SEISMIC AND BUCKLING ANALYSIS OF FLOATING COLUMN IN RCC FRAMED STRUCTURE

DISSERTATION II

Submitted by

GURPAL SINGH

11612432

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In partial fulfillment for the award of the degree of

MASTERS OF TECHNOLOGY

IN

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Under the guidance of

Mr. PARAMVEER SINGH

(Assistant Professor)

School of Civil Engineering

LOVELY PROFESSIONAL UNIVERSITY

Phagwara–144411, Punjab (India)

DECLARATION

I, Gurpal singh (11612432), hereby declare that this thesis report entitled **"Seismic and Buckling Analysis of Floating Column in RCC Framed Structure"** submitted in the partial fulfilment of the requirements for the award of degree of Master of Structure Engineering, in the School of Civil Engineering, Lovely Professional University, Phagwara, is my own work. This matter embodied in this report has not been submitted in part or full to any other university or institute for the award of any degree.

Date: **Gurpal Singh**

Place:

CERTIFICATE

Certified that this project report entitled "   Title of dissertation" submitted individually by student of School of Civil Engineering, Lovely Professional University, Phagwara , carried out the work under my supervision for the Award of Degree. This report has not been submitted to any other university or institution for the award of any degree.

Signature of Supervisor

Paramveer Singh

Assistant Professor

Head of Department

Structural Engineering

ACKNOWELEGDEMENT

I clarify my actual benediction to all those people who are helps me for completion of this project. I also thankful to Ass. Prof. Paramveer Singh (Assistance Professor), Department of Civil Engineering, LPU, Phagwara who are gives the valuable time and advantageous advice for completion of this dissertation.

I also heartily thanks to HOD, Department of civil Engineering, LPU for accommodate me the necessary facilities from the department.

I also gratitude to my parents who are supports me at every stage throughout the study and also thought me value of time and hard work.

ABSTRACT

Floating column is that type of column which is constructed without rigid foundation on a beam. In now a day many of structures with floating columns is a typical feature in the modern multi-storied buildings. The structural members are also fails due to buckling when they subjected to heavy loads. Column are the main lateral load resisting element in the moment resisting element and also play vital role in seismic performance of the building. In this study seismic performance of multistoried building with and without floating column and buckling analysis of columns are carried out and five and ten stories structure models are used which are located at zone IV. Static and dynamic analysis of all models carried out STAAD,PRO software. This study is abstract to spot the structural response for parameters like floor displacement, base shear, shear force, bending moment for the columns. It is also carried out to determining the elastic critical load for elastic buckling. This critical load used to determination of the corresponding member strength.

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ABBREVATION USED

M	Meter
MM	Millimeter
CM	centimeter
KN	Kilo-Newton
N	Newton
KNm	Kilo-Newton meter
RCC	Reinforced cement concrete
Av.	Average
IS	Indian Standard
FF	Fixed - Fixed
PP	Pinned - Pinned
%	Percentage
3D	Three Dimensional
Fig.	Figure
No.	Number
&	And

CHAPTER 1

INTRODUCTION

1.1 General

When discontinuity is provided in the path of load transfer at different floor level, the earthquake forces are developed at different floor level in the buildings and this discontinuity leads to poor performance of the building. Now a day buildings are improvement for the various purpose such as residential.

There are number of factor or condition which make the structure unstable and lead to failed. The structure failed when the stress occur in the building due to some external forces reach the yield or ultimate strength of the member of structure, exceed a specific maximum deflection, or when fracture of member or collapse occur. Buckling is a broad term which describe the mechanical behavior and generally defined the deformation which occur due to increasing the small amount of load, by this it showing the change in member shape. The elastic buckling of the member is generally analyzing by long slender compression member.

1.2 Motive behind the floating column analysis:-

Now a day's technology is developed around the world, a many new and complex structures are being constructed and design. Many different type of software are available for design the different type of structures. So with the help of STADD-PRO my attempt to analysis the seismic and buckling of floating column in RCC framed structure and also compare the results of different type of models.

1.3 Analysis of floating column:- STADD-PRO are used for analysis the multistoried structure with and without floating column in terms of various parameter such as displacement, storey drift, maximum column forces time period of vibration etc.

1.4 Advantages:-

- By using the floating column in building large function space are provided for storage purpose and another open space as per requirements.
- In some cases floating column may be provided economical structure.

CHAPTER 2

REVIEW OF LITERATURE

2.1 General

This present study includes the response of earthquake forces in multi-storey building frame with usual columns. Some of literature defined the strangeness of existing building in earthquake prone areas and some of these investigate the behavior of buckling on column and beams.

PardhiAvinash et al (2016) to investigate the seismic performance of the building which are with and without the floating column in terms of various parameter such as displacement, storey drift, maximum column forces time period of vibration etc. with various location of floating column and compare it with normal building. In this the building are modeled by using the finite element software ETABS. The beams and column are mode as 2 nodded elements with six DOF at each node and the slab is modeled as membrane elements with 3 DOF at each node. In this study the performance of seismic is evaluated by static and response spectrum analysis performed on various buildings. They conclude that floating columns are not suitable in high seismic zone.

Kumar Gaurav et al (2016) to study the dynamic structural behavior of simple configuration multi storey building with floating column which are conducted by various researcher in the past. The analysis is done by using the ETEBS software of RCC structure which are different number of storey with simple and complex floor plan with floating column. the parameter which are determine such as lateral forces, bending moment, shear forces, axial forces, storey shear, storey drift and base shear. Dynamic action is caused by the both wind and earthquake so with different level of forces along the height of the building.

