International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Comparative Study of Wind & Seismic Effect on a Multi-Storied Building

Uma Maheswari[1], Krishna Bhuvan Prasad[2]

[1]Assistant Professor & HOD, Department of Civil Engineering, Chaitanya Engineering College
[2]U.G. Student, Department of Civil Engineering, Chaitanya Engineering College

Abstract
On demand of growing population construction of high-rise building is being madecompulsory for avoiding land scarcity in future. Many major cities in India are very closer to the coastal area and almost all of them comes under live seismic zone which is big problem for high rise multistorey buildings. As manual analysis of such a complex structure is too hectic and time consuming, it is very necessary to find the solution on this issue instantly, the Wind and Seismic Analysis of the structure done by the softwares like STAAD-PRO and advanced software CSI ETABS. In this proposed study three different models were generated and analyzed by both softwares Staad-Pro and Etabs under the guideline of IS: 875-2015-Part III and IS: 1893-2016-Part-I. The response of G+5, G+20 and G+50 storey buildings has been studied. After comparing all the results we conclude whether earthquake or wind effect is critical.

Keywords: Etabs, Seismic Load, Staad-Pro, Wind Load

1. Introduction

Due to growing population and less availability of land, multistoried buildings are constructed which can serve many people in less area. In this modern era asurbanization increases availability of land isbecoming less, due to high population and cost of landbecome higher. To handle this problem, the onlysolution is to prefer high rise structure. In this thesis STAAD- Pro and ETABS software's is used to design and analyses any kind ofstructure in static and dynamic approach. However, these software's will give different design andanalytical results for the same structural configurations, this is due to their different analytical mechanism and the way they do analyse the structure. This raises a need to do a comparative study between these two software to know the real advantages and disadvantages of these software's

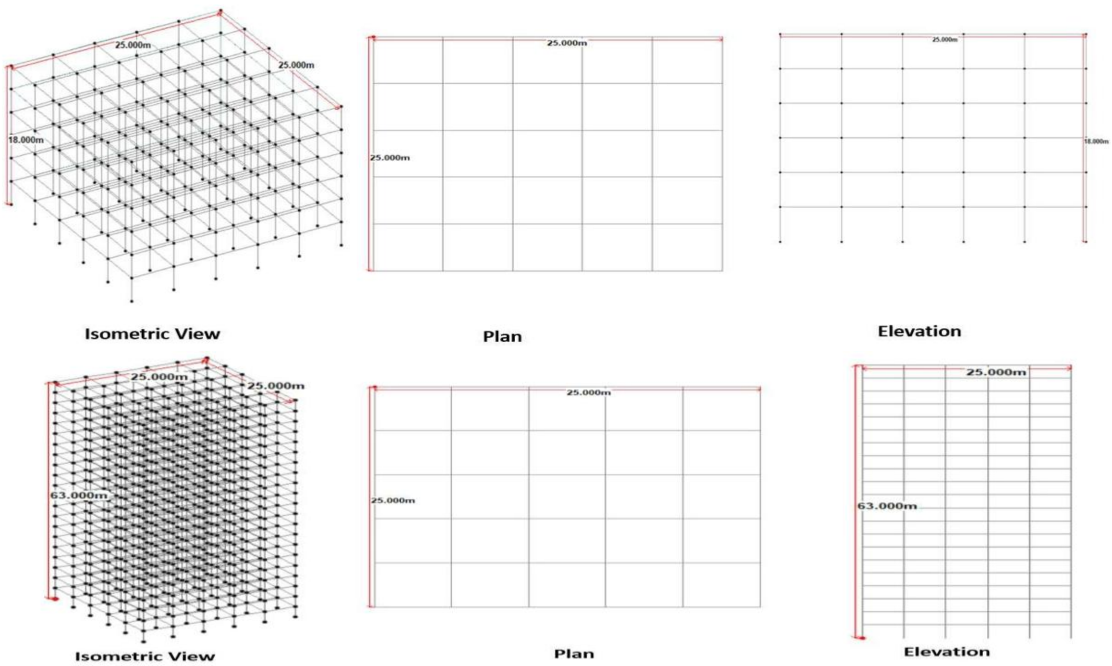
Rapid Industrialization causes migration of people to urban centers where job opportunities are significant.Therefore, land available for buildings to accommodate the migrated people is becoming scarce, resulting in rapid increase in the cost of land. The shortage of land and effective use of sites for new constructions in metropolitan areas plays very important role. This new generation of high-rise structures poses new challenges for structural engineering. High rise structures can be one that by virtue of height is affected by lateral forces due to wind or Earthquake or sometimes both.

STAAD Pro full form stands for Structural Analysis and Designing Program. STAAD Pro is a structural analysis & design computer program that was being developed by Research Engineers International (REL) at Yorba Linda, California in 1997. STAAD Pro helps structural engineers to automate their tasks by removing the tedious and long procedures of the manual methods. It allows civil engineers to analyze and design various types of structures on virtual platforms. Structural engineering firms, consultancies, various departments of construction companies, and government firms use STAAD pro extensively.

ETABS is the abbreviation of “Extended 3D Analysis of building System. ETABS is a product of Computer and structures, Inc. and is globally used for structural analysis and design of various types of structures.ETABS is a software company with headquarters in London, England.The company develops and delivers data visualization and report automation software and services tailored for the market research industry. The company was established in 1993 as ISPC by one of the original founders of Quan time- a specialist Data Processing software. Following a management buyout in 1999 ISPC was rebranded as ETabs. ETABS enables 3D object modelling, visualization tools, linear and non-linear analysis, static and dynamic analysis, sophisticated design for various types of materials.

