Review on Optimum Location of Floating Column In Multistorey Building With Seismic Loading

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Abstract- *Floating structures are very popular in today's world due to the their appealing look, more open space so as to provide more movement area in the building and freedom to architects to impart their imagination in front of world. Such cases are made possible with the help of various structural arrangements, one of those are floating column which implies that a vertical structural member which are supported over a beam or a joint randomly without any support below it. There are various cases which shows the use of floating column is not much successful in earthquake prone areas in terms of stability but it is because of the fact that there is not much work is done on the optimum location of floating column within the building. This study presents the review of such case studies and research work that had been carried in this field earlier. With reference of this review the need of research has been generated to examine the building with optimum location of floating column so it may not produce any chaos.*

Keywords- Floating column, earthquake prone area, optimum location, staad pro

I. INTRODUCTION

In the era of high rise building with theme based structure and to add some luxuries like open pool, big balconies, terrace gardens or more open spaces in the building in any random stories we need to facilitate such type of cases by providing floating column. To accomplish such kind of structure several arrangements are made, one of these are floating columnthat are placed in multistory building in various stories and also within the story as per requirement of design and architecture. Previously various studies was carried out for structural stability of building with floating column but nowhere are the traces of any such case to examine the location of floating column within the building. In the present study various research paper are studied and reviewed forresearch work done in the field of floating column so as to identify the problem arises till now so that they may be further analyzed and possible solution are suggested . In this paper a G+14 storied multistorey building is modelled andseveral models are framed for various location of floating column in the multistory building at various floor and also within the floor to check the optimum case within that.

Floating Column

A floating column is a structural member in a framed structure whose base are not supported by any fixed support. Generally in RCC building the column is placed in such a way like regular stacked structure i.e. the load transfer mechanism will take place in a regular pattern without any disturbance to frame or without producing any irregularity in the structure. But in floating column load is transferred by supporting frame i.e. the adjacent beam and column attached with the frame or sometimes within the beam.

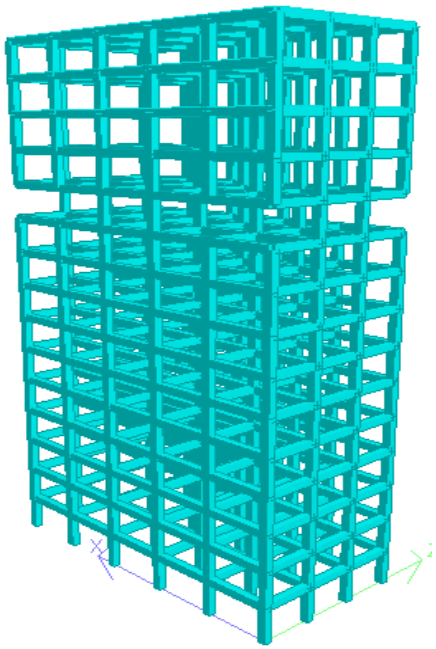

Fig 1: Isometric view of building showing floating column in G+9 floor level.

II. REVIEW OF LITERATURE

BadgireUdhav S., Shaikh A. N., Maske Ravi G., in this paperstudies are carried out on a multistorey building without floating column in three cases consisting of removal of periphery column in corners and analyzed for equivalent static method.All the cases consist of three phases in which different floor plan is selected where in the first phase bottom stories are selected for parking purpose, middle stories are planned for residential purpose and the upper stories are

planned for residential purpose also but with different arrangement plan. Several parameters are taken for analysis and the results are concluded that chances of failure is more in the model containing floating column in two longer side as compared to two shorter side. Also the values of shear force are varying significantly with respect to position and orientation of column.

Deekshitha R., Dr. H. S. Sureshchandra,in this paper an effort is made to analyze whether the building is safe with floating column. Also attempt is made to check the feasibility of structure as it is economical or not. A G+5 model is framed to analyze the building for various location of floating column in middle of ground story. Deciding parameter taken for analysis is displace of the building under various circumstances and for economic analysis various materials are calculated against various cases. The results of this study are displacement is more in building floating column and to improve the stability lateral bracing or shear wall is required. Also building with floating column is not economical.

Jayashri Sarode, Mr. Amol S. Pote,this paper involve the comparative study of normal building without any floating columnwith the floating column in lower story in simple framed building with RCC beam to support floating column in one case and composite beam in second case. Here in this case steel concrete composite beam is used for analysis in comparison to normal RCC beam girder. Both the response spectrum and static analysis is done against various parameters comprises of story shear, story drift, displacement, shaer force and results so obtained are the building with floating column and composite beam girder experiences the maximum displacement which shows that flexibility is highest in this case so the selection of composite beam is not found significant. Also in the response analysis the building experiences maximum story shear in the first story and decreases as the height of building increases in all cases.