Gajbe M Pramod et al (2016) in this they shows the analysis of story multi-stored steel structure building in zone '2' by applying the analysis and find the behavior of soft-storey at different floor level of building under the seismic load action. In recent year many a large number of building with soft storey have been built but it shows the very poor performance during the earthquake because soft storey are subjected to larger lateral loads, under these lateral deformation are larger than other floors so the design of structural member of soft stories is critical.

Bansal Anuj et al (2016) which described the pushover analysis of multi-storey buildings having flat and grid slab. It shows the analysis based on the static loading nonlinear behavior of building by using the three cases of multi-storey building are considered with area 20m * 20m having 4 storey; 8 storey; 12 storey with 3.6m storey height. All the three cases are considered having flat lab and grid slab which are analyzed by SAP2000.

Y R Lakkhitharadhya et al (2016) under this represent multi –storey building resting on flat and sloping ground which are analysis by seismic analysis. In this it carried out the analysis of G+10 storey building which have rest upon the 10^0 to 30^0 sloping ground and comparing the analysis with the building which are rest on the level ground. At different position, effects of at varying height of columns in bottom storey during earthquake are study by using ETAB 2015. The seismic analysis is to be carried out by the response spectrum analysis as per IS: 1893 (part 1): 2002. The result are obtained in the form of top storey displacement, storey acceleration, Base shear and Mode period and it is observed that short column are more affected during the earthquake.

It concludes that the sloping ground possess relatively more maximum displacement and shear force which give to critical situation than the flat ground. It also show the base shear is maximum at 20^0 and in X direction compared to other model and Y direction for sloping ground building. Displacements are maximum at the top storey and decrease with increase in slope angle also the storey acceleration decrease with increase in slope angle.

DeepikaNemali et al (2016) in this studies the difference between a building with diaphragm discontinuity and a building without diaphragm discontinuity. In this many type of analysis are carried out such as seismic analysis, nonlinear analysis, pushover and time history analysis. They conclude that the poshover.

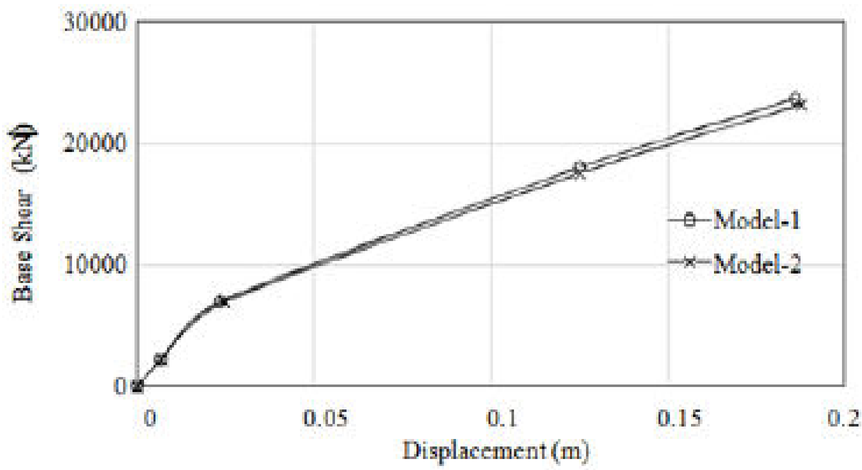

Fig. 2.1.1: Push curve –X (DeepikaNemali et al 2016)

- Compare the base shear vs. roof displacement hysteresis relation which carried out by non- linear time history analysis for both the models are found to be identical.

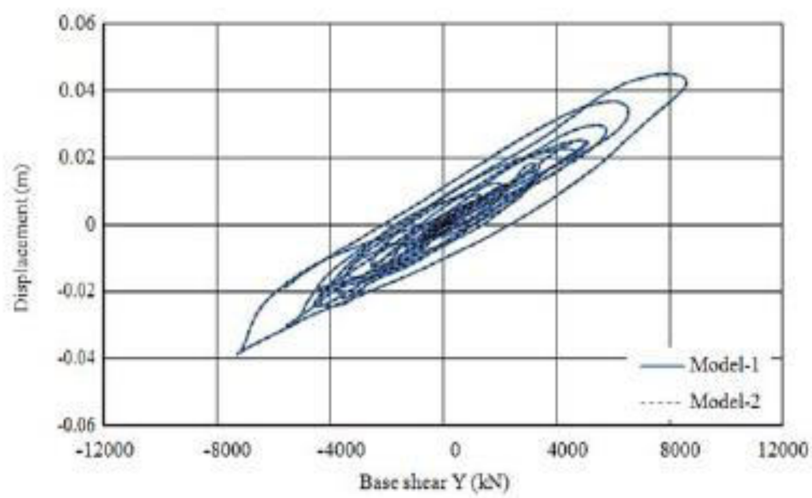

Fig. 2.2: Curve of Hysteresis in building (DeepikaNemali et al 2016).

Vishwajeet Deshmukh et al (2016) in this study find the effect of masonry in-fills on four story reinforced concrete frame for seismic response of a four story. Seismic analysis is to be done by using the Response Spectra Method for different reinforced concrete frame building models that are bare frame without opening and in-filled frame with opening and for analyzing the results of these are concluded by using ETABS 2015 for all frame model. The masonry infill are helpful in reducing the displacement of structure and may be used to limit drift of structure and the base shear of infill frame is more than in in-filled frame with opening and bare frame and also the time period of in-filled frame is less as compared to in-filled frame with opening and bare frame.

