Analysis And Design of High Rise Structure Subjected To Wind By Major International Code And Compared It's Results

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Abstract- *The rapid increase of the urban population in developing countries such as India, has forced the re-evalution of the importance of high rise building. The most prominent tall buildings are called high rise buildings. According to national building codes of india, A building having height more than 50 metre is called as high rise building. The study was conducted on 60 metre high rise building with geometrical building shape such as rectangular.The main aim of this paper is to understand provisions of American standard code and compare them with Indian Standard code. Today, The Building is modelled in 3D using ETABS, The comparative results are obtained from the different International codes .The comparative results are obtained from the different international wind loading codes and standards for terrain category 2 for all codes using ETABS software. Different perimeter like Base Shear, Story displacement, Story Drift.*

Keywords- ETABS, story Displacement, story drift.

I. INTRODUCTION

Buildings are defined as structure utilise by the people as shelter for diving, working or storage with rapid growth in population along with the development of industrial and commercial activities rapid urbanisation has take place which has resulted into continuous movement of rural people to metro cities. Many tall buildings are built worldwide especially in Asian countries such as china, koria, Japan, America.

the impact of wind load is to considered for the design of high rise building there are many failure of structure have occurred in India due to wind. From a structural engineer point of view high rise building is one that by virtue of it's height, is affected by lateral forces to an extent that they play an important role in the structural design.It is major challenge to study the impact and performance of tall building under wind loading . The building is modelled in 3D using ETABS software safety of building is checked against allowable limit prescribed for inter story drift, base share, displacement in code of practice. The two major international codes are used in these thesis.

OBJECTIVE:

1. To study and understand indian standard code and american standard code which are being used in these thesis.
2. To assign the loading value and other parameter to the structure according to the code of respective countries.
3. To obtained the structural parameter of the structure and generate the graph.
4. To compare the graph and decide which international code parameters gives good result.

II. LITERATURE REVIEW

1. Rakesh Choudhary, Prof. Vimlesh Agrawal, Prof. Vishal Arekar. Comparative study of along wind response of high rise building using major international codes with Indian code. (2019) - IS code gives the Higher value of base share, story displacement and story drift in comparison to NZ code and ASCE code, The NZ code gives higher value of ASCE code.
2. Md. Ahesan, Amit Yennawar. Comparative study of wind load analysis using different standard.(2018) - the american and australian standard gives the lower value of axial shear force, torsional moment and bending moment along z-direction as per indian load combination and loading combination prescribed in various code.
3. Kartik N, Varuna Koti. Comparative Analysis of high rise structure using various international codes.(2017) - it is apparent that the united state of american code has low value the structure analysed IS 1893: 2016 has shown better value, since EUROCODE surpasses all the other code when compared in terms of value obtained for structural parameters hence during the Design, Eurocode needs more reinforcement area when compared to other

codes due to increase reinforcement area with contrast to EUROCODE is more ductile.

4. Shams Ahmed, Prof. S. Mandal. Comparative study of along wind response of major International codes with Indian code.(2017) - the results obtained are quite different in spite of same basic gust wind velocity with averaging time of 3 second this is due to widely varied definition of wind characteristics in different code and standard. The gust loading factor value estimated buy ASCE-7 and EUROCODE also distinct due to their verried definition of wind characteristics parameter.
5. K. Rama Raju, M. I. Shereef, Nagesh R. Iyer, S. Gopalkrishnan. Analysis of Tall building subjected to wind and seismic load (2013) - In these paper, the response of tall building under wind load as per IS code of practice is studied. the model as 3D using ETABS software. the member force due to earthquake found using response spectrum method need to be multiplied by factor.

III. METHODOLOGY

* Description of Building Model: In these present study on RCC G+30 storied residential building models is taken for analysis and design from ETABS software. The grade of reinforcing steel and concrete used in the building are assumed to be Fe500 and M30 respectively.

* General features of the model structure.
Foundation - 2 m, Plinth - 1.2 m, Storey Height - 3 m, Column - 400×600 mm, Beam -300×450 mm, Corner bar - 25 mm Dia, Others bar - 20 mm Dai, C/C spacing - 40 mm, Stirrups - 10 mm Dia, Thickness of slab - 150 mm.

