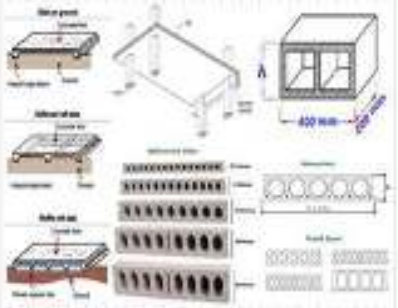
Various Types of Slabs



Prepared by

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Various Types of Slabs

What is a Slab?

Slabs are constructed to provide flat surfaces, usually horizontal in building floors, roofs, bridges, and other types of structures. The slab may be supported by walls or by reinforced concrete beams usually cast monolithically with the slab or by structural steel beams or by columns, or by the ground.

Or A slab is a structural element, made of concrete, that is used to create flat horizontal surfaces such as floors, roof decks and ceilings. A slab is generally several inches thick and supported by beams,columns, walls, or the ground.

Different Types of concrete slabs in construction:-

There are many different types of Slabs in Construction. Some of them are outdated and many of them are frequently used everywhere. In this article, Below are the types of concrete slab.

1- Flat Slab:-

The flat slab is a reinforced concrete slab supported directly by concrete columns or caps. Flat slab doesn't have beams so it is also called as beam-less slab. They are supported on columns itself. Loads are directly transferred to columns. In this type of construction, a plain ceiling is obtained thus giving attractive appearance from an architectural point of view. The plain ceiling diffuses the light better and is considered less vulnerable in the case of fire than the traditional beam slab construction. The flat slab is easier to construct and requires less formwork. This is one of the types of concrete slabs.

The thickness of the Flat slab is **minimum 8 *" or 0.2m.***

Flat Slab

Flat Slabs are used at:

1- To provide plain ceiling surface giving better diffusion of light

2.-Easy constructability with the economy in the formwork

3.-Larger headroom or shorter storey height & pleasing appearance.

4- This kind of slabs are provided in parking

5- Flat slabs are generally used in parking decks, commercial buildings, hotels or places where beam projections are not desired.

Advantages of Flat Slab:

1- It minimizes floor-to-floor heights when there is no requirement for a deep false ceiling. Building height can be reduced

2- Auto sprinkler is easier.

3- Less construction time.

4- It increases the shear strength of the slab.

5- Reduce the moment in the slab by reducing the clear or effective span.

Disadvantages of Flat slab:

1- In flat plate system, it is not possible to have large span.

2- Not suitable for supporting brittle (masonry) partitions.

3- Higher slab thickness.

Types of Flat Slab Construction :

1 - Simple flat slab(Flat plate)or (Slab without drop and column without column head(capital))..

2 - Flat slab with drop panelsor (Slab with drop and column without column head)

3 - Flat slab with column headsor (Slab without drop and column with column head)

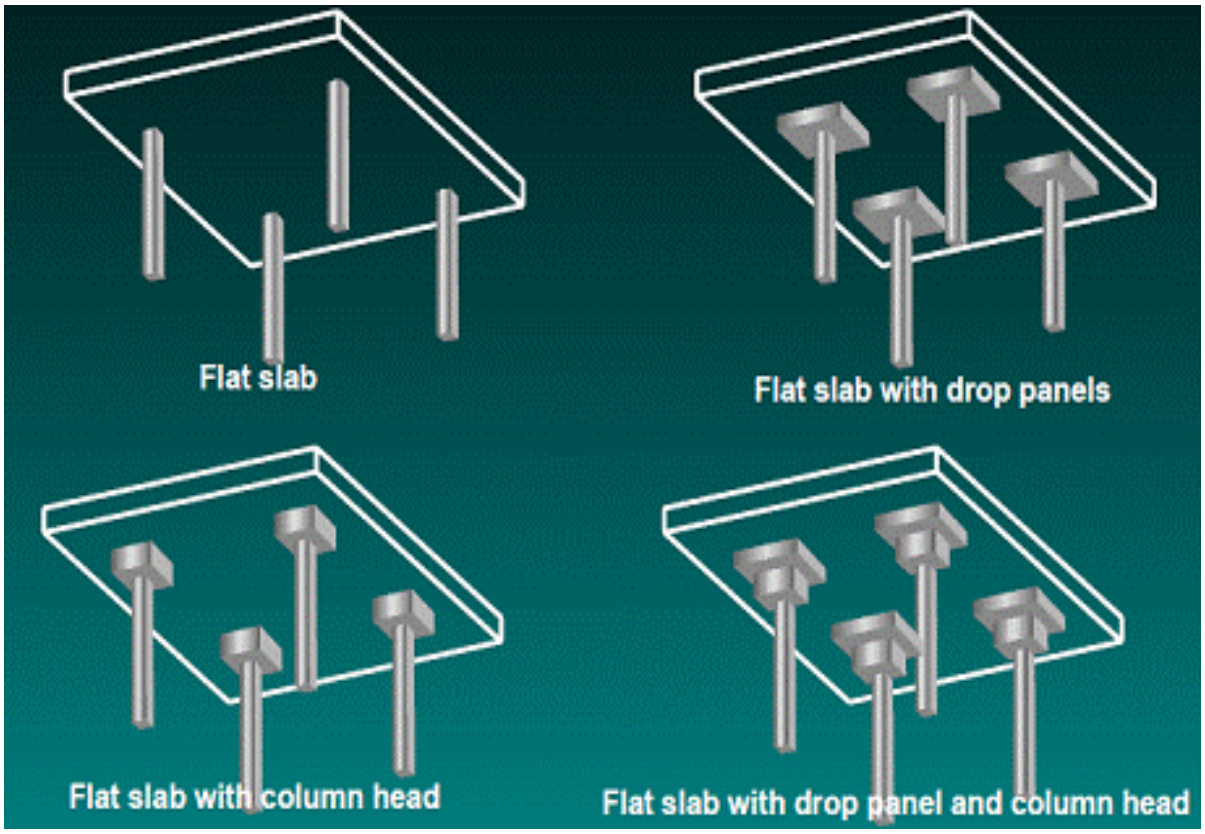
4 - Flat slab with both drop panels and column headsor (Slab with drop and column with column head)

Uses of Column Heads :

- It increase shear strength of slab
- It reduce the moment in the slab by reducing the clear or effective span

Uses of Drop Panels :

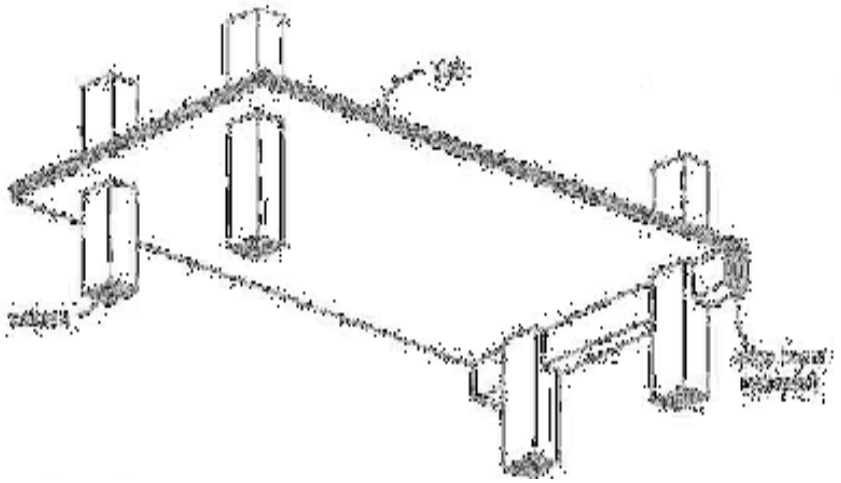
- It increase shear strength of slab
- It increase negative moment capacity of slab
- It stiffen the slab and hence reduce deflection



types of Flat Slabs

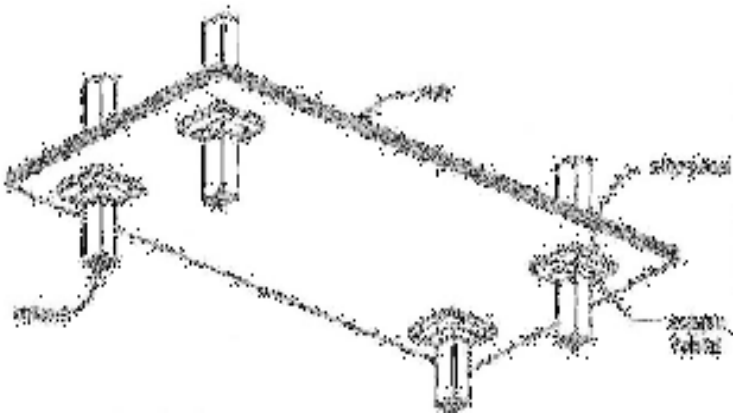
Note :

Flat plates are most suitable for spans of 6 to 8m, and live loads between 3 and 5KN/m2. Added to that, the range of spans for prestressed flat plates is between 8-12m, and it can also be constructed as post-tensioned slabs.



Flat Plate (Simple flat slab)

Flat slabs are most suitable for spans of 6 to 9m, and for live loads of 4-7KN/m2. They need more formwork than flat plates, especially for column capitals. In most cases, only drop panels without column capitals are used. It can be constructed as post-tensioned flat slabs.