KakpureGauri G. et al (2016) In this take mainly focus on the design parameter of the structure such as displacement, base shear, axial force, bending moment, torsion and storey drift. They are conclude that the following-

- It is very important to provide the dynamic analysis because static analysis is not sufficient for high rise buildings.
- Lateral drift will be more in case of building with re-entrant and reduction in base shear capacity compared to regular building.
- Storey drift value will be more in case of regular configuration than the irregular configuration and the storey drift increase with the height of building increase.
- Irregular shaped of building are severely affected by the seismic force and undergoes more deformation therefore regular shaped building must be preferred.
- The results which are obtained by equivalent static analysis, are uneconomical because value of displacement are higher than the dynamic analysis.

Fig. 2.3: Displacement in SMRF of dynamic and static (KakpureGauri G. et al 2016)

Alumed Mohammed Sameer et al (2016) to study and analyze presence of floating column in multistoried building. In this the finite element method codes are used for the 2 Dimensional storey frames with and without floating column under different earthquake excitation having different frequency content keeping the PGA and time duration factor constant and the time history of floor displacement, inter storey drift, base shear, overturning moment are computed for both the frame with and without floating column. they are conclude that with increase in ground floor column the maximum displacement, inter storey drift values are reduced and base shear and overturning moment vary with the change in column dimension.

PyasiShivani et al (2015) are considered the G+10 storied building which are located on a medium type of soil under all 4 zones with 5 cases of varying position of soft storey to investigate the effective building frame with soft storey at varying floors to withstand under different seismic zones and they are analyzed the 20 problems for this. The results are considered under bending moment, shear force, storey displacement and axial forces. They conclude that the soft storey in RCC framed structure should be avoided if it is necessary then it should be provided on ground storey rather than the top of the structure. If the soft storeys are provided on the bottom/ground storey of the structure then the some lateral forces resting techniques such as shear wall bracing and diagonal struts must also be provided for resisting the lateral forces.

Mr.RajuK.Lova et al (2015) In this analysis are carried out by using ETABS software. As per the CODE Provision IS1893-2002 the earthquake load are applied to a eight storey building which are located in a Zone II, Zone III, Zone IV and Zone V and pushover curve are developed for deriving the base shear and displacement and compare this curve for various model. They conclude that shear wall in position-3 better because at this position base shear increased by 9.82% and reduce the lateral displacement 26.7%, when it compared with the frame which are without the shear wall. They are found that the provision of shear wall at an approximate location is very advantageous.

PdolSagar R et al (2015) they carried out the analysis of RCC building with mass irregularity at different floor level. In this for analyzing different time histories are used. This paper represents the effect of mass irregularity on different floor in RCC building with time histories and analysis is done by using ETABS software. They conclude that RCC structure has different irregularities such as mass, stiffness and vertical geometry irregularity so it is necessary to analyse the building in various earthquake zones and effect of earthquake on structure can be minimize by providing shear wall, base isolation etc.

Kabir Md.Rashedul et al (2015) The response of multi storey regular and irregular building under static and dynamic loading in context of Bangladesh. Considering the mass of mass of each building same the effect of wind and static load on different shaped structure along with dynamic response under BNBC response spectrum has been analyzed. It concludes that the wind load is prime concern in displacement of high rise multi-storied building of any shape than static or dynamic earthquake loading.

Kumar E.Pavanet et al (2014) the objective of this study is to defined analysis of structure for static and dynamic analysis in ordinary moment resisting frame and special moment resisting frame. The two methods equivalent static analysis and response spectrum analysis are used in structural seismic analysis for residential building G+ 15 storied structures, which are located in zone II.

Avkar Mehmet (2014) investigate the elastic buckling of steel column with three different cross section i.e. square, rectangle and circle cross section and two different boundary condition i.e. fixed-free (FF) and pinned-pinned(PP) under the axial compression. The solution and effect of boundary condition , cross section, slenderness ratio on the buckling load of the steel column not only numerical computation have been performed but also finite element modeling are used for this. They conclude that

- ➢ The square section has a most efficient shape of column against buckling but the rectangular section has least efficient shape in both FF and PP boundary conditions.
- ➢ The square cross section has the lowest slenderness ratio than the rectangular cross section in both FF and PP

BhoiRekha M. et. al (2014) are carried out the buckling behavior of beam and column and effect of buckling behavior on beam and column.. In this they are conclude that it is very necessary to know the buckling behavior of beam-column connection, beam and column before designing of structure.

AkberuddinMohommedAnwarruddinmd.et al (2013) this analysis is carried out the capability of inelastic deformation of a frame and also find lateral displacement. They will be found the irregularity at the high altitude reduces efficient level of structure and it also decrease the decay and displacement of the structures. ETAB is used for analysis the result.

Bare frame which are without irregularity having more capacity to carry lateral load as compared to bare frame which are with irregularity i.e, vertical irregularity reduces flexure ad shear demand. Lateral displacement reduces by increasing the vertical irregularity. By increasing the vertical irregularity story drift of a building also reduces as per clause no. 7.11.1 of 1893-2002(part 1). Geometric irregularities have no effect but 2-5% difference in lateral displacement. They also conclude the capacity of structure to resist the lateral load increases with reduction in no. of bays vertically with reduction in lateral displacement. By seeing the above information, the seismic performance of irregular building is reduced by 11 to 12% for 200% vertical irregularity and 28 to 30% for 300% vertical irregularity as compare to systematic base model.

Kevadkar M.D. et. al (2013) evaluate the RCC building which is modeled and analyzed by E-TAB software spot lateral loading system. In this RCC building the analyzed is done in 3 parts 1) Model in which bracing are not used and also shear wall are not provided. 2) In this parts the model which have different shear wall system are provided 3) In this parts model which have different system of bracing are used. In this study many parameter are obtained such as lateral displacement, storey shear, storey drifts, base shear, demand capacity is to be calculated.

