

Building Planning

Planning : Elementary principles and basic requirements of a building planning, layout of residential & industrial buildings. Introduction to Plan, Elevation & Section of Residential Building.

INTRODUCTION :

The term planning of a building by an engineer is used to mean the arrangement of all the units of a building on all floors and at all levels and it not only includes the horizontal layout but also it takes into consideration the heights and levels to accommodate the space enclosed by walls, floors and roofs. During building planning, it is important to keep in mind, the general purpose of the building. Each type of building has its own requirements to suit its purpose in the best possible manner. There should be proper thinking on the functional or utility aspect of the building. Main considerations of planning are :

- (i) Human habitation and their requirements
- (ii) Climatic condition and effects
- (iii) Bye-laws (Rules and regulations) for planning and construction
- (iv) Materials and methods of construction
- (v) Available finance
- (vi) Comfort, safety and economy

9.1 PRINCIPLES OF PLANNING :

(GTU March, June 2009, June 2010, Dec. 2010, Janu. 2011, Dec. 2011)

There are certain general principles which an engineer should bear in mind while planning a building. These principles are not rigid but they are of very general nature and they have to be applied on individual merits only.

The general principles of planning are as given below :

- | | | | |
|---------------|-----------------|----------------------------|-----------------|
| (1) Aspect | (2) Prospect | (3) Privacy | (4) Grouping |
| (5) Romminess | (6) Flexibility | (7) Furniture requirements | (8) Circulation |
| (9) Lighting | (10) Elegance | (11) Economy | (12) Sanitation |

- (1) Aspect : (GTU, Mar.2009, Sept. 2009, June 2010, Apr.2010, Janu. 2011, June 2012)

Aspect refers to the planned arrangement of the doors and windows of the external walls to get sunlight, breeze and a good view of the scenery outside.

If a room gets good light and air from east the room is said to have east aspect.

Type of Room	Suggested Aspet
Drawing room, living room	South, SE
Bedroom	West, SW
Dining room	South
Kitchen	East
Verandah	West, SW

Proper aspect can take advantage of natural resources which is important for hygienic condition inside the building. Suggested aspect for kitchen is east direction. Sun rises in East in early morning. We have works like tea, breakfast, cooking etc in kitchen from early morning. Hence east aspect for kitchen can give advantage of natural sunlight. Sunrays are helpful to kill bacteria and germs. Sunlight can remove dampness.

Suggested aspect for Bedroom is west or southwest in wind direction. Sun sets in west. Cool breeze can enjoyed in evening and night. Suggested aspect for verandah and balcony is west or SW. The direct sunrays can be obstructed and heating of external walls by sunrays can be avoided by providing verandah or balcony.

- (2) Prospect :

(GTU, March 2009, Sept. 2009, June 2010)

A building is said to have prospect when it presents a good and pleasing appearance when seen from outside. It is used to mean the external views as seen from certain rooms of the building. It also includes the concealment of some undesirable views in a given outlook. To get good prospect, the doors and windows should be provided in an attractive manner. Exterior wall painting, pattern, cladding work etc. increase prospect of the building. Shape of balcony, canopy, ornamental grill etc. present good prospect. RWP and other pipes should be concealed. Projected windows permit more light and air inside the rooms as shown in fig 9.1.



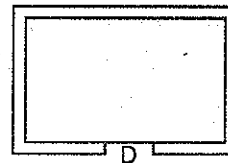
Fig. 9.1 Prospect - Projected Windows

(3) Privacy :

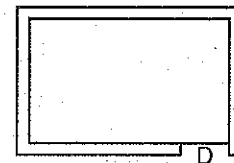
(GTU, June 2011, Dec. 2011)

For residential building planning privacy is important consideration. There should be privacy from one room to another room and also from neighbour building and public building and streets. Privacy is

necessary in the bedrooms, bathrooms, wc and urinals. Position of doors and sill height of windows and ventilations are decided as per privacy principle in building planning. Doors provided in corners of rooms permit proper privacy. At center door location should be avoided.



Not Preferable



Preferable

Fig. 9.2 Privacy - Location of Doors

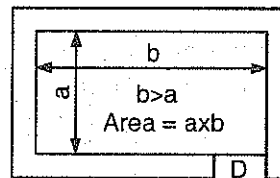
(4) Grouping :

Grouping refers to easy communication and utility of various rooms. Kitchen and dining room should be close to each other. Store room should be adjacent to kitchen. WC and urinals should be far away from the kitchen. Kitchen and toilet block should not be exposed to drawing room. Passage should be provided in such a way that meant for the purpose and should not be too long and should not be passed through drawing rooms. Bedrooms should be connected to bath by direct passage. Bed room should be less exposed to drawing room.

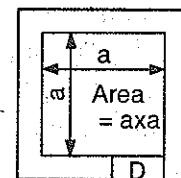
(5) Roominess : (GTU, April 2010, Janu. 2011, June 2011, Dec. 2011, June 2012)

Roominess refers to an arrangement of getting the maximum advantage from the minimum or limited dimensions of a room. The space must be utilised economically. Make the

room rectangular instead of a square. The length and breadth ratio may be 1.20 to 1.50 for building planning. Ceiling height also affect the effect of a spacious room. Small rooms should have low ceiling height. Long passages with high ceiling give effect of tunnel, which is not desired. Rectangular area of room is preferable instead of square room.



Preferable



Not Preferable

Fig. 9.3 Roominess

(6) Flexibility :

The plan of the building should be prepared by keeping in mind the future requirements. Expansion should be possible economically without major alterations in existing planning. Planning should be such that with minor adjustments, it becomes possible to satisfy needs when the occasion arises.

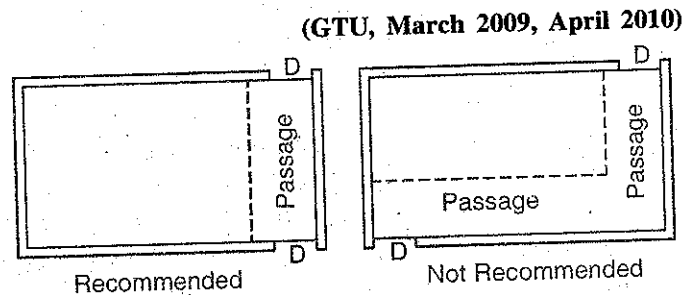
(7) Furniture Requirement :

During building planning the sizes of furniture to be required for functional utility of the rooms should be considered. The size of the rooms should be decided by considering easy accommodation of required furniture. By proper discussion with owner about family size and the facilities required, an engineer can plan the building in good manner. Kitchen size should accommodate platform, cupboard, dining table, refrigerator, mill etc. Bedroom size should accommodate bed, cupboard, side tables, dressing table etc. Children's bedroom should accommodate bed, study table, cupboard, dressing etc. as per furniture requirements of owner.

(8) Circulation :

Circulation refers to providing through passages between rooms in a building. It is necessary to permit horizontal circulation through passages, corridors and lobbies

and vertical circulation through staircases, lifts and ramps in building. Passage should be provided along shorter wall, not proper along longer walls. Passage should not cross the rooms.

**Fig. 9.4 Circulation****(9) Lighting :**

Natural and artificial lighting is provided in building planning. By proper ventilation sunlight can give good lighting. By using various electrical appliances artificial lighting is provided. Glare should be avoided.

(10) Elegance :

Elegance refers to the planning of elevation and layout of the plan to give an impressive appearance to the building. The proper width, height, location of doors and windows, materials employed in construction of exterior walls etc. create elegance. the result of elegance is aesthetics of building.

(11) Economy :

Building planning should be carried out in the financial limit of the client. An engineer should know in advance, the client intends to spend for the building and accordingly material of construction, finishing items, stage construction should be suggested. By estimation proposed amount should be derived and as per that work progress should be followed to avoid miserable failure of building construction project.

(12) Sanitation :

Provision for cleanliness, lighting and ventilation in sanitary units avoid growth of bacteria and spread of disease and give hygienic condition. In bath and w.c. glazed tiles dedo should be provided on walls to maintain clean condition. The ventilators in bath, w.c. permit sunlight and air circulation to maintain hygienic condition. The kitchen should have glazed tiles dedo. The flooring material should be easy to clean. Skirting should be provided in rooms. Bath tubs, urnilas, w.c. pans, wash basins, kitchen sinks should be of ceramic material to maintain them clean easily.

9.2 BASIC REQUIREMENTS OF A BUILDING PLANNING :

The building has to be planned to serve the users for their living, working and recreation.

