Ms. S.V. Sawant,
Asst. Professor
Civil Dept., SGU, Atigre

UNIT 2

➢ COMPONENTS OF BUILDING:

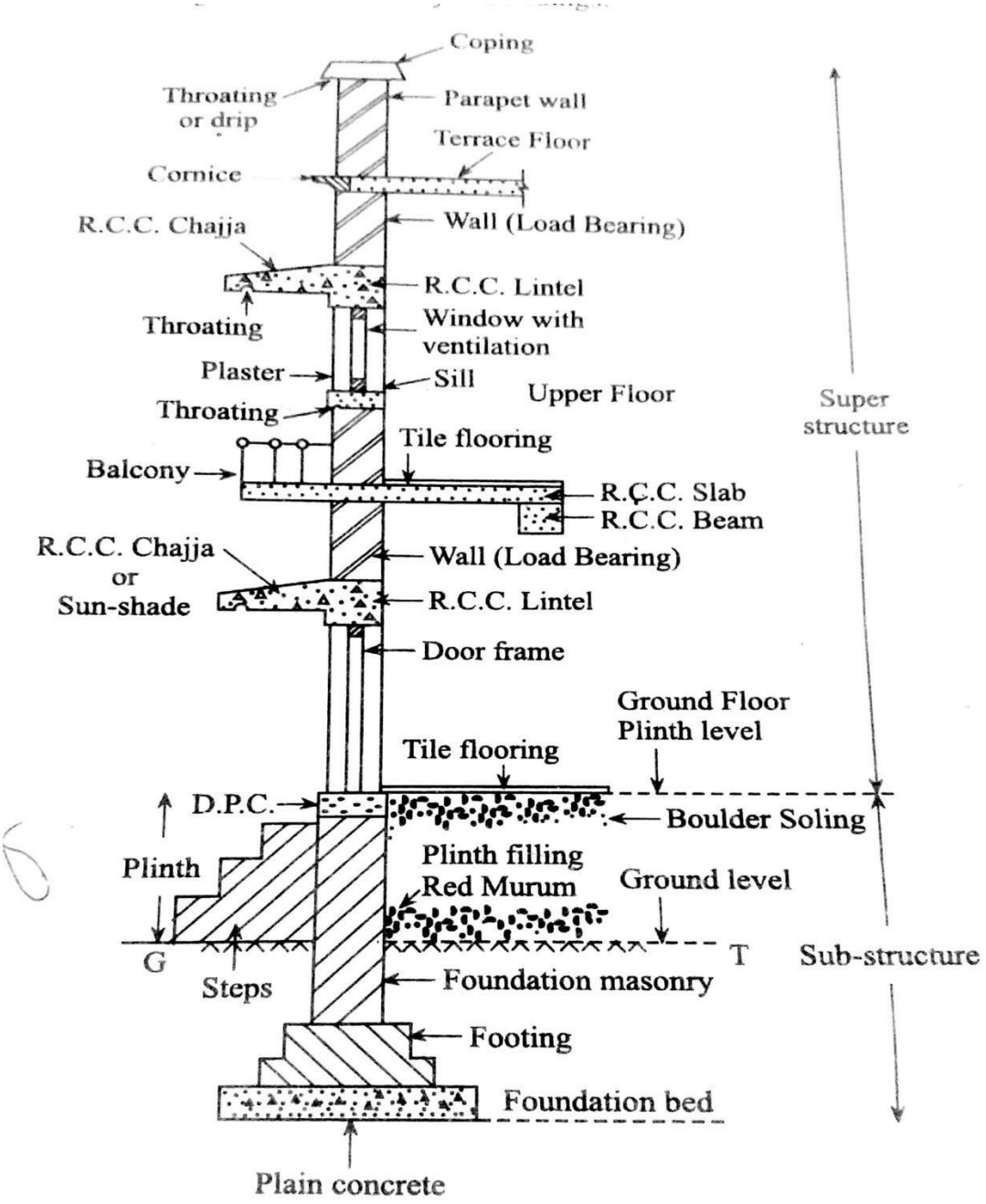


Fig. 2.2 : Typical Section Showing Various Building Elements.

1. Sub Structure: - It is the part of the structure which is below the ground level. I.e. foundation
- It consist of foundation, DPC and plinth.
1) Foundation:
-It is lowermost part of the building below the ground level which transfer the load of building to ground strata.

2) DPC:
-It is the layer provided in between the substructure and superstructure
-It prevents the entry of moisture into foundation below and superstructure above.