Chikyal A.K. et al. (2013) are shows the seismic response of structure of G+10 storey with steel are lapped above floor level. As a common practice the structure are constructed by lapping the 100% of the reinforcement just above the floor instead of lapping it at mid height. The column joints near the base where the base where 100% lapping is being done it will be behave like hinge which transfer only vertical/horizontal loads without moments. There is no change in axial force in columns, the variation of shear stress and bending moment is very much concern. The variation of shear force upto the extent of 40% where as the variation in the moment which have maximum value of 65% which really cannot be measured.

S.P. Bhattacharya et al. (2010) defined the Estimation of storey of a building with mass and stiffness variation due to seismic excitation. This paper investigate the proportional distribution of lateral forces evolved through seismic action in each storey level due to changes in mass and stiffness of building. The result concludes as a building structure with high mass and stiffness ratio provides instability of huge storey shear. A proportionate amount of mass and stiffness distribution is advantages to control over the storey and base shear.

MootyM.Abdelet. Al (2009) are carried out the modeling and analysis the various parameter on the structural pounding which are occur as a result of lateral vibration during strong ground shaking. In this the pounding phenomenon is thoroughly studied the different factor affecting pounding and investigate its mitigation. The nonlinear numerical analysis is used for pounding force and displacement calculation because the formulation of pounding equations clearly indicates the nonlinear nature of the problem. Pounding force is to be calculated by using commercial software packages like Sap 2000 where nonlinear gap elements between the adjacent building floors used to calculate the pounding forces. It concludes that the pounding forces are depends on the characteristics of the earthquake records and the dynamic characteristics of the adjacent buildings. Pounding forces increases with increasing the height of the adjacent buildings due to the whiplash effect and it decreases as the separation distance increases because the separation distance may be prevent the build-up of momentum of the moving masses thus reducing the impact forces. They also shows the pounding forces are affected by concrete cracking which can be modeled by using the effective moment of inertia according to the relevant codes.

FUJII kenji et al. (2004) are represent a simplified nonlinear analysis procedure for the single-storey asymmetric buildings. In this the response is carried out through a nonlinear static analysis of MDOF model and a nonlinear dynamic analysis of equivalent SDOF model. The results show that the response of torsionally stiff building can be satisfactory by the proposed procedure. It concludes that the a single storey asymmetric building oscillate predominantly in first mode when they are classified in torsionally stiff building and their response are influenced significantly by the second mode when they are classified in torsinally flexible buildings.

CHAPTER 3

SCOPE AND OBJECTIVE

3.1 Scope of study:-

In this project STADD-PRO are used for analysis the multistoried structure with and without floating column in terms of various parameters such as displacement, storey drift, and maximum column forces time period of vibration etc. After analysis the different type of model are compared it with each other and to understand what type of effect occur in these different type of model.

3.2 Objective of study:-

The objective of this study to analysis the seismic and buckling of floating column in RCC framed structure are:

- To study the effect of floating column in structure at different floor height and their best utilization in structure
- To analyse the column behavior in structure and to overcome their failures.

CHAPTER 4

RESEARCH METHOOLOGY

4.1 Research Methodology

In this study STADD-Pro software used for the seismic analysis of RCC framed structure for different arrangement of columns. In present work two structural model are used i.e five storey and ten storey for each structural model floating column is provided at different storey height.

Arrangements of floating column are:-

Table No.:- 4.1 Arrangement of floating column in different model

Model	**Type of model**
MOD0500	05 storey without floating column.
MOD0502	05 storey + floating 2^{nd} floor.
MOD1000	10 storey without floating column.
MOD1002	10 storey + floating 2^{nd} floor
MOD1005	10 storey + floating 5^{th} floor.

After analysis the different type of model are compared it with each other and to understand what type of effect occur in these different type of model.

4.2 Detail of Project:-

Table No.:- 4.2 Detail of model

Name of parameter	Value	Unit
Number of storey	5 & 10	Nos.
Storey height	3.5	M
Foundation depth	2.85	M
Floor finish	1	KN/m^3
Column R1	.4 X .45	M
Column R4	.35 X .45	M
Beam R2	.3 X .3	M
Beam R3	.3 X .35	M
Live load	3	KN/m^3
Importance factor	1	-
Seismic zone	IV	-
Zone factor	.24	-
Response reduction factor	5	-
Damping ratio	.05	%
Type of structure	01	-
Soil type	Medium	

