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Seismic Analysis of Floating Column Building

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Abstract: ***In the current cases, the building with floating columns have a typical feature in modern multi-storey construction practice in urban India. Such functions are very undesirable in the building, built on seismically active plots. This is a G + 9 storey analysis. Floating column design for external side forces. The conducted analysis is carried out for zone II, Zone III, Zone IV and zoneV using ETABS 2017. Lateral forces caused by an earthquake or wind, usually hinder the system of fixation and inclination of the wall system. This is to investigate the effect of a floating column under the earthquake arousal for soldering and inclination of the wall frame section. A linear static and dynamic analysis is done for a multi-storied frame with a floating column to achieve the target higher to react (effect) and factors to the safe and economical design structure under the various arousal earthquakes. Analysis of earthquakes made to analyze static and dynamic analysis. In the present work floating columns are provided in the building. The building is have different plan in dimension. The results are obtained in terms of displacement, reactions, forces and stresses***

Keywords: ETabs, bracing, shear wall, Floating column building, story drift

I. INTRODUCTION

India is a developing country when urbanization is at a more rapid level in the country, including adoption of methods and types of building structures under huge development in the last decade. Within the urbanization of multi-storey buildings built architectural difficulties. These difficulties are nothing but soft floors, floating column, heavy load, reduced rigidity etc. Now afternoon most urban multi-storey shells open up the first floor as an inevitable feature. The main use of these open stories in multi-storey building buildings is parking or foster lobby. But conventional civil engineering structures developed on the basis of the criteria of strength and rigidity. As a rule, the ground floor is stored for free without any designs, except for columns that carry a lot of building on the ground. This report occupies a multi building from the architectural complexity, that is, the complexity of a multistory building with a "floating column" and the behavior of the building in a higher seismic zone is observed and some recommendations are considered.

Looking forward, of course, one will continue to make the building interesting, rather than monotonous. However, it is not necessary to do on bad behavior and earthquake safety buildings. Architectural features that are damaging the earthquake reaction of buildings should be avoided.If not, they should be minimized. Under wrong functions such as floating columns in buildings that are part of buildings, you need a much higher level of engineering. Structural design and yet the building can not be as good as one with simple architectural functions.

II. REVIEW OF LITERATURE

Kirankumar Gabon, Viweiak Fanmoore studied on "A comparative study of a multistoried building with floating columns and without a shift of walls in this research behavior of the structure when receiving floating columns, obtaining a landslide wall and the structure of the walls and floating columns is shifted with the comparison of the normal structure. Also, comparing such parameters as floor displacement, floor overlap, floor displacement, time interval. Taking into account the G + 20 storey building, four models. The first model will consider a normal building, a second model will consider a floating column structure, the third model will consider the structure of the walls, the fourth model will be seen as a sliding wall and a structure of the floating column.

Nayeli, Shoriv p. Abdulridha, Zahra M. Khul, studied in a comparative study of a multistoried building with and without floating columns and sliding walls in this document architectural designer, probably, seeks to provide more space for one or a sea-storey building with different methods; One of them with the help of floating columns, which means that the end of any vertical element remains on the beam, leading to damage to the columns in this form of multistoried building.

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III. MODELING

The modeling of building is carried out in STAAD-PRO, the different parameters are considered for modeling. The types of modeling includes the Model-I: Building without floating column, Model-II: Building with floating column at corner position, Model-III: Building with floating column at one side, Model-IV: Building with floating column at other side, Model-V: Irregular Building without floating column, Model-VI: Irregular Building with floating column at corner position, Model-VII: Irregular Building with floating column at one side, Model VIII: Irregular Building with floating column at other side.

