International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 5 Issue 6, September-October 2021 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Seismic Analysis & Design of Reinforced Concrete Multistory Building under Different Zone's

Subodh Kumar[1], Prof. Priyanka Dubey[2]

[1]Research Scholar, [2]Assistant Professor,
[1,2]Department of Structural Engineering, Dr. A.P.J. Abdul Kalam University, Indore, Madhya Pradesh, India

ABSTRACT

Impact of wind load as a marvel on structures, especially tall plans can't be unseen. It's major to ponder the deferred result of wind in style and appraisal of plans. The plan is explored for the gravity loads and besides for the equivalent loads for example wind load in zone-ii (Bhopal), zone-iii (Nagpur), zone iv (Delhi), zone-v (Calcutta), zone-vi (Darbhanga).The structure is made on the thing known as staad.pro v8i. This appraisal is the assessment of the Reinforced strong cement multi-story building (G+10). The codes utilized for the evaluations of Dead weight are IS:875(Part 1)- 1987 ,for live weight the code IS :875(Part 2)- 1987 and for the incorporates of wind power in various breeze zones are IS :875 (fragment 3) - 1987.The deferred result of these appraisal shows the adjustment of forces, departures responses and weight of steel the proportion of partner material expected to negate equivalent loads will increase without a doubt. Amount of essential material expected to go against sidelong loads will augment profoundly.

KEYWORDS: *wind zones. Gravity Load Analysis and Design, Wind Load Analysis & Design, Comparison of wind intensity*

How to cite this paper: Subodh Kumar | Prof. Priyanka Dubey "Seismic Analysis & Design of Reinforced Concrete Multistory Building under Different Zone's" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-5 | Issue-6, October 2021, pp.264-270, URL: www.ijtsrd.com/papers/ijtsrd46404.pdf

IJTSRD46404

1. INTRODUCTION

The breeze has two perspectives. The underlying a helpful one that is its energy can be utilized to make power, sail boats and chill off temperature on a hot day. The other a parasitic one is that it stacks any and every thing that comes in the way. The latter is the point of view a creator is stressed over, since the pile caused should be upheld by a development with the specific prosperity. All amicable and mechanical development over the ground have thusly to be expected to go against wind loads. This essential notes is concerning the piece of wind planning overseeing underlying planning development.

The chief floor opens in essentially all multi-story structures in India because the fundamental floor halting or assembling is adjusted to the corridor. The ensuing floor was used to foster square dividers. According to the Indian seismic code, there is just a sensitive development, yet the equal hardness of the design is under half [IS: 1893, 1997]. Generally, the improvement of the full scale seismic base shear experienced during quake from its typical time. Seismic quake power scattered the base on the wax and mass at the height. In the sensitive commended structure, the upper story is getting strong, the little between stories goes through the buoy. In any case, the expressway stream in sensitive first floor is tremendous. The strength of the segment is furthermore immense in the primary floor for third designs, in light of the fact that the chief floor shear is most prominent. For upper states, in any case, due to the presence of designs, the strength of the section feasibly lessens, which occurs with startling hardness in unbalanced side force apportionment, which can cause pressure obsession locally. It influences the introduction of constructions during land shaking. Such constructions should be destitute down with dynamic assessment and intentionally arranged. Various tremors previously, for example, Sun Fernando 1971, Northbridge 1994, Kobe 1995, have shown the potential dangers related with such designs. In the dividers of the filler, there was simply minor damage in the upper broiler breaks.