Keerthi Gowda B. S, Syed Tajoddeen, in this paper the aim of the study is to analyze the seismic effect offloating column in multistory building. Basically three different cases taken for comparative analysis of various parameters under seismic excitation. In the first case normal building is taken without any floating column and in second case a building is taken with floating column in alternate stories in all four corners. And in the third case the same building with floating column providing lateral bracing is analyzed against different parameters. Study reveals that after providing lateral bracing to column will strengthened the structure supported by the fact that story drift is reduced by a subsequent amount of 18.28 %. Also all other parameters shows the significance of adding bracing. But here also the cases are only taken for floating column in a fixed location which arises the need of bracing.

Nakul A. Patil, Riyaz Sameer Shah, focuses their comparative study on seismic behavior of a building with and without floating column. Four different cases withdifferent number of floating will be planned for different cases was modelled. In this work comparison is done to check the response of RC frame structure for various cases under earthquake and normal loading and also various parameters are examined against various condition so as to obtain the superior structure out of these cases. This study concludes that the story drift is increases with increasing the number of floating column and also the drift is higher comparable to non-floating column building. They also revealed that providing floating column is not significant in higher seismic zone.

S. B. Waykuleet. al., has analyzed a G+5 multistory building with and without floating column for earthquake zone V. Various parameters are taken comprises of base shear, story drift, story displacement etc. for comparison of two cases modelled with floating column at middle of first story and outer periphery of all floors at a time and a building without floating column. Comparison is done for all parameters by linear static method and time history method of seismic analysis of IS 1893(Part 1):2002. Results of this study concludes that time period, displacement and story driftis comparatively greater in building with floating column but base shear is less in comparison to building without floating column.

Snehal Ashok Bhoyar, has made an attempt to analyze building performances subjected to lateral load under the effect of floating column. G+5 building is chosen for structural analysis with or without column for regularly planned building and irregularly planned building. The analyses is done by static analysis method which deals with the examination of various parameters against lateral loading. All the cases are modelled with floating column in all four corner for both regular and irregular cases at first floor only. The results shows that story drift in any structure is varied with respect to the structural arrangement of members and irregularities in the building architecture.The results shows that story drift in any structure is varied with respect to the structural arrangement of members and irregularities in the building architecture. It is also observed that story drift is a function of lateral displacement and twisting or overturning of building. Here the drift rises up to 50% at roof of the building.

Srikant. M. K., Yogendra. Rholebagilu, this research work presents some of the complex possibilities in the structure. Several cases aremodelled in combinationswhich

comprises of floating column in ground floor at different location, floating column with increased floor to floor height and floating column with heavy load for earthquake zones II and zone V. Conclusion drawn against examining various parameters for various conditions is that floating column under heavy load, increased story height in combination is not successful and hence not advisable. Story drift is varied more in case of combination of floating column with increased height and heavy load. Also the displacement is goes on increasing with higher zone. So it may also be concluded that the floating is solely used at some cases but without any combination to reduce the stiffness.

Waykule S. B., Kadam S. S, Lale S. V,in this review paper the work is done on study of various research work done previously in the field of floating structure for various loading condition and various arrangement of plan of building. Some of the cases will make variation in number of floating column along with different stories within the building. Some of the cases makes changes in location of floating column within the building. Various parameters are selected to examine the behavior of building under various circumstances which would give remarkable conclusion. Various methods of analysis i.e. linear static method, response spectrum method and time history method of analysis are used for analyzing the structure by various software like etabs, staad pro. Conclusion made from this study is that the comparison of the seismic parameters are done for both floating and non-floating structure by different analysis software sap 2000v17 to check the variation in the parameters.

III. CONCLUSION AND OUTLINE OF PROPOSED WORK

From the review of research done it wasseen that a lot of work is done in floating column for various condition but not in optimizing its location within the building at various stories.In most of the cases analysis is done for lower stories or for outer periphery throughout the buildingat a time in all the cases but not at various stories one at a time and at various locations. Following are the outline of proposed work drawn from the conclusion of above case studies:.

1. A G+14 story building is taken for analysis with or without floating column not only in lower stories but also in various stories one by one at various locations within the building to understand better the effect of various seismic parameters in such case of high rise building. The analysis is done for seismic zone V to check the maximum value of result parameters.
2. For such tall building various seismic parameters like displacement and drift are analyzedat all stories to examine the effective variation.
3. Some other deciding parameterslike maximum of bending moment, shear force and axial forceis needed to be analyzed for better optimization and conclusion for various cases.
4. Finally from analyzing above cases against various parameters optimum location of floating column within the building will be suggested.

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