COMPARATIVE SEISMIC ANALYSIS OF FLOATING COLUMN BUILDING AND NORMAL COLUMN BUILDING BY SAP SOFTWARE

S PARWANA NAZ[1], A VENKATA KRISHNA[2], K MOUNIKA[3], S ASHABI[4], H LALITHA[5]

[1, 2]Assistant Professor, Department of Civil Engineering, Ashoka Women's Engineering College, NH 7, Opp Dupadu Railway Station, Lakshmipuram post, kurnool, Dupadu, Andhra Pradesh 518002

[3,4,5] Bachelor of Engineering, Department of Civil Engineering, Ashoka Women's Engineering College, NH 7, Opp Dupadu Railway Station, Lakshmipuram post, kurnool, Dupadu, Andhra Pradesh 518002

Abstract In present situation homes with floating column is a typical characteristic inside the present day multi-storey construction in urban India. Such capabilities are exceedingly unwanted in a building built in seismically energetic areas .This paper targets to analyze the impact of a floating column below earthquake excitation for various soil conditions and as there is no provision or magnification issue laid out in I.S. Code, as a result the determination of such elements for safe and least expensive layout of a constructing having floating column. Sometimes, to meet the requirements these sorts of elements cannot be prevented even though those are not determined to be of safe.

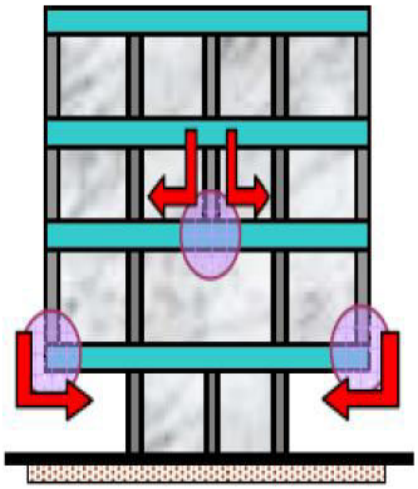
In this study an attempt is taken to observe the conduct of the constructing all through the seismic interest. In this observe, the seismic behavior of the RC multistory buildings with and without floating column is taken into consideration. The analysis is finished for the multi-storey homes of G+10 situated at region Using ETABS Software. Linear Dynamic Analysis is completed for 2D multi storey frame with and without floating column to reap the above goal i.e.the responses (impact) and factors for secure and reasonable design of the structure beneath one-of-a-kind earthquake excitation.

Keywords – Floating Column, Linear Analysis, Response Spectrum Analysis, Magnification Factor.

1. Introduction

Numerous urban multi story buildings in India today have open first story as an unavoidable component. This is fundamentally being received to oblige stopping or gathering halls in the main story. While the absolute seismic base shear as experienced by a building during a quake is subject to its characteristic period, the seismic power dispersion is reliant on the appropriation of firmness and mass along the tallness.

A column should be a vertical part beginning from establishment level and moving the heap to the ground. The term floating column is additionally a vertical component which (because of compositional design/site circumstance) at its lower level (end Level) lays on a bar which is an even part. The shafts thus move the heap to different columns underneath it.



Hanging or floating column

Objective of the study

The following are the main objectives of the project

1. To study the seismic behavior of multi story building by using IS 1893:2002
2. To compare the multi story buildings with and without floating column on multi story Building.
3. To compare the results of Story Drift, Shear force, Bending moment, Building torsion of buildings without floating column on multi story Building.
4. To study the buildings in SAP2000 in Response spectrum analysis.

2. LITERATURE REVIEW

Maison and Neuss (1984), Members of ASCE have preformed the computer analysis of an existing forty four story steel frame high-rise Building to study the influence of various modeling aspects on the predicted dynamic properties and computed seismic response behaviours. The predicted dynamic properties are compared to the building's true properties as previously determined from experimental testing. The seismic response behaviours are computed using the response spectrum (Newmark and ATC spectra) and equivalent static load methods.

Maison and Ventura (1991), Members of ASCE computed dynamic properties and response behaviours OF THIRTEEN-STORY BUILDING and this result are compared to the true values as determined from the recorded motions in the building during two actual earthquakes and shown that state-of-practice design type analytical models can predict the actual dynamic properties.

Arlekar, Jain &**Murty**(1997) said that such features were highly undesirable in buildings built in seismically active areas; this has been verified in numerous experiences of strong shaking during the past earthquakes. They highlighted the importance of explicitly recognizing the presence of the open first storey in the analysis of the building, involving stiffness balance of the open first storey and the storey above, were proposed to reduce the irregularity introduced by the open first storey.

3. METHODOLOGY

Non Linear dynamic analysis

Nonlinear powerful assessment uses the total of ground development records with an inside and out auxiliary form, hence is equipped for creating results with extraordinarily low vulnerability. In nonlinear powerful investigations, the exact auxiliary model exposed to a ground-movement record produces appraisals of issue distortions for each confirmation of opportunity inside the model and the modular reactions are blended the utilization of plans comprehensive of the square-root-aggregate of-squares.

