Design and Analysis of High Rise buildings using ETABS

Jenita Kuriakose, Sreya Shaji, Roshan Daniel, Jithu Sreekumar
B.Tech students
Dept. of Civil Engineering
Mangalam College of Engineering
Kottayam India

Mr. Richu George Varghese
Associate Professor
Dept. Civil Engineering
Mangalam College of Engineering
Kottayam India

Abstract : Civil engineering is a broad area in which buildings are planned and designed to meet specific needs. As we can see that many developments and changes happening in the sector of construction and everyday new commercial and residential building projects are initiated. As a result, thorough planning is required before beginning construction so that the work may be completed in a cost-effective manner while still meeting the needs of the users. The ETABS is an engineering software that helps in modelling, designing and calculating loads while making a structure. It is a very useful software in civil engineering field and provide a vast method to ease out the work of engineers. It analysis the structure in terms of static and dynamic loading conditions. The structure is analyzed in terms of static and dynamic loads. Today, there is a large scope in this subject, which allows many people to work in the respective field.

Ernakulam is a fast-growing metropolitan area. With this increasing growth comes problems of popoulation density, overpopulation and lack of land availability. To overcome this problem the most effective solution found out was high rise buildings. There are different types loading that act on a high rise building like wind load, earthquake load, live load, dead load etc. In this we are focusimg on wind load analysis on high rise buildings.

Keywords : ETABS, Wind And Seismic Analysis

I. INTRODUCTION

Civil engineering is a broad area in which buildings are planned and designed to meet specific needs. As we can see, there are numerous advances and changes taking place in the construction industry, and new commercial and residential building projects are being begun on a daily basis. As a result, thorough planning is required before beginning construction so that the work may be completed in a cost-effective manner while still meeting the needs of the users. The ETABS is an engineering software that helps in modelling, designing and calculating loads while making a structure. It is a very useful software in civil engineering field and provide a vast method to ease out the work of engineers. It analysis the structure in based on static and dynamic loads. Today there is a huge scope in this field and it gives the opportunity to many people to work in this respective field.

Ernakulam is a fast-growing metropolitan area. With this increasing growth comes problems of population density, overpopulation and lack of land availability. To overcome this problem the most effective solution found out was high rise buildings. There are different types of loading that act on a high rise building like wind load, earthquake load, live load, dead load etc. In this, we are focusing on wind load analysis on tall rise buildings.

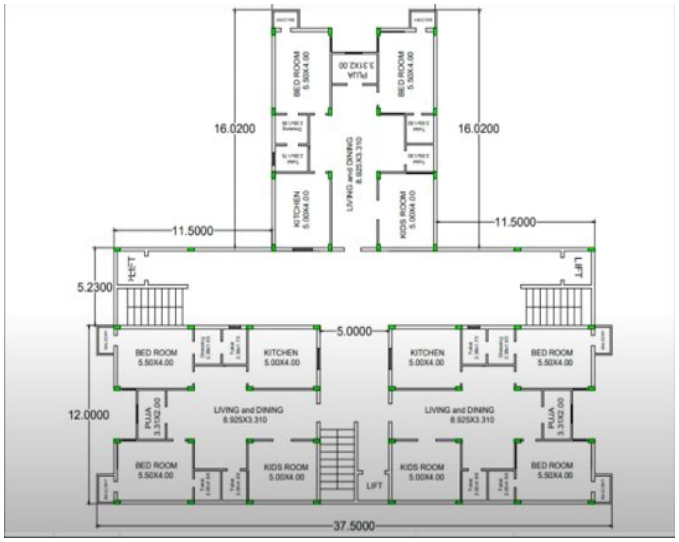
II. METHODOLOGY

The major focus of civil engineering is structural design. The design of the basic components and members of a building, such as Slabs, Beams, Columns, and Footings, is the most fundamental in structural engineering.

- Preparation of plan using AutoCAD
- Importing to ETABS
- Building modeling in ETABS
- Member Design
- Assigning load as pear IS provision
- Analyze structure using tool
- Drawings and detailing
- Results and Discussions
- Conclusion

Proposed Building Details

The proposed residential building is having each apartment of 3bhk having individual staircase and lift system that help for easy access to grounds



