EARTHQUAKE RESPONSE ON RESIDENTIAL BUILDING WITH FLOATING COLUMN

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Abstract - *The number of harm-free structures is rapidly increasing, and there are a few different types of structures. Shaking dividers or outlines, with or without post-tensioning and a variety of vitality dispersion devices connected to the structure in different ways are among them. If the situation does not change, harm-free constructions will shortly become no more expensive than conventional plans for new structures. Floating column sections are used in a variety of activities, especially on the bottom level, where movable braces are used to provide greater open space. These open areas may be necessary for a gathering corridor or a stopping point,* compared to a structure without a floating column the floating column-containing structure exhibits the most displacement, with an increase in the number of stories, there is a displacement rise from lower to higher stories. The amount of lateral displacement increases when the floating column is moved towards higher floors. When the floating column is relocated to higher floors, there is more lateral displacement.

Key Words: AutoCAD 2D, ETABS

1. INTRODUCTION

A section is a vertical component that begins at the foundation and moves the load heap to the ground. According to building arrangement and site conditions, the term "skimmed floating section" describes a vertical component that, at its lowest point, placed on a pillar, which is a lateral component. Therefore, the loads are transferred to several segmental columns beneath the beam.

Floating column sections are used in a variety of activities, especially on the bottom level, where movable braces are used to provide greater open space. These open areas may be necessary for a gathering corridor or a stopping point. Particularly in earth shudder zones, the exchange braces must be carefully planned and placed point by point. The section is a concentrated attack against the pillar that supports it. The portion usually becomes trapped at the bottom and is employed a force applied at a single infinitesimal on the exchange pillar as a result. This kind of structure may be examined using STAAD Pro, ETABS, or SAP2000. Gravity stacking is possible with gliding segments, but the move support needs to be reasonable in size (stiffness) and with little redirection.

2. OBJECTIVES

To ensure safety of building from seismic wave in various zones.

To study how composite multistory buildings that are different heights behave

To observe the impact of earthquake on building.

To determine the best location for a sectioned floating column in multi-story buildings.

To evaluate the floating column's critical position in a composite structure.

3. METHODOLOGY

3.1 Building Configuration

The goal of the current study is to analyse and place the floating columns. A single structure of G+10 floor is used in this current study by Using the E tabs 2016 software .the height of each floor will be 4m, the soft soil site condition is assumed in this case study. By linear static method the analysis of structure is done.

SL NO.	PARAMETERS	
01	No. of Stories	G+10 storied
02	Height of each story	4.26m
03	Software used	ETABS 2016
04	Analysis	Linear Static Method
05	Soil Medium	Soft Soil
06	Zone for Analysis	Zone V
07	Seismic Factor	0.36

3.2 Software

Etabs 2016 is the program's chosen software. A specialised computer programme created especially for building systems is called ETABS. R.W. Clough, et al. introduced the idea of special purpose programmes for building types of structures more than 35 years ago [1963]. However, as structural engineers apply nonlinear static and dynamic analysis and use the greater computing power currently available to create larger, more complex analytical models, the need for specialised software, such as ETABS, has never been clearer.

3.3 Modeling

1. Grid Modeling
2. Storey Data
3. Define Properties of Material
4. Frame properties
5. Shell Sections
6. Draw Structural Objects Manually
7. Structural Loads
8. Static Load Cases
9. Load Combination
10. Elevation and 3D View
11. Analysis Consideration

i. Equivalent Static method

ii. Design Seismic Base Shear

iii. Primary Natural Period

iv. Distribution of Design Force

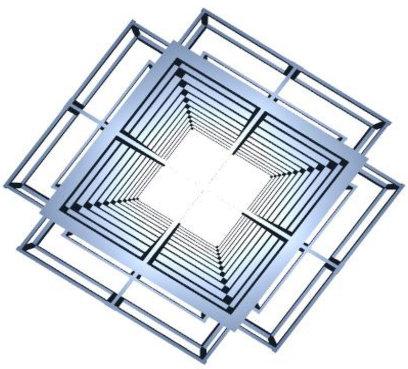

Figure 01 10 Storied top view Model

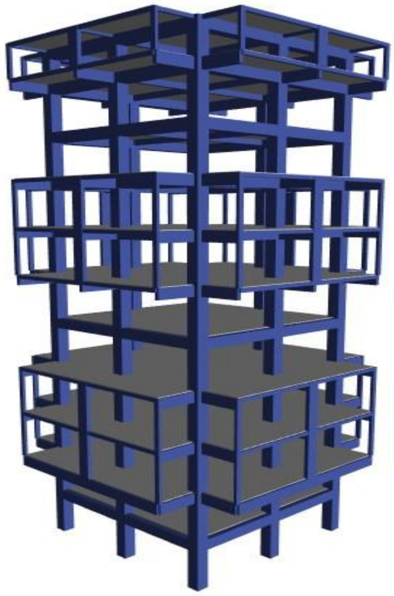

Figure 02 Storied Model

4. RESULT AND DISCUSSION

4.1 Story Displacement

Storey displacement	
Storey Level	**Floating column**
11	39.1
10	37.2
9	29.7
8	31.5
7	27.9
6	23.9
5	14.7
4	15.2
3	10.7
2	6.3
1	3.5

Table 1 Story Displacement for 10 Storied structures.

