Wind and Seismic Analysis of Building Using ETABS

YASHASHRI ANKALKHOPE[1], VAISHNAVI GHALE[2], PRATIK HARMALKAR[3], MAHESH GIRI[4], NIKHIL MHASKE[5]

[1, 2, 3, 4] *UG Student, Department of Civil Engineering, Dr D. Y. Patil School of Engineering & Technology, Pune-Maharashtra, India.*

[5] *Assistant professor, Department of Civil Engineering, Dr D. Y. Patil School of Engineering & Technology, Pune-Maharashtra, India.*

Abstract- Pune is the second most largest city metro politician city in the India state of Maharashtra and the 8th most populous city in India. It has been ranked as "the most liveable city in India". Several time. Nowadays in pune there is rapid increase in construction field. So, there is need of multi storey building. In seismic and wind analysis of building by using ETABS in this project we mainly deal with analysis and design of multi storey building by using ETABS software, considering loads that is, seismic load and wind load. Pune comes under zone II. We have taken G+11 storey building. The structure higher than G+5 is considered under the seismic loading. In this project we analysis and design of building using rectangular and circular column for economical structure. We find out the parameters like Bending Moments, Shear force, Base Reaction, Storey stiffness, Storey Shear, overturning moment, Storey displacement, Storey Drift etc. of all Storey of Building Discuss the results coming from the Linear Static Analysis method and Linear Dynamic Analysis (Response Spectrum Analysis) Method.

I. INTRODUCTION

In this modern technology of 21st century as urbanization increases the availability of land is becoming less, due to high population and cost of land become higher. To overcome this problem, the only solution is to prefer high rise structure. The effective design and construction of earthquake and wind resist structure have much greater importance in all over the world. For this ETABS provides both static and dynamic analysis for wide range of gravity, thermal and lateral loads. This analysis is mainly dealing with the study of an elliptical shaped plan by using AutoCAD software. It is to analyses the design of G+11. In this project, the "Seismic and Wind Analysis – Design of G+11 multi-storey RC residential building. The project is completed with reference to the Indian standard codes in planning we have used AutoCAD, Elevation, Interior and Exterior design with reference to

National Building Code 2005 Completed. Analysis of the structure is done in manual as well as using ETAB software. Designing of structural component are carried out using Indian standard code in limit state method.

1.1 Aim & objective of study

1. Analysis and Design of Building Using Rectangular Column
2. Analysis and Design of Building Using Circular Column.
3. The project work is aimed to fulfil the following objectives:

- Sizing and framing.
- Modelling and analysis in ETABS
- Design using Excel sheets developed
- Preparation of Reinforcement Drawings.
- To find out the parameters like Bending Moments, Shear force, Base Reaction, Storey stiffness, Storey Shear, overturning moment, Storey displacement, Storey Drift etc. of all Storey of Building Discuss the results coming from the Linear Static Analysis method and Linear Dynamic Analysis (Response Spectrum Analysis) Method

II. LITERATURE REVIEW

Title: Analysis and design of G+20 residential RCC building by using ETABS in zone II
Prepared by: C. V. Siva Rama Prasad, N. Sai Pavan, A. Varun Kumar, G. Sandeep Kumar, S. Sampath.

Assistant Professor, Department of Civil Engineering, Vignana Bharathi Institute of Technology, Aushapur (V), Ghatkesar (M), Medchal (D), Telangana, India.

Title: Seismic Analysis & Design of Multi story Building Using ETABS
Prepared by: Rinkesh R Bhandarkar, Utsav M Ratanpara, Mohammed Qureshi. Student Department of Civil Engineering, Faculty of Engineering Technology and Research, Bardoli, Gujarat, India, Assistant professor, Department of Civil Engineering, Faculty of Engineering Technology and Research, Bardoli, Gujarat, India.

Title: Seismic and Wind analysis of a multi storey building (G+12) by using ETABS software
Prepared by: C. Venkata Siva Rama Prasad Vignana Bharthi Institute of Technology

III. CASE STUDY

Dynamic analysis of G+ 20 multi storied building by using shear walls in various locations for different seismic zones by using Etabs

Prepared by: Shaik Akhil Ahamad, KV Pratap

Location: Narasaraopeta, Guntur, India

General: These Structural Engineers are mainly concerned with finding out the behavior of a structure when subjected to horizontal forces and adequate stiffness is required for the buildings which are high rise in order to confront horizontal forces aroused by winds and earthquakes. To confront the horizontal forces i.e., lateral loads developed by earthquakes and to contribute more stiffness to the structure they use Shear walls, which are added to the interior of the proposed structure. There main paper aims to study the usage of Shear walls at different locations in a $G+20$ multi storied residential building and to study the nature of the structure exposed to earthquake by adopting Response Spectrum Analysis. That Multi storied building with $G+20$ is analyzed for storey drift, base shear, maximum allowable displacement and torsional irregularity. They completed this analysis and modeling for the whole structure by using prominent FEM integrated software named Etabs 2015 in all the seismic zones of India prescribed by IS

1893 (Part-1) −2016. In this project the dynamic analysis they carried out on type -III (i.e., soft soil) for a irregular structure in plan in all the zones as specified and it is concluded that the structure with shear walls (i.e., Case C) placed symmetrically will show better results in terms of all the seismic parameters when compared with the structures without shear wall (i.e., Case A) and with shear wall at one end (i.e., Case B).
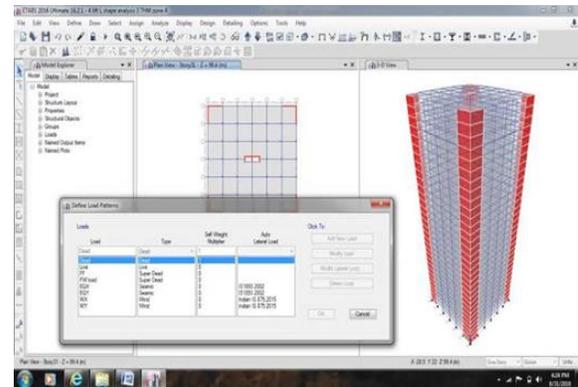
So, from this above idea we decided to do a project on wind and seismic analysis for building by using etabs.

IV. SCOPE OF THIS PROJECT

Based on project, study was undertaken with a view to determine the extent of possible changes within the seismic and wind behavior of RC Building Models.

- The RC framed buildings are firstly designed for the gravity loads, wind load and then for the seismic loads.
- The study introduced the symmetrical bare frame building models on using Response spectrum analysis.
- The study highlights the effect of seismic zone factor in Zone II {Pune Region} which is taken into account within the seismic performance evaluation of buildings.
- The study emphasis and discusses the effect of wind pressure and seismic zone factor on G+11 building structure.
- The whole process of modelling, analysis and design of all the primary elements for all the models are carried by using ETABS 2016 version software and AUTOCAD 2017 version Software.

V. METHODOLOGY

- Structural design is the primary aspect of civil engineering. The foremost basic in structural engineering is the design of simple basic components and members of a building viz., Slabs, Beams, Columns and Footings.
- The process of structure design involves the following steps:
1. Structural Planning
2. Calculation of Loads
3. Analysis of Structure
4. Member Design
5. Drawing and Detailing.

CONCLUSION

- Analysis was done by using Etabs software and successfully verified manually as per IS 456-2000.
- Etabs is the perfect useful software for this project which reduce the time for analysis and design.

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[5] IS: 875 (Part 3), "Indian Standard Code of Practice for design loads (Other than earthquake) for building and structures, Wind Loads" Bureau of Indian Standards, New Delhi.

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