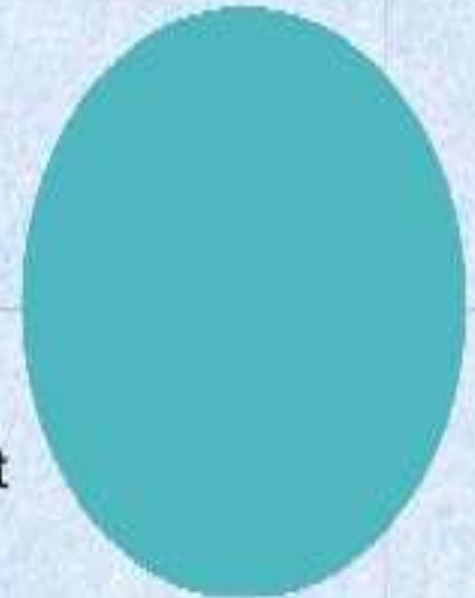


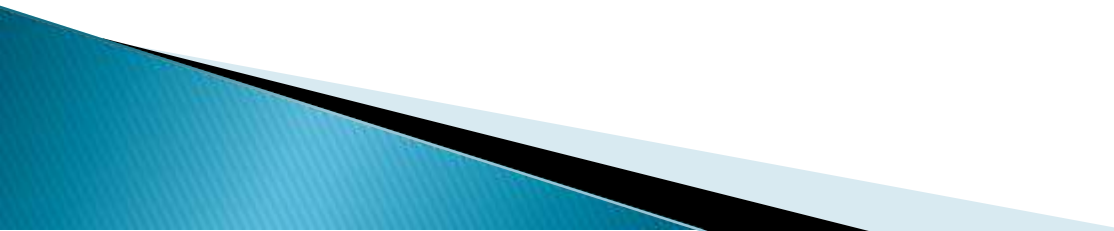
PROPERTIES OF AN IDEAL PAINT

- ✓ It should be possible to apply easily and freely.
- ✓ It should dry in reasonable time.
- ✓ It should form hard and durable surface.
- ✓ It should not be harmful to the health of workers.
- ✓ It should not be easily affected by atmosphere.
- ✓ It should possess attractive and pleasing appearance.
- ✓ It should form a thin film of uniform nature i.e., it should not crack.
- ✓ It should possess good spreading power.
- ✓ It should be cheap.



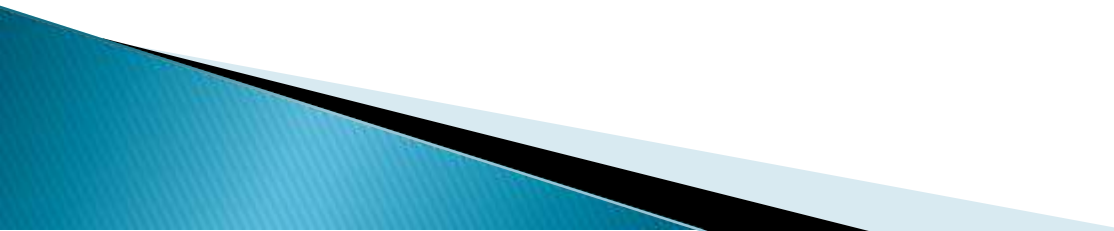
BUILDING CONSTRUCTION

Contents :

- Foundation & it's types
 - Stairs & it's classification
 - Masonry & it's types
 - Building & it's classification
 - Doors and windows & it's types
- 

Foundation

A **foundation** is a lower portion of **building** structure that transfers its gravity loads to the earth. **Foundations** are generally broken into two categories: shallow **foundations** and deep **foundations**. A tall **building** must have a strong **foundation** if it is to stand for a long time.



PURPOSE OF FOUNDATION

- The purpose of foundation is to transfer the load of the structure to the underlying soil without causing the danger of failure in shear and excessive settlement.
-

Factors Affecting Foundation Selection

- **Subsurface condition**
- **Type and magnitude of loading**
- **Type of structure**
- **Constraint – vibration, noise**
- **Cost**
- **Time**
- **Logistic**

Types Of Foundation

1. Shallow Foundation

It is further classified into:

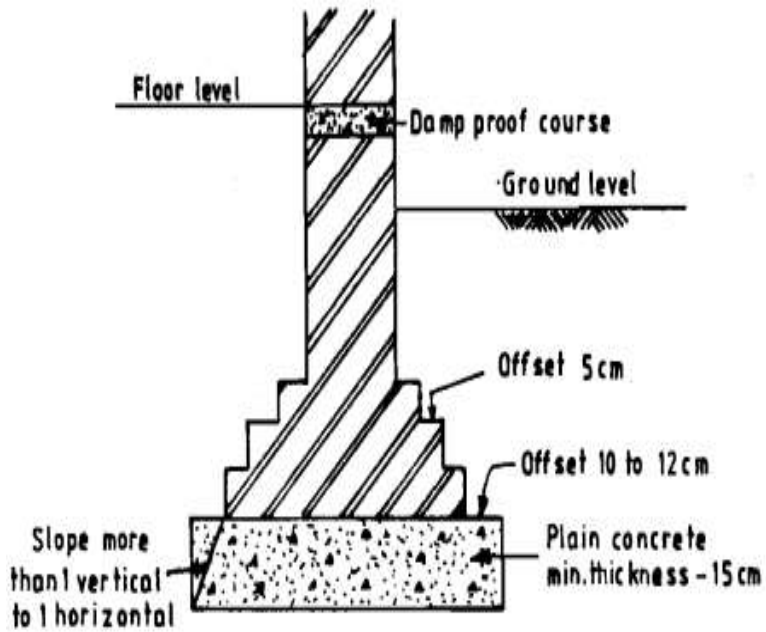
- ❖ Wall footing
- ❖ Isolated footing
- ❖ Combined footing
- ❖ Raft footing
- ❖ Inverted arch footing
- ❖ Grillage footing

2. Deep Foundation

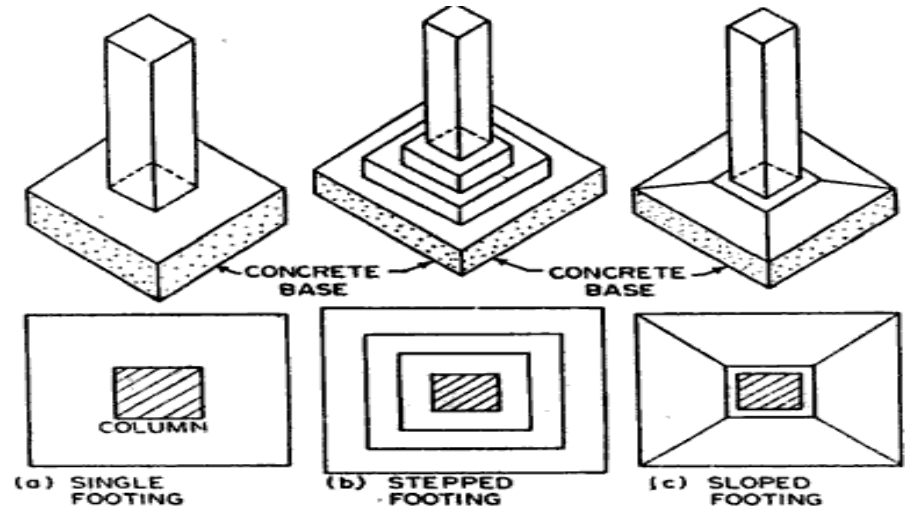
It is further classified into:

- Pile Foundation
- Well Foundation

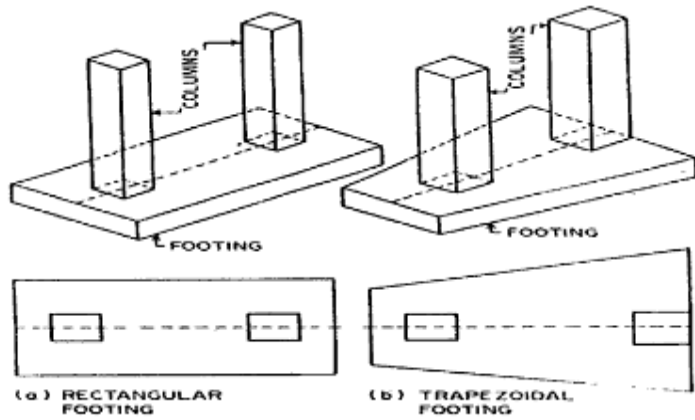
Wall footing



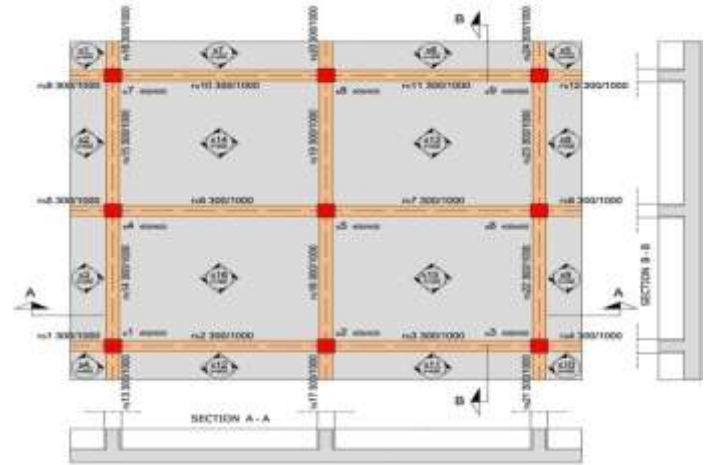
Isolated footing



Combined footing



Raft footing



Inverted arch footing

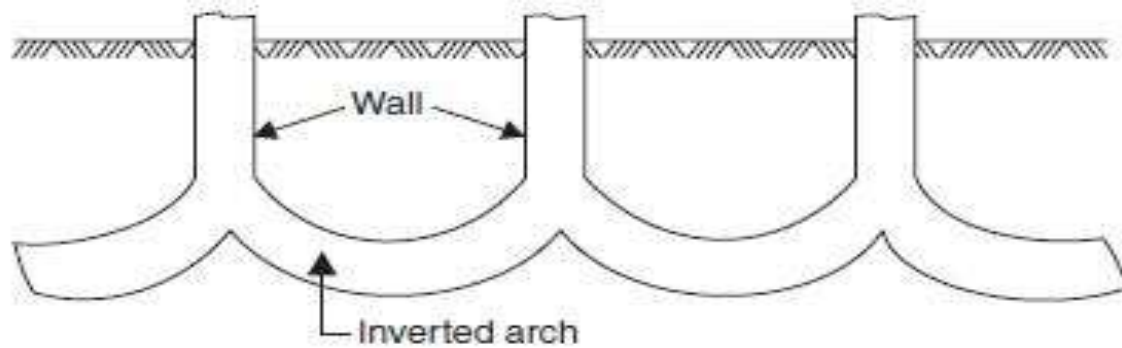


Fig. 7.8. Inverted arch footing

Grillage footing

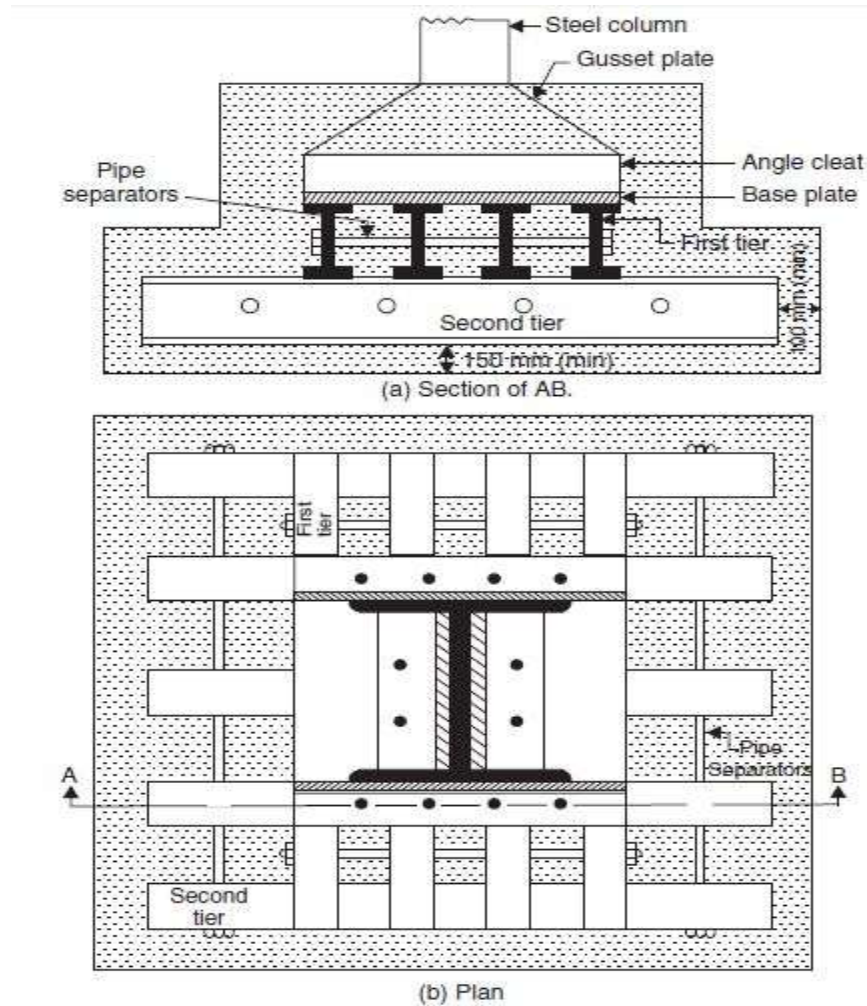
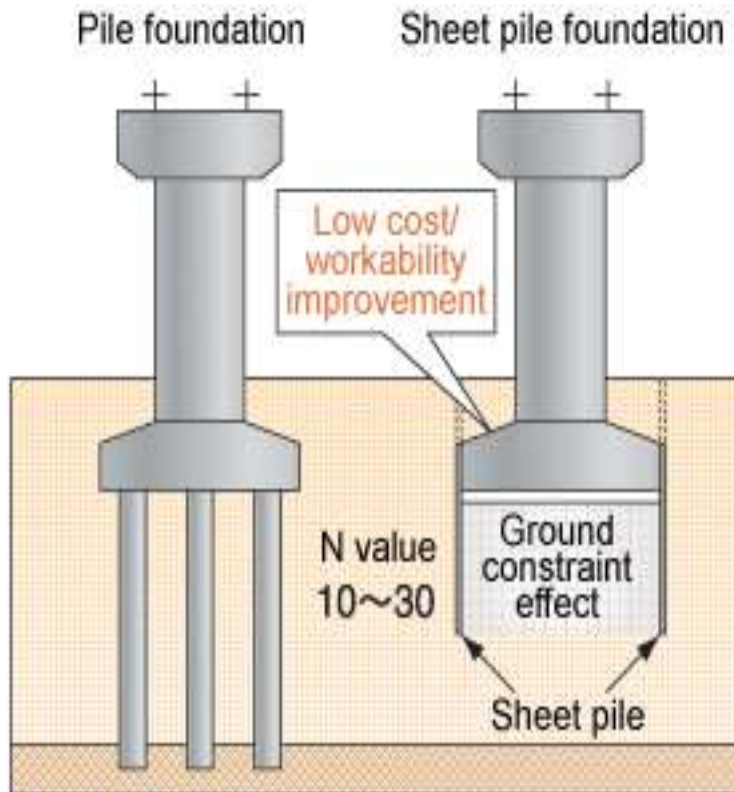


