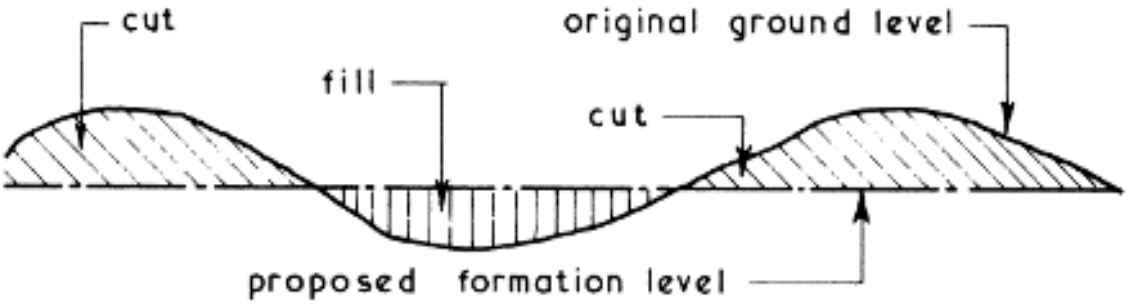
Excavation to hollow out in building terms to remove earth to form a cavity in the ground.

Types of Excavation ~

Oversite – the removal of top soil (Building Regulations requirement.)



Reduce Level – carried out below oversite level to form a level surface on which to build and can consist of both cutting and filling operations. The level to which the ground is reduced is called the formation level.



Setting out consideration of the reference

It is the process of identified and marked the building line or base line from which all other line. Building line can be given as a distance from either

- Center of the road
- The curve line
- Existing building

When setting out building lines, the first step is to measure the building line from the boundary or existing building. Then you need to determine the approximate length and

position of the string line, together with the building clearance measurement at each end, for locating the hurdle.

Pegs and hurdle profiles are installed, then the location for the line is accurately marked with nails on the profiles and the line set taut into position so it is correctly aligned with the boundary.

Once this has been completed, the right angled corners can be set out, the other building lines installed and finally the lines checked for square and measurements checked for accuracy.

5. Material quantity requirements

Material quantity requirements are calculated in accordance with plans and specifications .materials appropriate to the work application are identified.

The work man site preparation begins before you starting any work,

- Building has been designed
- Constriction documents have been approved
- Main contractor has been appointed by the client to construct the building.

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.

Once the profile boards are fixed, they should not be disturbed until the completion of basement level (plinth) of the building.

Calculate the quantity of each type of material required to complete the task. a verify of tools &equipments is needed to do digging, lifting, fixing and measuring jobs that are part of the work. the basic list should include:-

7.1.18 PROCEDURE IN LAYING OUT FLOOR PLAN

1. Read and interpret working drawing
2. List the tools and materials needed
3. Transfer the measurement from the working drawing to the actual size of the object on the actual site.
4. Locate the position of the object, measure and mark with peg stakes.
5. Construct a batter board for vertical and horizontal alignment based on the plan.
6. Prepare the wall foundation based on the plan, tamper it as required.
7. Measure the height of the stone and mark it on the batter board. (See the working drawing)
8. With the use of the string line and nails connect a line across to the other batter board.

9. Lay the stone following the line. Make sure that the stone are with-in the tolerance, parallel and vertical.

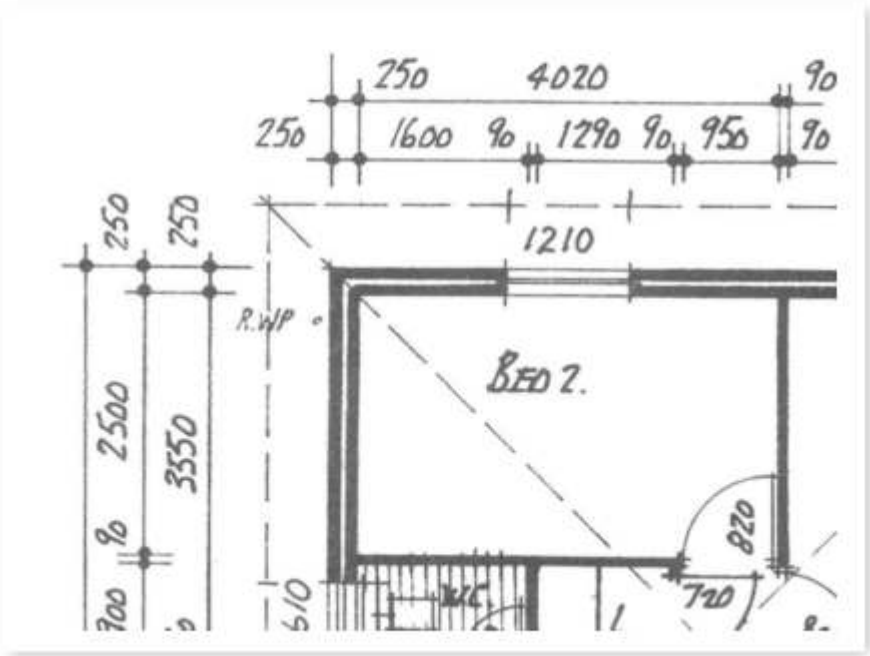
10. Layout line must be followed from the first course to the last course of the wall.

11. Clean the tools and the area after the work is done

The following answers are provided to you as a guide only. You should review them all to ensure that they meet your requirements.

1. Calculate the net surface area of the walls of Bed 2 in this part plan.

   The ceiling height is 2450, the door is 2060 high and the window is 1810 high.



FIger-1- floor plan

Formula = A = length × width, P = (length + width) × 2

P = (4.020 + 2.500) × 2 = 13.040

Gross A = 13.040 × 2.450 = 31.948

Deductions 1.210 × 1.810 = 2.190 (window)

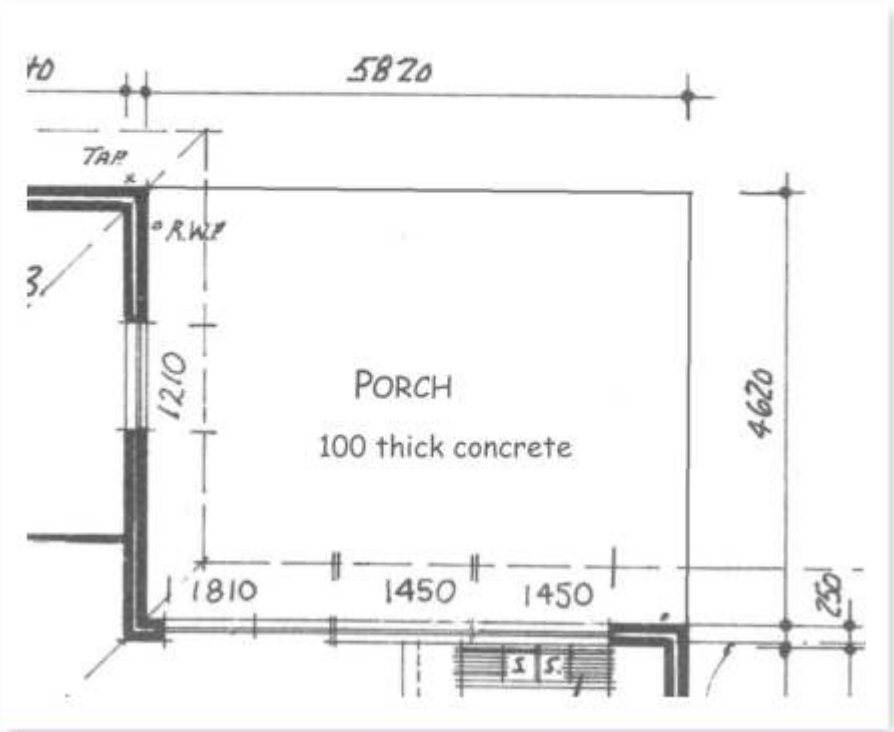
0.82 × 2.060 = 1.689 (door)

2.190 + 1.689 = 3.879

31.948 – 3.879 = 28.069 m^2

Answer = **28.069 m^2**

2. Calculate the volume of concrete required for the porch slab in this part plan. Allow approximately 5% wastage.



Formula = V = L × W × H (thickness)

= 5.820 × 4.620 × 0.100

= 2.689

To allow for wastage, round up to nearest 0.2.

Answer = 2.8 m^3

6. Plan and specifications

Plan and specification include:-

The drawings, specification and other documents from which the building is to be constructed, altered, removed or demolished.

The proposed procedures for inspection during construction.

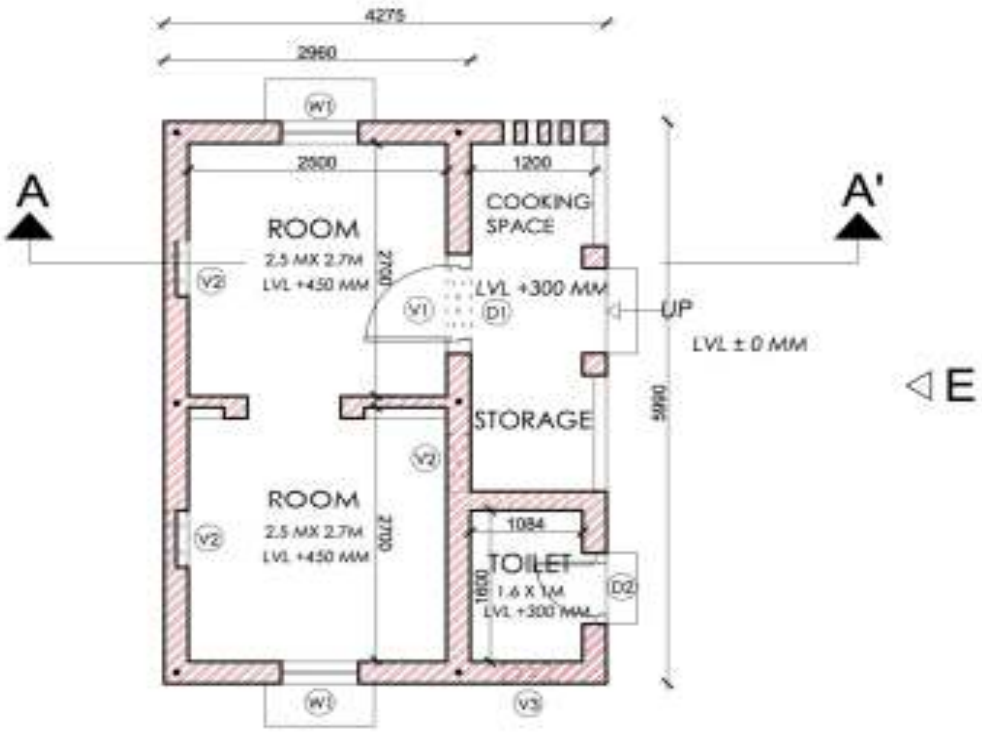
T he definition of intended building use.

Details specified systems and procedure for their inspection and repair.

1.6.1. Plan

The purpose of Plan is to present clear, concise and easily readable information on a proposed building project. This way everyone involved in the project is informed of what exactly is required. Various types of drawing methods are used to communicate this information.

Construction drawings are used to communicate ideas and information in a graphic form. Sketches are prepared first, then final working drawings are completed once the design details have been decided. Each drawing should be neat and clearly labelled. Sketches are not always drawn to scale.



PLAN OF THE HOUSE

7.1.19 The plans for many important buildings were once publicly available.

A set of intended actions, usually mutually related, through which one expects to achieve a goal. He didn't really have a plan; he had a goal and a habit of control.

- A two-dimensional drawing of a building as seen from above with obscuring or irrelevant details such as roof removed, or of a floor of a building, revealing the internal layout; as distinct from the elevation.

Special requirements Before you start work, you need to be aware of any company policies, procedures or requirements that you must comply with when you're handling carpentry materials in a workshop or on a worksite. While these policies and procedures may vary from company to company, they will commonly cover key points such as:

- the quality of work required
- the materials to be used
- the procedures for handling and storing materials
- the safety policies and procedures you must follow.

7.1.20 Location plan

It shows the location, size and nature of the plot, on which the building is to be constructed. And the immediate surroundings in the scale.

The exact position of the building and the boundary is marked by the building line which is defined by the municipality of the town or city.

7.1.21 Preparing work area

In order to provide the site worker with a set-up which allows him to carry out the process required efficiently, effectively and economically, the site should organize in proper manner.

A proper building Site has to be organized according to the following measures.

- Safety precautions have to be followed
- Economic aspects has to be taken into account
- Environmental protection has to be considered
- Should ensure that adequate support personnel are available
- Should be checked adequate tools, equipment's and other auxiliary tools are on site**.**

7.1.22 Working drawing interpretation

Working drawings

They are prepared in greater detail with all dimensions given to avoid the need for taking measurements from scale. They comprise of all plans and elevations as well as an adequate number of cross-sections. Materials to be used for the various parts of the building should be indicated in different symbols. They are the most important components of building drawings since they provide detail information on the internal as well as the external view of a building.

7.1.23 Components of working drawing

Survey beacons: these are concrete pillars located at principal corners of the site and at every change in the direction of boundaries. They define the boundary and area of the site.

Elevations: these are the different heights on the surface of the site in relation to a standard reference point known as the bench mark (BM).

Locations: which have equal elevations are joined together using contour lines.

These lines help to define the topography of the land within a site.

Site orientation: these refer to a system of defining the site in terms of its direction to the north, south, east and west. Orientation is important in planning the building area to make in to consideration such factors as the direction of rain, wind and

Physical features: these are permanent objects or features existing within the site or adjoining sites which are used for referencing or identification of the site.

Example

- **Existing buildings,** trees, roads, fences, etc.
- **Access road:** these shows the means of reaching the site.
- **Utilities: A** site plan shows utility supply lines such as for water, electricity and gas.

The following measures should to be taken to organize a building site.

- The site should be accommodated rest rooms, toilets, changing rooms, office, etc, and working staffs.

- Lockable store room for material, machines and equipment

- Protected working places and sheds during rainy season to secure preparation and work process.

-There should be suitable access roads and circulation space for transportation of materials and supply.

-The site should accommodate and facilitated with water, electric power supply and temporary storage for disposal.

PROCEDURE IN LAYING OUT RETAINING WALL

1. Read and interpret working drawing
2. List the tools and materials needed
3. Transfer the measurement from the working drawing to the actual size of the object on the actual site.
4. Locate the position of the object, measure and mark with peg stakes.
5. Construct a batter board for vertical and horizontal alignment based on the plan.
6. Prepare the wall foundation based on the plan, tamper it as required.
7. Measure the height of the stone and mark it on the batter board. (See the working drawing)
8. With the use of the string line and nails connect a line across to the other batter board.
9. Lay the stone following the line. Make sure that the stone are with-in the tolerance, parallel and vertical.
10. Layout line must be followed from the first course to the last course of the wall.
11. Clean the tools and the area after the work is done.

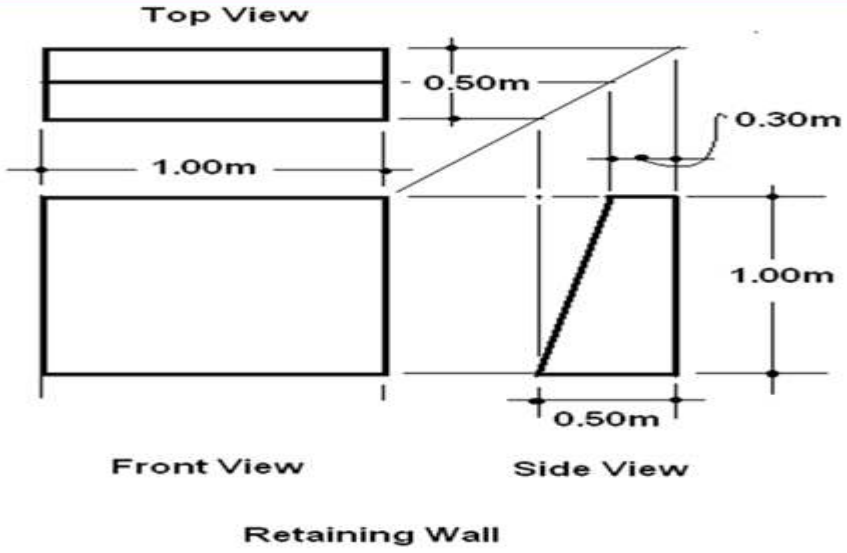
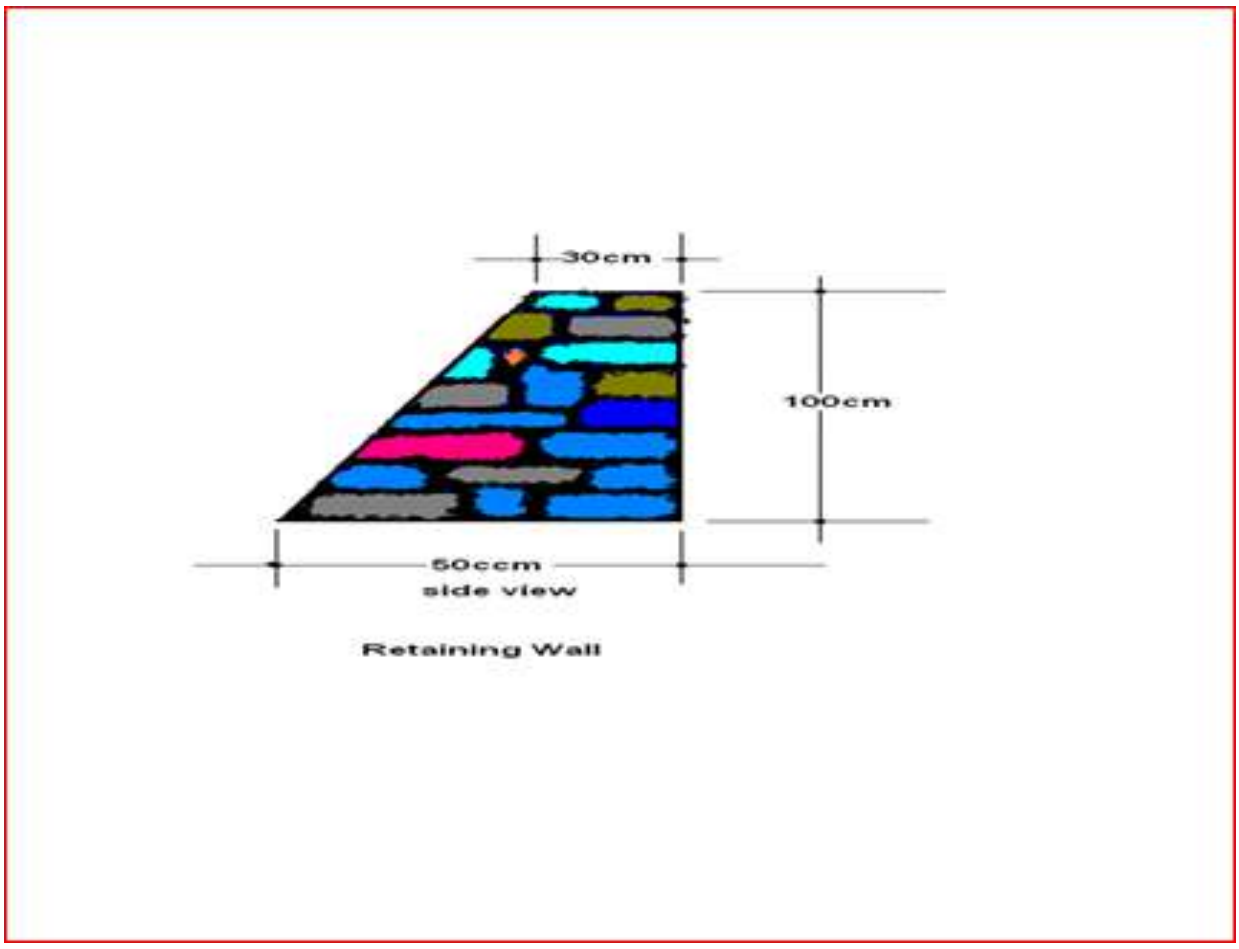
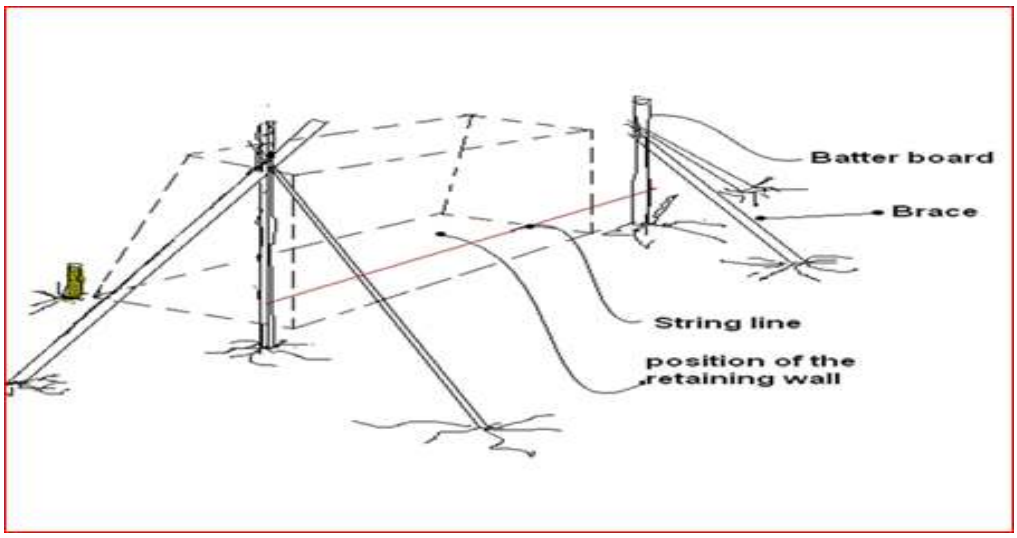


Figure –48- Retaining wall plan/viws





7. Obtaining, prepare safely handling and locating setting out material

Introduction of Preparing Materials

When you're planning any task on a construction project, you must make sure that you have the right tools, equipment and materials, and that everything is in safe working Condition.

When using any tools, equipment or materials on a construction site, remember to:

- check the condition of all tools before work begins; never use faulty equipment and report any that you find
- read the manufacturers' instructions for any tools, equipment and materials you're not familiar with
- be aware of materials that may be hazardous and check for warning labels or a safety data sheet (SDS)
- only use tools for their designed purpose.

8. environmental protection

9. Introduction

Construction industry, in general, is comparatively less organized and involves participation of major percentage of unskilled labor as compared to other industrial sectors.

As a major employment generator in many parts of the world, construction is also a sector associated with a proportionately high number of job-related accidents and diseases.

Accidents are generally unavoidable in construction projects but the number and gravity of accidents can be reduced considerably if proper safety measures are taken beforehand.

Health and safety in the context of construction industry are the discipline of preserving the heath of those who build, operate, maintain and demolish engineering works, and others involved in those works. The term safety generally applies to the protection from risk of injury and from avoidable accidents.

The term health refers to the well-being from the immediate and long-term effects of exposure to unhealthy working condition.

Health and safety are not only confined to construction works on- site.

Engineers, architects and surveyors are exposed to hazards during the investigatory stage of a project and while carrying out inspection tasks during the construction phase and on completed works.

Designers, in particular, carry both a moral responsibility and a duty of care for the safety of construction works, maintenance staff, demolition workers and the general public.

7.1.24 Environmental aspects of safety protection

The construction and demolition industry has consistently had a poor record regarding pollution of land and watercourses and the consequent damage to wildlife and natural habitats. The site engineer has a role to play in improving the environment by leadership and example.

Identify if the site owner/operator, etc. has an environmental and/or sustainability statement. Actively consider requiring or writing one; the paragraphs in this section would provide the essential content, and also need to be taken into consideration.

By your actions, positively avoid causing unnecessary damage or harm to the environment and adopt an awareness of environmental matters to minimize the effects of our activities. Where possible, adopt best practice regarding all international legislative and regulatory requirements and agreements.

Where practicable review activities and operations to identify environmental aspects and priorities action to address them.Take a lead in raising awareness of environmental matters among employees, contractors, clients, suppliers, visitors, etc.

Where you have the influence, you should encourage minimizing energy and resource consumption by promoting effective and efficient measures consistent with best practice. By influencing suppliers and contractors you should ensure that services and goods procured support national environmental policy.