Flat Slab

Flat slab with both drop panels Simple flat slab

and column heads

Flat slab with drop panels

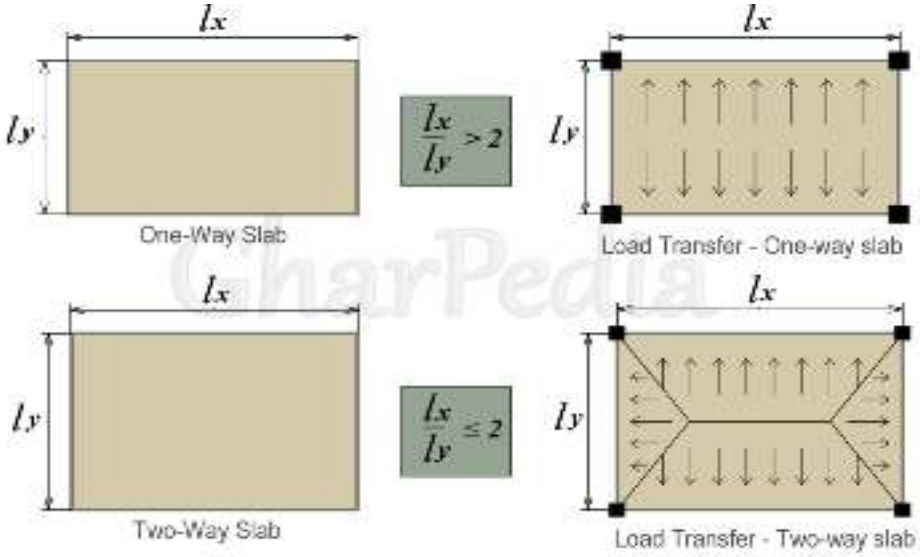
2-Conventional Slab:-

The slab which is supported on Beams and columns is called conventional slab. In this kind, the thickness of slab is small whereas depth of the beam is large and load is transferred to beams and then to columns. It requires more formwork when compared with the flat slab. In conventioanl type of slab there is no need of providing column caps. The thickness of conventional slab is ***4" or 10cm. 5" to 6" inches***is recommended if the concrete will receive occasional heavy loads, such as motor homes or garbage trucks.

Conventional concrete slabs are square in shape and has a length of 4m. Reinforcement is provided in conventional slab and the bars which are set in horizontal are called Main Reinforcement Bars and bars which are set in vertical are called Distribution bars.

Based on length and breadth of Conventional Slab is classified into two types:

1. One-Way Slab
2. Two-Way Slab



Conventional slab

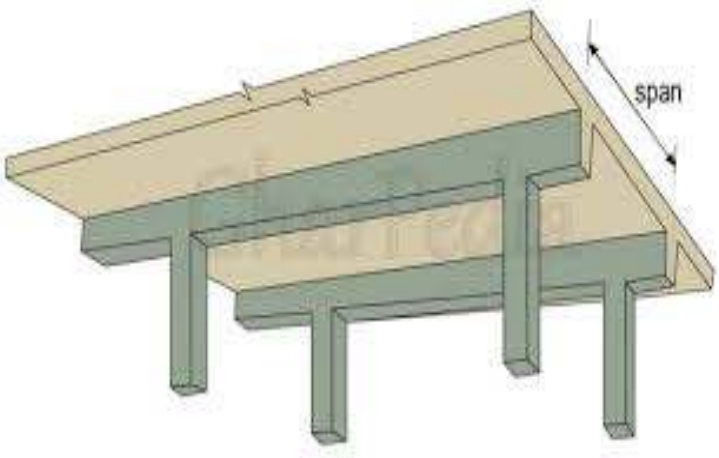
1. One Way Slab:

by beams on the two opposite sides to carry the load along one direction. The ratio of longer span (l) to shorter span (b) is equal or greater than 2, considered as One-way slab. In this type slab will bend in one direction i.e in the direction along its shorter span. However minimum reinforcement known as distribution steel is provided along the longer span above the main reinforcement to distribute the load uniformly and to resist temperature and shrinkage stresses.

$$\frac{Longer\,Span}{Short\,Span} \geq 2$$

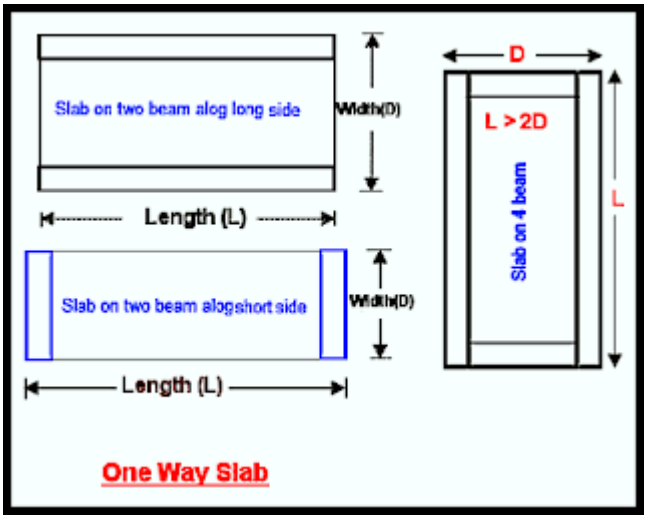
In general length of the slab is 4m. But in one way slab one side length is 4m and another side length is more than 4m. So it satisfies the above equation. Main reinforcement is provided in shorter span and distribution reinforcement is provided in longer span. Distribution bars are cranked to resist the formation of stresses.

Example: Generally all the Cantilever slabs are one Way slab. verandahs are a practical example of one way slab.



One way Slab

**The slab can be rested on four beams but the long-span of slab should be greater than two times of short-span. See the image below "One Way Slab".



One way Slab

Note :

One-way slabs on beams are most suitable for spans of 3-6m, and a live load of 3 to 5KN/m^2. They can also be used for larger spans with relatively higher cost and higher slab deflection. Additional formwork for the beams is however needed.

One- way Slabs are used at:

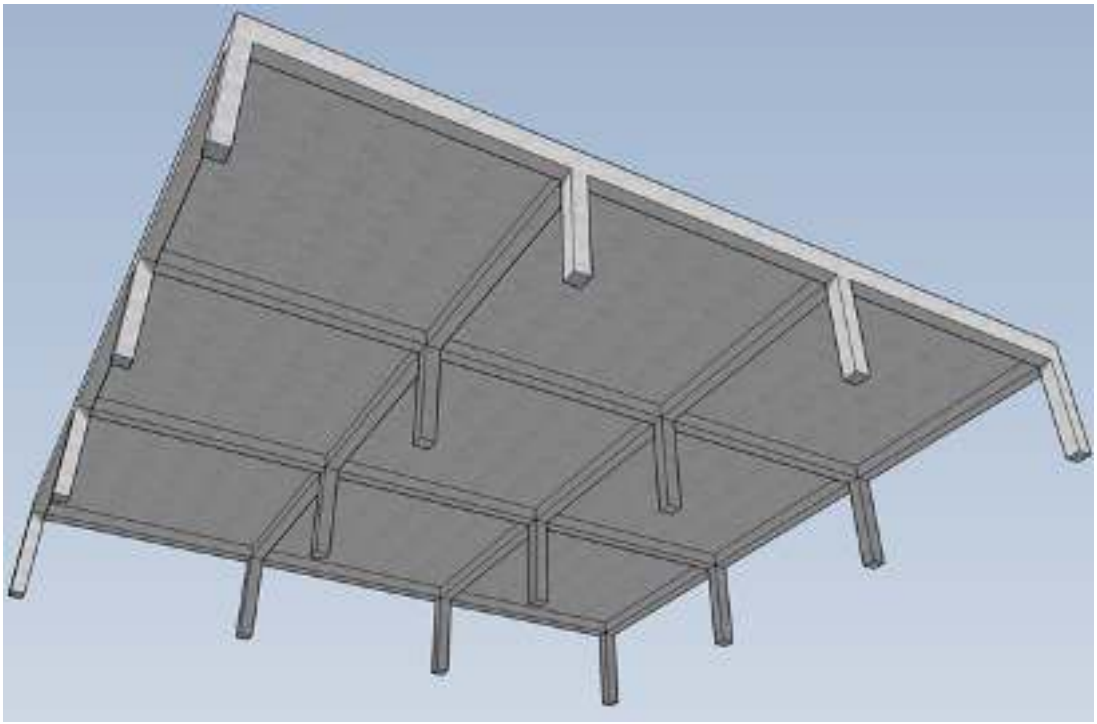
Slabs are mostly **used** as roof coverings and floors in various shapes such as square, rectangular, circular and triangular in buildings, tanks, bridges etc.

