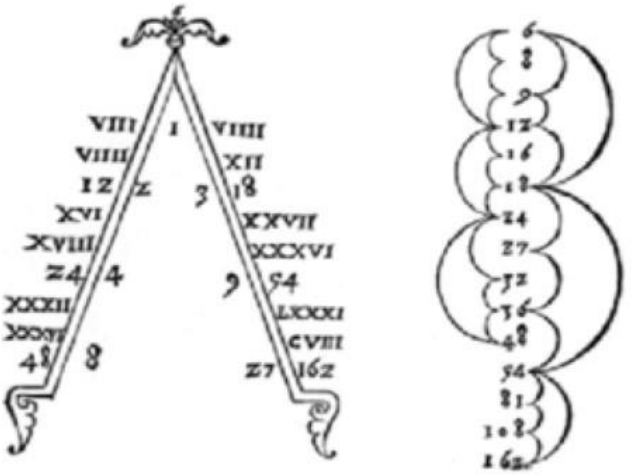
SCALE AND PROPORTION

Renaissance architects applied PYTHAGORAS'S THEORY OF MEANS to the ratios of the intervals of the Greek musical scale, and soon developed an unbroken progression of ratios that formed the basis for the proportions of their architecture.



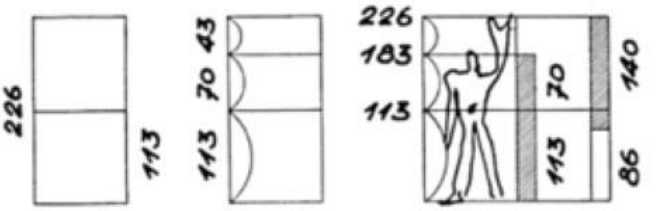
Series of interlocking ratios that results form applying Pythagoras theory of means to the intervals of the Greek musical scale.

MODULOR

Le Corbusier's own proportioning system developed in 1942 published as: The Modular: A Harmonious Measure to the Human Sale Universally Applicable to Architecture and Mechanics. : to order "the dimensions of that which contains and that which is contained."

He saw the measuring tools of the Greeks, Egyptians, and other high civilizations as being "infinitely rich and subtle because they formed part of the mathematics of the human body, gracious, elegant, and firm, the source of that harmony which moves us, beauty."

He based the Modular on both mathematics (the aesthetic dimension of the Golden Section and the Fibonacci Series), and the proportions of the human body (functional dimensions).



113, 70, 43 cm
43 + 70 =113
113 + 70 = 183
113 + 70 + 43 = 226(2x113)

KEN

The traditional Japanese unit of measure, the shaku, was originally imported form China.

Originally used simply to designate the interval between two columns and varied in size, it was soon standardized for residential architecture and became an absolute measurement.

Aside as a measurement system, it evolved into an aesthetic module that ordered the structure, materials, and space of Japanese architecture.

Two methods of designing with the Ken modular method:

Inaka-ma Method

The ken grid of 6 shaku determined the center-to-center spacing of columns. Therefore, the standard tatami floor mat (3 x ^ shaku or ½ x 1 ken) varied slightly to allow for the thickness of the columns.

Reference: Summary of D.K.Ching book by Arch. Janice Ma.

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SCALE AND PROPORTION

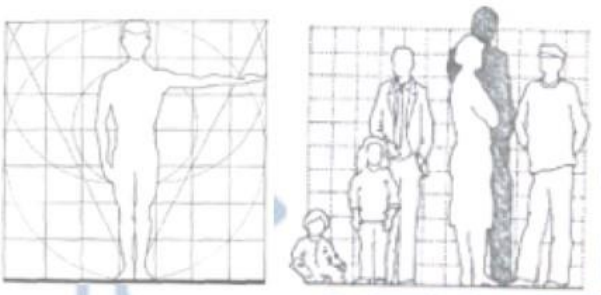
Kyo-ma Method

The floor mat remained constant (3.15 x 6.30 shaku) and the column spacing (ken module) varied according to the size of the room and ranged from 6.4 to 6.7 shaku.