Where possible influence and minimize the use of toxic materials and waste generated to prevent pollution. Dispose or recycle any waste in a responsible and appropriate manner. Ensure good management practices by reviewing them regularly, to verify their effectiveness in achieving environmental gains.

7.1.25 Regulatory requirement

In every site there are a lot of electrical hand tools and machines employed and in use. The purpose of every electrical tool is to ease the work, to accelerate, safe time, ease the work process, and to attain a better quality of work. The most common are drilling machine, concrete mixer, circular saw, lamps, extensions cable, cutting machines, electrical vibrators etc. But when the tools, machines and distribution board are not in safe condition, i.e., if they are misused, miss Fig. 7 handled, and installed improperly, they are source of hazard and accidents to anybody. A broken cable, for instance, exposed cable wires connected to body of a machine under power, and if someone touches the machine, it will give a heavy electrical shock or accident can possibly exist.

Similarly, human body conducts a current, if there is a direct contact between his body and any materials of good conductors with electrical power, the person becomes part of the circuit

and the current starts to flow through his body. Starting from a current of 0.05 Ampere the power can even cause of death.

As illustrated in Fig. 7 an inappropriate use of a hand lamp and misaligned or confusing cable lining is cause for danger. If the cable is broken by any means, and if somebody touches the bucket, trowel or iron bar or stops on the floating water, he will suffer a heavy electrical shock and may cause of death.

7.1.26

7.1.27 Local Air Pollution Prevention and Control (LAPPC)

these regulations apply to smaller industrial activities, known as Part B Installations, such as concrete batching or concrete crushing. Local authorities, as the regulators, are responsible for controlling emissions from these premises and set conditions in permits they issue to achieve this. Conditions are based on Best Available Techniques (BAT)12, which require that the cost of applying a technique is not excessive in relation to the environmental protection it provides. The Secretary of State for Environment, Food and Rural Affairs has produced Process Guidance Notes, which form the statutory guidance on what constitutes BAT for each regulated process. If the regulator believes the operator has contravened, or is likely to contravene any permit conditions, enforcement action can be taken. Local authorities should be aware that certain installations, such as concrete batching, are not covered by authorizations on demolition and construction sites, but must be included as planning conditions.

10.Self-check-1

Test-I Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

A	B
---------1. Folding meter/rule	A. measuring length in wall construction

---------2. Graphite Pencil	B. used for marking in wall construction
---------3. plum bob	C. check the vertical alignment
---------4. Helmet Protects	D. the carrier from down falling items
---------5. Spirit level	E. used to control the horizontal and vertical alignment of wall surface and edges
	F. Used when ruler is too long

Test II: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has 5Points.

1. What is the Safety means?
2. Write down at least four types of tools?
3. What are the Work instructions?
4. Write the difference between Spirit level and plum bob?

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

You can ask you teacher for the copy of the correct answers

Unit Two: site boundaries

This unit to provide you the necessary information regarding the following content coverage and topics:

- Survey pages for site plan.
- boundaries of site

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

- locate and Identify Survey corners pegs
- Identify boundaries of site

7.1.28
7.1.29
7.1.30
7.1.31
7.1.32
7.1.33
7.1.34
7.1.35
7.1.36
7.1.37
7.1.38
7.1.39
7.1.40
7.1.41
7.1.42
7.1.43
7.1.44
7.1.45
7.1.46
7.1.47

7.1.48

2.1 Survey pages for site plan. **11.**

Introduction

The first task in the process of setting out a building is identifying the exact size and Shape of the lot. Boundaries are used as reference lines from which measurements are Made to determine the position of the building

2.1.1 Locating the boundary markers

The size and shape of building lots are determined by a licensed surveyor from the

Registered plan of the area. The surveyor identifies the site features by driving survey

Pegs into the ground at appropriate points eg boundary corners and easement

Positions, and issues a survey certificate showing where the site boundaries ar and how they can be identified.

The survey certificate is used by the architect whendesigning the building and creating a site plan.

2.1.2 Working drawing interpretation

Working drawing:-They are prepared in greater detail with all dimensions given to avoid the need for taking measurements from scale. They comprise of all plans and elevations as well as an adequate number of cross-sections. Materials to be used for the various parts of the building should be indicated in different symbols. They are the most important components of building drawings since they provide detail information on the internal as well as the external view of a building.

2.1.3 SITE PLAN

A site is a parcel of land which is made up of one, two or more plots. Site plan is a drawing showing various properties in terms of their owners, locations, elevations, states of development and features such as roads, utility supply lines, etc.

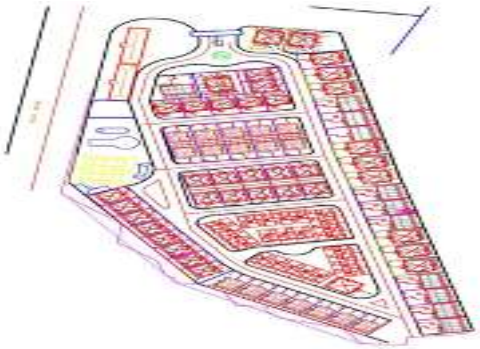


Figure – 56- site plan

2.1.4 . Components of a site plan

- **Survey beacons:** these are concrete pillars located at principal corners of the site and at every change in the direction of boundaries. They define the boundary and area of the site.
- **Elevations:** these are the different heights on the surface of the site in relation to a standard reference point known as the bench mark (BM).
- **Locations:** which have equal elevations are joined together using contour lines. These lines help to define the topography of the land within a site.
- **Site orientation:** these refer to a system of defining the site in terms of its direction to the north, south, east and west. Orientation is important in planning the building area to make in to consideration such factors as the direction of rain, wind.
- **Physical features:** these are permanent objects or features existing within the site or adjoining sites which are used for referencing or identification of the site.

Example

- **Existing buildings,** trees, roads, fences, etc.
- **Access road:** these shows the means of reaching the site.
- **Utilities: A** site plan shows utility supply lines such as for water, electricity and gas.

❖ Procedures to set out a building

1st - Collect the necessary tools, equipment & materials

- Working drawings
- Sharp pegs
- Timber Profiles
- Mason sledge hammer to drive pegs
- Claw Hammer & nails
- A ball of string to create the out line
- Builder's square
- Steel tape
- Water level
- Plumb bob

2nd – determine the frontage line on the site. That is the line beyond which the new building must not

project. It can be positioned by referring to the layout plan of the building. Pegs are driven in at

positions which are clear off the structure and a string line is then strained between these two pegs (1 and 2), secured to nails in, the top of each.

3rd (corners) of the building. It is from these pegs that a line is strained at 90° to the frontage line.

On a single rectangular building of modest size, the builder's square would be adequate to set

this right angle. Alternatively the 3-4 -5 formula can be applied by means of tape. By measuring

3 m on the frontage line and 4 m on the return with a 5 m hypotenuse a right-angle will have

been formed.

4th .which again is kept well clear of the structure. From this point it is possible to position the last

Two quoin pegs (7 and 8) at distances taken from the drawing between the frontage line and the

Rear line of the building.

5th .diagonally from peg 3 to peg 8 and then from peg 4 to peg 7 - these distances should be exactly the same if the building is rectangular and all angles are right angles.

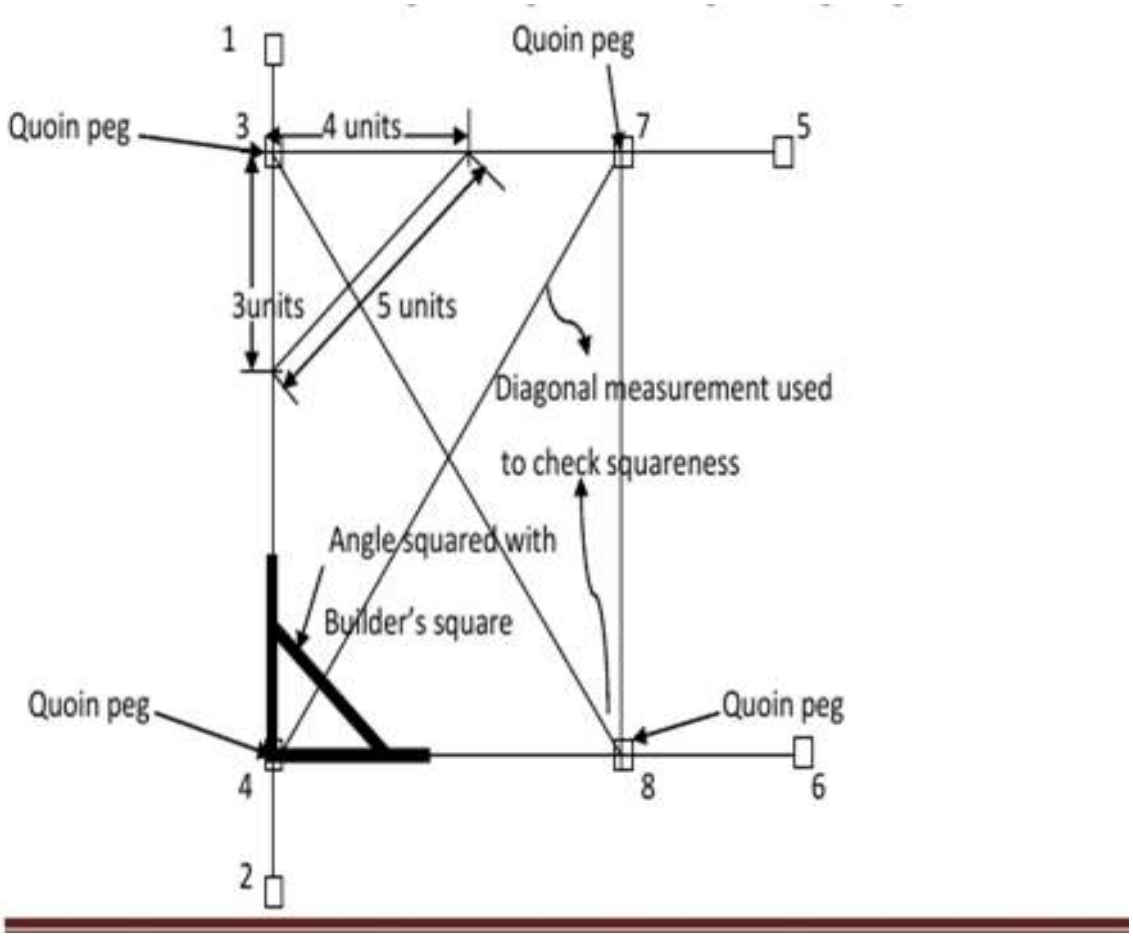


Figure – 57- Checking setting out profile

2.2 Boundaries of site

2.2.1 Identifying boundaries

The following standards shall apply to the field definition and reporting of site boundaries.

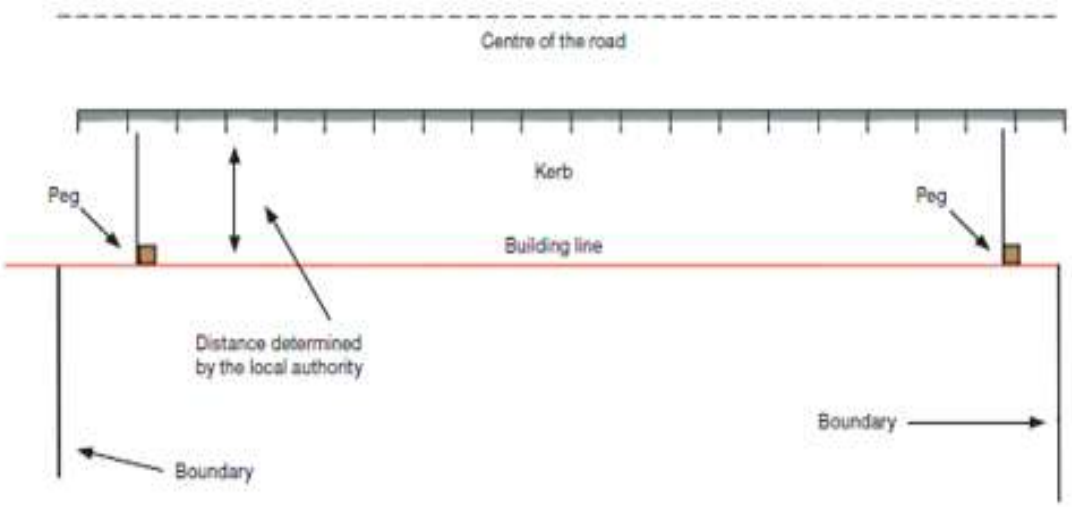
A. **Natural boundaries** are those defined by the extent of a natural landform or physical feature, where it can be reasonably deduced that the extent of archaeological remains is constrained by geomorphologic site formation processes.
B. **Observed boundaries** are those determined on the basis of the horizontal extent of archaeological remains observed during a field study

C. **Arbitrary boundaries** are those that reflect artificial and/or administrative boundaries (such as property lines or rights-of-way), the presence of existing disturbance or developments, or where sites extend beyond project area boundaries.

2.2.2.Procedure Of setting out from the existing

Step 1: set out the building line from the boundary

Assume that the building line has been stated as a distance from the curb of a road: Two square offset lines are set from the curb to the position of the building line at a distance apart which is greater than the width of the proposed building. Pegs are positioned at these points, and ranging line is fixed to these, giving the position of the building line as shown below

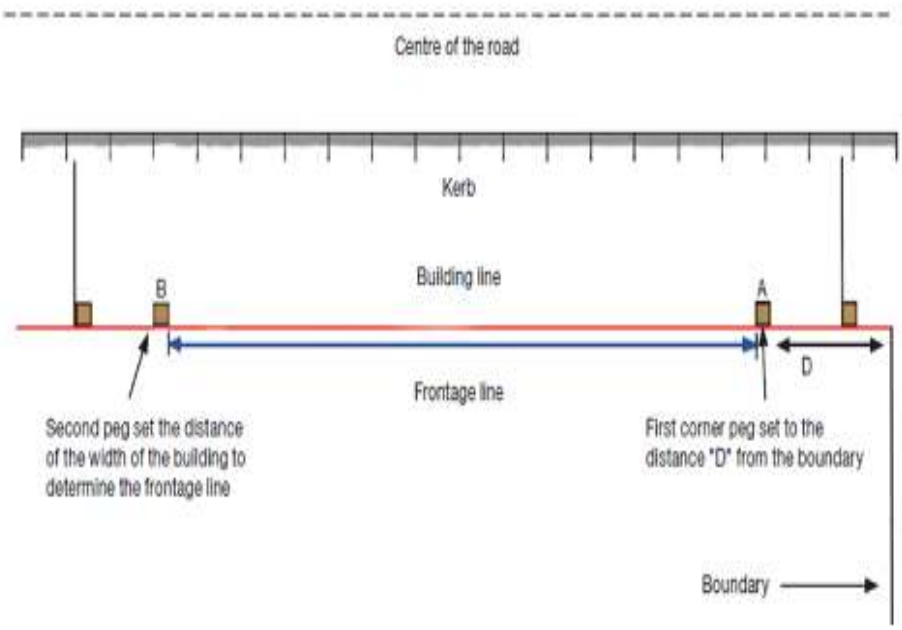


Setting out the building line

Step 2: Set out the base (frontage) line

A. After taking the dimensions from the drawing, relating to its position, the frontage line should be set out. This will either be on the building line or behind it.
B. The first corner peg (A) will be positioned from dimensions given on the drawing which relate to site features such as distance from a curb, gate posts, boundary intersections etc. The dimensions pinpoint the position of the corner. Alternatively, the frontage line may be simply on the building line so the only information required to set it out is the distance from a boundary. The diagram belowillustratesthis situation where the first peg is positioned on the building line a given distance (D) from the

boundary.

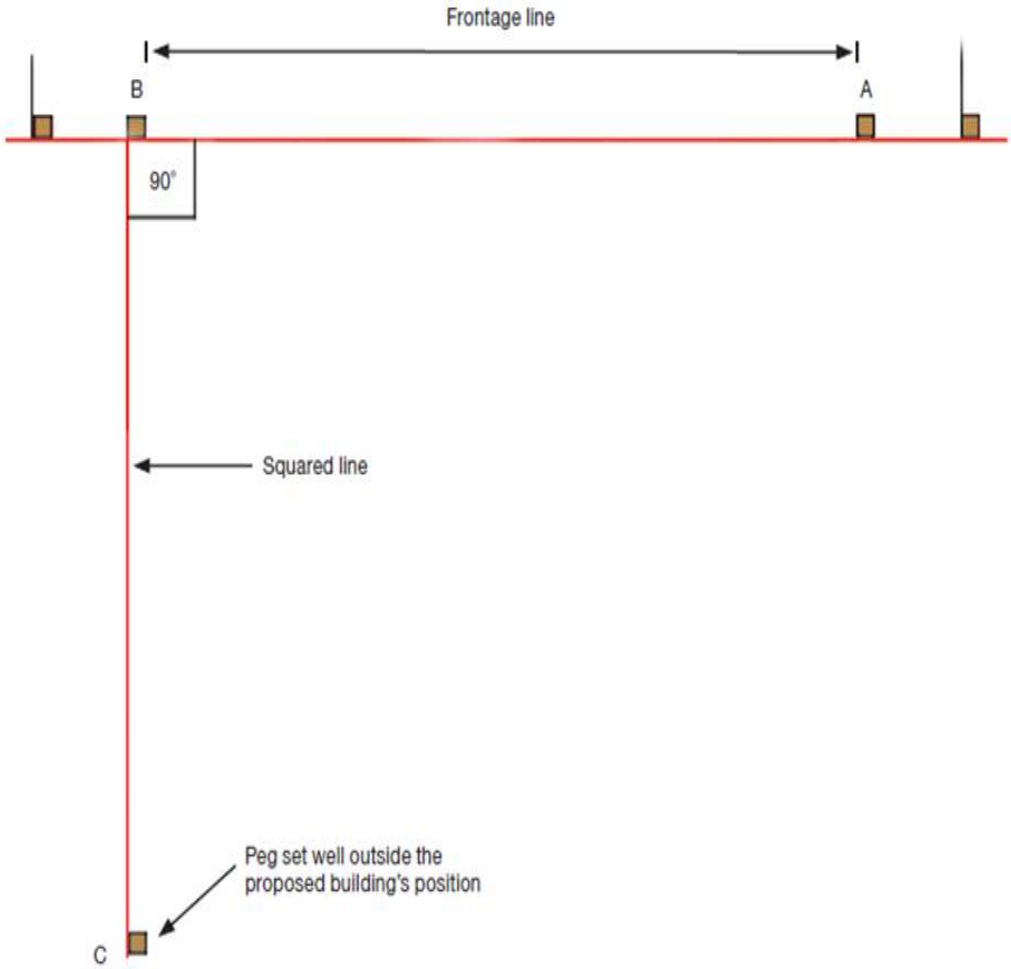


(c) Following the positioning of the first peg, the second peg (B) is positioned after carefully measuring the width of the building along the frontage line.

A nail is knocked into each peg to determine the exact position of the corner and to allow simple fixing of lines.

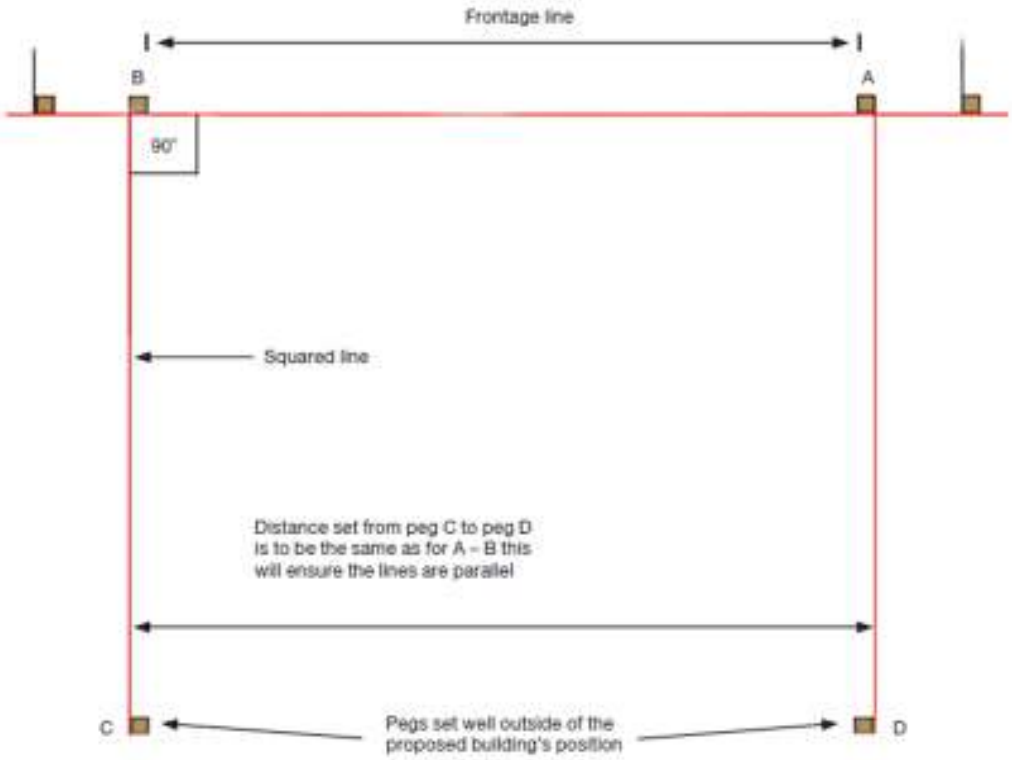
Step 3.Set out the first right angle to the frontage line

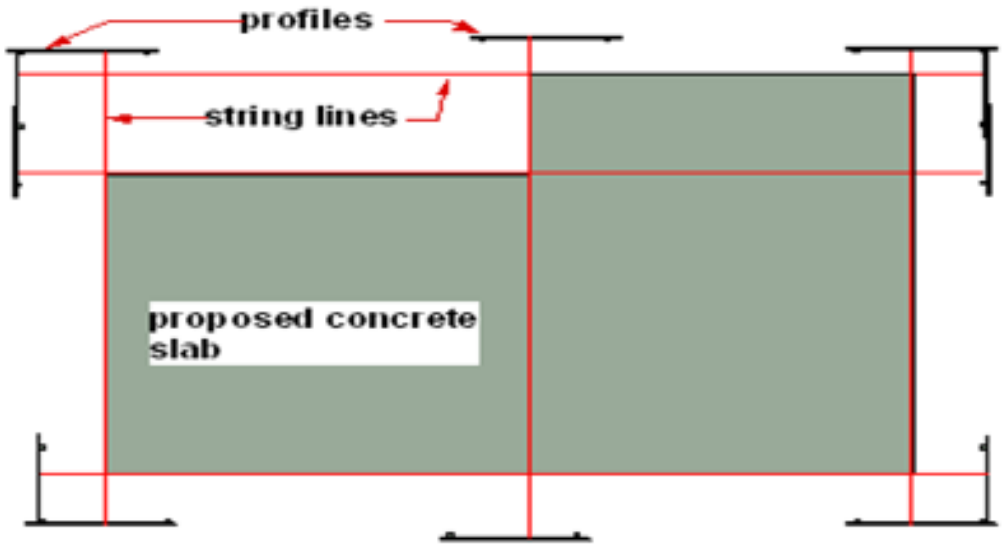
A. Attach a taut line to the nail on a corner peg (B here) and extend this well beyond the length of the wall to be set out.
B. Adjust the line carefully to cross the frontage line at 90˚ by the use of a builder's square, optical site square or the 3:4:5 methods.
C. When the line is correct, knock in a peg (with nail) at a distance greater than the length of the wall, and attach the line tautly. Check for square again and adjust if necessary.