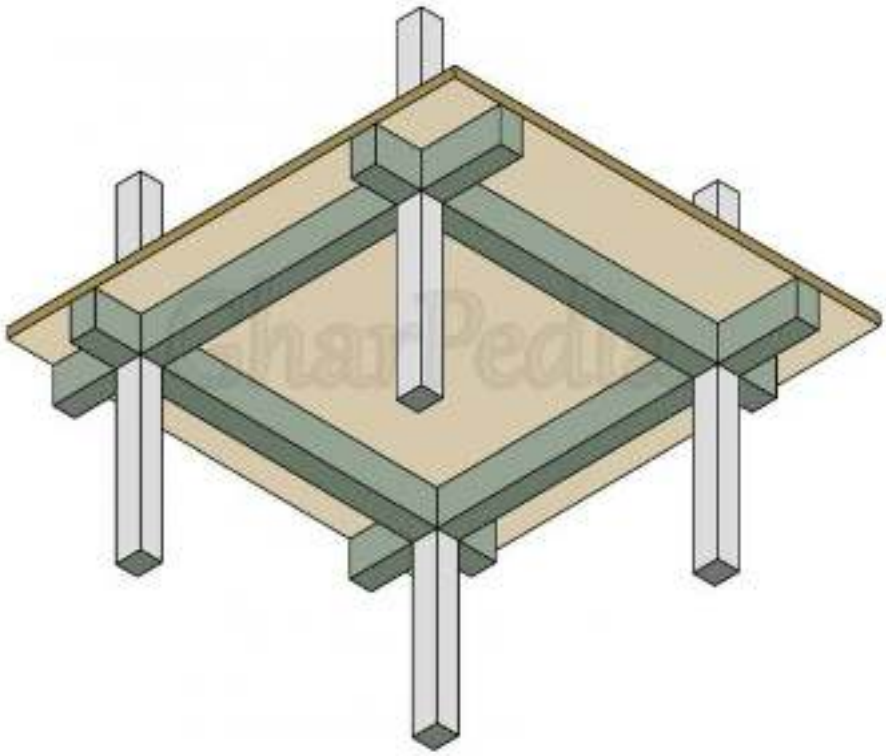
2. Two Way Slab:

Two way slab is supported by beams on all the four sides and the loads are carried by the supports along both directions, it is known as two way slab. In two way slab, the ratio of longer span (l) to shorter span (b) is less than 2. The slabs are likely to bend along both the directions to the four supporting edges and hence distribution reinforcement is provided in both the directions.

In this kind of slab, the length and breadth of the slab are more than 4m. To resist the formation of stresses distribution bars are provided at both the ends in two way slab.

$$\frac{Longer\,Span}{Shorter\,Span} = \frac{\mathrm{l}}{\mathrm{b}} < 2$$





Two-way Solid Slabs on Beam

Note :

Two-way slabs are supported on all sides. Slabs on beams are suitable for spans between 6-9m, and live loads of 3-6KN/m2 . The reinforcements in both direction increase the stiffness of the slabs, producing relatively low deflection. Additional formwork for the primary and secondary beams is needed.

Two- way Slabs are used at:

These types of slabs are used in constructing floors of multi-storeyed building.

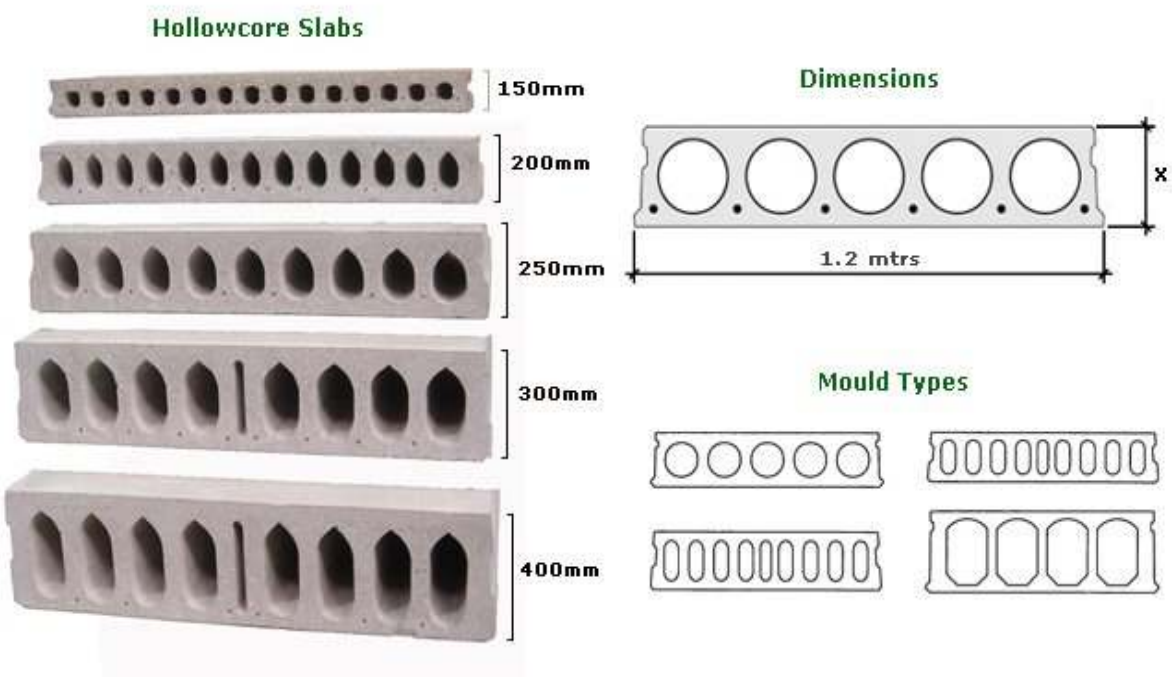
Difference between One Way Slab and Two Way Slab

No	Two Way Slab	One Way Slab
1	In one way slab, the ratio of longer span panel (L) to shorter span panel (B) is equal or greater than 2. Thus, $L/B \geq 2$	In two way slab, the ratio of longer span panel (L) to shorter span panel (B) is less than 2. Thus, $L/B < 2$.
2	Slab panel is supported on two opposite sides in short direction of one-way slab	Slab panel is supported on four sides of two-way slab.
3	One way slab bends or deflect in a direction perpendicular to the supporting edges	Two way slab bend or deflect in both directions.
4	Deflected shape of one way slab is cylindrical.	Deflected shape of two way slab is dish-shaped.
5	one way slab has structural strength in shortest direction	Two way slab has structural strength in the shortest direction
6	Main reinforcement is provided in only one direction for one way slabs.	Main reinforcement is provided in both the direction for two way slabs.

3-Hollow core ribbed Slab or(Hollow core slab):-

Hollowcore ribbed slabs derive their name from the voids or cores which run through the units. The cores can function as service ducts and significantly reduce the self-weight of the slabs, maximizing structural efficiency. The cores also have a benefit in sustainability terms in reducing the volume of concrete used. Units are generally available in standard 1200 mm widthsand in depths from 110mm to 400 mm. There is total freedom in length of units. These type of slabs are Pre casted and it is used where the construction has to be done fast.

The hollow core ribbed slabs have between four and six longitudinal cores running through them, the primary purpose of the cores being to decrease the weight, and material within the floor, yet maintain maximal strength. To further increase the strength, the slabs are reinforced with 12mm diameter steel strand, running longitudinally. This is one of the types of concrete slabs.



Hollow core slab installation:-

By using tower cranes Hollow slabs are inserted between the beams. The gaps between the slab is filled with screed.

Screed is a concrete material generally we use 20mm aggregate in concrete whereas in screed we use baby chips(small broken stones) as aggregates.

Hollow core ribbed slabs have excellent span capabilities, achieving a capacity of 2.5 kN/m2 over a 16m span. The long-span capability is ideal for offices, retail or car park developments. Units are installed with or without a structural screed, depending on requirements. Slabs arrive on-site with a smooth Pre-finished soffit. In car parks

and other open structures, Pre-finished soffits offer a maintenance free solution.

Note :

Hollow core ribbed slabs are suitable for spans (7m -- 20m) according to the table

The most common thicknesses with corresponding spans:

Hollow-core slab thickness	Maximum span
150 mm	7.0 m
200 mm	11.0 m
265 mm	13.5 m
320 mm	16.0 m
370 mm	14.0 m
400 mm	18.5 m
500 mm	20.0 m

Advantages :

1. Hollow core ribbed slab not only reduces building costs it also reduce the overall weight of the structure.

2. Excellent fire resistance and sound insulation are another attributes of hollow core slab due to its thickness.

3. It eliminates the need to drill in slabs for electrical and plumbing units.

4. Easy to install and requires less labour.

5. Fast in construction

6. No additional formwork or any special construction machinery is required for reinforcing the hollow block masonry.

Disadvantages:

1. If not properly handled, the hollow core ribbed slab units may be damaged during transport.

2. It becomes difficult to produce satisfactory connections between the precast members.

3. It is necessary to arrange for special equipment for lifting and moving of the precast units.

4. Not economic for small spans.

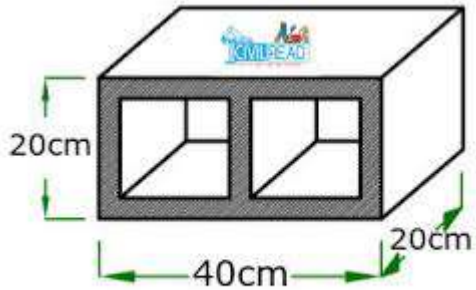
5. Difficult to repair and strengthen

Hollow core slab

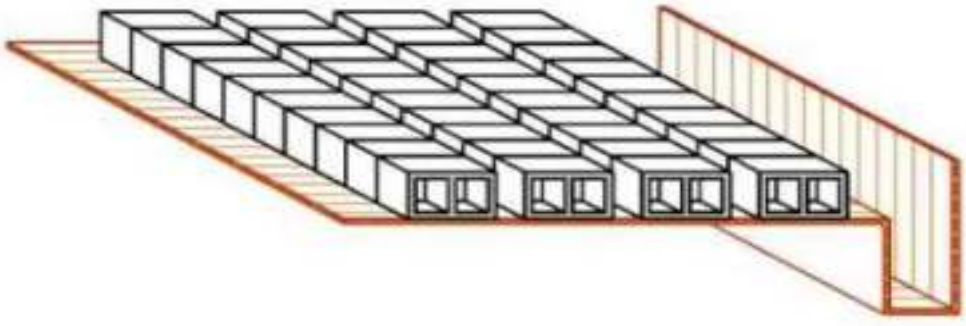
4-Hardy Slab or (Hordy Slab):-

Hardy slabs are generally seen in Dubai and China. Hardy slab is constructed by hardy Bricks. Hardy bricks are hollow bricks and made up of concrete Hollow blocks. These blocks are used to fill portions of the slab. Hardy slabs saves the amount of concrete and hence the own weight of the slab is reduced. This kind of slab has a more thickness 0.27m when compared with the conventional one. The method of installing Hardy slab is different from normal and it is clearly explained below:

The dimensions of Hardy brick is 40cm x 20cm x 20cm



Hardy Blocks



The process of hardy blocks execution is as follows:

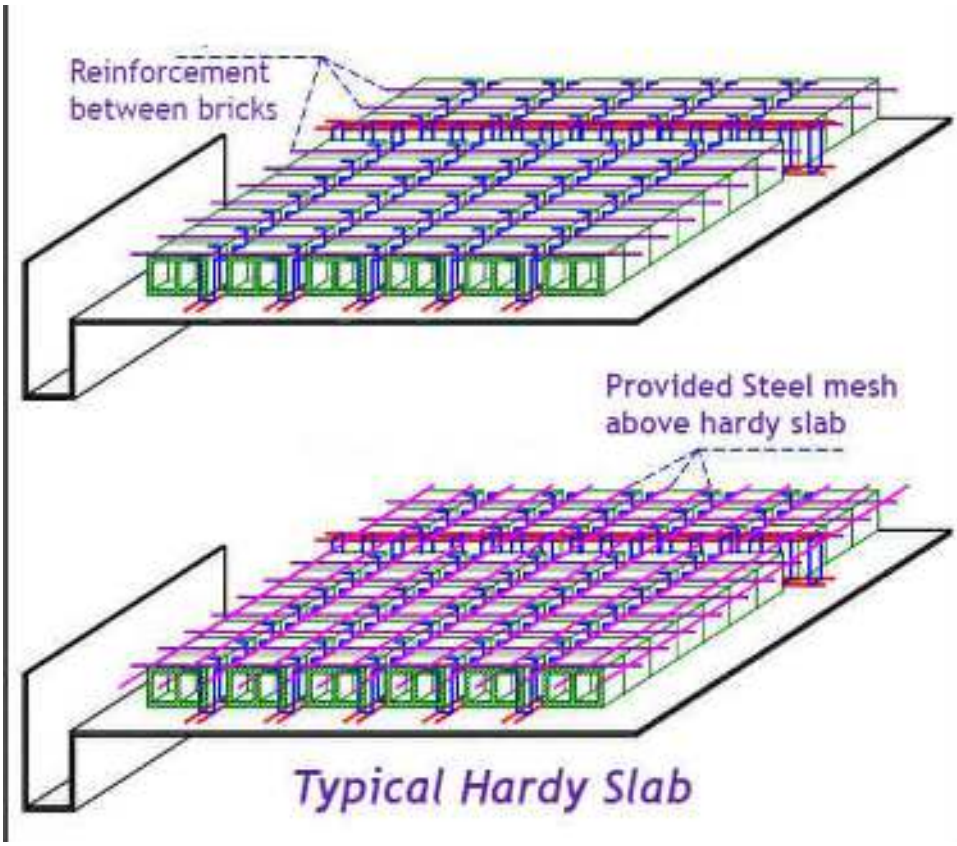
1 - Formwork is arranged and then shutters are fixed on the formwork.

2- Hardy blocks are placed on the shutter with one brick gap on the entire shutter.

3 - The gaps between the bricks are called a rib. Reinforcement is provided in a form of the beam within the gap.

4 - After placing the rib, the plane steel mesh is placed on entire slab area resting on ribs.

5 - Now pouring of concrete is done on a slab.



Where to use Hardy Slab?

Hardy slab is used where temperatures are very high. To resist the temperature from top of the slab thickness is increased. The heat coming from walls are resisted by using special bricks which has thermacol in it. Thermacol is the best insulator of sunlight.

Advantages :

1. Reducing slab weight by reducing the amount of concrete below neutral axis.

2. Ease of construction, especially when all beams are hidden beams.

3. Economic for spans > 5m with moderate live load: hospitals, office and residential buildings.

4.Improved insulation for sound and heat.

Disadvantages:

1. If not properly handled, the hollow core ribbed brick units may be damaged during transport.

2. Not economic for small spans.

3. Difficult to repair and strengthen

Hardy slabs are further classified into two types:

1. One way Hardy Slab

2. Two way Hardy slab

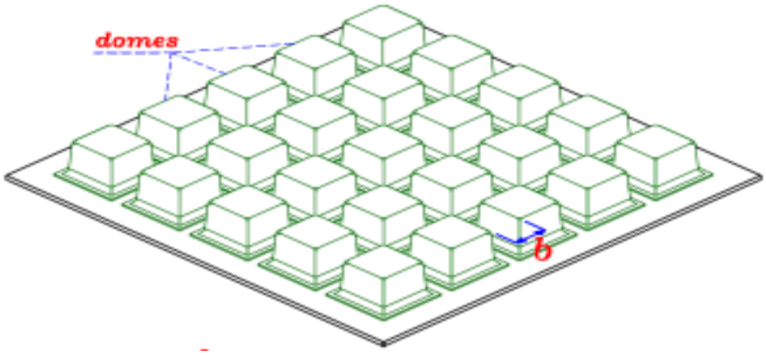


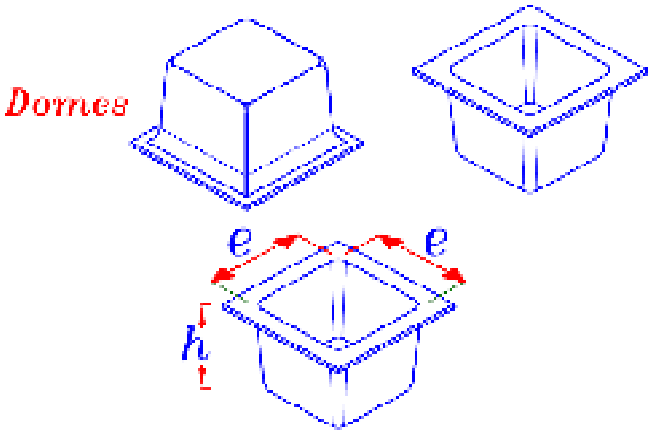
Hardy slabs

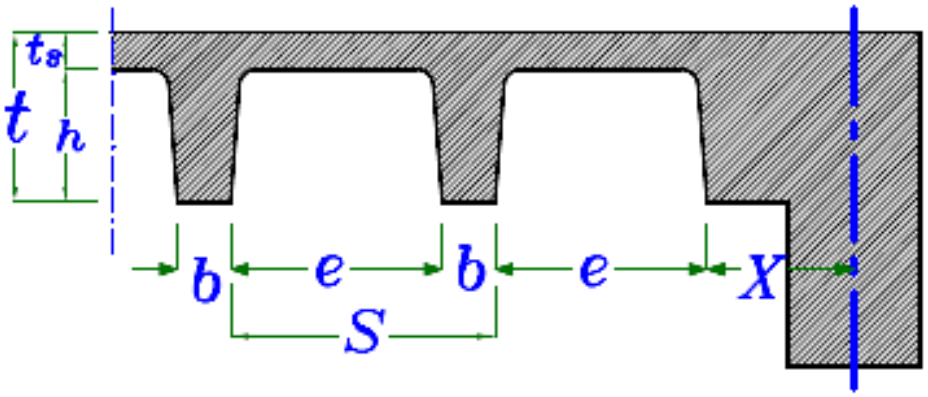
5-Waffle Slab or (Grid Slab):-

Waffle slab is a reinforced concrete roof or floor containing square grids with deep sides and it is also called as grid slabs. This kind of slab is majorly used at the entrance of hotels, Malls, Restaurants for good pictorial view and to install artificial lighting. This a type of slab where we find a hollow hole in the slab when the formwork is removed. Firstly PVC trays (pods) are placed on shuttering then reinforcement is provided between the pods and steel mesh is provided at top of the pods and then concrete is filled. After concrete sets, the formwork is removed and PVC pods are not removed. This forms a hollow hole in it in which hole is closed at one end. The concrete waffle slab is often used for industrial and commercial buildings while wood and metal waffle slabs are used in many other construction sites. This is a one of the types of concrete slabs.