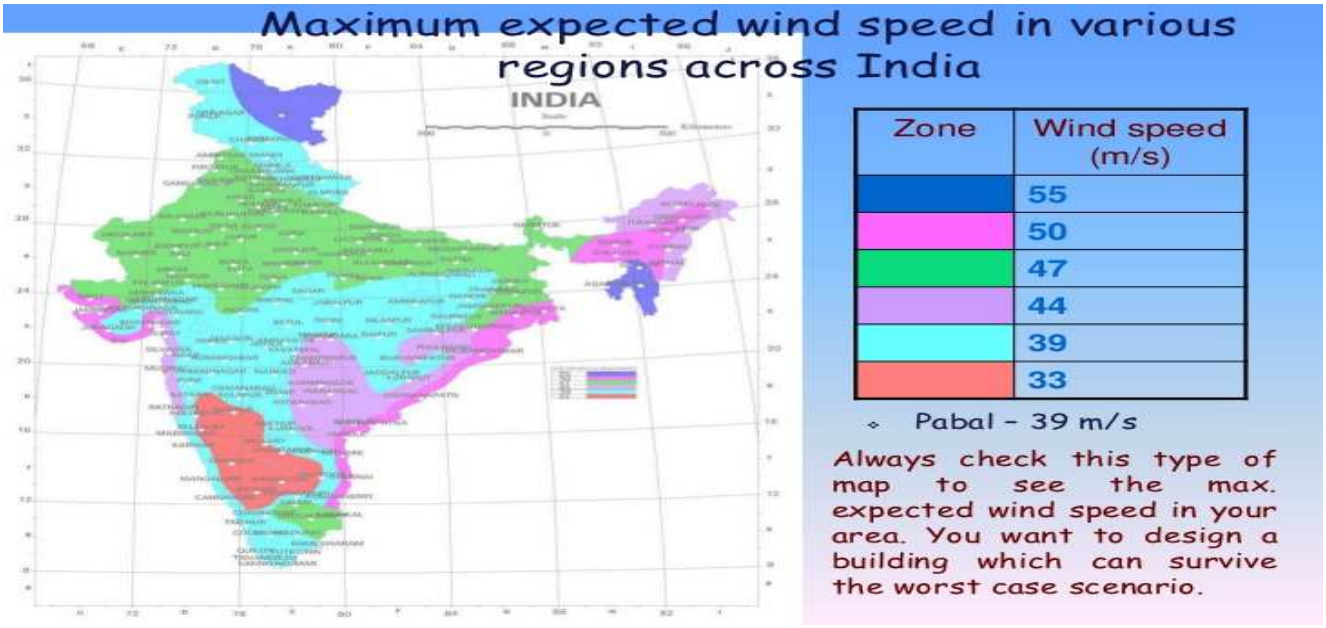


Figure 1 Wind Speed in Various Regions across in India

2. OBJECTIVE

Wind designing could be subsets of designing science, primary designing, and applied physical science to examine the after effects of wind inside the regular and furthermore the planned environment and studies the feasible mischief, bother or benefits which can result from wind. Inside the field of designing it incorporates strong breezes, which can cause inconvenience, similarly as Extreme breezes, as in an incredibly twister, tornado or critical tempest, which can cause broad annihilation. Wind designing arrangements with meteorology, liquid elements, mechanics, geographic information frameworks and assortment of expert designing disciplines along with aeromechanics, and primary elements. The devices utilized epitomize environmentally models, barometrically actual wonder air streams, open fly offices and system liquid elements models.

Wind engineering involves, among different topics

- Wind impact on structures (buildings, bridges, towers).
- Wind comfort close to buildings.
- Effects of wind on the ventilation in an exceedingly building.

3. REVIEW OF LITERATURE

Raghu et al. (2018), an organization is a planar essential system made out of persevering people that either meet or cross each other. Organization segment is a notable basic plan sent for the advancement of motel yards, air terminal constructions, huge supper anteroom, get together corridors and vehicle leaves. A load set on a connection or a shaft is redirected to the assistance along the connection line or the bar turn, a bend, a packaging, and steady column produce a comparative kind of one–directional weight dispersal type. A G+9 Story Grid piece structure is considered for this assessment and the models are explored with seismic zone IV, this models are shown in ETABS 2016 Software, and the assessment is finished using a response range method. The connection is made on the two models for base shear, story glide, story dislodging and story strength. It was construed that the Box effect of estimated kind arrangement, it is extending by and large robustness of the construction thusly, decreasing the impact issue in the plan and As isolating of organization emanates reduces higher will be load passing on restriction of the design.

