FLOORS AND FLOORINGS

TRADE : ARCHITECTURAL DRAUGHTSMAN & DRAUGHTSMAN CIVIL

BY

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SMRV GOVT ITI (W) NAGERCOIL -1

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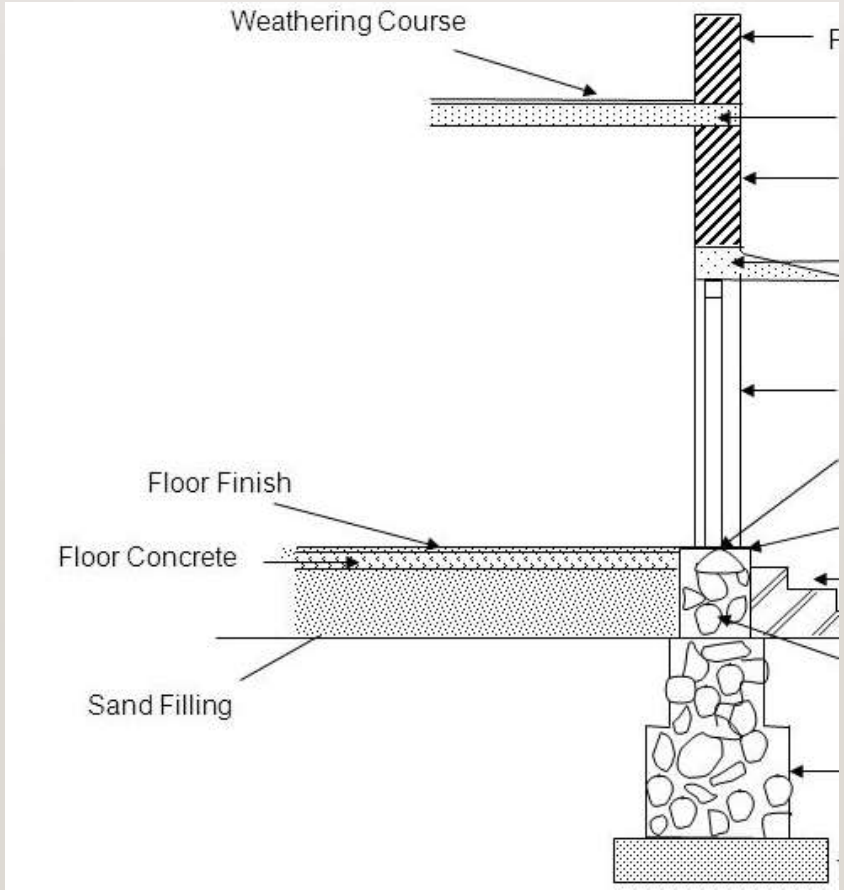
- FLOOR: It is a bottom level of a room subdividing plinth level and roof level with a solid construction.
- FLOORING: The exposed top surface of floor is known as flooring



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It is a horizontal element of a building structure, which divide the building into different levels, for the purpose of creating more accommodation within a restricted space, one above the other and provide support for the occupants, furniture and equipment of a building

The purpose of floor is to creating more accommodation within a restricted space, one above the other and provide support for the occupants, furniture and equipment of a building.

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4 FACTORS AFFECTING THE SELECTION OF FLOORING MATERIALS

- **Appearance**: The material should give pleasing appearance and if should produce the color effect with the use of building.
- **Cleanliness**: It should be such that it can be cleaned easily and effectively and has resistance against oil, grease etc.
- **Comfort**: It should possess good thermal insulation to give comfort for the residents.
- **Cost**: Cost should be reasonable.
- **Damp resistance**: The material should offer sufficient resistance against dampness.
- **Durability**: Resistance to wear, tear and chemical action.
- **Fire resistant**
- **Easy to give maintenance**
- **Noiseless** while using the floor
- **Non slippery surface** but smooth enough to clean easily.

Choice of floor

Choice of floor depends upon,

1 Span

2 Maximum load on the floor

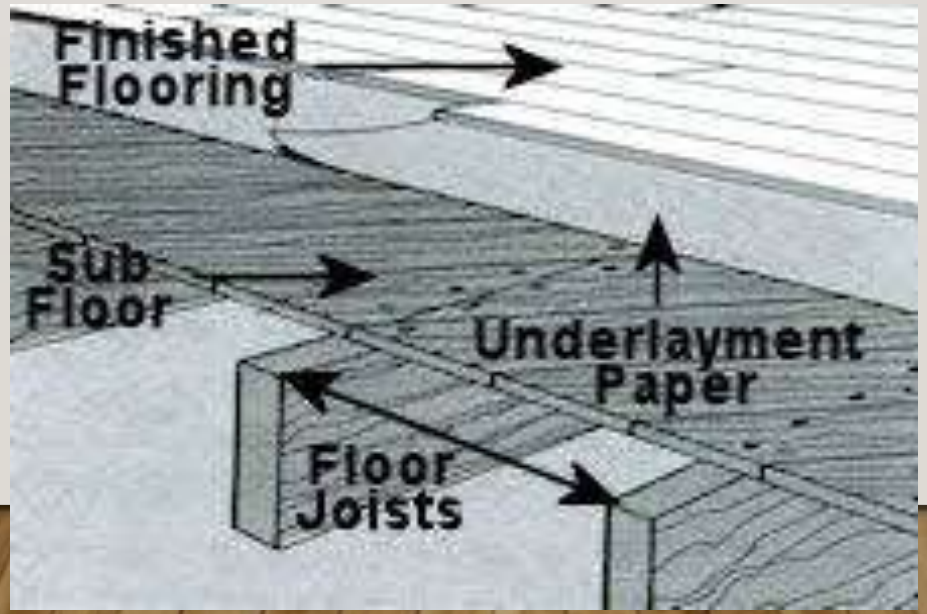
3 Type of construction

4 Material and labour available

5 Purpose or use of building.

6 COMPONENTS OF FLOOR

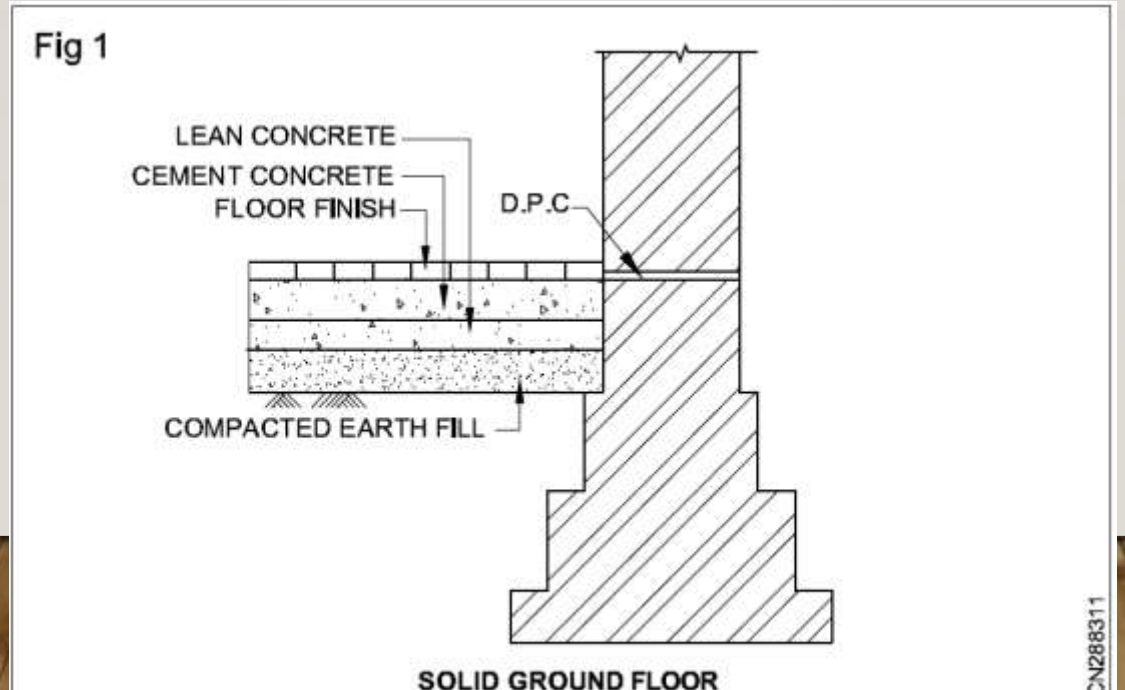
- **Sub Floor:** It provides proper support to floor covering and the super imposed load are carried by it.
- **Floor covering**: It provides a smooth, clean, impervious and durable surface.



TYPES OF FLOOR

1. GROUND FLOOR

- The floors resting directly on the ground surface are known as ground floors.
- They do not require provision of a floor.
- The major problems of a ground floor are damp exclusion and thermal insulation. For this purpose it is usually provided a bedding concrete of 1:4:8



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8 MUD FLOORING

- Such flooring is cheap, hard and fairly impervious.
- Easy to construct and easy to maintain.
- It has good thermal insulation property.
- Over a well-prepared ground, a 25 cm thick selected moist earth (mostly impervious) is spread and is then rammed well to get a compacted thickness of 15 cm.
- In order to prevent cracks due to drying, small quantity of chopped straw is mixed in the moist earth, before ramming.
- Sometimes, cow-dung is mixed with earth and a thin layer of this mix is spread over the compacted layer.
- Sometimes, a thin paint of cement – cow – dung (1:2 to 1:3) is applied.

