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COMPARATIVE ANALYSIS OF RCC BUILDING WITH FLOATING AND NON FLOATING COLUMN SUBJECTED TO SEISMIC LOADING

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Abstract -

In present scenario buildings with floating column is a typical feature in the modern multistory construction in urban India such features are highely undesirable in building built in seismically active areas. Now a days multistorey buildings are constructed for the purpose of residential, commercial etc, with open ground storey is becoming common feature. For the purpose of parking all, usually the ground storey is kept free without any construction except columns.

Results are compared in the form of Storey displacements, Storey Shear, Storey drift Moments with & without columns at base storey in both Static and Dynamic Analysis. Also the Zone wise results are compared using tables & graph to find out the most optimized solution.

The analysis is carried out using software STAAD Pro V8i software.

***Key Words*:**

Floating columns, Displacement, Base shear, earthquake zone.

1. INTRODUCTION

FLOATING COLUMN: Floating column is a vertical member, The Columns Float or move in above stories such that to provide more open space is known as Floating columns.

Many urban multistorey building in India today have open first storey.

Floating column are mostly used in ground floors nowadays.

These open spaces are mostly required for assembly hall or parking purposes.

Buildings with columns that hang or float on beams, at an intermediate storey and, do not go all the way to the foundation, have discontinuities in the load transfer path. This paper presents the results of comparision investigation of structural response quantities of a multi-storeyed building with floating columns.

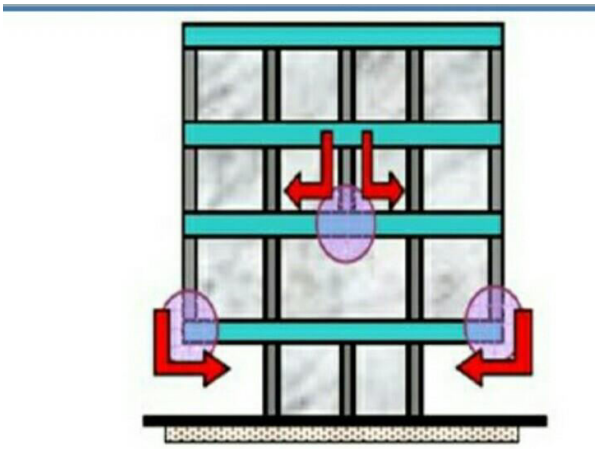
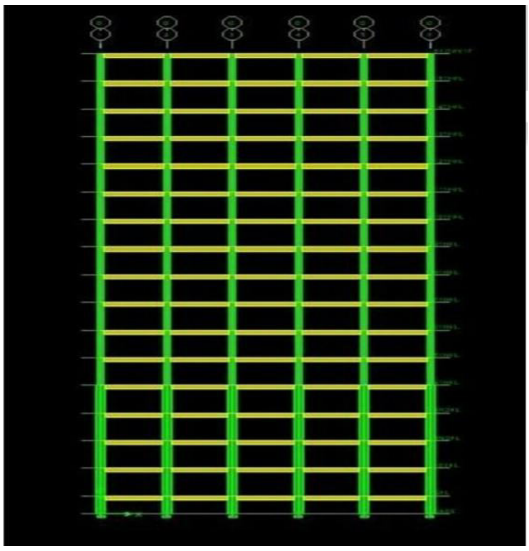


Fig. FLOATING COLUMN



E.g.-Non floating column building.

2. LITERATURE REVIEW

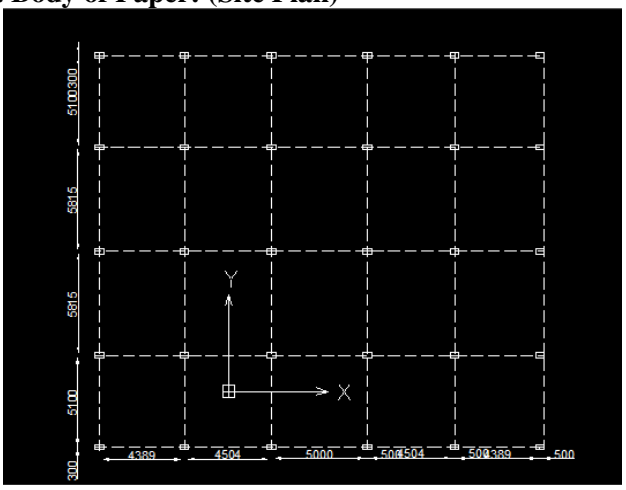
Bardakis & Dritsos [2] (2007) in this paper they evaluate the American and European procedural assumptions for the assessment of the seismic capacity of existing buildings by means of pushover analysis. The FEMA and the Euro code-based GRECO measures have been followed in order to assess a four-storeyed bare framed building and a correlation has been made with available tentative results.