Ramakrishna et al. (2018), for the arrangement engineers, assurance of the kind of the plan for a particular expectation is essential of late. Under conditions, piece developments and system structures winds up being more valuable diverged from the customary RC Framed Structures. Building points and the flexibility of the space use inside the developments, basic construction work, etc the modes are done using E-Tabs 2015 IS Code 456-2000. G+14 story structures are taken and arranged and examination is cultivated for both Gravity (D.L and L.L) and even (earth quake and wind) loads. A similar static technique is used to design and examine the developments, as requested by Indian Standard Code for quake safe plans. Study gives extraordinary information about story skim, story movement, base shear, story shear, and time period. It is seen that the seismic execution of grid piece structure was better when appeared differently in relation to that of level segment structure. It is found that the Story buoy of customary lump is 10% higher than level piece and network segment. The Base shear of standard piece is 44% higher than level lump and 37% higher diverged from network segment.

TusharGolait et al. (2019), continuous types of progress in the field of Structural Design are related to Flat Slabs and Grid Floors. This assessment is focused on thinking about the direct of standard pieces, level areas and organization lumps. Relative examination was finished with respect to nodal redirection, column shear and bar minutes. The showing and assessment was done using STAAD virtuoso V8i, contemplating square, hexagonal and octagonal estimations for the plans. The models were made for 10, 20 and 30 stories. Seismic loadings were considered for Zone II according to IS: 1893 (Part 1) - 2002, to survey the show of the general huge number of 27 models and it was done up dependent on assessment that.

4. METHODOLOGY

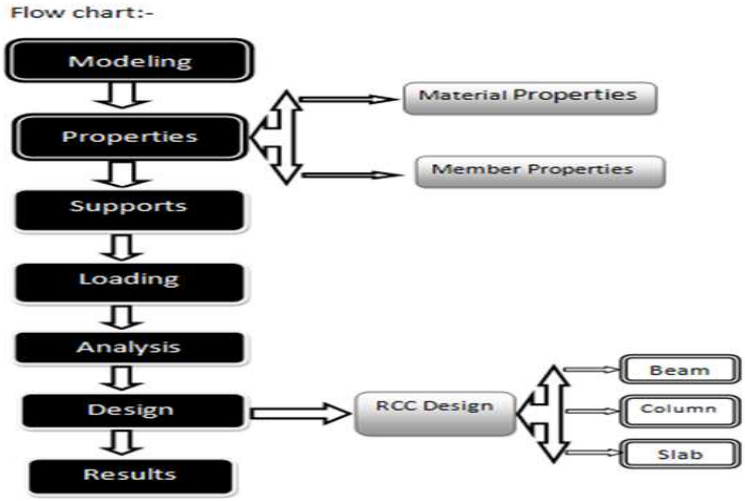
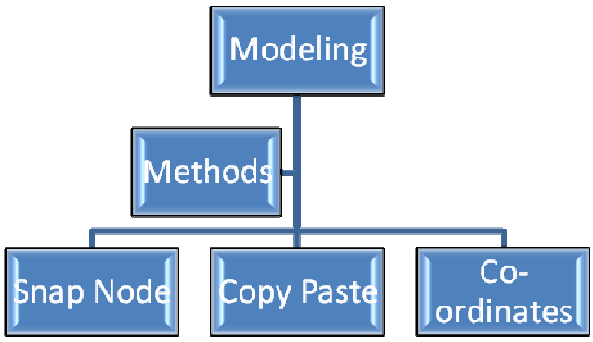


