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A Literature Study of Wind Analysis on High Rise Building

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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.*

Keywords**— Wind pressure, High rise Structure, L shape geometry, Residential Building, Stress.**

I. INTRODUCTION

In India residents are increasing gradually and the necessary land for living. It is a key requirement to survive anywhwere.For that reason multi story building are best choice for construction in Metro cities where a smaller amount of property is presented. As designer knows multi story structure provides large floor area in small area and it is beneficial also . hence, it is required to assemble high rise structure. If high rise structures are constructed than many structural troubles come to pass, such as lateral load effect, lateral displacement and stiffness etc. Normally for high rise structure wind and earth quake load effects are prevailing. Therefore for high rise structure it is essential to have knowledge of different loads and its effect on structure. There is many type of effect worked on structure and causes for failure.The effect of lateral load is very important to consider such as earthquake and wind loads. In some cases the wind load is important than earthquake load which depends on place and zone factor distinct by codes. Wind load or wind effect is as dangerous as earthquake as previous study say. Defining wind there are two aspects first one is helpful which is to produce power and gives relief in hot and humid environment and second one is parasitic which comes out to be factor believe for engineers. As a designer engineer wants to be safe his structure This wind effect will cause and produce wind induce movement in the structure. As high rise buildings move onward the envelope to larger heights, the structural designers are not only faced with difficulty to choosing a structural elements to take the lateral load such as wind load and earthquake load but also insuring the design criteria that meets reliability and serviceability requirement under difficult wind environment.Wind load take action as lateral weight on buildings which is act as along and across wind. In IS Code 875 (Part3)-1987, the basic wind speed are specified in map and categorized by zones. The shape and size of building is very significant in wind analysis, because the wind pressure is mainly depends on the exposed area of building in opposition to wind speed.

II. LITERATURE SURVEY

Arvind Y. Vyavahare1, Godbole. P.N2, Trupti Nikose3, 2012, As author study that Tall buildings are slender flexible structures in nature and require to be examine to settle on the significance of wind speed induced excitation along and across the path of wind in specific zone . The Indian codal provision of practice for wind load on any buildings and structures (code IS-875 Part-3 1987) gives a procedure to determine along wind response of tall structures, while the across wind response and intervention effect are not included in the code at present. A article 'Review of Indian Wind Code IS 875 (Part 3) 1987' has been set by IIT Kanpur under GSDMA project gives recommendations to gain across wind reaction of tall buildings and structure as per process given in Australian/New Zealand standard 'Structural Design Actions – Part 2 Wind Action (AS/NZS 1170-2 : 2002) In the Australian codal provision to obtain the cross wind response it is necessary to compute the coefficient (Cfs) for which figures and expressions are specified for selected (h:b:d) ratios. In this paper use of Artificial

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Neural Network (ANN) has been made to generalize the above process from the limited available data, so that across wind response can be obtained for a building with given (h:b:d) ratio.

Shaikh Muffassir [1],L.G. Kalurkar [2], 2016, This study shows The high rise structure or building is the necessity of metro cities. The multi story high rise RC building are more large and less elastic in nature as judge against to compound structures. This study investigates the similarity or comparison between RCC and composite structure under the effect of wind, additional to it compound structure also includes unlike plan configurations. this study has total 15 number of building model are arranged and analysis for wind load by using ETABS 2015software. The various software are work on wind and earthquake analysis but we goes for software ETABS 2015.The wind analysis is performed for unlike heights such 20m, 50m and 80m respectively. In adding together, the comparative study concludes that the compound structure are bigger elastic in nature and more at risk as compare to RCC structure and the compound option is better than RCC for multi story structure. Whole study is observed in software analysis.In addition, the comparison of unlike plan configuration shows that the response of parameter such as story displacement, story stiffness, base reaction and time period under effect of wind. The reason of this analysis is to conclude the most efficient shape of construction in horizontal zone.