3) Plinth:
-It is portion of substructure between the level of the surrounding ground and the level of ground floor
Functions:
1) To support the superstructure
2) To provide stability
3) To provide strength
4) To transfer the load from the building to the foundation layer
5) To retain the plinth filling
6) To provide safety against roads
7) To give aesthetic aspect to the elevation of building

2. Super Structure: - It is that part of the structure which is above the ground level.
-It consist of wall, column, door, sill, lintel, chajjas, floors, ceiling, beams, slabs, roof, parapet wall and coping , steps, stairs, lifts, etc.

1) Wall: -It is the component which encloses and divides the building space.
Functions are:
1) It makes building more functional
2) It provide privacy
3) It provides security
4) It provides protection

2) Floors: - It is the horizontal surface for circulation
Functions are:
1) It is used for horizontal movement
2) It is used to divide the building in different levels

3) Column:-It is the structural vertical member of the building
Functions are:
1) It gives lateral stability to the walls
2) It is used to provide support to beam

3) It is used to transfer the load to foundation

4) Door:-These are movable panel constructed in the opening through the wall
Functions are:
1) It provides horizontal circulation
2) It provide movement from one room to another
3) It provides privacy
4) It provides protection

5) Sill:-These are provided below the window
Functions are:
1) It provides supports to window
2) It also protect top of the wall from wear and tear
3) It protects rainwater entry

6) Lintel: -These are provided over the opening of door and windows
Functions are:
1) It supports the load of the wall above the opening
2) It is used to distribute load of wall below the surface of lintel

7) Window: -These are the opening built in the wall.
Functions are:
1) They provide light, air and cross ventilations
2) It provides security
3) It provides privacy
4) It provides aspect and prospects

8) Beam:-It is structural horizontal members of building
Functions are:
1) It is used to support the floor
2) It transfer the load to the column
3) It give lateral rigidity to framed structure

9) Slab:-These are horizontal surfaces supported for beam and columns.
Functions are:
1) It provide space for occupant to move, live and keep their materials
2) It distribute the load of the floor and transfer it to beams and columns

10) Roof -It is the topmost part of the building
Functions are:
1) It gives support to whole building structure
2) It protects building from rainwater. Sun etc.

11) Chajja: -These are the projections over the door and windows
Functions are
1) They provides protection against sun, rain and frost

12) Parapet Wall and Coping: -Parapet wall is the short wall constructed on the top of slab roof or terrace floor
-Its top portion is known as coping
Functions are
1) It is constructed for safety and viewing
2) It is used as protection against rainwater

13) Stairs: -These are provided as vertical structural members for vertical circulation
Functions are
1) It provides movement from floor to floor

- **BEARING CAPACITY :**

  Bearing capacity refers to the ability of soil to support the loads applied to the ground. It is crucial in geotechnical engineering and civil construction because it determines whether the soil beneath a foundation can withstand the imposed loads of a structure without experiencing shear failure or excessive settlement.

- **TYPES OF BEARING CAPACITY:**

  1) Ultimate Bearing Capacity:

  - Ultimate Bearing Capacity is the maximum load per unit area that soil can bear before failure occurs in the form of a shear displacement or collapse.
  - This represents the point at which the soil can no longer support the structure and undergoes shear failure, causing significant displacement or collapse. Engineers avoid using this value for designing foundations because failure would imply severe structural damage or collapse.

  2) Safe Bearing Capacity:

  - Safe Bearing Capacity is the maximum load per unit area that the soil can support without the risk of displacement or settlement, maintaining structural integrity.
  - It is a safer value used in the design of foundations, as it incorporates a **factor of safety** to avoid reaching the ultimate failure condition. This is the load the soil can handle continuously over time without excessive deformation or settlement.

$$\text{Safe Bearing Capacity} = \frac{\text{Ultimate Bearing Capacity}}{\text{Factor of Safety}}$$

➢ FACTORS AFFECTING BEARING CAPACITY OF SOIL:

1) **Type and nature of soil:** Course grained soil with less cohesion has better bearing capacity than that of fine grained cohesive soil.
2) **Physical properties:** Some properties such as density, shear strength affects bearing capacity.
3) **Vicinity of water table:** The nearness of water table to the soil affects the bearing capacity of soil.
4) **Environment condition:** Drainage and accumulation of water affects the bearing capacity of soil.
5) **Differential settlement:** Bearing capacity depend upon settlement.
6) **Moisture content of soil:** More moisture lesser will be the bearing capacity.
7) **Degree of soil compaction:** If more soil compaction is there, more will be the bearing capacity.

➢ TYPES OF FOUNDATION :

A) Shallow Foundation-:

-When the hard strata is available upto reasonable depth, shallow foundation is required.
-When depth of foundation is less than equal to width of foundation, it is called as shallow foundation.

