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Research Article

"CHALLENGES AND OPPORTUNITIES IN ERECTION OF A UNCONVENTIONAL BUILDING"; A STUDY

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A B S T R A C T

Construction Industries are playing the significance role in Indian economy. Today in Indian the population of rural area is migrating to cities. So the land rate for house is increasing rapidly. It is requirement of time that need be a home with sufficient space and is more economic than traditional house. Traditional building walls are covered the more space and these types of wall thickness are high. The design of the traditional building is complex and erection of building takes more time. The purpose of this paper is study the construction method of building which erected by unconventional method. The benefit of study will be describe in this paper and analyze the strength of building in comparison of traditional building.

INTRODUCTION

The paper will describe the mythology of unconventional building. According to Patil Dhanashree & Prof. Desai [1] today that speed of construction needs to be given greater importance especially for large housing projects. This is not only essential for the faster turnover of equipment and investment – leading possible to the reduction in the housing cost but also for achieving the national objective of creating a large stock to overcome shortest possible time. Fortunately, some of the advanced technologies catering to faster speed of construction are already available in the country. For e.g. Prefabrication, autoclaved blocks, tunnel formwork, aluminum formwork (MIVAN Technology) of construction etc. This paper describes the comparative analysis of conventional formwork and tailor made formwork on the basis of cost and time parameter.

The importance of material selection is shown by Ibuchim ogunkah, Junli yang [2]. Material selection is a complex and delicate task determined by the immense number of building material options. Likewise, multiple factors are often considered by the architect when evaluating the various categories of building materials. Mohamed S. Abdula & Ismailbin Rahmat [3] investigate whether the Malaysian current building projects are considered as "Green Designs".

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To achieve this aim a questionnaire survey was conducted. A sample of 274 respondents is covered, which included architects and engineers in the building design and consultancy sectors. WINSTEPS software is used in Rasch modeling to determine the validity and reliability of the data.

According to Geeta Mehta, Amit Mehta, & Bidhan Sharma [4] Green buildings is a concept on the same theory, In the effective view green construction includes, increasing energy efficiency of a building using green natural or renewable resources instead of non-renewable resources. In this paper we are presenting the factors to be considered to decide the selection of materials for green construction.

Conventional approach to earthquake resistant design of buildings depends upon providing the building with strength, stiffness and inelastic deformation capacity which are great enough to withstand a given level of earthquake-generated force. This is generally accomplished through the selection of an appropriate building configuration and the careful detailing of structural members. In this research, nonlinear pushover analysis has been used to evaluate the seismic performance of three buildings with three different plans having same area and height. This method determines the base shear capacity of the building and performance level of each part of building under varying intensity of seismic force. The results of effects of different plan on seismic response of buildings have been presented in terms of displacement, base shear and plastic hinge pattern. This is studied by Yaseer Alashker, Sohaib Nazar & Mohamed Ismaiel [5].

According to Kingsley Ukanwa, Noridah Mohamad & James B.P [6] lim PLFP is made up of two Whyte's with a polystyrene insulator placed in between them using a double shear truss connector of diameter 6mm placed at an angle 45˚. The panel is reinforced with both vertical and horizontal steel reinforcement of 9 mm diameter. Four panels with vary in dimensions are simulated to investigate their Ultimate Strength and Load-deflection profile. The results show that the length to thickness ratio of the panel is the major contributing factor to the ultimate strength of the PLFP. From the load deflection curve, the panel with the least deflection has the highest thickness which also results in a high Ultimate strength recorded at 34.43 KN.

Oustasse Abdoulage Sall, Mapathe Ndiaye, Alassame Thiam, Mathiorv Fall [7] studied the influence of mechanical and geometrical characteristics of the concrete and the soil on the stresses in a mat foundation. In this study, the soil-structure interaction is modeled by two parameters, the modulus of sub grade vertical reaction (k) and the modulus of sub grade horizontal reaction (2T). These two parameters are dependent on the geometrical and mechanical characteristics of the system. Results of this study show a sensitivity of solicitations to variations of geometrical and mechanical characteristics of the model. Although solicitations in the plate are sensitive to mechanical properties of concrete, these solicitations are strongly influenced by the mechanical and geometrical characteristics of the soil mass. However, it should be noted that the influence of E_b is denoted in the center of the plate whereas the Es feels almost in the same manner over the entire extent of the plate.