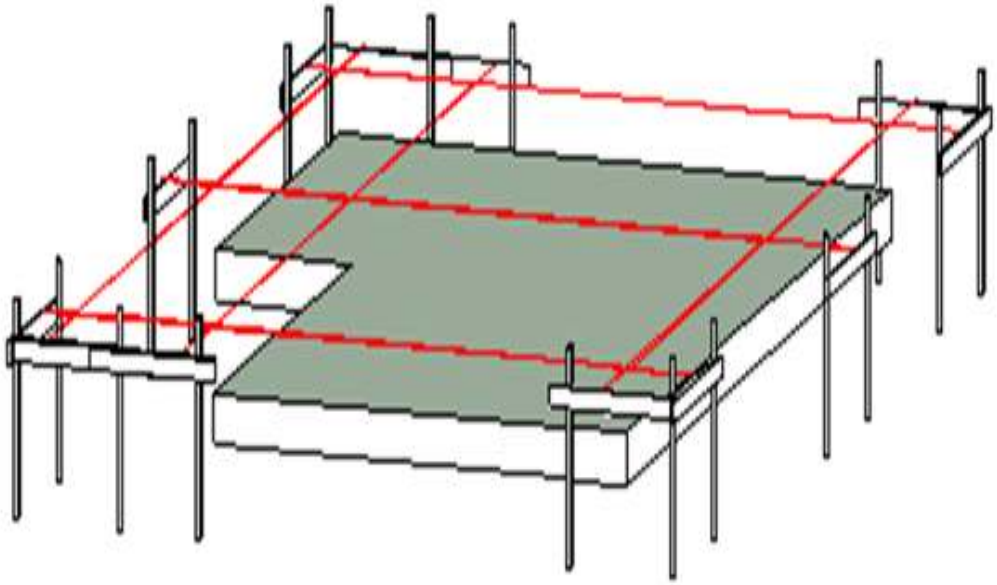


Step 4.Set out the second right angle to the frontage line

A. Measure the same length of the building's frontage line and set a peg (D) at same distance from the frontage line as peg C.
B. Attach the ranging line and check the dimensions before continuing







Setting string lines

12.Self -check-2

13.Test-I Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

A	B
---------1. Access road	G. shows the means of reaching the site
---------2. Survey beacons	H. used for marking in wall construction
---------3. Site plan	I. are concrete pillars located at principal corners of the site and at every change in the direction of boundaries.
	J. drawing showing various properties in terms of their owners, locations, elevations, states of development and features such as roads, utility supply lines, etc

Test II: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has Points.

1. What is the Working drawing?
2. Write Components of a site plan?
3. Write procedures of set out a building?

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

You can ask you teacher for the copy of the correct answers

Unit Three: Set out first line for building alignment

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

- Measurement of building line.
- position of line and building clearance
- Installing pegs and hurdles/profiles
- Mark footing width on profile
- Mark location with nails on hurdles/profiles

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

- *Determine measurement of building line.*
- *Determine position of line and building clearance*
- *Install pegs and hurdles/profiles*
- *Mark Foote width on profile*
- *Mark and locate with nails on hurdles/profiles*

3.1 Measurement of building line

Setting out involves working out the location and extent of the building on site. Each site is different, so start by establishing the particular conditions. Use information from territorial authorities' records combined with an on-site inspection.

- **Understand your site**

Where construction is being carried out, it's usually necessary to:

- accurately locate boundary lines
- determine ground conditions
- verify the location of underground and overhead services
- obtain site levels – it may appear flat or level, but appearances can be deceptive
- accurately verify the position of existing structures, such as the house, garage, outbuildings and significant trees
- Use a contractor with the appropriate carpentry or foundations license.

- **Set-out starts with designer**

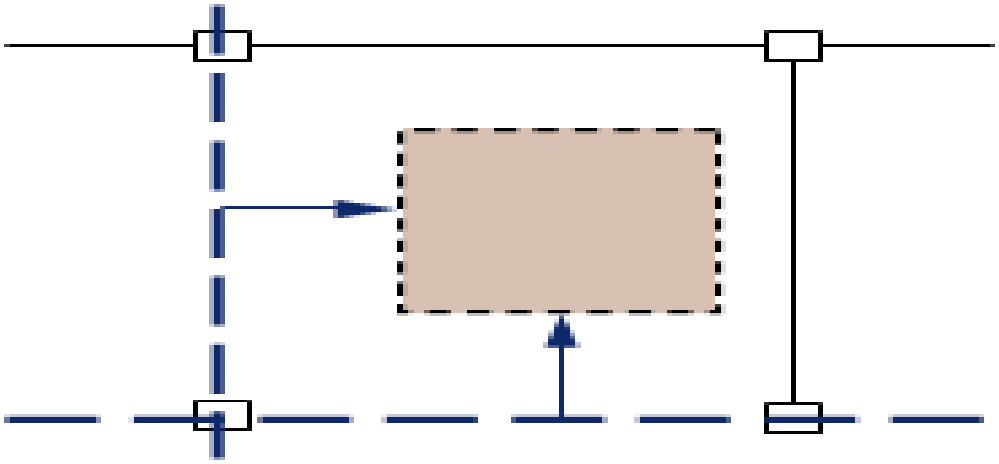
Building set-out starts with the designer – the building needs to be designed to fit to side yards, set-backs and height envelopes. Careful and un- ambiguous set-out instructions on the drawings make it easier for the builder to follow.

The designer's instructions must:

- determine the reference point for the set-out the front or side boundary (boundary pegs must be located)
- Give single offsets from the building to the most critical points on the boundaries (see Figure1) – they must not dimension set-outs to opposing boundaries
- establish a permanent datum point for setting out the height of the building in relation to the ground or other identified features – the datum point may be well clear of the building and established on a fixed feature such as a manhole cover.

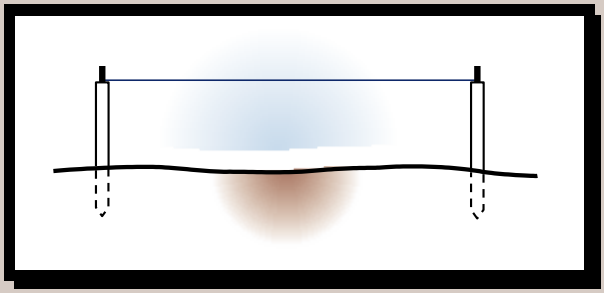
3.1.1 Marking the boundary

Once survey pegs have been located and identified, string lines can be set up to mark the boundary and provide a guide for finding the position of the proposed building.



String lines

String lines are some of the oldest and most basic hand tools used in building and construction. They're usually made from nylon or fine cotton string about 2–3 mm in diameter and used to create a straight line between two points.



A string line is set up by attaching one end of the string to a nail fixed into the top of a timber peg that's been driven into the ground. The string is then pulled taut (tight) and securely fastened to another peg.

The site should be cleared of all unwanted obstacles before string lines are set out and care should be taken to avoid any distortion to the line caused by wind, uneven ground, plants and grass, or debris.

A string line is set up by attaching one end of the string to a nail fixed into the top of a timber peg that's been driven into the ground. The string is then pulled taut (tight) and securely fastened to another peg.

The site should be cleared of all unwanted obstacles before string lines are set out and care should be taken to avoid any distortion to the line caused by wind, uneven ground, plants and grass, or debris.

Where you set the string lines to identify the site boundaries will depend on different factors, including:

- ✓ The shape of the lot
- ✓ The position of the proposed building
- ✓ Obstacles such as trees or existing structures
- ✓ Buildings built on the existing boundary line on adjacent lots
- ✓ Fences on the boundary line of adjacent lots.

Lots with level ground and boundary lines at 90° to one another are the easiest environment on which to set out a building. In this situation, you only need to set string lines on two sides of the lot, as all building measurements can be taken from these two reference lines.

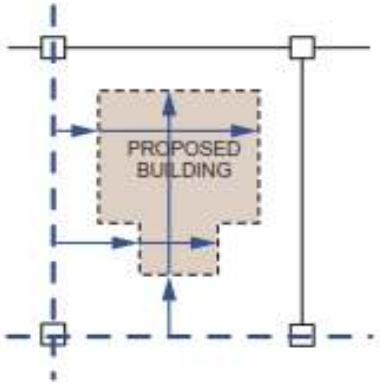


Fig-3 level 90°

3.1.2 Procedures how to make boundary line

Step-1

Locate the two boundary pegs that identify the **front** boundary and set a taut string line between these two points.

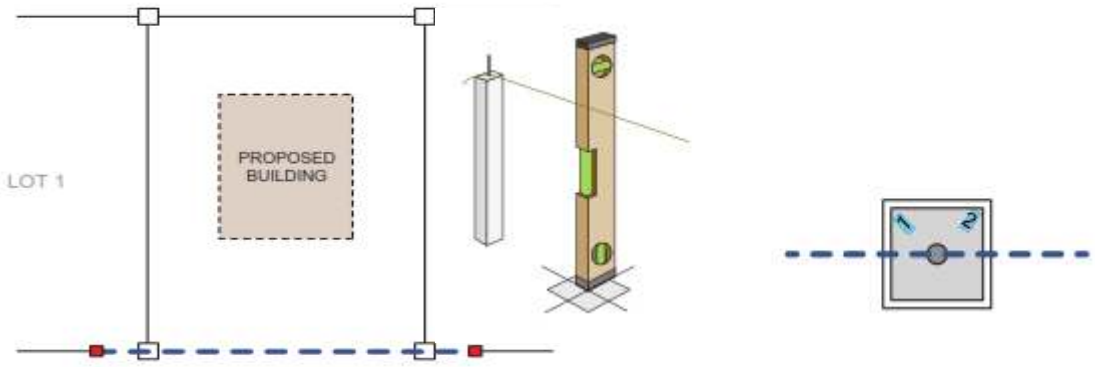
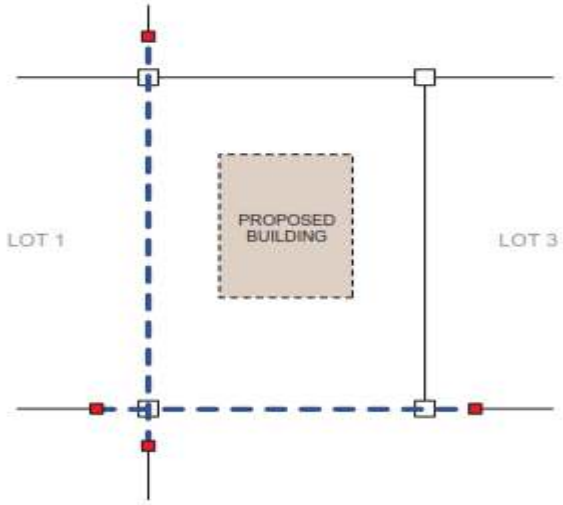


Fig-3 string line

Don’t attach string directly to the boundary pegs as this may disturb their position. Use temporary timber pegs with the string running above the exact centre of the boundary pegs (over the clout nail).
The position of the string can be checked by using a spirit level to plumb down (check vertically) from the string line to the centre of the boundary peg.

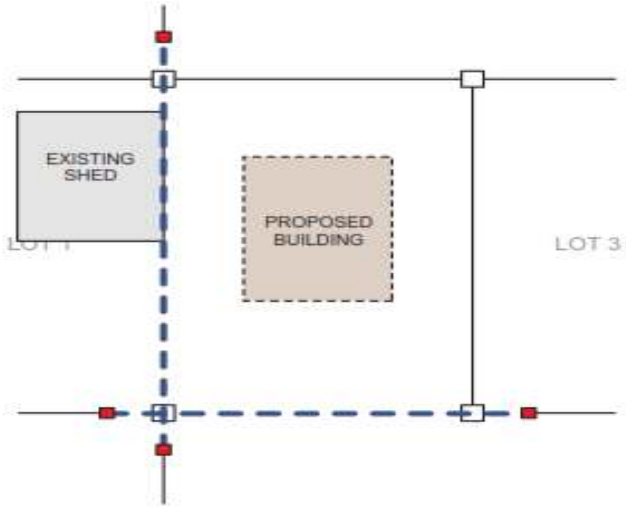
Step 2

Locate the two survey pegs that identify the **side** boundary and set a taut string line between these two points. Use temporary timber pegs running over the centre point of the boundary pegs

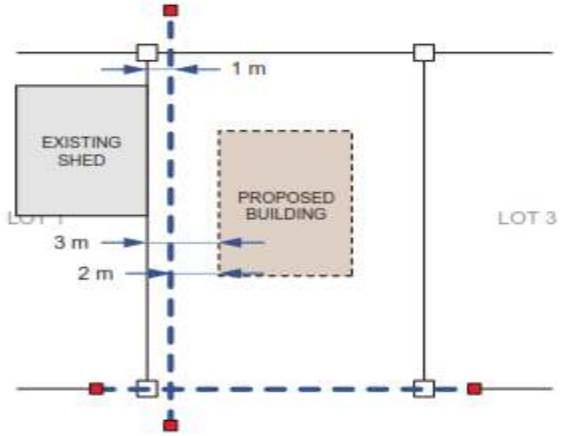


Example-1

The string line can be positioned against the side of the existing building; however, you must avoid bending or distorting the string line where it touches the existing building.



Example2



The string line is positioned at a set distance from the boundary pegs and away from the existing building. When you're using this method, you must adjust measurements taken from site drawings accurately to ensure that the proposed building remains in its desired position on the lot.

3.2 Position of line and building clearance

Setting out involves working out the location and extent of the building on site. Each site is different, so start by establishing the particular conditions. Use information from territorial authorities' records combined with an on-site.

When setting out building lines, the first step is to measure the building line from the boundary or existing building. Then you need to determine the approximate length and

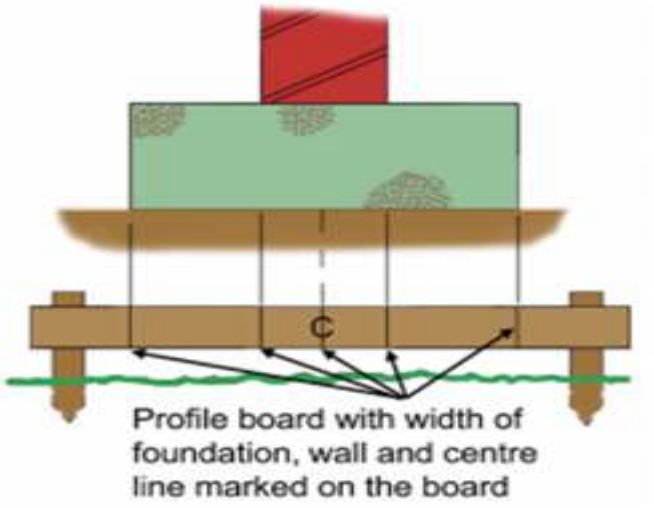
position of the string line, together with the building clearance measurement at each end, for locating the hurdle.

3.2.1 Profile boards

- Locating site plan and survey pegs
- Measuring building line from boundary or existing building
- Determining position and length of line
- Measuring building clearance
- Installing pegs and hurdles/profiles
- Marking location for line
- Setting and positioning line to true alignment

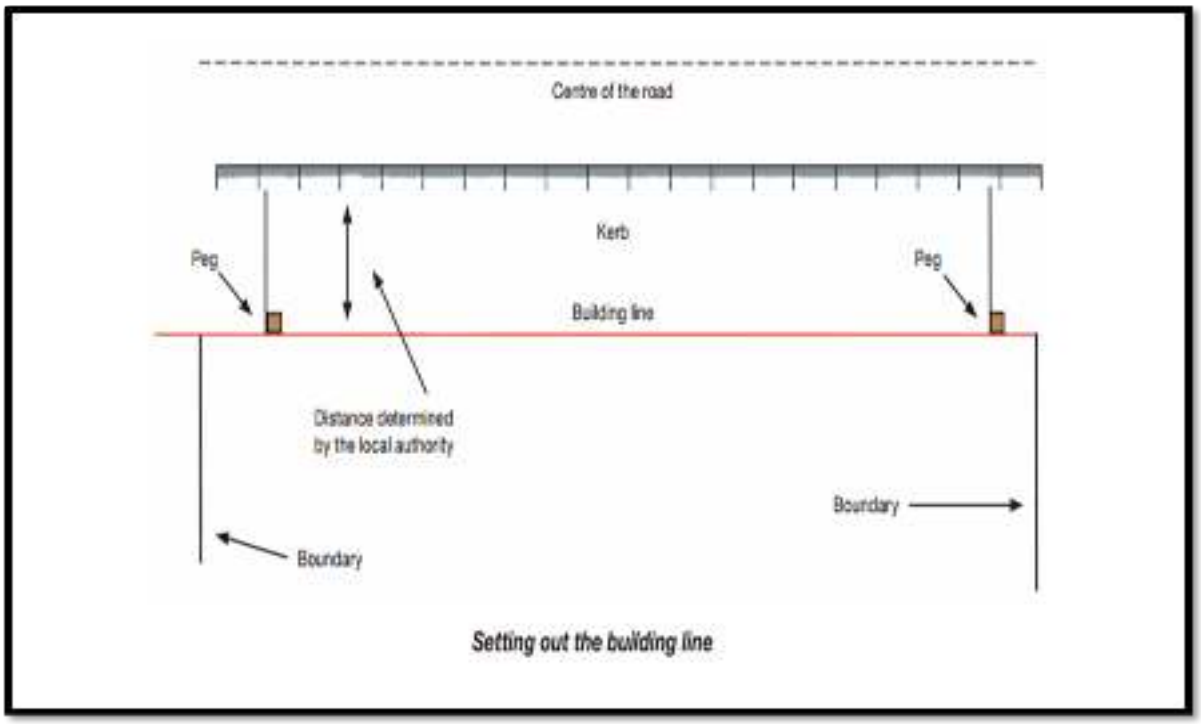
Timber Profile: - are wooden boards held in place by wooden pegs.

- Centre lines and width of foundation and walls can be marked onto the boards.
- On a corner Profile, three pegs, approximately 600 mm long and 50 mm square, are required for supporting the two cross pieces, approximately 1200 mm long, 75 mm deep and 25 mm thick.
- Profile board showing important dimensions that are marked on the board



Procedure

Step 1: Set out the building line
Assuming that the building line has been stated as a distance from the curb of a road:
(a) Two square offset lines are set from the kerb to the position of the building line at a distance apart which is greater than the width of the proposed building. Pegs are positioned at these points, and a ranging line is fixed to these, giving the position of the building line as shown below



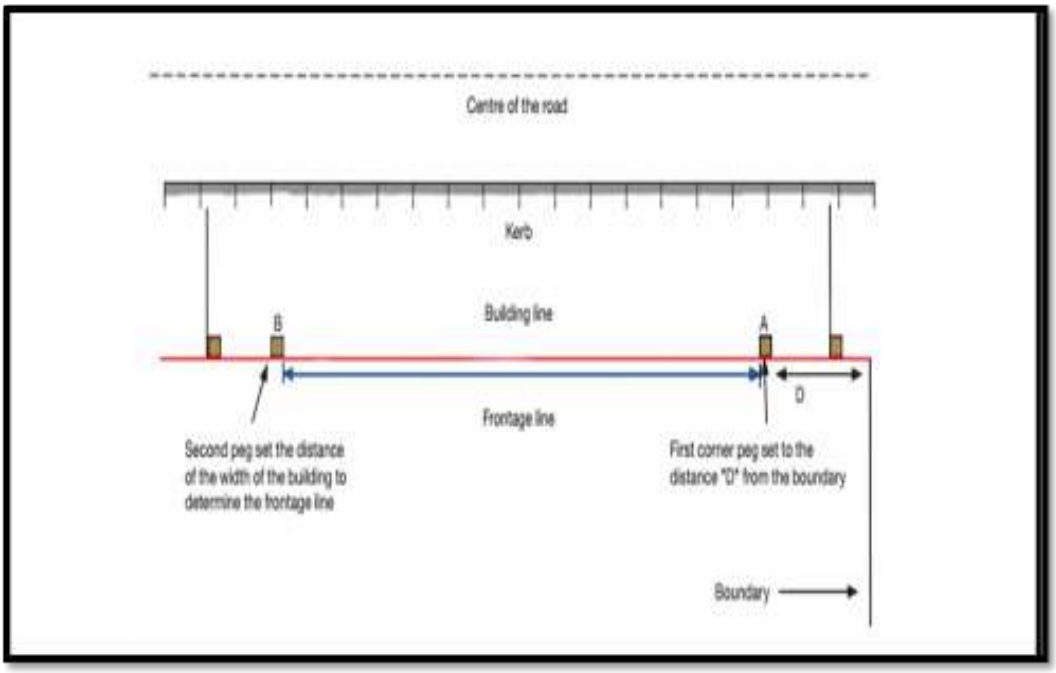
Setting out the building line

Step 2: Set out the base (frontage) line

- After taking the dimensions from the drawing, relating to its position, the frontage line should be set out. This will either be on the building line or behind it.
- The first corner peg (A) will be positioned from dimensions given on the drawing which relate to site features such as distance from a curve gate posts, boundary intersections etc.

The dimensions pinpoint the position of the corner.

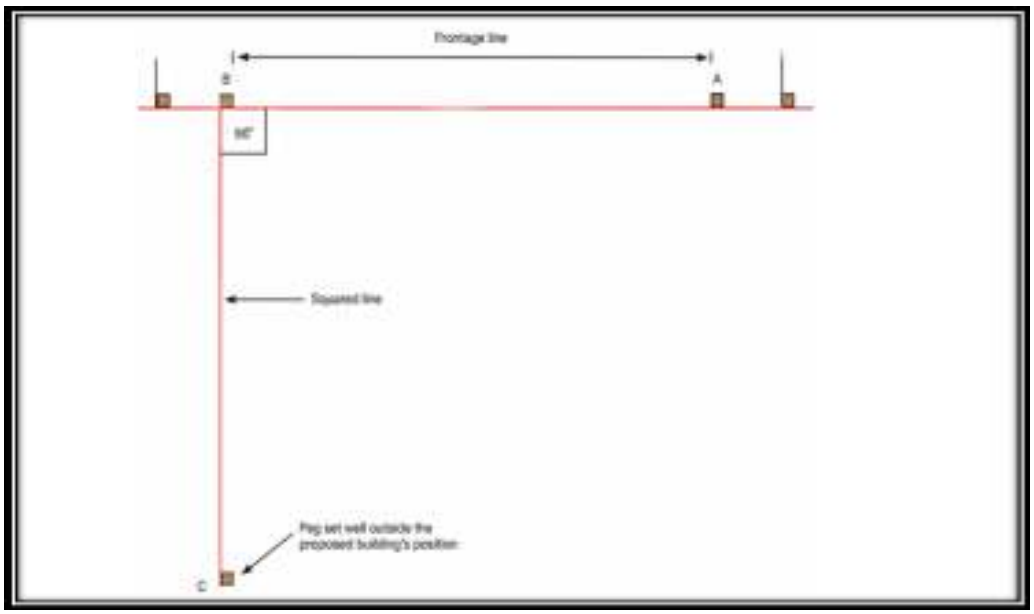
- Alternatively, the frontage line may be simply on the building line so the only information required to set it out is the distance from a boundary.
- The diagram below illustrates this situation where the first peg is positioned on the building line a given distance (D) from the boundary.



- Following the positioning of the first peg, the second peg (B) is positioned after carefully measuring the width of the building along the frontage line.
- A nail is knocked into each peg to determine the exact position of the corner and to allow simple fixing of

Step 3:- Set out the first right angle to the frontage line

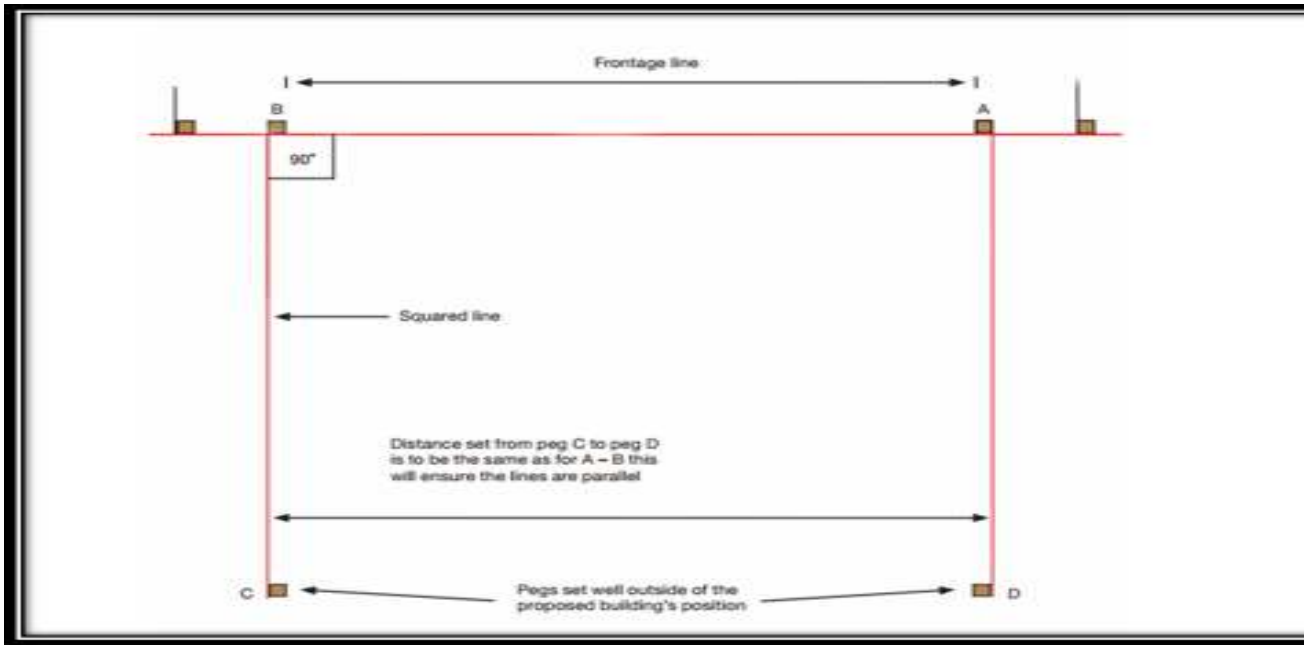
- Attach a taut line to the nail on a corner peg (B here) and extend this well beyond the length of the wall to be set out.
- Adjust the line carefully to cross the frontage line at 90˚ by the use of a builder's square, optical site square or the 3:4:5 method (see sheet 30).
- When the line is correct, knock in a peg (with nail) at a distance greater than the length of the wall, and attach the line tautly. Check for square again and adjust if necessary



Step 4:- Set out the second right angle to the frontage line.