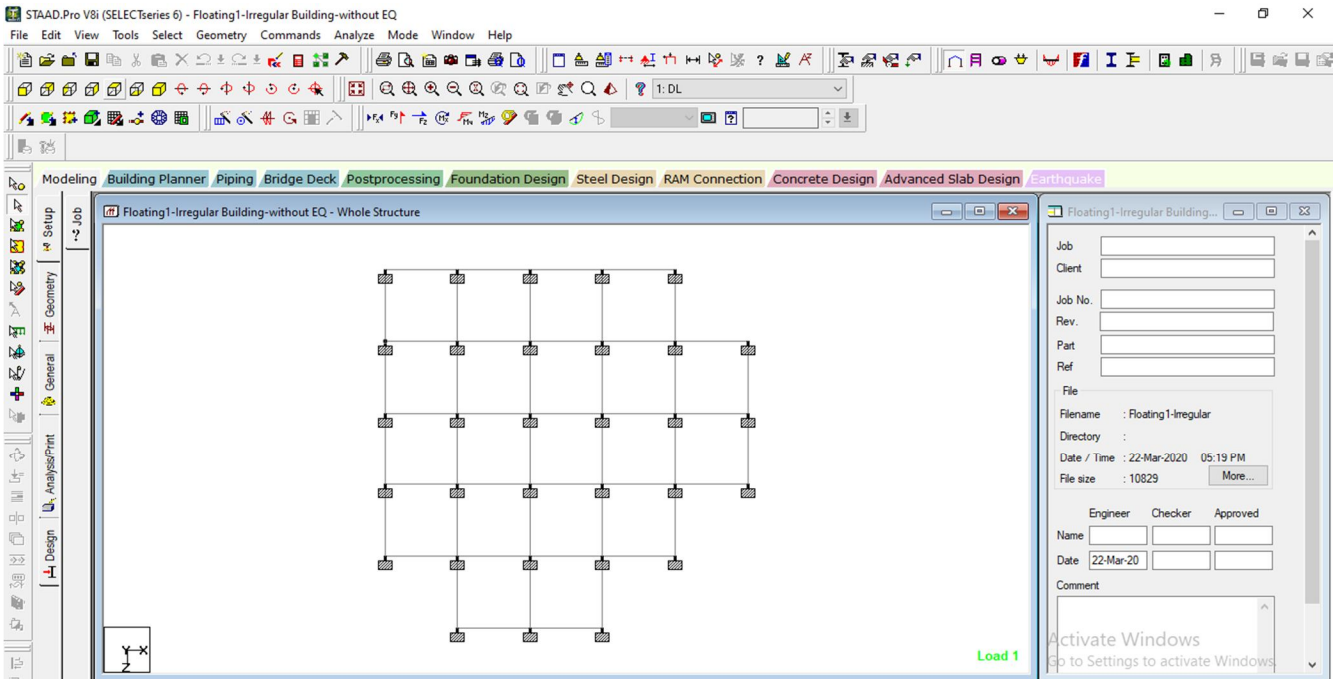

Fig.1: Plan of Irregular Building

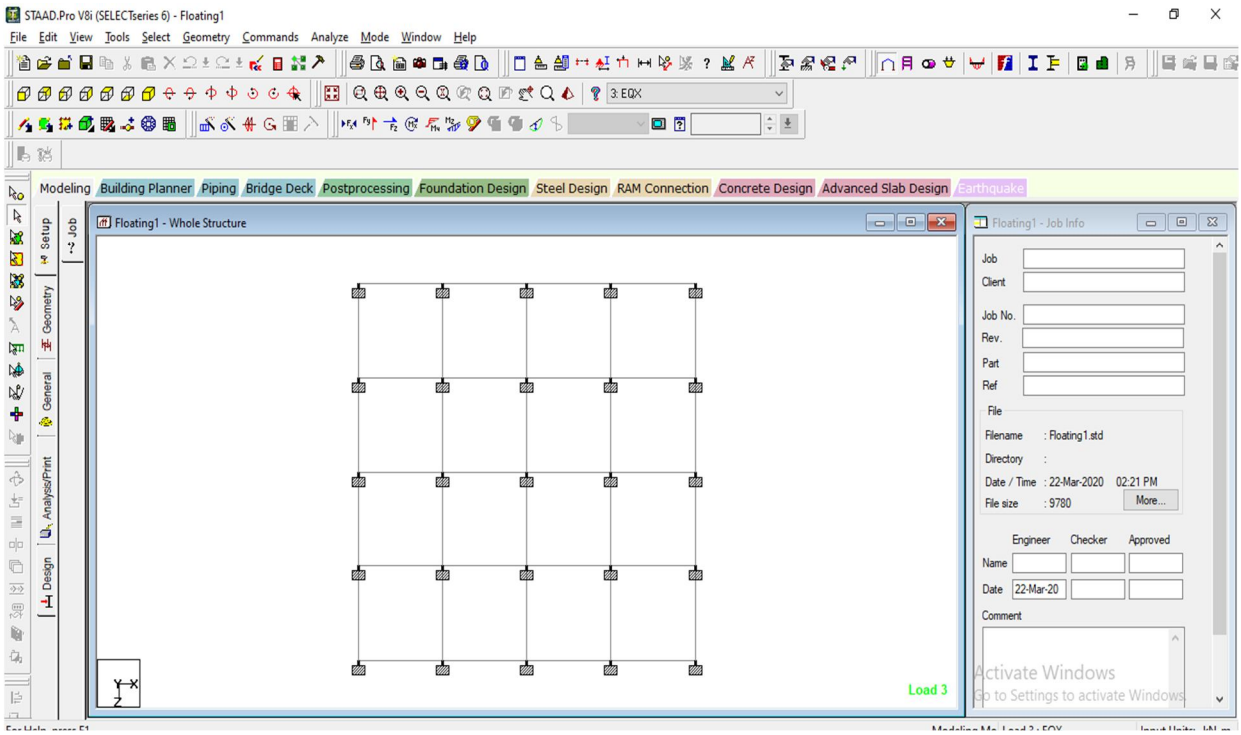

Fig.2: plan of Regular Building

