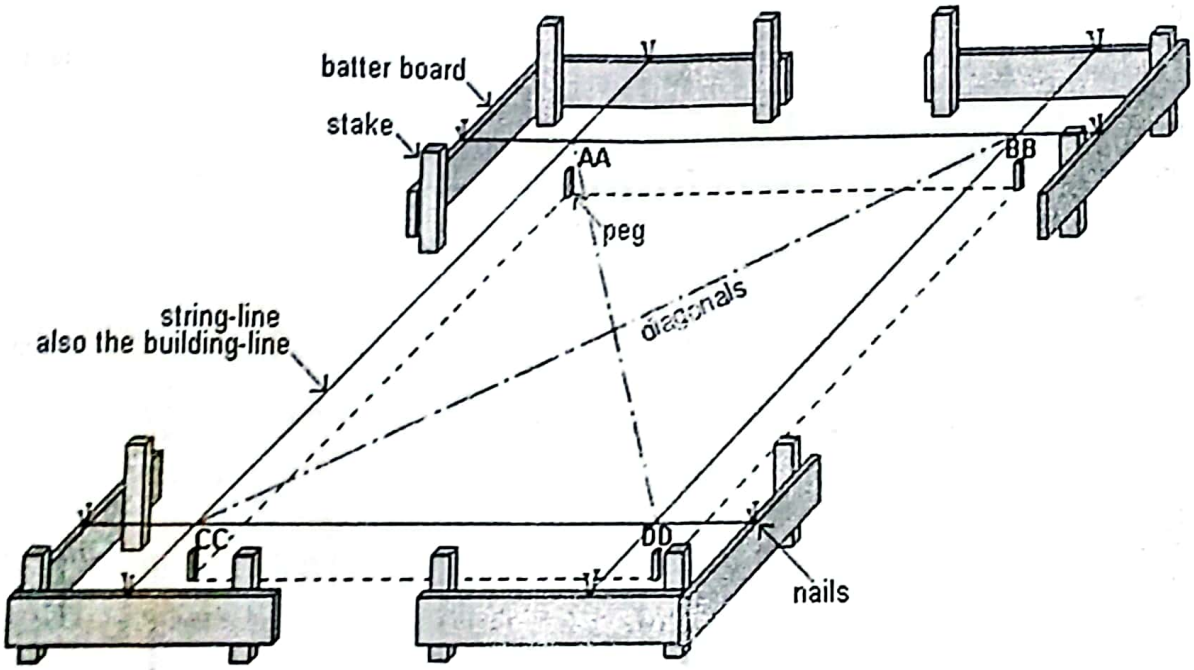
## BUILDING SETTING OUT.

It is an act of measuring and marking out of a building position, size and shape in site. It is the process of developing the physical positions of corners and walls of a building and it's done by transferring dimensions from the layout plan to the ground.

It clearly defines the outline of the excavations and the centre line of the walls, so that the construction can be carried out according to the plan.