Figure- 2 Flow Chart

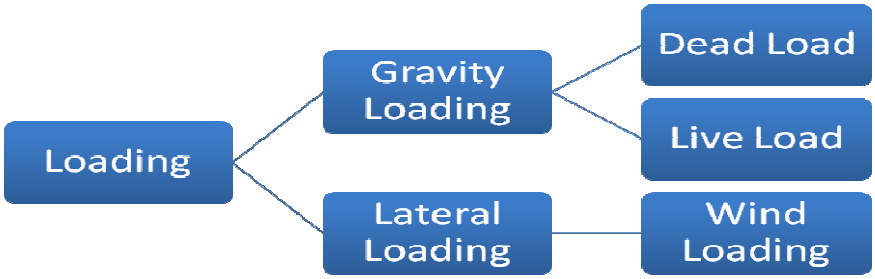
This proposition manages similar investigation of wind conduct of skyscraper structures building outlines with 3 mathematical (3 D) setups and totally extraordinary breeze zones, underneath the breeze sway according to 875 (section iii):1987 static examination. A correlation of study winds up as far as max removals, wind powers, max twisting minutes, most hub power, most shear power and response This investigation is attempted in after advances: - Modelling of building.

1. Modelling of building.
2. Designing of construction altogether five breeze zones (39, 44, 47, 50 and 55 m/s) according to is-875 (section iii):1987.
3. Modelling of building outlines is done on staad-genius v8i bundle.
4. Comparative investigation of results as wind powers, twisting minutes, most pivotal power, relocations, most shear power and response.
5. Analysis of the construction for the gravity load.

4.1. Methods of Modelling of Structure in Staad. Pro:-



4.2. Applications of Loading on Structure in Staad.Pro:-



5. Details of Structure Modeling

Table 1 Details of the structure

S. No.	Particulars	Values
1	Size of Beam	0.6mx0.4m
2	Size Of Column	0.7mx0.5m
3	Plan Size	34.72mx26.83m
4	Height Of Structure	35.5m
5	Height Of Individual Story	3m
6	Density Of Brick Masonry	20KN/M^3
7	Density Of Concrete	25KN/M^3
8	Grade Of Concrete	M-25
9	Grade Of Steel	Fe-415
10	Soil Condition	Medium Soil
11	Thickness Of Outer Wall	0.2m
12	Thickness Of Inner Wall	0.1m
13	Wind Zones	II, III, IV, V, VI
14	Thickness Of Slab	0.15m
15	Importance Factor	1
16	Terrain Category	2
17	Class Of Structure	B

