

Functional Planning of An Administrative Building

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Abstract— An office building must have flexible and technologically-advanced working environments that are safe, healthy, comfortable, durable, aesthetically-pleasing, and accessible. The paper describes about the planning of an administrative building considering the functional factors such as orientation, lighting and ventilation, and activity and circulation space planning. These elements relate to the fit between the building and the user's activities. The planning satisfies specific space and equipment needs of the tenant. Special attention is made to the selection of interior finishes and art installations, particularly in entry spaces, conference rooms and other areas with public access. The plan of the three storied building is prepared using Auto CAD 2011. The three dimensional modeling is done in Autodesk 3ds Max 2013.

Keywords— *Administrative building; functional planning; lighting and ventilation; orientation; space planning*

I. INTRODUCTION

Architecture is a fine blend of art, creativity and logic, reinforced with a backbone of structural technology. An architect's role is to design an environment (inside and outside), which caters to human needs, both physical and psychological comfort and luxuries. Thus planning should always respect factors which play a major role in merging all elements of a building to suit the comfort of the occupants. Functional planning is an ideal concept of planning a building based on the principles of architecture and in accordance with the function served by it. Functional design pertains to the development of the plan to facilitate in purely practical way the purpose of the building. It includes various factors to be considered such as orientation of the building according to its location, ventilation, lighting, and space planning with proper circulation space, and ensuring linkage between rooms. Sizes of rooms are decided according to the requirements in accommodation and different rooms are grouped in their functional sequence. Thus every element may express its own function and altogether, the function of the building as a whole.

II. METHODOLOGY

Architectural designing always proceeds from the whole to the part. A suitable site is thus selected initially, accessible from the sister institutions. Planning is done giving due consideration to fulfill all the requirements of the administrative block, and simultaneously making it user friendly. The building is oriented in harmony with the climatic conditions of the location. Path of the Sun is traced and wind direction is identified to adjust the internal layout so that the rooms can be planned accordingly. While planning, positioning of each and every component of the room is given prior importance and spaces are allotted. The images of various rooms are then prepared in 3ds Max Software to give an interior view of the planned building.

III. FUNCTIONAL PLANNING OF BUILDING

Functional planning of a building is planning based on the principle that every element expresses its own function and altogether, the function of the building [3]. Hence it includes various factors to be considered such as orientation of the building according to its location, space planning, with proper circulation space and linkage between rooms, lighting and ventilation [2].