ANTHROPOMETRICS

The measurement of the size and proportions of the human body. Its applicability to the design process is seen in the physical fit, or interface, between the human body and the various components of space.

anthro=man, pometry=measure

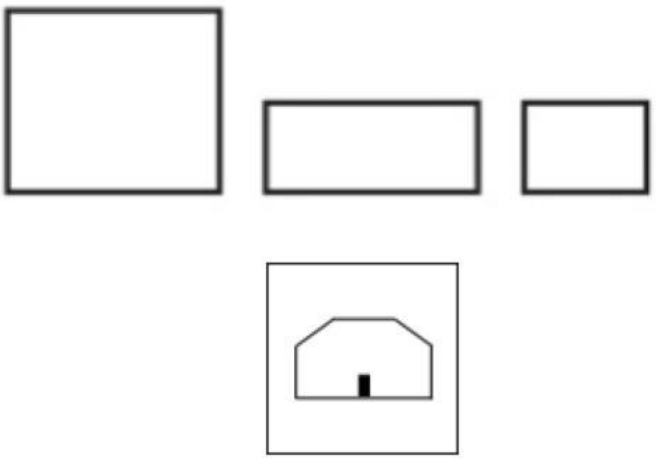


SCALE

Refers to how we perceive or judge the size of something in relation to something else.

The entity of a space or object is being compared to may be an accepted unit or standard of measurement.

In drawing, we use scale to specify the ratio that determines the relationship between the illustration it represents



Mechanical Scale

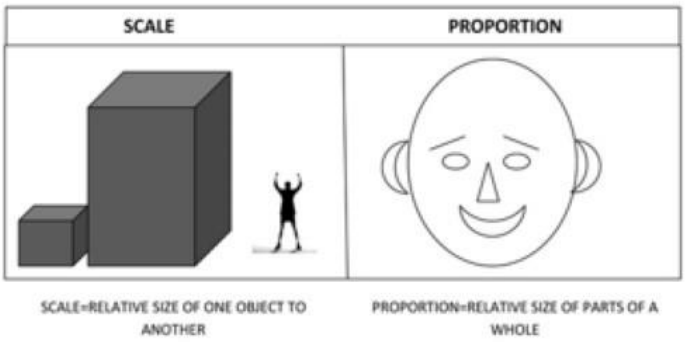
The size or proportion of something relative to an accepted standard of measurement.

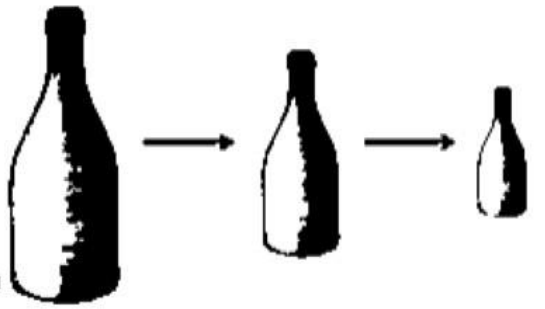
Visual Scale

The size or proportion an element appears to have relative to other elements of known or assumed size.

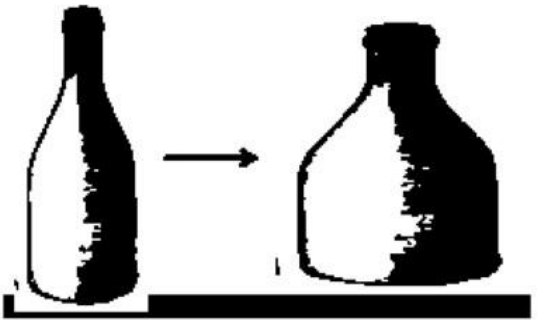
Human Scale

Based on the dimensions & proportions of the human body





Scale



Proportion

Reference: Summary of D.K.Ching book by Arch. Janice Ma.

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INTRODUCTION TO PERSPECTIVES

The way one see the world is driven by rules of perspective. Perspective in sketching is a tool to create a realistic illusion of three-dimensional space. Everything that is drawn, from an apple to a spaceship, needs to follow the rules of perspective in order to look realistic.

ONE-POINT PERSPECTIVE:

One-point perspective (frontal or central perspective) has only one vanishing point on the horizon line located somewhere within the picture plane (PP) and all the planes converge towards it.

