PUNE RESEARCH WORLD ISSN 2455-359X
AN INTERNATIONAL JOURNAL OF INTERDISCIPLINARY STUDIES VOL 6, ISSUE 2

PERFORMANCE OF MULTISTOREY BUILDING OF FLOATING COLUMN USING E-TAB SOFTWARE

DHANSHRI HANUMANT PATIL[1] RUSHIKESH B. BIRHADE[2]
BHAVEN R. SARODE[3] PANKAJ V. THORAT[4]
B.E. Civil Student[1, 2, 3, 4,]
Sinhagad Institute and Technology Science, Narhe Pune (MS) INDIA[1, 2, 3, 4,]

SHAHRUKH SALIM SHAIKH[5]
Guide
Assistant Professor
Sinhagad Instritude And Technology Science Narhe Pune (MS) INDIA[5]

ABSTRACT

Multi-stored buildings constructed for the purpose of residential, commercial, industrial etc., with an open ground stored is becoming a common feature. For the purpose of parking, usually the ground stored is kept free without any constructions, except the columns which transfer the building weight to the ground. For a hotel or commercial building, where the lower floors contain banquet halls, conference rooms, lobbies, show rooms or parking areas, large interrupted space is required for the movement of people or vehicles. Closely spaced columns based on the layout of upper floors are not desirable in the lower floors of such buildings. For this purpose, floating column concept has come into existence. The floating column is a vertical member which rest on a beam and doesn't have a foundation. The floating column act as a point load on the beam and this beam transfers the load to the columns below it. But such column cannot be implemented easily to construct practically since the true columns below the termination level are not constructed with care and hence finally cause to failure.

INTRODUCTION

The floating column is used for the purpose of architectural view and site situations. It can be analyzed by using ETABS 2018. During past earthquake reinforced concrete (RC) buildings

VOL 6, ISSUE 2 www.puneresearch.com/world JUNE-AUG 2021
(IMPACT FACTOR 3.02) INDEXED, PEER-REVIEWED / REFEREED INTERNATIONAL JOURNAL

have been damaged on a very large scale. These RC building have been damaged due to various reasons. A wide range of structural damages observed during past earthquakes across the world has been very educative in identifying the cause of failure. The principal causes of damage to RC buildings are soft storey, floating columns, mass irregularities, inconsistent seismic performance, soil and foundation effect, pounding of adjacent structures and inadequate ductile detailing of members. Lot of research work has been carried out on procedural assumptions, made in different seismic codes, for the assessment of seismic capacity of existing buildings. The inertia force developed at different floor levels need to be brought down along the height of frame through shortest possible path; any discontinuity in transfer path results in poor performance of the RC building under earthquake excitation. RC buildings with column that hang or float on beams at an intermediate stored and do not go all the way to the foundation have discontinuities in the load transfer path. For loose soil we preferred deep foundation (pile). If we will do so much calculation for a high rise building manually then it will take more time as well as human errors can be occurred. So the use of ETABS will make it easy. ETABS can solve typical problem like static analysis, Seismic analysis and Natural frequency. This type of problem can be solved by ETABS along with IS-CODE. Moreover ETABS has a greater advantage than manual technique as it gives more accurate and precise result than the manual technique.

Objectives

1. To study the effect of internal and external floating columns on the building under earthquake loading.

2. To find effects on various parameters of RC building under seismic load due to presence of floating columns.

3. To evaluate the conduct of multi-storey building having floating columns with shear wall under earthquake loads.

4. Compare base shear result with III zone.

5. Determine story drift at various story levels in G+10 story building with floating or without floating column

LITERATURE REVIEW

2.1 Literature Survey

Kishalay Maitra, N. H. M. Kamrujjaman Serker (2019) studied modern multi-story construction, floating column is an unavoidable feature of buildings. Such features are highly undesirable in building built in seismic prone areas. This study highlights the performance of floating column building and compared with normal building under seismic load. In this study, static and dynamic analyses using response spectrum method have been carried out for multi-story building with and without floating columns. Different cases of the building have been studied by varying the location of floating column and increasing the column size. The results showed that story displacement increased by 56.96% in floating column building compared to normal building. Torsionl irregularity was found when floating column was introduced unsymmetrically. It was also found that fundamental time period was increasing in floating column building and lateral stiffness was decreasing in floating column building. Fundamental time period of floating column building is greater than normal building. From mode shape it is observed that when floating column is provided unsymmetrically then torsional mode is found early compared to normal and symmetrical floating column building.