- **Basic requirements of a building :**

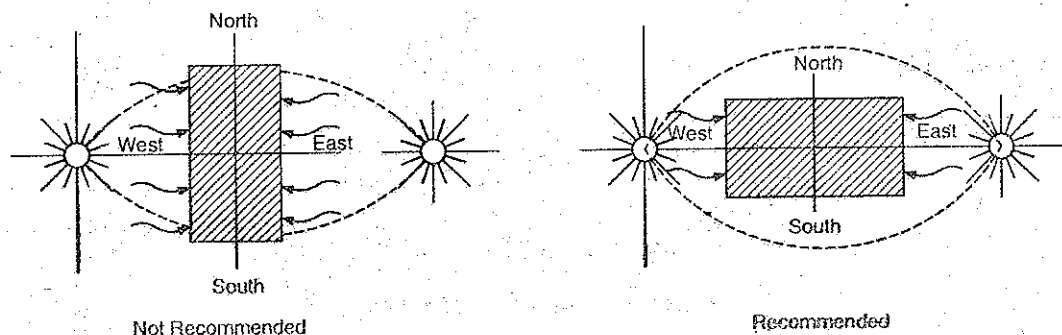
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|--|------------------------------------|
| (1) Comfort | (8) Fire resistant |
| (2) Convenience | (9) Thermal insulation |
| (3) Strength | (10) Coolness heat resistance |
| (4) Stability and durability | (11) Fresh air and wind |
| (5) Long life with minimum maintenance | (12) Sunlight |
| (6) Economical | (13) Termite proof |
| (7) Damp proof | (14) Safe and secure against steal |

The following are worthy considerations in a building planning.

9.2.1 Orientation of Buildings :**(GTU, June 2011)**

The setting of plan of the building on its site with reference to the directions is known as orientation. It plays an important role in increasing building utility from the view point of climatic considerations. The orientation of building should be as comfortable as possible. Direction of sunlight, wind, rainfall and its intensity and type of surroundings are taken into consideration while deciding orientation of the building.

The long walls of the building should be placed towards North and South. The short walls should be placed towards East and West.

**Fig. 9.5 Orientation**

Sufficient number of windows and ventilations of suitable level from the floor should be provided for air circulation inside the building.

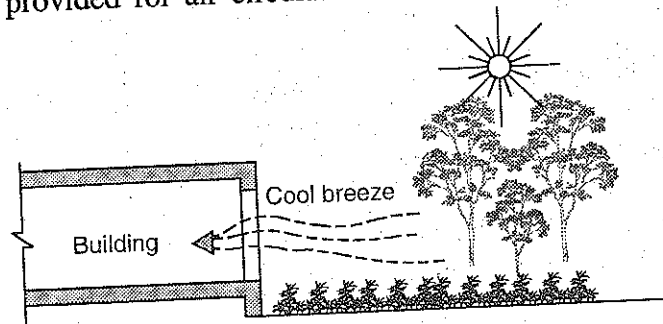


Fig. 9.6 Exposure to wind and good visibility

Weathersheds and overhanging roofs are desirable to cut-off rain water and to avoid dampness in building. Provide D.P.C. (Damp Proof Course) at suitable levels to keep away moisture. The chajjas (weathersheds) are of box type to avoid entry of rainwater through openings of doors, window and ventilators inside the building. Projecting slab over balcony and vertical drop helps in protection from sun and rain.

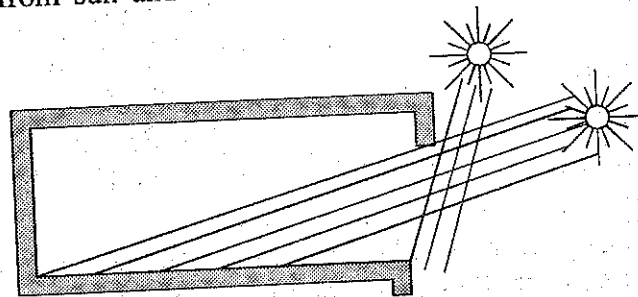


Fig. 9.7 Walls and Opening

Verandah and balcony should be provided adjacent to the walls which are exposed to East and West to avoid direct heating of walls of rooms. The areas with high intensity of rainfall should have sloped roof with overhanging portion.

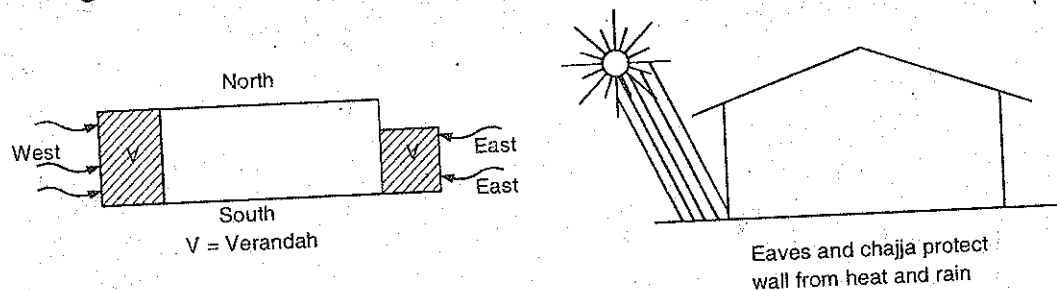


Fig. 9.8 Protection of Walls from Heat

9.2.2 Utility of Space :

The planning of a building has to give due consideration to the utility of the building. A residence must have living room, bed rooms, kitchen, bath, w.c., verandah and circulation space. Any building should be designed to provide certain facilities required for proper utilisation of the building.

9.2.3 Selection of Site :

The selection of site has an important bearing on the planning as well as designing a building. A building has to be planned depending on the location and the geometry of the site. It may become necessary to select a site to suit the way the building is planned. The selection of the site also depends upon the purpose for which the building is constructed. Owner should keep in mind the requirements as per family size and life style while purchasing land for residence. The shape and area of plot should be considered.

Site selection for a residential building : (G.T.U., January 2010)

- (1) The land should not belong to Agricultural work. The land must be NA (Non-agricultural) plot. The title must be clear. Proper documents of NA land must be checked.
- (2) The land should be in residential zone. It should be away from industries, hazardous activities, pollution and sewage disposal units. The land should not belongs to earthquake belt.
- (3) Cost of land.
- (4) Contour of land. If the river is in vicinity then check the past H.F.L. (High Flood Level). The low area as per surrounding topography, may cause rain water problem in monsoon
- (5) Availability of public utility services-like water, drainage, electricity, street lighting etc.
- (6) Availability of parks and playground like nature spots.
- (7) Connectivity through all weather road networks.
- (8) Distance from places of work.
- (9) Availablity of school, college, hospital, health center etc.
- (10) Availability of vegetable, fruit market, milk, dairy, bakery etc. in vicinity.
- (11) Availability of transport facility.
- (12) Direction of sun and wind and wind velocity.
- (13) Nature and use of adjacent area.
- (14) Shape and size of plot. Irregular shape triangular shape of plot should be rejected.
- (15) Distance from railway station, bus station and airport.

• Site selection for an industrial building :

- (1) Site for the industrial buildings should be away from residential zone. Generally, they are selected on outskirts of the town.
- (2) Site should be easily accessible to railway station and major connecting highways.
- (3) Site should be in vicinity to water supply.
- (4) Site should be with electric power supply source.
- (5) Site should be situated at locations where labour, workers and materials are available.
- (6) Transportation network and facility should be linked between towns and industrial building site.
- (7) Size of plot for industrial building depends upon type of activities and production capacity of proposed industry.
- (8) Light and ventilation should be taken into consideration while design of building is carried out. But it should be observed during site selection of an industrial building.

9.2.4 Regulations and Bye-laws :

Local authorities have defined certain rules for the construction of various types of buildings. Owner and engineer must consider them while purchasing the land and planning for that land. As per Town Planning Scheme built up area and open to sky area as marginal space should be left. Front margin should be left as per the exposure to NH, SH, MDR, ODR, VR, Urban street etc. like type of road and width of road. Building control line should be obeyed. Provision of water supply and sanitation should be considered. Proper ventilation and structural designs should be planned.

9.3 TYPES OF RESIDENTIAL BUILDING :

- (1) Detached Building - Bungalow

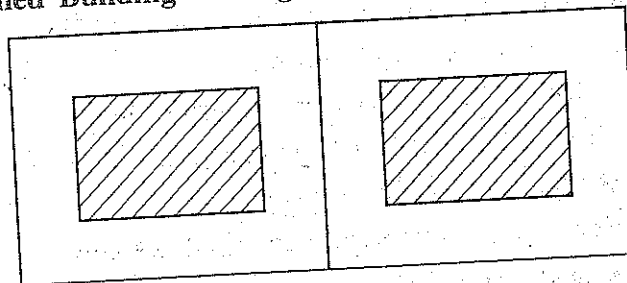
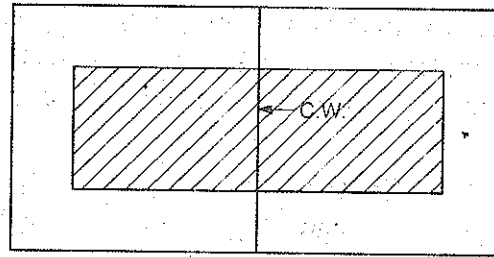


Fig. 9.9 Detached Building

An individual have margin on all the four sides of the building in detached building.

(2) Semi-detached Building – Twin Bungalows



C.W. = Center Wall / Common Wall

Fig. 9.10 Semi Detached Building

An individual have margin on front back and any one side. There are three margins. One wall at center of the plot is common wall in semidetached building.

(3) Row House

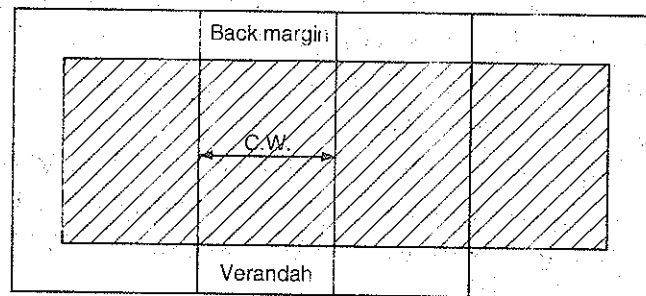


Fig. 9.11 Row House

in case of row house there is common wall on both the sides. There is small verandah in front of street road and back margin. Only first and last unit in row can get one side margin.