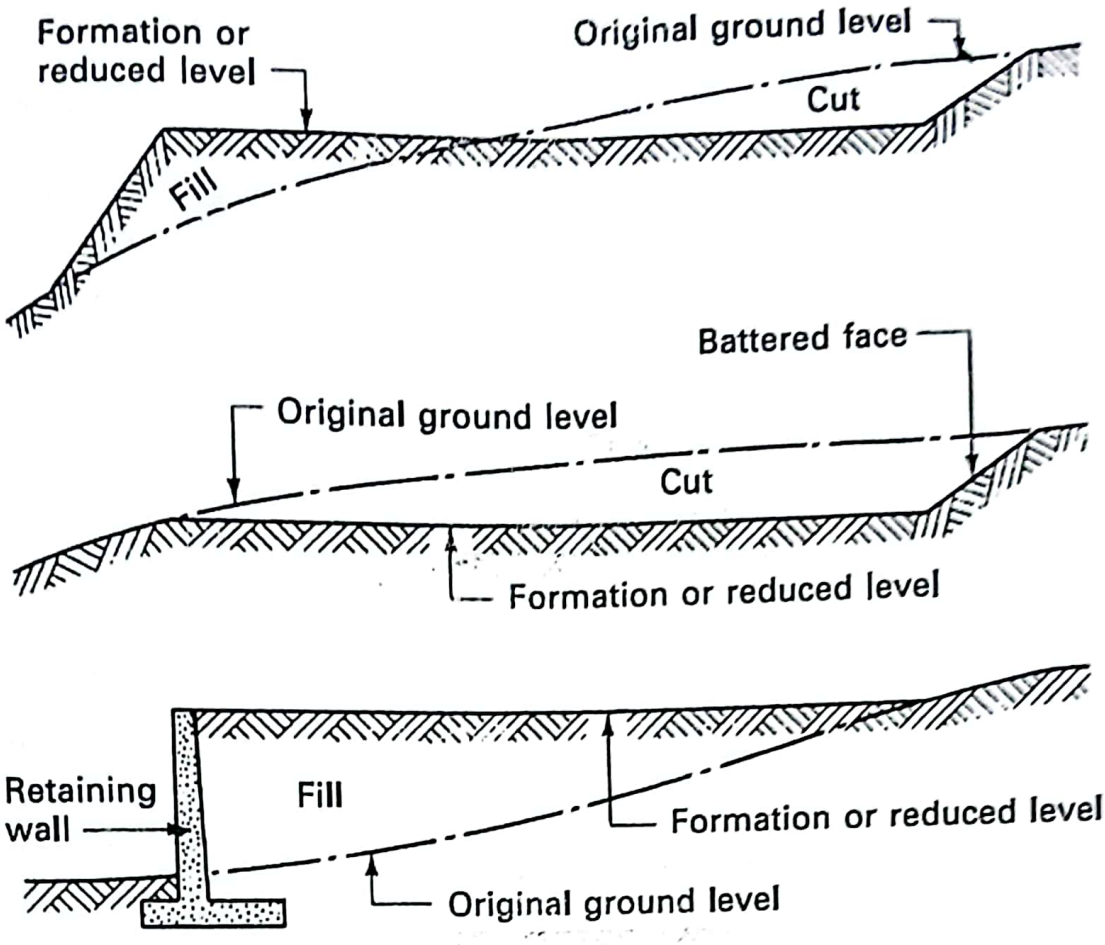
It is establishment of mark and from which the boundary line of a new building can be set out Setting Out the Building Outline ~ this task is usually undertaken once the site has been cleared of any debris or obstructions and any reduced-level excavation work is finished.

## A PICTURE SHOWING HOW SETTING OUT IS CONDUCTED.




## LEVELLING OF SLOPING SITES

Very few sites are level, and therefore before any building work can be commenced the area covered by the building must be levelled. In building terms this operation is called reducing levels. Three methods can be used, and it is the most economical that is usually employed. Cut and fill The usual method because, if properly carried out, the amount of cut will equal the amount of fill. Cut This method has the advantage of giving undisturbed soil over the whole of the site, but has the disadvantage of the cost of removing the spoil from the site.




**When is setting out done?**

- When building a new house
- When renovating an already existing building, especially an extension of building.

The process of setting out is done by a contractor and overseen by the lead project consultant engineer, architect or any other qualified member of the project team.

**The purpose of building setting out is to ensure that: -**

1. The building faces in the right direction
2. The building is erected on the correct plot of land
3. The over all sizes (length and breadth) are according to those shown on the drawing.
4. Specification (regards) are paid to the local building line

## *Terminology used during setting*

### *Building line*

*It is the line established by the authority beyond which no building may extend to ensure that its treats will appear uniform.*

*Is the line whose position on site is given by the local authority in front of which no*
development is permitted.

### Base line.

- Is a line that is a base for measurement or for construction.
- Is the line to which all the setting out can be related.

### Datum peg

- It is the peg use to establish a level on the site to which references to level is made
- It is the peg used for setting out the height.
- A point which serves as a reference or base for the measurement of other quantities

**Note:**

Where there are no benchmarks on or near the site, a suitable datum must be established. A site datum or temporary benchmark could be a post set in concrete or a concrete plinth set up on site.

### Method of setting out

The wall of the square or rectangle building must form the right angle of $90^0$

In setting out simple building we may use one of the following method.

1. The 3:4:5 method
2. The builder's square method

3. The optical square instrument method
4. Leveling Instrument.

**Process of setting out**

- Setting out is done on the principle of whole to part, according to this principle the largest possible rectangle of the of the building is found and set out. The rectangle is further partitioned into small parts (internal room).
- The first thing we need to establish is a parallel/reference/base line, to which all other line can be related. This can be taken along an existing building close to the proposed new structure/boundary wall if existing /kerb line.