Fig. 7.7. Grillage foundation

Types of Deep Foundation

Pile Foundation



Well Foundation

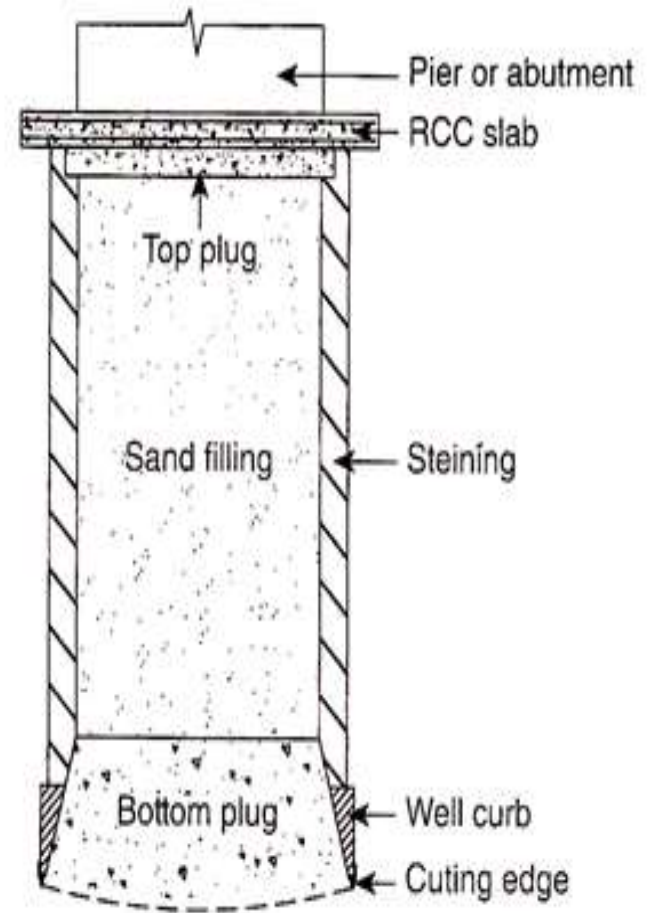


Figure 21.5 Components of a well foundation.

Stairs

A **stairway**, **staircase**, **stairwell**, **flight of stairs**, or simply **stairs** is a construction designed to bridge a large vertical distance by dividing it into smaller vertical distances, called **steps**. Stairs may be straight, round, or may consist of two or more straight pieces connected at angles.

Various Components or Parts of Staircase and their Details

Following are the various components of staircase:

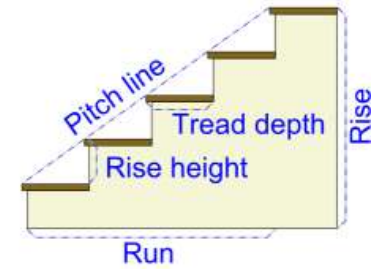
Step

The step is composed of the tread and riser.

Tread The tread “depth” is measured from the outer edge of the step to the vertical “riser” between steps. The “width” is measured from one side to the other.

Riser

The vertical portion between each tread on the stair. This may be missing for an “open” stair effect.



Landing – A landing is the area of a floor near the top or bottom step of a stair. An intermediate landing is a small platform that is built as part of the stair between main floor levels and is typically used to allow stairs to change directions, or to allow the user a rest.

Staircase – the entire structure relating to a stair, comprising steps, treads, risers, strings, balustrading, landings etc

FLIGHT

It is a series of steps without any platform or landing or break in their direction.

GOING

It is the horizontal distance between two successive riser faces.

NOSING

This is the outer projecting edge of a tread. This is generally made rounded to give more pleasing appearance and makes the staircase easy to navigate

WINDERS

They are tapering steps used for changing the direction of a stair.

SCOTIA

It is a moulding provided under the nosing to improve the elevation of the step, and to provide strength to nosing.

PITCH OR SLOPE

It is angle which the line of nosing of the stair makes with the horizontal.

STRINGS OR STRINGERS

These are the sloping members which support the steps in a stair. They run along the slope of the stair.

BALUSTER

It is a vertical member of wood or metal, supporting the hand rails.

HAND RAIL

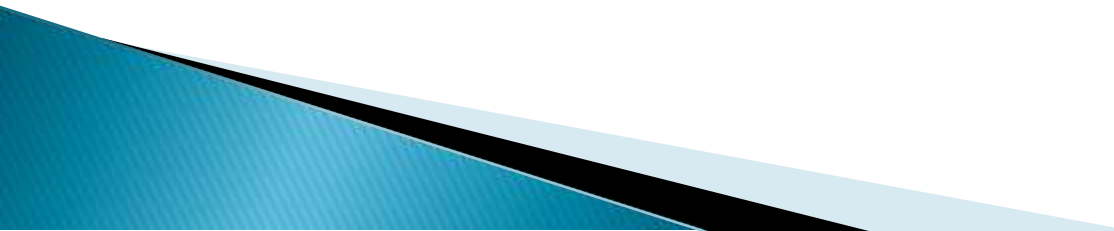
It is a rounded or moulded member of wood or metal following generally the contour of the nosing line, and fixed on the top of balusters.

RUN

It is the total length of stair in a horizontal plane, including landings.

HEADER

It is the horizontal structural member supporting stair stringers or landings.



Requirement Of a Good Stair

1. LOCATION

It should preferably be located centrally, ensuring sufficient light and ventilation.

2. WIDTH OF STAIR

The width of stairs for public buildings should be 1.8 m and for residential buildings 0.9 m.

3. LENGTH

The flight of the stairs should be restricted to a maximum of 12 and minimum of 3 steps.

4. PITCH OF STAIR

The pitch of long stairs should be made flatter by introducing landing. The slope should not exceed 400 and should not be less than 250.

