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Review paper on Analysis of a G+12 story RCC building using IS-875 (part 3) for basic wind speed 50m/s using STADD PRO software

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Abstract – *The buildings are subjected to lateral loads due to wind acting on the building structure. As we know, Buildings are constructed for residential and commercial use. In design practices there is the most varying phenomenon is a wind which is having static and dynamic effect on structures especially on flexible high rise building. The main objective of this project is to design a multistorey building using Indian Standard code i.e. IS-875 (part 3) 2015 for a basic wind speed of 50m/s using STAAD-Pro V8i computer software. It will be performed on a multi storey building to identify the lateral force, intensity, displacement, storey drift, wind load, dead load, and combination of wind load which is obtained from software after assigning data.*

Key Words: **Structural analysis, Intensity, Displacement, Reactions, High rise buildings, Basic Wind Speed, Story drift,IS-875 (part-3) 2015.**

1. INTRODUCTION

In past decades, several international building codes and standards have been developed and established for evaluating the effect of wind load on flexible high rise buildings, taking into account the influence of an structural geometry, constructions in the surrounding area, terrain category and site exposure category, and wind characteristics as well. Generally in wind is considered in the practices for design of high rise building, when a building structure comes in contact with wind both positive and negative pressures will occurs on buildings. The building must have sufficient strength to resist pressure to prevent wind effects on building failure. The wind natute is very unpredictable, even for the same locality area the wind speeds are extremely different and one may experience the effect of gusts lasting for few seconds. In convection current the radiation results acts in both direction i.e. upward and downward. Geographic location and obstruction near the structures are some of the factors on which the effect of wind on structure depends; much variation causes due to air flow and also characteristics of building itself.

Codal provision is one of the basic and important aspects for a structural design, especially for the multi storey building. Different codal provisions are affecting design parameter which leads its effect on the specification and cost of building.

1.1 Importance of Research Topic

This research objective is to design a multistorey building using Indian Standard code. This paper was carried out to find the percentage economy of the construction of buildings on which wind speed is accumulated. The technique used in order to obtain to objectives involves the comparison of multistory RCC building for basic wind speed. As the costal area has the more wind speed, which effect on building are more. The analysis and designing phase of this project work was done by using STADD PRO V8i software. The results of STAAD analysis were validated with the results of Manual analysis. To determine the which one is better so planning of construction in wind prone zone is considered analysis and design is carried out using conventional standard codes.

1.2 Objectives of the study

1. To study the IS: 875 part 3 for wind loads.

2. To analyze the G+12 building for basic wind speed (50m/s) using Indian standard code.

3. To find what parameters affect the G+12 building using basic wind speed of (50m/s).

2. LITERATURE REVIEW

1. **Shreenidhi H M, Shivaraju G D, Dr. T V Mallesh, S R Ramesh** (Aug. 2019) It can be concluded that IS:875(part 3) 2015 code will provide high safety to the structure for dynamics

2. **Md Ahesan Md Hameed, Amit Yennawar** (march 2018) Indian and Australian standards having same terrain categories. Gust factor is decrease with ht. because the ht. of frame increase the fundamental frequency decrease.

3. **Kilari Lkshmi Kanth Patrudu** (April-2018) As by analyzing the building the bending moments and shear forces are increased by 25% in the critical case compared with codal wind speed result..

4. **Sayyed Javad, Hamane Ajay A.** (May-2018) On the basis of analysis the values of Indian standard are

more as compare to American standard because of lack of seismic data such as detailed ground acceleration for different timings.

5. **Shaikh Muffassir, L. G. Kalurkar,** (July-August 2016) The parameter study shows the effect of wind load on multi story structure is accountable for high rise structure and also depends on shape of building.

6. **Chang-Abdulmonem A. Badri, Manar M. Hussein and Walid A. Attia**, (August 2014) All the ASCE 7,BS6399,EC Draft 201-08 codes shows linear distribution of shear forces with ht. above ground, whereas the wind tunnels tests result are somehow curved, this allows for a reduced overall effect of wind tunnel loads when compared to these codes.

7. **Mustafa M. Wagh and Ankita M. Sukhija,** (Sept. 2016)as per this, Composite structures are better for high rise structure as compared to rcc and steel structure.

8. **K. Surtesh Kumar** (july 2011) Many other subject matter from the IS-875 standard such as wind speed map, loading on roof and other structure requires revision as well. In summary, it is vital that the review and update of the existing provision (IS-875,part 3, 1987) shall be carried out at the earliest.