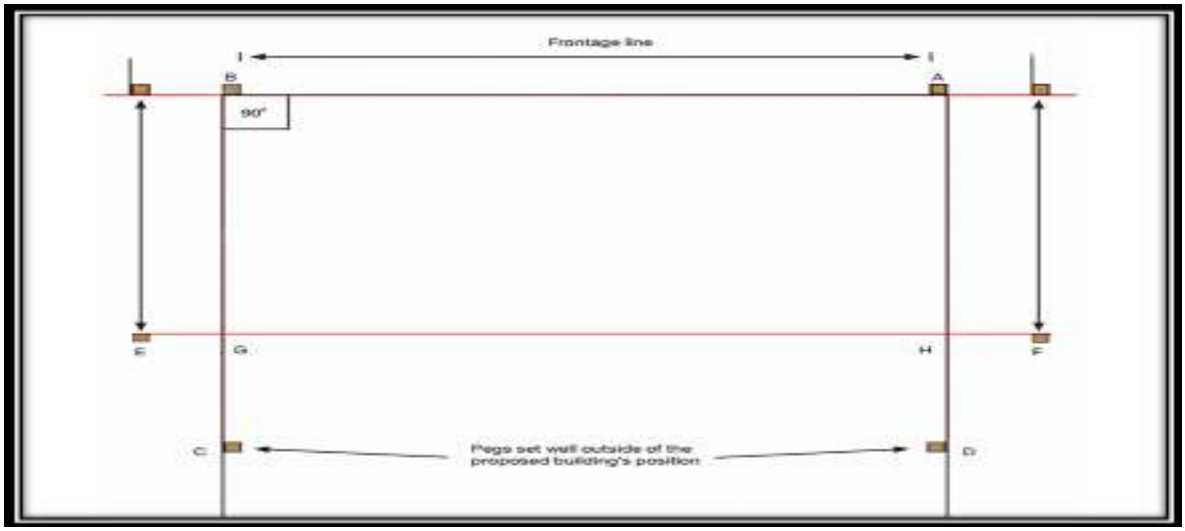
- Measure the same length of the building's frontage line and set a peg (D) at same distance from the frontage line as peg C.

  Attach the ranging line and check the dimensions before continuing



Step 5: Set out the final (back) line.

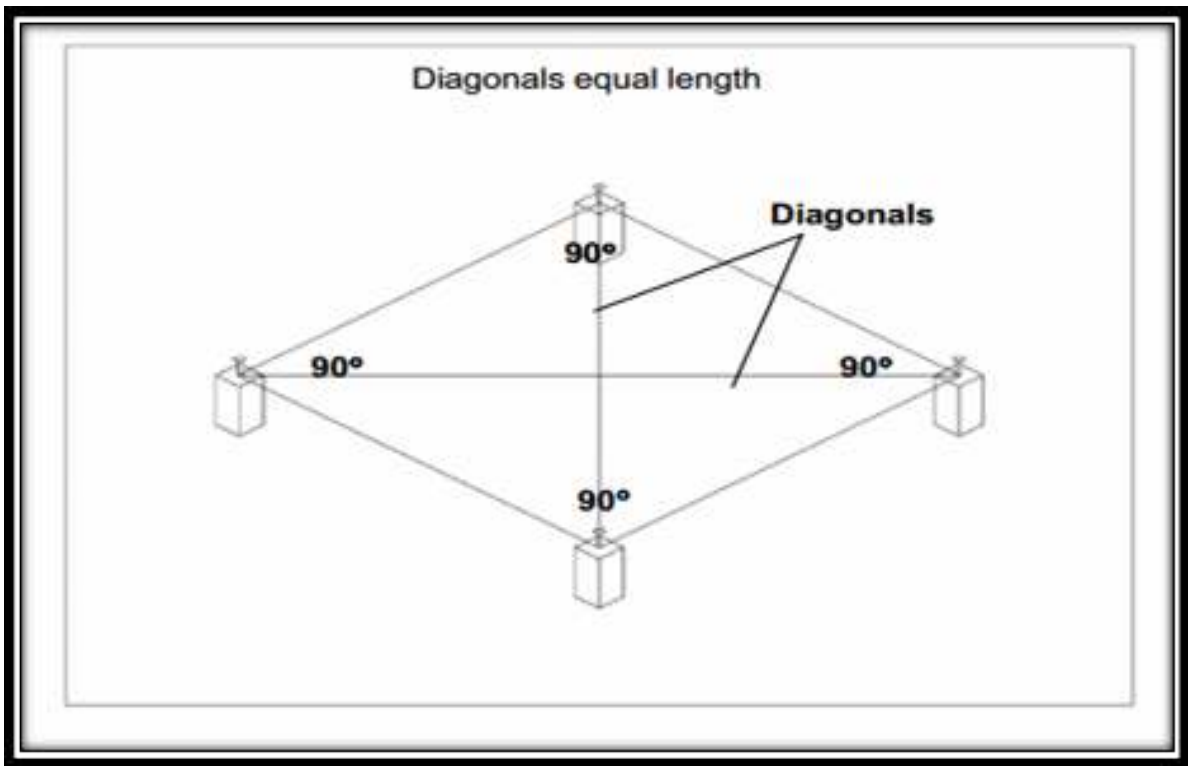
- Measure the dimension for the length of the building's side wall from the outer pegs on the frontage line and set pegs up approx. parallel with the wall lines, as shown (Pegs E and F).
- Attach ranging lines to the pegs to establish the back wall line which should be checked for parallel with the frontage line. The back corner positions, G and H, are at the intersection of the square lines.
- Pegs can be positioned at G and H, but this is not essential.

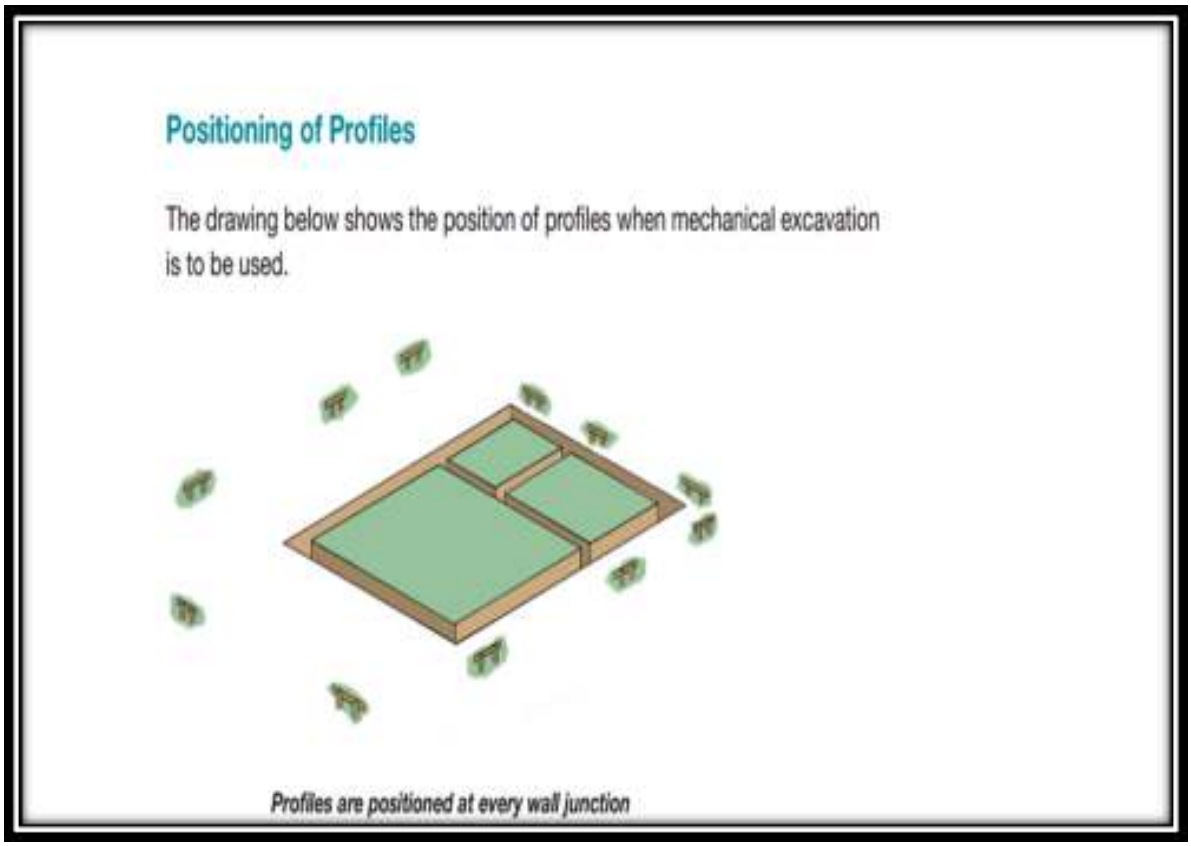


Step 6 Check the building setting out for square

- The setting out will be confirmed as square if all the measurements are correct and the diagonals measure exactly the same.
- Measure the dimensions carefully from A to G and B to H. These should be the same if the building has been set out perfectly.
- If the diagonals are not the same, but the lines remain parallel, adjust the back pegs by moving both nails the same distance across on the peg, (or moving the peg if necessary).
- This is to change the rhombus shape to a true rectangular shape.

An easy way of checking if a square or rectangle has been set out correctly, with all corners at 90º, is to check the diagonals across corners. If they are exactly the same length the setting out is correct.





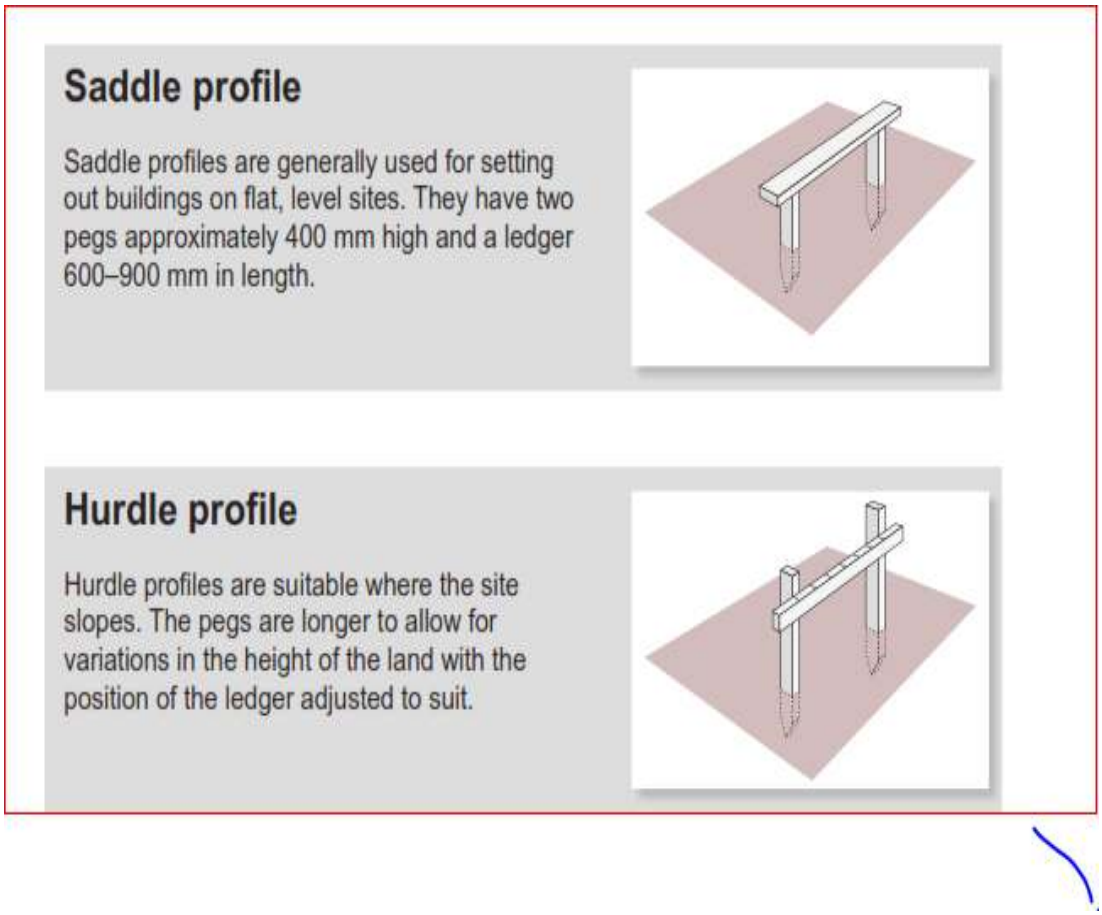
3.3 Installing pegs and hurdles/profiles

When setting out building lines, the first step is to measure the building line from the boundary or existing building. Then you need to determine the approximate length and position of the string line, together with the building clearance measurement at each end, for locating the hurdle.

Pegs and hurdle profiles are installed, then the location for the line is accurately marked with nails on the profiles and the line set taut into position so it is correctly aligned with the boundary.

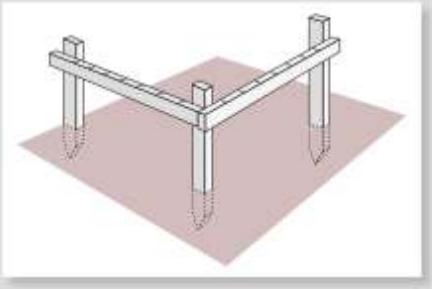
3.3.1 Installing hurdles/profiles.

Four types of profiles are used when a building is set out.



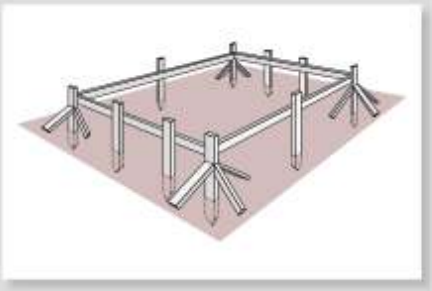
Corner profile

A corner profile has three pegs and two ledgers creating an L-shaped structure that can be used as an alternative to separate profiles at a 90° corner. They are much stronger than saddle or hurdle profiles as the adjacent ledgers provide support for each other.

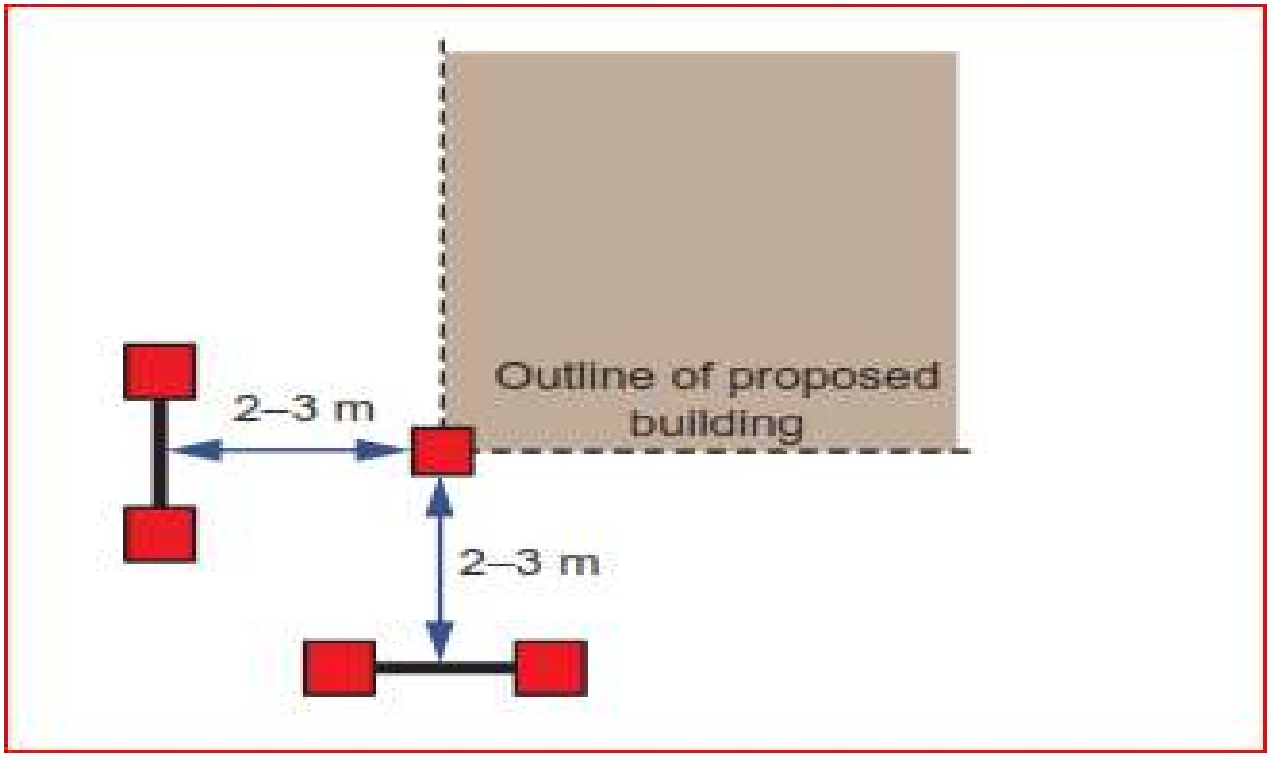


Continuous profile

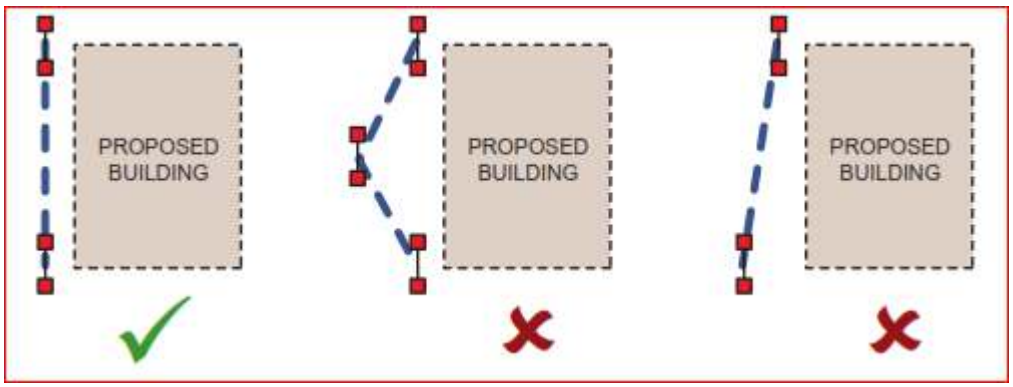
Continuous profiles have ledgers around the entire perimeter of the proposed building. Although this type of profile takes longer to set up and requires more resources, it's useful where the proposed building has a complicated shape and needs numerous stringlines.



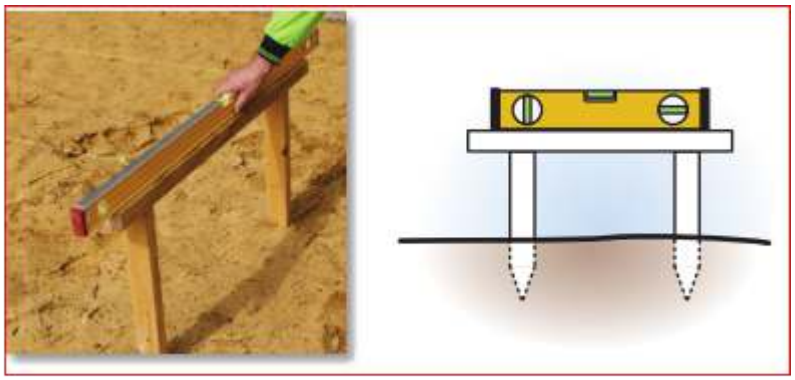
Profiles are placed to allow room for excavation work to be carried out without damaging or disturbing their position. It's recommended that profiles are set 2–3 m from the proposed building outline but this may have to be reduced if required by the site conditions.



Profiles should be placed parallel to the proposed building and in line with each other, where possible. Because string lines are used to determine the dimensions of the building, improper placement of the profiles can distort the building outline.



Install the ledger of a profile so that it's approximately level across its top. Use a spirit level to check each profile after it's been driven into the ground.



Profiles should be set up using a suitable leveling device such as an optical or laser

Level where possible, to make sure the tops of the ledgers are level with one another.

The size of the profile and the length of the ledger depend on the type of building

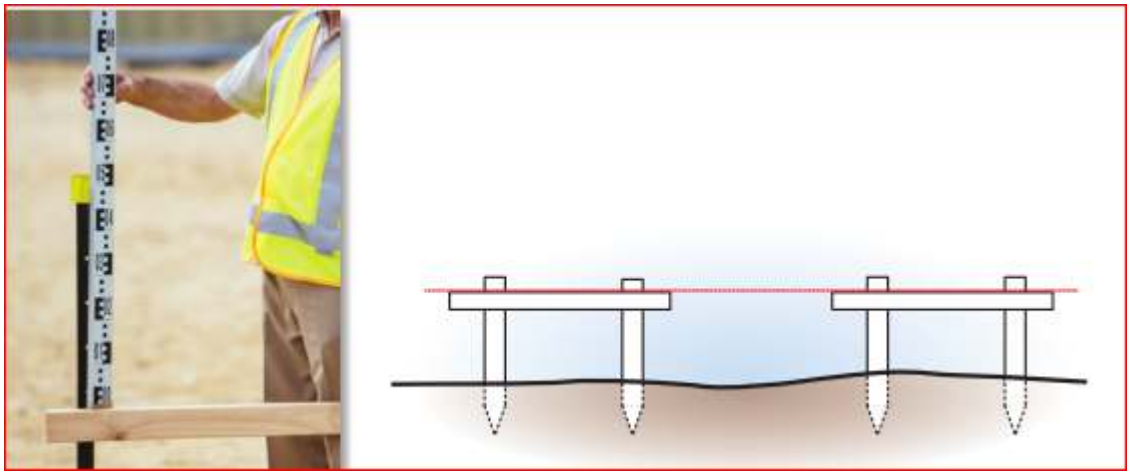
Techniques used to construct the foundations of the building.

The foundations are the lowest part of the building. They transfer the weight of the building via footings to the ground below.