Mailui Xiong, Miguel Angel Hidalgo Calno [8] focused on how to provide a successful optimization method for a particular building type, high-rise reinforced concrete buildings. The optimization method is based on decomposition of the main structure into substructures: floor system, vertical load resisting system, lateral load resisting system and foundation system; then each of the subsystems using the design criteria established at the building codes is improved. Due to the effect of the superstructure optimization on the foundation system, vertical and lateral load resisting system is the last to be considered after the improvement of floor.

U.B Kalwane, Y.M Ghugal, A.G Dahake [9] investigated toughness of polymer modified steel fiber reinforced concrete. Volume fraction of steel fibers is varied from 0% to 7% at the interval of 1% by weight of cement. 15% SBR latex polymer was used by weight of cement. Cubes of size 150 × 150 × 150 mm for compressive strength, prism specimens of size 150 mm × 150 mm × 700 mm for flexure strength and, specimen of size 150 × 150 × 150 mm with 16 mm diameter tor steel bar of length 650 mm embedded in concrete cube at the center for bond test were prepared. A.M Jadhav & M.K.Munot [10] model with different percentages of corrosion and with varying load conditions was also generated. The deflections of RCC beam for different corrosion percentages and for varying load conditions were then validated. The model is then used to explore the effects of bar radial expansion, due to formation of corrosion products, on the cracking of cover concrete. The predictions are compared with tests results from reinforced concrete accelerated corrosion specimens. The aim of the analytical investigation was to reveal the mechanism for the development of concrete cracking due to corrosion of reinforcement.

Tarak Ali and Sameh Yenia [11] studied on using different methods to enhance the ultimate capacity of flexural behavior in RC slabs. Four RC specimens were casted with common compressive strength and reinforced with steel mesh. Specimens were strengthened with different methods such as usage of GFRP sheets, carbon fibers laminate strips and near surface mounted steel bars. All specimens were subjected to two-point loading setup. Load was increased from zero to failure load. First crack was recorded and crack pattern was observed. The behavior of strengthened specimens was compared to that of the control specimen to judge the efficiency of the used techniques.

Now the paper is discuss on the design room which dimension is

Size of Room = 13 * 15 feet

Wall thickness = 3"

Wall height = 10'3"

Height of door = 7'3"

Width of gate = 3 feet

Components of building

A building consist of following parts

1. Foundation: - Foundation can be termed as the most critical part of any structure and lowest part of building. The foundation of any structure are laid much below the surface of the ground to serve following purposes :
   - To increase the stability of structure against overturning due to wind uplift.
   - To secure a good natural bed.
   - To protect the foundation courses from atmospheric influence.
2. Plinth: - Plinth is the middle part of building form ground level to floor level. The basic function of plinth wall is:-
   - It transmits the load of superstructure to the foundation.
   - It acts as retaining walls.
   - It protects the building from damp or moisture penetration.

3. Walls: - The primary function of wall is to enclose or divide the space for uses of inhabitants. Walls are generally classified as load bearing walls and non load bearing wall or partition walls.
4. Doors and windows: - The main function of doors in a building is to serve as a connecting link between internal parts and also to allow the free movement into and outside the building. The main function of windows is to provide proper ventilation and lighting of a building.

Doors and windows should perform the following basic functions:-

- They should be strong enough to resist the effect of weather.
- They should be thermal and sound insulated.
- They should not be affected by termites and damp.
- They should offer fire resistance and should be durable.

5. Floors: - The main function of a floor is to provide support for occupants, furniture and equipment of a building. The floor should performs following functions:-

   - Floors should be heat insulated.
   - Floors must be sound insulated and fire resistant.

6. Sill and lintels: - Windows sills are provided between the bottom of window frame and wall below it, to protect the top of wall from wear and tear. Lintel is similar to beam in character. Weather shades are generally combined with lintels of windows.
7. Roofs: - A roof the uppermost part of a building whose main function is to enclose the space and to protect the same from the effects of weather. A roof must have the following functional requirements:-

   - It must be strong and stable.
   - It should be weather resistance.
   - It should be heat insulated.
   - It should be fire resistance.

8. Stairs: - A stairs case is used for moving from one floor to another floor. The following functional requirement are for a stairs:-
   - It should be strong enough to carry the load of people.
   - It should be fire resistance.