Waffle Slab



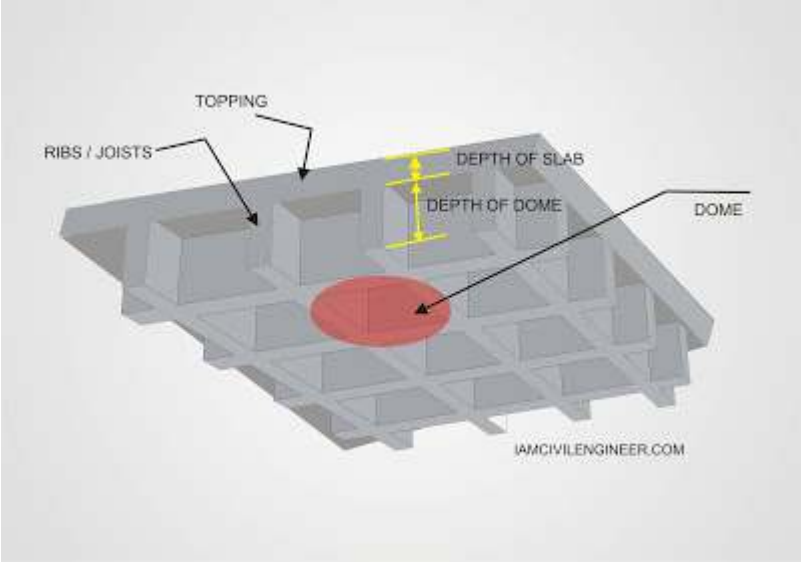




The thickness (**ts**)of waffle slab recommended is 85 to 100 mm while the overall depth of slab (**t**)is limited to 300 to 600 mm.

The width of beamsor ribs(**b**) provided in waffle slab are generally 110 to 200 mm.

Spacing of ribs(**s**) recommended is 600 to 1500 mm.



Where to use Waffle Slab & Waffle slab details:

A waffle slab has a holes underneath, giving an appearance of waffles. It is usually used where large spans are required (e.g auditorium, cinema halls) to avoid many columns interfering with space. Hence thick slabs spanning between wide beams (to avoid the beams protruding below for aesthetic reasons) are required. The main purpose of employing this technology is for its strong foundation characteristics of crack and sagging resistance. Waffle slab also holds a greater amount of load compared with conventional concrete slabs.

Note :

Grid slabs are suitable for spans of **9-15m** and live loads of **4-7KN/m²**. Formwork, including the use of pans, is quite expensive.

Based on the shape of Pods (PVC Trays) They are classified into different types some of them are:

1. Triangular pod system

2. Square pod system

Triangular pod system **Square pod system**

Advantages of Waffle slabs:

1. Waffle slabs are able to carry heavier loads and span longer distances than flat slabs as these systems are light in weight.

2. Waffle slab can be used as both ceiling and floor slab.

3. Suitable for spans of **9m – 15m** ; longer spans may be possible with posttensioning.

4. These systems are light in weight and hence considerable saving is ensured in the framework as the light framework is required.

Disadvantages of Waffle slabs:

1. Waffle slab is not used in typical construction projects.

2. The casting forms or moulds required for pre- cast units are very costly and hence only economical when large scale production of similar units are desired.

3. Construction requires strict supervision and skilled labour.

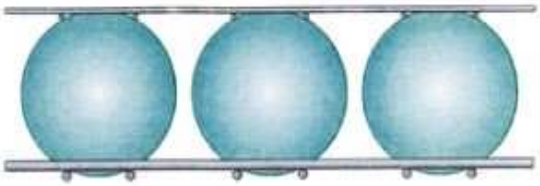
Waffle slab

6 - Bubble Deck Slab :

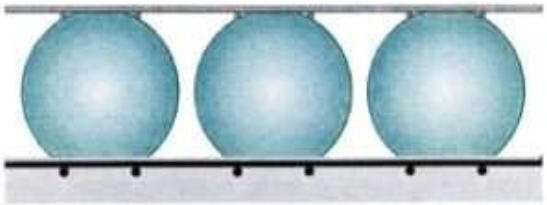
It is constructed by placing plastic bubbles which are prefabricated and the reinforcement is then placed between and over plastic bubbles and finally, fresh concrete is poured. The plastic bubbles replace the ineffective concrete at the center of the slab.

Bubble Deck slabs reduce weight, increase strength, larger spans can be provided, fewer columns needed, no beams or ribs under the ceiling are required. Consequently, not only does it decline the total cost of construction but is also environmentally friendly since it reduces amount of concrete.

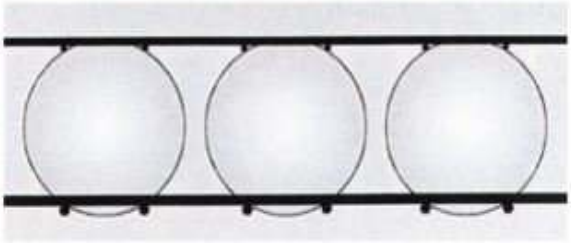
The *simple* **BubbleDeck**® is cast over the pre-fabricated 'bubble-lattice' on traditional formwork



In the *filigree-slab* **BubbleDeck**® the bottom side of the 'bubble-lattice' unit is furnished with a pre-cast concrete layer which on the building site replaces the horizontal part of the formwork.



The *simple* **BubbleDeck**® may also be delivered to the building site as pre-cast factory-made slabs.



Advantages :

1 - Concrete usage is reduced as 1Kg of recycled plastic replaces 100kg of concrete. Hence this technology is green technology.

2 - Reduces the overall dead load of structure & leads to 30 %to 50% lighter slab which reduces load on columns , walls and foundations.

3 - Larger spans.

4 - Lower the cost of total construction up to 8% to 10%.

5 - Environmentally green and sustainable – reduced energy & carbon emissions.

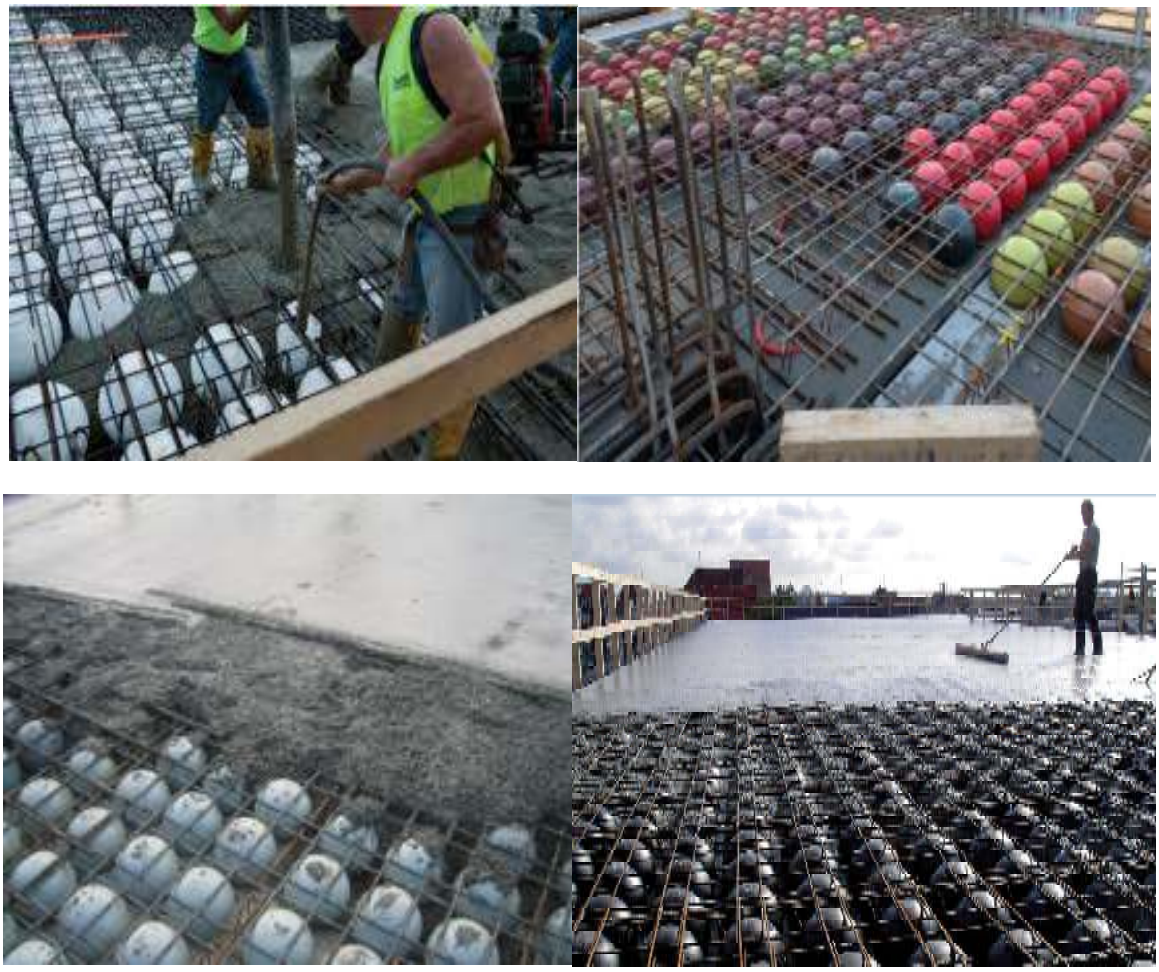
Disadvantage :

1 - Punching shear capacity is low.

