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REVIEW ON STUDY OF BEHAVIOR OF FLOATING COLUMN FOR SEISMIC ANALYSIS OF MULTISTOREY BUILDING

Ms.Waykule.S.B

PG Student of Civil Engg Department
SKN Sinhgad College of Engg,
Korti, Pandharpur,
Maharashtra, India

Prof. Kadam.S.S

Civil Engg. Department
SKN Sinhgad College of Engg,
Korti, Pandharpur,
Maharashtra, India

Prof.Lale.S.V

Civil Engg. Department
SKN Sinhgad College of Engg,
Korti, Pandharpur,
Maharashtra, India

Abstract—Floating columns are a typical feature in the modern multi-storey construction in urban India and are highly undesirable in buildings built in seismically active areas. In this paper static analysis is done for a multi-storey building with and without floating columns. Different cases of the building are studied by varying the location of floating columns floor wise. The structural response of the building models with respect to time period, Base shear, Storey drift and Storey displacements are compared for both building. The analysis is carried out using software sap2000v17.

Keywords: Floating column, linear static method, Time history method , sap2000v17

I. INTRODUCTION

Now a day's, multi-storey buildings in urban cities are required to have column free space due to shortage of space, population and also for aesthetic and functional requirements. For this buildings are provided with floating columns at one or more storey. These floating columns are highly disadvantageous in a building built in seismically active areas. The earthquake forces that are developed at different floor levels in a building need to be carried down along the height to the ground by the shortest path. Deviation or discontinuity in this load transfer path results in poor performance of the building. The behavior of a building during earthquakes depends critically on its overall shape, size and geometry, in addition to how the earthquake forces are carried to the ground. Many buildings with an open ground storey intended for

parking collapsed or were severely damaged in Gujarat during the 2001 Bhuj earthquake.

Floating Column:

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.

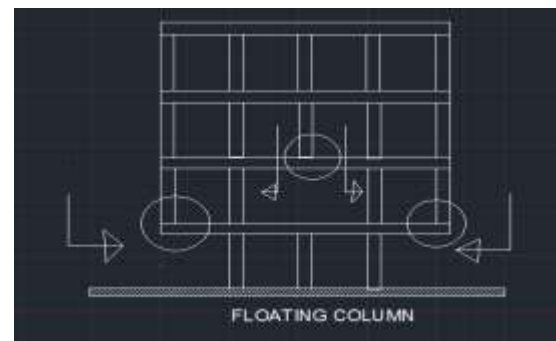


Fig no.1 Floating column in building

II. REVIEW PAPERS

1. Sukumar Bahera*

In this paper involve stiffness balance of first storey and the storey above are studied to reduce irregularity occurs due to presence floating column. To study response of structures under different earthquake excitation having different frequency content keeping the PGA and time duration factor constant they



develop FEM codes for 2D frames with and without floating column. The behavior of building frame with and without floating column is studied under static load, free vibration and forced vibration condition. The finite element code has been developed in MATLAB platform. The time history of floor displacement, inter storey drift, base shear, overturning moment are computed for both the frames with and without floating column. The dynamic analysis of frame is studied by varying the column dimension. It is concluded that with increase in ground floor column the maximum displacement, inter storey drift values are reducing. The base shear and overturning moment vary with the change in column dimension.

2. Shrikanth.M.K^{*1},Yogendra.R.Holebau²

In this paper study is all about to compare the behavior of a building having only floating column and having floating column with complexities. High rise building is analyzed for earthquake force. For that purpose created four models and analyzed for lower and higher seismic zones for medium soil condition. Analysis was carried out by using extended 3 dimensional analysis of building system ETAB version 9.7.4 software. Results are presented in terms of Displacement, soft storey, storey drift for these four models and tabulated on basis of linear seismic analysis.

3. T.raja sekhar*,Mr.P.V.Prasad¹

The behavior of building frame with and without floating column is studied under static load, free vibration and forced vibration condition. The results are plotted for both the frames with and without floating column by comparing each other time history of floor displacement, base shear. The equivalent static analysis is carried out on the entire project mathematical 3D model using the software STAAD Pro V8i and the comparison of these models are been presented. This will help us to find the various analytical properties of the structure and we may also have a very systematic and economical design for the structure.