I should be offer comfort and convenience

Foundation: - A foundation is the lowest part of the building structure. It is called as ground sill which transfers the all loads of building to the ground. All the strength of building depends on the foundation. Foundation can be divided in two parts:-

- Shallow foundation
- Deep foundation

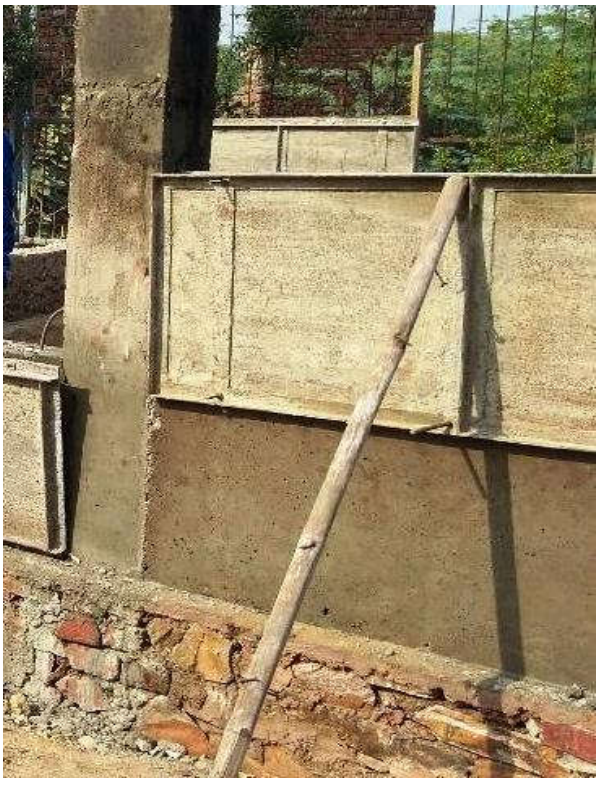
A shallow foundation distributes the load from the building on the upper layer of the ground. In this the depth of the foundation to the ground surface is five times less to the width of foundation. The different types of shallow foundation are

a. Strip Footing
b. Spread or Isolated footing
c. Combined footing strap or cantilever footing
d. Mat or Raft foundation

Deep foundation is type of foundation that transfer building loads to the earth further down from the surface than the shallow foundation its subsurface layer or deep depth. Deep foundation uses where the strata of the good bearing capacity are not available near the ground. In this project Deep foundation is used. In deep foundation piles foundation is used. Because this place have sandy soil so low bearing capacity is not sufficient for building or structure to stand. This project construction of foundation ratio is taken as 5:1. In project M_{20} concrete are used in the foundation and the depth of piles foundation is 3 feet and the width of pile foundation is 3/2.

Damp proofing in construction is a type of moisture control applied to building walls and floor to prevent moisture from passing in to the interior space. In this DPC is 8 mm and the thickness is 6 inch. Plinth is the portion of the structure between the surfaces of the surrounding ground floor. It helps to transmit the load of the super structure of the foundation. The plinth height depends upon the various factors such as need of architecture treatment to a building height flood level of area.

Now we discuss on the unconventional building. The mean of unconventional that the beyond the traditional building. In this construction is used only RCC frame wall and columns. In traditional building are using the bricks and cement. But in this construction is not using the bricks. So it may be consider the unconventional way to construct a building. In this construction RCC frame used to make the walls and columns. It reduces the man power efforts and time of construction. The unconventional building is more economic than the traditional building. The walls are the most essential component of a building. Walls provide privacy, security, and give protection against heat, cold sun and rain. In this construction is used 3" wall thickness and 10'3" height of the wall.



A pier is a member of similar to column except that it is bonded in to load bearing wall at the sides. Column are typically construction from materials such as stone, brick, block, concrete, timber, steel and some other have good compressive strength. In this project there are 6 columns of 9" each. Height of column 15 feet and the ration of the cement & sand 4:1 as M_{20} grade aggregate are used. In a column 4 bars of size 12mm are used for giving the better strength for absorb load. The distance between each bar is 9 * 9 inch. In these column 8 mm strips are used for joint the vertical bars. It fixed in 9 inch gaps and in a column 23 strips are used. The vertical bar of size 12 mm is providing for bearing compressive load. The construction of column is done by directly filled the RCC in the frame. The settle time for RCC as column form gave the 24 hrs. The ratio of sand and cement are taken 4:1 due to stability of column.

CONCLUSION

The construction of unconventional building is beneficial in terms of money and time. In rural are it may be more feasible than traditional way to construct the building. The labor are easily available in these are and the cost of labor are low. The benefits may be consider as following

1. The cost of the construction is lower than conventional building cost
2. The time of construction is low
3. The strength of building is higher than the conventional building
4. The Heat loss from the walls are low
5. The construction is more feasible

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