N. Lakshmanan, S. Gomathinayagam*, P. Harikrishna, A. Abraham and S. Chitra Ganapathi, 2009, Long-term data on hourly wind speed from 70 meteorological centres of India Meteorological Department have been collected. The daily gust wind data have been processed for annual upper limit wind speed (in kmph) for each site. Using the Gumbel probability paper approach the intense value quantiles have been derived. A design basis wind speed for each site for a return period of 50 years has also been evaluated. The sitespecific changes in the design wind speeds in the contemporary wind zone map for the design of buildings/structures are highlighted and revision to the map issuggested..

Tharaka Gunawardena1*, Shiromal Fernando 2, Priyan Mendis 1, Bhathiya Waduge 2, Dilina Hettiarachchi 2, 2017, Urban habitats around the world are becoming more congested with rising populations and the need for tall buildings is as high as ever. Sri Lanka is experiencing this reality at present as Colombo's skyline expands rapidly with a large number of upcoming complex high-rise buildings. The response of tall buildings to wind forces is a critical design criterion and it requires both conventional force based designs as well as performance based solutions. This paper discusses these challenges and the engineering solutions that they require to successfully design a tall building which is not only stable, safe and strong under wind loads but also performs excellently providing usable and highly functional design.

Umakant Arya1, Aslam Hussain2, Waseem Khan3. (2014),

In this study paper, the investigative result of wind speed and structural response of building frame on sloping ground has been studied and analyze. Considering various frame geometries and slope of grounds. Combination of static and wind loads are considered. There is many type of sloping ground. For combination, 60 cases in different wind zones and three different heights of building frames are analyzed. STAAD-Pro software has been used for analysis purpose. Results are collected in terms of Storey-wise drift ,Shear force, moment, axial force, support reaction, and Displacement which are critically analyzed to count the effects of a variety of slope of ground.

K.R.C. Reddy1 (2015) In different type of high rise structure chimney has its own importance. Along wind analysis of tall reinforced concrete chimneys by casual vibration approach and Codal methods of India (IS 4998 (part 1)), America (ACI 307) and Australia (AS/NZS 1170.2) are offered in this paper. For the analysis based on casual vibration approach, the RC chimney is model as multi-degree-of freedom system subjected to static load due to mean constituent of wind pace and dynamic load due to changeable component of speed. The changeable component of wind speed at a point is careful as temporal random process. subsequently, the codal procedures for along-wind analysis of tall RC chimneys from Indian, American and Australian codes are reviewed. Four RC chimneys are analyzed using these methods to achieve their responses. It is found that the codal methods of along-wind analysis are basic, are not prepared to estimation the deflection of the chimneys and producing mixed results. The simplifying assumptions used in these codes are discussed.

III. EXPECTED OUTCOMES AND NEED OF THE STUDY

The wind analysis on multi-storey building in wind zone second, the structures situated in indore (m.p.).The main purpose of this study is to analyse the highest multistory building in Indore.

- 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.

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IV. PROBLEM FORMULATION AND OBJECTIVE

The performance of RC structures before and after the application of wind forces.. In this study we are introducing new and the highest building of the indore for get better performance of building during the wind.the study to be done in wind zone second and the highest building in the region is the uniqueness of the study.

The specific aims and objectives of the project can thus be mentioned as:

a. Analysis of wind on G+19 storied RC Residential building as per IS codal provided with different shapes .
b. Analysis of wind G+19 storied RC Residential building with different stories.
c. Analysis of wind G+19 storied RC Residential building story drift , base reaction and displacement

V. CONCLUSION

On performing the extensive survey of the literature available n building structure it can be concluded that due to a wide variety of buildings, the in depth understanding in the field of wind Analysis and design of building structures is inadequate. The IS codes has provided certain guideline on the basis of which the building structures can be designed when subjected to wind loads. The literature survey in the performance and behavior of building structures when subjected to wind loads suggests that the requirement of establishing a methodology for studying the response of building structure to winded loads has become essential. Many researchers has performed work over various types of building. on the different types of buildings and find out the important parameter which is useful for understanding the behavior of wind forces.

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