Ozyigit [6], (2009) in this paper he performs free and forced in-plane and out-ofplane vibrations of frames. The beam has a straight and a curved part and is of circular cross section. A concerted mass is also located at different points of the frame with different mass ratios. FEM is used to analyze the problem.

Niroomandi, Maheri, Maheri & Mahini [5] (2010) in this paper they retrofitted an eight-storey frame strengthen previously with a steel bracing scheme with webbonded CFRP. Comparing the seismic presentation of the FRP retrofitted frame at joints with that of the steel X-braced retrofitting process, it was concluded that both retrofitting schemes have comparable abilities to boost the ductility reduction factor as well as the over-strength factor; the former comparing better on ductility and afterwards on overstrength. The steel bracing of the RC frame can be helpful if a substantial increase in the stiffness and the lateral load resisting ability is required. Similarly, FRP retrofitting at joints can be used in combination with FRP retrofitting of beams and columns to attain the desired increases.

Sukumar Behera [17](2012) In this paper he studied for current situation buildings with floating column is a typical feature in the modern multistorey construction in metropolitan India. Such features are highly objectionable in building built in seismically active areas. His study highlights the importance of clearly recognizing the presence of the floating column in the examination of building. Alternate measures, Seismic Analysis of Multi-Storey Building with Floating Columns 8 Literature Review relating stiffness balance of the first storey and the storey above, are proposed to decrease the abnormality introduced by the floating columns. FEM codes are developed for 2D multi storey frames with and with no floating column to study the responses of the structure under different earthquake excitation having different frequency content keeping the PGA and time period factor constant. The time history of floor displacement, inter storey drift, base shear, overturning moment are calculated for both the frames with and with no floating column.

3. Body of Paper: (Site Plan)



Details of building : RCC structure
Floor height : 3M
Column : 300X500 M
Beam : 300X500 M

Seismic Properties
Seismic zone : II and V
Zone factor : 0.1 and 0.36
Importance factor : 1.5

Material Properties : Material grades of M25 & Fe415 were used for the design.

Table -1

Loading on structure

Dead load :self-weight of structure

Weight of 230mm wall	: 14.25kN/m²
Weight of parapet wall	: 3.5kN/m²
Live load	: 4 kN/m²
Roof Live load	: 1.5 kN/m²
Wind load	: Not considered
Seismic load	: Seismic Zone II And Zone V.

Table -2

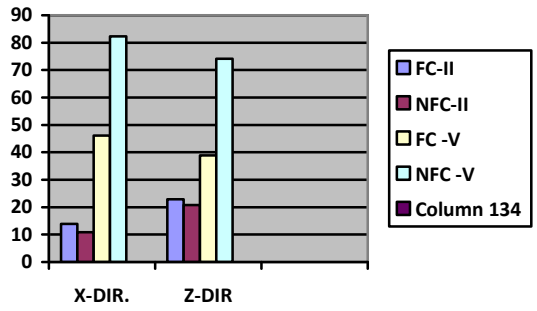
5. RESULTS

Comparision for model validation

MODEL VALIDATION FOR FC and NFC(Manual)		Model-2 NFC (Staad)
Base Shear (NFC)	687 KN	680 KN
Base Shear (FC)	685 KN	683 KN

Table -3
Comparision for displacement (MM) with zones

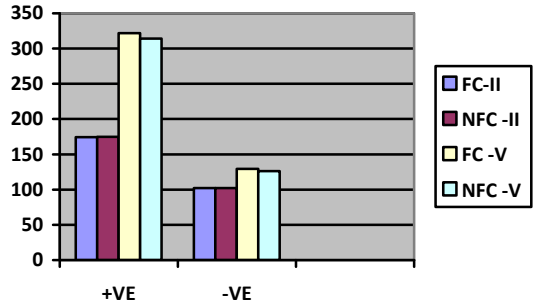
DIRECTION		IN -X	IN -Y
FC	ZONE II	13.89	22.83
NFC	ZONE II	10.84	20.79
FC	ZONEV	46.15	82.32
NFC	ZONE V	38.88	74.71



DISPLACEMENT (MM)

Table -4
Comparision for base shear (KN) with zones

+VE & -VE		+VE	-VE
FC	ZONE II	174.47	102.17
NFC	ZONE II	174.4	102.23
FC	ZONE V	322	129.34
NFC	ZONE V	313.9	126.23



BASE SHEAR (KN)

6. CONCLUSIONS

1. In zone v it is not advisible to provide floating column because displacement is very high in zone v.
2. For high displacement on floating column we use to improve performance during earthquake with providing the shear wall, steel jacketing, retrofitting etc.
3. Zone V is very high damage risk as compared to zone II.
4. It observed that building with floating column increase in fundamental time period in both X and Z direction as compared to building with non floating column.

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