

# Analysis of a 3 Dimensional Building Frame with Long Span and Floating Column Considering Seismic Load: A Review

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**Abstract**— The floating column is a vertical member which rest on a beam but doesn't transfer the load directly to the foundation. The floating column acts as a point load on the beam and this beam transfers the load to the columns below it. Floating column can be termed as a column resting on a beam instead for distributing load directly to the foundation. It acts as a point load on a beam which is further distributed to column attached to beam. In this review paper we are reviewing the past researches related to structure with long spans and structures with floating columns.

**Keywords:** Review, Floating Column, Analysis, Staad, Stability, Reinforcement

## I. INTRODUCTION

Now a days, in India having open first story in urban multi-storey building as an unusual feature. Primarily this space is adopted for parking purpose or used for reception lobbies in first storey, at the time of earthquake total seismic base shear is experienced by a building depend on its natural period, this seismic force distribution of building is dependent on the distribution of mass and stiffness along the height of building.

A vertical member which start from the foundation level is known as column, this transfer the load to the ground and the floating column is also a vertical member which is started from the horizontal member called beam. i. e. floating column is not started from the ground.

Current literature review includes study results of multi-storey building frames with floating column and without floating column in seismic active areas-

Bahera (2012) – In this paper stiffness analysis of building with first storey and the above storey, to reduce irregularities presence in the structure providing floating column. In this report building structure analysis with floating column and without floating column for different earthquake excitation having different frequency. This building analysis for static load, free and forced vibration with and without floating column. In this report the FEM code is developed in the MATLAB platform. In this report time history of floor displacement, storey drift, overturning moment, base shear are computed for frame with and without floating column and dynamic analysis is done by changing the column dimension. Result is that with increase in ground floor column the maximum displacement and storey drift is decrease and the overturning moment and base shear is varying with change in column dimension.

Shrikanth and Holebau (2014) – In this paper study of high rise building with floating column and complexities with floating column for earthquake force. For this analysis four models are constructed for medium soil and then this building structure is analyses these models with higher to lower seismic zone. This analysis is done by ETABS software and results of this analysis is presented in terms of storey drift

and displacement, soft storey and tabulated on basis of seismic analysis.

Sekhar and Prasad (2014) – In this paper the behavior of building structure with floating column and without floating column is studied under static load, forced and free vibration condition and the results are plotted for both the frames by comparing time history of floor displacement and base shear the static analysis of building frame is done by software STADD pro v8i and comparison of these models are presented. So that this study help us to find the analytical properties of the structure and we can constructed the building structure with systematic and economical type.

Mundada and Sawadaka (2014) - In this paper, a G+7 existing building with and without floating column is analyses by using STAAD pro v8i software with 3 models. This is done for architectural drawing and framing drawing of the building with floating column. Static analysis is done for these models is using STAAD pro v8i software. This will give results in terms of moment distribution, axial load, importance of line of action of forces etc. this study helps us to find various analytical properties of the building and provide a systematic and economical design for building structure.

Banerjee and Kumar (2014) – In this paper the effect of earthquake is studied at the time of earthquake when the shakes are developed in the earth then there will we some damages occurred in beam, column and storey and infill wall with floating column. In this paper storey drift, base shears, floor displacement, time period are analyses and this result compare with ordinary moment resisting frame. Due to lateral stress yielding, cracks and plastic hinge are observed during analysis. When we provide floating column with infill wall then there are some reduce in displacement and storey drift. In comparison of ordinary moment resisting frame displacement, time period is higher in floating column building.

Nanabala and Kumar (2014) – In this paper the aim is to building is safe - unsafe and economical - uneconomical in seismic active areas with floating column. For this analysis, G+5 normal building and G+5 floating column building is made with 3 models for the analysis and the load calculation is done by manually for static load using equivalent static method. This analysis is done by SAP2000. In this analysis model1 is normal building with same dimension, model2 is floating column building with same dimension, in model3 the dimension of beam and column are varying. After this model1, model2, model3 are compared for lateral displacement, time history analysis. This is for safe and unsafe analysis and for economical and uneconomical steel and concrete quantity is compared in model1, model2 and model3.

Nautiyal, Aktar and Batham (2014) – In this paper at the earthquake time analysis is conducted at the time of excitation soil condition is different and this give different results. There is no clause or no provision in is code for soil condition. In this paper two models are created G+4, G+6 with floating column for safe and economical checks. In this paper dynamic analysis is conducted and results are obtained in terms of dynamic response parameter like – base shear and moment for various soil condition for both the models

Nikhil and Pande (2014) – This paper is fully focused on the irregularities introduced in building with different position according to architectural requirement. The requirement of floating column is some time internal, external or may both internal and external. Then provide floating column to reduce irregularities. In this study G+6 model is made and applied earthquake load according to IS – 1893(part -1) – 2002. And this model is analysis for different earthquake zone. In this research critical combination of load are found out for seismic analysis of floating column for different load combination variation in various parameter such as displacement, forces and moments in column and beam. For different floor levels are compared and represented this value by graphs. This analysis is completed by STADD pro v8i software.

Bhensdadia and Shah (2015) –In this study seismic analysis in different earthquake zone soft storey and floating column effect is analysis. In this study push over analysis is adopted. In this analysis the yield performance level of building for displacement is done up to failure. This will help us to study about the ductility and collapse load of the structure. For this results, three RC bar frame structure with G+4, G+9, G+15 stories are compared with base force and displacement of RC bar frame structure with G+4, G+9, G+15 stories in different earthquake zones. Places Jamnagar, Rajkot and Bhuj using software SAP2000.

Ashfirahman (2015) – In this paper static and dynamic analysis is done with response spectrum method for a multi-storey with and without floating column. This analysis is done by using STAAD pro v8i software in this research floating column position is changed in a floor and the floating column is changed in a storey results are based on the fundamental time period, spectral acceleration, base shear, storey drift and storey displacement.

Rohilla and Gupta (2015) – In this paper study is done for seismic zone 2 and 5 for G+5 and G+7 RC building with critical position of floating column in vertical irregular buildings. There is some variation in supporting column and beam in building with effect the structure with floating column for the purpose of study 2 models are created with irregularities in vertical direction. Each models made with 2-ways which 5M and 6M respectively in X- direction and 5M height in Y – direction of each way. For the study purpose response factor is taken 5 and the importance factor is taken 1 in the analysis. The earthquake is considered only in X – directions by using ETABS software the results are obtained. That is storey drift, storey displacement, and storey shear. It gives result floating column provided in zone 2 but avoided in zone 5, because storey drift, displacement is increase in zone 5 due to presence of floating column in building structure.

Tamner and Talikoti (2016) - In this study results of multi-storey building with floating column for static and dynamic analysis is shown, in this floating column gives strength to the building when the horizontal beam designed safely. i.e. reinforcement is more compare to normal beam, than this gives 46.17% more strength to the building structure.

## II. CONCLUSION

In this review paper it can be conclude that authors in past evaluated that structure with analysis tool using concept of floating column are utilized In past but none of the researcher describes it positive and negative effects over the structure and also the most important part is its cost effectiveness.

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