(4) Low rise or High rise Building – Flats

9.4 LINE DIAGRAM :

Line diagram shows the general shape of the building. It shows layout of various rooms, enclosing walls and dividing partitions. It is showing general arrangement of various rooms with their in to in dimensions. Probable positions of doors and windows may or may not be indicated. Probable furniture and equipment arrangement may be shown on line diagram.

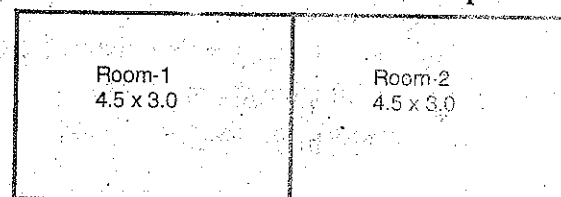


Fig. 9.12 Line Diagram

9.11

9.4.1 Uses of line diagram :

- To prepare detailed plan after confirming the client on line diagram.
- The owner can understand the probable arrangement of building planning. If any alterations are required, as per owner's requirement, then can be easily incorporated.
- Detailed working drawing can be prepared from line diagram.
- Probable furniture accommodation can be explained to the client.
- Positions of sun and wind direction for various rooms can be explained on line diagram.
- Position of entry, exit, openings, doors, windows can be determined on line diagram easily.
- Circulation among various units of the building can be shown on line diagram.

9.4.2 Steps to prepare plan from line diagram :

- (1) The dimensions given on line diagram are in to in dimension of any space. The dimensions are $X \times Y$. Given unit can be m, cm or mm. Enclosing wall thickness will be taken as per given instruction. It is assumed if any instruction is not given.
- (2) The walls are of three types
 - (i) External walls (ii) Internal walls (iii) Partition walls

Generally external walls are thicker than internal walls. If any instruction is not given then take all external walls as 30 cm or 20 cm and all internal walls as 20 cm
- (3) The walls of bath, W.C. and another small space are 10 cm thick. They are simply to divide the space and for partition. Hence non load bearing wall is known as partition wall.
- (4) Steps are provided at verandah side. Position of step is always near to main door or in front of main door. Steps are provided between ground level to plinth level.

Size of tread = 25 to 30 cm

Width of tread = 1.0 m minimum

Number of steps = $\frac{\text{Plinth height}}{\text{Riser height}}$

Height of riser = 15 to 20 cm

Number of tread = Number of riser - 1

Ex. Plinth height = 45 cm

Height of riser = 15 cm

Number of riser = $\frac{45}{15} = 3$

No. of tread = $3 - 1 = 2$

- (5) Direct entry is advisable in drawing room / living room.
- (6) Main door provided in drawing room for direct entry can be wider than another all doors of building. Width of door can be 1.5, 1.2, 1.0 m. Doors provided on external walls are known as external doors. Doors provided on internal walls are known as internal doors. Small size of doors are provided in bath, W.C. like small areas. General width of bath, W.C. door is 0.80 m.
- (7) Provide windows on external walls of rooms. Generally width of window is 0.9, 1.2, 1.5, 1.8 m. Provide ventilators on external walls of bath, W.C. etc. Generally width of ventilator is 30, 45, 60 cm.

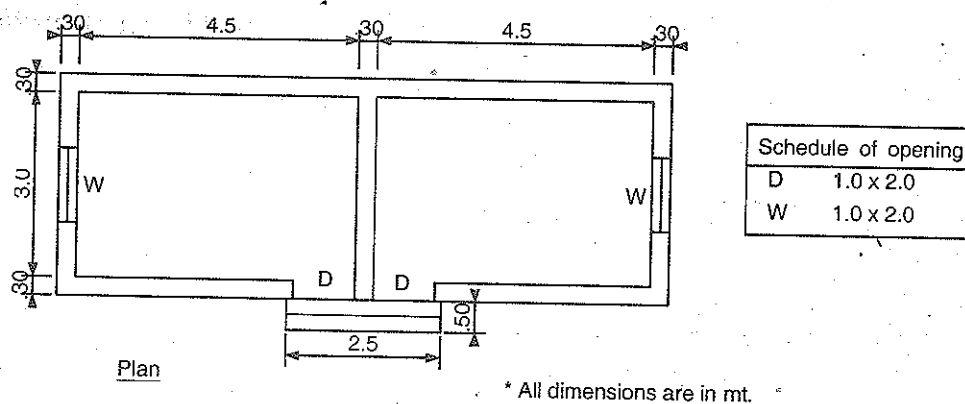


Fig. 9.13 Development of Plan as per Line Diagram

9.4.3 Drawing building plan :

To draw a plan, a building is imagined to be cut in horizontal plane at sill level and then it is viewed from top. It is drawn in 2D. Length and Width of various units with wall thickness is drawn in plan. Height of any unit is not observed from plan. Location of doors, windows, ventilators, gaps etc. are shown in plan.

9.4.4 Drawing building elevation :

Elevations are generally drawn above the plan by projecting vertical lines from plan starting from left end side to right end side of the building. Elevations are not showing any details below ground for substructure or foundation. Elevation of building is drawn in vertical plane starting from G.L. to roof level with parapet.

9.4.5 Drawing building section :

Section is generally drawn on side of elevation so that projections are easily taken from elevation. It is the sectional elevation of building at a particular assumed section. Section of a building is drawn in vertical plane starting from foundation to roof level with parapet. Dimensions, thickness, material type etc. all details are shown on section.

9.4.1 Uses of line diagram :

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Height of riser = 15 to 20 cm

Number of tread = Number of riser - 1

Ex. Plinth height = 45 cm

Height of riser = 15 cm

Number of riser = $\frac{45}{15} = 3$

No. of tread = $3 - 1 = 2$

- Cross section of wall showing foundation and plinth with dimensions.

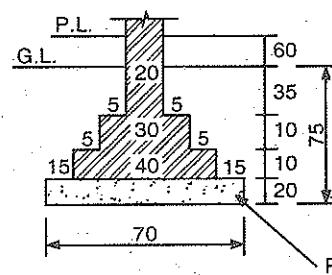


Fig. 9.15(a) 20cm thick wall foundation

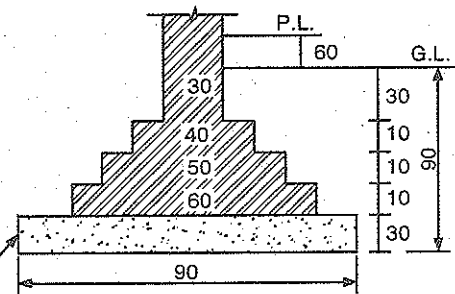


Fig. 9.15(b) 30cm thick wall foundation

All dimensions are in cm.