1) Wall Foundation:-

-It consist of continuous strip of footing to spread the load over the larger area
i) Simple Wall Footing:
- In this case width of footing is spread or enlarge by a single step from the wall width to distribute the load over the area.
- These are used for garden walls, walls of temporary light structures.
ii) Stepped Wall Footing:
-The width is spread by providing no. of steps on either side of the wall.

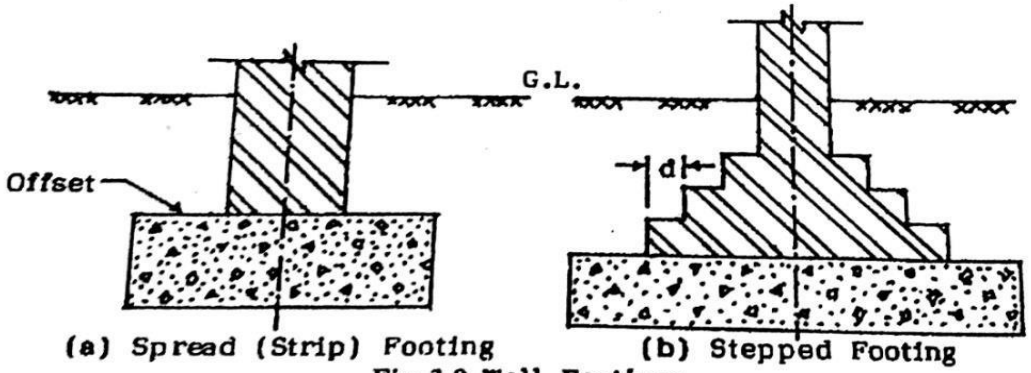
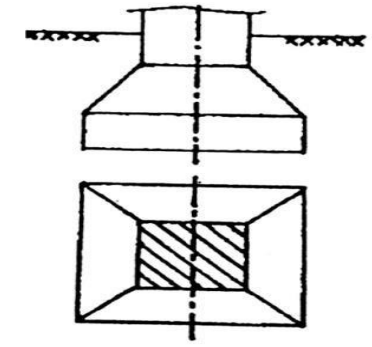


Fig. 3.9 Wall Footings

2) Column Foundation:

i) Isolated Foundation:

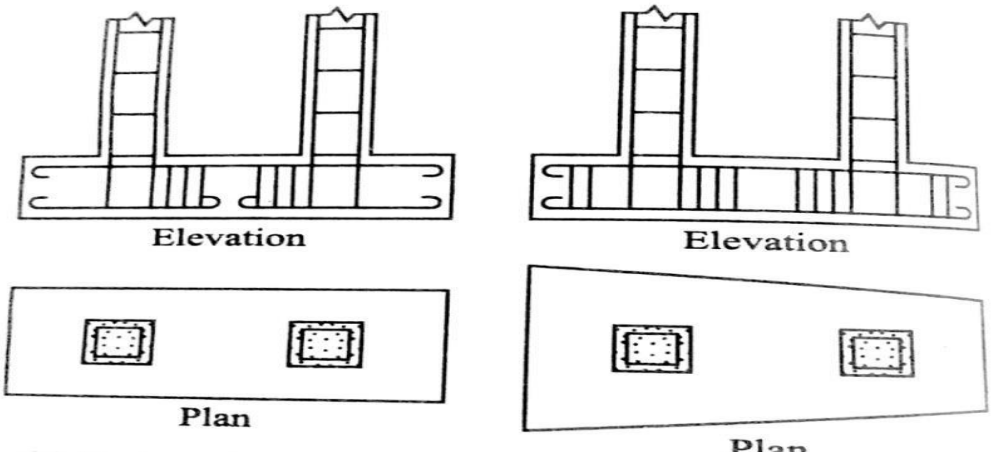
-It is also called as independent footing.
-It is generally provided under a column to distribute a point load on a soil below.



(a) Isolated Footing

ii) Combined Footing

-When two columns rest on single footing is called as combined footing.
-It may be rectangular or trapezoidal in shape.
-Sometimes two columns are very near to each other, in this situation this footing is used.
-When two columns are having same size then rectangular combined footing is used.
-When two columns are having different size then trapezoidal footing is used.