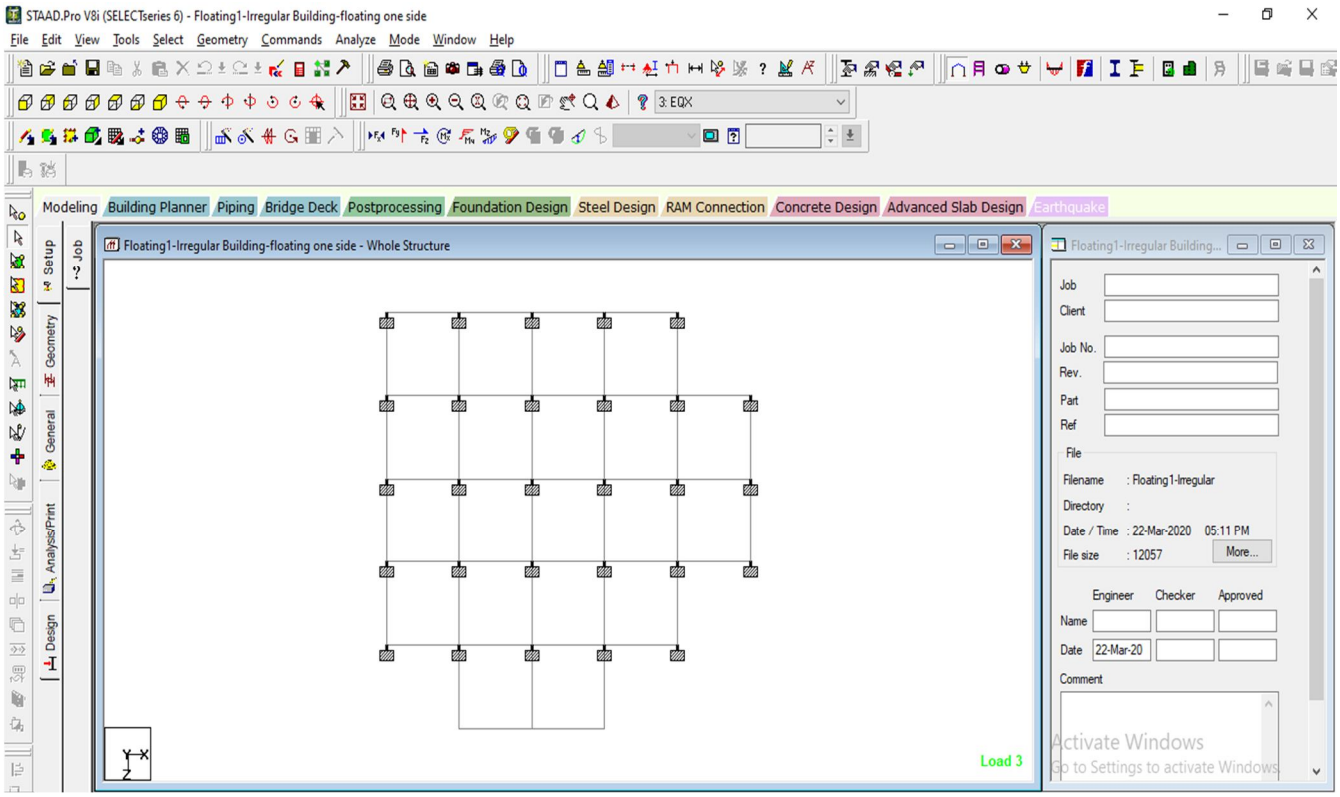

Fig.3: Plan of Irregular Building with Floating Column

The above models are then analyzed in the software STAAD-PRO.