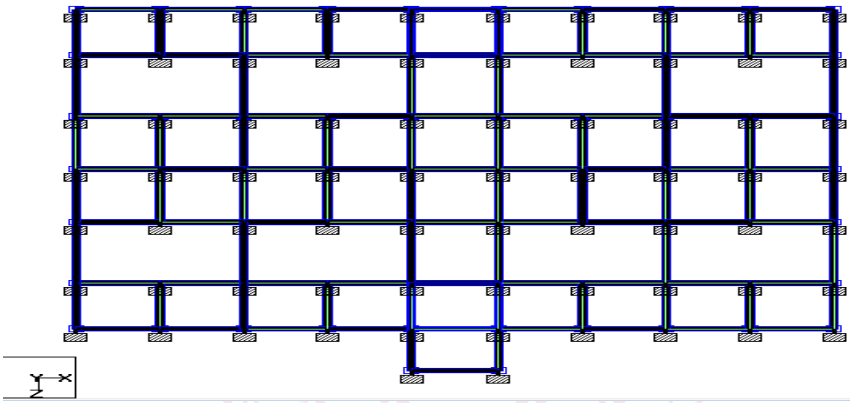


Figure 3 Reinforced Multi-Story Building Plan

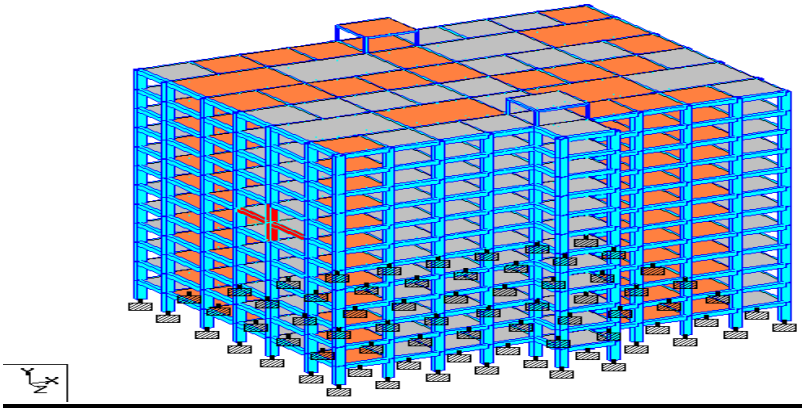


Figure 4 Front View of Three Dimensional Modelling

6. LOAD CALCULATION

Dead weight involve the ceaseless advancements material weight pressing the shaft, area, roof, floor, divider and foundations including claddings finish and fixed stuff .Dead weight is an outright load of the sum of the sections of the design that generally don't change as time goes on.

As per IS: 875 (part -I)

Outer wall load = .2*20*2.4= **9.6kn/m^2**

Inner wall load = .1*20*2.4= **4.8kn/m^2**

Parapet wall load = .1*20*1**= 2kn/m^2**

Floor load (SLAB) + floor finishing load**= 4.75kn/**m^2

7. Load Combinations:-

We have examinations the design for gravity load, wind load for different weight mix as per IS 875 (Part 3): 1987 and STAAD has assessments the construction for the most perceptibly horrible blend for each person from the design. Following are the store mixes which are taken by IS 875 (Part 3):1987 (for gravity stacking and wind load) is:-1.5(DD+LL)

1. 1.2(DD+LL+WL IN POSITIVE X DIRECTION)
2. 1.2(DD+LL+WL IN NEGATIVE X DIRECTION)
3. 1.2(DD+LL+WL IN POSITIVE Z DIRECTION)
4. 1.2(DD+LL+WL IN NEGATIVE Z DIRECTION)
5. 1.5(DD+ WL IN POSITIVE X DIRECTION)
6. 1.5(DD+ WL IN NEGATIVE X DIRECTION)
7. 1.5(DD+ WL IN POSITIVE Z DIRECTION)
8. 1.5(DD+ WL IN NEGATIVE Z DIRECTION)
9. . 9DD+1.5WL IN POSITIVE X DIRECTION
10. . 9DD+1.5WL IN NEGATIVE X DIRECTION
11. . 9DD+1.5WL IN POSITIVE Z DIRECTION
12. 9DD+1.5WL IN NEGATIVE Z DIRECTION

7.1. The Wind Pressure Shown With Respect to Cities

Table-2.Wind Pressure

City	Height (M)	Design Wind Pressure In KN/M^2					
		10	15	20	25	30	35.5
	K_2	0.98	1.02	1.05	1.075	1.1	1.113
Bhopal(39m/S)		0.88	0.95	1.01	1.060	1.105	1.130
Nagpur(44m/S)		1.116	1.209	1.2807	1.343	1.406	1.440
Delhi(47m/S)		1.280	1.38	1.47	1.54	1.606	1.640
Calcutta(50m/S)		1.450	1.5606	1.654	1.74	1.825	1.860
Darbhanga (55m/S)		1.744	1.900	2.000	2.100	2.200	2.250