Geometry of the model

The plan of the 3 building models is regular. All 3 models have a story height of H = 3.0m where all stories are of the same height. The first building consists of five stories, it is six stories including ground floor. The second building consist of twenty stories, it is twenty-one stories including ground floor. The third building model consist of fifty stories, it is fifty-one stories including ground floor. The building length is 25 m and width are 25 m so the area is 625 m^2. The building consists of square columns with cross-section (0.4 x 0.4) m, rectangular beams with cross- section (0.3 x 0.23) m and slab thickness of 150mm. The size of column and beam is constant for all stories. In each storey, the size of the beam is constant.



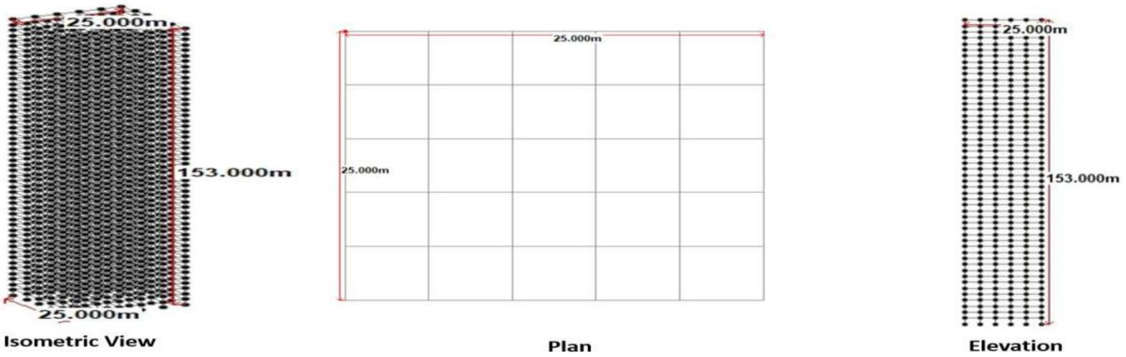


Fig 1: (G+5), (G+20), (G+50) Models Isometric View, Plan and Elevation

2. Objective and Scope

- To calculate the values of bending moment and shear force from multistory building by using STAAD –Pro and ETAB.
- To calculate the value of Roof Displacement from multistory building by using STAAD – Pro and ETAB.
- To calculate the value of Story Shear from multistory building by using STAAD Pro and ETAB.
- To calculate the value of Story Displacement from multistory building by using STAAD- Pro and ETAB.
- To calculate the value of Story Drift from multistory building by using STAAD Pro and ETAB.
- To compare STAAD-Pro results of the multistoried building with ETABS results.

3. Literature Review

[1] Yashashriankalkhope et.al (2021); "Wind and seismic analysis of building using ETABS":
The researchers studied the analysis and design of a building using rectangular and circular column, they determine the parameters of all storey of a building moments, shear force, base reaction, storey stiffness, storey shear, overturning moment, storey displacement, storey drift and so on. Their study reveals that comparison of both analysis and design was carried out by software and manual calculation as per IS 456- 2000.

[2] Dr. K. Chandra Sekhar Reddy (2019); "Seismic Analysis of High-rise Buildings (G+30) by using E-TABS":
In this research they had analyzed G+30 floors building by using E-TABS. They determine the effect of lateral moments, shear force, axial force, base shear, maximum displacement and tensile forces comparing the seismic zones 2,3,4 and 5. Finally, they concluded that lateral displacement or drifts are more in zone 5 when compared to the zones4,3 &2. They also found the base reactions of structure obtained in zone 5 the storey shear is higher in zone 5 than in zone 2.

[3] Jaiprakash et.al (2019); "Analysis of tall building structure subjected to wind and earthquake loads in different seismic zones":

The researchers studied the response spectrum method of analysis of a (G+30) storey reinforced concrete high rise building under wind and seismic loads. The results show that storey displacement is maximum at top storey and also observed that as the building height increase, lateral stiffness goes on decreases, storey drift is maximum at mid height of the building and goes on decreasing from mid height to roof level.

[4] B. Kusuma et.al (2017); "Seismic Analysis of a High-rise RC Framed Structure with Irregularities":
In this research they had analyzed G+49 stories of RC framed structure with unsymmetrical floor plan located in Zone IV, soil type III using finite element-based E-TABS software. They have determined the Base shear, Lateral Displacement, Storey stiffness and storey drift. Finally, they concluded that lateral displacement is increased in case of vertical irregular structure, The stiffness of the structure is reduced in vertical irregular re-entrant corner and stiffness irregular structure.

4. Methodology

Following are the various steps involved in this project
(a) Introduction (b) Literature Review (c) Modelling (d) Defining of Properties
(e) Calculation of various loads
(f) Defining and Assigning of various loads (DL, LL, WL and EL) and load combinations
(g) Check model and run analysis (h) Result analysis
(i) Comparative Study on the effect of Wind Load and Seismic Load (j) Conclusions

5. Loads Acting on Structure

(a) Dead load (as per IS:875 (Part-1)-2015): Outer wall load = 13.8kN/m, Internal wall load = 6.9 kN/m, Slab load = 3.75 kN/m^2, FloorFinishes=1.0kN/m^2
(b) Live load (as per IS:875 (Part-2)-2015): on floor = 3 kN/m^2, on roof = 1.5 kN/m^2
(c) Wind Load is calculated as per IS:875 (Part-3)-2015
(d) Seismic Load is calculated as per IS:1893 (Part-2)-2016

6. Wind Analysis Using STAAD-Pro

Wind Effect is considered for all Terrain Categories as per IS:875 (Part-3). Risk Coefficient k_1 is taken from table 1 (clause 6.3.1), pgno 7 of IS: 875 ((Part 3) for basic wind speed of 50m/s,k_1 = 1.0. Terrain Factor k_2 is calculated for all terrain categories at 3m interval for models (G+5, G+20, G+50) based on table 2, clause 6.3.2.2, pg no. 8, of IS 875 (Part 3). The roof of the building is considered as flat, k_3= 1.0.