TWO-POINT PERSPECTIVE:

Two-point perspective (angular perspective) has two vanishing points on the horizon line, which do not necessarily need to be within the picture plane (PP)

THREE-POINT PERSPECTIVE:

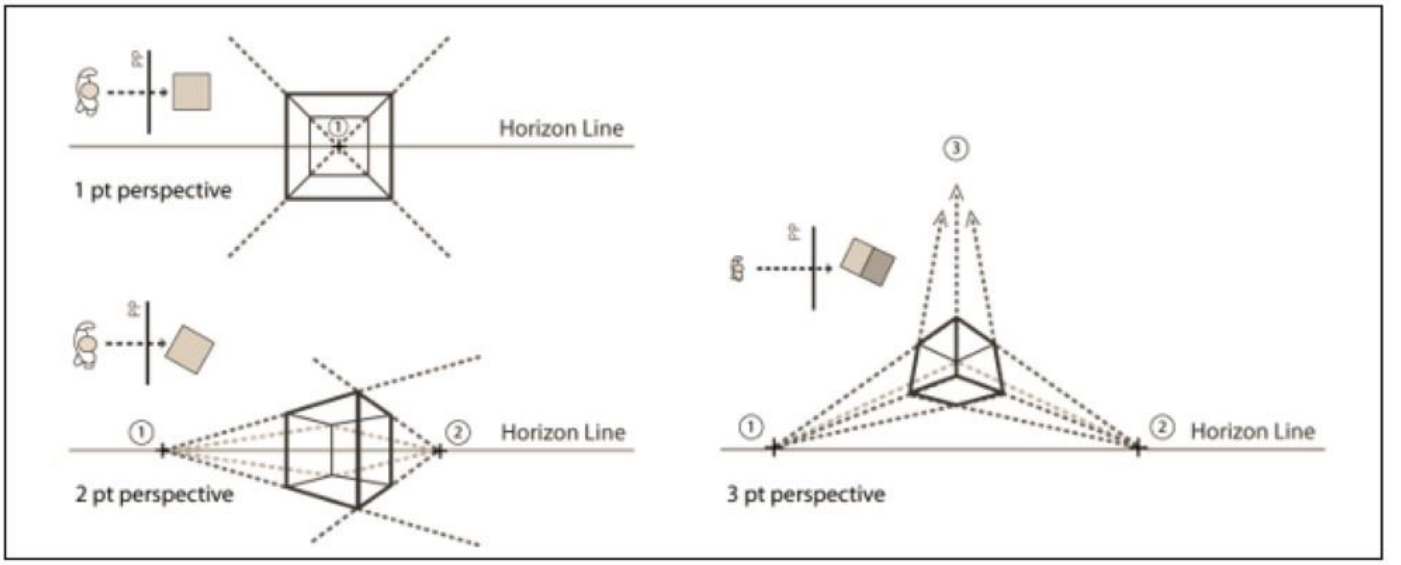
Three-point perspective uses three vanishing points where two of them are on the horizon line and the third is either high above the horizon line or below it. There are two basic types of three-point perspective based on the position of the horizon line:

- Worm's Eye View

The view perceived when a person looking high up, the horizon line is situated very low.

- Bird's Eye View

The view perceived when a bird views over a city and looking down, the horizon line is situated above.



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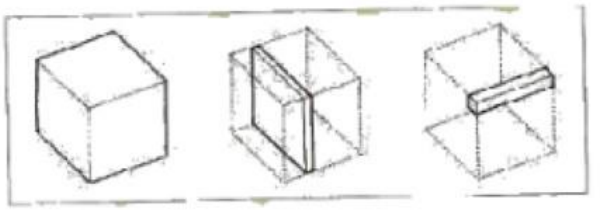
09 TRANSFORMATION OF FORMS & PATTERNS

TRANSFORMATION OF FORM

Form can be transforms in three ways:

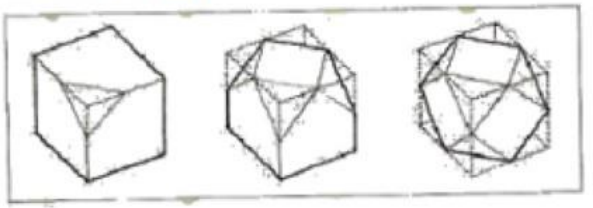
DIMENSIONAL TRANSFORMATION

A form can be transformed by altering one or more of its dimensions and still retain its identity as a member of a family of forms. A cube, for example, can be transformed into similar prismatic forms through discrete changes in height, width, or length. It can be compressed into a planar form or be stretched out into a linear one.



