WORKING DRAWING 1

1) DIFFERENT TYPES OF BRICK CUTS USED IN BRICK MASONRY

1. Closer

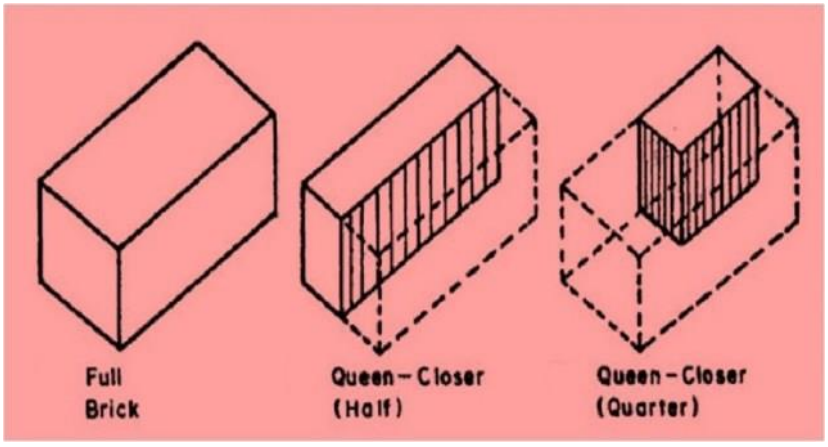
It is the portion of the brick cut along the length in such a way as one long face remains intact.

2. Queen Closer

When a brick is cut along its length, making it two equal halves then it is called *queen closer*. Thus a queen closer is a broken brick portion whose width is half as wide as the original brick. This is also called as *queen closer half*.

3. Queen Closer Quarter

If a queen closer is broken into two equal pieces then it is known as *queen closer quarter*. Such a closer is thus a brick piece which is one quarter of the brick size.



Different forms of Queen closer

4. King Closer

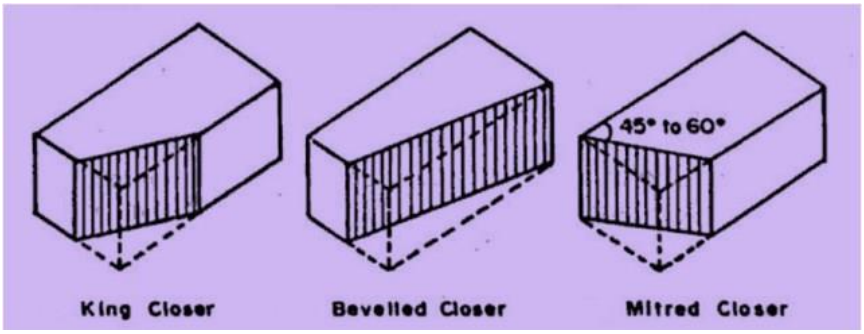
If a brick is cut in such a way that the width of one end becomes half that of a full brick, while the width at the other end is equal to the full width, then it is called as *king closer*. It is obtained by cutting out a triangular portion of the brick between the centre of one end (width side) and the centre of the other end (lay side). Thus it has half header and half stretcher face.

5. Beveled Closer

It is a form of king closer in which the whole length of the brick (i.e. stretcher face) is chamfered or beveled in such a way that half width is maintained at one end and full width is maintained at the other end.

6. Mitred Closer

It is a portion of a brick whose one end is cut splayed or mitred for full width. The angle of splay may vary from 45^0 to 60^0. Thus one longer face of the mitred closer is of full length of the brick while the other longer face is smaller in length.



King closer – Beveled closer – Mitred closer

7. Bat

When a brick is cut across the width, the resulting piece is called *bat*. Thus a bat is smaller in length than the full brick.

8. Half Bat

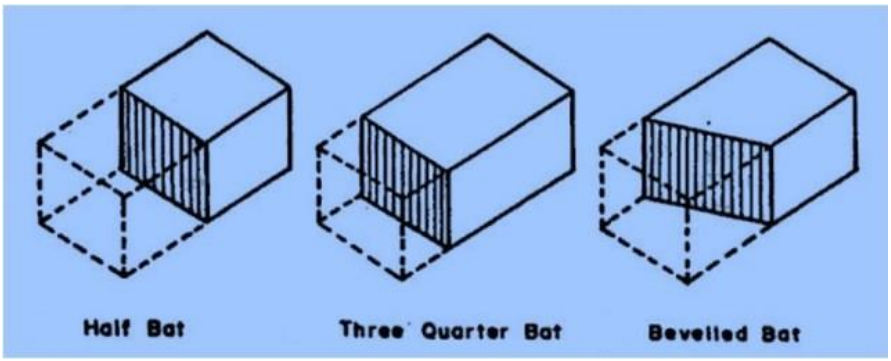
If the length of the bat is equal to half the length of the original brick, it is known as *half bat*.

