

# A Review on Seismic Analysis of Multistorey Building with Floating Column using STAAD.PRO V8i

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**Abstract:** Structural engineering is a part of civil engineering dealing with the analysis and design of structures that support or resist loads. This project deals with the study of architectural drawing and the framing drawing of the building having floating columns. The load distribution of the floating columns and the various effects due to it is also being studied. The importance and effects due to the line of action of force are also studied. In this we are dealing with the comparative study of seismic analysis of multistoried building with and without floating columns. 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 being done. This will help us to find the various analytical properties of the structure and we may also have a very systematic and economical design of the structure. The floating column is a vertical member which at its lower level rests on the beam which is a horizontal member. These beams carry this additional load to neighbor columns or the columns below it which ultimately increase the load on remaining columns. There are many buildings in which floating columns are practiced, especially above the ground floor, so as to provide more open space for parking and other needs.

**Keywords:** Floating Column, Multistorey Buildings, STAAD PRO V8i, seismic.

## 1. INTRODUCTION

In recent times, 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 result 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.

**Column:** The column is a vertical member which which transfers its self weight and load of corresponding beams to the foundation under it.

**Floating Column:** The floating column is a vertical member which rests 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.

## 2. LITERATURE REVIEW

Literature review related to the seismic analysis of multistorey building was carried out. The objective was to know the stability of different multistorey buildings for different seismic zones. It was noticed that many researchers, academicians and consultants have worked extensively on seismic zones, seismic design, importance of seismic analysis, modern design methods, design formulae etc.

### 2.1 Collection of Data

Keerthi Gowda B. S. (May 2014)<sup>1</sup> suggested that earthquakes in different parts of the world demonstrated the hazardous consequences and vulnerability of inadequate structures. The buildings with floating column have a typical feature in the modern multistorey construction in urban India. The floating column means a vertical element which at its lower level rests on a beam. The seismic inertia forces generated at its floor levels in a building need to be brought down along the height to the ground and any deviation or discontinuity in this load transfer path results in poor performance. Thus features such as floating columns were highly undesirable in the building built in seismically active area. Present study examines the adverse effect of the floating columns in building. Models of the frame have been developed for multi-storey RC buildings with and without floating columns to carry out a comparative study of structural parameters such as natural period, base shear, and horizontal displacement under seismic excitation. Results obtained depicts that the alternative measure of providing lateral bracing to decrease the lateral deformation, should be taken. The RC building with floating column after providing lateral bracing was analyzed. A comparative study of the results obtained was carried out for all above three models. The building with floating columns after providing bracings showed improved seismic performance.

According to Ms. Priyanka D. Motghare (2016)<sup>2</sup> this paper pertains of analytical studies carried out to evaluate the performance of RCC frame under different position of floating columns. Building with a column that hangs or floats on beams at an intermediate storey and do not go all the way to the foundation, have discontinuities in the load transfer. The

analysis had been carried out on a five storey RCC frame structure which has been analyzed. Analysis was carried out considering different positions of floating column by using STAAD pro. The effect of position of floating column was also studied. The bending moments were higher for all the floating column cases. The final maximum bending moments values were also influenced by the presence of floating column.

Sharma R. K. (June 2016)<sup>3</sup> studied that in urban India floating column building was a typical feature in the modern multi-storey construction. Buildings with floating column were adopted either for architectural aspect or when more free space was required in the ground floor. Such features were highly undesirable in seismically active areas. In the project studies the analysis of G+5, G+7, G+9, G+11 and G+13 storey building with floating column and without floating was carried out. The analysis has been done by using Staad Pro V8i software by using Response spectrum analysis. The paper deals with the variation in results in displacement of structure, base shear, Seismic weight calculation of the building from manual calculation and Staad pro V8i. For building with floating column and building without floating column, finding the variation between the response parameters of earthquake and describe what happens when variation may be high or low. The study was carried out to find whether the floating column structures were safe or unsafe when built in seismically prone areas, and has also found out commercial aspects of floating column building either it was economical or uneconomical.

According to Ms. Waykule S.B. (January 2017)<sup>4</sup> in recent times, multi-storey buildings in urban cities were required to have column free space due to shortage of space, population and also for aesthetic and functional requirements. For this, buildings were provided with floating columns at one or more storey. These floating columns were highly disadvantageous in a building built in seismically active areas. The earthquake forces that were 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 that 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 were 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.

## 2.2 Concluding Remark:

We studied that comparative seismic analysis of multistoried building with and without floating column analytical study is carried out on floating column and other columns affected due to floating column. Preliminary study is carried out on a building model comparing three cases. Following are some conclusions based on work done in the present study. In the model floating columns and struts are provided at the specified locations in different cases. The 3- D analysis of building is carried out for Seismic Analysis Of Multistorey Building With Floating Column all three cases i.e. normal framed building without floating columns, with floating columns and with struts supporting floating columns and comparative study is done. The main objective of the study is to improve the seismic performance of building with floating columns and proper design of building with floating columns.

## 3 Methodology

1. Studying literature related to seismic analysis of buildings with and without floating columns.
2. Making different models of multistorey building using STAAD.Pro.
3. Designing for the different model cases and giving the analysis based on parameters such as time period, storey drift, storey displacement, etc.
4. Suggesting the best suitable model cases from all the structures.

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