IV. RESULTS

The results of the models are obtained in terms of displacement, axial shear, shear force and moments for the different models are as follows.

Table 1: Reaction for the Regular building with floating columns at one side

		Horizontal	Vertical	Horizontal	Moment		
	Node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
Max Fx	57	35.395	322.065	0.428	0.415	-0.243	-93.299
Min Fx	52	-35.395	322.065	0.428	0.415	0.243	93.299
Max Fy	60	-19.54	653.303	-10.192	-10.67	0.247	63.277
Min Fy	54	-15.029	-141.735	2.696	2.85	0.246	51.479
Max Fz	67	0.428	322.065	35.395	93.299	0.243	-0.415
Min Fz	54	0.428	322.065	-35.395	-93.299	-0.243	-0.415
Max Mx	67	0.428	322.065	35.395	93.299	0.243	-0.415
Min Mx	54	0.428	322.065	-35.395	-93.299	-0.243	-0.415
Max My	54	-22.276	179.816	-2.262	-2.328	0.412	76.969
Min My	60	22.276	179.816	-2.262	-2.328	-0.412	-76.969
Max Mz	52	-35.395	322.065	0.428	0.415	0.243	93.299
Min Mz	57	35.395	322.065	0.428	0.415	-0.243	-93.299

Table 2: Displacements for the Regular building with floating columns at other side

			Horizontal	Vertical	Horizontal	Resultant
	Node	L/C	X mm	Y mm	Z mm	mm
Max X	176	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	31.594	-6.214	-13.991	35.108
Min X	184	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	-31.594	-6.214	-13.991	35.108
Max Y	30	4 EQZ	0	3.463	5.562	6.552
Min Y	105	10 GENERATED INDIAN CODE GENRAL_STRUCTURES 6	0	-15.949	-24.839	29.519
Max Z	180	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	0	-0.348	26.091	26.094
Min Z	180	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	0	-14.363	-47.625	49.743
Max rX	80	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	0	-0.319	11.67	11.674
Min rX	80	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	0	-14.379	-19.061	23.876
Max rY	9	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	-6.568	-6.187	-1.038	9.083
Min rY	1	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	6.568	-6.187	-1.038	9.083
Max rZ	35	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	-8.82	-0.34	-3.266	9.412
Min rZ	29	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	8.82	-0.34	-3.266	9.412
Max Rst	180	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	0	-14.363	-47.625	49.743

Table 3: Beam Forces for the Regular building with floating columns at other side

	Beam	Node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
Max Fx	111	56	1160.625	0	20.603	0	-5.251	0
Min Fx	109	4	-169.284	27.36	-9.083	6.536	11.713	1.32
Max Fy	6	6	46.884	81.974	0	0	0	110.785
Min Fy	1	4	43.087	-68.174	0.159	-0.267	0.237	95.1
Max Fz	53	13	285.7	0	55.487	0	-106.796	0
Min Fz	458	37	231.765	-0.87	-54.752	-0.182	59.042	-1.269
Max Mx	115	10	824.939	41.616	25.43	9.808	-57.894	3.125
Min Mx	109	4	824.939	-41.616	25.43	-9.808	-57.894	-3.125
Max My	111	56	198.02	0	34.511	0	93.563	0
Min My	123	68	311.184	0	-40.617	0	-126.847	0
Max Mz	111	56	642.583	-49.573	12.886	-7.818	-3.617	129.631
Min Mz	111	56	642.583	49.573	12.886	7.818	-3.617	-129.631