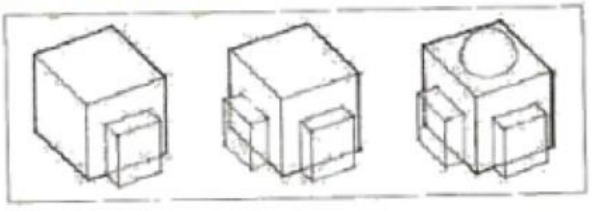
SUBTRACTIVE TRANSFORMATION

A form can be transformed by subtract in a portion of its volume. Depending on the extent of the subtractive process, the form can retain its initial identity or be transformed into a form of another family.



ADDITIVE TRANSFORMATION

A form can be transformed by the addition of elements tom its volume. The nature of the additive process and the number and relative sizes of the elements being attached determine whether the identity of the initial form is altered or retained.



FORMAL COLLASION OF GEOMETRY

When two forms differing in geometry or orientation collide and interpenetrate each other's boundaries, each will vie for visual supremacy and dominance. In these situations, the following forms can evolve:

The two forms can subvert their individual identities and merge to create a new composite form.

One of the two forms can receive the other totally within its volume.

The two forms can retain their individual identities and share the interlocking portion of their volumes.

The two forms can separate and be linked by a third element that recalls the geometry of one of the original forms.

Reference: Architecture Form, Space and Order - FRANCIS D.K CHING

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ELEMENTS OF BUILDING

The following are the basic elements of a building:

1. Foundation
2. Plinth
3. Walls and columns
4. Sills, lintels and chejjas
5. Doors and windows
6. Floors
7. Roofs
8. Steps, stairs and lifts
9. Finishing work
10. Building services.

1. FOUNDATION:

Foundation is the most important part of the building. Building activity starts with digging the ground for foundation and then building it. It is the lower most part of the building. It transfers the load of the building to the ground. Its main functions and requirements are:

Distribute the load from the structure to soil evenly and safely.

To anchor the building to the ground so that under lateral loads building will not move.

It prevents the building from overturning due to lateral forces.

It gives level surface for the construction of super structure.

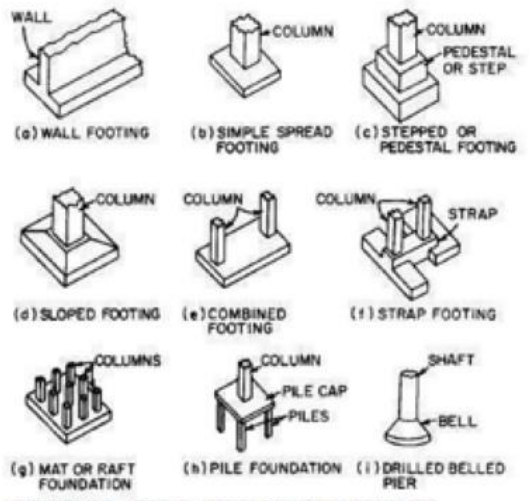


FIGURE 9.41 Common types of foundations for buildings.

2. PLINTH:

The portion of the wall between the ground level and the ground floor level is called plinth. It is usually of stone masonry. If the foundation is on piles, a plinth beam is cast to support wall above floor level. At the top of plinth a damp proof course is provided.

It is usually 75 mm thick plain concrete course. The function of the plinth is to keep the ground floor above ground level, free of dampness. Its height is not less than 450 mm. It is required that plinth level is at least 150 mm above the road level, so that connections to underground drainage system can be made.

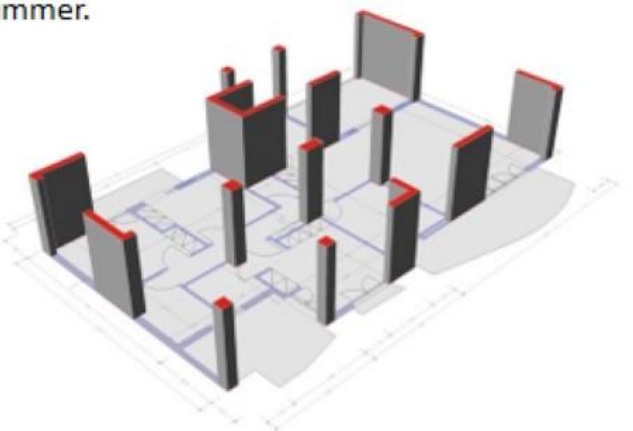
3. WALLS AND COLUMNS:

The function of walls and columns is to transfer the load of the structure vertically downwards to transfer it to foundation. Apart from this wall performs the following functions also:

It encloses building area into different compartments and provides privacy.