5. HEAD ROOM

The distance between the tread and soffit of the flight immediately above it, should not be less than 2.1 to 2.3 m. This much of height is maintained so that a tall person can use the stairs with some luggage on its head.

6. MATERIALS

Stairs should be constructed using fire resisting materials. Materials also should have sufficient strength to resist any impact.

7. BALUSTRADE

All open well stairs should be provided with balustrades, to avoid accidents. In case of wide stairs it should be provided with hand rails on both sides.

8. LANDING

The width of the landing should not be less than the width of the stair.

9. WINDERS

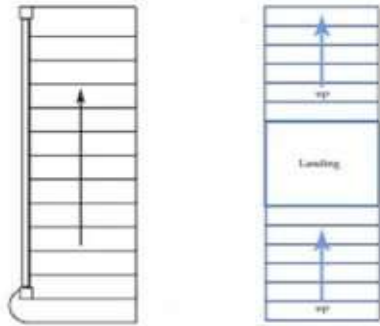
These should be avoided and if found necessary, may be provided at lower end of the flight.

10. STEP PROPORTIONS

The ratio of the going and the rise of a step should be well proportioned to ensure a comfortable access to the stair way.

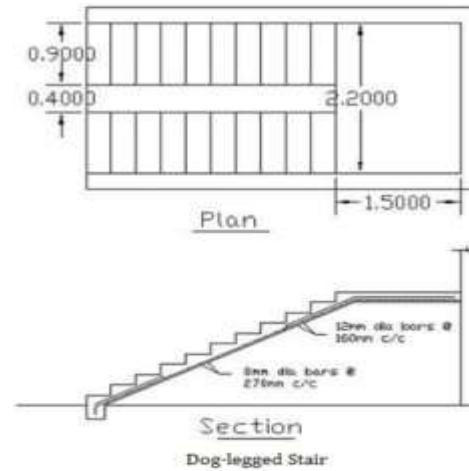
CLASSIFICATION OF STAIRS

1. STRAIGHT STAIR:



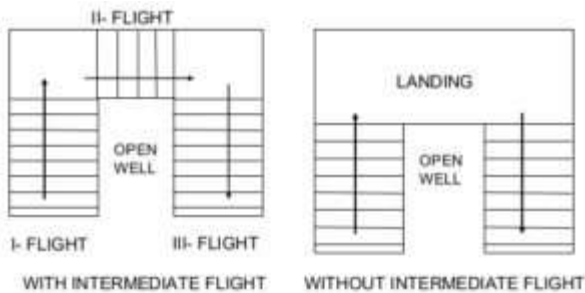
Straight Stair

2. DOGGED-LEGGED STAIR:



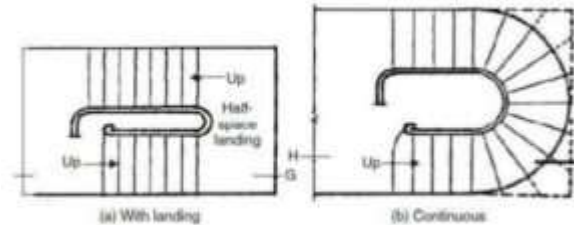
Dog-legged Stair

3. OPEN NEWEL STAIR:



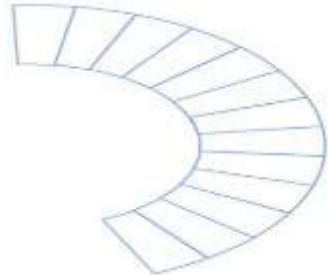
Open Newel Stairs

4. GEOMETRICAL STAIR:

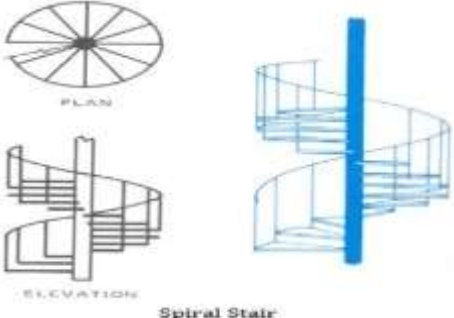


Geometrical Stair

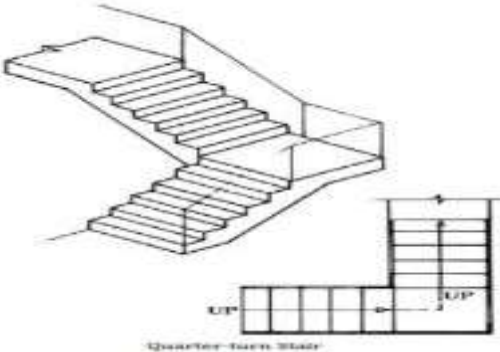
5. CIRCULAR STAIR:



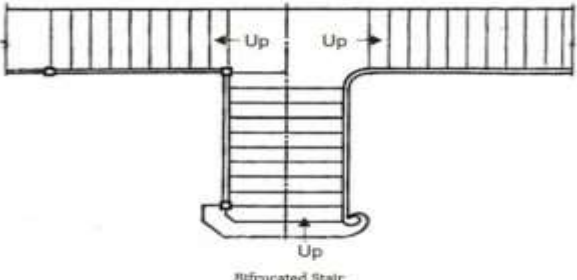
6. SPIRAL STAIR:



7. QUARTER-TURN STAIR:



8. BIFURCATED STAIR:

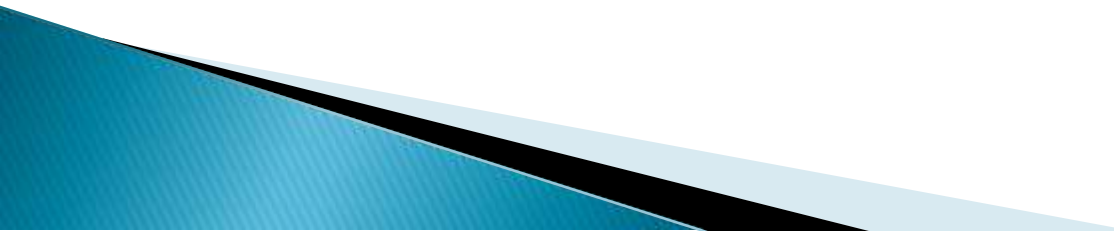


Masonry

Masonry consists of building structures by laying individual **masonry** units (brick, concrete block, stone, etc). Normally the **masonry** units are laid with cement mortar, which binds them together to create a structure. **Masonry** construction can provide beautiful walls and floors at economical prices.

Brick masonry

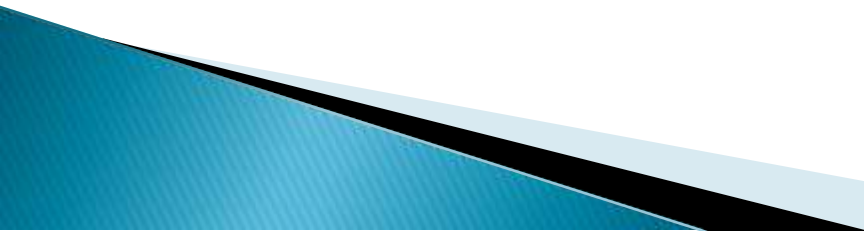
Brick masonry is used for construction of buildings and other structures by using brick stone, stone blocks, brick blocks with different types of masonry.