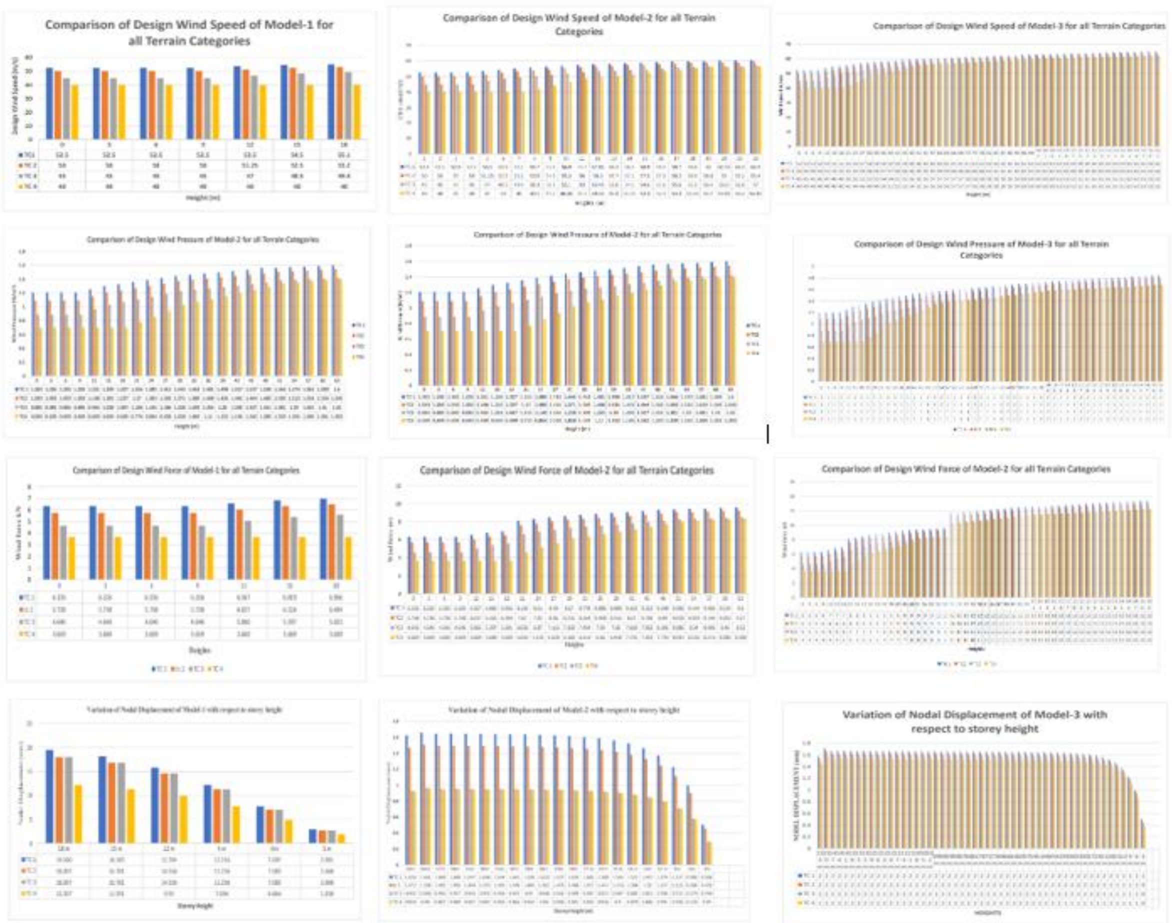
Table 1: Max. Shear Force for (G+5), (G+20) and (G+50) Model

S.NO	Terrain category	Max. S.F **(G+5) Model**	Max. S.F **(G+20) Model**	Max. S.F **(G+50) Model**	Load combinations
1.	TC-I	+3.26E+3	11.5E+3	26.6E+3	1.5(DL+LL)
		-5.204	-93.513	-611.782	(WL-x)
2.	TC-II	+3.26E+3	11.5E+3	26.6E+3	1.5(DL+LL)

		-5.204	-93.513	-611.782	(W-x)
3.	TC-III	+3.26E+3	11.5E+3	26.6E+3	1.5(DL+LL)
		-5.204	-93.513	-611.782	(W-x)
4.	TC-IV	+3.26E+3	11.5E+3	26.6E+3	1.5(DL+LL)
		-5.204	-93.513	-611.782	(W-x)

Table 2: Max. Bending Moment for (G+5), (G+20) and (G+50) Model

S.NO	Terrain category	Max. B.M. **(G+5) Model**	Load Combinations **(G+5) Model**	Max. B.M. **(G+20) Model**	Max. B.M. **(G+50) Model**	Load Combinations **(G+20 & G+50) Model**
1.	TC-I	+19.269	1.2(DL+LL)	44.977	116.639	1.5(DL+Wx)
		-19.269	1.2(DL+LL)	-44.799	-116.639	1.5(DL+Wx)
2.	TC-II	+19.269	1.5(DL+Wx)	44.977	116.639	1.5(DL+Wx)
		-19.269	1.5(DL+Wx)	-44.799	-116.639	1.5(DL+Wx)
3.	TC-III	+19.269	1.2(DL+LL)	44.977	116.639	1.5(DL+Wx)
		-19.269	1.2(DL+LL)	-44.799	-116.639	1.5(DL+Wx)
4.	TC-IV	+19.269	1.2(DL+LL)	+54.574	116.639	1.5(DL+Wx)
		-19.269	1.2(DL+LL)	-44.799	-116.639	1.5(DL+Wx)