Not to scale

9.5 LAYOUT OF RESIDENTIAL BUILDING :

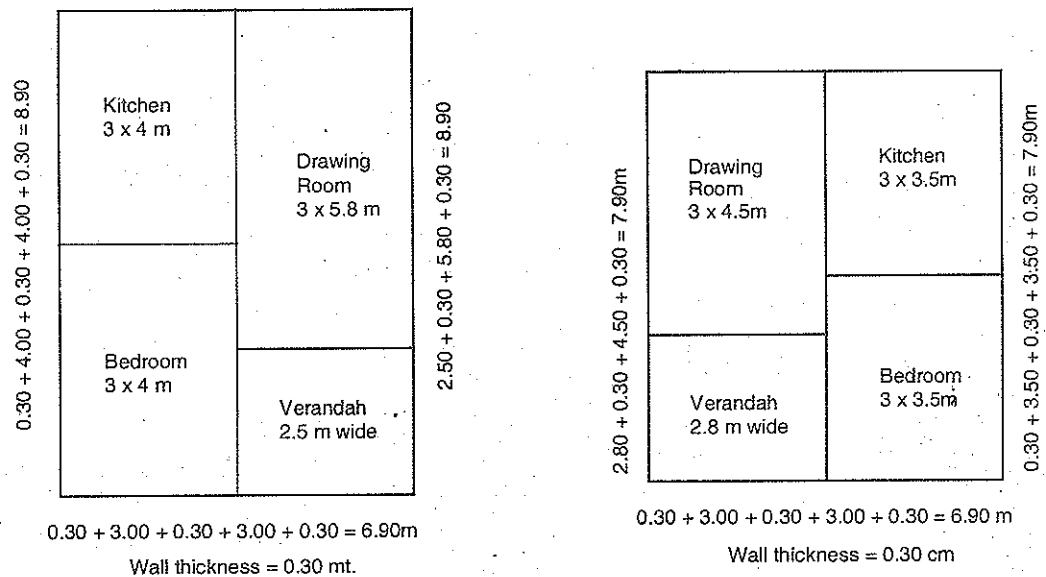


Fig. 9.16 Layout of Residential Building

Development of plan as per line diagram

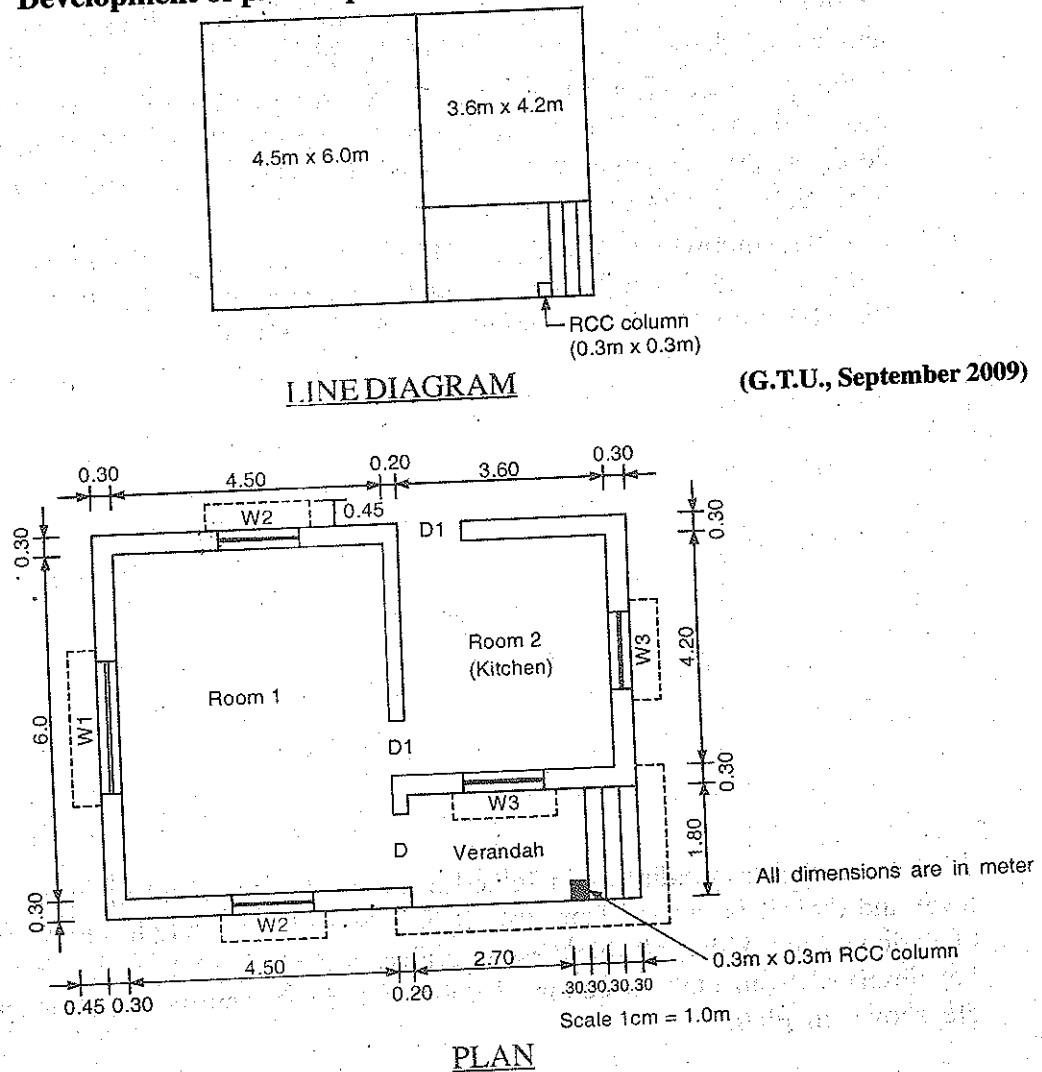


Fig. 9.14 Development of plan as per line diagram

Schedule of opening :

Door :

D : 1.20m × 2.0m

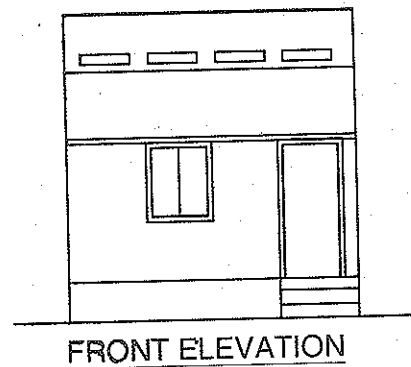
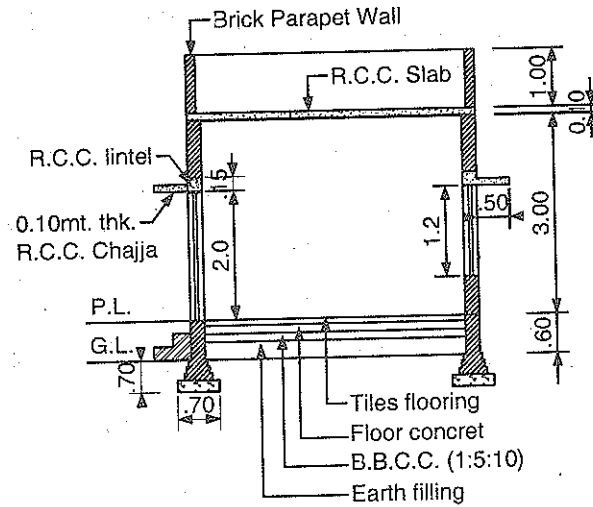
D₁ : 1.00m × 2.0m

Window :

W₁ : 2.00m × 1.20mW₂ : 1.50m × 1.20mW₃ : 1.50m × 0.80m

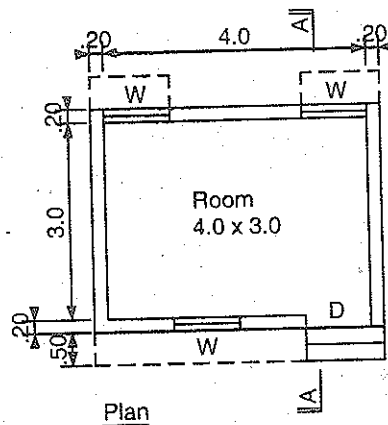
- Plinth ht : 60 cm No. of Riser = 04
No. of Tread = 03
Width of Tread = 30 cm
Height of Riser = 15 cm
- Floor height : 3.0m

9.6 PLAN, ELEVATION AND SECTION OF RESIDENTIAL BUILDING:



Schedule of opening

D	1.0 x 2.0
W	1.0 x 1.2
C.B.	1.0 x 0.35



Room
4.0 x 3.0

Line Diagram
(G.T.U. Dec. 2008)

Note - All dimensions are in mt.

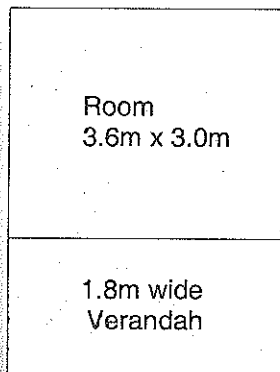
Fig. 9.17 Planning of a Room

(GTU Dec. 2008)

Plan and Section :

Schedule of opening	
D	1.0 x 2.0
W	1.8 x 1.8

Tread	0.25m
Riser	0.15m



Line Diagram
(G.T.U. June 2009)

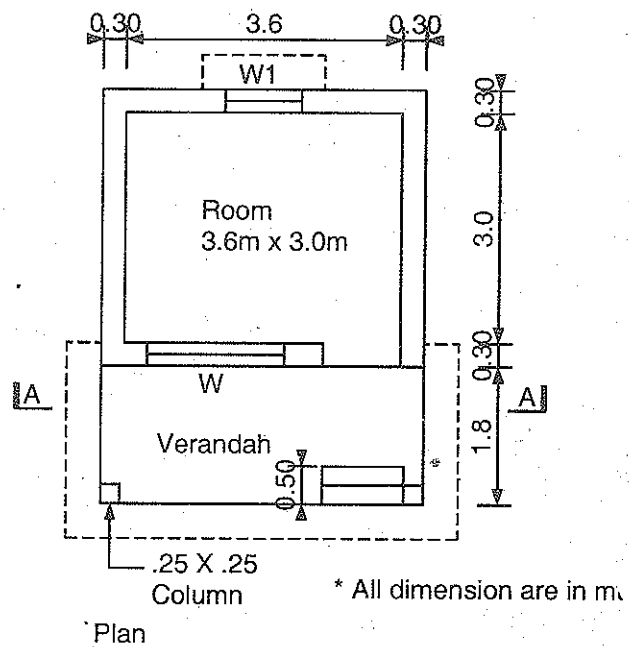
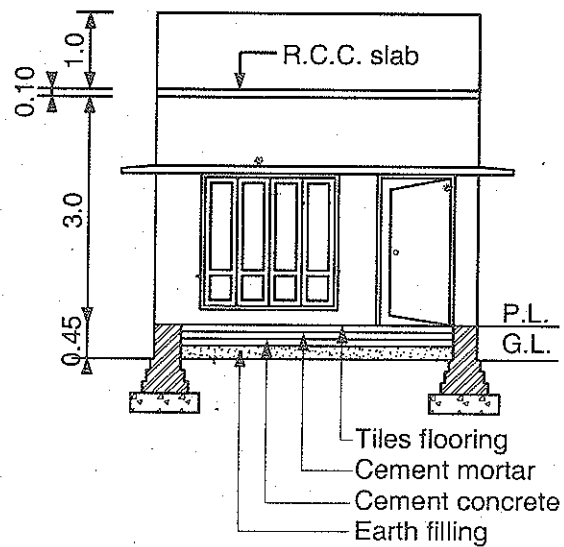