Application of the Brick Masonry

Brick masonry has a number of practical application and can be used very conveniently at places like construction of ordinary as well as important building ,foundation,walls,columns,ornamental works ,circular brick work buttresses, retaining structures, window sills, jambs, corbels, coping, fire places, flumes, tall chimney,cavity walls,floors,arches,culverts,steps,etc.

Advantages of Brick masonry

- Since shape and size of bricks are uniform, it do not need skilled labour for the construction.
 - Bricks are light in weight and hence handling them is easy.
 - Bricks are easily available around cities and their transportation cost is less because their weight is less.
 - It is possible to use all types of mortar in brick masonry.
 - Thinner walls can be constructed with bricks but it is not so with stones.
 - It is easy to form openings for doors and windows.
 - Dead load of brick masonry is less.
 - Brick masonry has better fire and weather resistance compared to stone masonry.
- 

TECHNICAL TERMS USED IN MASONRY WORKS

1. HEADER:

It is a full brick or stone which is laid with its length perpendicular to the face of the wall.

2. STRETCHER:

It is a full brick or stone in which is laid its length parallel to the face of the wall.

3. BOND:

It is a term applied to the overlapping of bricks or stones in a wall in alternate courses, to bind the whole wall together.

4. COURSE:

A horizontal layer of bricks or stones is termed as course.

5. HEADER COURSE:

It is a course of brickwork entirely composed of headers.

6. STRETCHER COURSE:

It is a course of brickwork in which all the bricks are laid as stretchers.

7. BED:

It is a term used to indicate the lower surface of bricks or stones in each course. It may also be termed as surface of the bricks on which it rests.

8. FACE:

The surface of a wall exposed to weather is termed as face.

9. FACING:

The material used in the face of the wall is known as facing.

10. BACK:

The inner surface of the wall which is not exposed to the weather is termed as back.

11. BACKING:

The material used in forming the back of the wall is known as backing.

12. HEARTING:

The portion of a wall between facing and backing is termed as hearting.

13. JOINT:

The junction of two or more bricks or stones is called joint.

14. RACKING BACK:

The process of stopping the unfinished end of a wall in stepped fashion.

15. BAT:

It is a portion of a brick cut across the width or a brick cut by some fraction of its length.

16. CLOSER:

It is a portion of a brick cut in such a manner that its one long face remains uncut.

17. KING CLOSER:

It is a brick which is cut in such a way that the width of one of its end is half that of a full brick.

18. QUEEN CLOSER:

It is a term applied to a brick which is half as wide as full brick. Queen closer is made by cutting a brick lengthwise into two portions.

19. BEVELLED CLOSER:

It is similar to king closer with the only difference that the whole length of the brick is bevelled for maintaining half width at one end and full width at the other.

20. MITRED CLOSER:

It is a brick whose one end is cut splayed or mitred for the full width.

21. PERPEND:

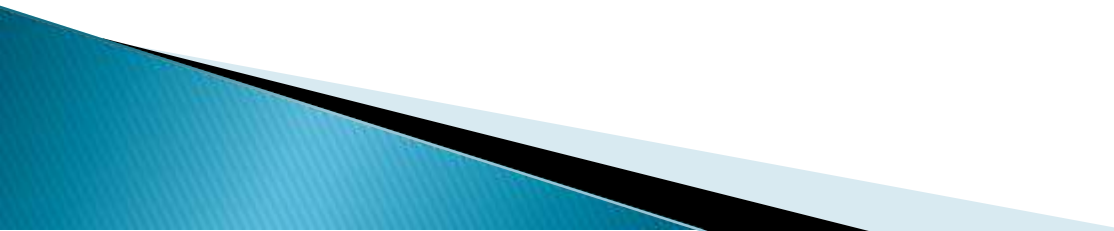
It is a vertical joint on the face of a wall directly over vertical joints in an alternate course.

22. FROG:

It is a depression on the top face of a brick. Frog provides a recess for the mortar which on setting forms a key and prevents the displacement of the brick above.

23. PLINTH:

The horizontal projecting or flush course of stone or brick provided at the base of the wall above ground level is known as plinth.



24. SILL:

It is a horizontal member of brick, stone, concrete or wood provided to give support for the vertical members of a window.

25. JAMBS:

The vertical sides of a finished opening for door, window or fire place etc. are termed as jambs.

26. REVEALS:

Reveals are the exposed vertical surfaces left on the sides of an opening after the door or window frame has been fitted in position.

27. LINTEL:

A horizontal member of stone, brick, steel or RCC, used to support the masonry or load above an opening.

28. ARCH:

A mechanical arrangement of wedge-shaped blocks of stone or brick arranged in the form of a curve supporting the masonry or load above an opening.

29. CORNICE:

It is a horizontal moulded projection provided near the top of a building or at the junction of a wall and ceiling.

30. PARAPET:

It is a term applied to a low wall built around a flat roof to act as a protective solid balustrade for the users of the terrace.

31. WEATHERING:

Weathering is the term applied to the bevelled top surface of a stone.

32. GABLE:

It is a triangular shaped portion of masonry at the end of a sloped roof.

33. SPALLS:

Chips or small pieces of stone broken off a large block are termed as spalls.



34. COLUMNS:

It is an isolated vertical load bearing member whose width does not exceed four times its thickness.

35. PIER:

It is a vertical member of stone or brick masonry constructed to support an arch, beam or lintel etc.

36. BUTTRESS:

It is similar to pier built on the exterior of a wall properly bonded to it.

37. CORBEL:

It is the extension of one or more course of brick or stone from the face of a wall.

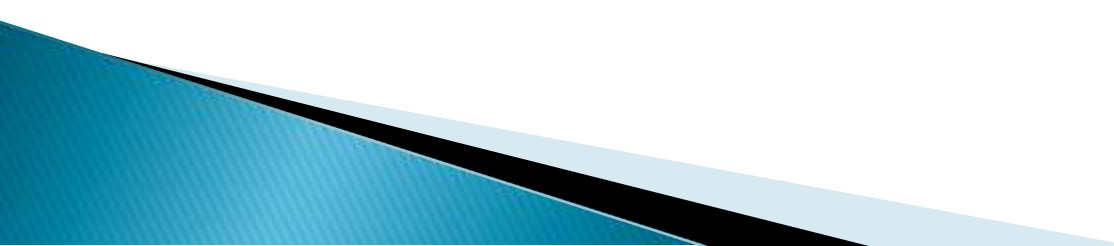
38. THRESHOLDS:

The arrangement of steps provided from ground level to reach plinth level on external doors and verandah is termed as thresholds.