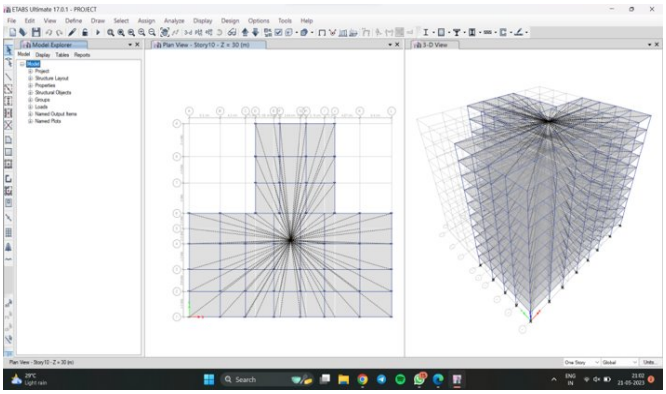
Data's For Modeling

Concrete grades = M40

Steel = FE600

Name	Type	E MPa	v	Unit Weight kN/m³	Design Strengths
A416Gr270	Tendon	196500.6	0	76.9729	Fy=1689.91 MPa, Fu=1861.58 MPa
A615Gr60	Rebar	199947.98	0.3	76.9729	Fy=413.69 MPa, Fu=620.53 MPa
Fe600	Steel	210000	0.3	76.9729	Fy=600 MPa, Fu=600 MPa
M40	Concrete	31622.78	0.2	24.9926	Fc=40 MPa

3D View In ETABS



Load Details

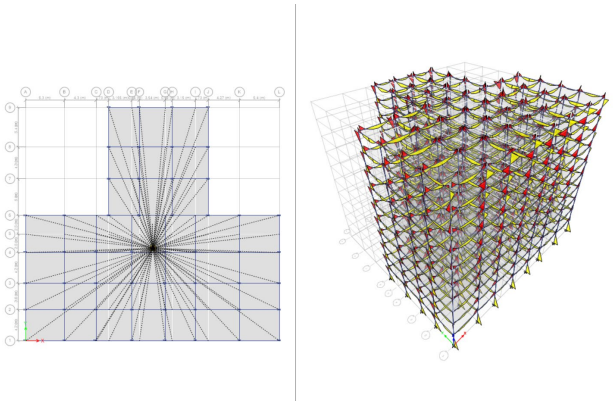
Considerations are made for dead load, live load, wind load, and seismic load. Due to the equipment and other embedded structures' selfweight, dead load is a major factor. The load may be taken into consideration based on the unit weight of each item, as stated in IS 875 (part I).

Load Patterns

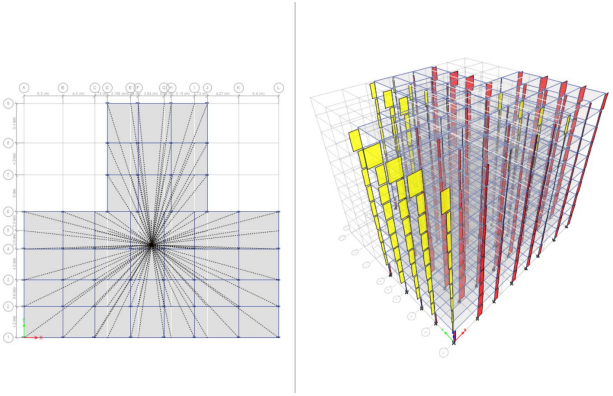
Name	Type	Self Weight Multiplier	Auto Load
Dead	Dead	1	
Live	Live	0	
EQ X	Seismic	0	IS1893 2002
EQ Y	Seismic	0	IS1893 2002
W X	Wind	0	Indian IS 875:2015
W Y	Wind	0	Indian IS 875:2015

ANALYSIS AND RESULT DISCUSSION

BENDING MOMENT



SHEAR FORCE DIAGRAM



III. CONCLUSION

The structure is based on the E-TABS design, which provides acceptable serviceability, strength, and economic work. Working time is saved by using E-TABS software, and it also assists us in precisely developing structures. The structural components were designed both manually and using software. There is not much land available in urban areas so buildings are constructed in story's to utilize the vertical space. Rather than destroying forests and swamps to build houses, shopping centers and factories, they can be placed in a vertical tower to serving to preserve the environment. The displacements, story shears increases as the wind speed increases. The high rise stories are more effected by the wind forces and the wind influence increases if the height of the structure increases further. It is observed that the lateral force excited on the structure have shown increasing severity with increase in the wind speed.

REFERENCES

- [1] U. H. Varyani, "Structural Design of Multi-storeyed Buildings", South Asian publishers, New Delhi, Second edition.
- [2] James Ambrose & Dimitry Vergun, "Simplified building design for Wind and EQ forces", Third edition, A Wiley inter science publication.
- [3] Mahesh N. Patil, Yogesh N. Sonawane. "Seismic analysis of multi-storeyed building" International Journal of Engineering and Innovative Technology (IJEIT) Volume 4, Issue 9, March 2015.
- [4] IS: 875:1987 (part-1 and part2) "Indian Standard Code of practice for design loads", Bureau of Indian Standards, New Delhi.
- [5] IS: 875:1987 (part-3) "Indian Standard Code of practice for design Wind loads", Bureau of Indian Standards, New Delhi.
- [6] John D. Holmes, Yukio Tamura, Prem Krishna,(2008) "Wind loads on low, medium and high-rise buildings by Asia-Pacific codes" The 4th International Conference on Advances in Wind and Structures 29-31 May 2008, Jeju,Korea.