9. Three Quarter Bat

It is a form of brick bat having its length equal to three quarter of the length of a full brick.

10. Beveled Bat

A brick bat is called *beveled bat*, when its width has beveled.



Different forms of brick bat

2) DIFFERENTIATE BETWEEN SHALLOW AND DEEP FOUNDATION

Shallow foundation and deep foundation have several differences. Sources of main differences between deep and shallow footings are definition, depth of foundation, cost, feasibility, mechanism of load transfer, advantages, disadvantages, types etc.

In the following table the main differences between shallow and deep foundation are given:

Sl No.	Sources	Shallow Foundation	Deep Foundation
1	Definition	Foundation which is placed near the surface of the earth or transfers the loads at a shallow depth is called shallow foundation.	Foundation which is placed at a greater depth or transfers the loads to deep strata is called deep foundation.
2	The depth of foundation	The depth of shallow foundation is generally about 3 meters or the depth of foundation is less than the footing with.	Greater than shallow foundation.
3	Cost	Shallow foundation is cheaper.	Deep foundations are generally more expensive than shallow foundation.
4	Feasibility	Shallow foundations are easier to construct.	The construction process of a deep foundation is more complex.
5	Mechanism of load transfer	Shallow foundations transfer loads mostly by end bearing.	Deep foundations rely both on end bearing and skin friction, with few exceptions like end bearing pile.

Sl No.	Sources	Shallow Foundation	Deep Foundation
6	Advantages	Construction materials are available, less labor is needed, construction procedure is simple at an affordable cost etc.	Foundation can be provided at a greater depth, Provides lateral support and resists uplift, effective when foundation at a shallow depth is not possible, can carry huge load etc.
7	Disadvantages	Possibility of a settlement, usually applicable for lightweight structure, weak against lateral loads etc.	More expensive, needs skilled labors, complex construction procedure, can be time-consuming and some types of deep foundations are not very flexible etc.
8	Types	Isolated foundation, strip foundation, mat foundation, combined foundation etc.	Pier foundation, pile foundation, caissons etc.

3) DIFFERENT TYPES OF LEVELS IN THE BUILDING

1. Plinth Level

The level at which Substructure ends and superstructure starts is called *Plinth level*. It is the part of the superstructure between natural ground level and Finished floor level. The plinth is provided to restrict the seepage of storm water and rain water into the building.
The plinth height is in between 300mm – 450 mm from ground level.
It is recommended that the minimum plinth height of 150 mm is adopted from the top of the road.
Damp proof course (DPC) is laid on Plinth level. The purpose of applying DPC is to restrict the movement of moisture through walls and floors.

In Simple when you climb 3-4 steps to reach the building ground level is called Plinth height.

2. Sill level or Window Sill level

The level between the base portion of the window and portion of the floor above ground level (upwards) is called *Sill level***.** Mortar bed or concrete bed is laid at the base of the window. The height of sill level depends upon the type of room for bedroom & bathroom the height may kept around minimum 1100mm due to privacy concerns and in the living room the window sill level is kept at minimum 600-650mm from the floor level.

It is recommended that the *minimum sill level height of 44 inches.*

3. Lintel level

The level between the top portion of the window and top slab is called Lintel level. The potion above the Door lintel or Window lintel is called Lintel level. Lintel is provided above the door and window to transfer the upward wall load to the surrounding wall. Lintel is generally made up of Reinforced concrete or cement mortar.

4. Natural ground level (N.G.L)

Natural ground level is termed as Level of the ground. The height of Natural ground level (NGL) is generally measured with Mean-sea level.

Natural Ground Level & Building Ground Level

5. Building ground level (B.G.L) / Finish floor level (F.F.L)

The ground level inside building is called Building Ground level or Floor Finish level**.** This level is at the height of minimum 150mm – 450mm from the Natural ground level (N.G.L). The reason for raising building height is to restrict the entry of water during storms and rainfall. The height may go up to meters if the building located in slope and heavy rainfall areas.