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MURAM OR MURRUM FLOORING

BRICK FLOORING

- These floors are used in cheap type of construction such as stores, goodowns, Warehouses etc.
- The brick to be used should be of uniform shape and colour and good quality.
- It consists of layer of brick (Flat or on edge) laid over 10 to 15 cm thick P.C.C of 1:8:16

FLAG STONE FLOORING

- Flagstone is any laminated sand stone available in 2cm to 4 cm thickness.
- The sub soil is properly compacted, over which 10 to 15 cm thick lime concrete or lean cement concrete is laid.
- The Flagstones (Stone slabs) are then laid over 20 to 25 mm thick layer of bed mortar.
- In laying the slabs, work is started from two diagonally opposite corners and brought up from both sides.
- If any particular slab falls lower than the string level, it is re-laid by putting fresh layer of stiff mortar.
- When the stone slabs are properly set, mortar in the joints is raked out to a depth of about 15 to 20 mm and then flush pointed with 1:3 cement mortars.
- Proper slope is given to the surface for drainage.
- The work is properly cured.

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12 CEMENT CONCRETE FLOORING

- It is moderately cheap, quite durable and easy to construct.
- This is commonly used for residential, commercial and industrial buildings.
- The floor consists of two components (1) base concrete, and (2) topping or wearing surface.
- The base course may be 7.5 to 10 cm thick, either in lean cement concrete (1:3:6 to 1:5:10) or line concrete containing 40% mortar of 1:2 line – sand (or 1 lime:1Surkhi: 1 sand) and 60% coarse aggregate of 40mm nominal size.
- The base course is laid over well compacted soil, and levelled to rough surface.
- It is properly cured.
- When the base concrete has hardened, its surface is brushed with stiff broom and cleaned thoroughly.

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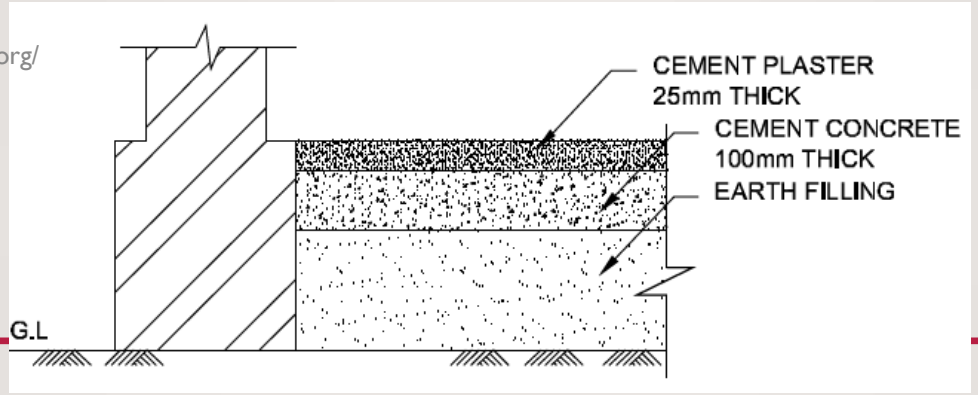

- The topping is then laid in square or rectangular panels, by use of either glass or plain asbestos strips or by use of wooden battens set on mortar bed.
- The topping consists of 1:2:4 cement concrete laid tothe desired thickness (usually 4 cm) in one single operation. in the panel.
- Topping concrete is spread evenly with the help of a straight edge, and its surface is thoroughly tamped and floated with wooden floats till the cream of concrete comes at the top.
- Steel trowel is used for smoothening and finishing the top surface.
- The prepared surface is protected from sunlight, rain, and other damages for 12 to 20 hours.
- The surface is then properly cured for a period of 7to 14 days.

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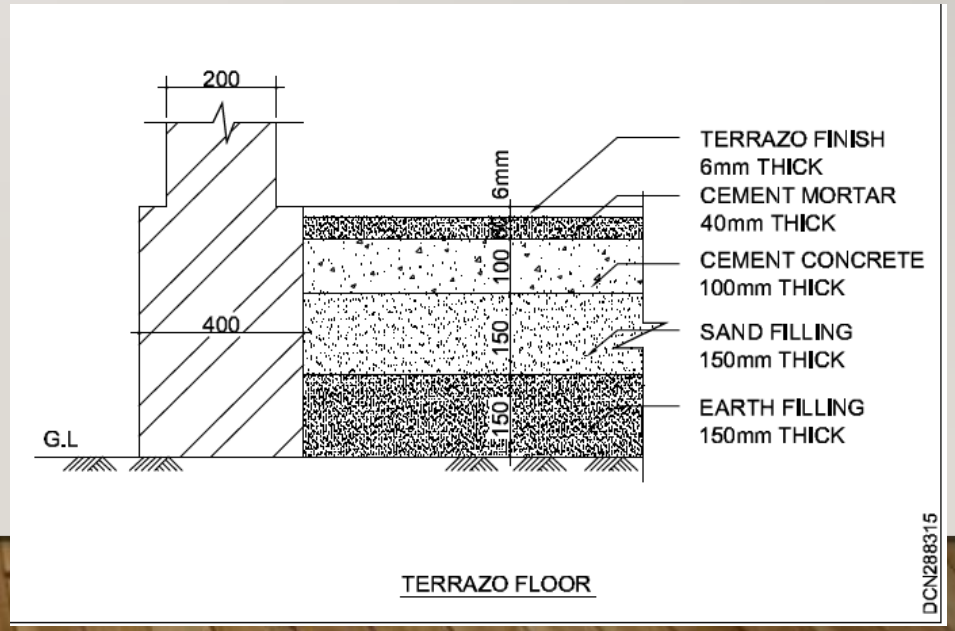
14 TERRAZZO FLOORING

- In this floor, marble chips of various shades are used as aggregate.
- The proportion of terrazzo mix is generally 1:2 to 1:3 i.e, one part of cement to two to three parts of marble chips by volume.
- Prepare base concrete surface of 75cm thick.
- The cement and marble chips are thoroughly mixed wet and laid for a thickness 20 mm.
- The first coat of polishing is done by a coarse carborandom stone, second coat is done by finely grained carborandom stone.
- Wax is applied as a final coat of polishing to get glossy surface
- This floor in generally used for residential buildings, bath room, Clock rooms, etc.



TERRAZO FLOOR

15 TILES FLOORING

- Firstly, levelled hard bed or 15 cm thick P.C.C is preparedd.
- Over this bed, a thin layer of cement mortar 1:1 is laid.
- Then pre cast tiles of cement concrete or pottery are laid over it carefully, filling the joints with mortar, which are generally paper thick.
- Extra cement is wiped off and joints cleaned with saw dust.

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16 MARBLE FLOORING

- It is a superior type of flooring, used in

Residential buildings, hospitals, sanatoriums,

temples etc.

- Where extra cleanliness is an essential requirement.
- Marble slab may be laid in different sizes, usually in rectangular or square shapes.
- The base concrete is prepared in the same manner as that for concrete

flooring.

- Over the base concrete, 20 mm thick bedding mortar of either 1:4
- cement sand mix or (lime putty):
- The paved area is properly cured for about a week.

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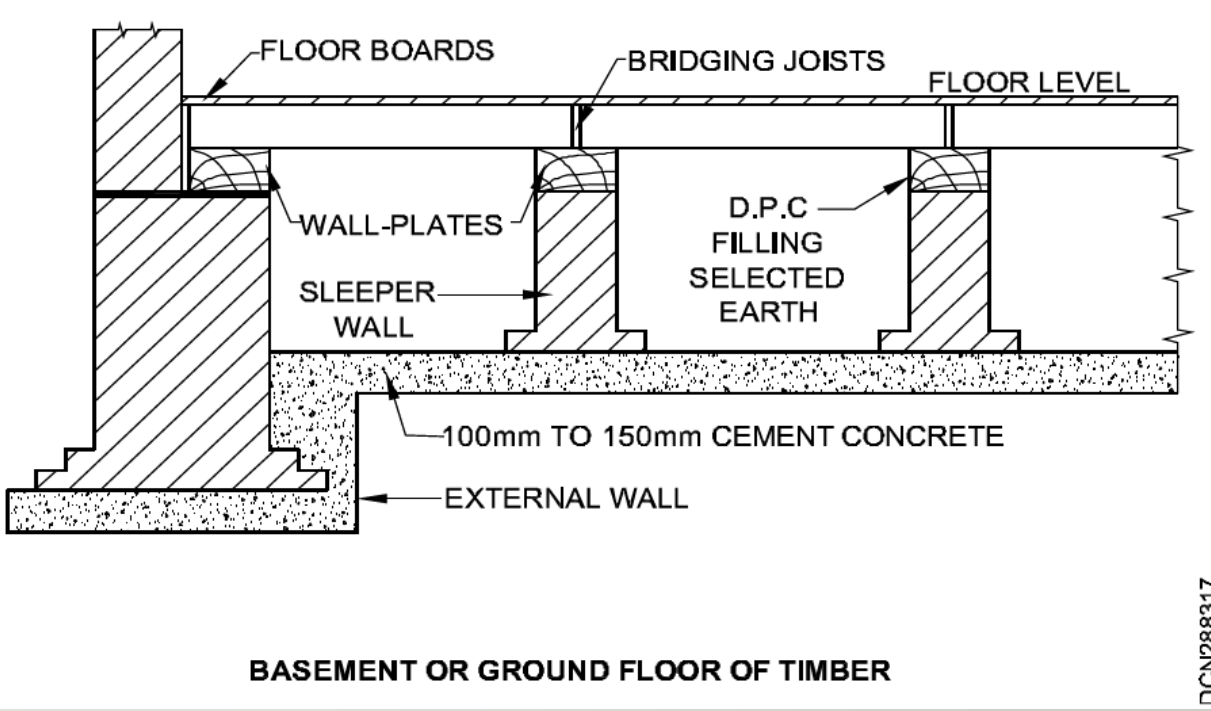
17 GRANOLITHIC FLOORS

- It is a finished coat, which is provided over a concrete surface.
- The concrete mix used is 1:1:2 or 1:1:3. And aggregate used may be basalt, lime stone or quartz silt.
- The minimum thickness of finishing should be 12 mm.