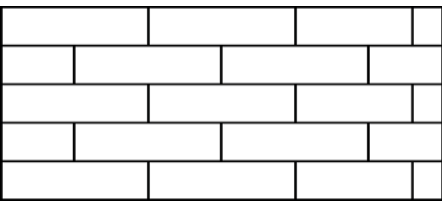
Types of Bonds in Brick Masonry Wall Construction :

The most commonly used types of bonds in brick masonry are:

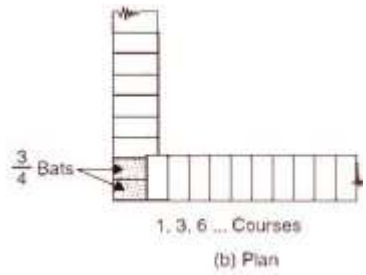
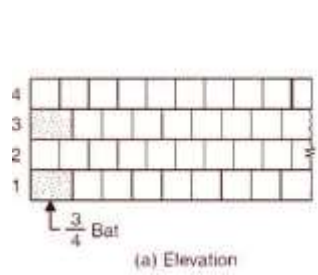
- | | |
|-------------------|-----------------------|
| 1. Stretcher bond | 6. English cross bond |
| 2. Header bond | 7. Brick on edge bond |
| 3. English bond | 8. Raking bond |
| 4. Flemish bond | 9. Facing bond |
| 5. Dutch bond | 10. Garden wall bond |



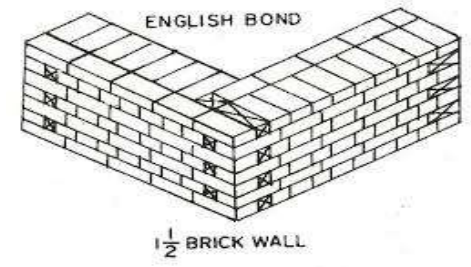
1. Stretcher bond



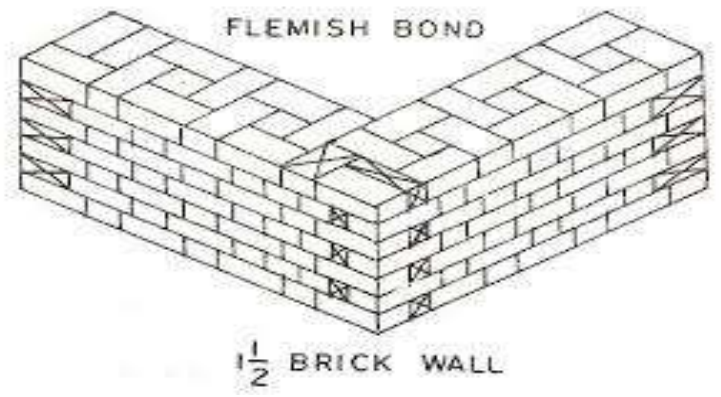
2. Header bond



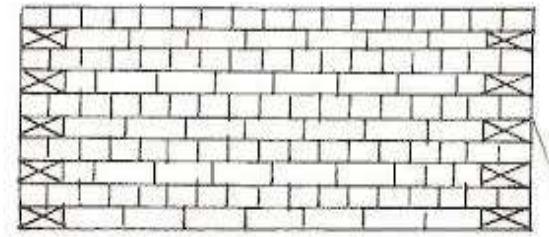
3. English bond



4. Flemish bond



5. Dutch bond



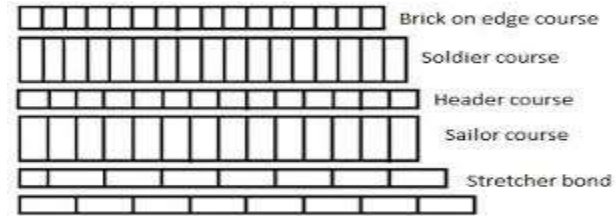
Elevation of a wall in Dutch bond

6.English cross bond

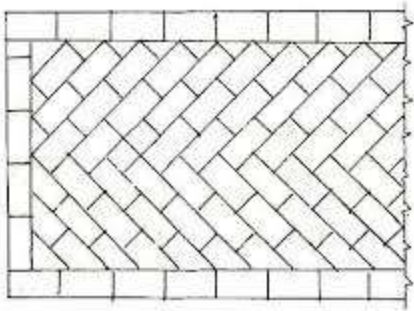


Elevation of wall in English cross-bond.

7.Brick on edge bond

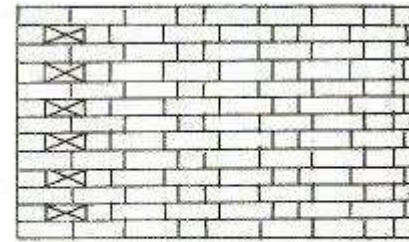


8.Raking bond



Plan showing arrangement of bricks in Herring-bone bond.

10.Garden wall bond

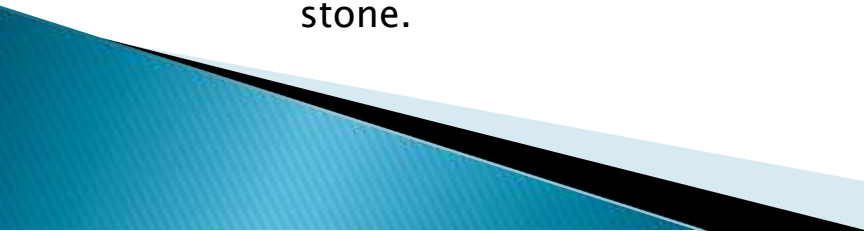


Elevation of wall in Flemish garden wall bond

Stone masonry

The art of building the structures using stone blocks and mortar is termed as stone masonry. It is preferred where building stones are abundantly available in nature. These stones when cut and dressed to proper shape and size provide an economical material for the construction of various parts of the building in hilly terrains.

Glossary of terms

1. **Natural Bed:** The setting of the stone on the same plane as it was formed in the ground. This generally applies to all stratified materials.
 2. **Bed:** The top or bottom of a joint; natural bed-surface of stone parallel to its stratification.
 3. **Bedding plane.** The plane along which a stone can be separated, easily, is called bedding plane. Stones are laid in a structure so that load acts perpendicular to their bedding plane.
 4. **Cornice.** The course of a masonry provided at ceiling level of the roof projecting outside the surface of the wall of a building, is called cornice.
 5. **Throating.** A small groove cut on the underside of a projecting chajja, cornice, coping, to discharge rain water without trickling to walls, is called throating.
 6. **Coping:** A flat stone used as a cap on walls or around the perimeter of patios and pool decks.
 7. **Template:** A detailed pattern or drawing showing exact dimensions to be fabricated.
 8. **Bond stones:** Bond stones are generally cut to twice the bed thickness of the material being used.
 9. **Reveals.** The exposed vertical surfaces perpendicular to window or door frame, are called reveals.
 10. **Drip stone.** A projecting dressed stone having its undersurface throated, is called drip stone.
- 



Classification of Buildings

Contents:

- * Building structure.
- * Non building structure.
- * classification of buildings;
 - > Based on occupancy.
 - > Based on type of construction.



Building structure:

- A **building** structure is a man-made structure with a roof and walls standing more or less permanently in one place, such as a house or factory.
- Buildings are classified into two categories.
 - 1) Based on the occupancy.
 - 2) Based on the type of construction.



❖ Buildings classified, based on the occupancy:

Every building or portion of land shall be classified according to its use or the character of its occupancy as a building of Occupancy. They are categorized into the following types.