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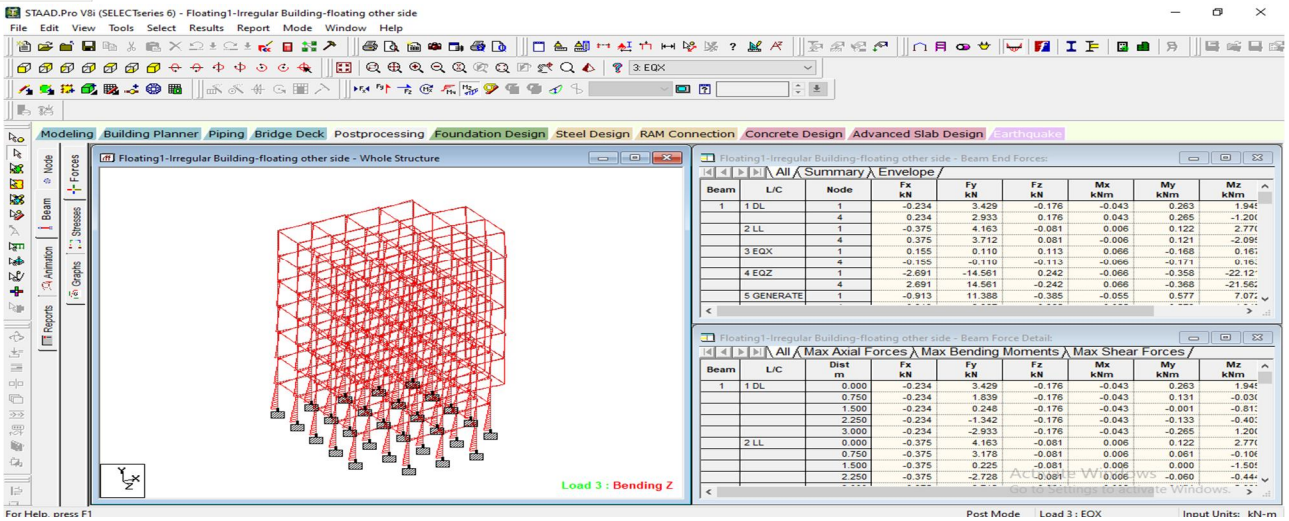


Fig. 4: Forces on the beam and column

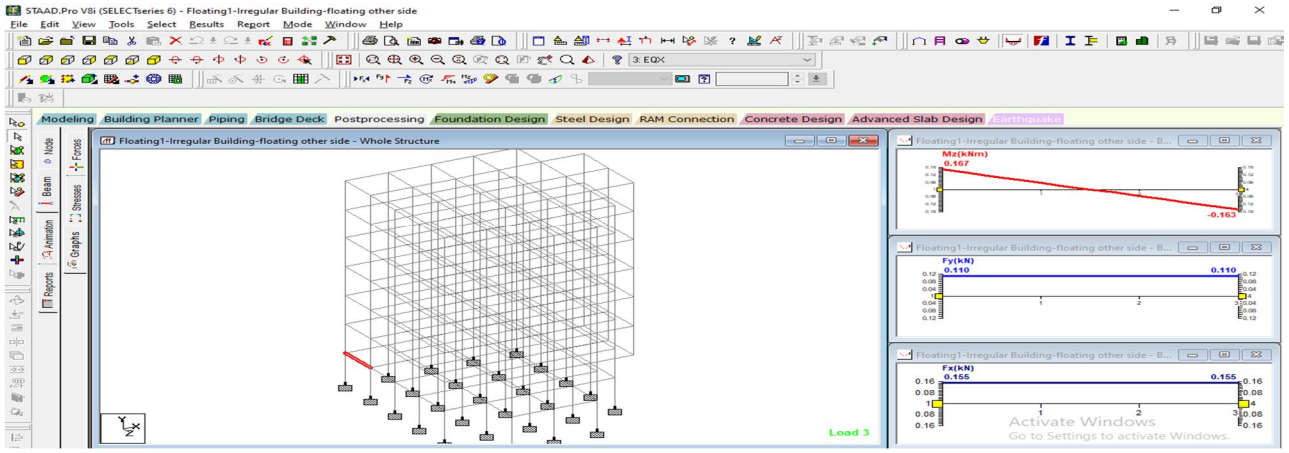


Fig.5: Graph for the beam in STAAD-PRO

Table 4: Displacement for Irregular building without floating column

			Horizontal	Vertical	Horizontal	Resultant
	Node	L/C	X mm	Y mm	Z mm	mm
Max X	187	16 GENERATED INDIAN CODE GENRAL_STRUCTURES 12	29.479	-0.033	0.077	29.479
Min X	247	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	-29.515	-0.259	0.163	29.516
Max Y	187	3 EQX	19.66	0.212	0.059	19.661
Min Y	188	5 GENERATED INDIAN CODE GENRAL_STRUCTURES 1	-0.072	-1.384	-0.072	1.388
Max Z	180	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	0.077	-0.033	29.479	29.479
Min Z	223	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	0.163	-0.259	-29.515	29.516
Max rX	80	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	0.032	-0.16	12.925	12.926
Min rX	211	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	0.066	-0.156	-12.933	12.934
Max rY	179	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	29.078	-0.268	0.076	29.08
Min rY	177	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	0.076	-0.268	29.078	29.08
Max rZ	235	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	-12.933	-0.156	0.066	12.934
Min rZ	87	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	12.925	-0.16	0.032	12.926
Max Rst	187	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	-29.508	-0.902	-0.109	29.522