Gulchaman Khan, Prof. Mayur Singi (2018) discussed the causes of three times of multi-storey houses are taken into consideration having 8 storeys, twelve storeys and sixteen storeys. All the 3 instances are taken into consideration having hanging columns furnished with and without shear partition, and moreover analyzed for zone V the usage of software ETABS 2016 .observation shows that the supply of hanging columns is nice in growing FSI of the building however is a volatile component and increases the vulnerability of the building. Its miles observed from the evaluation that lateral displacement and storey drift of the constructing will boom from decrease to better zones due to the fact the significance of depth might be more for higher zones. Through the usage of shear wall those parametric values reduce in all of the models. The storey float and displacement is extra for floating column homes due to the fact as the columns are eliminated the mass receives accelerated and therefore drift and displacement also will increase. As we have provided the shear walls at all the four junctions which makes it total stable in both the aspects lateral displacement as well as storey drift as we have provided shear walls at all the junctions which provides more strength up to 70% problem is solved for the seismic point of view.

6.3 Scope for future work

1. The study can further be preceded by varying the seismic input parameters in the framed structures.
2. The response of floating column can also be studied for various other response parameters.
3. Effect of floating column in structures having various other irregularities like mass irregularity, stiffness irregularity etc can be studied.
4. Irregularity locations can be changed to analyze the effect of the same.

5. Other analysis methods like time history method and pushover analysis etc. can be used.

Conclusions

Following conclusions have been drawn on the basis of above analysis:

1. The Base shear is maximum in X-direction at flouting column building at G+10 stories building in zones III. Also in G+10 stories building base shear are increases 1.14 times as compare to without flouting column building.
2. In G+10 story building due to earthquake loading, the displacement is maximum in G+10 story flouting column building as compare to G+10 story with without flouting column in zone III.
3. The storey displacement increases with increase in height of frame model. The increases in storey displacement are maximum.
4. In G+10 regular models, the increases in storey displacement are maximum at upper floors.
5. The maximum increase in storey drift in G+10 regular models is in the floor having floating column.
6. In G+ 10 regular models, the storey drift response has not changed much with the presence of floating column at position in upper floors.
7. Floating column provided at in first floor is most critical and to be analyzed carefully.
8. In multi-storey framed building, displacement and drift of the building increases from lower zones to higher zones as the magnitude of intensity of earthquake will be more for higher zones than lower zones.
9. The storey drift increases with the presence of floating column.
10. It has been observed that on increasing the size of beams and columns of ground floor, the storey displacement and storey drift have been reduced for only lower floors and not much effect has been observed at upper floors.
11. It has been observed that with increase in cross-section area of beam and cross sectional of columns floors having floating column, the effects of floating column on seismic response of structure can be minimized.

12. Floating column should be avoided in high rise framed RC buildings located in high seismic zones.

REFERANCES

1. Kishalay Maitra, N.H.M Kamrujjaman Serker, ‘’Evaluation of seismic performance of floating column building,’’ ISSN (ONLINE): 2330 – 8737, ISSN (PRINT): 2330 – 8729, Vol.6, Issue 2, and April 2018.

2. GulchAman Khan, Prof. Mayur Singi: ‘’seismic analysis of multistory building having floating column,” CODEN: IJESS7, ISSN: 2277 -9655, Vol.3, Issue 1, January 2019.

3. Asst. Prof. Nikhil Ingawale, Aishwarya Ashok Magar, ‘’Rahul Shashikant Jadhav, Kunal Mahadev Gaikwad, Deepak Bhikaji Pawar: analysis of earthquake resistance structure by using ETABS,” ISSN (ONLINE): 2395 – 1052, Vol.4, Issue 6, June 2018.

4. Snehal Ashok Bhoyar: ‘’effect of floating column on building performance subjected to lateral load,” ISSN: 2456 – 8465, Vol.1, Issue 2, and June 2017.

5. Mayur R. Rethaliya, Nirav S. Patel, Dr.R.P. Rethaliya: ‘’seismic analysis of multistorey building using ETABS- a review,” ISSN (ONLINE): 2348 – 4470, ISSN (PRINT): 2348 - 6406, Vol.4, Issue 12, December 2017.

6. Regy Jose, Restina Mathew, Sandra Devan, Sankeerthana Venu, Mohith Y S: ‘’analysis and design of residential building using ETABS,” ISSN (ONLINE): 2395 -0056, ISSN (PRINT): 2395 – 0072, Vol.4, Issue 6, June 2017.

7. A Pavan Kumar Reddy, R. Master Praveen Kumar: ‘’analysis of G+30 high-rise building by using ETABS for various frame sections zone iv and zone v,” ISSN (ONLINE): 2319 - 8753, ISSN (PRINT): 2347 – 6710, Vol.6, Issue 7, July 2017

8. Ali Kadim Sallal: ‘’design and analysis ten storied building using ETABS Software,” ISSSN: 2455 – 0876, Vol. 4, Issue 2, and May 2018.

9. Nakul A. Patil: ‘’comparative study of floating and non-floating columns with and without seismic behavior- a review,” ISSN: 2395 – 6453 (ONLINE), Vol. 1, Issue December 2015.

10. KeerthiGowda B.S. Syed Tajoddeen: ‘’seismic analysis of a multi-storey building with floating columns,” Issue 19-20, MAY 2014.