Fig. 9.18 Planing of a Room with Verandah (GTU June 2009)

Plan, Elevation and Section :

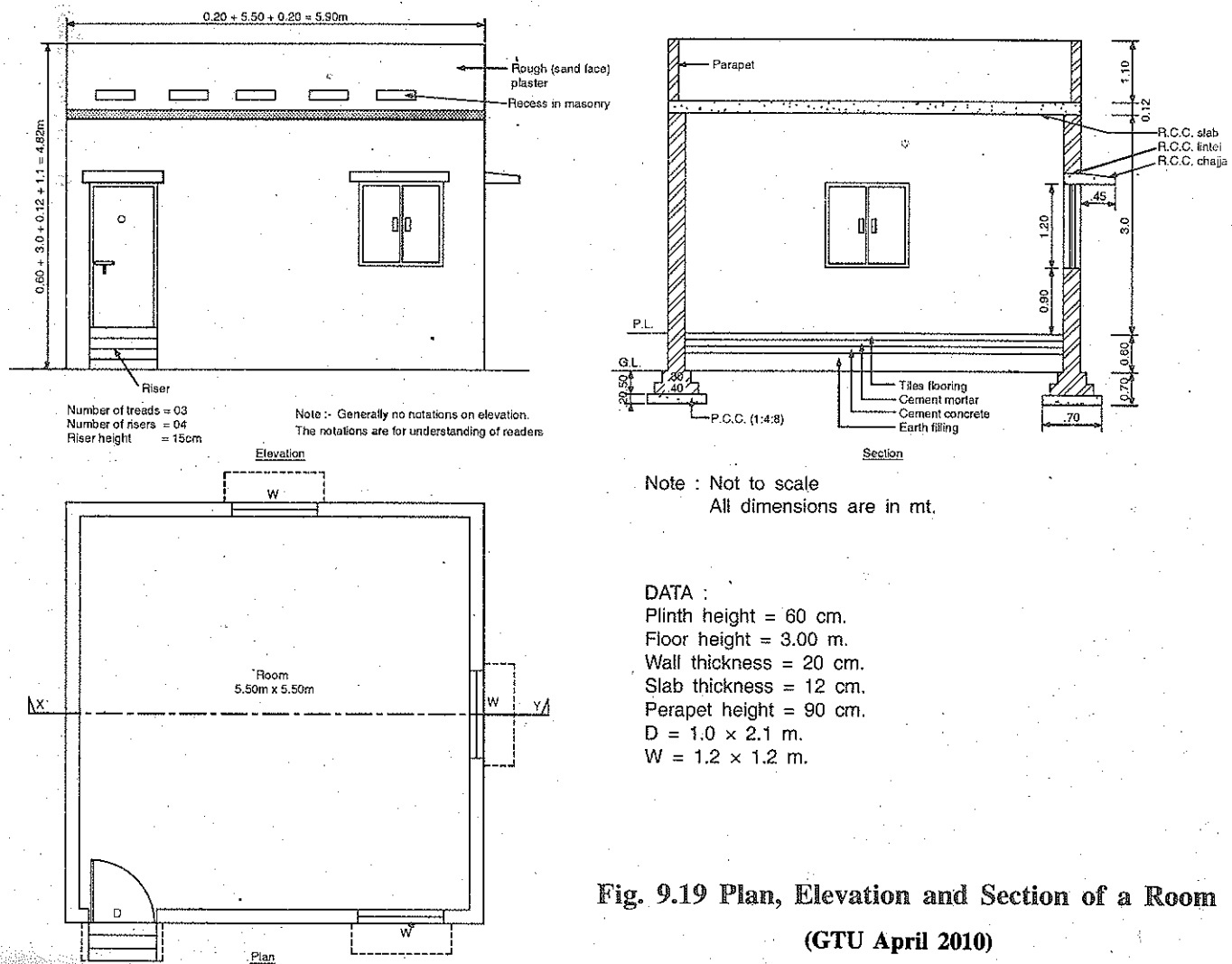
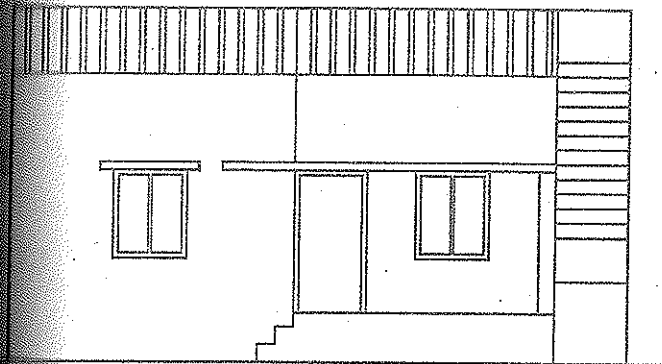
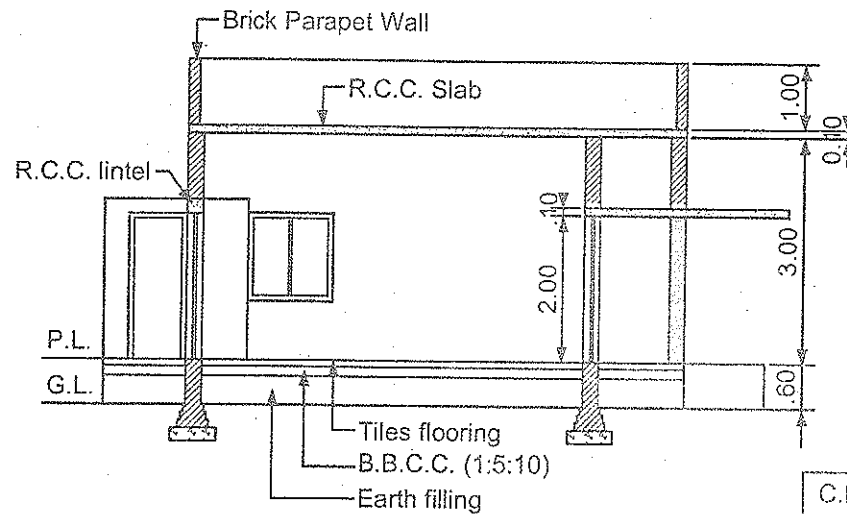


Fig. 9.19 Plan, Elevation and Section of a Room
(GTU April 2010)

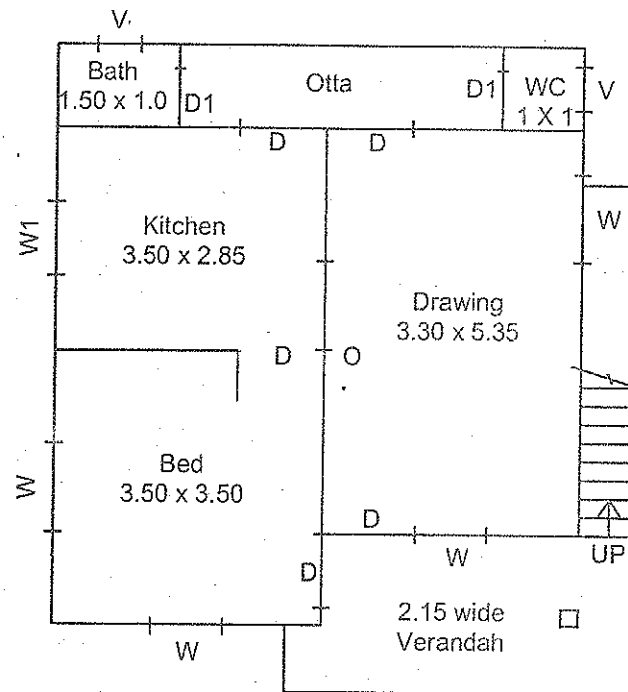
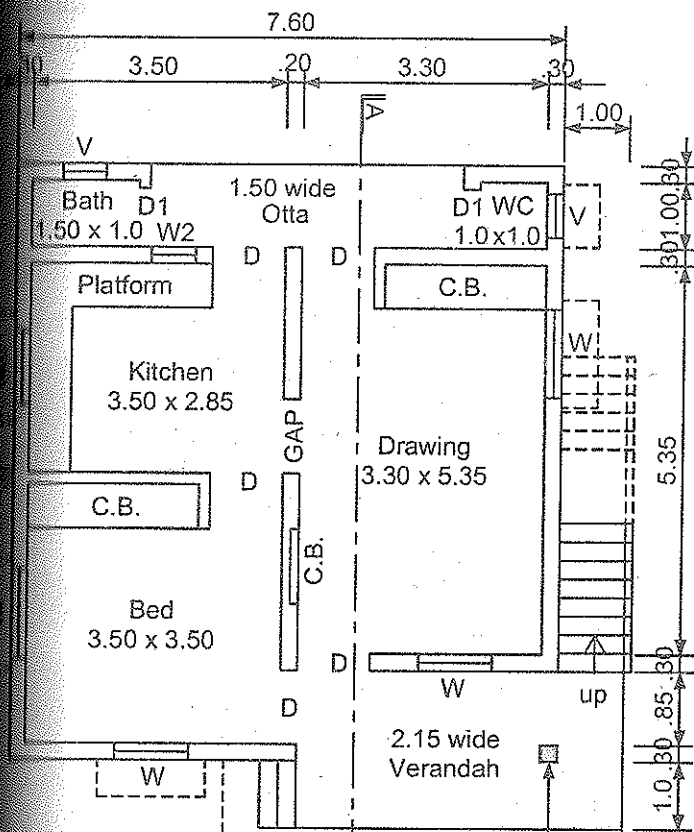


FRONT ELEVATION



SECTION AT A-A

C.B.	=	Cupboard
Schedule of Opening		
D	=	1.00 x 2.00
D1	=	0.80 x 2.00
W	=	1.20 x 1.20
W1	=	1.00 x 0.90
W2	=	0.60 x 0.90
V	=	0.60 x 0.45



Tread width = 30 cm
Riser high = 20 cm

All dimensions are in Mt.