Table 5: Reactions of Irregular building with floating column at one side

		Horizontal	Vertical	Horizontal	Moment		
	Node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
Max Fx	71	39.678	416.212	16.693	17.731	4.749	-109.634
Min Fx	74	-40.669	645.099	22.65	21.665	-5.049	112.04
Max Fy	73	-0.794	1044.095	23.119	15.943	-0.45	2.065
Min Fy	55	0.189	-116.792	-18.096	-61.712	-0.035	-0.528
Max Fz	73	-0.239	413.252	41.355	102.186	-0.212	0.614
Min Fz	62	0.575	287.457	-37.496	-109.946	-0.245	-0.662
Max Mx	73	-0.239	413.252	41.355	102.186	-0.212	0.614
Min Mx	62	0.575	287.457	-37.496	-109.946	-0.245	-0.662
Max My	73	39.637	352.021	9.431	6.985	5.402	-109.729
Min My	73	-40.513	588.774	15.276	10.209	-5.891	112.018
Max Mz	74	-40.669	645.099	22.65	21.665	-5.049	112.04
Min Mz	73	39.637	352.021	9.431	6.985	5.402	-109.729

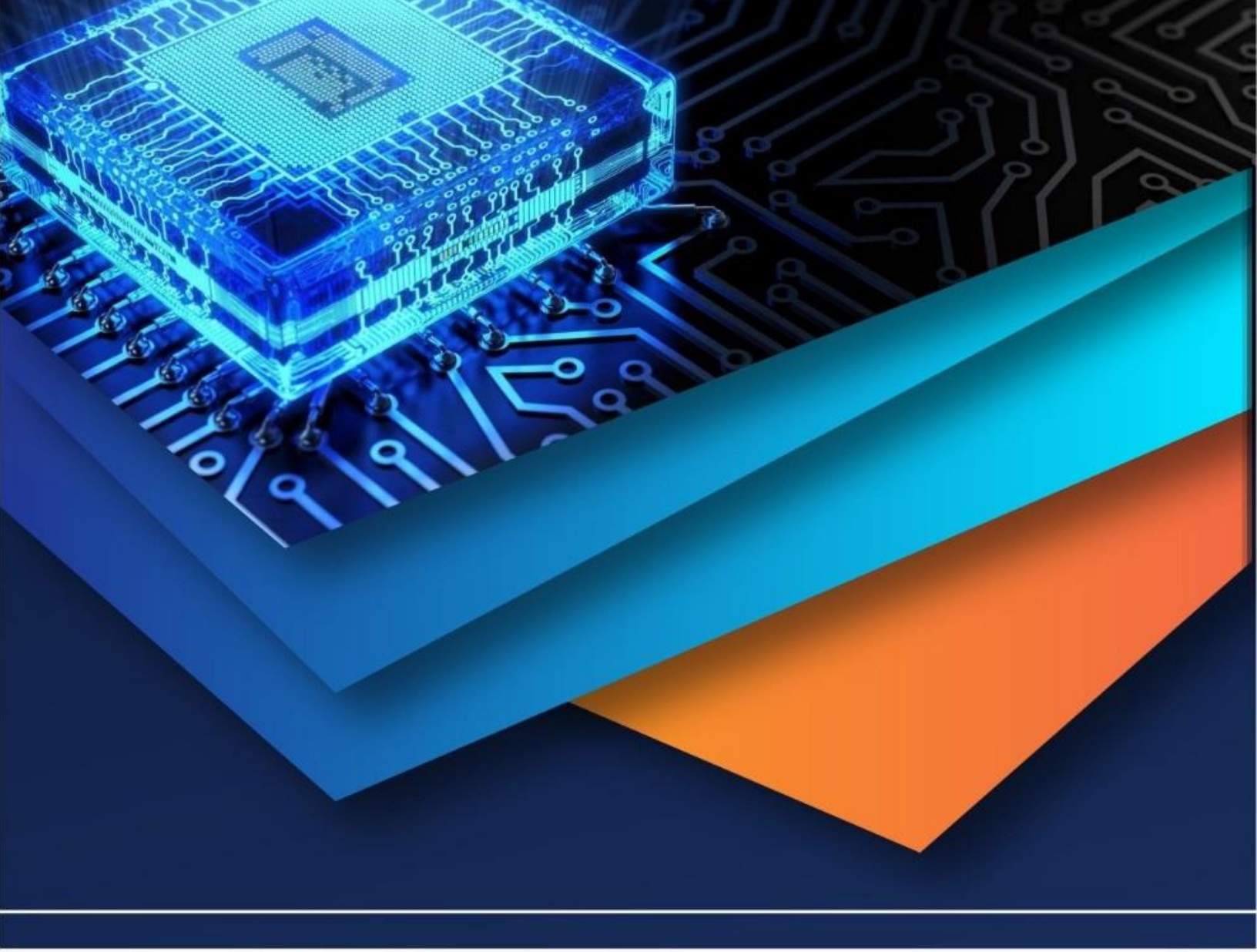
V. CONCLUSION

From the above study it is concluded as follows:

A. It is found the displacement is more in the Regular building with one side floating columns.
B. The reactions found to be more in the Regular building with other side floating columns.
C. The forces are found to be more in the regular building with one side floating columns as compared to other models.
D. The floating columns in one side of the regular building has more displacement and forces as compared to the floating columns at corners.
E. The floating columns should be provided with due care.

REFERENCES

[1] IS 1893 (Part 1):2016 Criteria for Earthquake Resistant Design Of Structures
[2] IS: 456:2000, "Indian Standard Code for Plain and Reinforced Concrete", Bureau of Indian Standards.
[3] Kirankumar Gaddad, Vinayak Vijapur "Comparative Study Of Multi Storey Building With And Without Floating Columns And Shear Walls" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056, 2016.