4) DEFINITION OF STAIR HEADROOM

Definition of stair headroom: or stair overhead clearance is the vertical distance measured between the outer edge of the stair tread surface (close to the stair tread rounded nosing), and the under-side of the ceiling above.

5) REQUIREMENTS OF GOOD STAIRS

A good stair should provide an easy, quick and safe mode of communication between the various floors of the building. General requirements of good stairs are as mentioned below.

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 stairway.

Following empirical rules may be followed.

- Treads/Goings in cm + 2 (rise in cm) = 60
- Treads/Goings in cm x (rise in cm) = 400 to 450 appx.
- Treads/Goings in cm + (rise in cm) = 40 to 45 appx.
- Standard sizes: Tread 30 cm, Rise 14 cm

Other combinations of rise and going can be calculated by subtracting 20 mm from going and adding 10 mm to rise. Thus other combinations of rise and going would be

- Rise 15 cm x Tread 28 cm
- Rise 16 cm x Tread 26 cm
- Rise 17 cm x Tread 24 cm

Generally adopted sizes of steps are:

- Public buildings: (27 cm x 15 cm) to (30 x 14 cm)
- Residential buildings: 25 cm x 16 cm

6) RAT TRAP BOND

Rat trap bond is a brick masonry method of wall construction, in which bricks are placed in vertical position instead of conventional horizontal position and thus creating a cavity (hollow space) within the wall. Architect *Laurie Baker* introduced it in Kerala in the 1970s and used it extensively for its lower construction cost, reduced material requirement and better thermal efficiency than conventional masonry wall, without compromising strength of the wall.

7) TYPES OF STAIRCASES

1. Straight Stairs

A straight staircase is the most common style and is most affordable to build.

A straight staircase is the most common and affordable style available. Pre-cut risers — the vertical part of the staircase — are available in lumber yards home stores and many builders use these because of their simplicity. The straight-line design means that the staircase doesn't need any special support and only needs to be attached at the top and the bottom. This type of staircase also allows for easier installation of railings and handrails. Of course, there are variations of the straight staircase that include open risers, modern materials and metal cable railings that significantly alter the basic look. While a straight staircase may be the most common.

2. L-Shaped Stairs

L-shaped stairs are attractive and take up less space.

L-shaped stairs are another common style of staircase. They are a straight staircase with a turn, either in the middle or closer to one end or the other. L-shaped stairs are appealing for a variety of reasons, primarily because they are more visually appealing. In addition, they tend to take up less space and can be used in the corner of a room. For some people, they are also easier to navigate because of the wider landing that breaks up the flight of stairs. Of course, these types of staircases are more complex to build and consequently more expensive. L-shaped staircases also usually require support for the landing and the turn.

3. U-Shaped Stairs

U-shaped stairs have a 180-degree turn.

U-shaped staircases generally consist of two flights of stairs that go in opposite directions with a landing at the switchback. These are also more visually interesting than a straight staircase. Moreover, they take up less linear floor space and can be handy for a corner design. Typically the landing is of a generous size. The main drawback of a U-shaped staircase is the turn that makes it more difficult to move larger pieces of furniture upstairs.

4. Winder Stairs

Winder stairs assume a wedge shape as they turn.

Winder stairs are a lot like an L-shaped staircase, except that there is no landing. Instead, the stairs are continuous, taking on a wedge shape as they make the turn. These have been far less common in contemporary homes and are typically found in older residences. Rarely were they used as the main, front stairs and were more likely to be found as the second set of stairs in the home. This type of staircase is seeing a resurgence in popularity, thanks to the trends that favor smaller homes and more sustainable homes.

5. Spiral Stairs

While perfect for tighter spaces, spiral staircases are still considered more of a novelty style. True spiral stairs have one central post to which all the radiating steps are attached, as they spiral upward through a space in the floor above. Because of their contact nature, they are typically found in beach houses and compact city dwellings because of the small amount of space they require. Many city and municipal building codes require that a spiral staircase be a secondary route of egress from the higher floor because they are not as easy to navigate. In fact, that is one of the main drawbacks for a spiral staircase: Only one person at a time can use the stairs and footing require caution because the inner portion of each step is narrow. Besides, it is much harder to move larger items up and down a spiral staircase.