Graph 1:Comparison of Design Wind Speed, Design Wind Pressure, Design Wind Force and Nodal Displacement for all Terrain Categories of all 3 Models

7. Seismic Analysis Using STAAD-Pro

Seismic Analysis on the structure is carried out using IS: 1893 Part-2 code. The seismic weight of each floor is taken as its full dead load and appropriate amount of imposed load. The seismic weight of each floor is worked out by distributing equally the weights of walls and columns in any storey to the floor above and below that storey. Seismic' weight of building is the sum of seismic weights of all the floors. Importance Factor (I) = 1.0, Response Factor ® = 1.5

Table 3: Max. Shear Force for (G+5), (G+20) and (G+50) Model

S.NO	Terrain category	Max. S.F **(G+5) Model**	Load Combinations **(G+5) Model**	Max. S.F **(G+20) Model**	Max. S.F **(G+50) Model**	Load combinations
1.	TC-I	+3.26E+3	1.5(DL+LL)	11.5E+3	26.6E+3	1.5(DL+LL)
		-5.204	(EQ-X)	-862.979	-2.21E+3	(EQ-Z)
2.	TC-II	+3.26E+3	1.5(DL+LL)	11.5E+3	26.6E+3	1.5(DL+LL)
		-197.476	(EQ-X)	-862.979	-2.21E+3	(EQ-Z)
3.	TC-III	+3.26E+3	1.5(DL+LL)	11.5E+3	26.6E+3	1.5(DL+LL)
		-197.476	(EQ-X)	-862.979	-2.21E+3	(EQ-Z)
4.	TC-IV	+3.26E+3	1.5(DL+LL)	11.5E+3	26.6E+3	1.5(DL+LL)
		-197.476	(EQ-X)	-862.979	-2.21E+3	(EQ-Z)

Table 4: Max. Bending Moment for (G+5), (G+20) and (G+50) Model

S.NO	Terrain category	Max. B.M. **(G+5) Model**	Load Combinations **(G+5) Model**	Max. B.M. **(G+20) Model**	Max. B.M. **(G+50) Model**	Load Combinations **(G+20 & G+50) Model**
1.	TC-I	+19.269	1.2(DL+LL)	+54.574	300.874	1.5(DL+EQ+Z)
		-19.269	1.2(DL+LL)	-54.574	-300.384	1.5(DL+EQ+Z)
2.	TC-II	+173.434	1.5(DL+EQX)	+54.574	300.874	1.5(DL+EQ+Z)
		+173.434	1.5(DL+EQX)	-54.574	-300.384	1.5(DL+EQ+Z)
3.	TC-III	+19.269	1.2(DL+LL)	+54.574	300.874	1.5(DL+EQ+Z)
		-19.269	1.2(DL+LL)	-54.574	-300.384	1.5(DL+EQ+Z)
4.	TC-IV	+173.434	1.2(DL+LL)	+54.574	300.874	1.5(DL+EQ+Z)
		-173.433	1.2(DL+LL)	-54.574	-300.384	1.5(DL+EQ+Z)

8. Wind Analysis Using ETABS

Each model of the building is subjected to Self Weight, Dead load, Live load, wind load, seismic load. After applying these loads, each model of the building is analyzed for various load combinations. After analyzing each model, result are obtained in terms of Bending Moment, Roof Displacement, Storey Displacement, Storey Drift.

9. Seismic Analysis Using ETABS

Seismic Analysis is done in ETABS using Static Method. The analysis is done for all 3 models for all load combinations specified in IS: 1893 Part-2, 2016.