MARBLE	GRANITE
WAVE TEXTURE	GRAINY TEXTURE

18 WOODEN FLOORING



BASEMENT OR GROUND FLOOR OF TIMBER

- In hilly areas where the wood is available in a large quantity and on the other hand, the climate is damp, wooden floors are used.
- These are also used in dancing halls, auditoriums,etc.
- The timber to be used for flooring should be of the best quality, well – seasoned and free from cracks, knots, flaws and other defects.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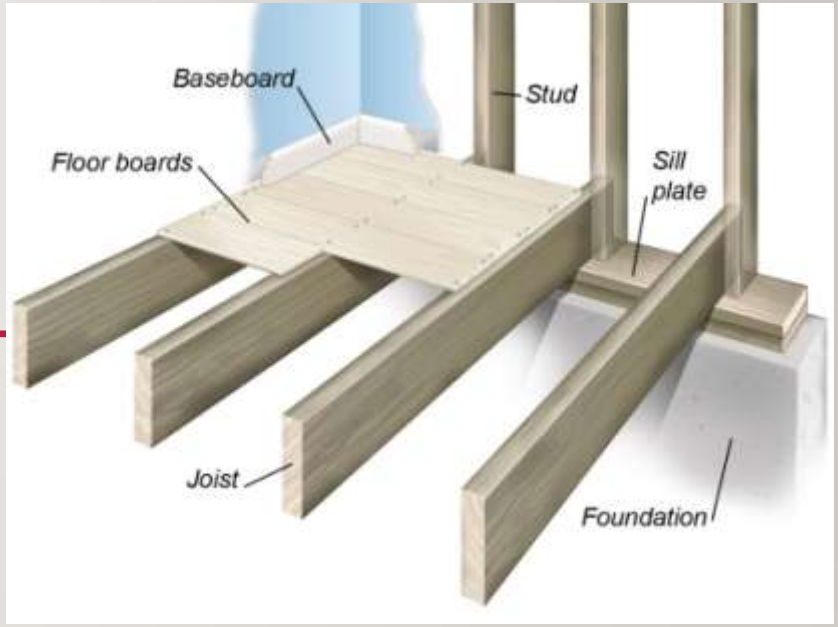
Baseboard
Stud
Floor boards
Sill plate
Joist
Foundation


Tyvek

VINYL SHEET FLOORING

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VENEER FLOORING

FLOOR COVERINGS WITH WOODEN FINISH

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ASPHALT FLOORING

- The asphalt flooring can be carried out in a variety of colours and in different forms.
- The asphalt tiles, which are produced from natural asphalt, bitumen, asbestos fiber and mineral pigments are available in different sizes and in a variety of colours.
- The asphalt terrazzo is formed by the combination of black or coloured asphalt

with marble chips.

- This terrazzo is laid hot and the surface is made smooth by a trowel.
- The asphalt flooring is water-proof (no space), vermin proof, dustless and joint less.
- It is used for surface subjected to heavy wear as incase of dairies, breweries,

hospitals, shops, restaurants, loading platforms, swimming pools, terrace etc.

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22 RUBBER FLOORING

- It consists of sheets or tiles of rubber, in a variety of
- patterns and colours.
- The sheet or tile is manufactured by mixing pure rubber with fillers such as cotton fibre, granulated cork or asbestos fibre.
- The sheets or tiles are fixed to concrete base or wood by means of appropriate adhesive.
- Rubber flooring is resilient and noise proof.
- However, they are costly. They are used only in office or public building

LINOLEUM FLOORING

- It is a covering which is available in rolls, and which is spread directly on concrete or wooden flooring.

- Linoleum sheet is manufactured by mixing oxidized linseed oil in gum, resins, pigments, wood flour, cork dust and other filler materials.
- The sheets are either plain or printed, and are available in **2 to 6 mm thickness, and 2 to 4 m width.**
- Linoleum tiles are also available, which can be fixed (or glued) to concrete base or wood floor, in different patterns.
- Linoleum sheet is either spread as such, or also maybe glued to the base by inserting a layer of saturated felt.
- Linoleum coverings are attractive, resilient, durable and cheap, and can be cleared very easily.
- However, it is subjected to rotting when kept wet or moist for some time.It cannot, therefore, be used for bath room, kitchens etc
- It is very popular for its easy installation and removal, cheap and aesthetic looking thus it is very suitable for commercial and office areas.

24 CORK FLOORING

This type of flooring is perfectly noiseless, and is used
in libraries, theatres, art galleries, broadcasting station
etc.
Cork which is the outer bark of cork oak tree, is available in the form of cork carpet and cork tiles.
It is fixed to concrete base by inserting a layer of saturated felt.

25 GLASS FLOORING

This is special purpose flooring, used in circumstances where it is desired to transmit light from upper floor to lower floor, and specially to admit light at the basement from the upper floor.

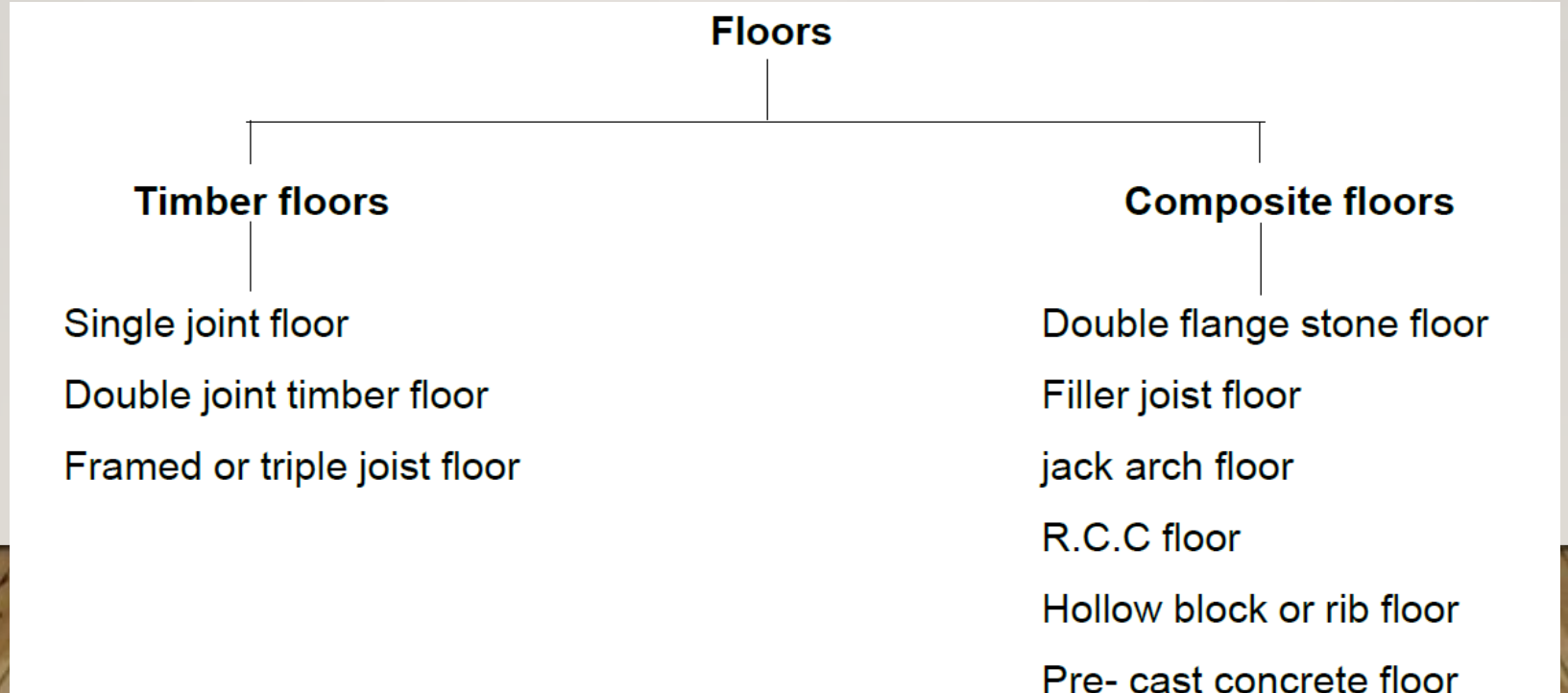
Structural glass is available in the form of tiles or slabs, in thickness varying from 12 to 30 mm.

These are fixed in closely spaced frames so that glass and the frame can sustain anticipated loads.

Glass flooring is very costly, and is not commonly used.

UPPER FLOOR

- The floors constructed above the ground floor are known as upper floors.
- Upper floors are supported either on the walls or on columns
- the flooring materials are practically the same as used for ground floor



MEZZANINE FLOOR IS AN INTERMEDIATE **FLOOR** BETWEEN MAIN **FLOORS** OF A BUILDING, AND THEREFORE TYPICALLY NOT COUNTED AMONG THE OVERALL **FLOORS** OF A BUILDING

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SUSPENDED FLOOR

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SINGLE JOIST TIMBER FLOOR

- It is adopted for maximum span of 3.6 m
- These floors consist of single joists which are placed below the floor boards.
- The joists are usually at a centre to centre distance of 300 mm to 450 mm.
- The joists are supported on wall – plates at their ends
- When the span of joist exceeds about 2.4m, herring bone strutting are provided.
- Ends of this struts are nailed to the joists.
- At the end, the wedges are provided between the wall and the joist.