Footings are designed by a structural engineer and the type of footing used will vary depending on the:

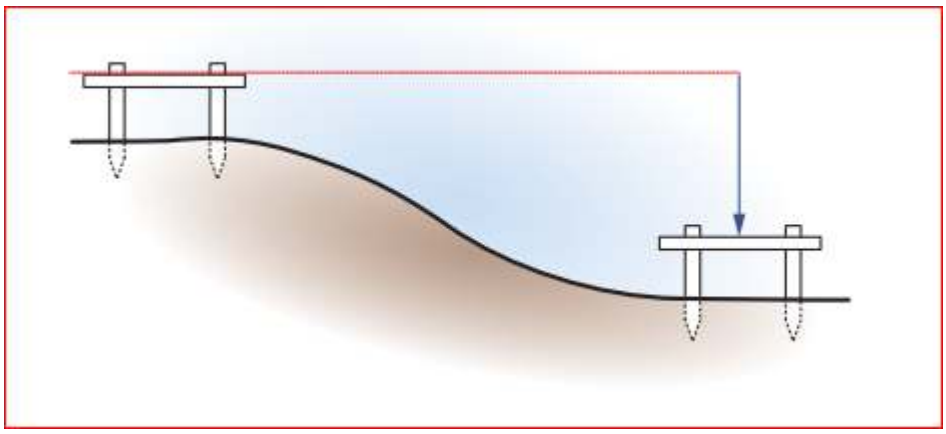
- weight of the building
- type and size of wall construction used
- type of soil being built on
- slope of the building lot
- budget for the build.

Profiles are used to set out the information required to construct the footings. The tops of the profiles are marked with the width of the footing and any other relevant information including, for example, the width of the wall, the width of the cavity or the position of the stumps or posts.

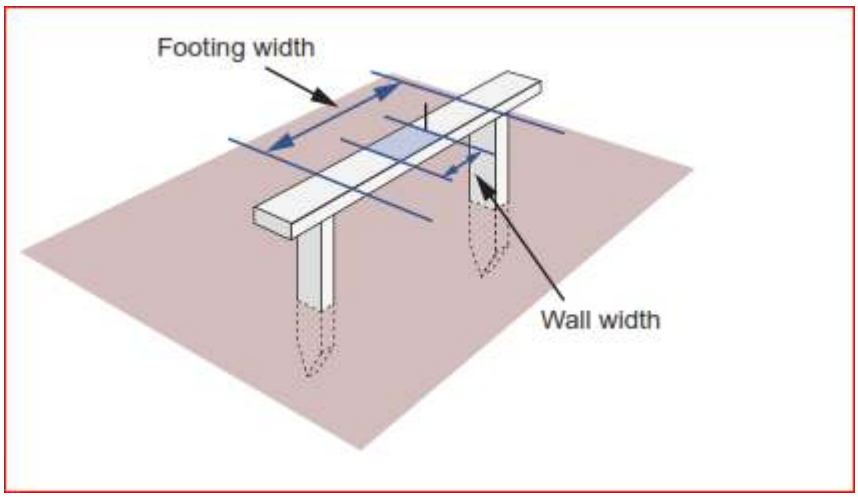


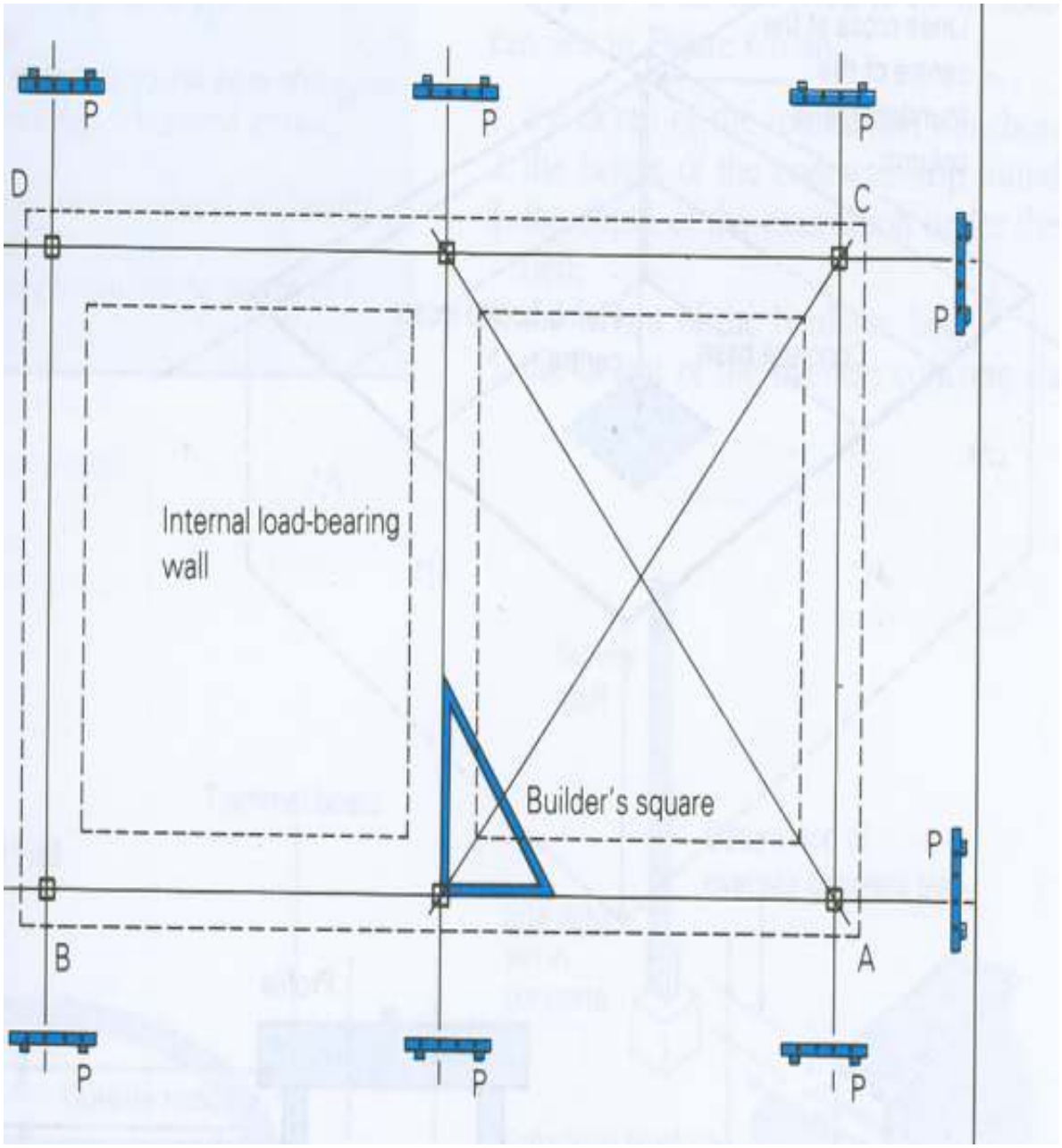
On sloping sites where it's impractical for profile ledgers to be level,

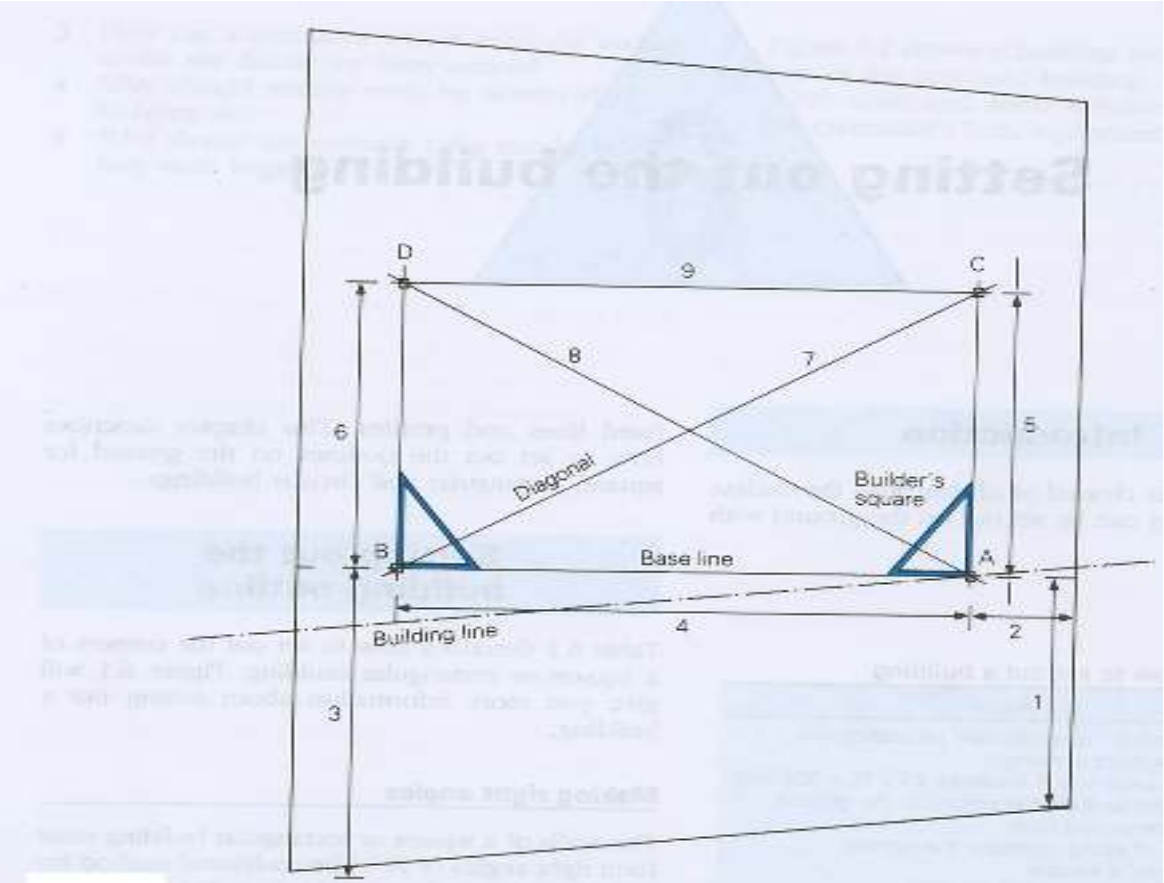
Eg. the slope is too step, you may need to step the profiles down along the slope. The building dimensions should always be measured horizontally and a plumb-bob or spirit level used to transfer the exact measurement down to the top of the ledger.



Profiles are used to set out the information required to construct the footings. The tops of the profiles are marked with the width of the footing and any other relevant information including, for example, the width of the wall, the width of the cavity or the position of the stumps or posts.


Footing width
Wall width


P
P
P
D
C
P
Internal load-bearing wall
Builder's square
P
B
A
P
P
P



Setting out the corners of a building.

3.4 Mark footing width on profile

3.4.1 Terminology used in setting out work

The following terminology is used in setting out in civil engineering work and the trainee are advised to learn the terminology thoroughly as he/she across the terms while studying this chapter.

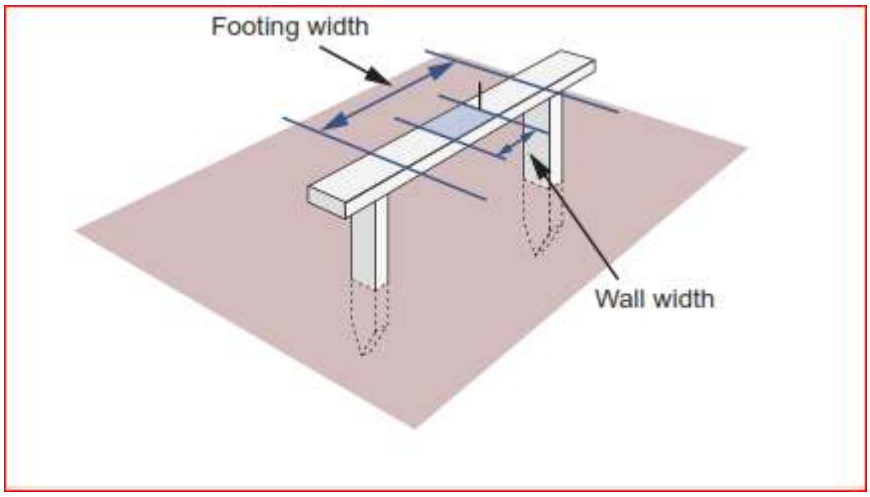
- **Setting out: -** is the process of laying down the excavation lines and center lines, etc. on the ground before excavation is started.
- **Pegs:-** are short pointed wooden rods driving in to the ground to mark an excavation, construction, etc. .line or a level. A nail driven in top of the peg usually shows the position of the point.

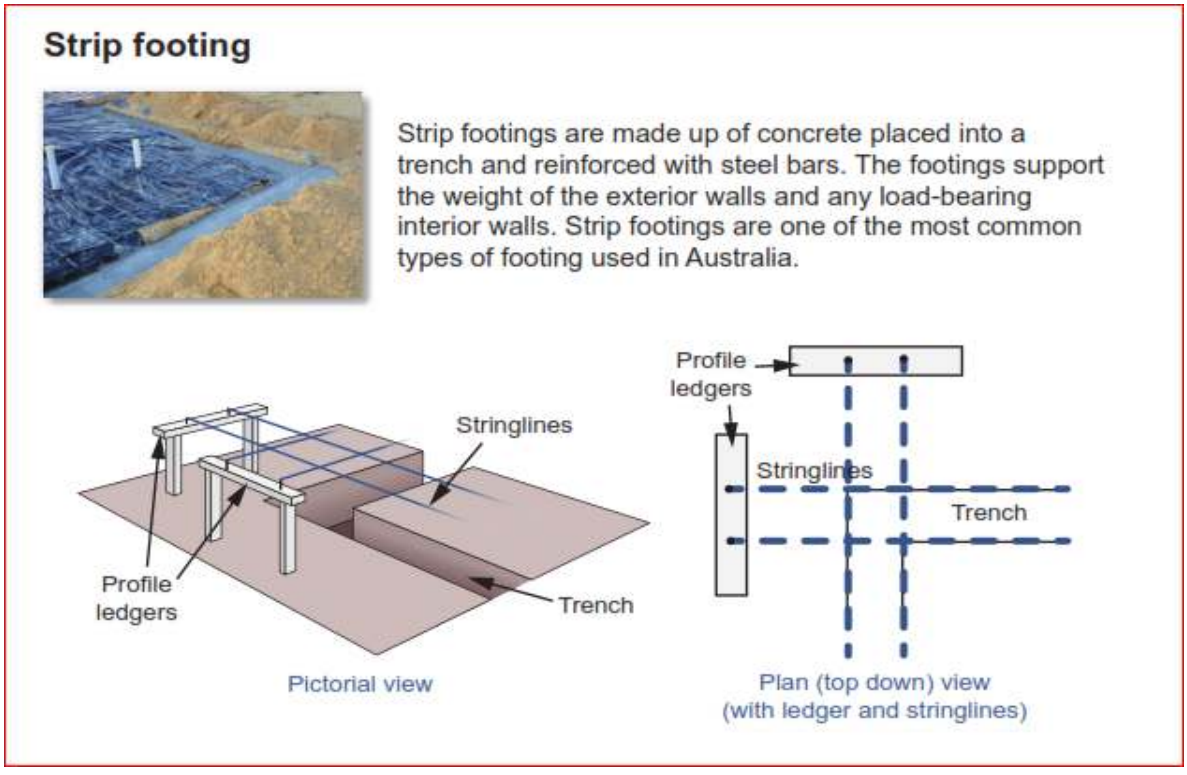
Batten boards (profile board):- A horizontal board 150 mm by 25 mm cut to varying length. They are nailed to 100 mm x 50 mm x 50 mm square post, which have been pointed and driven into the ground. Batten board or profile board located about 0.5-1.0 m outside the limits of foundation wall. The lines defined by nails in the top of the profile boards are the outside faces.

3.4.2 .FOOTTING WIDTH

Profiles are used to set out the information required to construct the footings. The tops of the profiles are marked with the width of the footing and any other relevant information

including, for example, the width of the wall, the width of the cavity or the position of the stumps or posts.





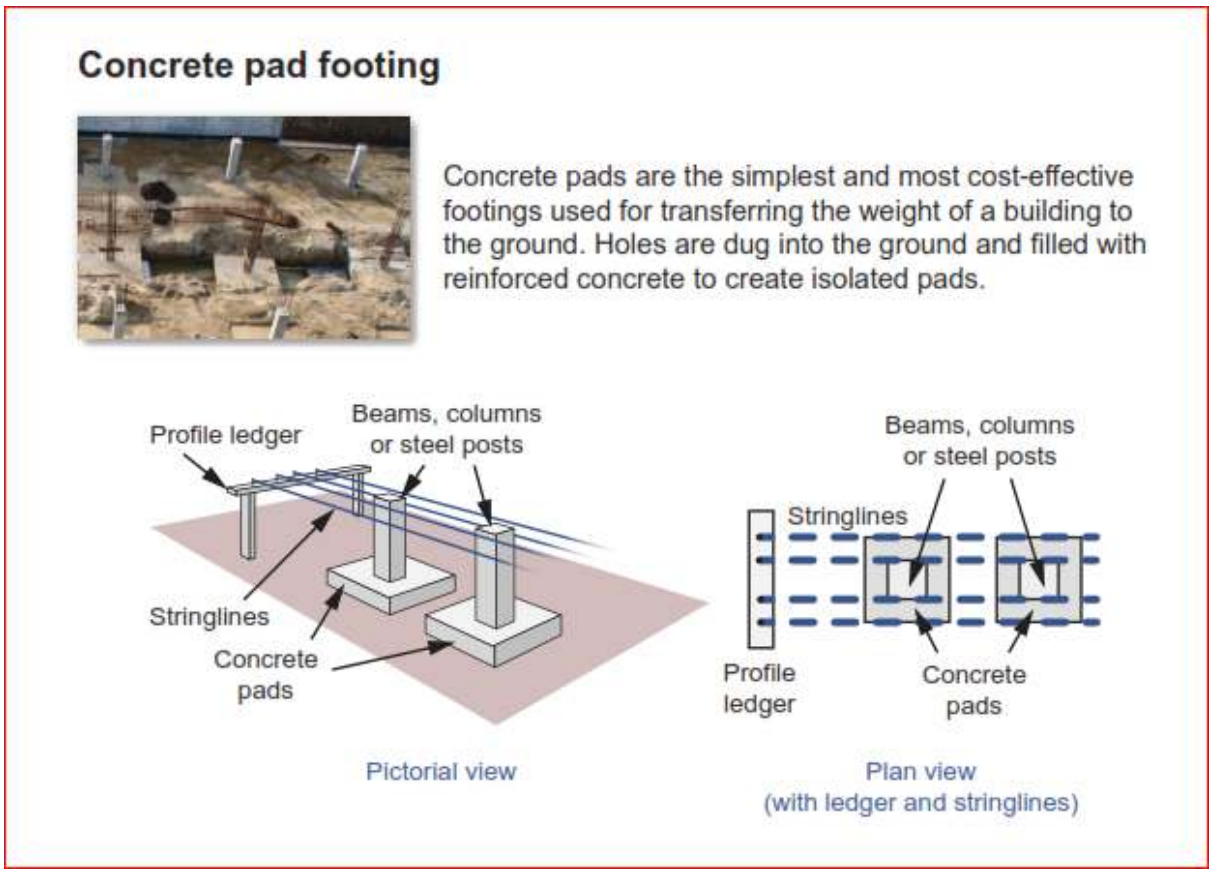


Fig-1 marking of footing & foundation line

3.5 Marking location with nails on hurdles/profiles

3.5.1 MARKING LOCATION FOR LINE

The use of measuring tape and building lay out instruments building lines marking where the walls of a structure from this measuring mark a line square to the pump cut line to the bottom edge of the rafter.

a. SETTING AND POSITIONING LINE

Arrangement or position in a strength line or in palled lines.Proper relative position the act of aligning or the condition of being aligned alignment of faction in the party

b. DETERMINING G POSITION AND LENGTH OF LINE

Line length with the wrong type size and the problem is magnified. The short the line length the smaller the front should be allowing more words to the line.

Typical it is the front size that gets adjusted but don't be afraid to re-evolution your page layout to accommodate wider or narrower text columns**.**

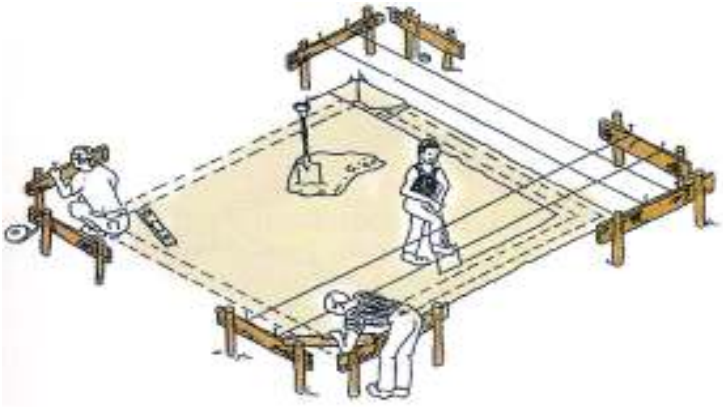
3.5.2 MEASURING BUILDING CLEARANCE

Clearing verification of building structure measurement on walls, floors and ceiling were carried out by in situ gamma spectrometry besides traditional method like direct measurement with a contaminated monitor.

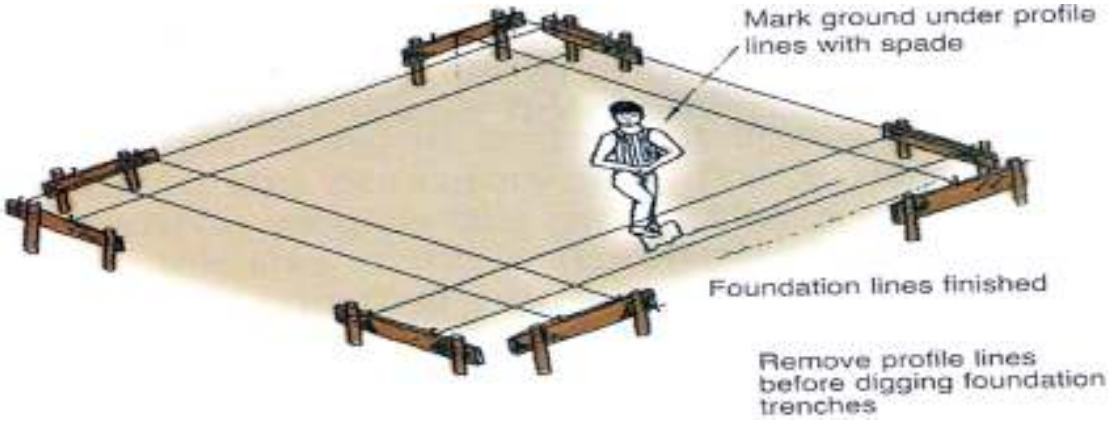
Clearance level s it is necessary to establish the most adequate methodology which includes direct measurement on walls, floors, and ceiling laboratory. Measurement on representative samples and the use of property derived calling factor.

Building structure considering to technical difficulties associated to the measurement of alpha emitters, the Measurements were performed by gamma spectrometry or using portable monitors

3.5.3 MARKING OUT FOUNDATION AND WALL THICKNESSES



MARKING OUT ON THE GROUND FROM THE PROFILES



14.Self- check-3

Directions: Answer all the questions listed below.

1. are some of the oldest and most basic hand tools used in building and construction. _____

A) Reduce B) String lines C) Timber Profile

2. are wooden boards held in place by wooden pegs

A) Timber Profile B) Recycle C) Reuse

3. are installed, then the location for the line is accurately marked with nails on the profiles and the line set taut into position so it is correctly aligned with the boundary?

A) Pegs and hurdle profiles B) Saddle profile C) A and B

Test-I Matching

Instruction: select the correct answer for the give choice. You have given 1 Minute for each question. Each question carries 2 Point.

A	B
---------1. Saddle profile	A. Are suitable where the slopes
---------2. Hurdle profile	B. Has three pegs and two ledgers creating an L_shaped structure
---------3. Corner profile	C. Are generally used for setting out building on flat level sites.

Test II: short Answer writing

Instruction: write short answer for the given question. You are provided 3 minute for each question and each point has 5Points.