4.3 Structural Modeling

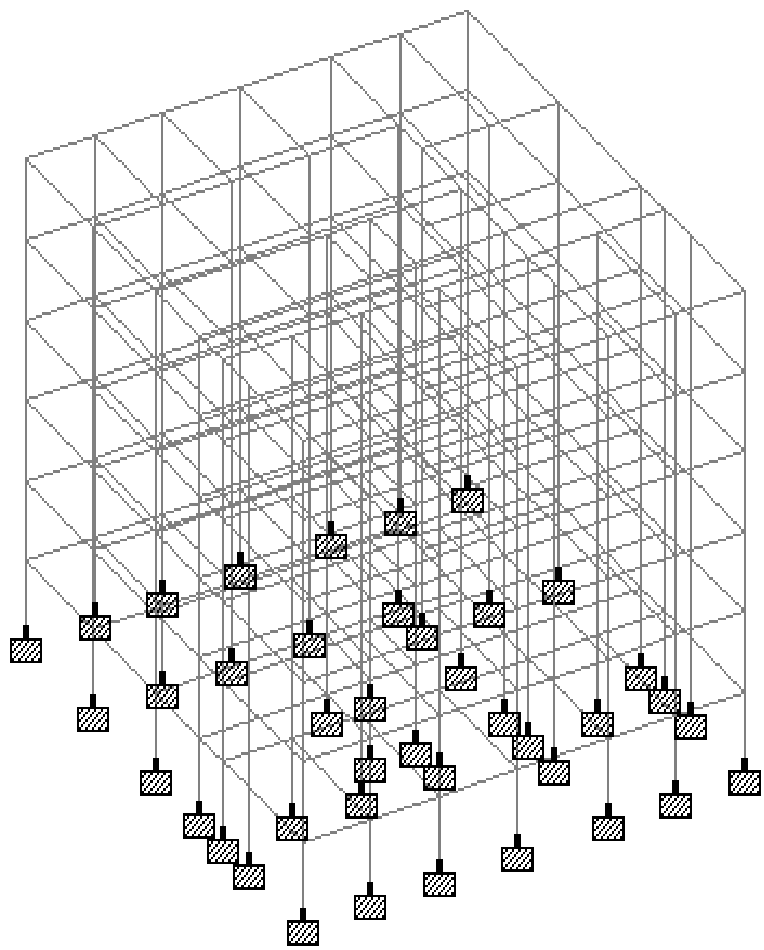

Fig.4.1 (3D View of 5 – Storey Model)

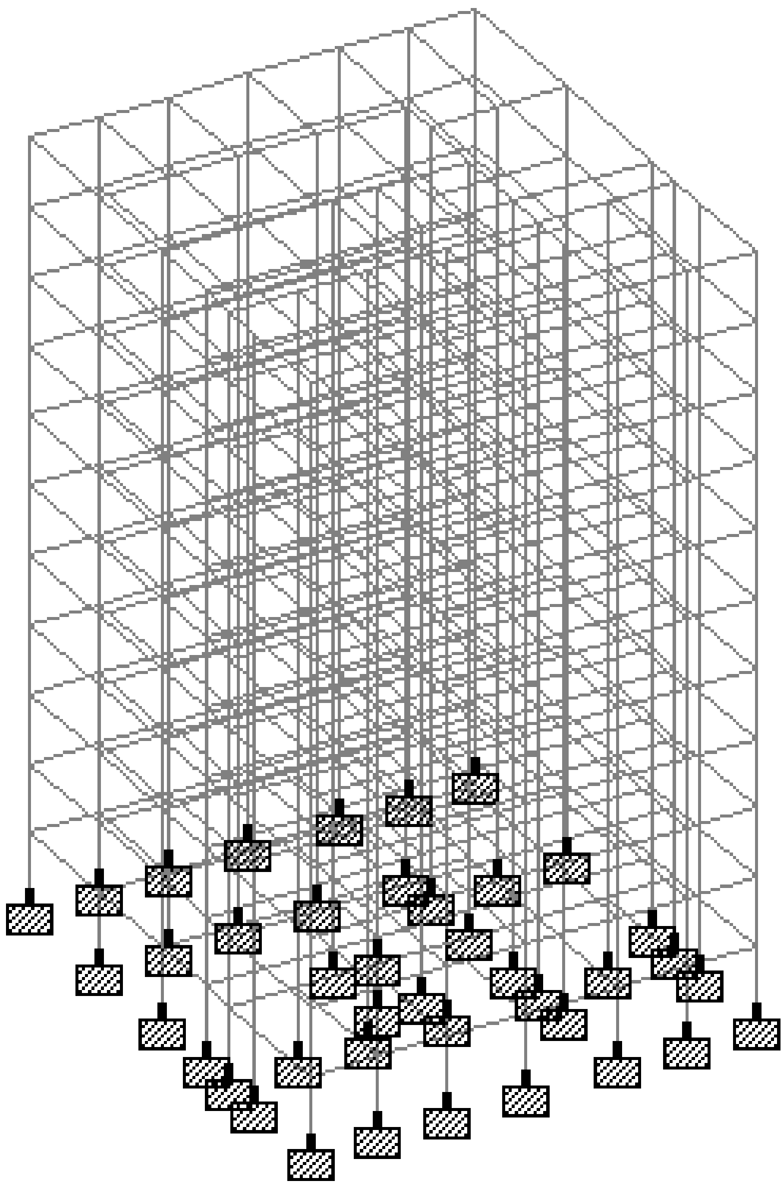

Fig.4.2 (3DView of 10 – Storey)

CHAPTER 5

RESULTS AND DISCUSSION

5.1 Dead & Live Loads:-

Table No.:- 5.1

Type of Model	Dead Load (DL) (KN)	Live Load (LL) (KN)
MOD0500	35913.65	8859.20
MOD0502	32664.61	8859.20
MOD1000	54428.85	17134.16
MOD1002	42584.78	8859.20
MOD1005	47475.54	17134.16

5.2 Base Shear Force:-

Table No.:- 5.2

<table>
<tr><th colspan="2">Model</th><th>MOD0500</th><th>MOD0500</th><th>MOD0500</th><th>MOD0500</th><th>MOD0500</th></tr>
<tr><td rowspan="2">Base Shear Force (V) (KN)</td><td>X</td><td>1722.41</td><td>1569.05</td><td>1352.51</td><td>19383.47</td><td>1299.60</td></tr>
<tr><td>Z</td><td>1722.41</td><td>1569.05</td><td>1352.51</td><td>19383.47</td><td>1299.60</td></tr>
</table>