It provides safety from burglary and insects.

It keeps the building warm in winter and cool in summer.



Reference: https://www.civilengineeringx.com/building-planning/elements-of-a-building/

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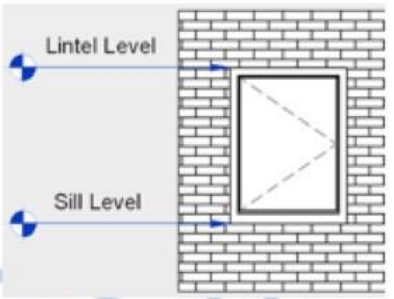
ELEMENTS OF BUILDING

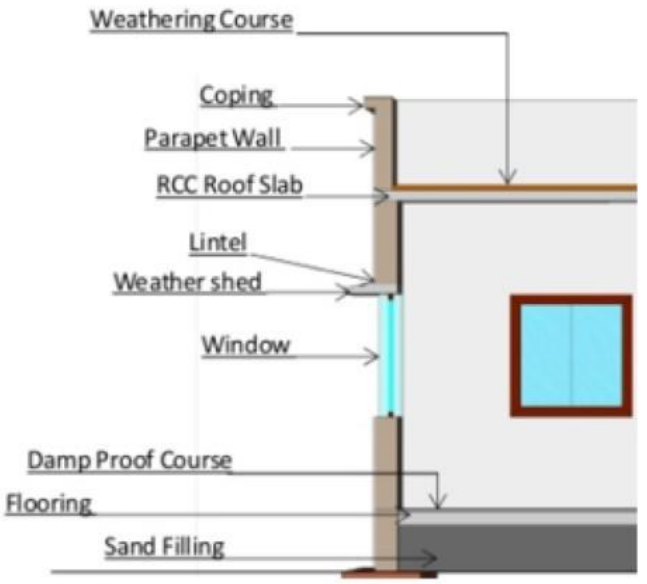
4. SILLS, LINTELS AND CHEJJAS:

A window frame should not be directly placed over masonry. It is placed over 50 mm to 75 mm thick plain concrete course provided over the masonry. This course is called as sill. Lintels are the R.C.C. or stone beams provided over the door and window openings to transfer the load transversely so as to see that door or window frame is not stressed unduly. The width of lintels is equal to the width of wall while thickness to be provided depends upon the opening size.



Chejja is the projection given outside the wall to protect doors and windows from the rain. They are usually made with R.C.C. In low cost houses stone slabs are provided as chejjas.

The projection of chejja varies from 600 mm to 800 mm. Sometimes drops are also provided to chejjas to improve aesthetic look and also to get additional protection from sun and rain.



5. DOORS AND WINDOWS:

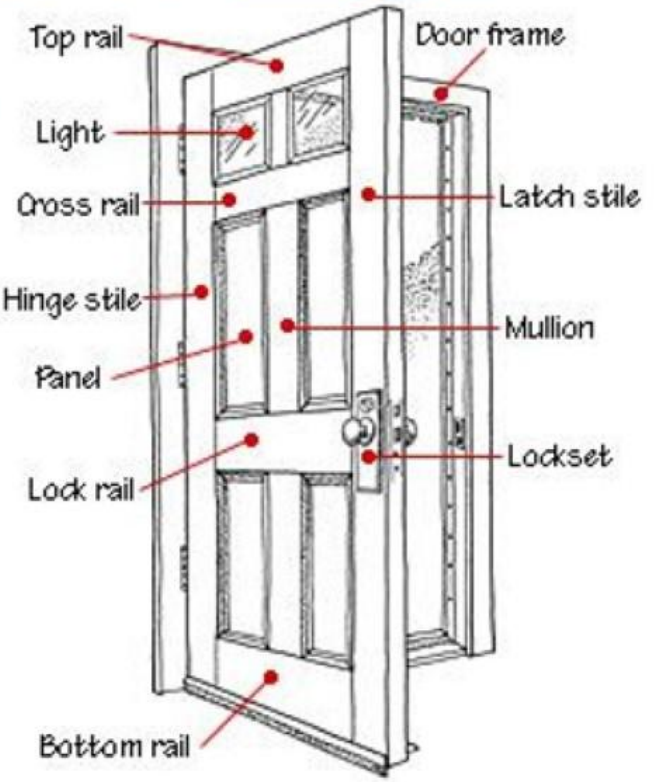
The function of a door is to give access to different rooms in the building and to deny the access whenever necessary.