1. What is Profiles?
2. Write Four types of profiles?
3. What is Pegs ?
4. What is setting out ?

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

You can ask you teacher for the copy of the correct answers

Operation sheet 3.2: Setting-out Profile Set-up for Building Works

- **Operation title:** Procedures of setting out for building work
- **Purpose:** To practice the process of marking position of shape and sizegeometrical shape

- **Instruction:** Using the figure below and given equipments measure the length of each line. You have given **4 Hour** for the task and you are expected to write the answer on the given line.
- **Tools and requirement:**
    - Hammer,
    - Circular saw,
    - Pencil.
    - Try square
    - Sprat level
    - String
    - Pegs
    - Tape
    - Pum bob
    - Slade hammer
    - Profile bord

Procedures for setting out

- Find out the radius of the building from the working drawings.
- Mark out this measurement on the ground.
- Place a stake securely on the ground at the end of the radius in the center of the building.
- Drill a 12mm hole in the stake.
- Place a 12mm reinforcing bar in the hole in the stake.
- Check the top of the bar is level.
- Cement the stake in position.
- Loop a piece of rope, which is the length of the radius of the building over the reinforcing bar. Measure the distance to the inner and outer sides of the foundation from the working drawings

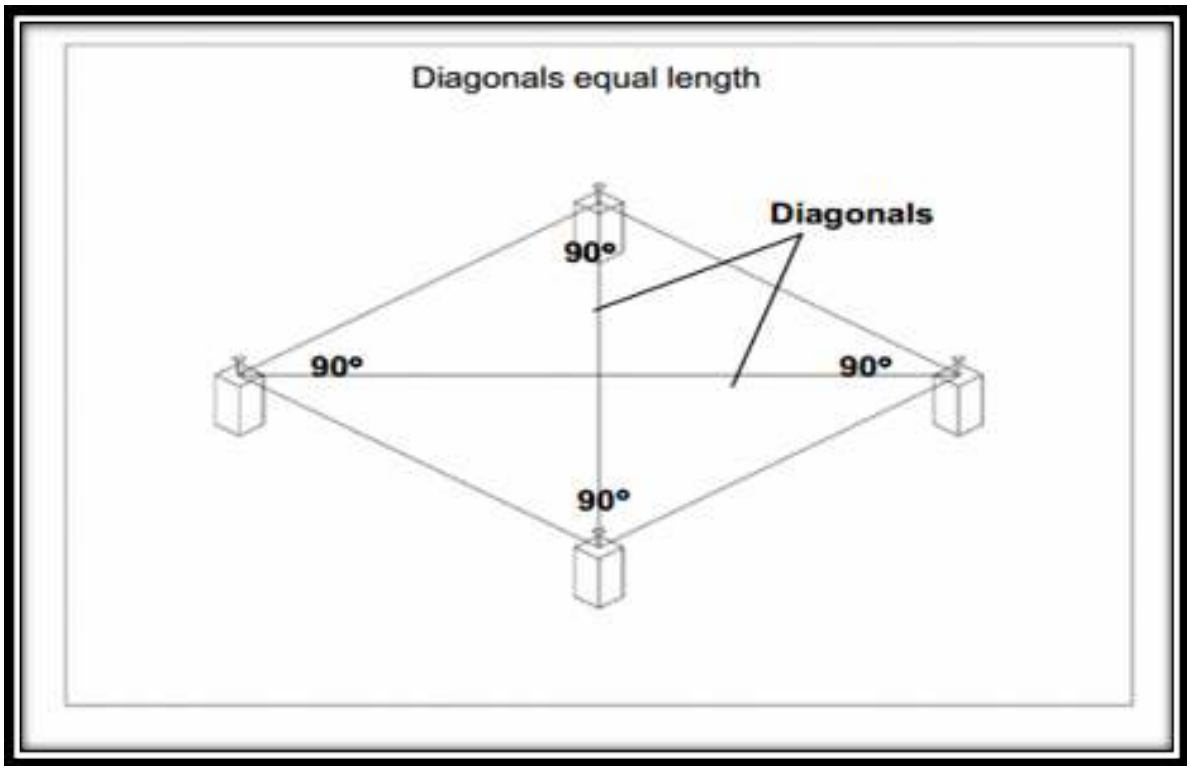
LAB TEST 3.2. Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: - Given necessary templates, tools and materials you are required to perform the following tasks within 6 hour.

Task 1.check inspection procedures

Task 2. Inspect plan of setting out



Unit Four: Setting out right angle corners

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

- Corner of building.
- Setup right angle.
- Set building corner

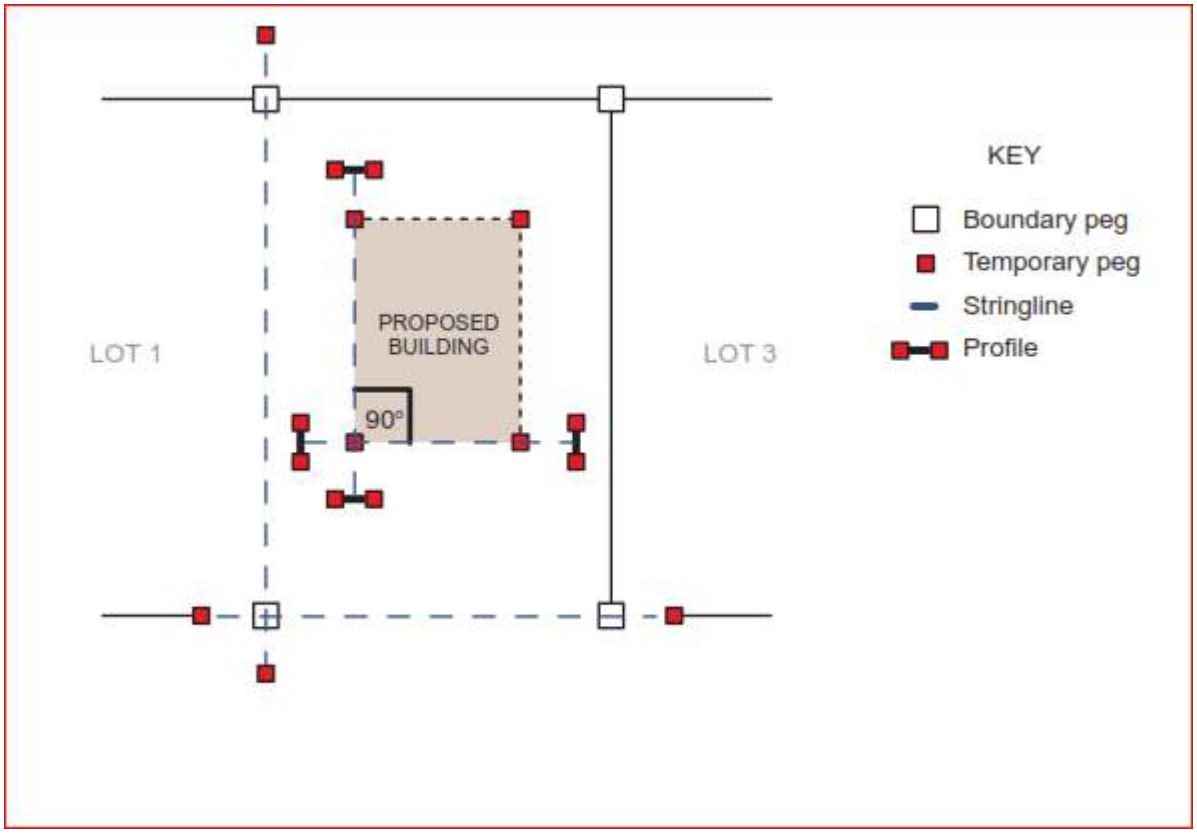
This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Determining corner of building.
- Identifying right angle.
- Setting building corner

4.1. Determine corner of building.

4.1.1. Setting out right-angled corners

If the proposed building has right-angled (90°) corners, the string lines must be checked at this point to make sure that the corner angle is accurate before any other string lines are installed



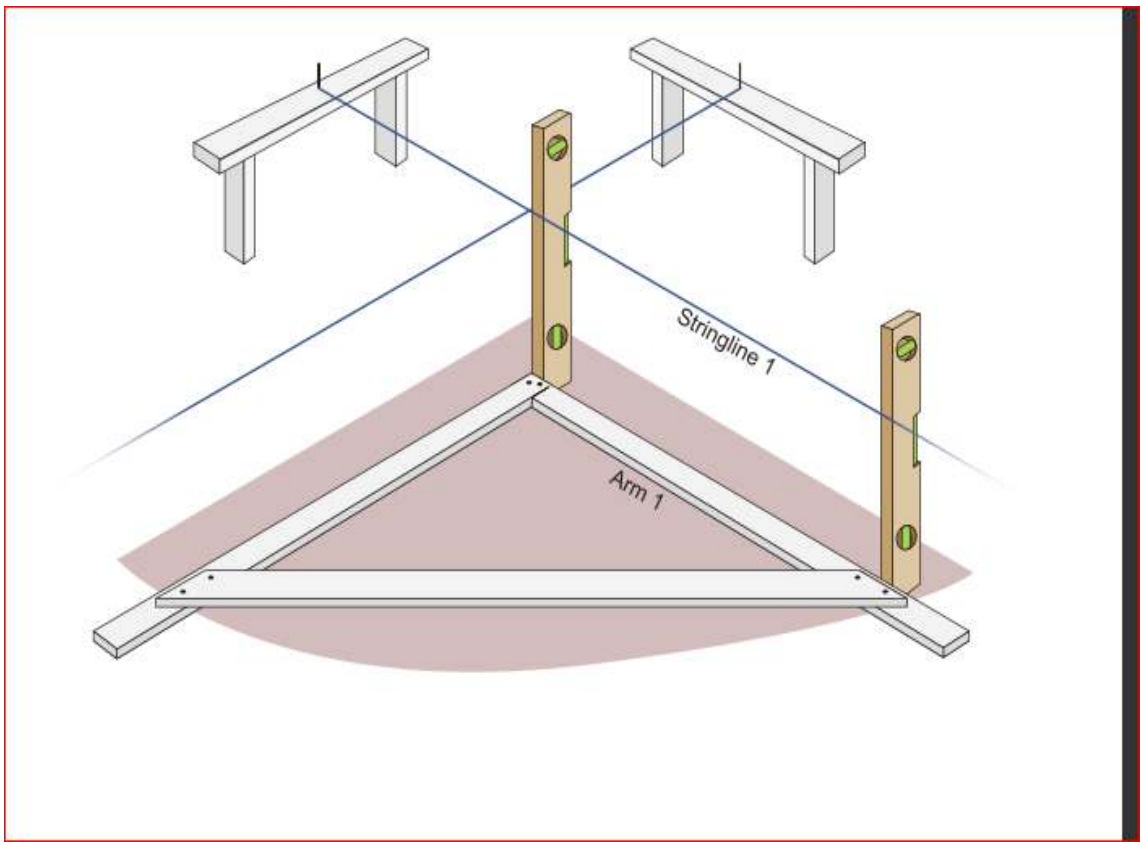
4.1.2 Checking angles using a builder's square

The simplest way of checking that the angle is precisely 90° (also called 'checking for square') is to use a builder's square.

1. Place the builder's square beneath the two string lines that form the corner.

2. Use a spirit level to plumb down and set the outer edge of arm 1 of the builder's square directly under string line 1.

1. Check the position of the other string line. If it doesn't run directly over the outer edge of the other arm of the builder's square, the corner is 'out of square.

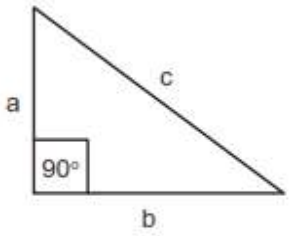


Checking angles using the 3:4:5 method

The second way of checking for square is by using a calculation called Pythagoras's theorem (commonly known in the building industry as the 3:4:5 method).

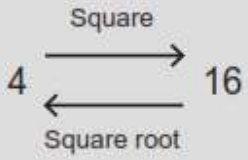
The theorem tells us that for a right-angled triangle – which is a triangle where two of the sides meet at 90° – the sum of the squares on the two shorter sides equals the square on the longest side (known as the hypotenuse).

In other words, for the triangle pictured here, $a^2 + b^2 = c^2$.



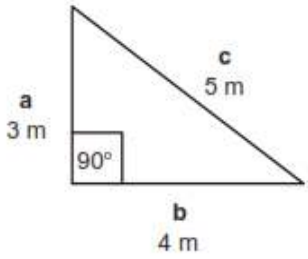
The **square** of a number is the result of the number multiplied by itself. For example, the square of four is 16; that is, 4 × 4.

A **square root** (√) is the opposite. A number, when divided by itself, gives the original number. The square root of 16 is 4 because 4 x 4 = 16.



A simple example of this is a triangle with sides of 3 m, 4 m and 5 m.

A simple example of this is a triangle with sides of 3 m, 4 m and 5 m.



$a^2 + b^2 = c^2$

$3\ m^2 + 4\ m^2 = 5\ m^2$

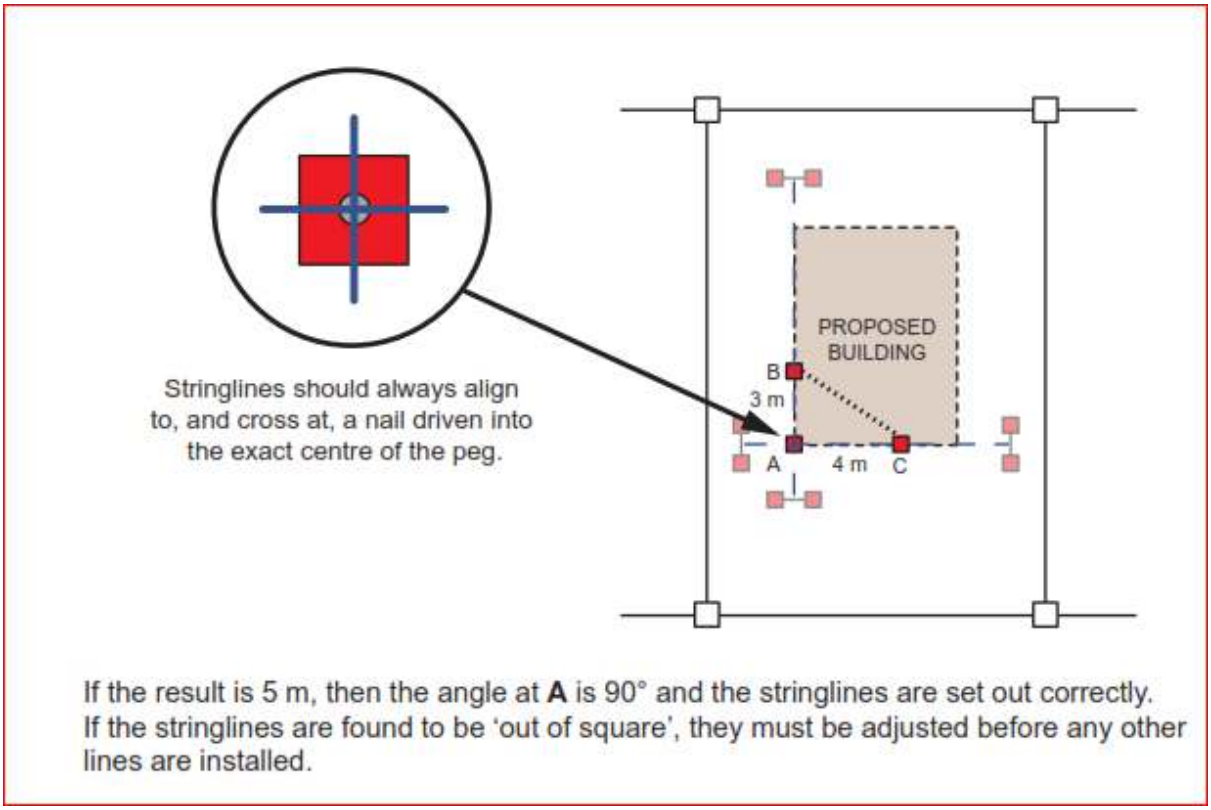
because

9 m + 16 m = 25 m

√25 m = 5 m

Use the 3:4:5 method to check the angle of the front corner. Follow these steps.

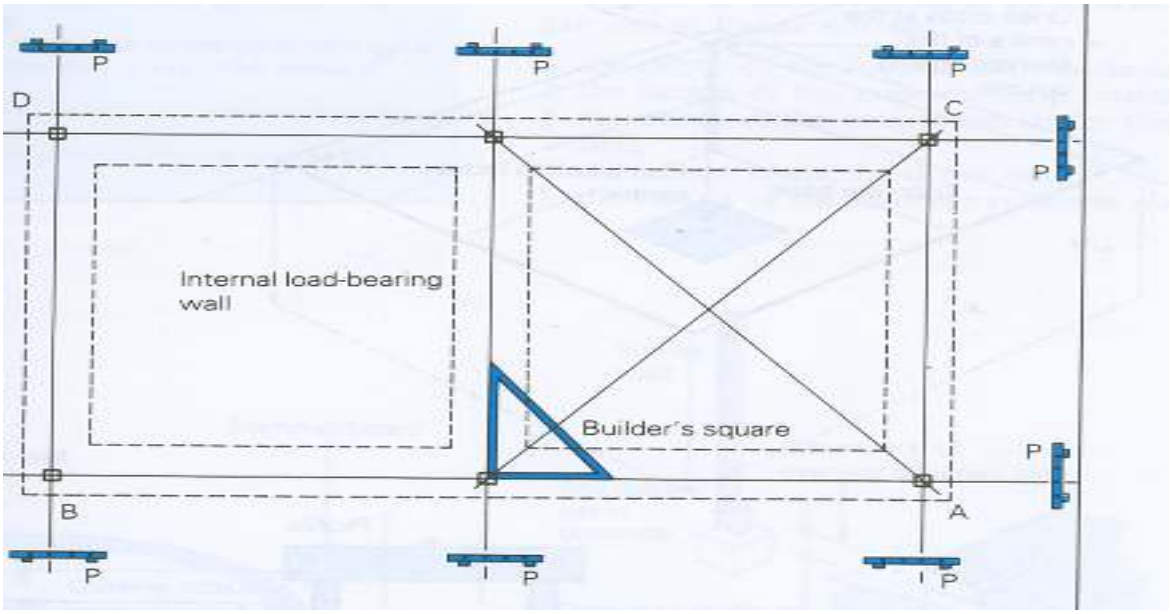
1. Drive a timber peg into the ground at the corner of the building (**A**).
2. From the centre of corner peg **A**, measure 3 m along the first line **A–B** and drive another peg (**B**) into the ground.
3. From the centre of corner peg **A**, measure 4 m along the second line **A–C** and drive another peg (**C**) into the ground.
4. Measure the distance between pegs **B** and **C**.



If the result is 5 m, then the angle at **A** is 90° and the stringlines are set out correctly. If the stringlines are found to be 'out of square', they must be adjusted before any other lines are installed.

Set out the front or building line in the usual manner with peg or marks at the required distance.

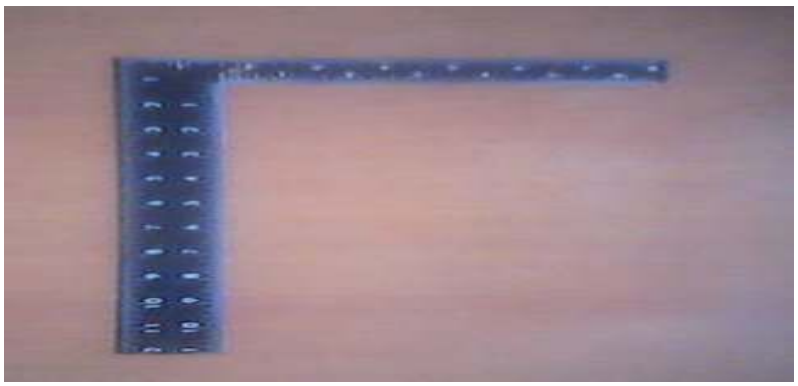
- Please the builders square so that front line touch one side if the square right through its length.
- Stretch alien from the peg so that it is parallel to second side of the square & stabilish the third peg. A corner of angle 90*is thus obtained.
- With the aid of a tape measure mark out the length & width of the proposed building.
- Transferring the builders squire to the remaining corners & reputing the above operations a simple rectangular building can be set out.
- After establishing the four corner pegs profiles separate or continues may be erected in the same way.


P
P
P
D
C
P
Internal load-bearing wall
Builder's square
P
B
A
P
P
P

4.2 Setup right angle.

If the proposed building has right-angled (90°) corners, the string lines must be checked at this point to make sure that the corner angle is accurate before any other string lines are installed.

1. Mark out the building line from the road by measuring the requirement distance from the center of the goad or by stretching a line along an existing building to the proposed site.
2. 2/Mark out the overall length of the building by driving by peg A&B along the ringing line.
3. ften two steel tape measures mark out for equal distances on ranging start from the corner peg at B these distanced maybe in any unit of measurement MM CM MD M.
4. Pull a tape measure from point B to C & ask an assistant to hold it ready with hammer & peg.
5. Pull the second tape from forth mark at **D** on the ringing line point **E** on the first tape.
6. .The distance 5m if using meters on tape **DE** should coincide with point 3m on tape **BEC**. Then the angle **B** is (90*) from Pythagoras theorem. If the points do not coincide the tape **B-C** is either shifter out ward or in wards 5m on the second tape coincide with the **3m** mark on the first tape.
7. Repeat the same procedure to obtain the right angle for **BAF** & mark out the overall width of the building.
8. Establish corner pegs & erect profile.
9. Mark the position of partition wall on the profile with either nails or saw cut ringing lines are stretched through these nails & the corner peg to mark the ground to indicate the line.



4.3 Set building corner

Peg the four outside corners: -Determine the location of the building in relation to other buildings and boundaries (as usually shown on the site-plan or other relevant plan), and place pegs in the ground marking the four corners of the building.

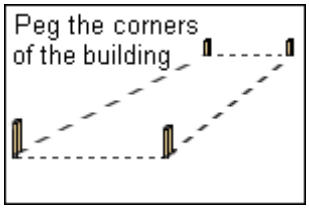


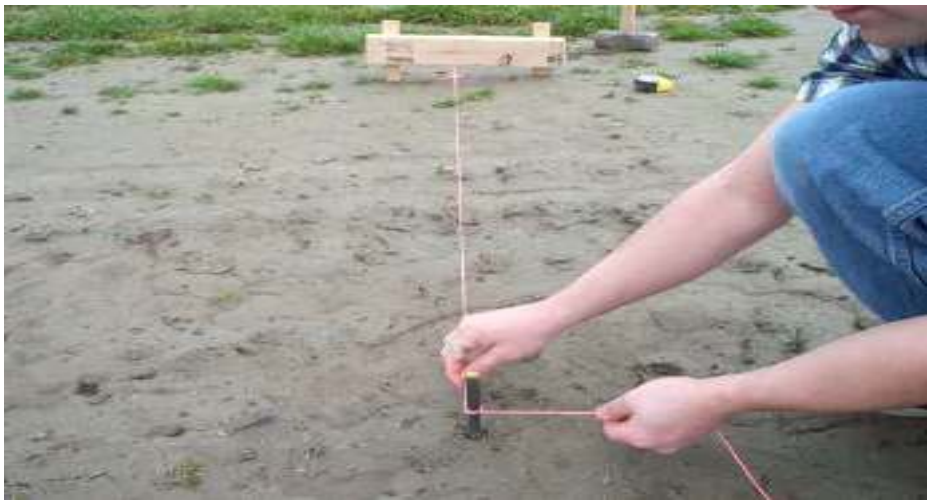
Fig- 1 peg

We need the following materials;

- *2 batter boards*
- *2' length of 1/2" rebar*
- *String*
- *Mallet*
- *4 wooden stakes*
- *2 green stakes or small wooden dowels*

- *Tape measure*
- *Knife*

This method can be used to create a square or rectangular string line of any size. For this tutorial a 4' by 12' area is being marked off. Start by pounding a piece of rebar into the ground to mark one corner of the rectangle.



Tie one end of the string to a batter board. Don't tighten the string down too much around the batter board because you will need to adjust it later. Pull the string taut, and loop it around the rebar a couple times. Move to the second batter board, pull the string taut, and tie it off.