6. Circular Stairs

A circular staircase is more like a traditional staircase than a spiral one — think of the kind you might find in a medieval castle. While it does go around and the steps are tapered, the curve is more relaxed than a spiral staircase with steps are easier to navigate. Sometimes called helixed stairs, their curve is more graceful and less compact, which helps to create an architectural focal point. Of course, these require more open space and are costlier to build.

7. Curved Stairs

Most commonly used in or near an entryway, a curved staircase is a design statement. They do not form a circle as spiral or circular staircases do, and instead, are meant to be a major design

feature. Easy to traverse, the curve is usually gentle and is an elegant choice for any style of home. This type of staircase is said to be the most difficult to construct and, consequently, one of the most expensive.

8. Ladder Stairs

Great for tight spaces and small residences, ladder stairs are one of the most space-efficient types of staircases. Of course, it's a good idea to check building codes in the local area because often they are not permitted as the main staircase. Ladder stairs can be built in a variety of styles, from a literal ladder style, as in this photo, to more stylized versions. In any case, ladder stairs will typically have taller steps and can be particularly difficult to climb, especially when coming down the staircase. These types of stairs can be very handy for other uses, such as for reaching the upper shelves of extensive bookcases or extra tight spaces.

9. Split Staircase

A split staircase — originally called bifurcated — is the grande dame of all staircases. Typically used in the entryway of a very grand and spacious home, the staircase starts with a wider flight at the bottom. Part of the way up, there is a generous landing with two narrower flights on either side of the bottom section — one going left and the other going right. Large, expansive and expensive, this is a design statement that is intended to make a big impression.

10. Space-Saving Staircase

While circular staircases and ladder styles are good for compact homes, there is a wide variety of other styles that are space-saving options for staircases. Stairs that are more steeply pitched, ribbon style stairs, and narrower, alternating steps are all ways to incorporate a staircase in a home with minimal lost space.

11. Floating Staircase

Usually a variation on a straight staircase, a floating staircase usually consists of treads with no risers. Instead, the treads themselves are attached to the wall in a way that the support is invisible, or at least minimally visible. Other times, glass or plexiglass risers are used to achieve a floating appearance. The material used can be wood, but it is often something else like metal, glass or stone. It is a contemporary look that often foregoes handrails, although glass can be used for safety instead of a traditional railing without sacrificing the open feeling.

12. Storage Staircase

Large or small, almost any home can use more storage and the often-overlooked area underneath the stairs can be turned into valuable space for stashing necessities. The most

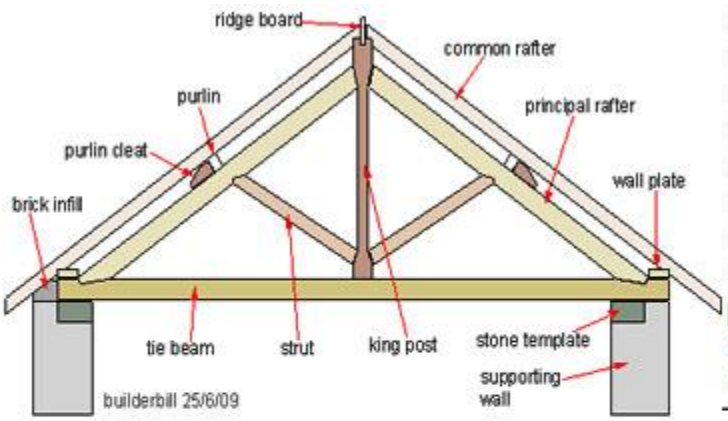
common way to do this is by building cabinets underneath the risers instead of simply walling off the space

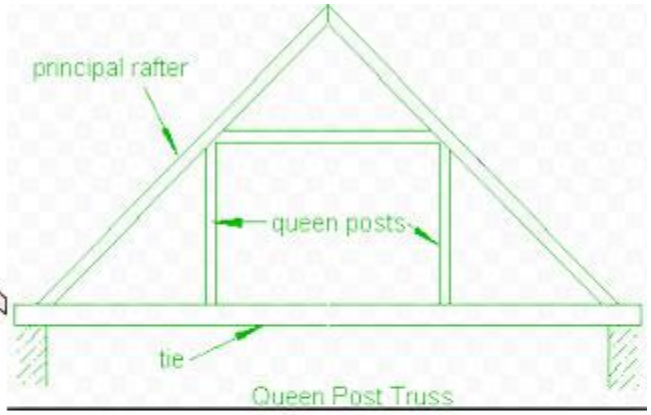
8) THE KING POST TRUSS & QUEEN POST TRUSS

