International Journal For Technological Research In Engineering
Volume 5, Issue 9, May-2018 *ISSN (Online): 2347 - 4718*

SISMIC ANALYSIS OF BUILDINGS THROUGH FLOATING COLUMN IN MATLAB

Dheeraj[1], Pankaj[2]
[1]M. Tech. (Structure Engg.), [2]Asst. Prof., Dept. of Civil Engg. CBS Group of Institutions, Jhajjar

Abstract: Presently multi-story structures have been worked for private, business, mechanical and different purposes, with the historical backdrop of open land as a typical component. For stopping, the historical backdrop of the land is kept up for nothing out of pocket with an establishment, aside from the sections that convey the heaviness of the working to the ground. For the lodging or business building, where the lower floors contain meal lobbies, meeting rooms, corridors, display lobbies or parking spots, a substantial space is required to cut the development of individuals or vehicles. Segments that are close to the upper floors are not suggested on bring down floors. To keep away from this issue, the drifting section idea showed up. With this analysis it has been stated that the seismic analysis over the building found better analysis with floating column. So implementation of this for high bridge railway trace will be also implemented and analysis under this proposed work.

I. BUILDING WITH FLOATING COLUMN

Many of the multi-story urban buildings in India today have the first story open as an inevitable feature. This is mainly adopted to accommodate car parks or reception rooms in the first story. While the total seismic cutoff measurement of the building's witness during the earthquake in the natural term depends, it depends on the distribution of the seismic force and the massive distribution of the hardness along the height.

1.1 Floating Column

It is accepted that the segment is a vertical part that begins from the base level and moves the heap to the ground. The term drifting section is additionally a vertical component that (as indicated by the building plan/area of the site) at a lower level (end level) situated on a pillar that is a flat part. The bundles thusly move the heap to different segments beneath.

1.2 Seismic Analysis of Multistory Building

In the present gliding shaft situation, structures are a regular element of the cutting edge multi-story working in urban India. These attributes are greatly bothersome in structures worked in dynamic seismic territories. This investigation features the significance of expressly perceiving the nearness of a drifting Section in the examination of structures. Alternative measures are proposed, including the balance of rigidity in the first story and the previous story, to limit the irregularities introduced by the floating columns.

II. LITERATURE SURVEY

Mohammed Jameel et. al. proposed the Nonlinear EMF analysis that of earthquake-induced bombardment between adjacent multi-storey buildings The construction flow adjacent to structures due to seismic excitation increases structural damage or even causes structural failure. Among the possible damage to the building, earthquakes induced by earthquakes have been observed in many earthquakes.

A. Wahidi et. al. proposed the Floating pole buildings that are highly undesirable to be constructed in seismic areas because the interruption in the direct loading path has shown a low performance in previous earthquakes. This paper examines the psycho version analysis of ordinary G + 5 column and column buildings using the response spectrum specified in the IS2000 code in SAP2000.

Gary Chock et. al. proposed the auxiliary points of interest of a few harmed structures in the Tohoku region were recorded instantly after the July 11, 2011 tremor of Tohoku-Oki and Tsunami by the observation group supported by the American Society of Civil Engineers. The profundities and speeds of the torrent stream were resolved in light of the examination of the video records and the impacts saw in the straightforward stream frameworks.

Hardik Bhensdadia et. al. proposed the main open story and the gliding section are commonplace highlights of current multi-story structures in urban India. These attributes are to a great degree bothersome in structures that have been built in seismically dynamic territories. This has been confirmed in various analyses of solid tremors in past quakes, for example, Bhuj 2001.

III. MODELLING DETAILS

In the current study, the seven-story building is considered normal and in the common building the bungalows are removed with different arrangements to do it under construction with a floating column. For this evaluation, two different cases with a normal construction are considered. These cases are evaluated for two different areas, that is, the third and the fifth region. The height of the building is 3 meters. The building has an area of 20 m x 20 m. The column spacing in the X direction is 5 m and the spacing of the columns in the Y direction is 5 m.

IV. ANALYSIS & RESULT

In recent days, buildings require free space with a floating column due to air and other active needs in urban areas of India. This paper analyzes the effect of the position of the floating column in a multi-storey building under the stimulus of an earthquake. The response spectrum is implemented for the seismic analysis of G + 5 and G + 7, which is analyzed in the column search and flotation. It was assumed that the third area of the earthquake was based on an intermediate floor (compatible with II). The response of the building, such as drifting soils, displacement floors and shear storage, consisted of evaluating the results obtained using MATLAB Seismic Tool.

4.1 METHODOLOGY

A. General

An effort has been made in this project, which contains a multi-storey building without a floating column under the inspiration of the earthquake. The construction program deals with MATLAB shows the figures of the construction plan. The dimensions of the plan are similar to the height of each position, because the other current figures are in Table 4.1.

B. Modeling of Structure

The construction model is seen through the stories G + 5 and G + 7 (model 1 and model 2) and without taking into account the columns for the analysis. The ground floor of both models is a parking area and the first floor is considered a commercial area and the floor area is considered above. The model of this building is the third area. The circumstances of the Middle East have been considered for this analysis.