Figure-3 pull the string taut

Following one leg of the string line, measure 3' away from the outside of the rebar. Use a green stake or a small dowel to mark the spot. Move to the other leg of the string line and measure 4' away from the outside of the rebar, again marking it with a small, round stake

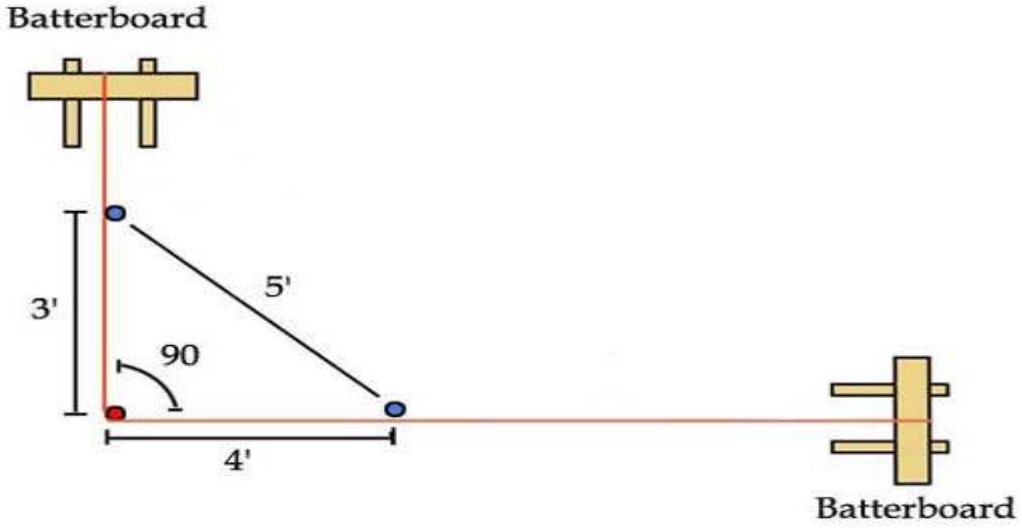


Figure- 4 check 90 degrees

The Pythagorean Theorem states that if one leg of a triangle is 3 units, one leg is 4 units, and the hypotenuse is 5 units, then the angle in between the legs is 90 degrees. Measure the distance in between the two marker stakes. The object is to get that value to be 5' by sliding the string along the batter board. Adjust the position of the string on the batter board until you have a 3' by 4' by 5' triangle.

Figure- 5 marker stakes

our can verify this mark by measuring the distance diagonally between the two corner stakes that are already in the ground. Hook your tape measure on the first piece of rebar and measure the distance between it and the marks you made in the dirt. If the values are identical, you have right angles all the way around your rectangle. Pound in the fourth stake and run the string line the rest of the way around the rectangle. Tie off the ends

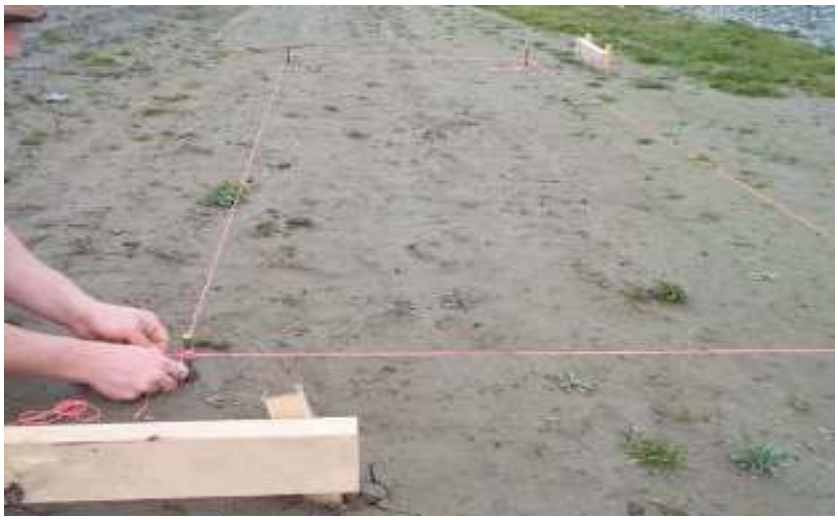


Figure-6 string line the rest

5 Self -check-4

Test I: short Answer writing

Instruction: write short answer for the given question. You are provided 10 minute for each question and each point has 20Points.

1. Write four step to check the angle of the front corner ?
2. Write The simplest way of checking that the angle is precisely 90°?
3. What is right angle ?
4. What is Pythagoras theorem ?

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

You can ask you teacher for the copy of the correct answers

Operation sheet 4.2: Setting-out Profile Set-up for Building Works

- **Operation title:** Procedures of setting out for building work
- **Purpose:** To practice the process of marking position of shape and sizegeometrical shape
- **Instruction:** Using the figure below and given equipments measure the length of each line. You have given **4 Hour** for the task and you are expected to write the answer on the given line.
- **Tools and requirement:**
    - Hammer,
    - Circular saw,
    - Pencil.
    - Try square
    - Sprat level
    - String
    - Pegs
    - Tape
    - Pum bob
    - Slade hammer
    - Profile bord

Procedures for setting out

- Find out the radius of the building from the working drawings.
- Mark out this measurement on the ground.
- Place a stake securely on the ground at the end of the radius in the center of the building.
- Drill a 12mm hole in the stake.
- Place a 12mm reinforcing bar in the hole in the stake.
- Check the top of the bar is level.
- Cement the stake in position.
- Loop a piece of rope, which is the length of the radius of the building over the reinforcing bar. Measure the distance to the inner and outer sides of the foundation from the working drawings

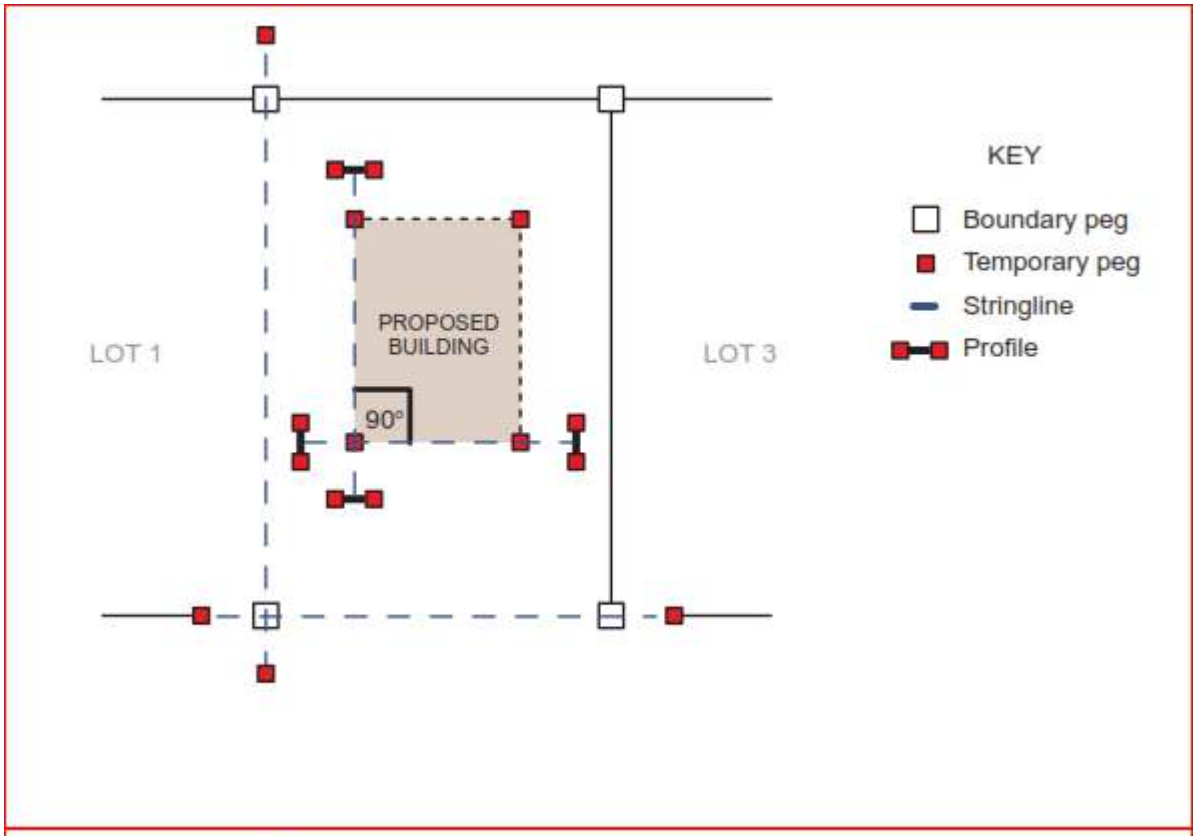
LAB TEST 4.2. Name: _____ Date: _____

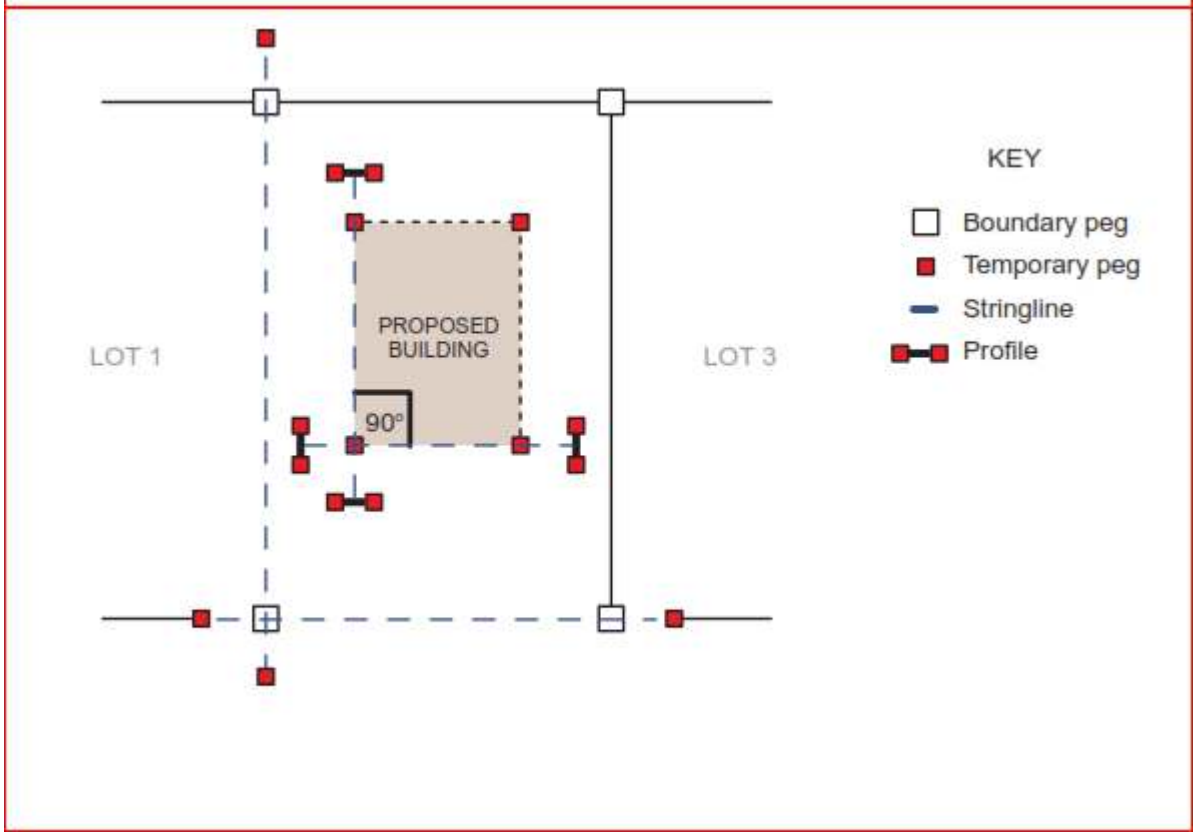
Time started: _____ Time finished: _____

Instructions: - Given necessary templates, tools and materials you are required to perform the following tasks within 6 hour.

Task 1.check inspection procedures

Task 2. Inspect plan of setting out





Unit Five: Install other building lines

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

- Installing hurdles for remaining building lines
- Marking and nailing measurement
- Setting taut of string lines

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

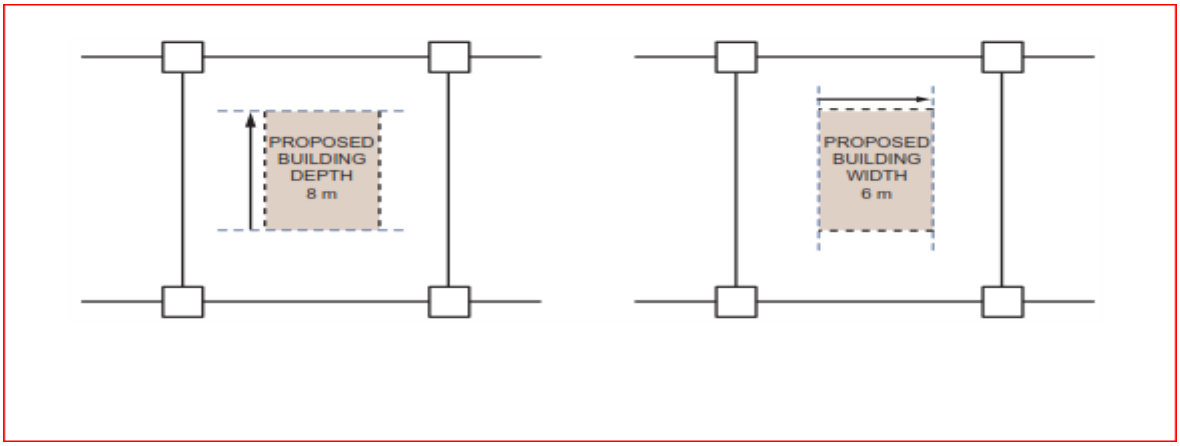
- Install hurdles for remained building lines
- Marked and nailing measurement
- Setting String lines taut into position

5.1 Installing hurdles for remaining building lines

5.1.1 Installing hurdles for remaining building lines

Setting out the remaining the first two building lines are used to determine all subsequent building lines. This means that the measurements for positioning the third and fourth string

lines are taken from these lines rather than the boundaries, using the dimensions for the building found on the plans and specifications.



Step 1

a) Determine the building depth from the site plans and specifications to measure

the position of the third building line.

b) Install the profiles E and F approximately 2–3 m from the temporary pegs and use a spirit level to make sure each ledger is level across the top face.

c) Measure the distance identified as the structure depth from profile A to profile E,

and from profile B to profile F.

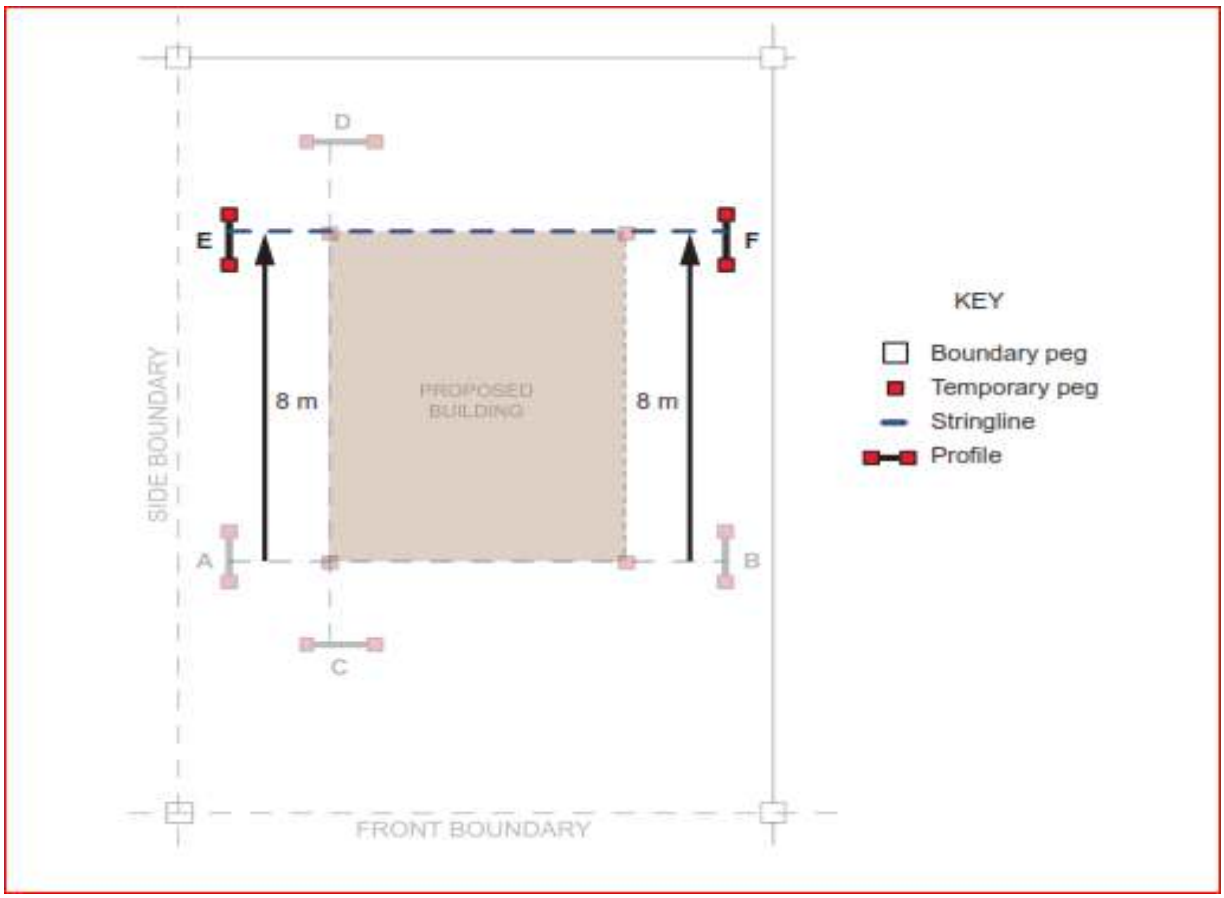
Note: Measurements should not be taken from string lines as they bend easily

and can make the measurement inaccurate. Always measure from the top of one

profile to the top of the next.

Tape measures must be pulled tightly as a sagging tape measure will give an incorrect measurement.

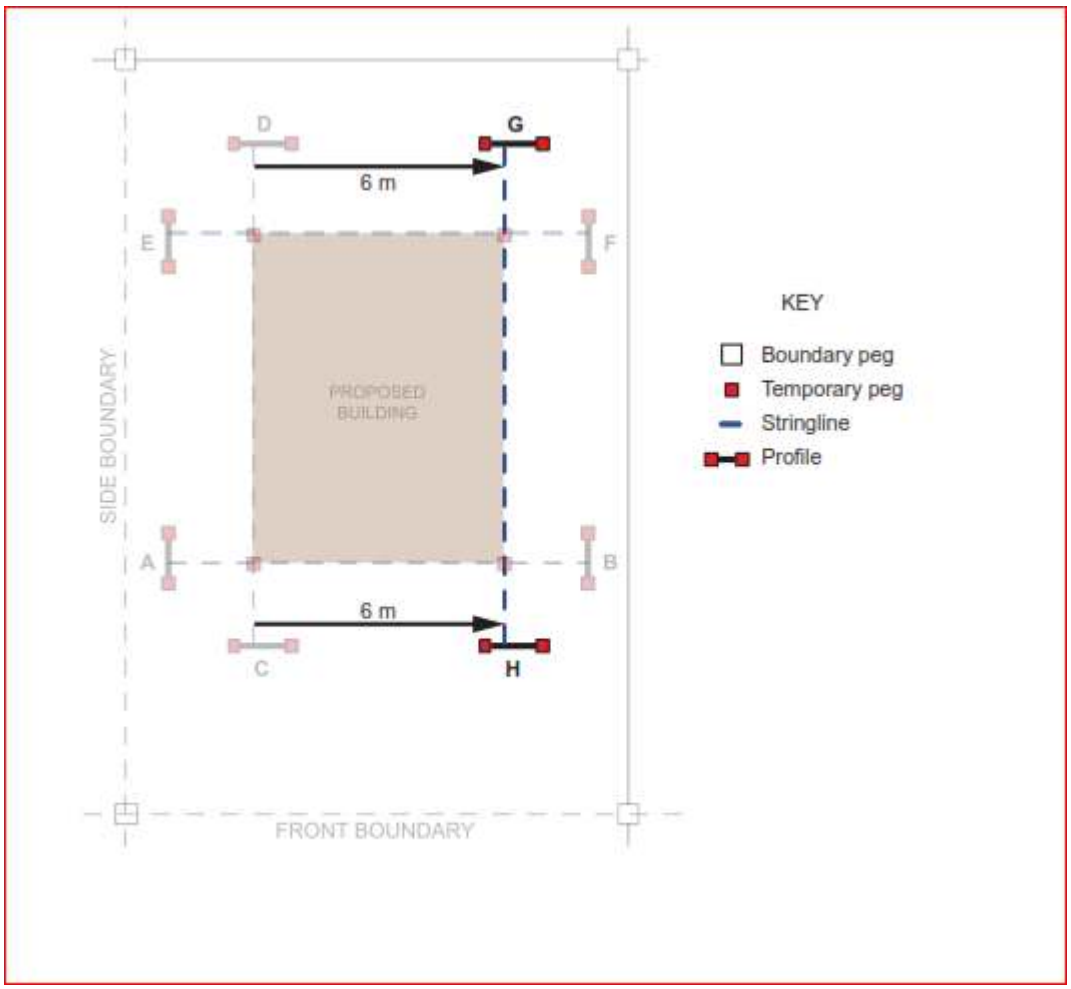
d) Fix a nail in the top of each new ledger at the mark, and set the string line E–F taut (Stretched tight) between the nails to create the third building line.



Step 2

a) To set out the fourth and final line, position profiles G and H and measure the distance identified as the building width from profile C to profile G, and from profile D to profile H.

b) Fix a nail in the top of each new ledger at the mark, and set the string line G–H taut between the nails reto cate the fourth building line



5.2 Marking and nailing measurement

- Nailing surface for the top ends of the common rafters.
- The common rafters extend from the top wall plaster to the ridge.
- The gable end studs are up right farming members.
- A level seat cut is placed where the rafter rests to the top plated.
- The notch formed by the set and heat cut ling.

5.2.1 Fixing the corners in place

The position of the corners must stay fixed in place after the ground is excavated.

You will need to buildspecial boards called profiles to attach the lines that define the outline of the building.

The profiles replace the corner pegs.

A profile consists of two timber posts with a horizontal board across the top.

The posts are sharpened like
takes so that they will stay in the ground. You should use two profiles at each corner. This me ans that you must make eight profiles for a simple rectangular building.

5.3 Setting taut of string lines

5.3.1 Setting out the profiles and string lines

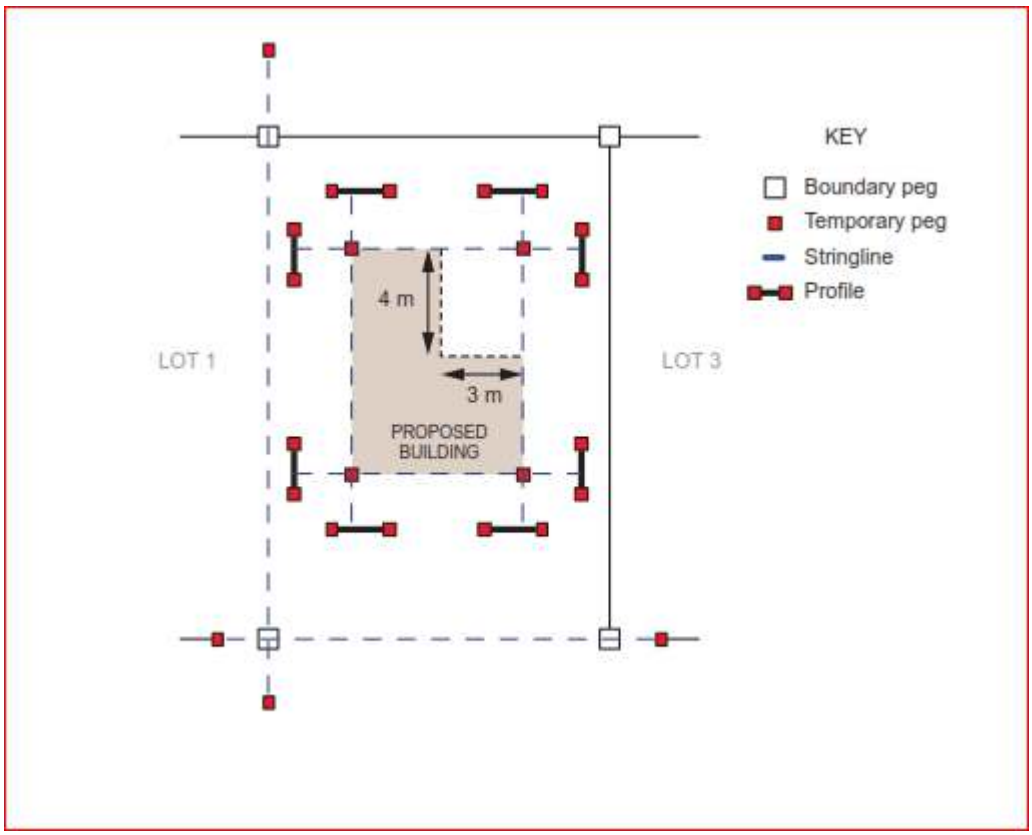
The following example shows the process for setting out an L-shaped building with two offset measurements

Step 1

Set out the initial rectangular shape as described earlier in this section. Starting with a regular shape rather than a single reference line allows for greater accuracy and testing of overall dimensions.