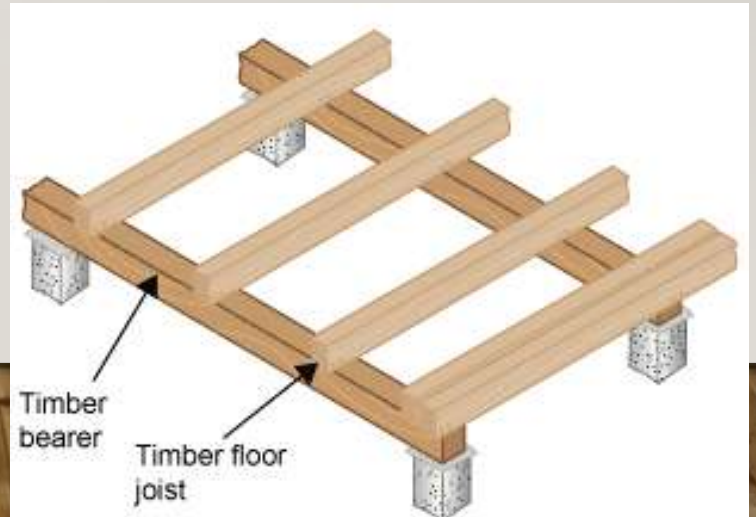
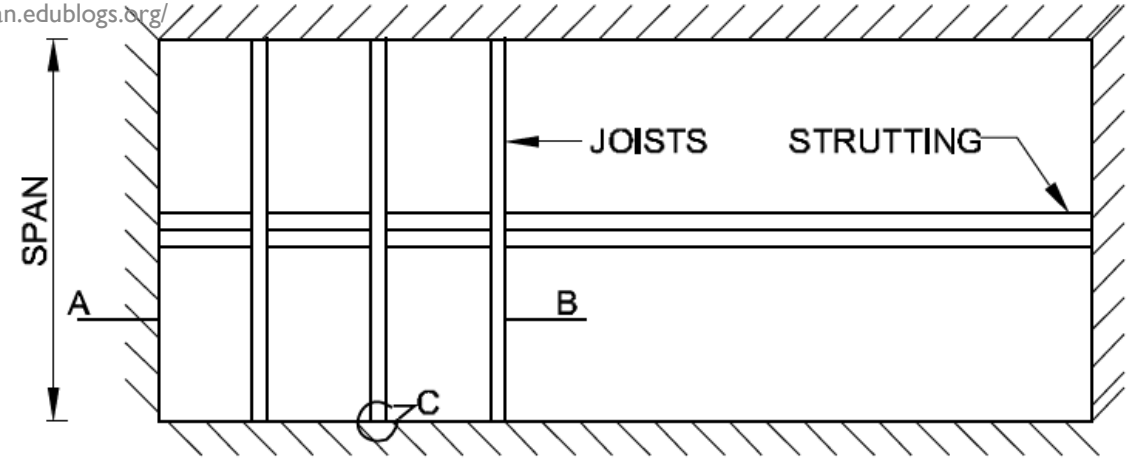
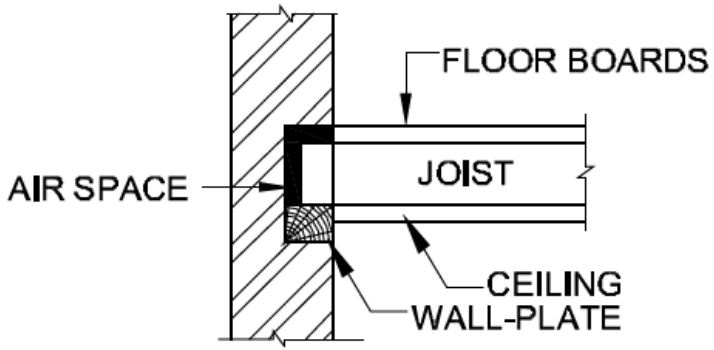


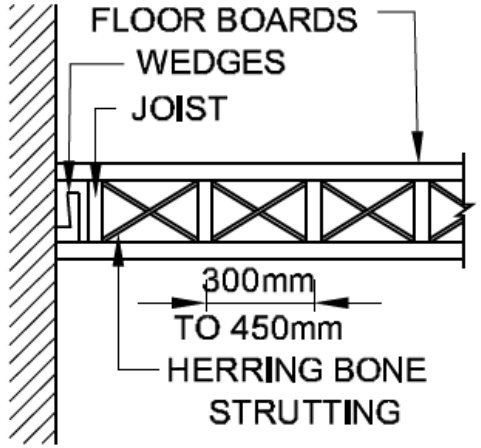
Fig 1



PLAN



DETAILS AT C



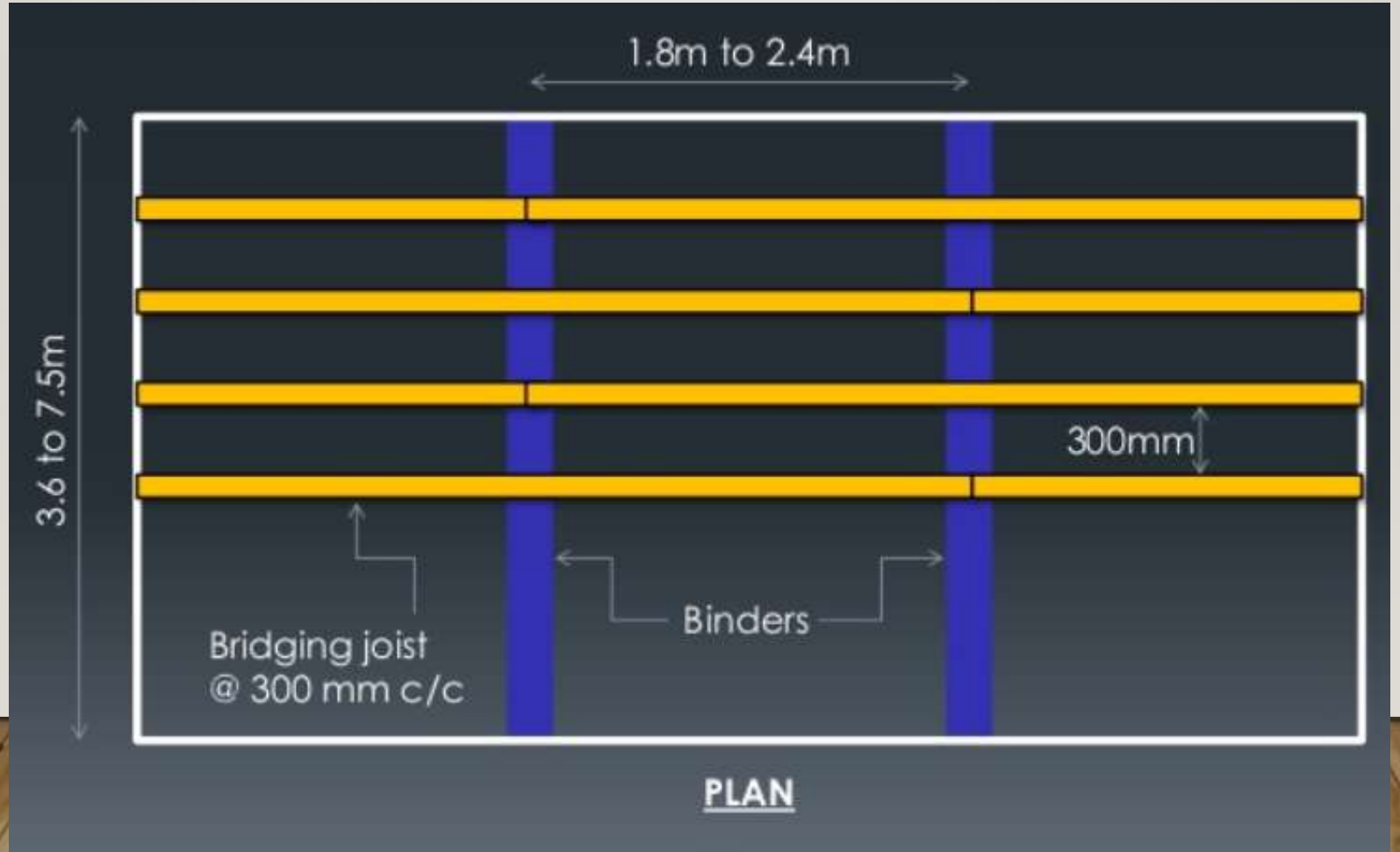
SECTION ON AB

DETAILS OF SINGLE JOIST TIMBER FLOORS

DCN288511

DOUBLE JOIST TIMBER FLOOR

- It is stronger than single joist timber floor. Span is upto 7.5m
- In this type of floor, the intermediate supports, known as the binders, are provided for the bridging joists.
- The end of binders rest on wooden stone blocks