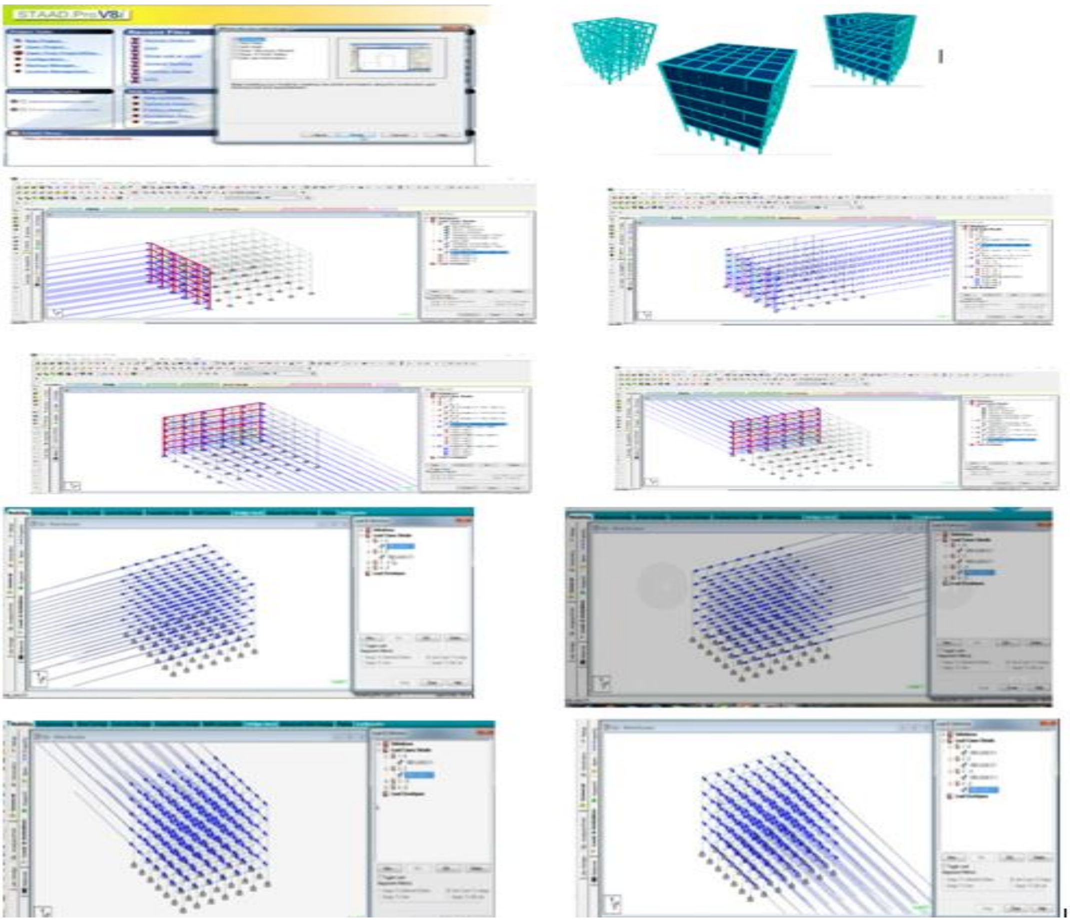


Fig 2: Wind and Seismic Analysis Using STAAD-Pro

Table 5: Maximum Storey Drift for (G+5) Model due to Wind (mm)

Storey No.	Load Case/Combo	Dir	Max. Drift
1	1.5 (DL + WX+)	X	0.013
1	1.5 (DL + WY+)	Y	0.013
2	1.5 (DL + WX+)	X	0.011
2	1.5 (DL + WY+)	Y	0.011
3	1.5 (DL + WX+)	X	0.009
3	1.5 (DL + WY+)	Y	0.009
4	1.5 (DL + WX+)	X	0.006
4	1.5 (DL + WY+)	Y	0.006
5	1.5 (DL + WX+)	X	0.004
5	1.2 (DL +LL+WX+)	Y	0.003

Table 6: Maximum Storey Drift for (G+5) Model due to Earthquake(mm)

Storey No.	Load Case/Combo	Dir	Max. Drift
1	1.5 (DL + EQX+)	X	0.193
1	1.5 (DL + EQY+)	Y	0.192
2	1.5 (DL + EQX+)	X	0.18
2	1.5 (DL + EQY+)	Y	0.18
3	1.5 (DL + EQX+)	X	0.15
3	1.5 (DL + EQY+)	Y	0.15
4	1.5 (DL + EQX+)	X	0.113
4	1.5 (DL + EQY+)	Y	0.113
5	1.5 (DL + EQX+)	X	0.069
5	1.5 (DL + EQY+)	Y	0.068

Table 7: Maximum StoreyDisplacement for (G+5) Model due to Wind

Storey No.	Load Case /Combo	Dir	Max.Displ(mm)
1	1.5 (DL + WX+)	X	0.013
1	1.5 (DL + WY+)	Y	0.013
2	1.5 (DL + WX+)	X	0.024
2	1.5 (DL + WY+)	Y	0.024
3	1.5 (DL + WX+)	X	0.033
3	1.5 (DL + WY+)	Y	0.033
4	1.5 (DL + WX+)	X	0.040
4	1.5 (DL + WY+)	Y	0.039
5	1.5 (DL + WX+)	X	0.043
5	1.5 (DL + WY+)	Y	0.042

Table 8: Maximum StoreyDisplacement for (G+5) Model due to Earthquake

Storey No.	Load Case/Combo	Dir	Max.Displ (mm)
1	1.5 (DL + EQX+)	X	0.193
1	1.5 (DL + EQY+)	Y	0.192
2	1.5 (DL + EQX+)	X	0.373
2	1.5 (DL + EQY+)	Y	0.372
3	1.5 (DL + EQX+)	X	0.522
3	1.5 (DL + EQY+)	Y	0.522
4	1.5 (DL + EQX+)	X	0.635
4	1.5 (DL + EQY+)	Y	0.634
5	1.5 (DL + EQX+)	X	0.704
5	1.5 (DL + EQY+)	Y	0.703

Table 9: Maximum Storey Drift(mm) for (G+20) Model due to Wind and Earthquake

Storey No.	Max. Drift		Storey No.	Max. Drift		Storey No.	Max. Drift		Storey No.	Max. Drift	
	Wind	EQ		Wind	EQ		Wind	EQ		Wind	EQ
1	0.015	0.18	6	0.005	0.048	11	0.0087	0.009	16	0.0032	0.004
1	0.015	0.18	6	0.005	0.045	11	0.0085	0.008	16	0.0028	0.003
2	0.010	0.15	7	0.004	0.034	12	0.0075	0.008	17	0.0025	0.003
2	0.010	0.15	7	0.003	0.031	12	0.0073	0.007	17	0.0019	0.002
3	0.008	0.113	8	0.003	0.027	13	0.0064	0.007	18	0.0014	0.002
3	0.008	0.113	8	0.002	0.022	13	0.0061	0.006	18	0.0011	0.001
4	0.007	0.069	9	0.002	0.018	14	0.0051	0.006	19	0.0009	0.00089
4	0.006	0.068	9	0.001	0.016	14	0.0048	0.006	19	0.0008	0.00084
5	0.006	0.061	10	0.001	0.012	15	0.0041	0.005	20	0.0007	0.00078
5	0.005	0.059	10	0.001	0.011	15	0.0037	0.005	20	0.0004	0.00074