8. ANALYSIS AND RESULTS

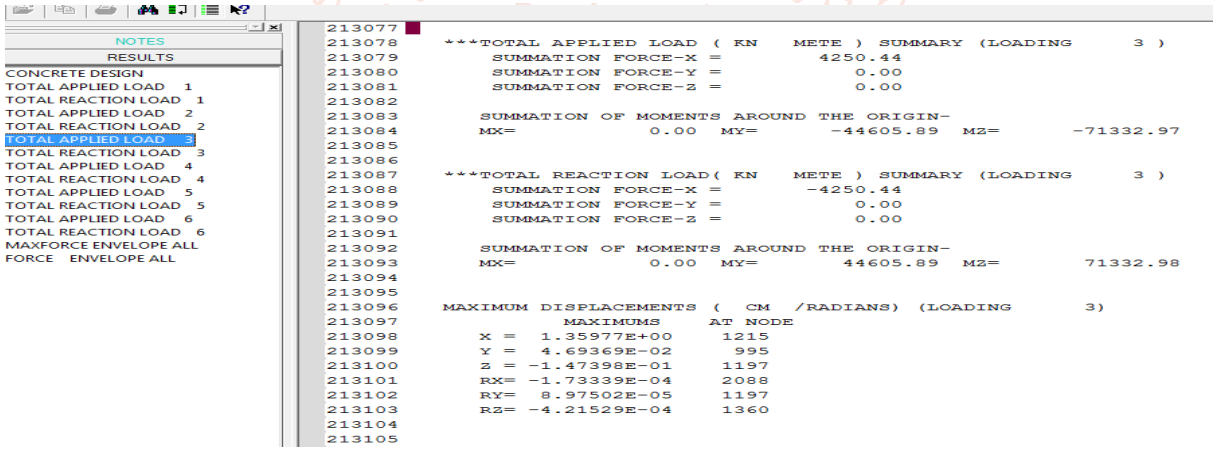


Figure-5 Horizontal Displacement In + X Directions

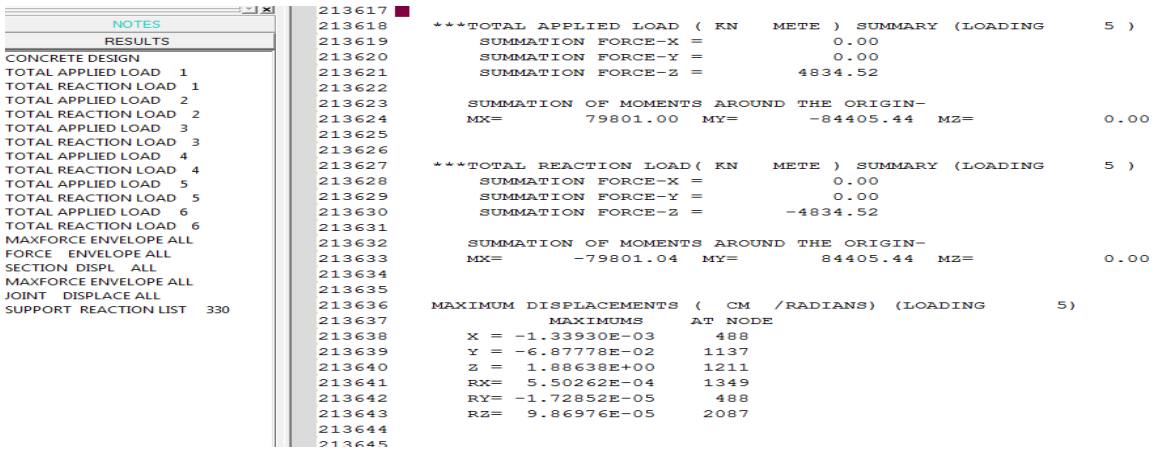


Figure-6 Horizontal Displacement In + Z Direction

8.1. Details of Beam Reinforcement:-

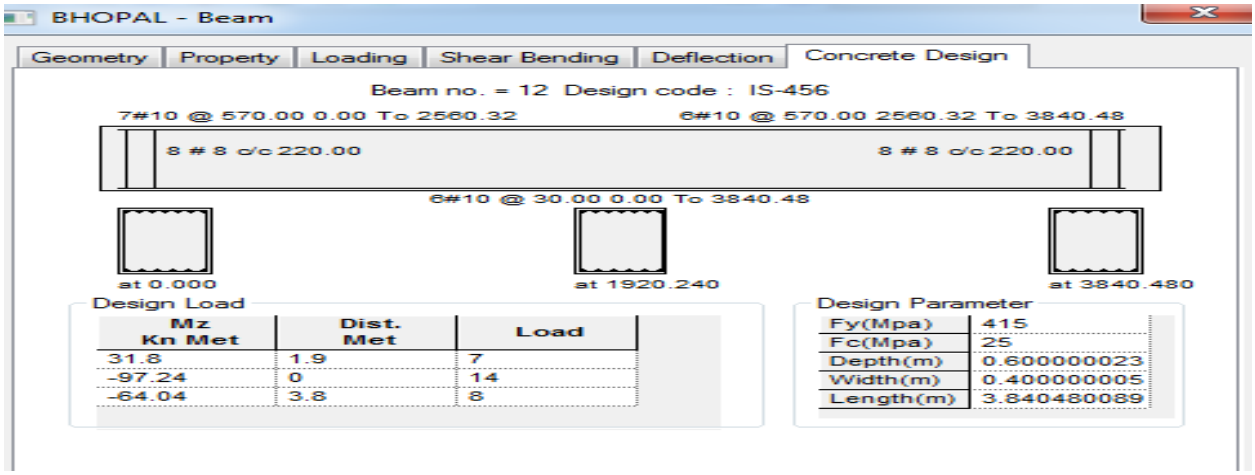