PLAN

Only for Reference ...

0.30 x 0.30
R.C.C. column

www.civildc2013.weebly.com

LINE DIAGRAM

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9.7 LAYOUT OF INDUSTRIAL BUILDING :

• Area occupancy of Industrial site

(a) Built up area :

50 – 60% of plot area

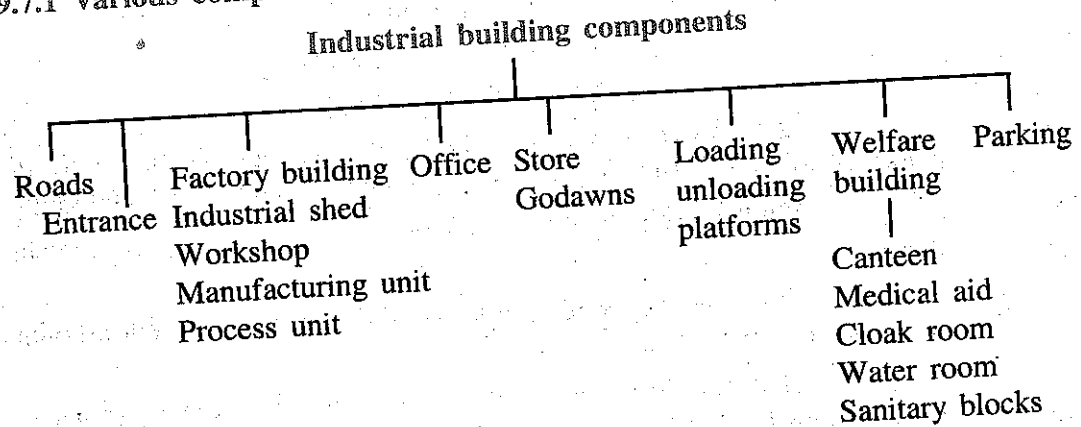
- Factory
- Office
- Store
- Welfare units

(b) Open to sky area :

40 – 50% of plot area

- Roads
- Margin
- Parking

9.7.1 Various components of an industrial building –



9.7.2 Planning of industrial building is carried out by following considerations.

1. **Location and site :** Industrial building should be so located that they do not encourage concentration of population in large urban centres. Industrial buildings may be located outside the towns. The site for industrial building should be close to perennial water supply. It should be with electric power supply and should permit easy drainage. It should be close to railway station.
2. **Orientation and lighting :** North light roofs can be used to take advantage of northlight. Adequate lighting within industrial building can be obtained by arranging sheds in the East and West direction and by providing glazed windows in the North and South walls. Windows should not be placed in East and West walls of the building.
3. **Size of industrial shed :** The length of shed varying according to the requirement. The minimum size of work shed may be 60 sq.m. and the maximum size of 600 sq.m.
4. **Covered area of industrial shed :** 50% to 60% of the plot area.
5. **Roads :** the area of roads should not exceed 20% of the total area of industrial plot (estate).

Roads should be laid out for one way traffic with 3.70 m width. Generally bituminous flexible pavement is adopted. Roads can be of cement concrete pavement also. There should be one incoming road and separate another one outgoing road.

6. Plinth : 30 cm above crown of road.
7. Height of roof : 4.20 m from plinth to tie level of roof.
8. Administrative building for industries : 5% to 10% of total estate area
9. Windows and Ventilators : upto 25% of the floor area in humid regions and upto 15% of floor area in hot dry regions
10. Number and size of door : Two per shed
 $2.5 \text{ m} \times 2.5 \text{ m}$ (Front)
 $2.5 \text{ m} \times 1.8 \text{ m}$ (Rear)
11. Flooring : 4 to 5 cm thick cement concrete (depends on the nature of work) IPS and kotahstone flooring is also suitable for an industrial building.
12. Roofing : Pitched roof of Galvanised iron sheet or Asbestose cement sheet.
13. Water supply : Natural water supply is advantages. Sufficient amount of water should be available.
14. Drainage : There should be proper drainage system for waste and waste water disposal.
15. Span : Sheds of 10 m and 13 m span may be adopted in most cases.

9.7.3 Requirements of an industrial building. (G.T.U., April 2010)

1. Canteen : It is the place where refreshment and lunch with hot and cold drinks are available for industrial building users. It is provided with cooking space, cleaning area and dining area. The size depends upon number of workers.
2. Cloak room : It is used for changing of cloths for the workers. Lockers and racks are provided as per number of workers. It should be well lighted and ventilated.
3. Office and administration : Office building is provided for owner and administrative staff. The salary or wages and attendance for workers are managed from office. Records of raw material, stock and finished goods are kept in office. Receipts and gatepass for trucks and loaded/unloaded goods are made in office. The telephonic and internet communications for industry and their production is carried out from office.
4. Entrance : Minimum two entrances are provided with gates and security cabin in industrial building. Entry and exist gates are separately provided.

Entrance for workers and trucks may be separate or same. Entrance gates should be sufficient wide to allow trucks inside the industrial plot site.

5. **Loading unloading platforms :** The goods received from truck is unloaded on unloading platforms. The goods to be transported from industry is loaded on loading platforms. It is the space provided for stacking goods and trucks. They are generally open to sky. They are strong surface platforms. They are slightly raised from surrounding ground. They may be provided with ramps. They are adjacent to store/godawn entrance and factory shed entrance.
6. **Medical aid :** In each industrial building atleast primary treatment should be available to the users. In case of minor accidents in industry like cut, wound, burn, shock, quick medical aid should be available. In some industries regular health check up of workers and advice with medicine and treatment is arranged by owner.
7. **Sanitary blocks :** Sufficient number of urinals and water closets should be provided in separate location in industrial building for workers and office staff. They should be in separate locations for male and female users. They should be with water supply and electrification. They should be well ventilated and maintained. They should be washed regularly and maintained clean.
8. **Storage building :** They are covered building. They store raw materials as well as finished goods or products of industries. Their size depends upon capacity of industry. They should be well protected and ventilated.
9. **Parking :** (i) Cars – 20 m²/vehicle (ii) Two wheeler – 3m²/veh. (iii) Cycle stand for workers parking area is with roof shelter.
10. **All weather roads :** Roads provided should be all weather road. Generally black topped bituminous flexible pavement or cement concrete pavement is provided. They are single lane and connecting entry and exit gates. Roads are provided to connect various units of industrial building.
11. **Factory shed :** It is the space where manufacturing of goods is carried out. Number of workers are working there. Machineries and plants are provided there. They are covered by steel truss and roof sheets. They should be well ventilated and lighted. Northlight is favoured here. Proper air circulation is required. Sufficient number of doors and windows/ventilators should be provided. The flooring should be non-slippery and durable.
12. **Watchman's / Security cabin :** Security purpose watchman is hired in industry. They check entry and exit of trucks with appropriate goods loading. They check entry and exit of workers. They restrict entry of

unauthorised persons in industrial building. Steal or theft of goods can be avoided by security.

13. Drinking water

14. Telephone

15. Circulation space

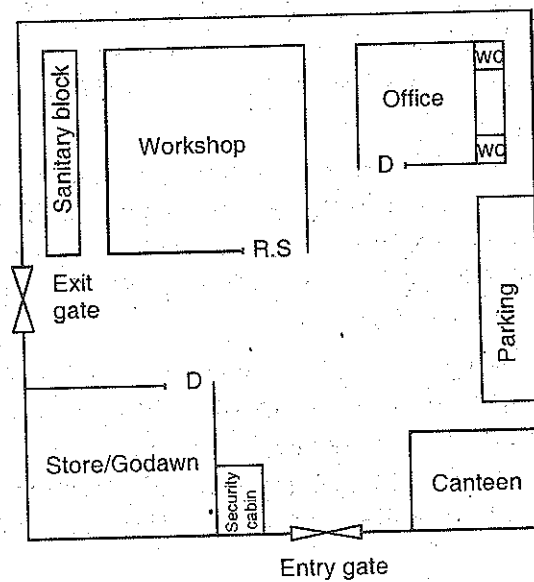


Fig. 9.21 Layout of Industrial Building-I (G.T.U., January 2010)