5.3 Storey Drift & Maximum Average Displacement:-

M0D05002

Table No.:- 5.3

SR. NO.	STOREY HEIGHT (M)	MAX. AV. DISPLACEMENT (CM)		MAX. DRIFT (CM)	
		X	Z	X	Z
1.	0.00	0.4816	0.4486	0.3203	0.2999
2.	3.50	0.08513	0.9930	0.3856	0.3646
3.	7.00	0.8599	0.6685	0.0047	0.0041
4.	10.50	0.0785	1.0058	0.0047	0.0041
5.	14.00	1.0922	1.0123	0.0047	0.0041
6.	17.50	1.1022	1.0197	0.0047	0.0041

M0D0502

Table No.:- 5.4

SR. NO.	STOREY HEIGHT (M)	AV. DISPLACEMENT (CM)		MAX. DRIFT (CM)	
		X	Z	X	Z
1.	0.00	0.5284	0.4253	0.3533	0.2617
2.	3.50	1.3484	1.1677	0.5502	0.4561
3.	7.00	1.8522	1.5386	0.3407	0.2748
4.	10.50	1.8428	1.5471	0.0055	0.0060
5.	14.00	1.8588	1.5880	0.0055	0.0060
6.	17.50	1.8620	1.5641	0.0055	0.0060

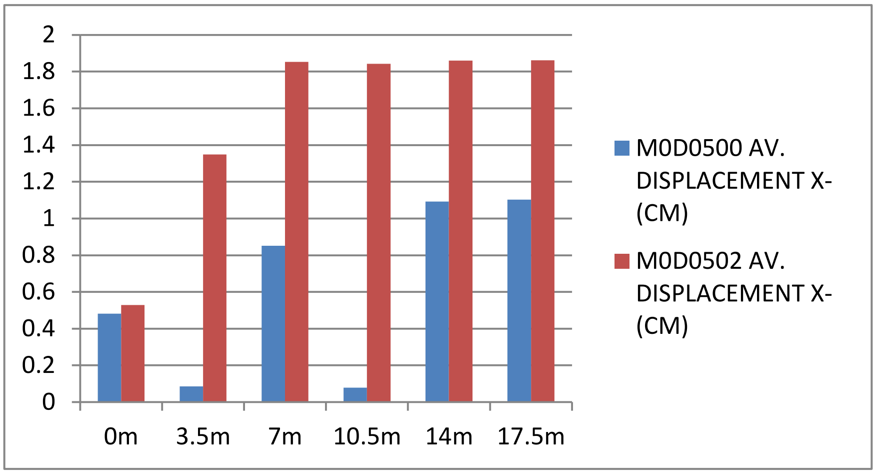

Fig. 5.1: Comparison of Av. Displacement - X between M0D0500 & M0D0502

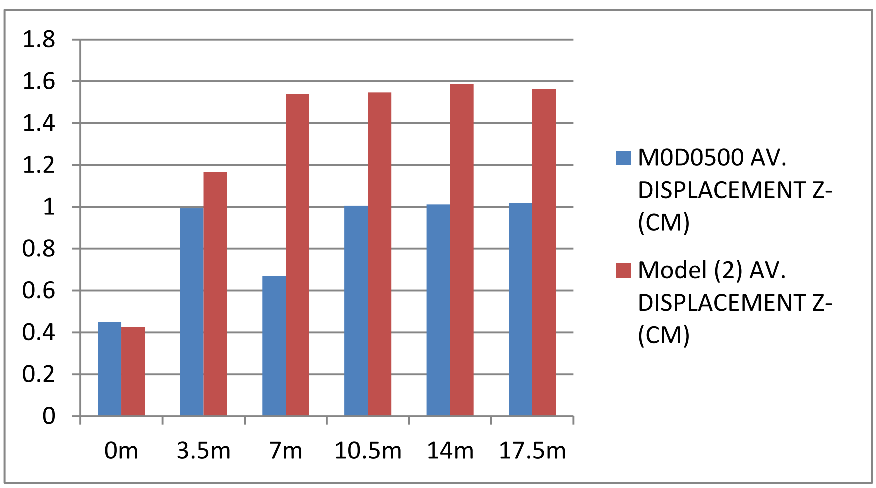

Fig. 5.2: Comparison of Av. Displacement - X between M0D0500 & M0D0502

It may be shown that the average displacement X & Z in M0D052 is more than the average displacement X & Z in M0D0502, so that the floating column are increase the average displacement.