In non-straight unique examination, the non-direct homes of the structure are thought about as a major aspect of a period zone assessment. This methodology is the most extreme thorough, and is required by methods for some construction standards for homes of unordinary arrangement or of exceptional noteworthiness. be that as it may, the determined reaction can be delicate to the qualities of the character ground movement utilized as seismic info; therefore, a few investigations are required the use of explicit floor development measurements to achieve a reliable estimation of the probabilistic dissemination of basic response. since the places of the seismic reaction rely on the profundity, or seriousness, of the seismic shaking, a thorough assessment requires various nonlinear unique examinations at various scopes of profundity to symbolize stand-out attainable quake

consequences. This has caused the development of techniques like the Incremental Dynamic examination.

Types of loads considered for design

The following are the various types of loads considered for the analysis

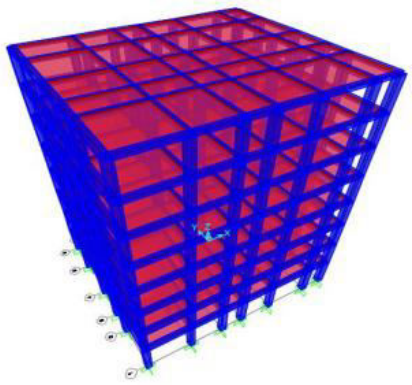
- ❖ Dead load
- ❖ Live load
- ❖ Floor load
- ❖ Seismic load
- ❖ Wind load

MODELING IN SAP 2000

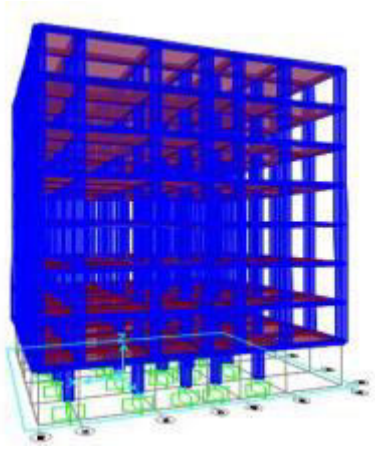
In the present study, analysis of G+8 multi-story building in Zone IV using SAP 2000 software Basic parameters considered for the analysis are

1. Utility of building : Residential building
2. Number of stories : G+8
3. Shape of regular building : Rectangular
4. Geometric details
   a. Ground floor : 3.3m
   b. floor to floor height : 3m
5. Material details
   a. Concrete Grade : M30 (COLUMNS AND BEAMS)
   b. All Steel Grades : HYSD reinforcement of Grade Fe500
6. Bearing Capacity of Soil : 200 KN/m2
7. Type Of Construction : R.C.C FRAMED structure
8. Column : 0.23m X 0.5m
9. Beams : 0.5m X 0.5m
10. Slab : 0.125m
11. Earthquake Zone 2 : 0.24
12. Wind speed : 44m/s