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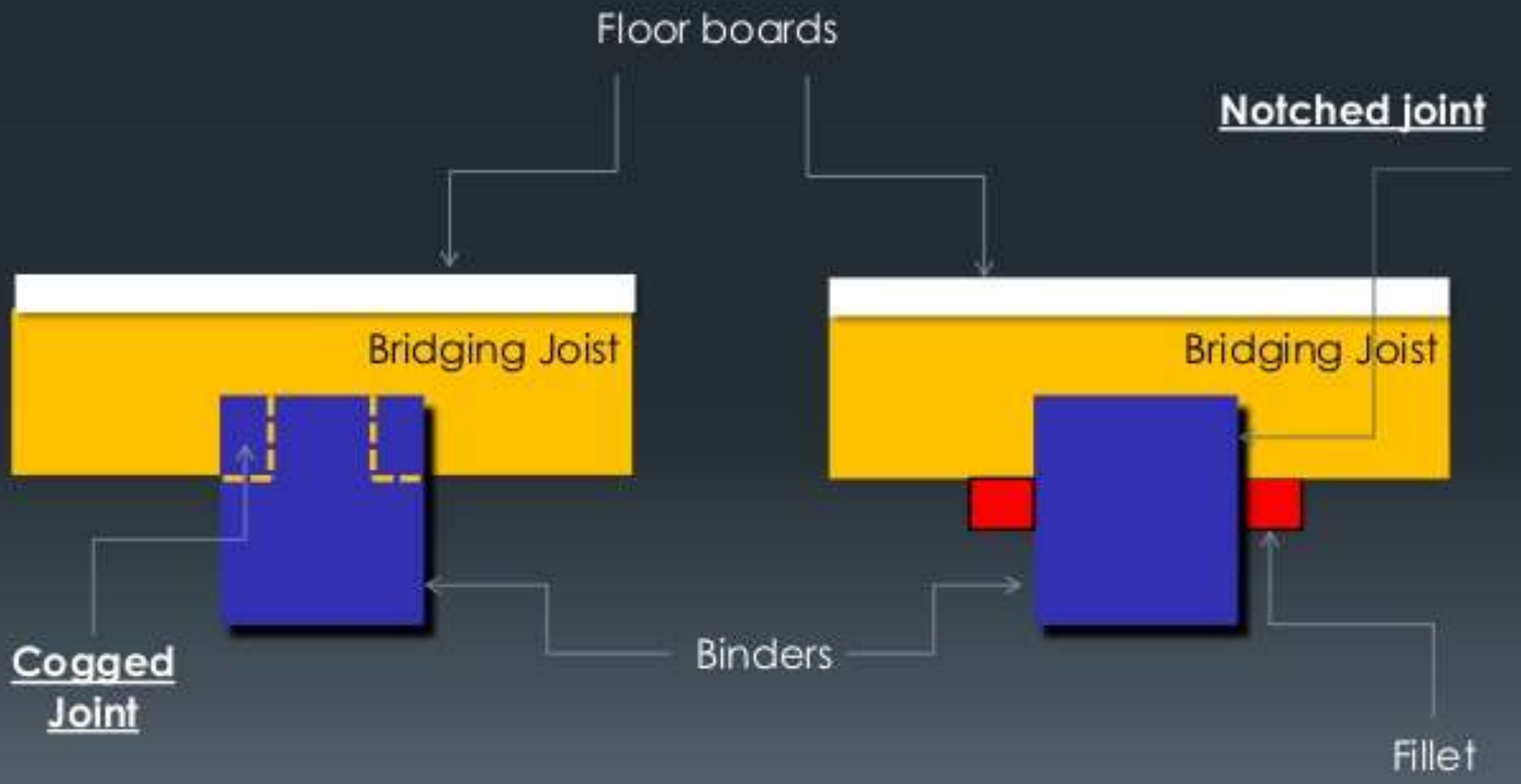
METHODS OF FIXING BINDERS WITH JOISTS



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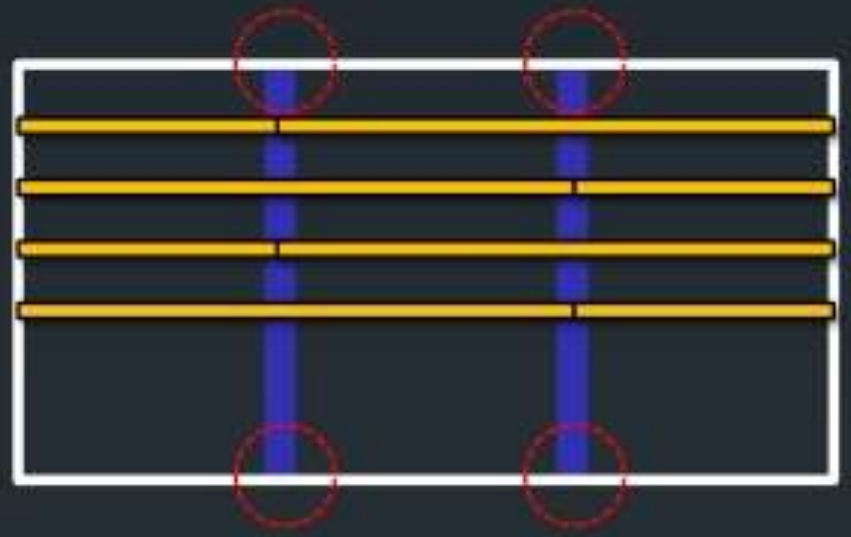
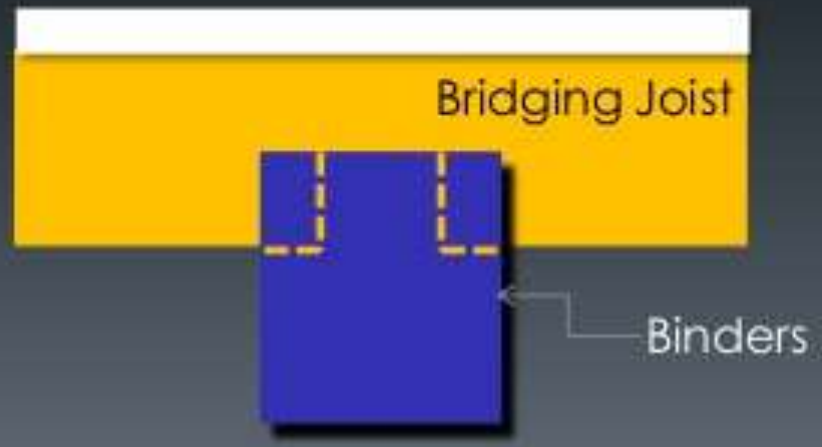
DISADVANTAGES

The **weight** of the floor is thrown on **the few points** on the wall.

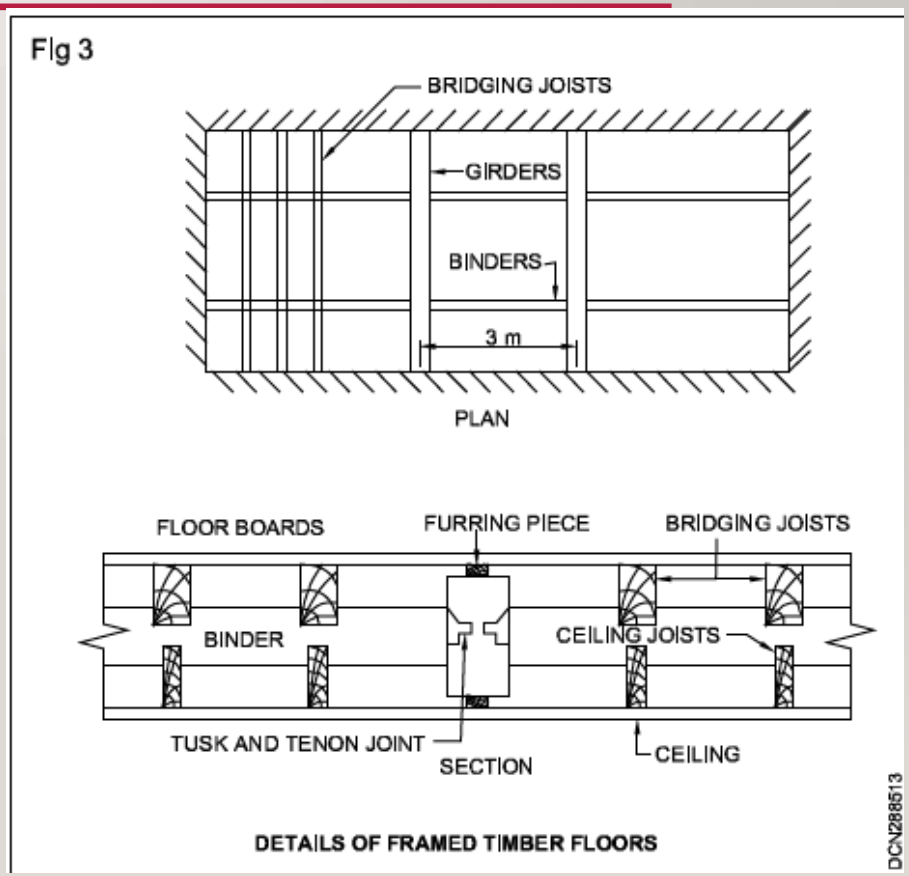


Depth of the floor is **increased** by use of **binders** and accordingly, the **height of the room is decreased.**



34 FRAMED OR TRIPLED JOIST TIMBER FLOOR

- It is suitable for span greater than 7.5 m
- In this type of floors, the intermediate support, known as the girders, are support the binders.
- The girders are placed at a centre to centre distance of 3 m.
- The ends of binders are supported on iron stirrups which are fixed to the girders.
- The ends of girders rest in walls on stone or concrete templates.