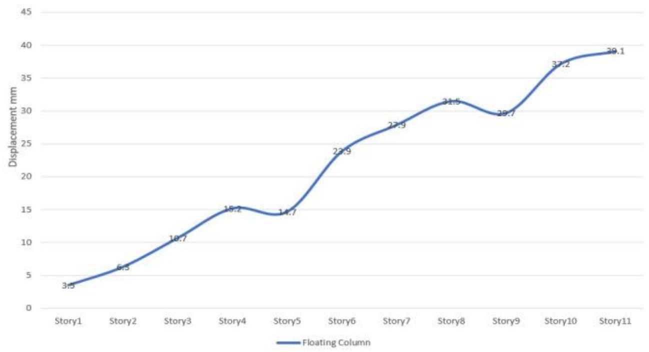

Figure 03 storey vs. displacement for structure.

4.1.1 Observations and Discussions on Storey displacement

By studying from Table 1 their values in fig. 03, The graph shows that there is minimum displacement at storey 1 and the maximum displacement at the storey 3 and 4 because of the floating column.

4.2 **Story Drift**

Storey drift	
	Floating column
11	0.000511
10	0.00069
9	0.0009
8	0.000956
7	0.001044
6	0.001107
5	0.001148
4	0.0012
3	0.00116
2	0.001187
1	0.000668

Table 2 Story Drift for 10 storied structures.

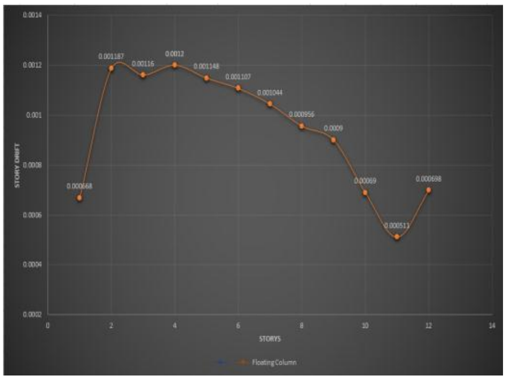

Figure 04 storey drift for structure

4.2.1 Observations and Discussions on Storey drift

By studying from Table 2 their values in fig. 04 we can see that variation in drift as storey height increases. We can clearly see that there is a reduction of drift for building, respectively for equivalent static analysis

4.3 Storey Shear

	Storey shear
11	909.1189
10	2276.68
9	1600.3087
8	1845.3558
7	2033.4132
6	2172.0127
5	2396.78
4	2330.9644
3	2366.38
2	2382.4643
1	2386.7672

Table 3 Storey Shear in 10 Storeys

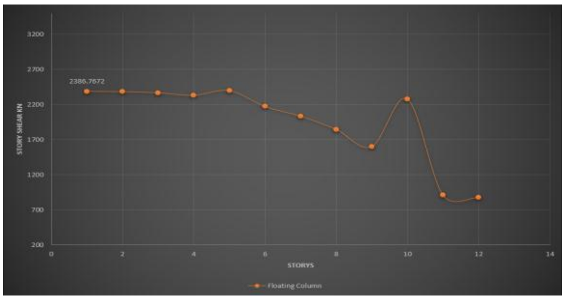

Figure 05 Storey Shear along storeys

4.3.1 Observation and Discussion on Storey Shear

By Studying Table 3 & Fig 05 we can conclude that storey shear is highest at the base of the structure or where structure meets the ground. This is because of bottom storey is level that is directly contact with the ground and feels the maximum effect of lateral forces.

4.4 Base Shear

Table 4 Base Shear in 10 Storeys

Base shear	
Load case /combo	**FZ**
x-direction	10009.798 KN

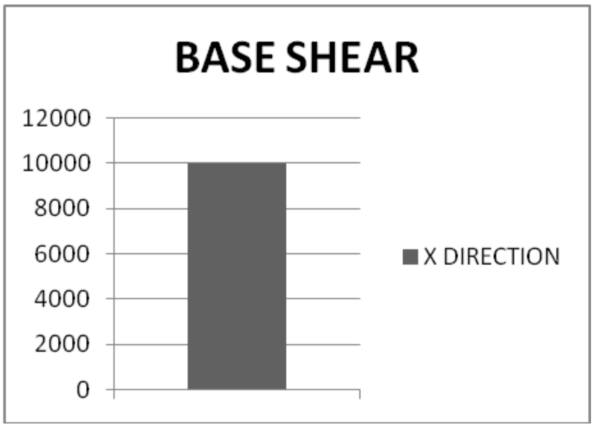

Figure 06 Base Shear in 10 Storeys along X Direction

4.4.1 Observation and Discussion on Base Shear

y studying Table 4 and Fig 06, it can be observed that the base shear at x-direction is 10009.798 KN, and the base shear values are obtained from the E tabs 2016.

5. CONCLUSION

When compared to a structure without a floating column, the floating column-containing structure exhibits the most displacement.

With an increase in the number of stories, there is a displacement rise from lower to higher stories.

The amount of lateral displacement increases when the floating column is moved towards higher floors.

When the floating column is relocated to higher floors, there is more lateral displacement.

Without a floating column, the structure exhibits the lowest base shear, whereas one exhibits the highest base shear.

Additionally, tale drift was cut in half from its initial level.

The tale shear value was raised to a quarter of its initial value.

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