Building models in SAP 2000



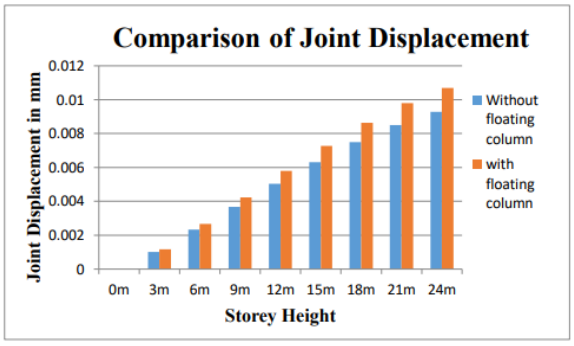
Building without floating columns



Floating column Building

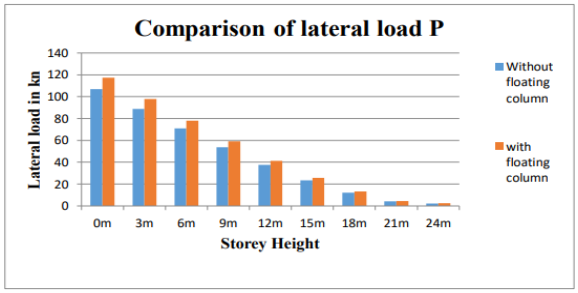
RESULTS AND ANALYSIS

Joint displacement



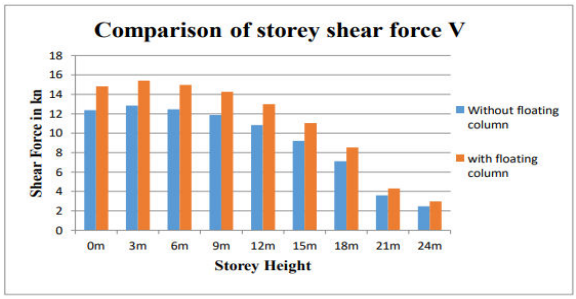
Comparison of joint displacement

Lateral load P



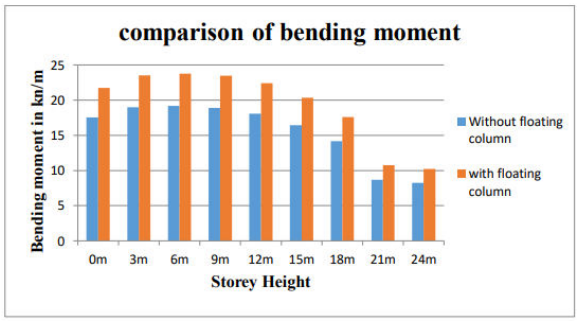
Comparison of Lateral load P

Storey shear force



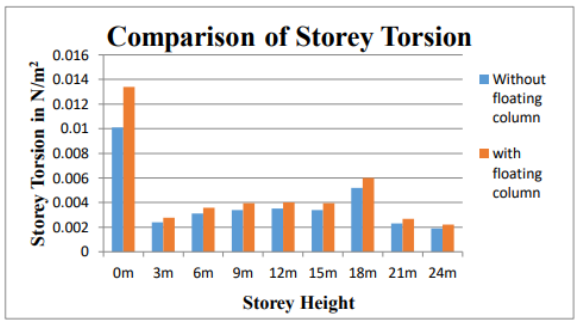
Comparison of Storey shear force

Storey bending moment



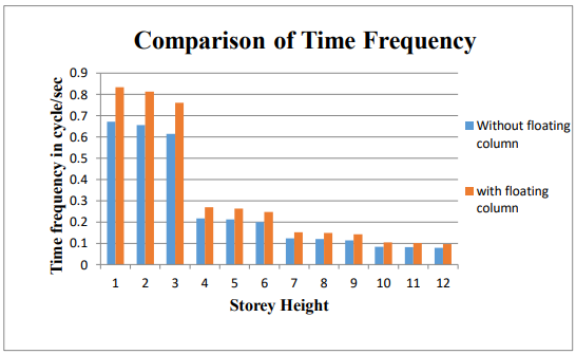
Comparison of Storey bending moment

Storey torsion



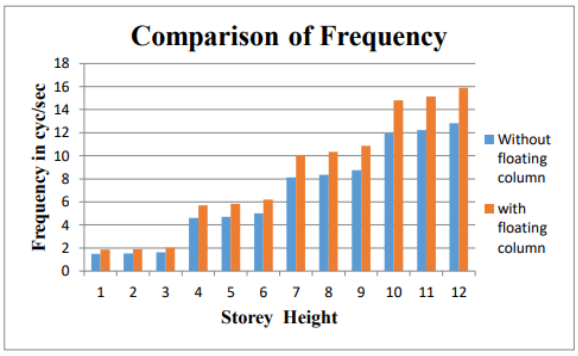
Comparison of Storey torsion

Comparison of time period



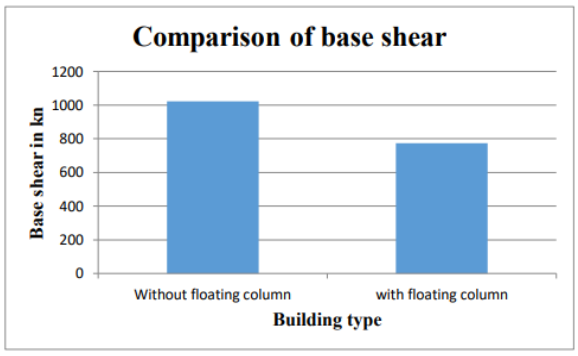
Comparison of time period

Comparison of frequency



Comparison of frequency

Comparison of base shear values



Comparison of base shear values

CONCLUSIONS

From this study the following conclusions were made

1. The studies of various research and analyzing the studies mentioned above, it can be concluded that the use of floating

column in the modern buildings are increasing vastly.

2. The unavoidable requirements of space at the time of its shortage can be fulfilled by floating column leading to increase in their demand within residential building as well as commercial building.
3. Building provided with floating column shows more storey drift and storey displacement as compared to building without floating column in seismic prone area.
4. The value of story drift increases from top story to bottom story the value of drift has higher value for building with floating column than building without floating column in both X and Y direction.
5. The value of Shear force in both X and Y direction increases from top story to bottom story the value of Shear force has higher value for building with floating column than building without floating column.
6. In a similar way the value of building torsion increases from top story to bottom story the value of building torsion has higher value for floating column building than building without floating column.
7. The value of Bending moment in both X and Y direction increases from top story to bottom story the value of Bending moment has higher value for building with floating column than building without floating column.
8. It is concluded that with increase in ground floor column the maximum displacement, inter storey drift values are reducing.

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