- 1) Agricultural buildings
- 2) Commercial buildings
- 3) Residential buildings
- 4) Educational buildings
- 5) Government buildings
- 6) Industrial buildings
- 7) Military buildings
- 8) Religious buildings
- 9) Transport buildings
- 10) Power plants



Educational buildings:

- This occupancy type shall include any building or portion thereof in which education, training and care are provided to children or adults. This occupancy shall be subdivided as follows :



Museum



School



Archive



library

Government buildings:

➤ It is a building that houses a branch of government.



Capitol



Embassy



Prison



Fire station



Post office

Agricultural buildings:

- ✓ They are the structures designed for farmers and for agricultural practices, for growing and harvesting crops, and to raise live stock.



barn



Chicken coop



Farm house

Residential buildings:

- ✓ A **Residential** building is that, in which housing predominates, as opposed to industrial and commercial areas. building may vary significantly between, single-family building, multi-family **building**, or mobile homes.



Apartment



Villa



Bungalow



Nursing home

Commercial buildings:

- They are the buildings, which are used exclusively for commercial use.



Ware house



Bank



Convention centers



Gas stations



Automobile companies

Transport buildings:

- This is a structural building which consists of the means of equipment necessary for the movement of passengers or goods on land, water, and air ways.



Air port



Railway station



Parking garage



Light house



Bus station

Power stations/power plants:

- These buildings serve as the industrial facility to generate electric power.



Geo thermal
power plant



Fossil fuel power
plant



Nuclear power
plant



Renewable energy power station

DOORS & WINDOWS

DOOR

A **door** is a moveable barrier secured in a wall opening.

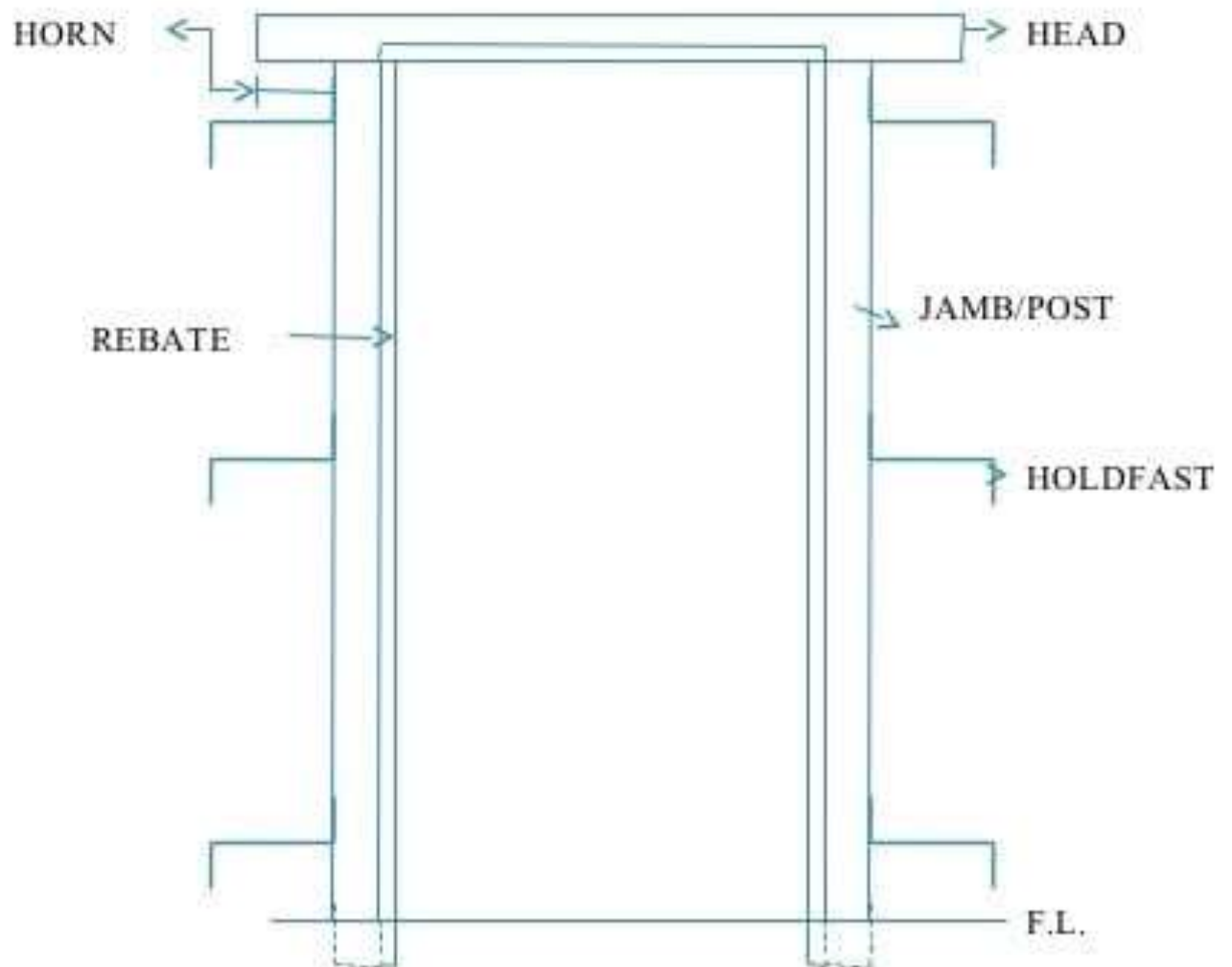
Functions:

1. They admit ventilation and light.
2. Controls the physical atmosphere within a space by enclosing it, excluding air drafts, so that interiors may be more effectively heated or cooled.
3. They act as a barrier to noise.
4. Used to screen areas of a building for aesthetic purposes, keeping formal and utility areas separate.

Components of a door:

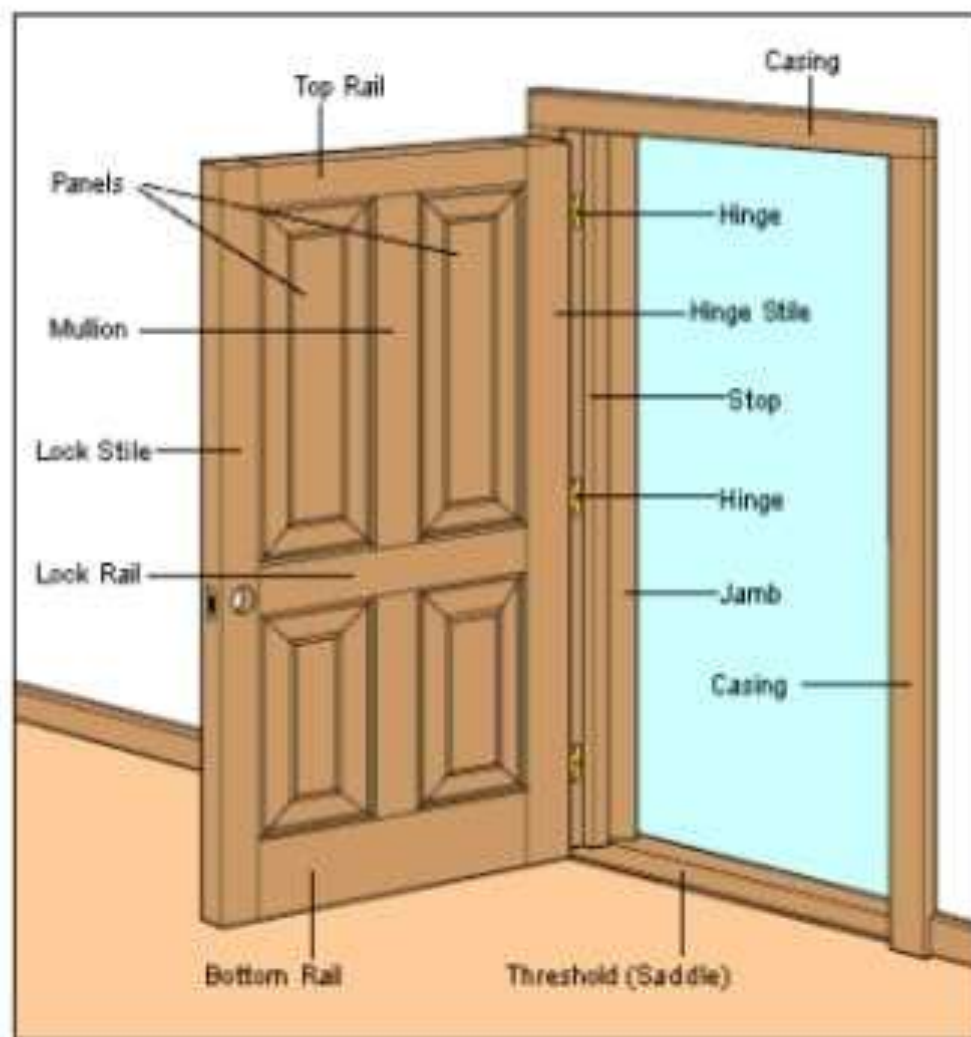
- a) Door frame
- b) Door shutter

Door frame



Location of door in a building

- The number should be kept as minimum.
- It should meet the functional requirement.
- It should preferably be located at the corner of the room, nearly 20 cm from corner.
- If in a room, more than 2 doors are there, they shall be located facing each other.





Sliding Window or Slider:

- Has two or more sashes that overlap slightly but slide horizontally within the frame.
- Suitable openings or grooves are left in the frame or wall to accommodate the shutters when the shutters are opened.

Types of Doors

On the basis of working operations

- Hinged doors
 - Battened type
 - Framed and paneled
 - Glazed/Sash
 - Flushed
 - Louvered
 - Wire-guage
- Revolving doors
- Sliding doors
- Swing doors
- Collapsible doors
- Rolling shutter

DOOR FRAMES

Materials used for door frames

- Timber
- Steel
- Aluminium
- Concrete
- Stone

SIZES OF DOORS

The common width-height relations used:

- Width = 0.4 – 0.6 Height
- Height = (width + 1.2)m

General sizes used:

a) Residential

External door – 1.0 x 2.0 to 1.1 x 2.0 m

Internal door - 0.9 x 2.0 to 1.0 x 2.0 m

Bath & WC – 0.7 X 2.0 to 0.8 x 2.0 m

Garages for cars – 2.25 x 2.25 m to 2.40 x 2.25 m

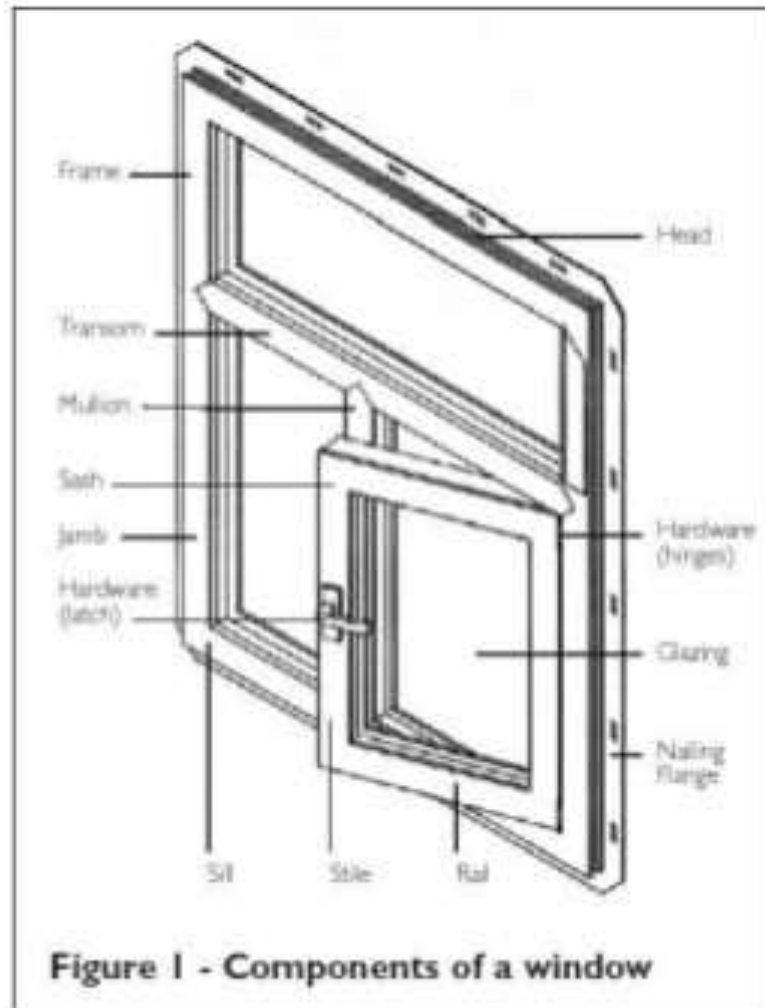
b) Public

1.2 x 2.0 m **or** 1.2 x 2.1 m **or** 1.2 x 2.25 m



WINDOWS

Window details



TYPES OF WINDOWS

Fixed windows

- In this type, the glass pane is permanently fixed in the opening of the wall.
- The shutter can't be opened or closed.
- The function is limited to allowing light and or permit vision in the room.
- No rebates are provided to the frame.
- The shutters are fully glazed.
- In homes they are generally decorative windows near doors, stairwells and high-places or are used in combination with other styles.

- **Glazed window**

This is a type of casement window where panels are fully glazed.

The frame has styles, top rail and a bottom rail.

The space between top and bottom rail is divided into number of panels with small timber members called, sash bars or glazing bars.

The glass panels are cut 1.5-3.0 mm smaller in size than the panel size to permit movement of sash bars.

Glass panes are fixed to sash bars by putty or by timber beads.

Double-hung windows

- It has two panes, top and bottom that slide up and down in tracks called stiles.
- The most common used windows today. When open, these windows allow air flow through half of its size.
- The two parts are not necessarily the same size.
- Traditionally, each shutter is provided with a pair of counterweights connected by cord or chain over pulleys.
- When the weights are pulled, the shutters open to required level.
- It is possible to have controlled ventilation.
- Sash windows may be fitted with simplex hinges which allow the window to be locked into hinges on one side, while the rope on the other side is detached, allowing the window to be opened for escape or cleaning.
- Nowadays, most new double-hung sash windows use spring balances to support the sashes.