**Instrument and tools required for setting out**

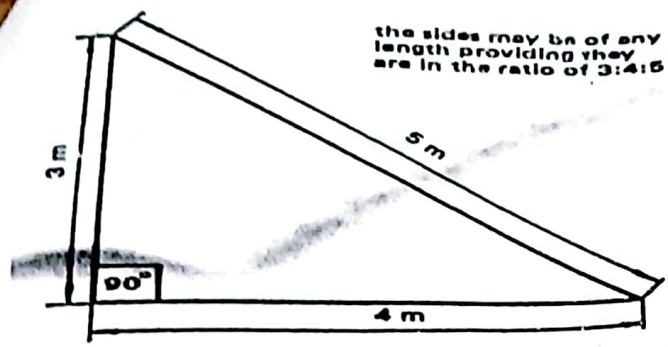
The following are the tools and equipment used during setting out the building

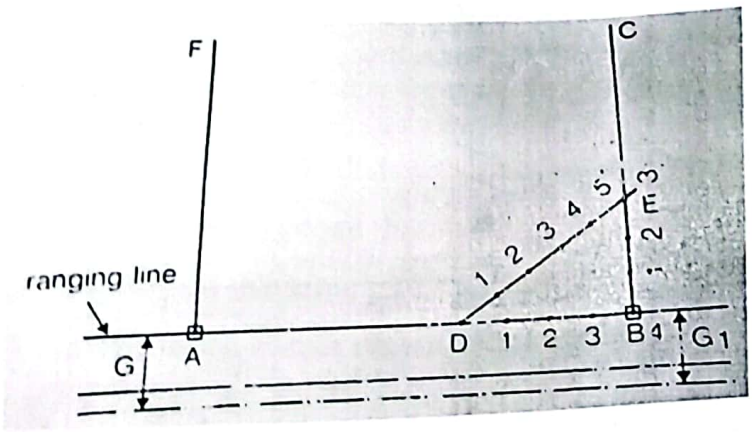
- Timber board 75mm by 50mm or any appropriate size
- Round poles / timber to act as pegs or steel for hard ground
- Nylon threads (manila rop)
- Ordinary nails 1 inch and 2 inch
- White chalk or lime
- Clear hose pipe for determination of horizontal levels
- Sledge hammer
- Measuring tape
- Builder's square

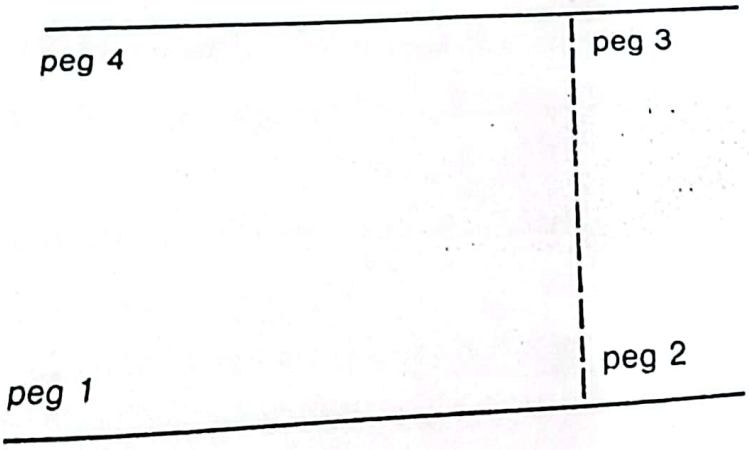
**The 3:4:5 Method**

It is the traditional method for making right angle 3:4:5 triangles to setting out right angles in the field.

The triangle has side measuring 3,4, and 5 meter, it must a triangle with a 90° angle between the shot sides.it is based to on Pythagorean theorem from the geometry. A2+B2=C2 for a right triangle is the longest side




**Steps for setting out by 3:4:5 method**

1. Mark out the building line from the road by measuring the distance from the road by measuring the required distance from the centre of the road or by stretching a line along the existing builders.

- Then locate the base line/ranging line which marks the front wall of the Building.
- Base line is a line that is base (starting line) for measurement or for construction

2. Mark out the overall length of the base line of the building by driving in pegs along the base line, nail the three peace of timber together which you cut to these lengths to make a frame place the right angle of the square against the line between the corners
3. A long the base line measures a distance of 4m from the corner peg Call AB
4. Measure the distance from the corner peg by tape 3m = BC

6. Pull the second tape from the first mark a on the base line to point C

7 The measure the distance 5m. should coincide with the point C 3m on the tape BC to prove that the angle B is $90^{o}$ ( from Pythagoras theorem)

8. Repeat the same procedures to obtain the right angle for the other corner.

9 Establish corner pegs and event profiles.

10 Mark the positions of partition walls on the profile with either nails or saw

.