2 - Skilled labour required.

3 - Conventional slab is less deflect than bubble deck slab.

4 - Load carrying capacity is less than conventional slab.

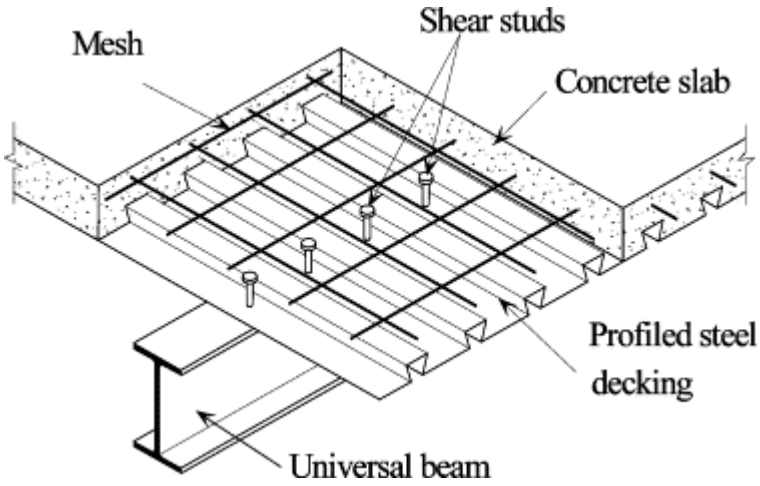


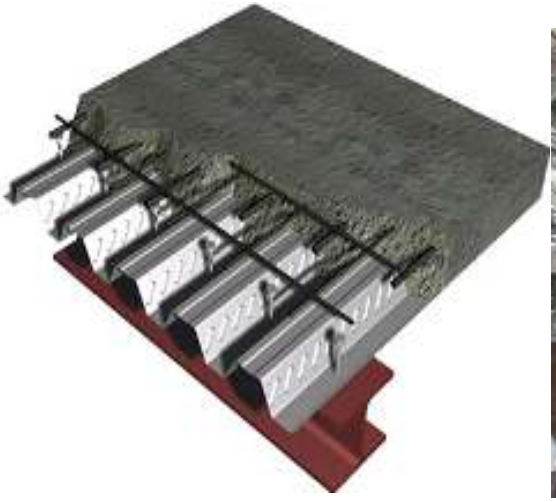
Bubble Deck Slab

7 - Composite Slab :

Commonly, it is constructed from reinforced concrete cast on top of profiled steel decking. The decking acts as formwork and working area during the construction phase, and it also acts as external reinforcement during service life of the slab.

For a steel decking of thickness between 50-60mm, the span of the slab can reach up to 3m. However, if the steel decking thickness is increased up to 80mm, slabs with span of 4.5m can be constructed.





Composite Slab

8 - Precast Slab :

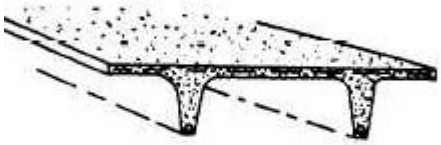
Precast concrete slabs are casted and cured in manufacturing plants, and then delivered to the construction site to be erected. The most outstanding advantage of the preparation of slabs in manufacturing plants is the increase in efficiency and higher quality control which may not be achieved on site.

The most commonly used precast slabs are: the channel and double-T types. They can be used for spans up to 15m. The double-T slabs vary in sizes and spans up to 15m have been used.

The tongue-and-groove panel could vary in size based on the design requirement. When they are placed, the tongue of one panel is placed inside the groove of adjacent panel.

With regard to the cost of precast slabs, it is reported that precast concrete slabs are cheaper than cast in situ concrete slab by approximately 24%.

A. CHANNEL



B. DOUBLE-T

C. TONGUE AND GROOVE

Precast Slab

9 -Dome Slab:

These kind of slab is generally constructed in temples, Mosques, palaces etc. And Dome slab is built on the conventional slab. Thickness of Dome slab is **0.15m**. Domes are in the semi-circle in shape and shuttering is done on a conventional slab in a dome shape and concrete is filled in shuttering forming dome shapes. This is a one of the types of concrete slabs.

Dome Slab laid on Conventional Slab

Dome Slab

10 -Pitch roof slab:

Pitch roof is an inclined slab, generally constructed on resorts for a natural look. Compared to traditional roofing materials Tile-sheets used in pitch roof slab are extremely lightweight. This weight saving reduces the timber or steel structural requirements resulting in significant cost savings. Tile-sheets are tailor made for each project offering labour cost savings and reduced site wastage. And the thickness of the slab is depends on the tiles we using it may be **2 "-8 ".** This is a one of the types of concrete slabs.

In Pitched Roof construction, the pitched roof is constructed with slopes pitched at least **20degrees** to the horizontal for slates and **40 to 60degree** for tiles. The least slope of the pitched roof is determined by the minimum slope necessary for excluding the roof covering and drain rainwater to eaves or valley gutter. The slope of the roof varies according to the span, the climate conditions of the site, and the nature of the covering material. The slope should be such that the people attending repair must be able to walk and work without fear.

Pitch roof

Advantages:

1. Pitched roof sheds off rain water better.
2. This slab gives you internal storage or room space.
3. It is less likely to leak.
4. Roof coverings are cheaper.
5. If it is a standard pitch, building materials are more cost-effective

Disadvantages:

1. This type of slabs are not suggested for long spans.

2. Repairs in slabs ike plumbing repair or electric wiring on slabs is difficult.

Pitch roof slab

11-Slab with Arches:

This is a type of slabs which is generally adopted in the construction of bridges. Bridges are subjected to two loads moving load from the vehicles and Wind load. These slabs are adopted at a place where there is a need of redirecting wind load and if there is a long curve in direction of slab these slabs are adopted. It resists the fall of the bridge due to heavy wind load.

They were originally built by stone or brick but these days these are built by reinforced concrete or steel. The introduction of these new materials allow arch bridges to be longer with lower spans. This is a one of the types of concrete slabs.

Slab with Arches

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Advantages of Arch Bridge:

1. Easy to build with the locally available material.
2. these type of bridges are very rigid and extremely strong.
3. Arch bridges are built up with a variety of materials like stone, concrete, steel, etc.

Disadvantages of Arch bridge:

1. They take a long time to build.
2. It requires a massive amount of building materials to build.

Slab with Arches

12 - Pre – Stressed slab :

1 Post tension slab

B - Pre Tension Slab

A- Post tension slab:

The slab which is tensioned after constructing slab is called Post tension slab. Reinforcement is provided to resist the compression. In Post tension slab the reinforcement is replaced with cables/ steel tendons.

Post-Tensioning provides a means to overcome the natural weakness of concrete in tension and to make better use of its strength in compression. The principle is easily observed when holding together several books by pressing them laterally.

In concrete structures, this is achieved by placing high-tensile steel tendons/cables in the element before casting. When concrete reaches the desired strength the tendons are pulled by special hydraulic

jacks and held in tension using specially designed anchorages fixed at each end of the tendon. This provides compression at the edge of the structural member that increases the strength of the concrete for resisting tension stresses. If tendons are appropriately curved to a certain profile, they will exert in addition to compression at the perimeter, a beneficial upward set of forces (load balancing forces) that will counteract applied loads, relieving the structure from a portion of gravity effects. This is a one of the types of concrete slabs.

In this type of slab, cables are tied instead of reinforcement. In Steel reinforcement, the spacing between bars is **4inch to 6inch** where as in Post tension slab the spacing is more than **2m**.

Laying cables

Hydraulic Jacking

Advantages of Post tension slab:

1. It allows slabs and other structural members to be thinner.

2. It allows us to build slabs on expansive or soft soils.

3. Cracks that do form are held tightly together.

4. Post tension slabs are excellent ways to construct stronger structures at an affordable price.

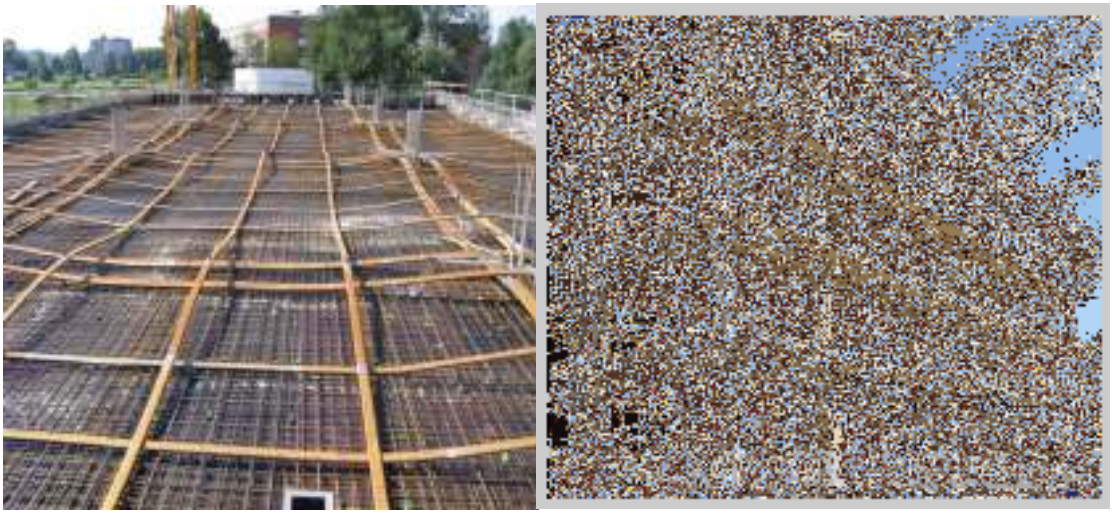
5. It reduces or eliminates shrinkage cracking-therefore no joints, or fewer joints, are needed

6. It lets us design longer spans in elevated members, like floors or beams.

Disadvantages of Post tension slab:

1. The post tension slab can be made only by skillful professionals.

2. The main problem with using post tension slab is that if care is not taken while making it, it can lead to future mishaps. Many a times, ignorant workers do not fill the gaps of the tendons and wiring completely. These gaps cause corrosion of the wires which may break untimely, leading to some failures unexpectedly.