[4] Israa H. Nayel, Shereen Q. Abdulridha, Zahraa M. Kadhum "The effect of shear wall locations in rc multistorey building with floating column subjected to seismic load" (IJCIET) Volume 9, Issue 7, July 2018.
[5] Sreekanth G.N., Pradeep K.R., Arunakanthi E,(2014),"Seismic Analysis of a Normal Building and Floating Column Building", IJERT-Vol.03 pp981-98,2014.
[6] Kandukuri Sunitha, Mr. Kirankumar Reddy. "Seismic Analysis of Multistorey Building with Floating Column by using Tabs" IJETSR ISSN 2394 - 3386, Augast 2017.
[7] Bureau of Indian Standards:IS-875,part (1) 1987,Dead loads on Buildings and Structures, New Delhi, India
[8] Bureau of Indian Standards:IS-875,part (2) 1987, Live loads on Buildings and Structures, New Delhi, India
[9] Allacheruvu Raghavendra, T.Appa Reddy, G.N.Sreekanth "Comparative Seismic Study On Strengthening Of Floating Column Building Using Bracings", ISSN: 2394-2827 Volume-3, Issue-5, Oct.-2016.
[10] Srikanth M.K., Yogeendra R. Holebagilu,(2014), "Seismic response of complex buildings with floating columns for zone II and zone V".IJOER- Vol.02 pp.1-11 ,2014
[11] Sreevidya M G, Neethu Joseph, Tilba Thomas " Effect Of Floating Column On The Seismic Behaviour Of A Multistoried Building." e-ISSN: 2395-0056 Volume: 05 Issue: 04 Apr-2018 www.irjet.netp-ISSN: 2395-0072.
[12] A.P. Mundada, S.G. Sawdatkar, "Comparative seismic analysis of Multistory Building with and without Floating Column ", International Journal of Current Engineering and Technology - Vol. 04pp.3395-3400. ,(2014)
[13] Deekshitha.R, Dr.H.S.Sureshchandra, 'Seismic Analysis of Multistorey Building with and without Floating Column' IRJET- Vol.04pp.2546-2550. (2017) Arpit Shrivastav, Aditi Patidar 'Seismic Analysis of Multistorey Building having Floating Column', SSRG-IJCE - Vol.05 ISSN:2348-8352. (2018)



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