Number of doors should be minimum possible. The size of the door should be of such dimension as will facilitate the movement of the largest object likely to use the door.

Windows are provided to get light and ventilation in the building.

They are located at a height of 0.75 m to 0.9 m from the floor level. In hot and humid regions, the window area should be 15 to 20 per cent of the floor area.

Another thumb rule used to determine the size and the number of windows is for every 30 m3 of inside volume there should be 1 m2 window opening.



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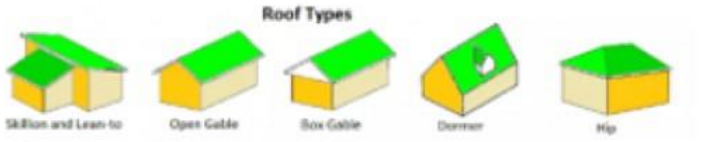
ELEMENTS OF BUILDING

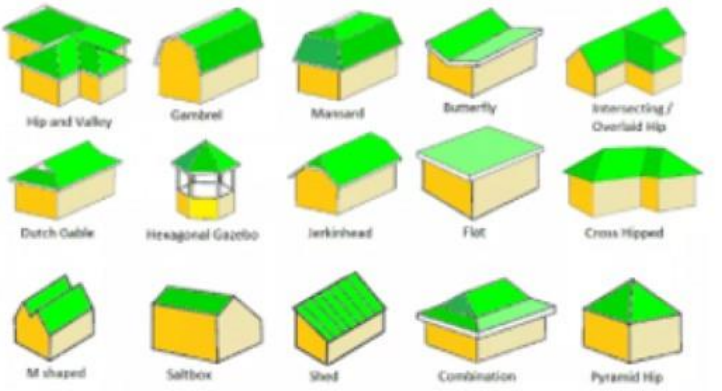
6. FLOORS

Floors are the important component of a building. They give working/useful area for the occupants. The ground floor is prepared by filling brick bats, waste stones, gravel and well compacted with not less than 100 mm sand layer on its top. A lean concrete of 1 : 4 : 8, 100 mm thick is laid. On this a damp proof course may be provided. Then floor finishing is done as per the requirement of the owner. Cheapest floor finish for a moderate house is with 20 to 25 mm rich mortar course finished with red oxide. The costliest floor finish is mosaic or marble finishing. Other floors are usually of R.C.C. finished as per the requirements of the owner.

7. ROOF:

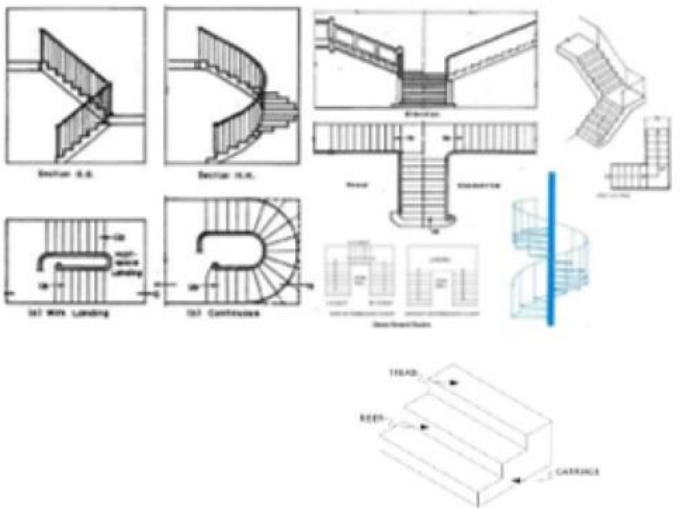
Roof is the top most portion of the building which provide top cover to the building. It should be leak proof. Sloping roof like tiled and A.C. sheet give leak proof cover easily. But they do not give provision for the construction of additional floor. Tiled roof give good thermal protection. Flat roofs give provision for additional floors. Terrace adds to the comfort of occupants. Water tanks can be easily placed over the flat roofs.





8. STEP, STAIRS AND LIFTS:

Steps give convenient access from ground level to ground floor level. They are required at doors in the outer wall. 250 to 300 mm wide and 150 mm rise is ideal size for steps. In no case the size of two consecutive steps be different. Number of steps required depends upon the difference in the levels of the ground and the floor. Stairs give access from floor to floor. They should consists of steps of uniform sizes. In all public buildings lifts are to be provided for the conveniences of old and disabled persons. In hostels G + 3 floors can be built without lifts, but in residential flats maximum floors permitted without lifts is only G + 2. Lift is to be located near the entrance. Size of the lift is decided by the number of users in peak hours. Lifts are available with capacity 4 to 20 persons.