11. The ranging line or base line are stretched through these nails and the corner peg to mark the ground to indicate the line of excavation for the foundation.

**Advantages of 3:4:5 method of setting out**

1. Simple to use.
2. Can be applied to large building
3. Accuracy of setting out is self- evident
4. Adjustment in the event of error is simple and quick

**Disadvantages of 3:4:5 method of setting out**

1. Two tape measures are required which may be difficult to obtain in rural line may lead to inaccurate work.
2. Effect of wind on tapes and line may lead to inaccurate work especially on long buildings.

**The builder's square method.**

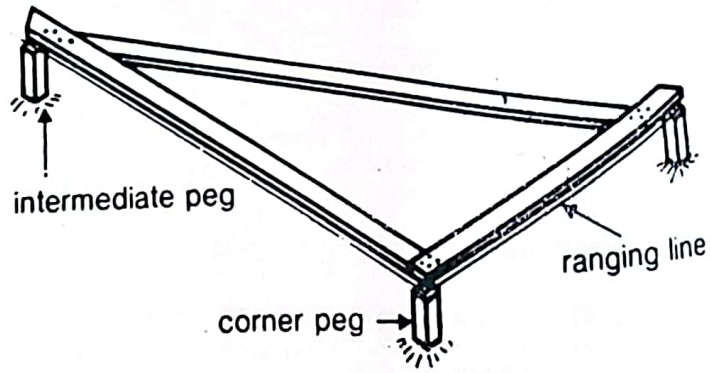
This method of setting out it use builders square to create a true $90^{o}$

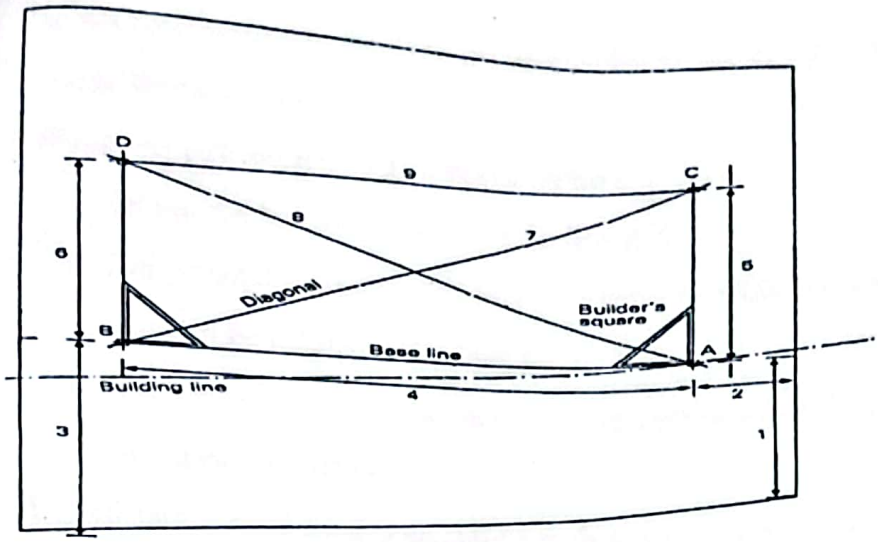
The builder's squares is used were corner meet

1. Set out the building line and the base line or front line with pegs.
2. Place the builders square so that the front line touches on side of the square right through its length
3. Stretch a line from the corner peg so that it is parallel to the second side of square and establish the third peg. A corner with an angle of $90^{o}$ is there by obtained.
4. With the aid of a tape measure mark out the length and breadth of the proposed building.
5. Transferring the builders 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 may be erected in the corner.

**Note:**

Building square method can only be used with accuracy for small buildings.






**Advantages of the builder's square method**

1. Simple to use
2. Does not require any calculation
3. Can be very accurate when used for small rectangular building
4. Quick in application.

**Disadvantages of boulders square method**

1. Un seasoned timber can twist and warp leading to errors when used.
2. Un suitable for large buildings.

**Optical square**

Optical squares are simple sighting instruments used to set out right angles.

- They can be provided either with mirrors or with one or two prisms.

There are two types of prismatic squares

(i) Single prismatic squares

(ii) Double prismatic squares

**Single prismatic square setting out.**

It can be used to set out right angles and perpendicular lines.

The prismatic square is fitted in a metal frame with handle. Attached to the handle is a look to which a plumb bob can be connected.

The special construction of the prism enables to see at right angles when looking through the instrument.