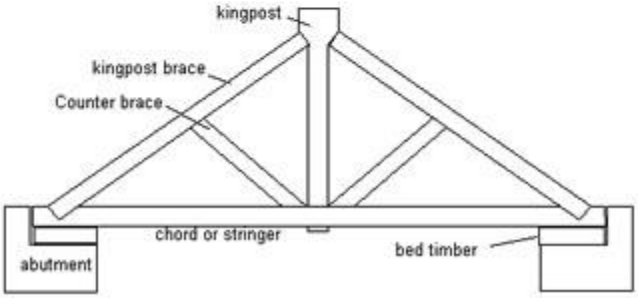
The King post truss & Queen Post truss are part and parcel of the sloping roof. Both of them are found in residential, commercial or industrial buildings.

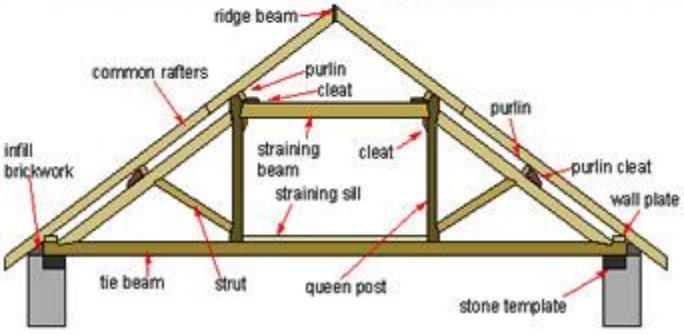
King Post Roof Truss	Queen Post Roof Truss
1. A king post contains a central vertical post that is utilized in architectural or bridge designs, dealing with tension to support a beam underneath from a truss apex above.	1. Queen Post Truss can be described as a pitched roof support provided with two vertical tie posts which are attached among the tie beam and the rafters.
2. The king post truss comprises of the following components: • Tie Beam • Two Inclined principal rafter • Two struts • King post • Ridge Beam	2. The Queen post Truss comprises of the following components. • Two Queen posts • Two Principal Rafters • Struts • Tie Beam • Straining beams • Straining sills • Purlins
3. King post truss is mostly effective if the length of the span remains between 5 to 8 m.	3. Queen post truss can be applied if the length of the span remains between 8 to 12 m.
4. One vertical post is arranged at the centre of the roof that is known as king post.	4. Two vertical posts are arranged on 2 sides maintaining proper spacing that is known as queen post.
5. Straining beam and straining sill are not	5. Straining beam and straining sill are essential to

required.	retain the queen post in steady position.
6. King-post is attached with main rafter, strut and tie beam.	6. Queen-post is attached with principal rafter, strut, Straining beam, straining sill and tie beam
7. The top ends of two main rafters are attached with ridge pitch.	7. Top ends of two main rafters are coupled with the queen posts heads.









9) RAFT OR MAT FOUNDATIONS

A raft foundation, also called a mat foundation, is essentially a continuous slab resting on the soil that extends over the entire footprint of the building, thereby supporting the building and transferring its weight to the ground.

A raft foundation is often used when the soil is weak, as it distributes the weight of the building over the entire area of the building, and not over smaller zones (like individual footings) or at individual points (like pile foundations). This reduces the *stress* on the soil.

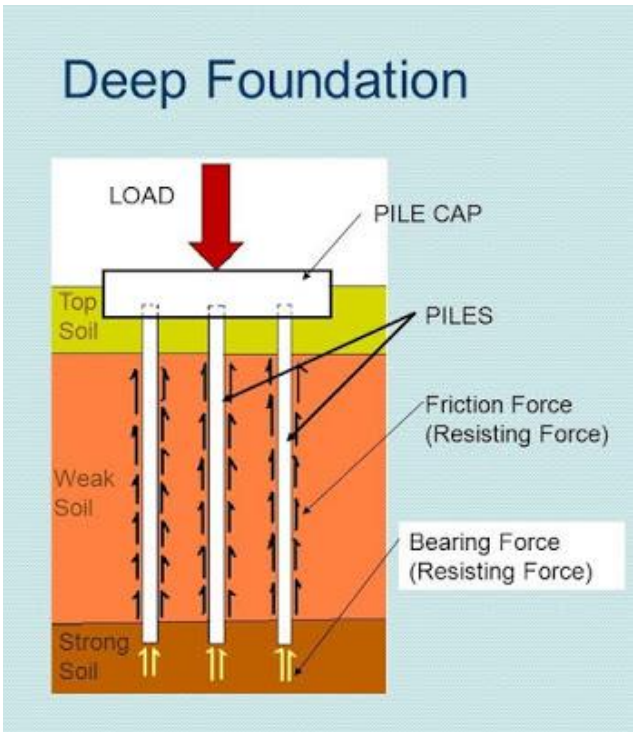
The concept of stress is very basic to civil engineering. Stress is simply weight divided by area. For example, if a building measuring 5 x 5 weighs 50 tons, and has a raft foundation, then the stress on the soil is weight / area = 50/25 = 2 tons per square meter.