I) Model -1(G+5):

Two types of elevation Model-1A and Model -1Bare considered. Each type of elevation consist of three positions for varying the location of floating columns

position-a & l: Building in which usual columns. (Without Floating Column)

b) Position-b &m: Building in which floating column at first floor. (Intermediate Floating Column)

c) Position-c &n: Building in which floating column at ground floor.

II) Model -1(G+5):

Two types of elevation Model-2A and Model -2B are considered. Each type of elevation consist of three positions for varying the location of floating columns

a) Position-p & s: Building in which usual columns. (Without Floating Column)

b) Position-q & t: Building in which floating column at first floor. (Intermediate floating column)

c) Position-r & u: Building in which floating column at ground floor.

(Corner floating column)

C. Preliminary Data

The preliminary data is enough to model. The results are analyzed that represent the one of the main factors of the data is obtained. Both models must preserve the initial data in the same way. Some relevant data should be discussed in the particular table.

The arbitrary 10-story construction with an area of 13,440 square feet is considered for the study. The extension of the Gulf in the direction x 16 'and the stretch of the bay in the direction and 14'. The dimensions of the beams, columns and other properties of the building were determined in Table 4.1.

Table 4.1: member's properties

Member properties		
Slab	Thickness	6"
Beams	Normal building	18" x 12"
	Floating column building	18" x 12"
Column	Exterior	12" x 12"
	Interior	15" x 12"
Concrete	Grade of concrete	3 ksi
Steel	Grade of steel	60 ksi

Case 1

In this case usual building is considered as specified in above. Beams size is considered 18" x 12" for both X and Y direction. Column size considered for exterior 12" x 12" and for interior 15" x 12".

Case 2

Here left side edge column of ground floor of the building is sorted out. Other columns properties and their location are same.

Case 3

In this case ground floor column size is increased. Left side column size is sorted out. Exterior column size is considered 14" x 12". And interior column is considered as 16" x 12".

Case 4

Here all edge side column of ground floor is sorted out. The location and properties of other column and beam are kept same.

Case 5

In this case all edge side column of ground floor is sorted out and ground floor column size is increased. Column size considered as 20" x 15".

V. METHODS OF ANALYSIS

Seismic analysis is a key tool in seismic engineering. It is usually used to determine the response of buildings in a simple way due to seismic forces. It is part of the structural analysis and part of the structural design where the earthquake is a common phenomenon.

The seismic study methods used in the study are

i. Equivalent Static Analysis

ii. Response Spectrum Analysis

iii. Modal Analysis

5.1 PROPOSED ANALYSIS

The method of earthquakes is popularly known as a static equivalent method, a dynamic method. In the current work, the previous method was adopted. The method of fixed equivalence analysis determines a series of lateral forces that operate in a building to represent the forces resulting from earthquakes, generally determined by the seismic response spectrum. The basic assumption is that the building responds in its basic state. Given the normal frequency of the building, the response is examined from the design response spectrum.

(I) Seismic lateral impact or seismic design: the total basic seismic (VB) graph is determined in any principal direction by the following expression:

VB = Ah W
Where,
Ah = Design horizontal seismic coefficient by using fundamental natural period (Ta) =ZISa/2Rg.
W = Seismic weight of the whole building as per clause
Z = Zone factor.
I = Importance factor
R = Response reduction factor
Sa/g = Average response acceleration coefficient for rock and soil sites.
Ta = Approximate fundamental natural period of vibration for moment resisting frame building in seconds .
h = Height of the building, in m.
d = Base dimension of the building, in m, along the considered principal direction of the lateral force.
(ii)Distribution of Base Shear and Design Force:
The computed design base shear (VB) shall be distributed along the building height by following expression:

$$Q_i = V_B \frac{W_i h_i^2}{\sum_{j=1}^{n} W_j h_j^2}$$

Where,
Qi = Design lateral force at floor i.
Wi = Seismic weight of floor i.
hi = Height of floor i measured from base.
n = Number of storey in the building (number of levels at which the masses are located)
MATLAB software calculates and applies the static seismic forces to analyze the structure in accordance with the procedures as recommended by the relevant IS Codes.

VI. CONCLUSION

Storage displacement increases along the height of the building. Each model increased the displacement values of floating column buildings, especially for columns of floating columns. The increase or decrease in the displacement of the earth depends on the longitudinal mass.

• The decrease in the decrease is due to the presence of a floating column. They go down in the lower floors, and this happens due to the reduction of the displacement in the lower floors of the last floor.

• The stable cut decreases along the height of the building. Reduce the usual column because there is a floating column in the building. Because the block is less in the construction of a floating column without a floating column.

• From the comparative analysis of all models, floating columns in buildings, especially floating columns, should be avoided because they are more vulnerable in earthquake-prone areas.

With this analysis it has been stated that the seismic analysis over the building found better analysis with floating column. So implementation of this for high bridge railway trace will be also implemented and analysis under this proposed work.

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