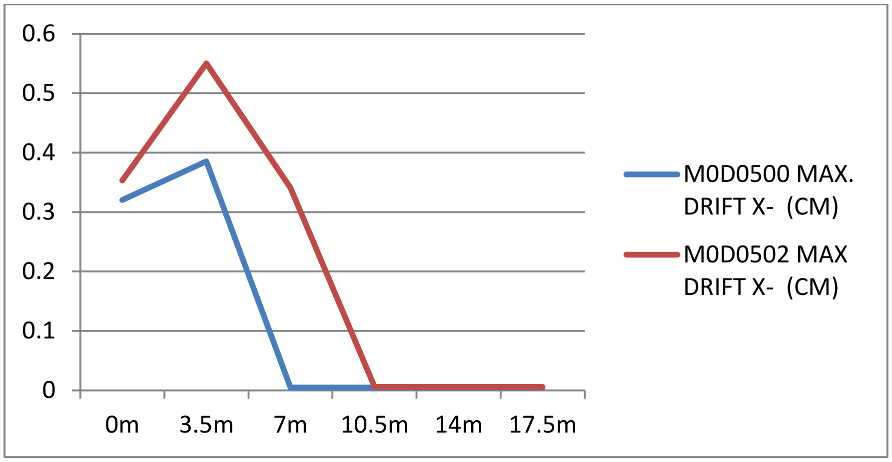

Fig. 5.3: Comparison of Storey Drift - X between M0D0500 & M0D0502

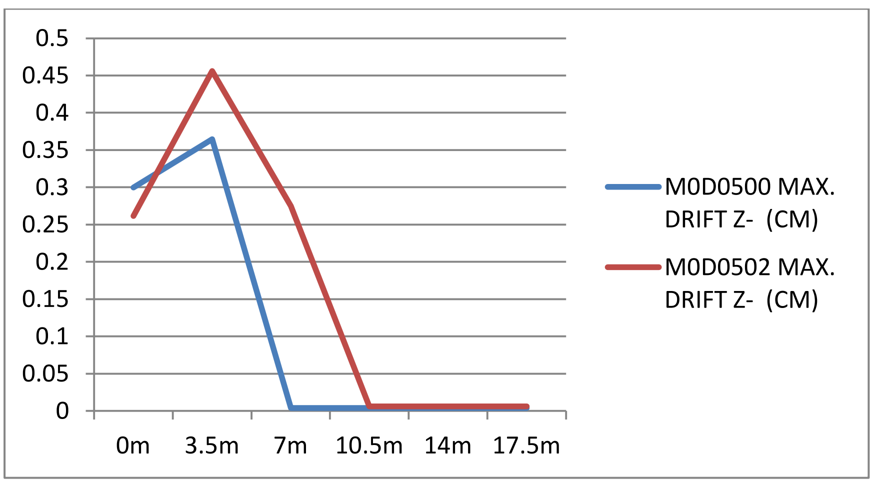

Fig. 5.4: Comparison of Storey Drift - Z between M0D0500 & M0D0502

The fig. shows that the storey drift in X and Z are more at the 1st floor level and after it may be constant in both the models. If the storey height is increase the drift will be decrease.

M0D01000

Table No.:- 5.5

SR. NO.	STOREY HEIGHT (M)	MAX. AV. DISPLACEMENT (CM)		MAX. DRIFT (CM)	
		X	Z	X	Z
1.	0.00	0.6291	0.4286	0.04192	0.0143
2.	3.50	1.3690	0.9456	0.4912	0.3986
3.	7.00	1.3899	0.9567	0.0091	0.0078
4.	10.50	1.4098	0.9677	0.0091	0.0078
5.	14.00	1.4302	0.9787	0.0091	0.0078
6.	17.50	1.4506	0.9897	0.0091	0.0078
7.	21.00	1.4710	1.0007	0.0091	0.0078
8.	24.50	1.4914	1.0177	0.0091	0.0078
9.	28.00	1.5118	1.0227	0.0091	0.0078
10.	31.50	1.5322	1.0337	0.0091	0.0078
11.	35.00	1.5526	1.0386	0.0091	0.0078

M0D01002

Table No.:- 5.6

SR. NO.	STOREY HEIGHT (M)	MAX. AV. DISPLACEMENT (CM)		MAX. DRIFT (CM)	
		X	Z	X	Z
1.	0.00	0.6562	0.5178	0.4388	0.3235
2.	3.50	1.6816	1.3953	0.6878	0.5706
3.	7.00	2.3300	1.9583	0.4380	0.3571
4.	10.50	2.3443	1.9794	0.0138	0.0149
5.	14.00	2.3585	2.0005	0.0138	0.0149
6.	17.50	2.3728	2.0216	0.0138	0.0149
7.	21.00	2.3870	2.0121	0.0138	0.0149
8.	24.50	2.4013	2.0638	0.0138	0.0149
9.	28.00	2.4156	2.0848	0.0138	0.0149
10.	31.50	2.4298	2.1059	0.0138	0.0149
11.	35.00	2.4441	2.1270	0.0138	0.0149

M0D01005

Table No.:- 5.7

SR. NO.	STOREY HEIGHT (M)	MAX.AV. DISPLACEMENT (CM)		MAX. DRIFT (CM)	
		X	Z	X	Z
1.	0.00	0.5412	0.3986	0.3586	0.2658
2.	3.50	1.5159	1.2120	0.6394	0.5369
3.	7.00	2.5865	2.0790	0.6976	0.5722
4.	10.50	3.623	2.8984	0.6758	0.5346
5.	14.00	4.4617	3.5975	0.5576	0.4263
6.	17.50	4.9592	3.9377	0.2771	0.2017
7.	21.00	4.9577	3.9354	0.0322	0.0244
8.	24.50	5.1040	3.9964	0.0184	0.0180
9.	28.00	5.0704	4.0573	0.0184	0.0180
10.	31.50	5.0208	4.0110	0.0184	0.0180
11.	35.00	5.0656	4.0584	0.0184	0.0180