Table 10: Maximum StoreyDisplacement (mm) for (G+20) Model due to Wind and Earthquake

Storey No.	Max. Displ		Storey No.	Max. Displ		Storey No.	Max. Displ		Storey No.	Max. Displ	
	Wind	EQ		Wind	EQ		Wind	EQ		Wind	EQ
1	0.029	0.377	6	0.067	0.785	11	0.105	1.023	16	0.156	1.210
1	0.029	0.375	6	0.065	0.782	11	0.103	1.021	16	0.154	1.207
2	0.033	0.525	7	0.079	0.805	12	0.110	1.042	17	0.164	1.225
2	0.032	0.521	7	0.077	0.801	12	0.108	1.041	17	0.162	1.221
3	0.043	0.636	8	0.084	0.840	13	0.120	1.074	18	0.175	1.234
3	0.041	0.634	8	0.081	0.835	13	0.118	1.073	18	0.172	1.230
4	0.046	0.709	9	0.089	0.900	14	0.131	1.091	19	0.185	1.246
4	0.042	0.706	9	0.086	0.893	14	0.129	1.089	19	0.189	1.243
5	0.057	0.745	10	0.092	1.012	15	0.145	1.112	20	0.195	1.310
5	0.056	0.741	10	0.090	1.001	15	0.141	1.110	20	0.191	1.304

Table 11: Maximum Storey Drift (mm) for (G+50) Model due to Wind and Earthquake

Storey No.	Max. Drift		Storey No.	Max. Drift		Storey No.	Max. Drift		Storey No.	Max. Drift	
	Wind	EQ		Wind	EQ		Wind	EQ		Wind	EQ
1	0.067	0.077	14	0.190	1.565	27	0.257	2.312	40	0.276	2.562
1	0.055	0.077	14	0.188	0.196	27	0.251	2.305	40	0.266	2.553
2	0.086	0.092	15	0.198	1.642	28	0.260	2.347	41	0.276	2.565
2	0.086	0.094	15	0.195	1.643	28	0.253	2.340	41	0.266	2.556
3	0.096	0.097	16	0.205	1.716	29	0.263	2.380	42	0.276	2.567

3	0.095	0.096	**16**	0.202	1.718	**29**	0.263	2.372	**42**	0.266	2.557
4	0.100	0.105	**17**	0.212	1.787	**30**	0.265	2.409	**43**	0.276	2.566
4	0.099	0.104	**17**	0.208	1.789	**30**	0.257	2.402	**43**	0.266	2.451
5	0.108	0.112	**18**	0.218	1.854	**31**	0.267	2.436	**44**	0.275	2.565
5	0.105	0.110	**18**	0.14	1.855	**31**	0.259	2.428	**44**	0.265	2.555
6	0.113	0.117	**19**	0.224	1.918	**32**	0.269	2.460	**45**	0.275	2.561
6	0.112	0.118	**19**	0.219	1.919	**32**	0.261	2.452	**45**	0.266	2.552
7	0.126	0.132	**20**	0.229	1.978	**33**	0.270	2.481	**46**	0.275	2.557
7	0.126	0.133	**20**	0.224	1.979	**33**	0.262	2.473	**46**	0.265	2.547
8	0.138	0.142	**21**	0.234	2.036	**34**	0.272	2.500	**47**	0.275	2.552
8	0.136	0.144	**21**	0.229	2.030	**34**	0.263	2.491	**47**	0.265	2.543
9	0.148	0.153	**22**	0.239	2.090	**35**	0.273	2.516	**48**	0.276	2.548
9	0.146	0.154	**22**	0.233	2.084	**35**	0.264	2.507	**48**	0.266	2.538
10	0.157	0.162	**23**	0.243	2.140	**36**	0.274	2.530	**49**	0.277	2.545
10	0.155	0.164	**23**	0.237	2.135	**36**	0.265	2.521	**49**	0.267	2.535
11	0.166	0.171	**24**	0.247	2.188	**37**	0.274	2.541	**50**	0.273	2.551
11	0.164	0.172	**24**	0.241	2.182	**37**	0.266	2.532	**50**	0.273	2.540
12	0.175	0.180	**25**	0.251	2.232	**38**	0.275	2.550			
12	0.172	0.181	**25**	0.245	2.226	**38**	0.266	2.541			
13	0.183	0.186	**26**	0.254	2.274	**39**	0.275	2.557			
13	0.180	0.188	**26**	0.248	2.267	**39**	0.266	2.548			

Table 12: Maximum Storey Displacement(mm) for (G+50) Model due to Wind and Earthquake