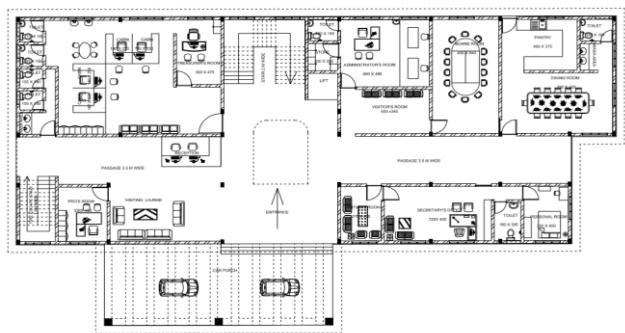


Fig. 1. Plan of ground floor

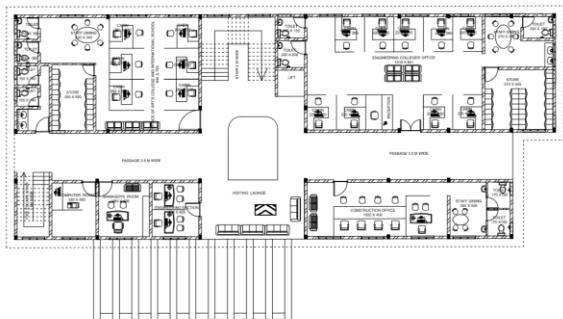


Fig. 2. Plan of first floor

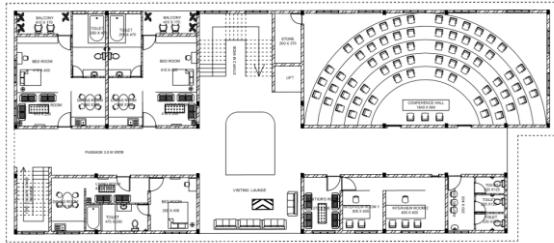


Fig. 3. Plan of second floor

A. Site selection

The directions and alignment of the plot with respect to north, determines the location of spaces within the structure, with respect to orientation principles. The most suitable site is selected considering access to site, characters of structures around the site, existing greenery, and dimensions of the site so as to get an idea of foreground and side margins, openness from point of view of ventilation, light and view, sound and air pollution, elevation of the ground with respect to the existing roads [1]. A suitable site is selected with size 78 m X 42 m with access from its South. The rear side of the plot is open with provision for enough ventilation and lighting.

B. Orientation

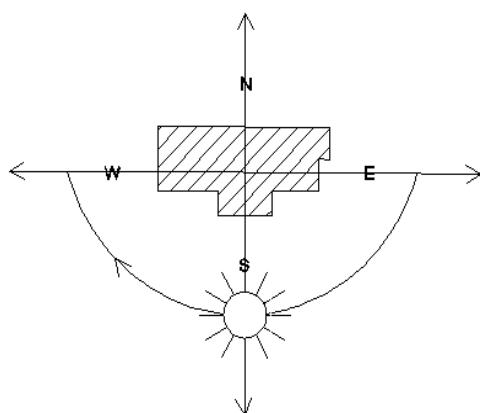


Fig. 4. Orientation of building

The building is proposed to be approximately in rectangular form with the longitudinal axis of the building aligned along the East-West direction where minimum heat is received thus achieving temperature moderation and natural day-lighting [4]. This provision causes minimum wall area to expose to direct sunrays and thus cause less absorption and radiation of heat as well as avoid glare. The exposure of south walls to the sun is reduced by providing chhajjas and sun breakers [1].

The cabins of the account section are towards the North to make use of the comfort zone with no direct sunrays and air conditioned rooms are placed towards the south [4].

C. Internal layout and circulation space

An office building incorporates a number of space types to meet the needs of staff and visitors, which includes offices, visitor support spaces, administrative support spaces, operational and maintenance spaces [2]. The function of each space, movement of people to and from the space, i.e. passages, and proper location of entries and exits are established. Preparation of furniture layouts for each space is an effective process for achieving this [3].

The administrative office building incorporates a number of space types to meet the needs of staff and visitors [2]. These include:

1) Offices

a) Administrative office

Administrative office is of 100 square meter area with 9 cabins, reception and waiting area. Circulation space and waiting area together consumes 54 square meter area. Entrance to the section is of 1.5m wide. Store and staff dining is provided adjacent to the office.

Cabins in the administrative office section are of size 260 cm X 220 cm. It includes working table of 160 cm long and 80 cm wide and a small shelf of 50 cm width can also be fitted into the space behind the table to give a functionally designed cabin. Cabin provides a total circulation space of 1.56 square meters, furniture space of 2.25 square meters and activity space of 1.91 square meters. Panels around the cabin are of 160cm height [3].

a) Account section

Account section is of 11mx8.4m size which includes 4 cabins, treasures room, staff dining and waiting area. Working space of 180cmx 220cm includes a table of 60cm width [3]. Treasurer's room is of 300cmx475cm dimension.



Fig. 5. Office cabin

2) Meeting rooms

a) Board room

An enclosed room equipped with appropriate information and communication technology. Board room is provided to hold meetings of the committees. The principal furniture in the board room is a large rectangular table with 14 chairs around it, enclosed in an area of 450cmx840cm. The table width is 2.0 m satisfying a minimum of 1.85m, to allow members on both the sides with their papers. It allows a 75cm space for persons [3].