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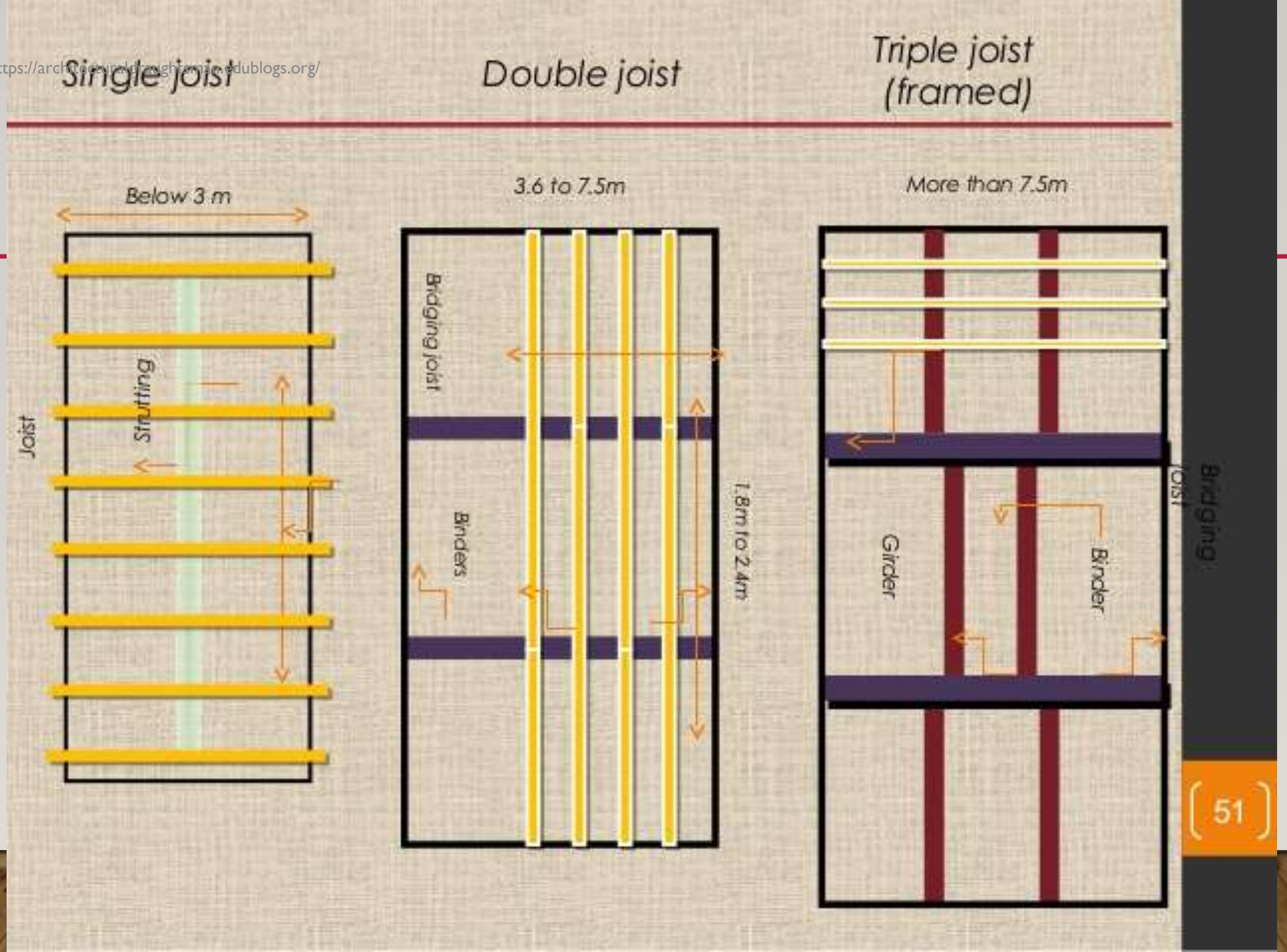
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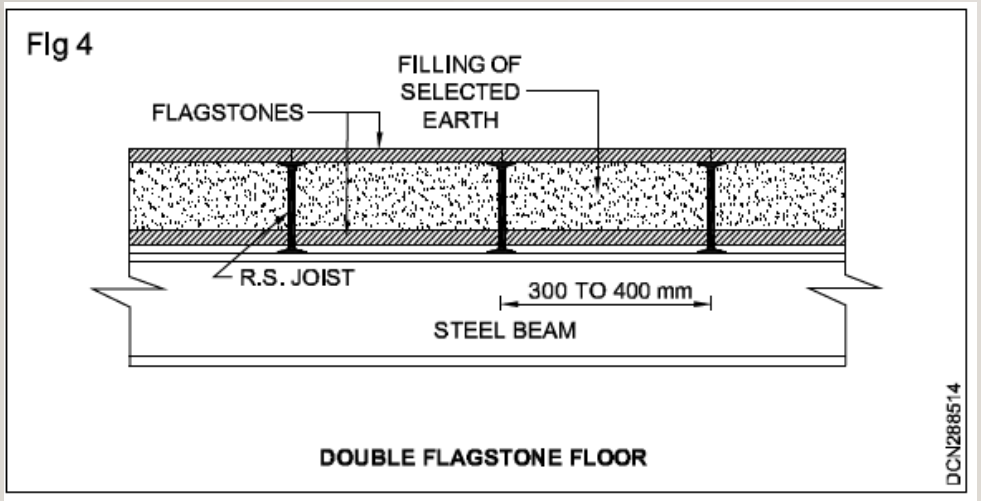
Single joist
Double joist
Triple joist (framed)
Below 3 m
Joist
Strutting
3.6 to 7.5m
Bridging joist
Binders
1.8m to 2.4m
More than 7.5m
Girder
Binder
Bridging joist

COMPOSITE FLOOR

- If floors are composed of more than one material, then they are known as composite floors.
- It is more fire resistant and sound proof than timber floor.
- It can be easily cleaned and possesses better hygienic property.
- It can be adopted for long spans

37 DOUBLE FLAG STONE FLOOR

- Flagstones of two layers are used.
- If span is about 4 m only steel joists are provided.
- Top layer of flag stone is finished.



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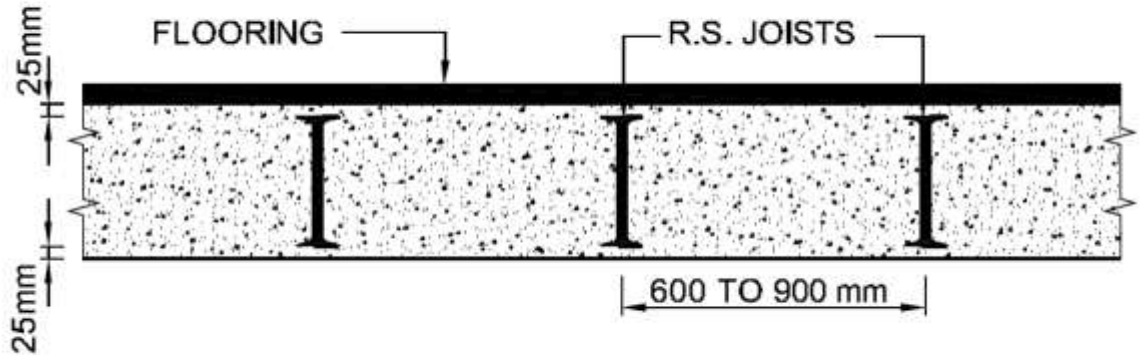
38 FILLER JOIST FLOOR

- Small sections of R S J are placed in concrete.
- The joists may either rest on wall or on steel beams.
- The joists act as reinforcement.
- The concrete should completely surround the joist

Fig 5

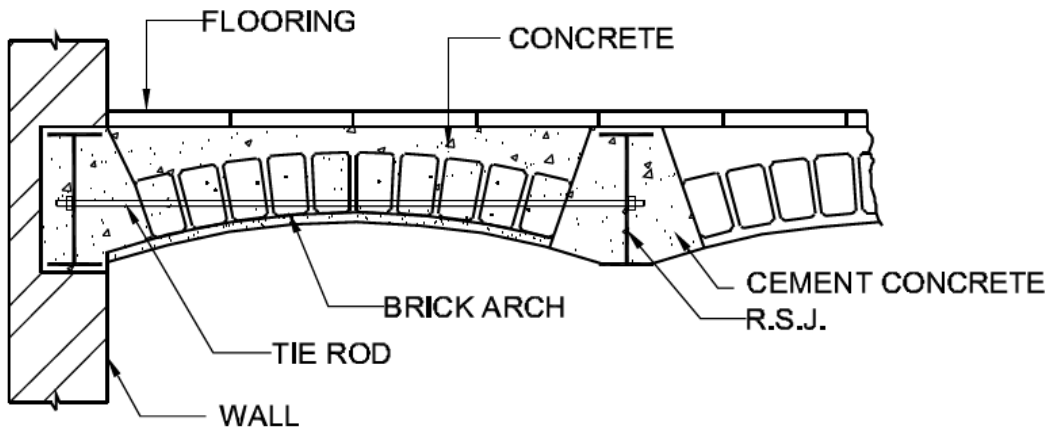


FILLER JOIST FLOOR

JACK ARCH FLOOR

- Brick or concrete arches are constructed and they rest on the lower flange of mild steel joist.
- The joists are placed at a distance of about 800 mm to 1200 mm centre to centre.
- Rise of arch should be 100 mm to 200 mm.
- The minimum depth of concrete at the crown should be 150mm.