Storey No.	**Max. Displ**		**Storey No.**	**Max. Displ**		**Storey No.**	**Max. Displ**		**Storey No.**	**Max. Displ**	
	Wind	**EQ**		**Wind**	**EQ**		**Wind**	**EQ**		**Wind**	**EQ**
1	0.033	0.423	**14**	0.156	1.091	**27**	0.291	2.105	**40**	0.859	3.225
1	0.031	0.410	**14**	0.154	1.089	**27**	0.287	2.100	**40**	0.857	3.221
2	0.041	0.589	**15**	0.164	1.112	**28**	0.301	2.150	**41**	0.912	3.315
2	0.037	0.531	**15**	0.162	1.110	**28**	0.299	2.130	**41**	0.911	3.313
3	0.050	0.679	**16**	0.172	1.210	**29**	0.315	2.224	**42**	1.010	3.412
3	0.046	0.661	**16**	0.171	1.207	**29**	0.312	2.223	**42**	1.008	3.410
4	0.060	0.720	**17**	0.185	1.225	**30**	0.324	2.354	**43**	1.020	3.521
4	0.058	0.710	**17**	0.184	1.221	**30**	0.323	2.351	**43**	1.017	3.520
5	0.071	0.758	**18**	0.191	1.234	**31**	0.334	2.412	**44**	1.027	3.610
5	0.067	0.749	**18**	0.190	1.230	**31**	0.331	2.409	**44**	1.024	3.608
6	0.084	0.799	**19**	0.211	1.246	**32**	0.425	2.516	**45**	1.035	3.712
6	0.081	0.793	**19**	0.209	1.243	**32**	0.423	2.513	**45**	1.033	3.705
7	0.091	0.825	**20**	0.220	1.310	**33**	0.513	2.609	**46**	1.042	3.845
7	0.087	0.811	**20**	0.219	1.304	**33**	0.508	2.605	**46**	1.041	3.842
8	0.102	0.849	**21**	0.230	1.412	**34**	0.512	2.711	**47**	1.054	3.935
8	0.097	0.837	**21**	0.228	1.410	**34**	0.510	2.704	**47**	1.052	3.934
9	0.110	0.910	**22**	0.245	1.520	**35**	0.590	2.802	**48**	1.067	4.010
9	0.102	0.897	**22**	0.243	1.514	**35**	0.560	2.799	**48**	1.065	4.008
10	0.120	1.020	**23**	0.259	1.617	**36**	0.612	2.942	**49**	1.078	4.020
10	0.109	1.001	**23**	0.257	1.614	**36**	0.608	2.941	**49**	1.074	4.019
11	0.135	1.023	**24**	0.264	1.719	**37**	0.712	2.957	**50**	1.089	4.031
11	0.131	1.021	**24**	0.262	1.714	**37**	0.708	2.954	**50**	1.088	4.028
12	0.141	1.042	**25**	0.275	1.812	**38**	0.790	3.011			
12	0.137	1.041	**25**	0.271	1.809	**38**	0.786	3.009			
13	0.149	1.074	**26**	0.280	1.941	**39**	0.816	3.210			
13	0.1047	1.073	**26**	0.279	1.939	**39**	0.809	3.190			

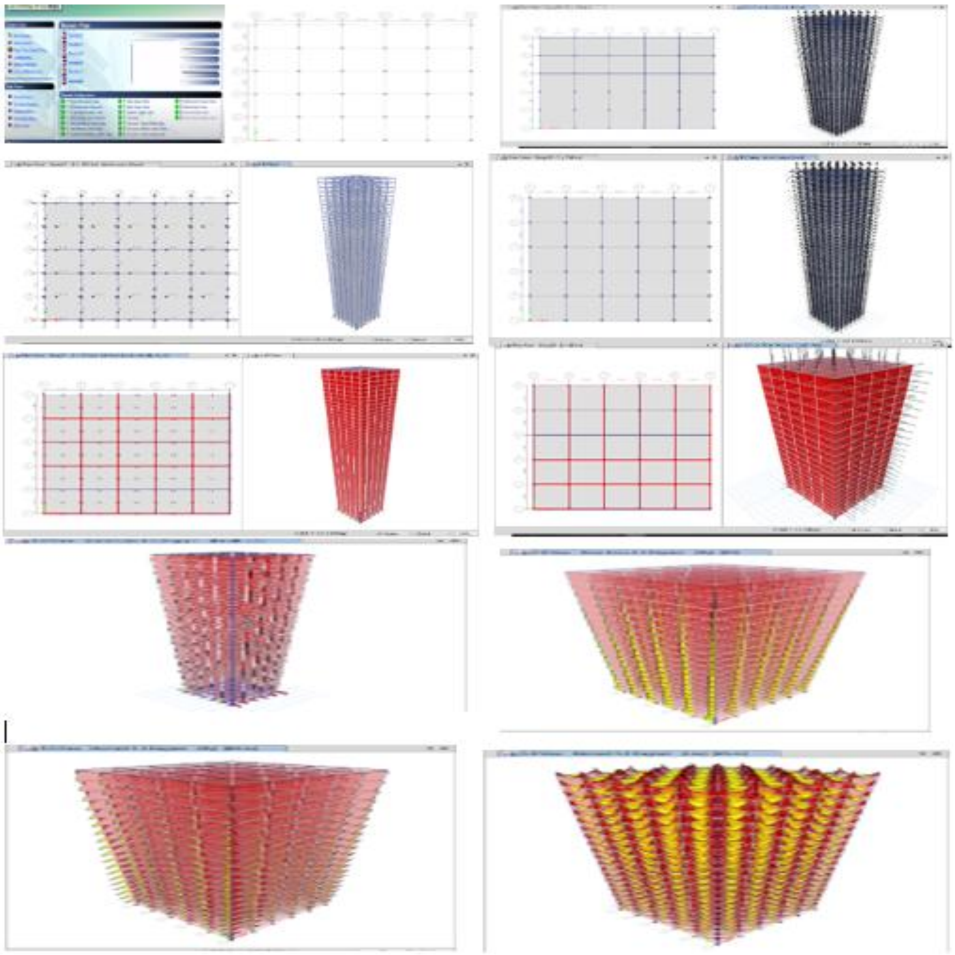
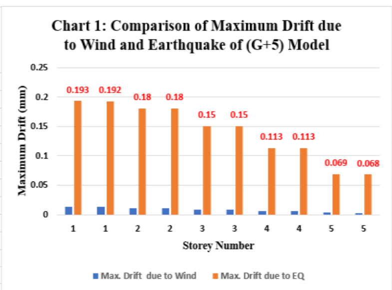
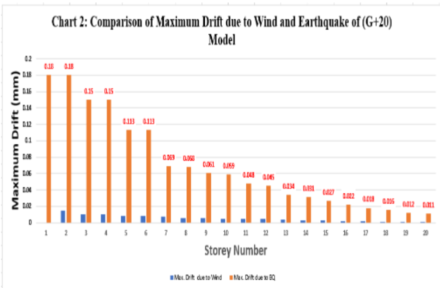
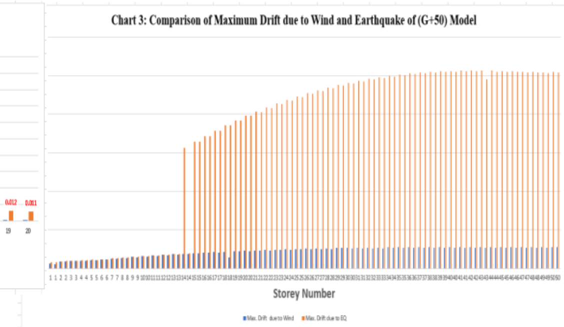