Fig. 6. Board room

b) Conference room

Conference room of size 1840cmx840cm is laid out. It is always better that rear wall does not follow the line of curvature of the last seating row. The floor of auditorium is made rising towards the rear. The back to back spacing between two rows is 100cm. Passages along the width of the room is having minimum width of 1m. A minimum width of 1.2m is provided in between the rows of the seats and sidewall. Two access doors of width 1.5 m are provided satisfying the minimum width [3]. The artificial means of ventilation with fans and exhausts are also installed. For good sight and audibility, rows of seats are curved in plan. Separate room is provided to serve as a storage space.

D. Lighting and ventilation

Day-lighting strategies that potentially reduce the need of artificial lighting are provided. The front walls of the entrance and the common visiting lounge are glazed to receive maximum sunlight [5]. Good lighting is available with a vast entrance, giving a pleasing environment within the building [3]. The passage towards East has sufficient lighting due to glass wall at its end. Sky-lighting is also provided by means of an opening of 350 cm x 470 cm in the first and second floors, covered on the top by glass supported on steel framework over pergolas. This opening with long North-South direction is more effective in mitigating heat effects. Good distribution of light can be achieved by providing tilted or sloping portions along three sides of the opening so that the sunlight falling on it gets reflected towards the first- floor. The common visiting lounges at the first and second floors are also well-lighted by the transparent glass in the front. Ventilators and windows in the northern side also provide excellent means of ventilation and lighting. Besides, artificial lights are also provided according to the requirements.

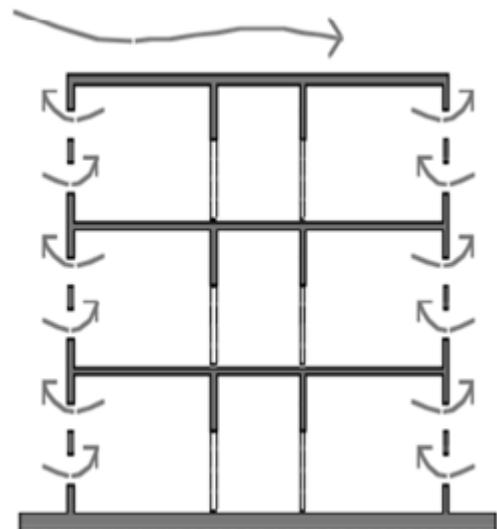


Fig. 7. Stack ventilation

The openings are oriented in such a way that maximum possible effort is made to prevail air during summer [4] and they are provided at low level of 0.6m so that incoming air stream is not deflected towards the ceiling. Window area is 20 percent of floor area [1]. Ventilators are provided as near to ceiling as possible in order to enhances natural ventilation by Stack effect and this accounts for an area of 5.3 square meters. With openings near the top of stacks, warm air can escape whereas cooler air enters the building from openings near the ground [5]. Windows of living rooms open directly to open space in the front. In the case of rooms with only one wall exposed to outside, provision of two windows on that wall is ensured. Provision of mechanical ventilation for circulation of fresh air as well as exhaust of used air can be made.

E. Acoustics

Acoustical treatment is to be done for clear human speech, musical instruments, echoes and other sources of noise for meeting rooms of the building. In order to avoid airborne noise carried from room to room or through small gaps around the windows and doors proper sound insulation is provided by using carpets, curtains and proper furnishings [4]. Conference room and board room are designed so as to prevent echoes. Concave surfaces which are liable to produce echoes are avoided in the design. Porous materials like fabrics, thermocol are provided. Concave divergence of the seats is employed with rectangular wall towards the rear. Since the capacity is only 60, ceiling can be horizontal without any uneven distribution of sound. The ceiling thus requires no sound absorbing material [3]. This completes the planning process, and now, a fully functional plan is ready.

IV. CONCLUSION

Functional requirements are to be taken into account for efficient planning of an administrative block. The time spent for this purpose is really worthwhile from the point of view of the correct approach to planning and construction. While planning a building, the principles of planning are considered in close association with the theoretical and practical aspects. All the principles may not be rigidly possible to adopt and there should be some scope of flexibility.

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