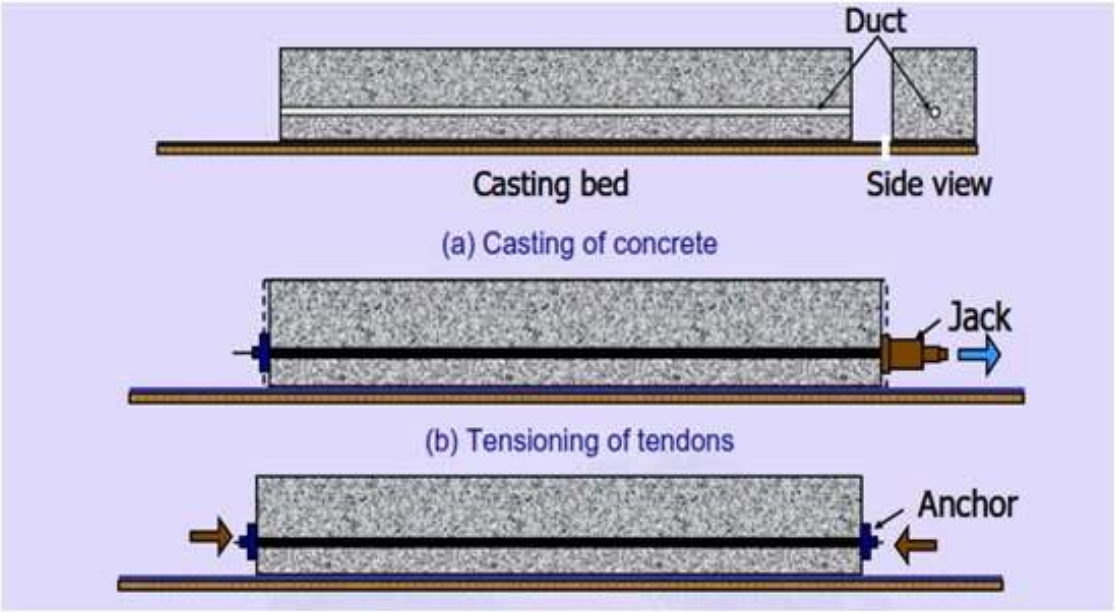
post tension slab

B -Pre Tension Slab :

The slab which is tensioned before placing the slab is called Pre tension slab. The slab has same features of Post tensioning.

Difference Between Pretension and Post Tension

post – tensioning	pre – tensioning
1- In this method prestressing is done after the concrete attains it's strength	1- In this method the concrete is prestressed with tendons before it is placing in position.
2- This method is developed due to bearing	2- This method is developed due to bonding between the concrete and steel tendons .
3- Post tensioning is preferred when the structural element is heavy	3- Pre tensioning is preferred when the structural element is small and easy to transported.
4- In this method products are changed according to structure .	4- In this method similar prestressed members are prepared .
5- Cables are used in place of wires and jacks are used for stretching.	5- Pre-tensioning members are produced in mould.



Post-tensioning

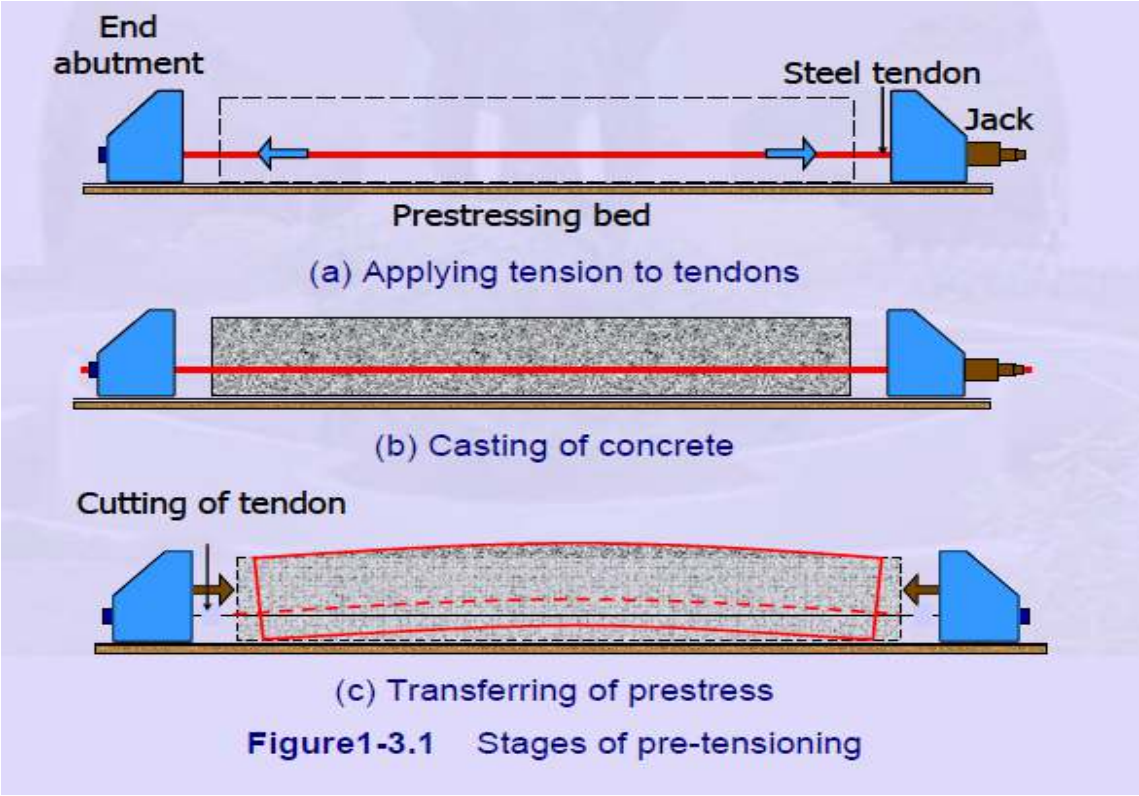


Figure1-3.1 Stages of pre-tensioning

pre – tensioning

13-Cable suspension slab:

If the span of the slab is very long, then we go for cable suspension slab which is supported on cable such as London bridge, Howrah bridge etc. Generally, in the construction of houses for every 4m, we provide a column whereas in cable suspension slab for every 500m we provide a column. This kind of slab is provided where the length of the span is more and difficulty in building columns. The slabs are tied with cables and these cables are joined to columns.

Cable suspension slab

Advantages:

1- Longer main spans are achievable than with any other type of bridge.

2- One common reason that the choice to build a suspension slab is reached is if it is being built in a high earthquake zone.

Disadvantages:

1- Considerable stiffness or aerodynamic profiling may be required to prevent the bridge deck vibrating under high winds.
2- Not as well insulated as a ground slab , as the base doesn't touch the ground.

14 -Grads Slab/ Slab on grade:

The slab which is casted on the surface of the earth is called a Ground slab . This type of slab is used in the Basement floor.

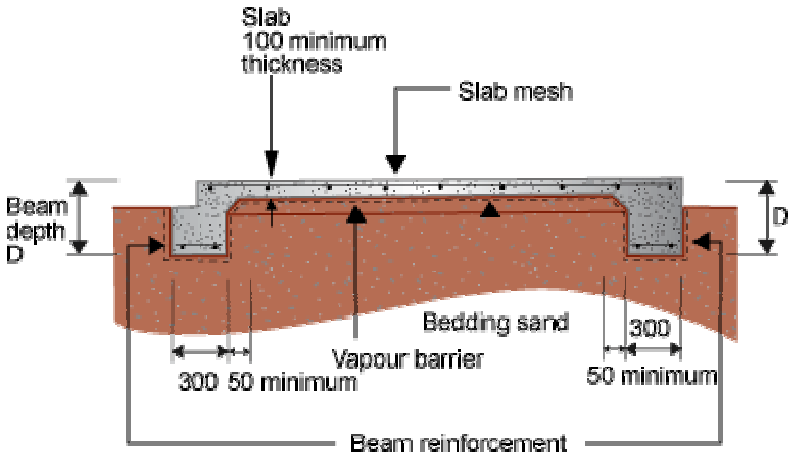
Generally, slab on grade are classified into three types :

1. Slab on ground
2. Stiffened raft slab
3. Waffle raft slab

1. Slab on ground :

It is the simplest type of slab on grade which is a composite of stiffening beams constructed from concrete around perimeter of the slab, and has a slab thickness of 100mm. It is suitable for stable ground which is mostly composed of sand and rock and not influenced by moisture, and soils that undergo slight movement due to moisture.