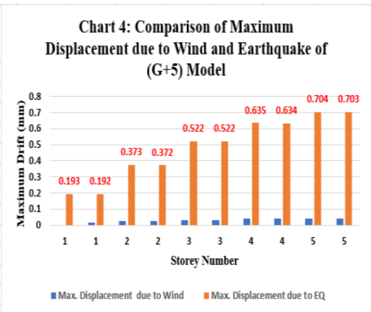
Fig 3: Wind and Seismic Analysis Using ETABS

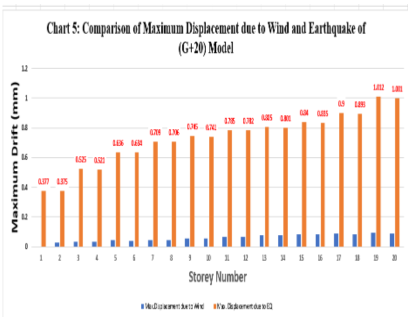
10 Comparative Study

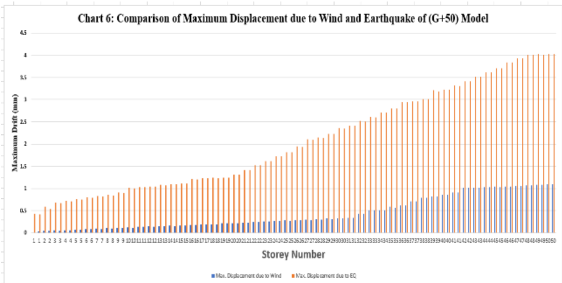












11 Conclusions

The values of shear force and bending moment obtained by STAAD-Pro analysis and ETAB analysis had no much difference. As the storey level increases ETAB analysis gives conservative results.The values of roof displacement increased with increase in no. of storeys. The critical load combination is 1.5 (DL+LL) for Wind analysis on Multi-storied Buldingsanalysed using STAAD and 1.5(DL+Wx)and 1.5(DL+EQx) or Seismic analysis on Multi-storied Buldingsanalysed using STAAD and ETABS.nStorey drift goes on decreasing as height of building increases where asStorey Displacement increases as height of building increases.

References

1. YashashriAnkalkhope et.al (2021); “Wind and seismic analysis of building using ETABS”, IRE Journals, Volume 04 Issue 12.
2. Dr. K. Chandra Sekhar Reddy (2019); “Seismic Analysis of High-rise Buildings (G+30) by using E-TABS”, International Journal of Technical Innovation in Modern Engineering & Science (IJTIMES), Volume 05 Issue 03, pp: 174-181.
3. Jaiprakash et.al (2019); “Analysis of tall building structure subjected to wind and earthquake loads in different seismic zones”,International research journal of engineering and technology (IRJET), Volume 06, Issue 07.
4. B. Kusuma et.al (2017); “Seismic Analysis of a High-rise RC Framed Structure with Irregularities”, International Research Journal of Engineering and Technology (IRJET), Volume 4, Issue 7,pp: 1405-1411, July2017.
5. IS 875 (Part 1): 1987, Code of Practice for Design Loads (Other than Earthquake) forBuildings and Structures, Part-1 Dead Loads, Second Revision, Bureau of Indian Standards, New Delhi.
6. IS 875 (Part 2): 1987, Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Part-2 Imposed Loads, Second Revision, Bureau of Indian Standards, New Delhi.
7. IS 875 (Part 3): 2015, Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Part-3 Wind Loads, Third Revision, Bureau of Indian Standards,New Delhi.
8. IS 1893 (Part 1): 2016, General Provisions and Buildings Criteria for Earthquake Resistant Design of Structures, Sixth Revision, Bureau of Indian Standards, New Delhi.

Bibilography

	Anusuri. Uma Maheswari, Assistant Professor & HOD of Department of Civil Engineering at Chaitanya Engineering College,Kommadi, A.P. She obtained B.TECH (civil) & M.TECH Structural Engineering degree from G.V.P. College of Engineering.
	B. Krishna Bhuvan Prasad, pursuing B.tech from Chaitanya EngineeringCollege, Kommadi, A.P.