

SEISMIC ANALYSIS OF INTERNAL AND EXTERNAL FLOATING COLUMN BY ETABS SOFTWARE

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ABSTRACT

A column is supposed to be a vertical member starting from foundation level and transferring the load to the ground. The term floating column is also a vertical element which (due to architectural design/site situation) at its lower level (termination Level) rests on a beam which is a horizontal member. The beams in turn transfer the load to other columns below it. There are many projects in which floating columns are adopted, especially above the ground floor, where transfer girders are employed, so that more open space is available in the ground floor. These open spaces may be required for assembly hall or parking purpose. Floating columns are a typical feature adopted in the modern age multi-storey building construction. These floating columns reduce the efficiency of the building to resist seismic forces up to a large extent, that is why these are the extremely undesirable unit in the seismic prone areas.

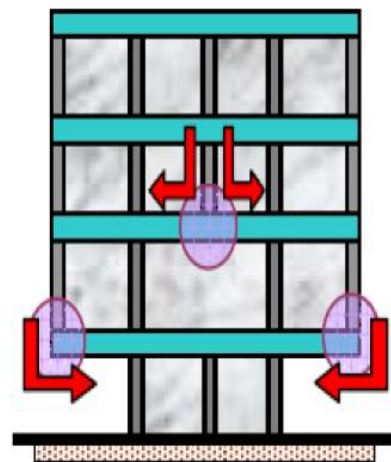
In this study an attempt was made to analyze and design of G+10 story building by Staad Pro Software. In the present study a comparison was made between floating column and non floating column building. Results like story deflection of building, shear in X direction, Shear in Y direction, Bending in X direction, Bending in Y direction, Area of steel required for the floating column building and non floating column building is studied by using Response spectrum analysis.

Key words : Floating column, Column, deflection, shear, Bending, Response spectrum analysis.

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

1. To calculate the design lateral forces for floating column building by using Staad pro.
2. To study the Story drift, Shear force, Bending moment, Building Torsion for floating column building.
3. To carry out ductility-based earthquake-resistant design as per IS 1893 corresponding to equivalent static analysis and time history analysis and to compare the difference in design.

2. LITERATURE REVIEW

S.B Waykule and Dr. C.P. (2016) learned about examination of G+5 Building with and without floating column in exceptionally seismic zone v. Two models are made, for example, floating column at first and without floating column building. Straight static and time history investigation are completed of all the two models and correlation of seismic reaction boundary, for example, timespan, base shear, story uprooting, story float and dynamic reaction are finished by shifting the area of floating column floor shrewd by utilizing direct static and time history examination.

ISHA ROHILLA et. al. [2015], examined the basic situation of floating column in vertically unpredictable buildings for G+5 and G+7 RC buildings for zone II and zone V. Additionally the impact of size of bars and columns conveying the heap of floating column has been evaluated. The reaction of building SSRG, for example, story float, story removal and story shear has been utilized to assess the outcomes acquired utilizing ETABS programming.

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

4. MODELING IN STAAD Software

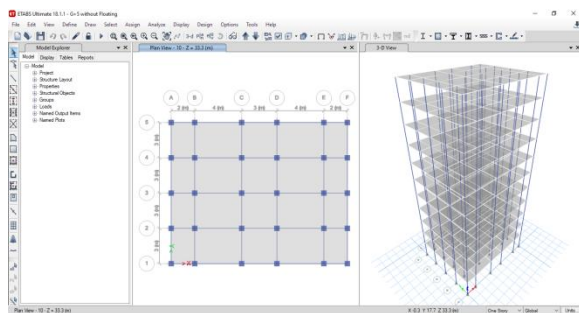
Problem statement

In the present study, analysis of G+10 multi-story building in Zone V seismic zones is carried out.