If the same building were supported by say 4 individual footings, each of 1 x 1m, then the total area of the foundation would be 4 m2, and the stress on the soil would be 50/16, which is about 12.5 tons per square meter. So increasing the total area of the foundation can dramatically lower the stress on the soil, which is nothing but weight per square meter.

A raft foundation is also very good for basements. Foundations are created by excavating soil in order to find strong, compact, undisturbed natural soil that is at least a few feet below ground level. This soil is much stronger than the loose soil at the surface. If we construct a raft foundation at say 10 feet below ground, and build concrete walls around the periphery, this makes an excellent basement. Therefore, an engineer designing a building with a basement will tend to choose a raft foundation over other types of foundations.

10) PILE CAP

A *pile cap* is a thick concrete mat that rests on concrete or timber piles that have been driven into soft or unstable ground to provide a suitable stable foundation. It usually forms part of the foundation of a building, typically a multi-story building, structure or support base for heavy equipment. The cast concrete pile cap distributes the load of the building into the piles. A similar structure to a pile cap is a "raft", which is a concrete foundation floor resting directly onto soft soil which may be liable to subsidence.



11) LOUVER

A louver is a ventilation product that allows air to pass through it while keeping out unwanted elements such as water, dirt, and debris. A number of fixed or operable blades mounted in a frame can provide this functionality. The basic considerations for selecting louvers are Louver Free Area, Water Penetration, and Resistance to Airflow (Pressure Loss). Once these concepts are understood, they can be used to properly apply a louver.

12) TREAD, RISER, WAIST

1. Tread

Stair tread is the horizontal portion of a set of *stairs* on which a person walks. The *tread* can be composed of wood, metal, plastic, or other materials. In residential settings, *treads* can be covered in carpeting. *Stair treads* can come in non-slip varieties, particularly in commercial or industrial locations. The dimension varies from 270 mm for residential buildings and factories and 300 mm for public buildings where huge number of persons utilize the staircase.

2. Riser

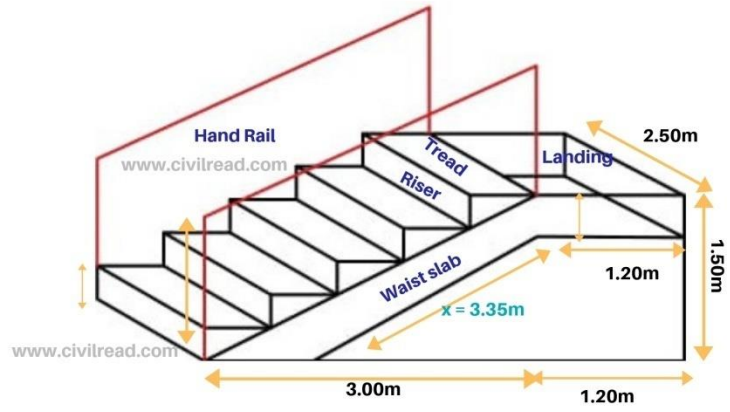
The vertical distance amid two consecutive steps is known as riser. The dimension of the riser differs from 150 mm for public buildings and 190 mm for residential buildings and factories.

3. Waist

The depth of the waist-slab on which steps are built up is called as waist. The depth (thickness) of the waist is the least thickness perpendicular to the soffit of the staircase (cl. 33.3 of IS 456). The steps of the staircase which stand on waist-slab can be developed with bricks or concrete.