Step 2

Determine the specified offset distances from the site plans. In this example, the offsets of the building are 3 m wide and 4 m deep.

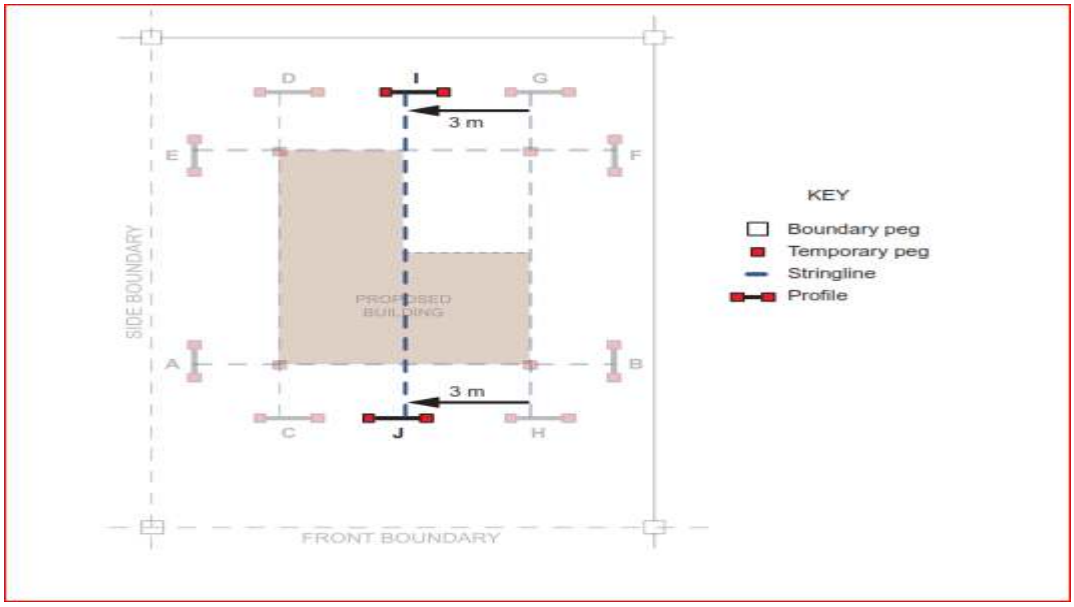


Step 3

a) Set up profiles I and J for the first offset building line.

b) Measure the distance identified as the offset width from profile G to profile I, and from profile H to profile J.

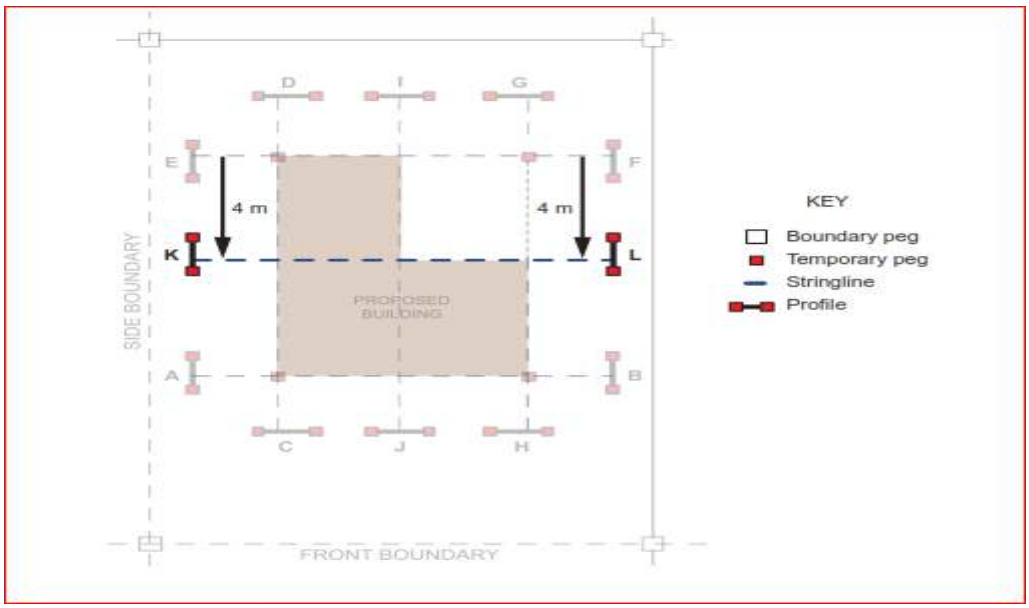
c) Fix a nail in the top of each new ledger at the mark and set the string line I–J taut between the nails to create the building line



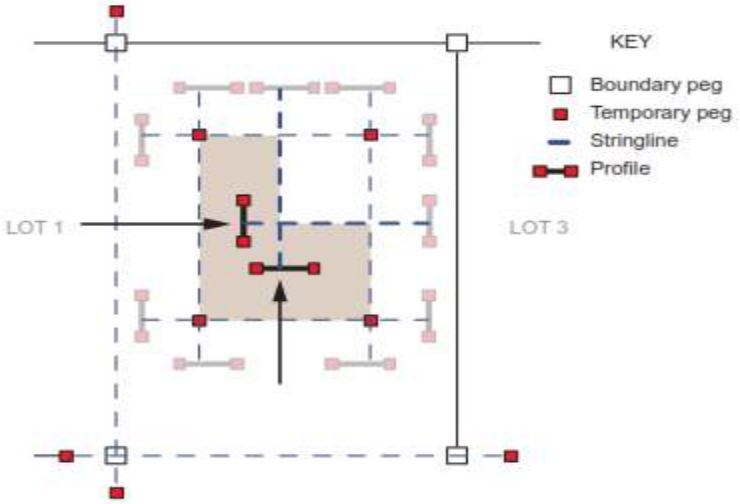
Step 4

a) To set out the second offset building line, position profiles K and L and measure the distance identified as the offset depth from profile E to profile K, and from profile F to profile L.

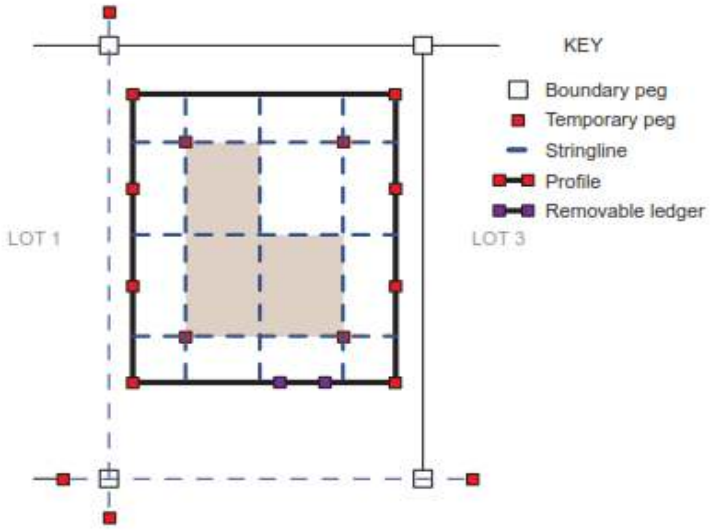
b) Fix a nail in the top of each new ledger at the mark, and set the string line K–L taut between the nails to create the final building line.



In some situations (depending on the type of footings being set out), the profiles may be set up on the inside of the proposed building.



Alternatively, setting out may be carried out using continuous profiles as shown here.



Note: A removable ledger is placed near the front of the site to provide access to and from the proposed building.

Unit six: Building lines are checked for squares

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

- diagonal measurements for squares
- line to provide square relationship

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

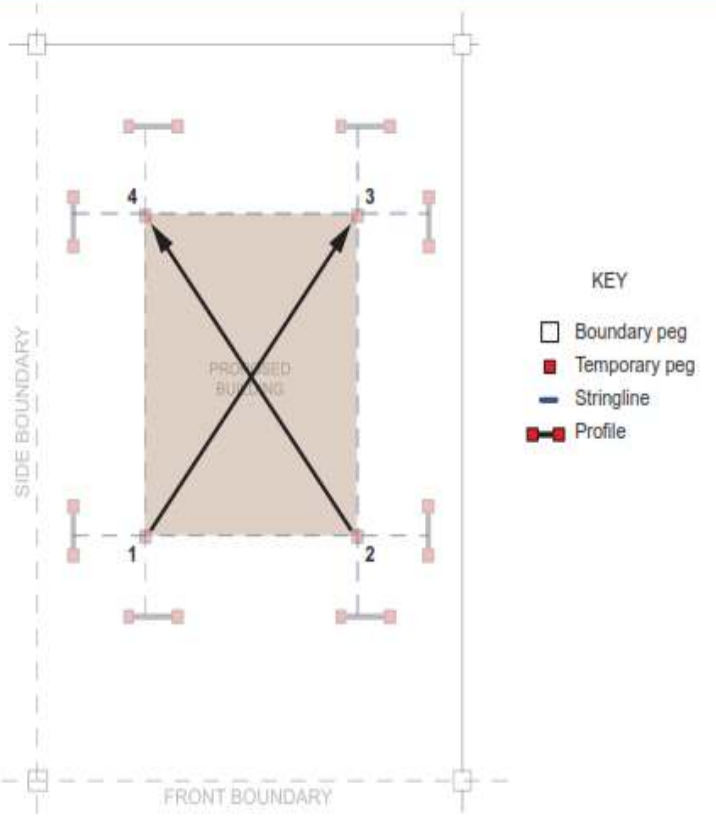
- Checking of Diagonal measurements
- Adjust line to provide square relationship

6.1 Diagonal measurements for squares

Once the initial rectangular shape has been completed, it must be checked to ensure that the set‐our is square; that is, the corners are at 90°, and the measurements are correct. You do this by comparing the diagonal distances between corners.

Take precise measurements of the distance between corners 1 and 3 and between

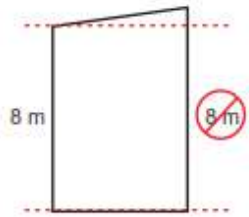
Corners 2 and 4. If these diagonal measurements are the same, the set‐out is correct.



There is an allowable variation that is considered a reasonably acceptable amount of error when setting out a building. This is known as a **tolerance** and is a difference of 5 mm over a diagonal distance of 15 m.

If the difference between the diagonal measurements is greater than the allowable tolerance, the set-out is not correct and the stringlines must be adjusted.

There are two reasons that one diagonal line may be longer than the other.

	
1. The first corner of the set-out is not square (90°).	2. The dimension measurements are not correct and the opposing lines are not parallel.

To determine the cause of the error, you must recheck the initial corner with either a builder's square or the 3:4:5 method **and** check the dimensions of each side of the set-out.

To determine the cause of the error, you must recheck the initial corner with either a builder's square or the 3:4:5 methods and check the dimensions of each side of the set out.

6.1 *Adjusting* Line to provide square relationship

ADJUSTING LINE TO PROVIDE SQUARE

- It provides measure of how well future outcomes are likely to be predicted.
- Between the comets and the values of the single repressor being used for prediction.
- Important cases where the computational definition can yield diffusion values depending on the definition used arise where the predictions are being compared.

7.1.49

6.2.1 Builder's square method**:**

1. Set out the front or building line in the usual manner with pegs or marks at the required distance.

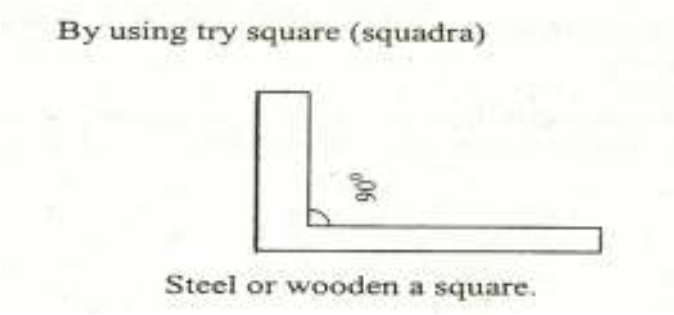
2. Place the builder's square so that front line touch one side if the square right through its length.

3. Stretch a line from the peg so that it is parallel to second side of the square and establish the third peg. A corner of angle 90 degree is thus obtained.

4. with the aid of a tape measure mark out the length and breadth of the proposed building.

5. Transferring the builder's square to the remaining corners and repeating the above operations; a simple rectangular building can be set out.

6. After establishing the four corner pegs, profiles (separate or continuous) may be erected in the same way.



6.2.2 CHECKING MEASUREMENTS FOR ACCURACY

These techniques regulate requirement and operation of measurement accuracy control procedure. It helped to calculation in accuracy of fuel consumptions measurement with flow meters installed on a vehicle.

The maximum error in the measurement of physical quantity in terms of the output of an instrument when referred to the individual instrument calibrations.

Once this has been completed, the right angled corners can be set out, the other building lines installed and finally the lines checked for square and measurements checked for accuracy.

Determining corner of building

In setting out simple building we use one of the three methods.

These are: -

- The 3,4,5 method
- The builder's square method
- Leveling instruments.

The 3, 4, 5 methods:-

1. Mark out the building line from the road by measuring the required distance from the center of the road, or by stretching a line along an existing building to the proposed site. The building line is then, represented by a line knows the ranging line, which also marks the front wall of the building as shown by Fig.

2 .Mark out the overall length of the building by driving pegs at A and B along the ranging line.

3 .Obtain two steel tape measures; mark out four equal distances on the ranging line starting from the corner peg at B. These distances may be in any unit of measurement. That is mm, cm, m etc.

4 .Pull a tape measure from point B to C and ask an assistant to hold it, ready with hammer and peg.

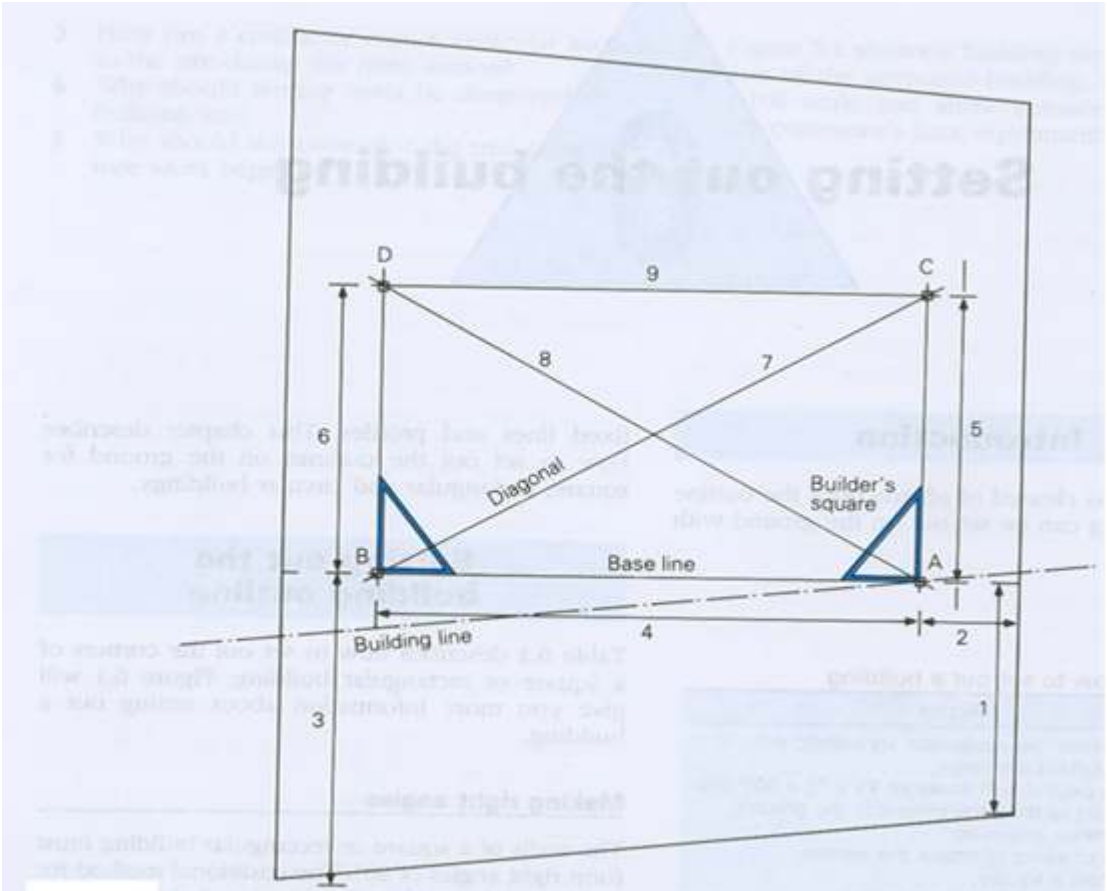
5.Pull the second tape from fourth mark at D on the ranging line to point E on the first tape.

6. The distance 5m if using meters on tape DE should coincide with point 3m on tape BEC. Then the angle B is 90 degree (from Pythagoras theorem). If the points do not coincide, the tape BC is either shifted out wards or in wards until 5m on the second tape coincide with the 3m marks on the first tape.

7. Repeat the same procedure to obtain the right angle for BAF and mark out the overall width of the building.

8 .Establish corner pegs and erect profiles.

9. Mark the position of partition wall on the profile with either nails or saw cut. Ranging lines are stretched through these nails and the corner pegs to mark the ground to indicate the line of excavation



Setting out the corners of a building.

Unit seven: Clean up

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

- Clearing work area
- . Disposing , reusing and recycling of materials
- Cleaning, checking, maintaining and storing of tools and equipment

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

- Clear work area
- Dispose reusing and recycling of materials
- Clean, check, maintain and store of tools and equipment

7.1 Clearing work area

When you complete any task on a building site, you must clear your work area to ensure the safety and convenience of your workmates, other construction teams and the public. This process includes:

- recycling or disposing of any waste material
- cleaning, maintaining and storing equipment
- safely filing or storing plans, documents and records
- Cleaning up the area.

7.1.1 Clearing the site

Keeping the site tidy is an essential part of maintaining a safe workplace. Tools, equipment and materials are all potential hazards to site workers and the public and should always be properly organized and stored when they're not being used.

The pegs, pickets, string lines and profiles you place during a setting out task can be safety hazards and should be removed once there's been sufficient progress on the construction, and the position, size and shape of the building are well established.

7.1.2 Relevant legislation, regulations and job specifications

State and territory Regulations usually require a site to be kept and left in a clean, safe

condition. The tasks involved in setting out by level don't produce a lot of clutter or rubbish but all construction workers must know and follow the site policies and procedures for maintaining a tidy, organized and
safe workplace including:

- clearing potential safety hazards
- safe waste disposal
- recycling of materials
- Maintenance and storage of tools and equipment.
- Inspection shall be carried out daily to ensure that sufficient workmen/women, tools and facilities are provided to maintain the standard of hygiene.
- Final cleaning of the site and removal of all temporary facilities shall be carried out to approval at completion of works

7.2 Disposing , reusing and recycling of materials

Disposal methods adopted depend on the nature of the material. To obtain this information, a comprehensive sampling and analysis program is required so that the correct route for disposal can be determined.

7.2.1 Contaminated Material and wastes

To ensure that all contaminated material uncovered on a construction site are excavated and disposed of in an environmentally responsible manner.

Excavate material in a manner which avoids off-site environmental problems.

Seal remaining contaminated material or wastes, where only part of the tip has been excavated, to ensure that there is no off-site effect now or in the future.

Dispose of contaminated material in a land fill licensed to take the type of contaminated material or wastes uncovered

- **Disposing** Removing and destroying or storing damaged, used or other unwanted domestic, agricultural or industrial products and ***substances***
- **Recycling** means turning an item into raw materials which can be used again, usually for a completely new product. This is an energy consuming procedure.
- **Reusing** refers to using an object as it is without treatment. This reduces pollution and waste, thus making it a more sustainable process.
    - **Advantages of 3R'S**

Recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products. Recycling can benefit your community and the environment.

Recycling reduces waste disposal by transforming useful materials such as plastic, glass and paper into new products

The reusing process is not just about re-purposing materials, but the object as it is. This includes buying and selling used goods and repairing items rather than discarding them. Reusing is better than recycling because it saves the energy that comes with having to dismantle and re-manufacture products. It also significantly reduces waste and pollution because it reduces the need for raw materials, saving both forests and water supplies.

- **Waste management**

Construction projects create a lot of waste including general rubbish and used, damaged or surplus materials. All waste must be disposed of appropriately.

- No degradable substances and organic material like food and vegetation should be disposed of at a landfill site.

•Left over materials in good condition and in useable sizes or quantities can be salvaged.

- Used materials that can be repurposed or reprocessed can be recycled.

Note: Hazardous waste such as asbestos must be handled by removal specialists.




There are laws which outline how waste materials should be dealt with and large

fines can be issued if they're not followed. Companies and contractors usually develop policies and procedures to make sure that everyone on the building site complies with these requirements.

Therefore, Waste that cannot be ***reused*** or ***recycled*** in some form eventually finds its way to *disposal*. This ***disposal*** includes landfills, but an increasing number of municipalities have elected to divert ***waste*** into resource recovery. These recovery methods use the ***waste*** to generate electricity or produce raw ***materials*** for industry.

7.3 Cleaning, checking, maintaining and storing of tools and equipment

1. Proper tools and equipment are essential for the effective operation of any civil works site. Equipping the construction site with the correct tools and equipment plays an essential role in achieving timely and good quality results. For every construction activity there is an optimal combination of tools, equipment and labor. Depending on the nature and content of the works, the technical staff needs to know which tools to use and how to effectively combine them with manual labor.
2. Once on site, equipment requires trained operators and supervisory staff who are proficient in its operation and maintenance.
3. Faulty equipment is a common reason for delays on construction sites. A major responsibility of the project management is to ensure that tools and equipment are maintained in a good condition and are readily available when required for the various work activities.
4. For certain construction activities, particularly hauling of materials and compaction, high labor productivity and good quality of work may be difficult to achieve using only manual labor and hand tools. In such cases, using light construction equipment can increase the efficiency of work.
5. Site supervisors need to know how to use the tools and how to operate the equipment in order to secure good work progress and the expected high quality results. It is also important that staff know the full potential, as well as the limitation, of the use of manual and equipment-based works methods.
6. Finally, tools and equipment need regular maintenance, requiring good workshop facilities, a reliable supply of spare parts and qualified mechanical staff.

2.3 Dos and don'ts of machinery safety for workers

7.3.1 Do…

- Check the machine is well maintained and fit to be used, ie appropriate for the job and working properly and that all the safety measures are in place – guards, isolators, locking mechanisms, emergency off switches etc
- Use the machine properly and in accordance with the manufacturer's instructions
- Make sure you are wearing the appropriate protective clothing and equipment required for that machine, such as safety glasses, hearing protection and safety shoes

7.3.2 Don't…

- Use a machine or appliance that has a danger sign or tag attached to it. Danger signs should only be removed by an authorised person who is satisfied that the machine or process is now safe
- Wear dangling chains, loose clothing, rings or have loose, long hair that could get caught up in moving parts
- Distract people who are using machines
- Remove any safeguards, even if their presence seems to make the job more difficult

Self check 7

Directions: Answer all the questions listed below.

1. Turning an item in to raw material which can be used again is _____

   A) Reduce B) Recycle C) Reuse

2. Using an object as it is

   A) Reduce B) Recycle C) Reuse

3. What is clean up?

   A) Make something neat B) Restore order or morality C) A and B


የሥራ እና ክህሎት ሚኒስቴር
MINISTRY OF LABOR
AND SKILLS