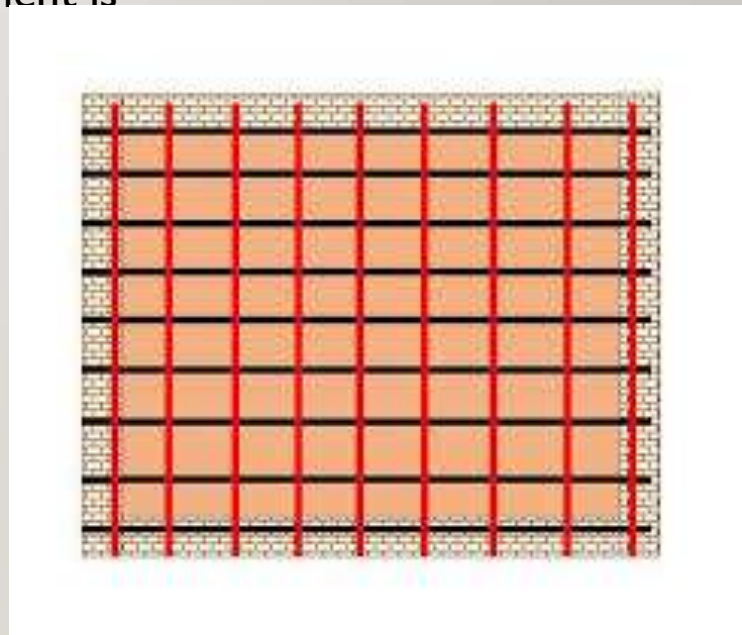
Fig 6



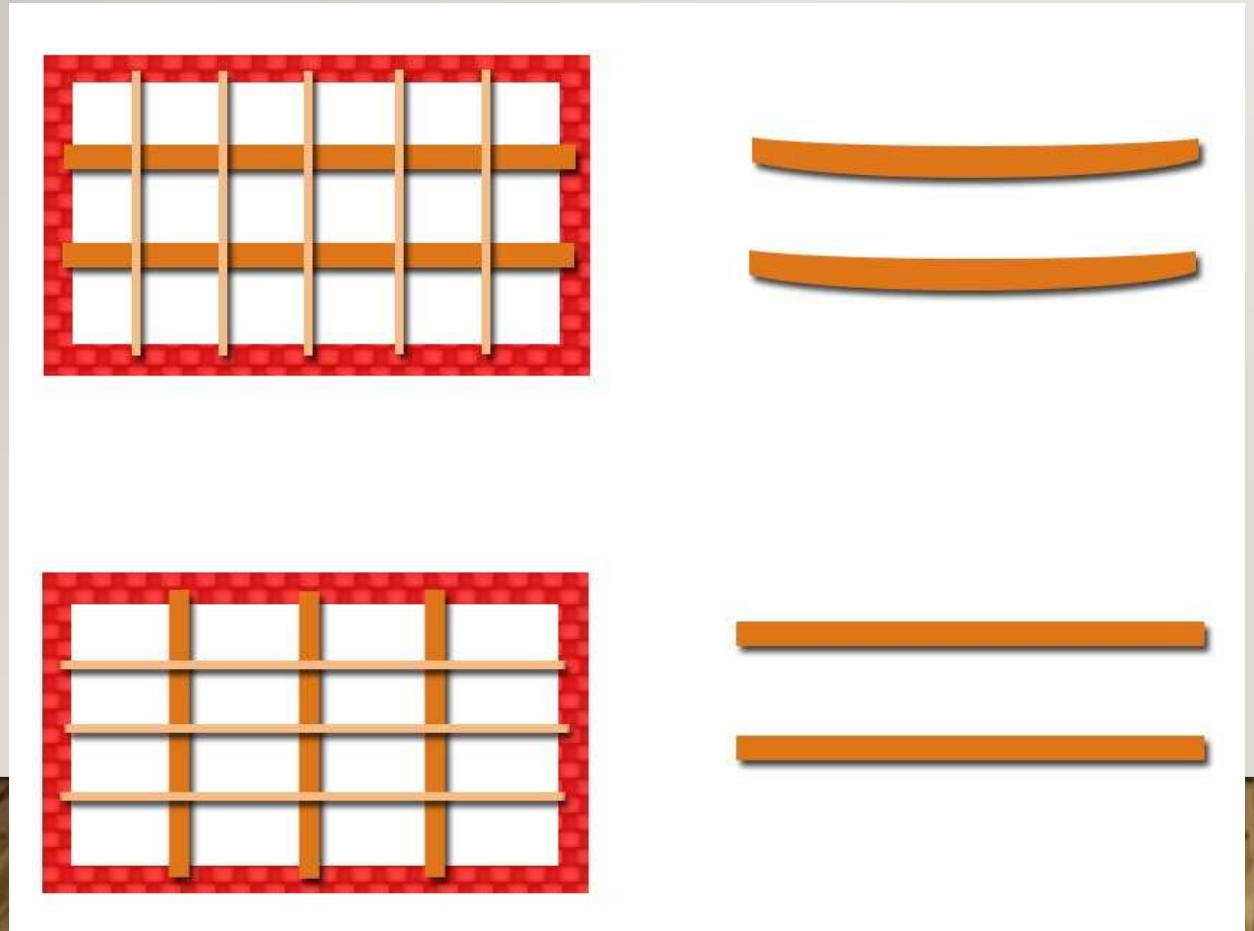
BRICK JACK ARCH FLOOR

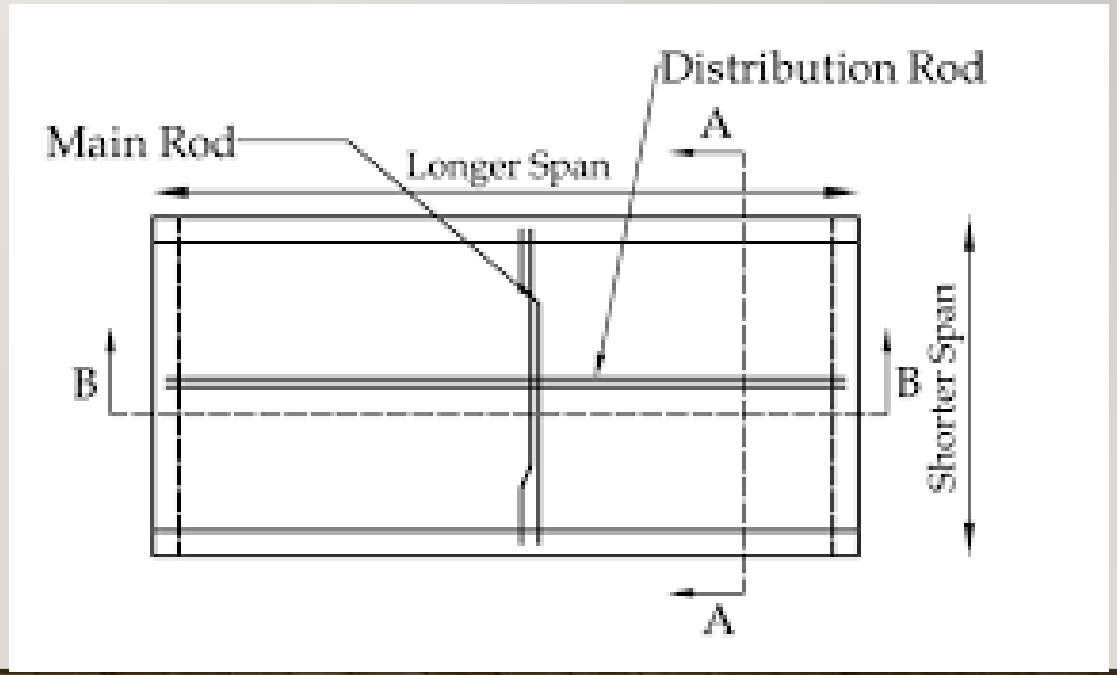
R.C.C FLOOR

- Steel bars and concrete are used to form a floor. Beams and slabs are designed as per load on floor.
- For R.C.C slab, the thickness varies from 80 mm to 150 mm and the main reinforcement is generally in the form of mild steel bars of diameter varying from 9mm to 12 mm.
- R.C.C beams are to be provided when the span of slab exceeds 4 m or so.
- The location, spacing and bending of steel bars are to be decided carefully.
- RCC work may be cast –in-situ or pre-cast, the former being very common.
- Suitable flooring can be provided on the surface of an R C.C floor.
- The R.C.C floors are less costly, durable, and easy to construct and fire proof.
- However, they are likely to transmit sound.
- The reinforcement in the flat slab can be arranged either in two-way system or four-way system.
- For ordinary loading conditions, the two-way system of reinforcement is generally preferred.



- The shorter span should have a heavy binder support and the joists are placed above in longer span so that bending is reduced in timber flooring
- Like that in RCC slab the shorter span is provided with large dia bars at bottom and the longer span is provided with lesser dia bars above.
- Steel bars at shorter span is called main bar, and the longer span bars are called distributor



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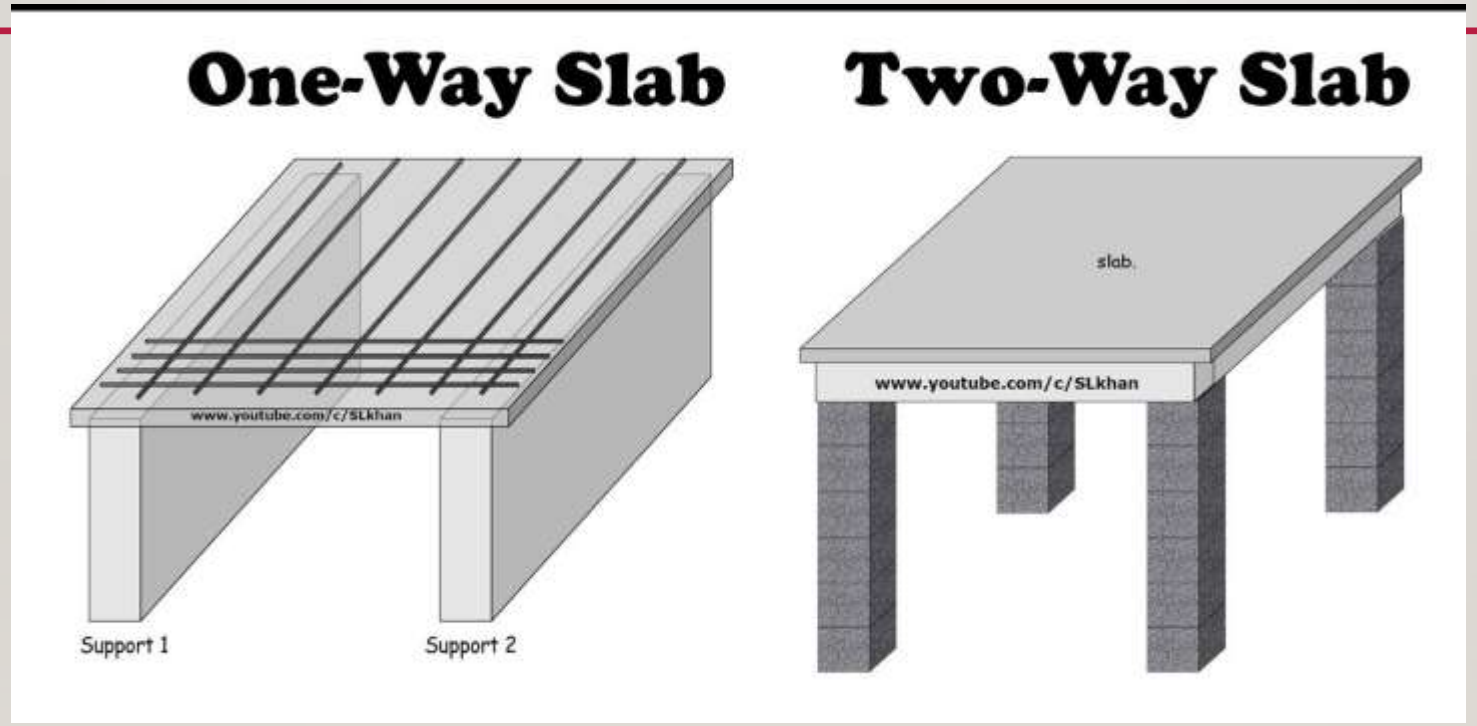