General guidelines for making the plan for a staircase:

• The relevant dimensions of tread and riser for all the parallel steps should be identical in sequential floor of a building.
• The minimum vertical headroom over any step should remain at 2 m.
• Usually, the number of risers in a flight should be limited to twelve.
• The lowest width of stair should have been 850 mm, though it is recommended to keep the width among 1.1 to 1.6 m. In public building, cinema halls etc., large widths of the stair should be arranged.



Note: Remember there are two waist slabs in staircase for understanding purpose we have shown oonly one waist slab in this image. Refer Fig 1 Image for more details.

Typical Diagram of Staircase

13) ADVANTAGES OF USING STEEL ROOF TRUSSES

All of the advantages of building with steel roof trusses are akin to the benefits of building with steel in general. In addition to meeting stringent green building certification requirements, steel is strong, durable and resistant to the majority of the threats that wood trusses are vulnerable to.

Here are some of the advantages of building with steel trusses, in no particular order.

1. High Strength-to-Weight Ratio.

Once of the major advantages of steel trusses is their high strength-to-weight ratio. Not only does this make for a stronger product, and one that can withstand heavy wind and snow loads (more on the later), it also allows for roof designs with superior spanning capacities. This is why steel is almost exclusively the choice for builders designing large sporting arenas, warehouses, hangars and so on.

2. It Is Uniform

Unlike timber which can't possibly be uniform due to its inherent, natural growth environment, steel trusses are completely true to form. They are pre-fabricated in factories with stringent quality control. Therefore, the trusses that arrive at the job site are constructed exactly as designed, with minute variation - if any. This isn't possible in the realm of wood timbers, whose properties can vary over time, especially in response to temperature fluctuations and relative humidity.

3. Steel is Incredibly Durable

Adequately coated steel trusses are extremely durable. Not only can they withstand high stress situations under scenarios of both tension and pressure, they also require very minimal maintenance. Steel also has high ductility, so significant deformities can occur - the large majority of which would be obvious and flag a need for replacement - before the roofing system will fail. Steel and metal roof systems are also recommended in areas of the country where there is severe wind and/or or storm potential. Roofs can be engineered to resist extremely high wind uplift ratings, including hurricane-force winds, and the aforementioned resistance to pressure makes them an ideal choice for regions of the country that experience heavy snow-loads.

4. Complete Pest Resistance

Timber trusses are susceptible to pests, which is a serious threat in areas that are prone to termite and other wood-boring pest infestations. While wood can be treated to increase pest - resistance, the treatments are inherently toxic, which diminishes indoor air quality and is a black mark on any project that desires to be sustainable or eco-friendly.

5. Fire-Resistant

Fire-retardant coatings render steel roof trusses virtually indestructible by fire. This is important for any structure with living occupants or that houses valuable property. Increased fire resistance is also an added benefit for structures built in high-storm areas or where there is a greater risk of seismic activity, both of which can elevate a structure's risk of fire.

6. Eco-Friendliness

As mentioned at the beginning, steel and metal buildings get extra points with reputable green building certification programs such as LEED. One of the main reasons for this is that steel trusses are fabricated using up to 90% recycled content and are also 100% recyclable at the end of their lifespan. This, combined with the fact that they are incredibly durable and rarely need to be replace, makes them a very eco-friendly building product.

Many of these advantages segue to other advantages. For example, steel's uniformity makes it less prone to maintenance throughout its lifetime and its ability to be pre-fabricated leads to faster erection times, resulting in lower overall labor costs.

When looked at as a whole, these advantages make steel roof trusses an affordable building option, especially when you weigh the savings gained via lifetime costs because of their durability and longevity.

14) DISADVANTAGES OF USING STEEL ROOF TRUSSES

1. Vulnerability to Corrosion

While steel may be impervious to pests, fire and wind - it is vulnerable to corrosion, particularly as the result of chronic moisture exposure. However, steel trusses purchased from a reputable metal building supplier will be designed and coated in accordance to your climate and building codes. These coatings eliminate the risk of corrosion, assuming the building implements adequate vapor barriers, ventilation and insulation.

2. Steel is Emissive

Steel quickly emits any heat that is absorbed. This is great news when it comes to products like steel roofing and siding, which mitigate solar heat gain, but it can be a detriment in buildings where interior comfort is important. While steel trusses don't offer the same level of innate insulation that timber trusses do, this too is remedied via adequate radiant barriers and insulation. However, it's important to note that can also increase insulation costs because a greater quantity of insulation is required to fill the attic space.