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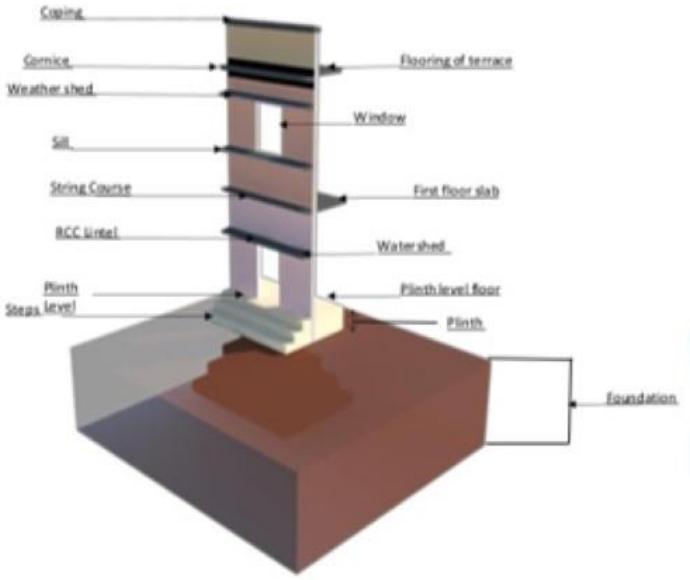
ELEMENTS OF BUILDING

9. FINISHING:

Bottom portion of slab (ceiling), walls and top of floor need smooth finishing with plaster. Then they are provided with white wash, distemper or paints or tiles. The function of finishing work is:

- Give protective cover
- Improve aesthetic view
- Rectify defective workmanship
- Finishing work for plinth consists in pointing while for floor it consists in polishing.



10. BUILDING SERVICES:

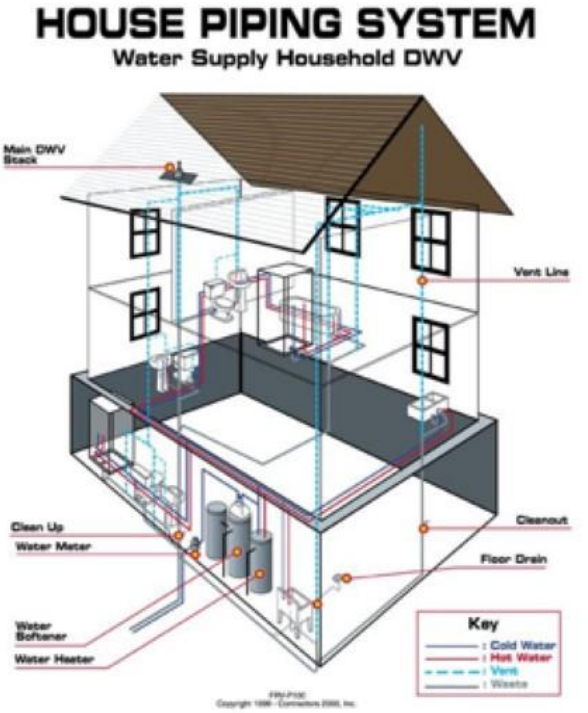
Water supply, sanitation and drainage works, electric supply work and construction of cupboards and show cases constitute major building services. For storing water from municipal supply or from tanker a sump is built in the house property near street. From the sump water is pumped to over head tanks placed on or above roof level so as to get water all the 24 hours. Plumbing work is made so as to get water in kitchen, bathrooms, water closets, sinks and garden taps.

For draining rain water from roofs, down take pipes of at least 100 mm diameters should be used. Proper slopes should be given to roof towards down take pipe. These pipes should be fixed at 10 to 15 mm below the roof surface so that rain water is directed to the down take pipe easily. The sanitary fittings are to be connected to stone ware pipes with suitable traps and chambers.

Stone ware pipes are then connected to underground drainage of municipal lines or to the septic tank.

Many carpentry works are required for building service. They are in the form of showcases, cupboards, racks etc.

Electric supply is essential part of building services. The building should be provided with sufficient points for supply of lights, fans and other electric gadgets.



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