4. A.p.mundada*,S.G.Sawadakar

In this paper study is done for architectural drawing and the framing drawing of the building having floating columns. For comparison G+7 existing residential building with and without floating column are taken for carry out entire project work. by using STAAD ProV8i 3D 3 model are created .equivalent

static analysis of these model are done by using STAAD Pro V8i .Different parameters such as axial load ,moment distribution, importance of line of action of force and seismic factors are studied for models. This will help them to find the various analytical properties of the structure and also have a very systematic and economical design for the structure.

5. Hardik Bhensdadia*,Siddarth shah

In this study an attempt is made to reveal the effects of floating column & soft story in different earthquake zones by seismic analysis. For this purpose Push over analysis is adopted because this analysis will yield performance level of building for design capacity (displacement) carried out up to failure, it helps determination of collapse load and ductility capacity of the structure. To achieve this objective, three RC bare frame structures with G+4, G+9, G+15 stories respectively will be analysed and compared the base force and displacement of RC bare frame structure with G+4, G+9, G+15 stories in different earthquake zones like Rajkot, Jamnagar and Bhuj using SAP 2000 14 analysis package.

6. Susanta Banerjee*,Sanjay kumar patra

This paper presents the effect of stiffness of infill wall to the damage occurred in floating column building when ground shakes. Modelling and analysis are carried out by non linear analysis programme IDARC- 2D. Damage occurred in beams, columns, storey are studied by formulating modified Park & Ang model to evaluate damage indices. Overall structural damage indices in buildings due to shaking of ground are also obtained. Dynamic response parameters i.e. lateral floor displacement, storey drift, time period, base shear of buildings are obtained and results are compared with the ordinary moment resisting frame buildings. Formation of cracks, yield, plastic hinge,are also observed during analysis. from this it is concluded that lateral floor displacement ,storey drift of floating column building with infill wall are reduced than floating column building without infill wall. Also it is concluded that fundamental time period, lateral floor displacement of floating column building are higher than ordinary moment resisting frame.

7. Sreekanth Gandla Nanabala^{1*}, Pradeep kumar.

In this paper find whether structure is safe or unsafe with floating column when built in seismically active



areas and also find floating column building is economical or uneconomical.

For that purpose analysis of G+5 storey normal building and floating column building are done for external lateral forces. this analysis done by using sap2000. external lateral load are calculated manually. using equivalent static method for analysis created 2D3 model, model1, model2, model3. model1 is a normal building with same dimension of beam and column. model2 is floating column building without changing dimensions. model3 is floating column building with changing dimension of beam and column. And compare the both building based on displacement due to lateral load in terms of model1, model2, model3. also based on stiffness, and based on time history analysis. To check economy of both building compares steel and concrete quantity in terms of model, model2, model3.

8. Prerna Nautiyal*, Saleem Aktar and Geeta Batham

In this paper investigate the effect of a floating column under earthquake excitation for various soil conditions and as there is no provision or magnification factor specified in I.S. Code, hence the determination of such factors for safe and economical design of a building having floating column. Linear Dynamic Analysis is done for 2D multi storey frame with and without floating column. For that purpose created the model G+4 and G+6 building having changing the position of floating column. after that response spectrum analysis is done for both building. dynamic response parameters such as base shear and moment for hard and medium soil condition are obtained for both building models.

9. Er. Ashfi Rahman*

In this paper static analysis and dynamic analysis using response spectrum method is done for a multi-storeyed building with and without floating columns. Different cases of the building are studied by varying the location of floating columns floor wise and within the floor. The structural response of the building models with respect to Fundamental time period, Spectral acceleration, Base shear, Storey drift and Storey displacements is investigated. The analysis is carried out using software STAAD Pro V8i software.

III. SUMMARY OF REVIEW

From the study of all literature review it was observed that study is required for floating column

building for safe point of view during earthquake. Most of all literature review gives better result For normal building as compared to floating column building so more study required for this.

IV. METHODOLOGY

The main objectives of the proposed work are:

1. To compare the modal response of all the models (Mode shapes, Time period, Frequency).
2. To compare the Base shear, Storey drift, Storey displacement and maximum displacement of each storey.
3. To plot the response of the structure for Time history analysis.

Outline of Proposed Work

In the proposed work there is modeling of three types of buildings, building without floating column and building with floating column at 1st floor and building with floating column at 2nd floor. Comparing seismic parameter such time period, base shear, storey displacement, storey drift for all the three models. seismic analysis is done by linear static and time history method by using sap 2000v17.

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