9. **N G Shilu and Dr. H S Patel,** (Oct.-Dec 2011) As per this paper the calculated values using GSDMA code is matching with corresponding values of solved example.

10. **Indian Standard 875 (part 3)-1987 and 2015** "Code of practice for design loads (other than earthquake) for building and structure part 3 wind loads (second revision)."

3. DESIGN PARAMETERS

BASIC WIND SPEED	50 m/s
ZONE	II
CITY	CHENNAI
TERRAIN CATEGORY	IV
CLASS	B

4. RESULT AND DISCUSSION

1 Load calculations

DL:

Full brick wall load-18.4 KN/m

Half brick wall load-12 KN/m
Floor load-3.125 KN/m
Parapet load-5 KN/m

LL:

Live load for floor-5 KN/m

2. Design Speed

Vz = Vb×K1×K2×K3×K4
=50×1.08×k2×1×1.30
=70.2× K2 m/s

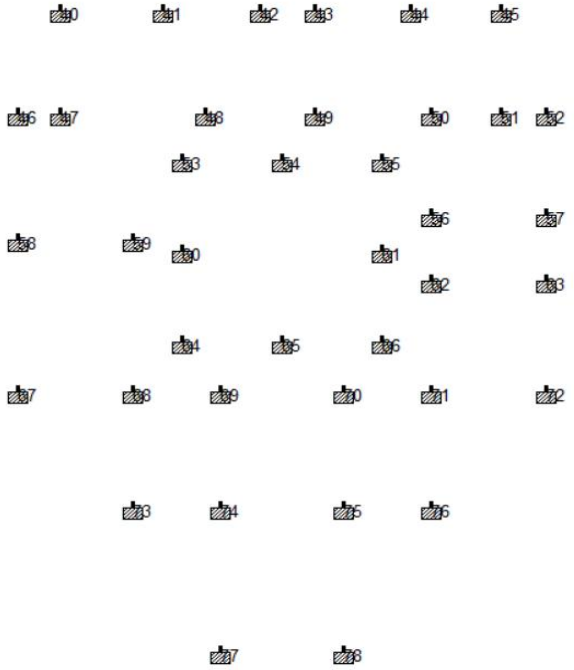
Pz= 0.6×Vz^2

Following table shows the calculation of pressure intensity,

Ht.	K2	Vz = 70.2K2	Pz = 0.6*Vz^2
10	0.80		
12	0.80	56.16 m/s	1892.367 N/m^2 1.892 KN/m^2
15	0.80		
16	0.80	56.16	1.892 KN/m^2
20	0.80	56.16	1.892 KN/m^2
24	0.87	61.074	2.238 KN/m^2
28	0.936	65.707	2.590 KN/m^2
30	0.97		
32	0.983	69.007	2.857 KN/m^2
36	1.01	70.902	3.016 KN/m^2
40	1.035	72.657	3.167 KN/m^2
44	1.06	74.412	3.322 KN/m^2
48	1.087	76.307	3.493 KN/m^2
50	1.10		

The following results are obtained after analysis of building.

1. Column Reactions



Number of nodes	Fy KN	Mx KNm	Mz KNm
40	1297.71	132.262	349.38
41	1193.197	68.35	276.867
42	1188.983	73.475	281.695
43	1164.713	66.984	280.57
44	1043.775	53.456	272.808
45	1199.908	118.588	338.721
46	2231.039	899.83	259.93
47	1336.818	401.165	195.621
48	1738.576	488.154	555.48
59	1502.664	569.034	586.34
50	1566.269	361.807	140.463
51	1404.238	346.327	126.475
52	2082.626	28.949	1144.576
53	2067.921	375.089	171.164
54	2169.318	571.226	575.848
55	2013.783	562.098	576.374
56	1701.108	361.306	159.453
57	1233.751	345.169	139.121
58	1866.127	547.095	735.501
59	1569.321	484.418	760.911
60	1553.692	557.829	775.069
61	1401.019	890.919	271.923
62	2030.699	918.528	295.981
63	1741.843	231	1182.909
64	1828.841	230.776	1166.936
65	1917.701	694.501	285.003
66	1131.741	326.96	145.388
67	3195.94	996.858	496.34
68	2876.297	968.19	408.556
69	2309.16	396.592	253.089
70	2913.556	792.234	474.136
71	2846.231	556.939	776.369
72	2892.41	546.084	773.875

After designing the structure using Staad Pro software the following sizes of beams and columns are obtained.

Maximum size of beam – 230 x 450 mm
Column sizes – 400 x 750 mm

5. CONCLUSION

1. After designing, the total quantity of RCC required for the construction is found to be 1360.8 cum.

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