(a) Rectangular Footing (b) Trapezoidal Footing

Fig. 2.16 : Combined Footing.

iii) Continuous Footing

-When a no. of columns are in a row and are closely spaced, then footing is called as continuous footing

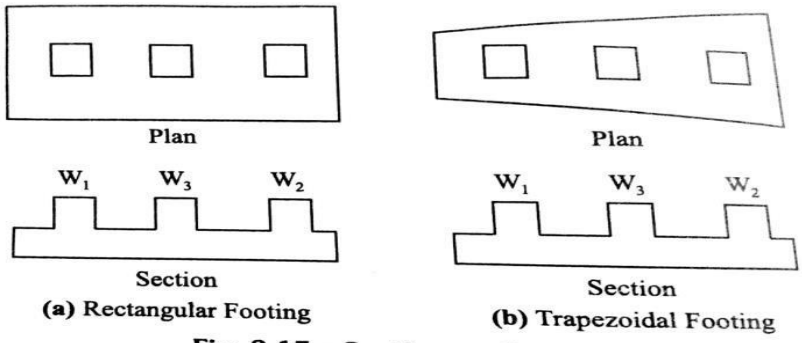


Fig. 2.17 : Continuous Footing.

iv) Cantilever Footing or Strap Footing:

-When an extreme column of building is very close to boundary of next plot, a strap or beam is provided at bottom connecting both interior and exterior column and it is called as cantilever footing

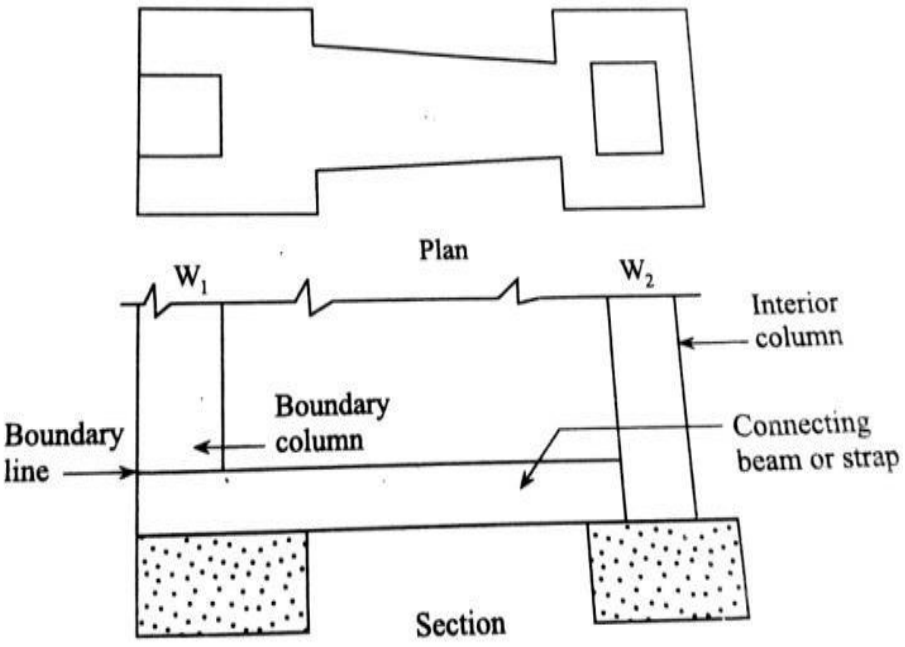


Fig. 2.18 : Strap Footing.

v) Raft or Mat Foundation:

-In case of made up ground, soft clay or marshy site, normal footing is not suitable.
-Generally RCC slab of suitable thickness is laid over the entire area of the building in the form of raft or mat and is called as raft foundation.

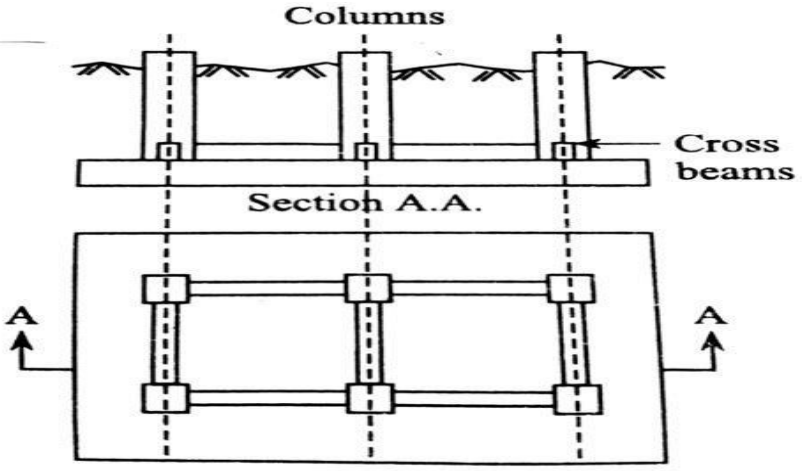


Fig. 2.22 : Plam Raft Foundation.

vi) Grillage Foundation:

-When a column carries heavy structural loads which are to be transferred to a soil of low bearing capacity, grillage foundation is used.
-In this the total load is transmitted over a large area by mean of rolled steel joists or beams called as grillage