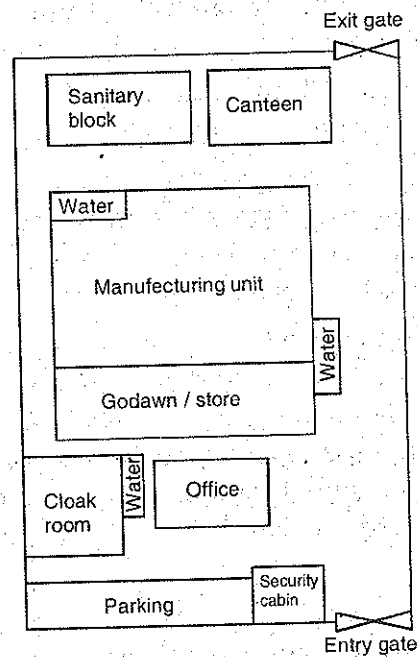


Fig. 9.22 Layout of Industrial Building-II

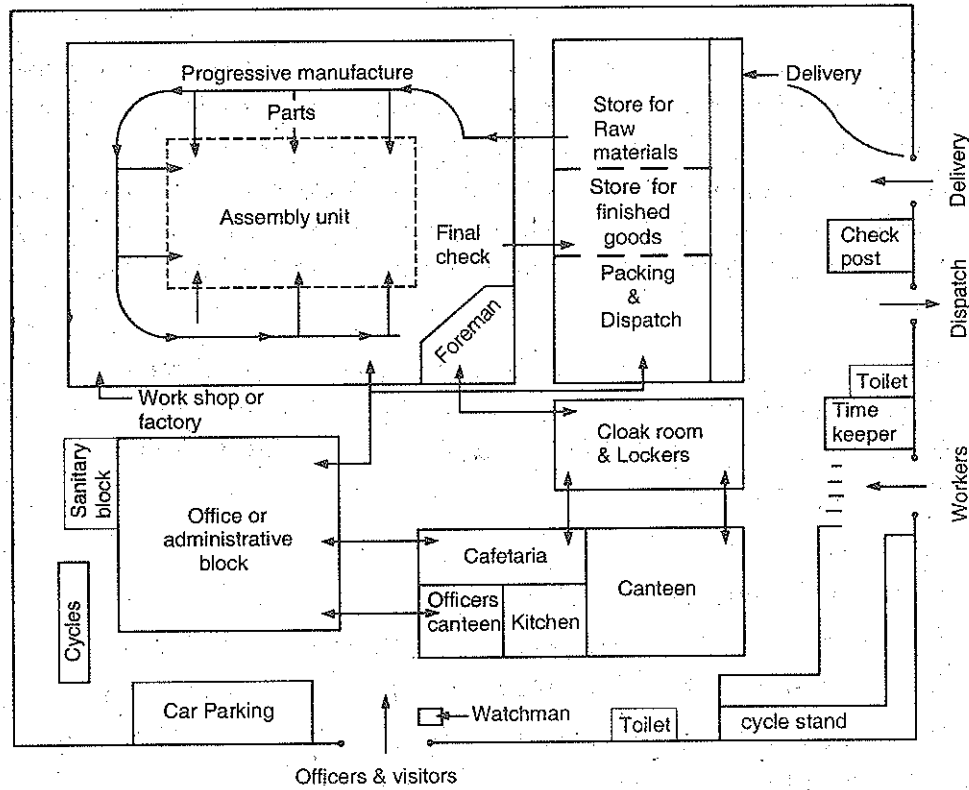


Fig. 9.23 Layout of Factory

(GTU, Dece. 2010)

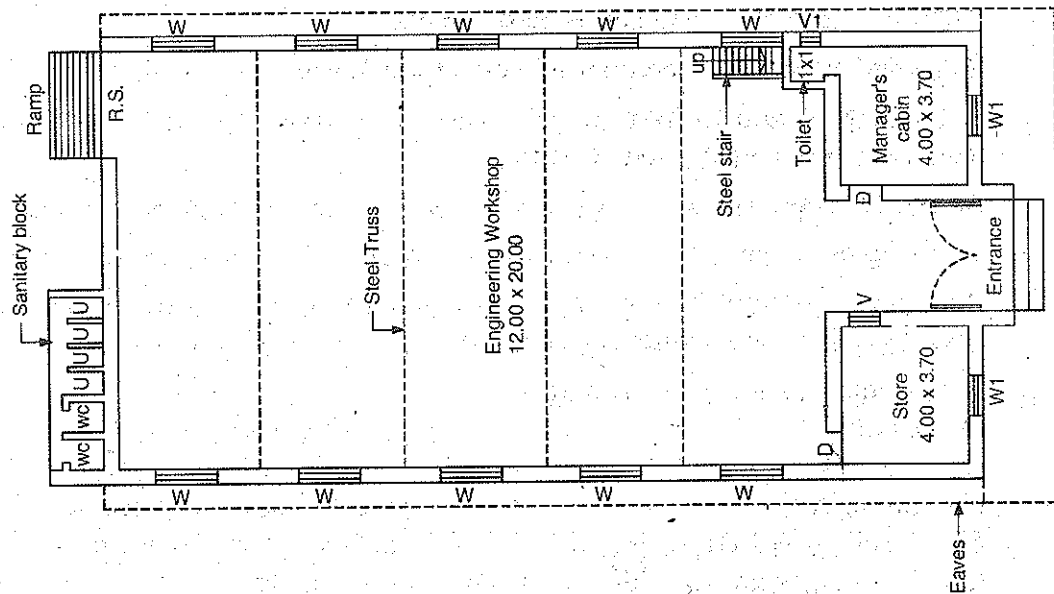


Fig. 9.24 Workshop Building Plan

Type-I :

G.F.(Ground Floor) structure having roof of A.C.(Asbestos Cement) or G.I.(Galvanised Iron) sheets. The steel trusses are provided to support the roof. Large scale industries follow this type of construction.

Generally in industrial buildings iron doors and windows are preferred. Wider door openings are preferred for convenience. They are protected by red oxide oil paints. Main door may be of glass or iron and generally covered by rolling shutters.

Type-II :

The buildings are constructed with R.C.C. slab. F.F. (First Floor) is provided on G.F. (Ground Floor) in future to provide activities other than manufacturing. Small scale industries follow this type of layout. R.C.C. work increase the cost of construction.

*** REMEMBER KEY POINTS ***

1. There are 12 principles of planning :
 - (1) Aspect (2) Prospect (3) Privacy (4) Grouping
 - (5) Roominess (6) Flexibility (7) Furniture requirements
 - (8) Circulation (9) Lighting (10) Elegance (11) Economy
 - (12) Sanitation
2. Proper aspect of a room can take advantage of natural resources like sunlight and breeze which is important for health and comfort.
3. Suggested aspect for kitchen is East direction
4. Suggested aspect for bedroom is west or southwest in wind direction.
5. A building is said to have prospect when it presents a good and pleasing appearance when seen from outside.
6. As per principle privacy, doors should be provided in corners of rooms.
7. Grouping principle refers to easy communication and utility of various rooms.
8. Roominess principle refers to an arrangement of getting the maximum advantage from the minimum or limited dimensions of a room.
9. Basic requirements of a building :

<ol style="list-style-type: none"> (1) Comfort (2) Convenience (3) Strength (4) Stability and durability (5) Long life with minimum maintenance (6) Economical (7) Damp proof 	<ol style="list-style-type: none"> (8) Fire resistant (9) Thermal insulation (10) Coolness, heat resistance (11) Fresh air and wind (12) Sunlight (13) Termite proof (14) Safe and secure against steal
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10. Direction of sunlight, wind, rainfall and its intensity and type of surroundings are taken into consideration while deciding orientation of the building.
11. The long walls of the building should be placed towards North and South.
12. Verandah and balcony should be provided adjacent to the walls which are exposed to East and West to avoid direct heating of walls of rooms.
13. Shape, size and cost of plot are the factors of site selection.
14. There are main four types of residential building – detached, semidetached, row house and flats.
15. Line diagram shows the general shape of the building. It shows general arrangement of various rooms with their dimensions.
16. No. of steps = $\frac{\text{Plinth height}}{\text{Riser height}}$
17. To draw a plan, a building is imagined to be cut in horizontal plane at sill level and then it is viewed from top. It is drawn in 2D.
18. Elevations are generally drawn above the plan, by projecting vertical lines from plan starting from left end side to right end side of the building.
19. Section of a building is drawn in vertical plane starting from foundation to roof level with parapet. Dimensions, thickness, material type etc. all details are shown on section.
20. Considerations for industrial building planning :

(1) Location and site	(9) Windows and Ventilators
(2) Orientation and lighting	(10) Number and size of door
(3) Size of industrial shed	(11) Flooring
(4) Covered area of industrial shed	(12) Roofing
(5) Roads	(13) Water supply
(6) Plinth	(14) Drainage
(7) Height of roof	(15) Span
(8) Administrative building for industries	
21. Components of an industrial building :

(1) Canteen	(9) Parking
(2) Cloak room	(10) All weather roads
(3) Office and administration	(11) Factory shed
(4) Entrance	(12) Watchman's / Security cabin
(5) Loading unloading platforms	(13) Drinking water
(6) Medical aid	(14) Telephone
(7) Sanitary blocks	(15) Circulation space
(8) Storage building	

22. There are two types of industrial building :

- (1) Only G.F. structure with A.C. or G.I. sheet roof.
- (2) The structure with R.C.C. slab. F.F. can be extended on G.F. structure.