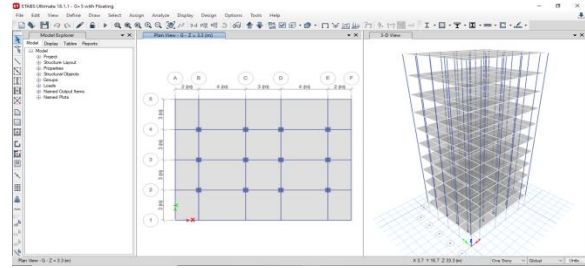
Basic parameters considered for the analysis are

1. Utility of building : Residential building
2. Number of stories : G+5
3. Shape of building : Rectangular
4. Geometric details
 - a. Ground floor : 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 Fe550
 - c. Bearing Capacity of Soil : 200 KN/m²
6. Type Of Construction : R.C.C FRAMED structure
7. Column : 0.46m X 0.46m
8. Beams : 0.35m X 0.46m
9. Slab : 0.15m
10. Seismic Zone : V

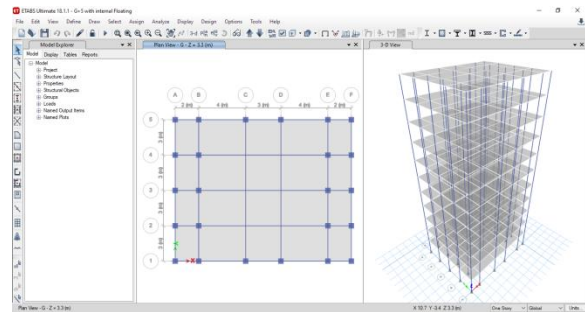
Building models in ETABS software



General G+10 building without floating column



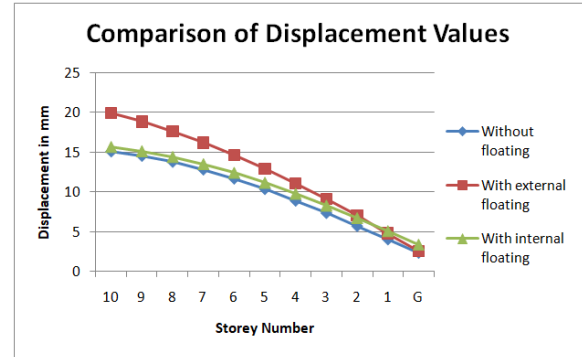
With external floating column Building



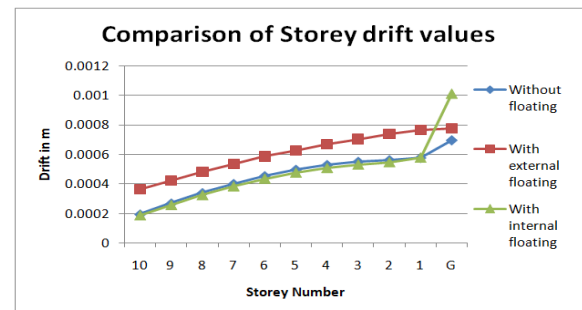
With internal floating column Building

5. RESULTS AND ANALYSIS

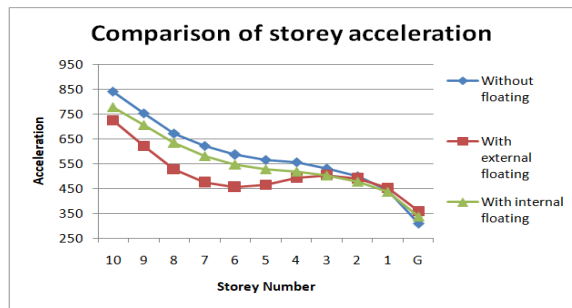
Displacement



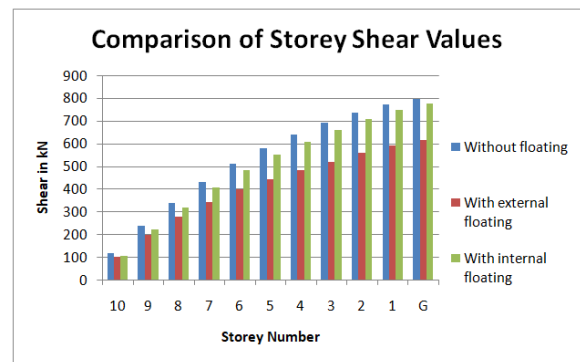
Storey drift



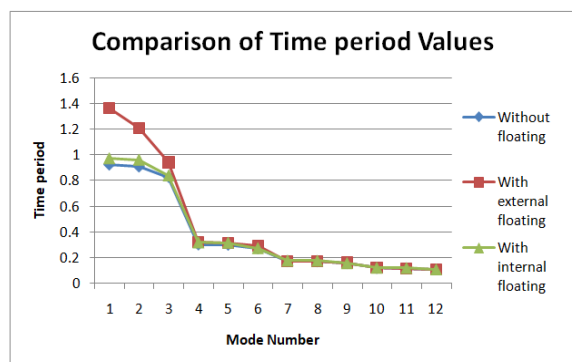
Storey acceleration



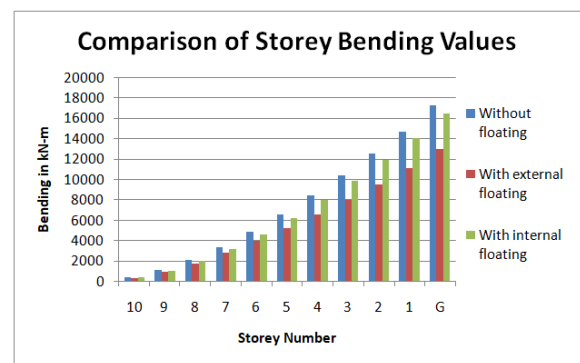
Storey shear



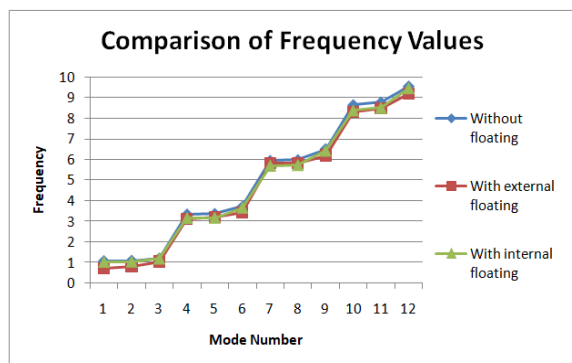
Time period



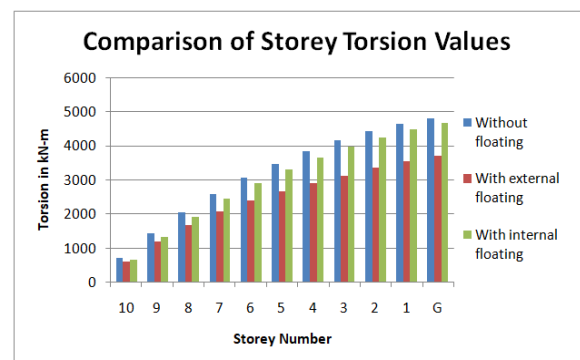
Storey Bending



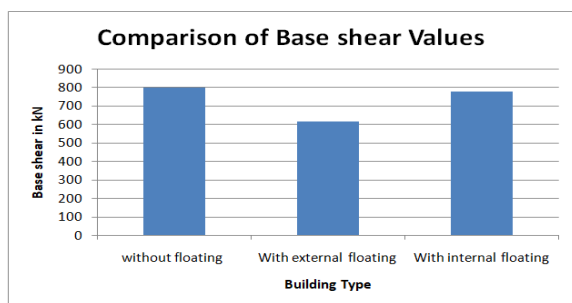
Frequency



Storey torsion



Base shear



6. CONCLUSIONS

From the above study the following conclusions were made

1. The term floating column is also a vertical element which (due to architectural design/ site situation) at its lower level (termination Level) rests on a beam which is a horizontal member. The beams in turn transfer the load to other columns below it.

2. The displacement values decreasing from top storey to bottom storey and higher values are obtained for external floating column sections than remaining models like internal floating and normal buildings.
3. The storey drift values increasing from top storey to bottom storey and higher values are obtained for external floating column sections than remaining models like internal floating and normal buildings.
4. The storey acceleration increases by providing the floating at the ground floor.
5. In case of the base shear values it is having less intensity for external floating column building than normal column and internal floating.
6. The values of shear, bending and torsion has less values by providing the floating for the building structures.
7. The time period values are decreasing from node 1 to none 12 and frequency values increasing from node 1 to node 12.

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