* Shear wall provided at only lift.
All wall thickness - 300 mm, Opening width - 1.2 m, Opening Height - 2 m.

IV. RESULT OF ANALYSIS

*Result obtained by Indian Standard :
Displacement- Maximum : 22.5 MM
Minimum : 0
Bending Moment - Maximum : 44.02 KN/N
Minimum : 7.247 KN/N
Shear force - Maximum : 39.54 KN
Minimum : 4.38 KN

* Result obtained by American standard code :
Displacement- Maximum : 24.5 MM
Minimum : 0
Bending Moment- Maximum : 54.77 KN/M
Minimum : 6.34 KN/M
Shear force- Maximum : 48.32 KN
Minimum : 5.89 KN

The Indian standard code is better value as compared to American standard code, The building is design under zone 2 (Mumbai).To Design the building by Indian standard the building is safe to all other parameters, In these papers story drift, displacement, share force, Bending moment are calculated under major international codes such as American standard code and Indian standard code.

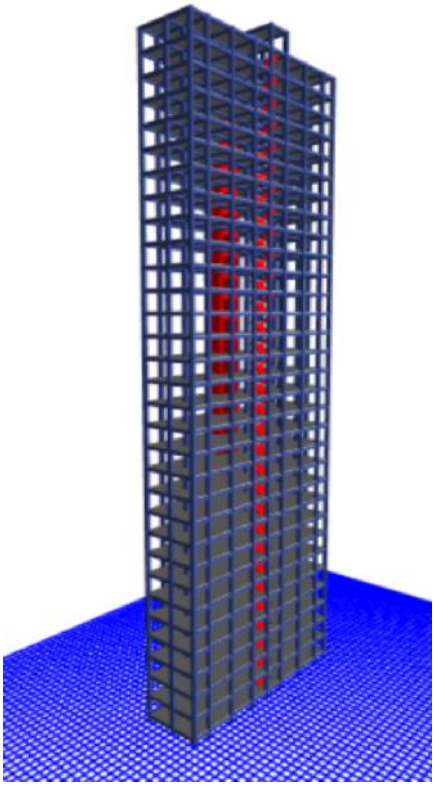
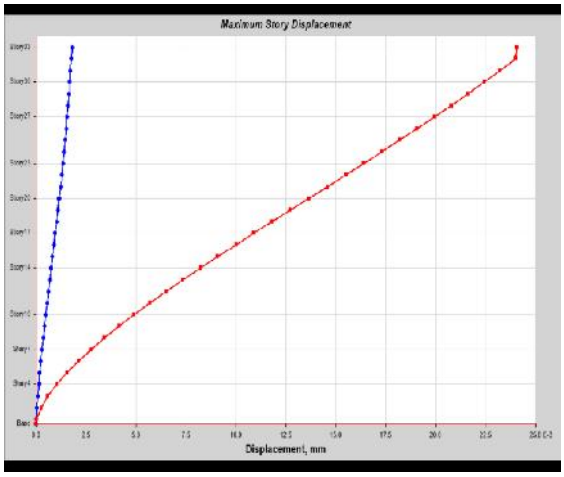
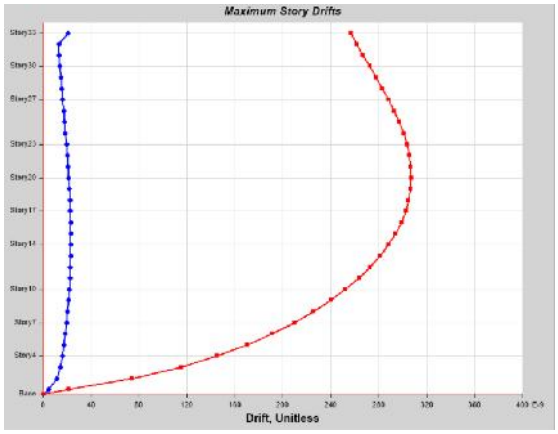


Fig. High Rise Structure

* By Indian standard - story displacement



* By Indian standard - Story drift



* By American standard code - Displacement

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[8] IS 456-2000 Plain and reinforced concrete code of practice, Bureau of Indian standard.

[9] IS 875 Part 3 Wind load on building and structure.

[10] ASCE7-05 Minimum design load for building and structure.