

# Design & Analysis of Hostel Building Through ETABS Software

Shubhankar Mishra<sup>1</sup>, Manas Rathore<sup>2</sup>

<sup>1</sup>Dept of Civil Engineering

<sup>2</sup>Assistant Professor, Dept of Civil Engineering

<sup>1, 2</sup> Kalinga University, Raipur-492001, Chhattisgarh, India

**Abstract-** Structural Analysis is the branch in which we determine the behavior of structures through which we can predict the responses of different structural components under effect of different types of loads. Every structure will be subjected to either one or multiple loads, the various kinds of loads normally considered are dead load, live load, earth quake load and wind load. ETABS (Extended Three-Dimensional Analysis of Building System) is the ultimate integrated software for the structural analysis and design of building. In this project “Analysis and Design of hostel building (G+5) through ETABS software” is an attempt to design and analyze a hostel building using ETABS. A G+5storey building is considered for this study. The analysis is design is done as per IS 456:2000 guidelines. This project is designed as per INDIAN CODES – IS 1893 part II: 2002, IS 456:2000. Drawing and detail are done using Auto CAD.

**Keywords-** ETABS, Building, Design, Analyses

## I. INTRODUCTION

In Civil Engineering there is a term called building which is used to mean a structure consisting various components like walls, columns, floors, roofs, doors, windows, ventilators, stairs lifts, foundation various types of surface finishes etc. Structural design and analyses are applied to create a structure having qualities such as resisting all applied loads without failure throughout its intended life. Before design and analyses of any structure, all the necessary information regarding soil has to be collected by using geotechnical investigation. A geotechnical site investigation is method of collecting information and evaluating the conditions of the site according to which the design and construction of the foundation is made for the structure. Structural engineers are always working to find the most economical and efficient design with accuracy as well as ensuring that the final draft of the building must be serviceable for its intended usage over its design life. There are various software packages which are available in the market for designing and analyzing all the types of structures viz. RISA, STAADPRO, ETABS, RAM, MIDAS, SAP and STRUDL etc.

The main objective of this study is to analyze and design a G+5 commercial building using ETABS software.

- To design structural components like footing, Column, beam, slab.
- To create and draw reinforcement details of structural components through the application of Auto CAD.

To achieve the objectives of the study that is to design and analyze hostel building using ETABS. The fundamental requirements such as safety, durability, economy, aesthetic appearance, feasibility, practicability and acceptability should be met. The following methodology should be followed: -

- Site survey
- Soil investigation
- Structural planning
- Analysis and design in ETABS

In first phase, surveying is to be done and then a plan or map is prepared for the area showing topographical details related to design of structure etc. Therefore planning has to proper and perfect. The application of a geotechnical site investigation is necessary to obtain sufficient site information for designing a structure in the proper time with minimum cost. The structural plan is prepared using a computer aided software, in this case it is prepared using AutoCAD.

ETABS is used for design and analyses of any type of project which includes bridges, towers, stadium, culverts etc. ETABS provides us with good, compatible and scalable solution that will fulfill each and every demands of the project. This project is designed taking into consideration INDIAN CODES- IS 1893-part2:2002, IS 456:2000. The analysis is carried out by considering severe seismic zones and behavior is assessed by taking type-II Soil condition.

**Varalakshmi V et.al (2014)** analyzed and designed a G+5 storey residential building and many components like beam, slab, column and foundation. The live load and dead load were

calculated as per HYSD bars and IS 875(Part I & II)-1987 i.e., Fe 415 are taken as per IS 1986- 1985. They concluded that the protection of the concrete building depends upon the initial architectural and structural configuration of the complete building, the standard of the structural analysis, design and reinforcement detailing of the building frame to attain stability of elements and their ductile performance.

- **Chandrashekar et.al (2015)** designed and analyzed the multistoried building by using ETABS software. A G+5 storey building under the lateral loading effect of wind and earthquake was considered for this study and analysis is done by using ETABS. They have also considered the probabilities of occurrence of spread of fireside side and therefore the importance of use of fire proof material up to highest possible standards of performance also as reliability. They suggested that the wide chances of ETABS software which is extremely innovative and easier for top rise buildings in order that time incurred for designing is reduced. Balaji.U and Selvarasan M.E (2016) worked on analysis and style of multistoried building under static and dynamic loading conditions using ETABS.
- **Balaji.U and Selvarasan M.E (2016)** designed and analyzed a multistoried building under dynamic and static loading conditions using ETABS. In this work a G+13 storey residential building was studied for the earth quake loads using ETABS. Here they took the material property to be linear, dynamic and static analyses were performed. The non-linear analysis was carried out by considering severe seismic zones and the behavior was assessed by considering type II soil condition. Different results like displacements, base shear was plotted and studied.
- **Geethu et.al (2016)** made a comparative study on analysis and design of multi storied building by STAAD Pro and ETABS software. They provided the details of both commercial and residential building design. Their plan was made in accordance with the national building code and was drawn using Auto CAD software. In that paper they concluded that comparing both software results, ETABS software shows higher values of bending moment and axial force.

## II. CONCLUSION

As we know that the building had similar floors ETABS is one of the best software that can be adopted for analysis and design. ETABS software allows us to analysis and design the building at the least time possible.

## REFERENCES

- [1] Limit State Theory and Design of Reinforced Concrete- Dr. V. L. Shah and Dr. S. R. Karve
- [2] Limit State Design- Dr. Ramchandra
- [3] Theory of Structures- S Ramamrutham
- [4] IS 456: 2000, Indian Standard Plain and Reinforced Concrete - Code of Practice, Bureau of Indian Standards, New Delhi.
- [5] IS: 875 (Part I) - 1987, Indian Standard Code of Practice for Design Loads (Other than Earthquake) (Dead Loads) for Buildings and Structures, Bureau of Indian Standards, New Delhi.
- [6] IS: 875 (Part 2) - 1987, Indian Standard Code of Practice for Design Loads (Other than Earthquake) (Imposed Loads) for Buildings and Structures, BIS, New Delhi.
- [7] IS: 875 (Part 3) - 1987, Indian Standard Code of practice for design loads (other than earthquake) (Wind Loads) for buildings and structures, Bureau of Indian Standards, New Delhi.
- [8] IS 1893 (Part 1):2002, Indian Standard Criteria for Earthquake Resistant Design of Structures, Bureau of Indian Standards, New Delhi.
- [9] SP 16 (1980): Design Aids for Reinforced Concrete to IS 456:1978, Bureau of Indian Standards, New Delhi.
- [10] SP 34 (1987): Handbook on Concrete Reinforcement and Detailing, Bureau of Indian Standards, New Delhi.
- [11] AUTOCAD and ETABS software for designing and analysis of structure.
- [12] Varalakshmi V, Gshivakumar and R S Sarma (2014) "Designed and d G+5 residential building by ETABS", International Conference on Advance in Engineering and Technology.
- [13] Chandrashekar and Rajashekar (2015), "Analysis and Design of Multi Storied Building by Using ETABS Software", International journals of scientific and research vol.4: issue.7: ISSN no. 2277-8179.
- [14] Balaji and Selvarasan (2016), "Design and Analysis of multistoried building under static and dynamic loading conditions using ETABS", International Journal of Technical Research and Applications e-ISSN: 2320-8163, www.ijtra.com Volume 4, Issue 4, PP. 1-5.
- [15] Geethu S N, Depthi M, Abdul Nasir N A and Izzudeen K M (2016) "Comparative study on design and analysis of multi storied building by STAAD.Pro and ETABS software"
- [16] AUTOCAD and ETABS software for designing and analysis of structure.