Figure-6. Details of Beam Reinforcement

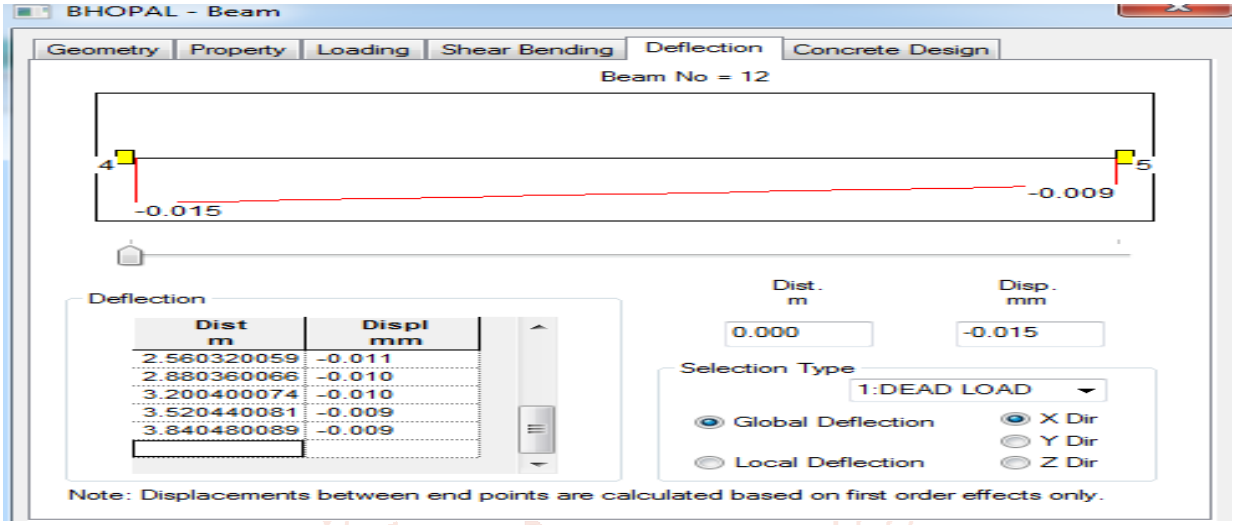


Figure-7.Deflection of Beam

9. Wind Intensity

Table-3 Wind Pressure

City	Minimum Wind Intensity	Maximum Wind Intensity
Bhopal	0.88	1.13
Nagpur	1.116	1.44
Delhi	1.28	1.64
Calcutta	1.45	1.86
Darbhanga	1.744	2.25

