ANALYSIS OF RCC HIGH RISE BUILDING FOR WIND LOAD

Shubham Ramesh Shahare.

Shubham Ramesh Shahare, CIVIL engineering, G.H. Raisoni University Amravati.
Bharti Changode, CIVIL engineering, G.H. Raisoni University Amravati.

Abstract - Recently modern architecture means something regularity and irregularity in geometry. Everyone wants to win the race of designing beautiful and complex structures and with issue of scarcity of land it is today's necessity to go higher and higher vertical and construct high rise structures. But as we go higher wind excitation becomes one of the most precarious force acting on the surface of the structure and if the plan geometry is irregular it can induce torsion which can be life-threatening to the structure, so it is essential to analyze and understand such forces during designing. In this study the behavior of high rise building against the wind force in wind zone 2nd, L shape is studied and analyzed for specific heights. Also direction of wind plays very vital role in behavior of structure.

***Key Words*:** Wind pressure, High rise Structure, L shape geometry, Residential Building, Stress.

1.INTRODUCTION

From the beginning in the middle of the last century and right up to the present day, high rise buildings have always been a dominant landmark in the townscape, visible from far and wide, like the towers of Antiquity and the middle Ages. At the same time, this sky-scraping construction method has always been an ideal means of displaying power and influence in the community; another reason of construction of Tall buildings in large numbers is, due to scarcity of land and to meet the increasing demand for space for residential and commercial purposes. The safety of life and property is main aim of proper design of structure against lateral and gravity loads which are acting on the structure. These tall structures being slender light weight and with low structural damping undergo oscillations due to earthquake and wind loads. These oscillations are in direction of ground motions in case of Earthquake loading and along wind, across wind under the influence of strong winds. As height of structure increases, wind intensity also increases. At a particular height, wind force is the governing factor of design of structure against lateral loading. Many of such high, rise structures are needed in region where wind intensity is higher. Also in coastal regions where Tornados, Hurricanes are active, there is a need of wind design structures. So in this project, wind study is done and finds the effect of wind forces on the structures for different terrain categories and zones.

2. LITERATURE REVIEW

Analysis and Design of RCC tall building subjected to Wind loads. The Eighth Asia-Pacific Conference on Wind Engineering, December 10–14, 2013, Chennai, India

 Lateral loading due to wind load along with vertical gravity loads is important for finding the behavior of the tall buildings. As the height of a building becomes taller, the amount of structural material required to resist lateral loads increases drastically.

 The design of tall buildings essentially involves a conceptual design, approximate analysis, preliminary design and optimization, to safely carry gravity and lateral loads. The design criteria are strength, serviceability and human comfort.

 The main objective of study is to carry out the analysis of G+40 multi stored residential building against wind loads as per Indian standard codes of practice IS 875(Part 3):1987.

Design of High-Rise Buildings. (Author: Fazlur R. Khan .Seminar ASCI Chikago Fabricators)

 The continuing economic prosperity and population increase in the urban areas point toward a future with increased activity in high-rise construction of residential and office buildings.

 However, construction of high-rise buildings can be economically attractive only if the structural engineers can have comprehensive understanding of the structural behaviors of various systems on one hand and the practical sense of the construction.

 The purpose of this paper is to briefly discuss the various aspects of a multi-story structure with particular reference to the latest AISC Code and point out the interpretations of the theory and practice involved in each case that may lead to more efficient multi-story structures.

3. EXPECTED OUTCOMES AND NEED OF THE STUDY

The wind analysis on multi-storey building in different terrain categories and zones. The main purpose of this study is to analyse the highest multistory buildings.

- Analyzing different building with their different height for wind analysis.
- To determine various results for high rise building after the wind forces applied.
- The comparative study of different number of RCC and composite structures.

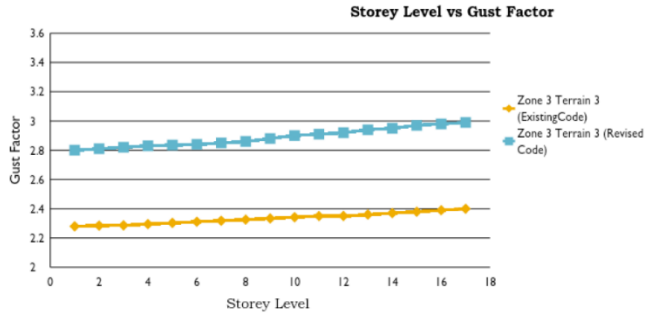
4. OBJECTIVES

1) Study of Existing Code IS: 875 (Part 3)-1987and Revised Code IS: 875 (Part 3)-2015

2) Analysis of structure with wind load for various load combination using STAAD Pro.

3) Study the structural response for terrain category 3 and 4 for Existing Code and Revised Code.

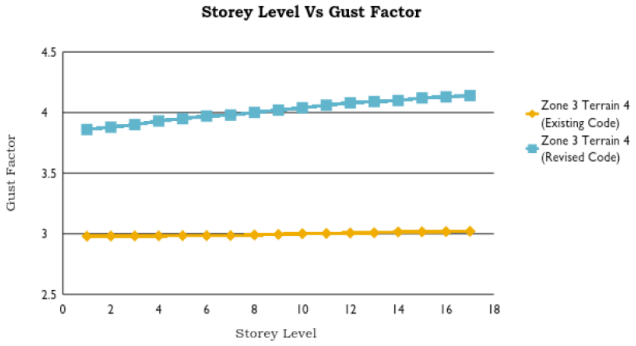
Chart -1



Storey Level vs Gust Factor Zone 3 Terrain 3

Storey Level	Base	Middle	Top
% Increased	18.5	22.9	24.5

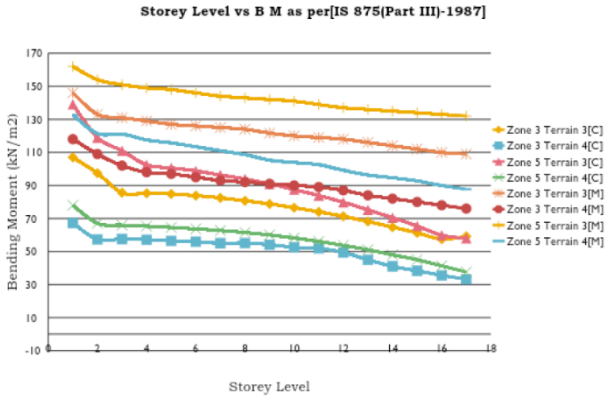
Chart -2



Storey Level vs Gust Factor Zone 3 Terrain 4

Storey Level	Base	Middle	Top
% Increased	29.5	33.7	37.1

Chart -3



5. CONCLUSIONS

1) The procedure given by Revised IS Code is more systematic andconvenient as compared to Existing IS Code method as the values fromthe graphs need not to be interpolated.

2) The revised IS Code gives more sensitive and accurate values ascompared to old IS Code as there is 30% to 40% increase in Gust factorvalues.

3) The revised IS Code give s higher values for parameters such asBending moment, Shear Force and Storey Drift Ratio , so the structurewill be much safer if we design the structure by revised code.

4) Middle column gives more value for Bending moment and Shearforce as compared to corner column , so the more cross sectional areaand reinforcement required as compared to corner column.

5) The critical load combination is found to be 1.5(DL + WL) Z +ve , asit gives maximum values for Bending moment and Shear force.

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