3. Steel Can Fail at High Temperatures

Cold-formed steel cables can fail at 800°F, and steel expands at 1000°F, exerting powerful lateral pressure that can cause walls to collapse. Heat-related truss expansion can also cause the bottom cord to buckle and fail. Thus, fire-proofing steel roof trusses is a must to ensure they will perform well in the event of a fire, keeping in mind that the average residential house fire burns at about 1,100°F.

4. Specialized skills required

Since steel trusses are relatively new phenomena in the mainstream building arena - particularly in the residential sector - there is a degree of skill required to erect and construct them as per manufacturer's instructions. There are also slightly different tool requirements, and these tools are not typically in the repertoire of the average contractor unless they already work with steel and metal building components on a regular basis. As a result, lack of the proper skills and/or tools can result in either poorly installed trusses or increased labor costs to find a crew that can get the job done right. Similarly, finding experienced metal building laborers may be a challenge if steel buildings aren't the norm in your area.

Because many of the disadvantages of steel roof trusses are mitigated with proactive measures addressed during the design and pre-fabrication phases, many contractors still find steel trusses to be the most advantageous option - especially for large-scale commercial and industrial projects. The key is to buy from the right supplier and make sure the construction team is well versed in the tools and techniques required to construct the building to the design specifications.

15) DIFFERENCE BETWEEN ENGLISH BOND AND FLEMISH BOND

Difference between English bond and Flemish bond are as follows:

1. English bond is much stronger than flemish bond for the walls thicker more than *1½ brick.*
2. Flemish bond shows more attractive and pleasing appearance of masonry work.
3. Flemish bond is economical as it uses broken brickbats, although it requires some extra mortar for additional joints.
4. Uses of flemish bond is a bit difficult than english bond. Flemish bond requires more skilled labour and supervision.

16) TYPES OF DEEP FOUNDATIONS

Examples of common deep foundations include:

1. Pile foundations

2. Caissons

3. Cylinders

4. Basements

5. Hollow Box Foundations (Buoyancy Rafts)

6. Shaft Foundations

1. Pile Foundations

Pile foundations are constructed through driving preformed units into the required founding level or by drilling in, driving tubes filled with concrete to the desired depth. The tubes can be filled with concrete in different ways – they can be filled during or before withdrawal, or through drilling unlined, partly lined, or wholly lined boreholes before being filled with concrete.

These foundations are used when the soil, constructional or economic conditions make it necessary to transmit loads of structures to strata that are beyond the reach of shallow foundations. Besides supporting structures, piles can be used to help resist uplift, overturning, and lateral forces. They are used as foundations for waterfront installations, bridges, and buildings.

2. Caissons

These are hollow substructures that can be constructed near or on the ground surface and are sunk to the desired level as a single unit. They have an enormous load-carrying capacity and are commonly used for bridges.

3. Cylinders

These are small caissons with only a single cell.

4. Basement Foundations

These hollow substructures provide storage or working space below the ground level. They're constructed in open excavations. The functional requirements govern their structural design.

5. Buoyancy Rafts

Buoyancy rafts, also known as hollow box foundations, are designed to create a semi-buoyant or buoyant substructure below which the loading on the soil is decreased to the required low intensity. They can be constructed in open excavations or sunk like caissons.

Buoyancy rafts are more expensive than traditional forms of foundations. For that reason, their use is usually restricted to sites that are on silts, soft sands and other alluvial deposits that are very deep, or where loads can be kept concentric. Schemes requiring underground tanks or where it's economical to incorporate deep basements into the design are common.

6. Shaft Foundations

These foundations are constructed by drilling a cylindrical hole within a deep excavation and subsequently placing concrete or another prefabricated load-bearing unit in it. Their length and size can be easily tailored. Drilled shafts can be constructed near existing structures and under low overhead conditions, making them suitable for use in numerous seismic retrofit projects. It may, however, be difficult to install them under certain conditions such as soils with boulders, soft soil, loose sand, and sand under water

17) TRANSOM

In architecture, a transom is a transverse horizontal structural beam or bar, or a crosspiece separating a door from a window above it. This contrasts with a mullion, a *vertical* structural member. Transom or transom window is also the customary U.S. word used for a transom light, the window over this crosspiece. In Britain, the transom light is usually referred to as a *fanlight*, often with a semi-circular shape, especially when the window is segmented like the slats of a folding hand fan. A well-known example of this is at the main entrance of 10 Downing Street, London/