Concrete slab on the ground

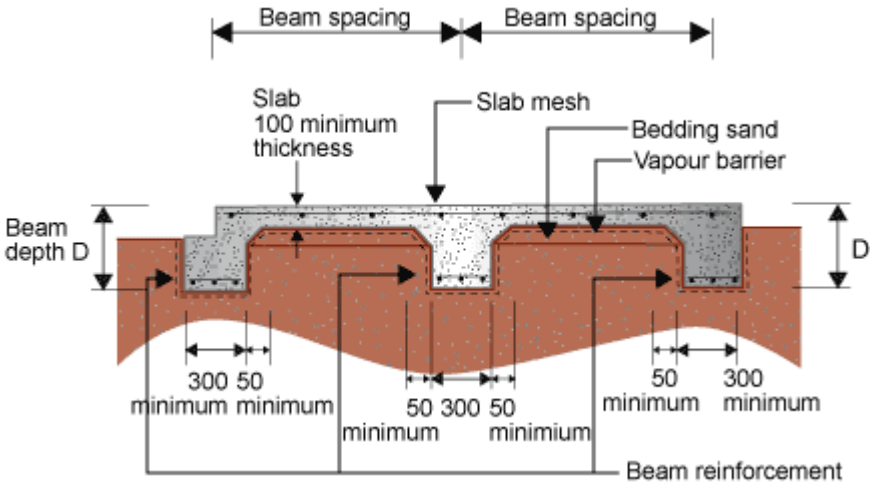


Section showing slab on ground design

2. Stiffened raft slab :

It is similar to slab on ground apart from stiffening beams which are set in channels through the middle of the slab. Consequently, it creates a kind of supporting grid of concrete on the base of the slab. Soil with moderate, high amount, and severe movement due to moisture.

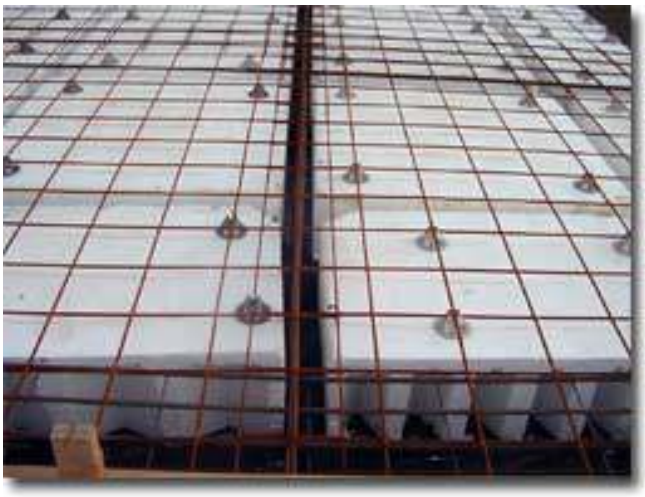
Stiffened raft slab



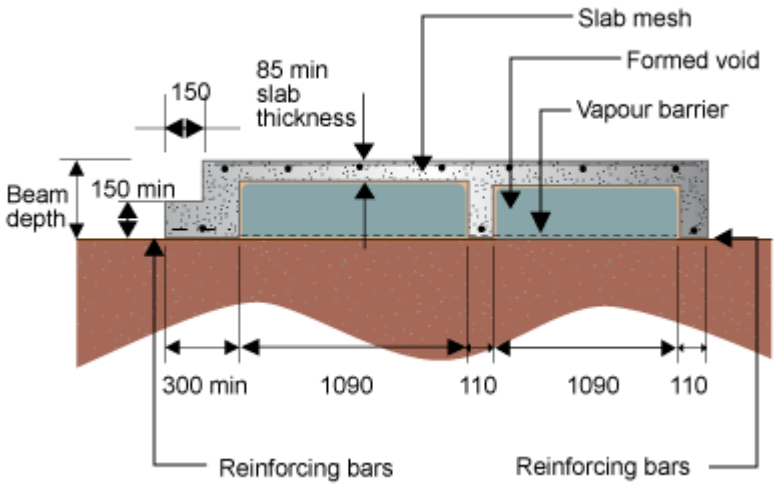
Section showing stiffened raft design

3. Waffle raft slab :

It is constructed entirely above the ground by pouring concrete over a grid of polystyrene blocks known as 'void forms'. Waffle raft slabs are generally suitable for sites with less reactive soil, use about 30% less concrete and 20% less steel than a stiffened raft slab, and are generally cheaper and easier to install than other types. These types of slabs are suitable only for very flat ground.



Polystyrene void forms below reinforcemen.



Section showing waffle raft slab

15 -Miscellaneous Slabs:

a- Low roof slab:

The slab which provided above the door for storage purpose is called Low roof slab. Slab is closed at all ends and open at one end. This slab lies below the actual slab and above the door sill level. These types of concrete slabs are used in houses.

Low roof slab

b - Room Chajja or Loft :

This kind of chajja (Slab) is provided in drawing rooms and kitchen for storing House material. The usual difference between low roof slab and Room chajja is Low roof slab hides house material and whereas Room Chajja or Loft doesn't hides house material they are open and provided above the door side. This is a one of the types of concrete slabs.

Note :

- Normal width of chajja is between 2′ to 2'6″.
- Loft is a cantilever slab of 2′ to 2'6″ projecting out from kitchen or bedroom wall at a height of 7′.Used for storage.
- The usual **difference between low roof slab and Room chajja is Low roof slab** hides house material and whereas **Room Chajja** or Loft doesn't hides house material they are open and provided above the door side. This **is** a one **of** the types **of concrete slabs**.

Room Chajja or Loft

Chajja (Slab) or Loft

Chajja (Slab) or Loft

Advantage of Chajjaor Loft

1. Protects from external sunlight.
2. Protects from rainwater
3. as aesthetics to a building
4. a recess place to keep utilities like A.C compressor

c - Projected slab or (Portico slab) :

The slab which has one side fixed and the other side is free is called as **Projected Slab** or **Cantilever slab**. These type of slabs are generally constructed in hotels, Universities, function halls, etc. to use that area for dropping or picking up zone and for loading and unloading area. This is a one of the types of concrete slabs.

Portico are more ornamental in nature and have a provision that car can be parked below till passengers board or alight.

Projected slab or (Portico slab)

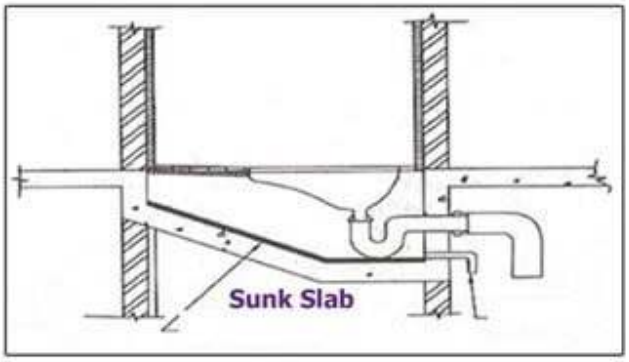
d - Sunken Slab or (Depressed slab) :

Slab which is provided below the washrooms to hide the sewage pipes or sewerage pipes is called Sunken slab. In this type, the pipes that carry water are concealed below the floor. Special care has to be taken to avoid leakage problems. After casting sewage pipes in the slab the slab is filled with coal or broken pieces of bricks. There are two types of the sunken slab.

The slab which is provided **below** the normal floor level at a depth of 200mm to 300 mm and filled with broken pieces of bricks is called Sunken slab.

or

The Slab which is provided **above** the normal floor level at a height of 200mm to 300mm and filled with coal or broken pieces of bricks called Sunken slab.



[Sunken slab below floor slab]

e - Kitchen Slab :

The slab is provided in the kitchen for its platform. For placing stove and other kitchen material is called Kitchen Slab. It has a breadth of 0.5m and length of wall and thickness is 2″.

Kitchen Slab

References :

1 - Design of R.C Concrete structure 2 edition by (MashhourGhoneim and Mahmoud El- Mihimily

2 - Structural Concrete (Theory and design 6 edition) by M. NadimHasson , Akthemal Al Manaseer

3- Design od .R.C 7 edition by (Jack C . McCormac , James K . Nelson

4 - Stephen C. Hollow core manufacture and factory design. *The Indian Concrete Journal*2013; 20--25

5- Seminar presentation on bubble deck slab ,byshivanisharma .

6 – www.google.com:

a- https://civilshastra.com/

b-http://acivilengineer.com/

c-https://civilread.com/

d-https://yasserelleathy.com/rc-eng-yasser.html

e -https://constructionqueries.wordpress.com/2014/11/21/family-of-chajjah-porch-portico/

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