**Setting out procedure by prismatic square.**

1. Set out the building line and base line AB
2. The prismatic square has to be placed vertically above the corner peg C. This can be achieved by using plumb bob.

- The instrument can be held by the operator but is better to install the instrument on tripod.

An assistant should hold pole (D) in such a way that it can be seen when looking through opening just above the prism.

- At the indication of the operator pole D is slightly moved so that pole D forms one line when looking through the instrument) with the image of pole (A)
- The line connecting pole D and peg C form – right angle with the base line.

**Prismatic square method**

The setting out which use the site square and theodolite to do setting out of the building

The advantage of prismatic square method

**Advantages of prismatic square method**

- Can be used for large buildings with some accuracy
- Transfer of lines to profile boards done easily

**Disadvantages of prismatic square method**

1. The range of accuracy is limited to only 33 m
2. Distances cannot be read off direct in the instrument, but need to be measured with a tape measure.

**Setting out circular building**

Circular building setting out need profiles that moves.

Setting up a moving profile for a circular building.

1. Setting up the Building line and base line
2. Find out the radius of the building from the working drawings.
3. Mark out this measurement on the ground.
4. Place a stake securely in the ground at the end of the radius in the center of the building
5. Drill a 12 mm hole in the stake
6. Place a 12 mm reinforcing bar in the hole in the stake
7. Check that the top of the bar is level
8. Cement the stake in position
9. Loop a piece of rope which is the length of the radius of the building over the reinforcing bar.
10. Measure the distances to the inner and outer sided of the foundation from the working drawings. Use the rope to measure the same distances on the ground

Mark the distances around the outline of the building.

Setting work begins you (contractor) needs to find a fixed pint to measure the difference level of the building.

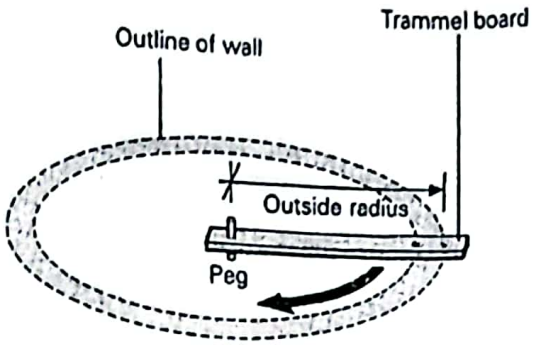
The following are typical levels that need to be measured in the site.

1. Depth of the foundation trenches
2. The height of the concreter strip foundation
3. The depth of the excavation under the hard core bed
4. The height of the hardcore bed
5. The height of the oversite concrete slab

Setting up and using a site datum level.

1. Select a position for a wooden peg where it will not be disturbed by building work and place it so that the top is about level with the top of the oversite concrete slab or other fixed level

2. Set up the survey leveling instrument so that ou can see a measuring staff on the concrete slab and the site datum mark
3. Level the site daturm mark and concrete it in position




Setting procedure by prismatic

1. The front line or building line is set out with pegs or marks at the required distance
2. Set up the tripod at No.2 peg so that the datum rod is direct over the peg or mark which represent the corner point.
3. Release the spick (plumb bob) screw and extend the spike make sure it sits firm on the nail or mark.
4. After mounting the instrument on the tripod head lock the screw and tight it.
5. Check the circular bubble over over the top of the instrument if the instrument is not off the center.
6. After setting the and rotate the instrument, point the lower telescope to the front or building line and lock the screw.
7. Sight on the peg No 1 through the lower level telescope
8. Sight the peg No 3 through the telescope and measure the required distance
9. Remove the instrument to the peg No 3 and lining up on peg No2 and for the remaining corner eg No 4 can be set out

**Fixing the corner in place**

The position of the corers must fixed in place after the ground is cleared and

The corners are fixed by two profile

**Profile**

1. Profile consist timber post with a horizontal board across the top
2. It uses to define the outline of the of the building

You should use two profile at each corner.

Profile are a minimum of 900mm away from the marked peg (boundary of the building)

**Setting up a site datum for levels**

Datum is fixed point to measure the different in level of the building

Datum use to measure the following thing

- The depth of the foundation
- The height of the concrete for the strip foundation
- The depth of the excavation under the hardcore bed
- The height of the hardcore bed
- The height of the oversite concrete slab

**Setting up and using a site datum**

Step 1

Select a position for a wooden peg where it will not be disturbed by building work

Place the top about level with the top of the over site concrete

Step 2

Set up the survey levelling instrument so that you can see a measuring staff on the slab and the datum mark.

Step 3

Level the site datum mark and concrete in position