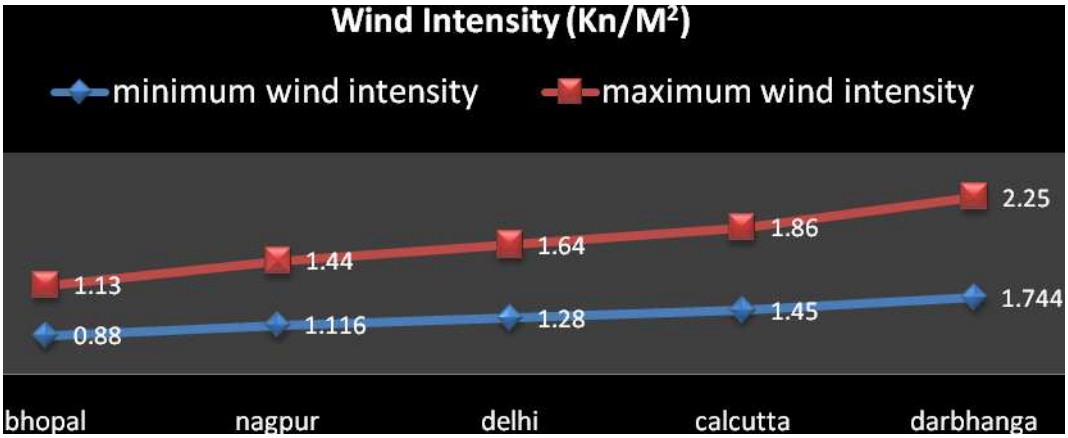


Figure-8. Wind Pressure

10. CONCLUSION

This overall assessment makes us appreciate the response of the construction under the various breezes stacking.

1. From this examination we can say that breeze power are rules over the 10m beginning from the soonest stage.
2. Generally an additional development is given to go against the breeze load anyway in my assessment there is no convincing motivation to give any sort of additional plan.
3. The whole RC layout is planned to go against the breeze load.
4. Percentage assortment of outright strong sum for the whole development, between gravity load plan and wind load plan for wind zone II to VI is found to independently.
5. Percentage assortment of full scale support sum for whole development, between gravity load plan and wind load design are also increases.

REFERENCES

[1] Ahmad, Shakeel, "Wind pressures on low ascent hip rooftop structures". Ph.D. Theory, Civil Engineering Department, University of Roorkee (Now Indian Institute of Technology Roorkee), May 2000.

[2] Ahmad, Shakeel, "Wind pressures on low ascent hip rooftop structures". Ph.D. Theory, Civil Engineering Department, University of Roorkee (Now Indian Institute of Technology Roorkee), May 2000.

[3] B.S Taranath, (1998), "Underlying Analysis and Design of Tall Buildings". McGraw-Hill Book Company, 1988.

[4] Davenport, A. G.: The use of factual ideas to the breeze stacking of constructions. Continuing of Institution of Civil Engineers, Vol.19, pp.449-472, 1961.

[5] Guide to the Use of the Wind Load Provisions of ASCE 7-02 ByKishor C. Mehta; and James M. Delaha.

[6] Holmes, J.D., "Mean and fluctuating interior pressing factors prompted by wind". Proc. fifth International Conference on Wind Engineering, Fort Collins, 1979, pp. 435–450

[7] Hussain, M., and Lee, B.E., "An air stream investigation of the mean pressing factor powers following up on huge gatherings of low ascent structures". Diary of Wind Engineering and Industrial Aerodynamics, Vol. 6, 1980, pp 207–225.

[8] IIT Kanpur, Learning Earthquake Resistant Design and Construction, Earthquake Tips.

[9] IS 1893 (Part 1):2002 Code of standards for quake safe plan of constructions.

[10] IS 456: 2000, ―Plain and built up concrete - Code of training

[11] IS 875 : Part 1 : 1987 Code for configuration loads (other than earthquake)for structures and designs It manages the dead loads, Unit loads of building material and put away materials

[12] IS 875 : Part 1 : 1987 Code for configuration loads (other than earthquake)for structures and designs It manages the dead loads, Unit loads of building material and put away materials

[13] IS 875: Part 3, 2015, 2013, Design Loads (Other than Earthquake) for Buildings and Structures - Code of Practice Part 3 Wind Loads, Bureau of Indian Standards, New Delhi.

[14] IS 875: Part 2: 1987 Code for configuration loads (other than quake) for structures and constructions. It manages the different sorts of forced burden that can come on various kinds of structures.

[15] IS 875: Part 2: 1987 Code for configuration loads (other than quake) for structures and constructions. It manages the different kinds of forced burden that can come on various sorts of structures.