Longer span/ shorter span > 2
Ex: Narrow and long passage ways

Longer span/ shorter span <= 2
Ex: Square and nearly square shaped rooms

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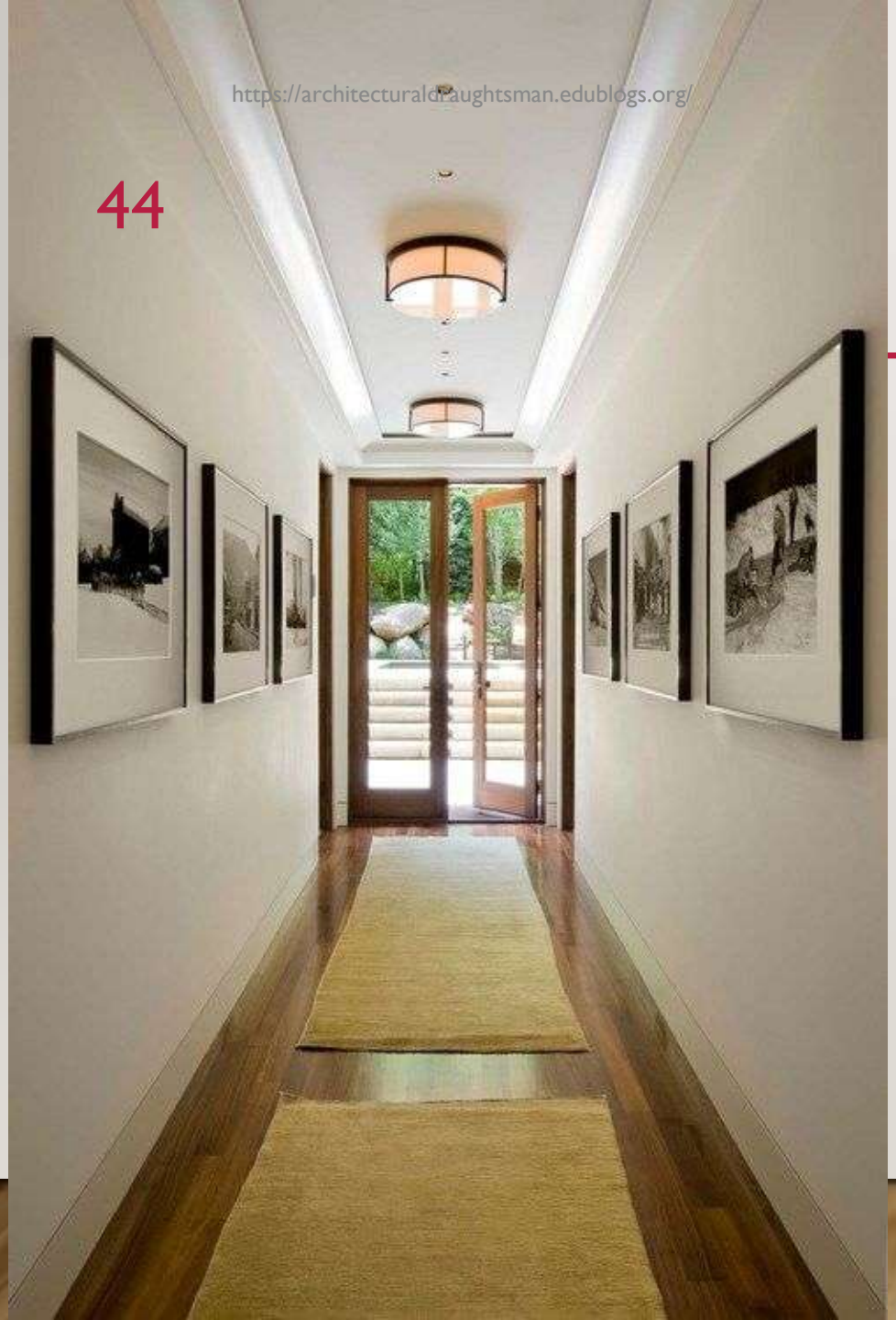

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LOADS ARE TRANSFERRED THROUGH TWO OPPOSITE SIDES OF THE SLAB

LOADS ARE TRANSFERRED THROUGH ALL FOUR SIDES

One-way Beam and Slab

Two-way Flat Plate

One-way Joist Slab

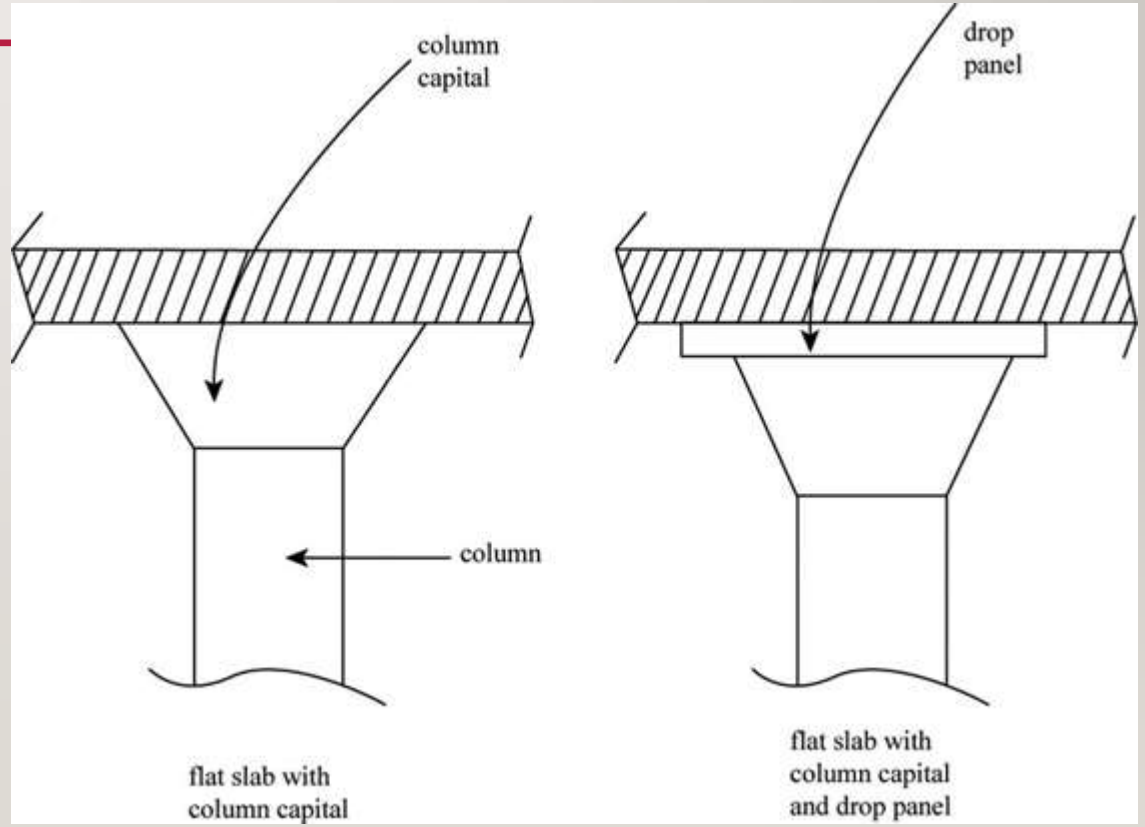
Two-way Flat Slab with Drops

One-way Flat Slab

Two-way Waffle Slab

Skip Joist/Wide Module

Two-way Beam and Slab



HALLOW BLOCK OR RIB FLOOR

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- Hollow blocks of clay or concrete are used to reduce self weight of floor.
- This type of floor is economical, fire-proof, soundproof and light in weight.
- Plumbing and electrical installations can be conveniently carried through the hollow blocks without affecting the appearance.
- These floors are widely used for building like hospitals, hotels, schools, offices, etc.

PRE-CAST CONCRETE FLOOR

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- With the development of pre-cast concrete construction technique, it is possible to prepare the pre-cast unit for the floor.
- These pre-cast units are available in suitable size and can be conveniently handled, transported and fixed. Hence supervision is needed for every stage.
- They may be supported either on walls or on rolled steel joists.
- The sides of each unit contain grooves which are used to connect the adjacent units.
- The members are light in weight and hence the cost proves to be economical.
- They are fire-proof and sound-proof.
- They do not require formwork during construction.
- They have good thermal insulation
- Very fast construction of high rise buildings can be done

THANK YOU

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INSTRUCTOR

ARCHITECTURAL DRAUGHTSMAN TRADE

SMRV GOVT ITI (WOMEN), NAGERCOIL

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