* REVIEW QUESTIONS *

[1] G.T.U., December 2008

- Q.5. (b) Draw a detailed PLAN of a room of size 4 m × 3 m. Take plinth height = 60 cm. Also prepare the schedule giving relevant description of door, window and ventilator and cupboard. [Page 9.15, Fig.9.17] 05

[2] G.T.U., March 2009

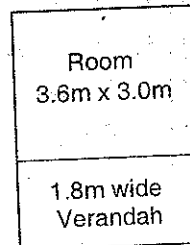
- Q.1. (b) Enumerate various principles of planning and explain aspect and prospect in detail. [Page 9.2, 9.3] 05

- Q.2. (a) Define the following : (iv) Circulation. [Page 9.5] 01

[3] G.T.U., June 2009

- Q.4. (c) Explain general principles of building planning. [Page 9.1] 05

- Q.5. (a) Draw detailed plan and sectional elevation of building from the following line sketch. Take brick wall thickness = 30 cm and plinth height = 45 cm. Suitably place the door, windows and cupboard. 06

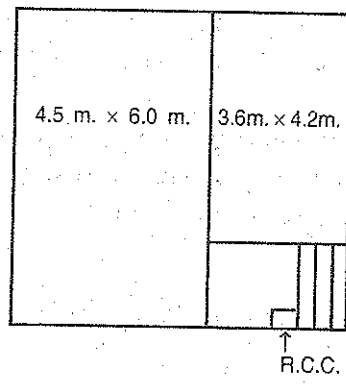


[Page 9.16, Fig. 9.18]

[4] G.T.U., September 2009

- Q.4. Draw the detail plan of a building from its line sketch diagram. Draw the conventional signs to show the brick work and RCC work. Also give dimensions of doors, windows, floor height, and plinth and parapet height. Draw the cross section of wall showing foundation and plinth with necessary dimensions. 14

Line sketch diagram, all dimensions are in metres.



[Page 9.13, Fig. 9.10]

Q.5. Write short notes on : (3) Aspect and prospect. [Page 9.3].

04

[5] G.T.U., January 2010

Q.4. (a) State the factors for selecting the site for a residential building. Also state the layout plan of an industrial building.

07

[Page 9.8, 9.21, Fig. 9.20 / Fig. 9.21]

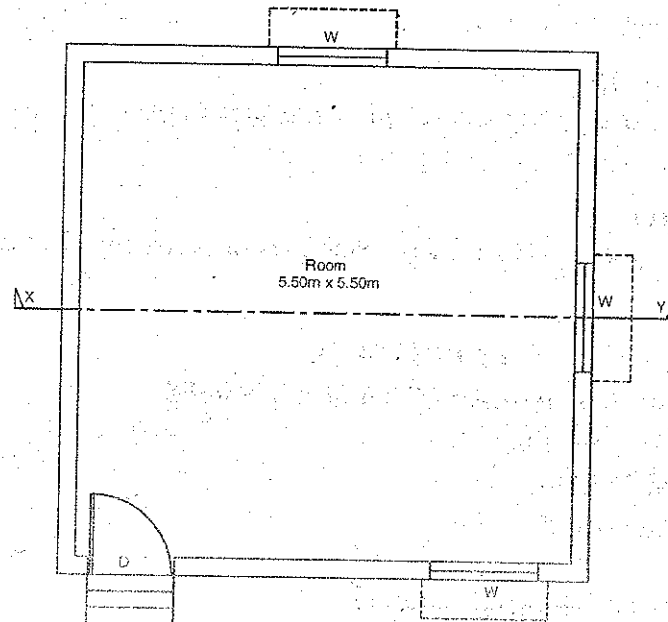
[6] G.T.U., April 2010

Q.3. (b) 1. Explain following principles of building planning :

07

Aspects, Roominess and Circulation. [Page 9.3, 9.4, 9.5]

2. Draw front elevation of given building to the scale 1:50. Refer given plan and data given in sketch no. 01 Assume any other data, if required, if not given.



Sketch No. 01

[Page 9.17, Fig. 9.19]

- Q.3. (b) 1. Sketch typical layout of an industrial building. Explain purpose of each segment / components of layout prepare by you. [Page 9.19, 9.21, 9.22, Fig. 9.20 / 9.21 and 9.22] 07
2. Draw section of given building at given plan 'XY' to the scale 1:50. Refer given plan and data given in sketch no. 01. Assume any other data, if required, if not given. [Page 9.17, Fig. 9.19]
- [7] G.T.U., June 2010
- Q.4. (b) Enumerate various principles of planning and explain aspect and prospect in detail. [Page 9.2, 9.3] 05
- [8] G.T.U., December 2010
- Q.1. (b) Explain Fundamental Principles for the planning of the residential building in brief. [Page 9.2] 05
- Q.5. (b) Discuss layout plan of a typical Industrial Building having usual units like workshop, store for raw material and finished goods, office, toilets etc. [Page 9.22, Fig. 9.22] 05
- [9] G.T.U., January 2011
- Q.4. (a) Enlist the principles of planning? Explain aspect and Roominess? [Page 9.2, 9.3, 9.4] 05
- [10] G.T.U., June 2011
- OR Q.3. (a) Explain the following principles of Building Planning : 05
- (i) Roominess [Page 9.4] (ii) Orientation [Page 9.6]
- (iii) Privacy [Page 9.4]
- [11] G.T.U., December 2011
- Q.5. (b) Enumerate various principles of planning and explain privacy and Roominess in detail. [Page 9.2, 9.4] 07
- [12] G.T.U., June 2012
- Q.2. (c) Explain (i) Aspect (ii) Roominess principles of planning a building. [Page 9.3, 9.4] 04

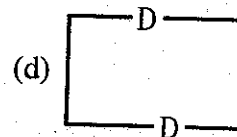
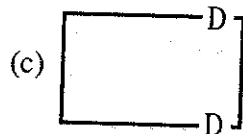
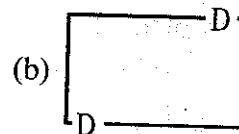
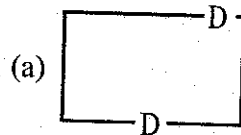
* EXERCISE *

1. Discuss about basic requirements of building planning.
2. Write short note on following.
 - (i) Orientation of building
 - (ii) Furniture requirement
 - (iii) Roominess
 - (iv) Requirements of industrial building
 - (v) Need of principles of planning

3. Draw a line diagram for residential building which accomodate a living room, a kitchen, a bedroom and a verandah. Assume suitable data and state clearly on sketch.
4. Draw a layout for industrial building of your choice. Assume suitable data and state them clearly.

* OBJECTIVE TYPE QUESTIONS *

1. Proper/suggested aspect for kitchen is
(a) North (b) South (c) East (d) West
2. As per principle of planning – Privacy, door should be located at
(a) Center (b) Corner (c) At any location (d) All of above
3. Suggested aspect for verandah and balcony is
(a) North-East (b) South-East (c) South-East (d) South-West
4. Suitable dimensions for 12 m² bedroom is
(a) 3.46 × 3.46 (b) 4 × 3 (c) Any of (a) & (b) (d) None
5. Horizontal circulation within building is possible by
(a) Verandah (b) Balcony (c) Passage (d) Staircase
6. Select suitable doors arrangement in a room from following



7. The long walls of the building should be placed towards
(a) North and East (b) East and West
(c) North and South (d) North and West
8. The short walls of the building should be placed towards
(a) North and East (b) East and West
(c) North and South (d) North and West
9. Verandah and balcony should be located adjacent to the wall which are exposed to
(a) East and West (b) West and South
(c) North and South (d) North and East

10. Which shape of land plot is not suitable for planning ?
 (a) Rectangular (b) Square (c) Triangular (d) None
11. The Residential building with all sides margin is known as
 (a) Detached building (b) Semidetached building
 (c) Row house (d) None
12. Number of treads in a staircase is equal to
 (a) Number of risers (b) Number of risers + 1
 (c) Number of risers - 1 (d) none
13. Number of treads for 45 cm plinth height and 15 cm Riser height
 (a) 3 (b) 2 (c) 4 (d) none
14. No. of risers in a staircase is equal to
 (a) Number of treads (b) Number of treads + 1
 (c) Number of treads - 1 (d) none
15. Plan is prepared by taking a cross section at
 (a) Foundation level (b) Lintel level
 (c) Slab level (d) Sill level
16. Elévation is drawn
 (a) above plan (b) below plan
 (c) on right side of plan (d) on left side of plan
17. What number of cycles can be accomodated in 12 m² parking area
 (a) 10 (b) 12 (c) 20 (d) none
18. An industrial building have
 (a) A.C. sheet roof (b) Rolling iron shutter
 (c) Steel truss (d) All
19. Suitable flooring for an industrial building is
 (a) I.P.S. (b) Kotahstone
 (c) Cement concrete (d) All
20. Minimum desirable width of step is
 (a) 75 cm (b) 1.0 m (c) 2.0 m (d) None

Objective Answers

- | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|
| 1. (c) | 2. (b) | 3. (d) | 4. (b) | 5. (c) | 6. (c) | 7. (a) |
| 8. (b) | 9. (a) | 10. (c) | 11. (a) | 12. (c) | 13. (b) | 14. (b) |
| 15. (d) | 16. (a) | 17. (a) | 18. (d) | 19. (d) | 20. (b) | |

* * * * *