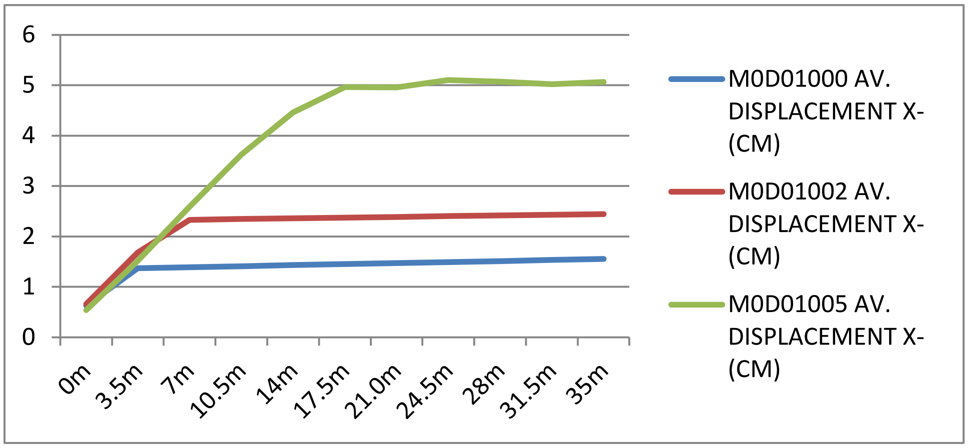

Fig. 5.5: Comparison of Av. Displacement - X between M0D1000 & M0D1002 & M0D1005

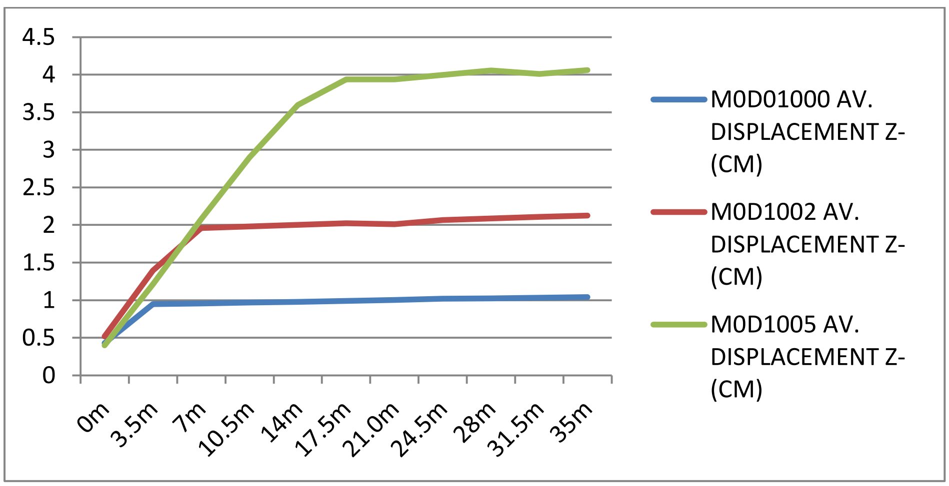

Fig. 5.6: Comparison of Av. Displacement - Z between M0D1000 & M0D1002 & M0D1005

It may be assign the average displacement (X) & (Z) in the M0D1005 is more than the average displacement X & Z in M0D1000 & M0D1002, so that the floating column which are used at 5^{th} increase the average displacement.1

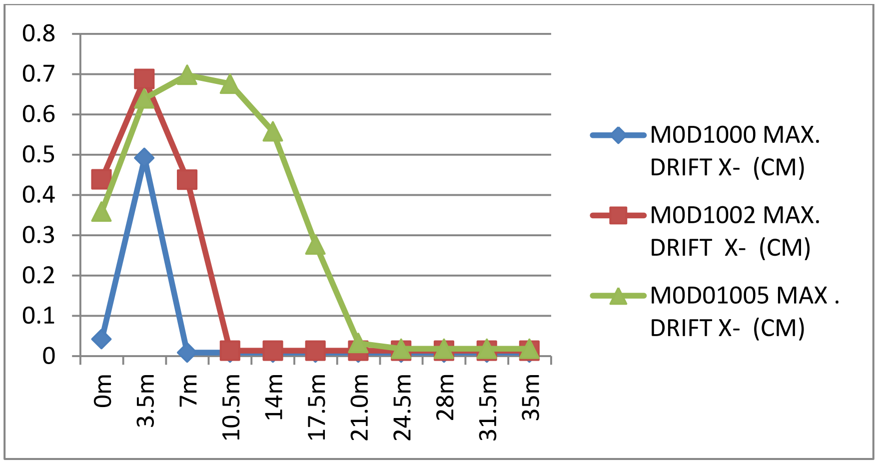

Fig. 5.7: Comparison of Storey Drift - X between M0D1000 & M0D1002 & M0D1005

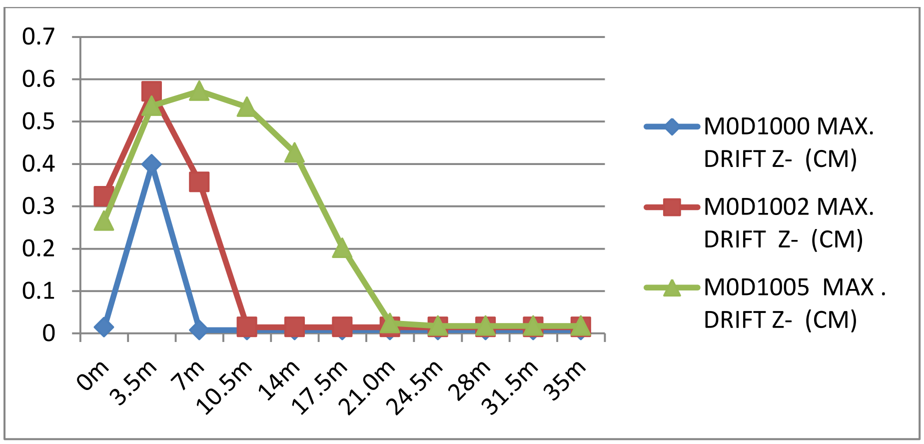

Fig. 5.8: Comparison of Storey Drift - Z between M0D1000 & M0D1002 & M0D1005

It may be shown that the storey drift X & Z in M0D01005 is more than the storey drift X & Z in M0D01000 & M0D100, so that the floating column which are used at 5th increase the average displacement.

5.3 Comparison of Maximum Node Displacement, Support Reaction and Maximum Beam End Forces of each Model in X, Y & Z direction

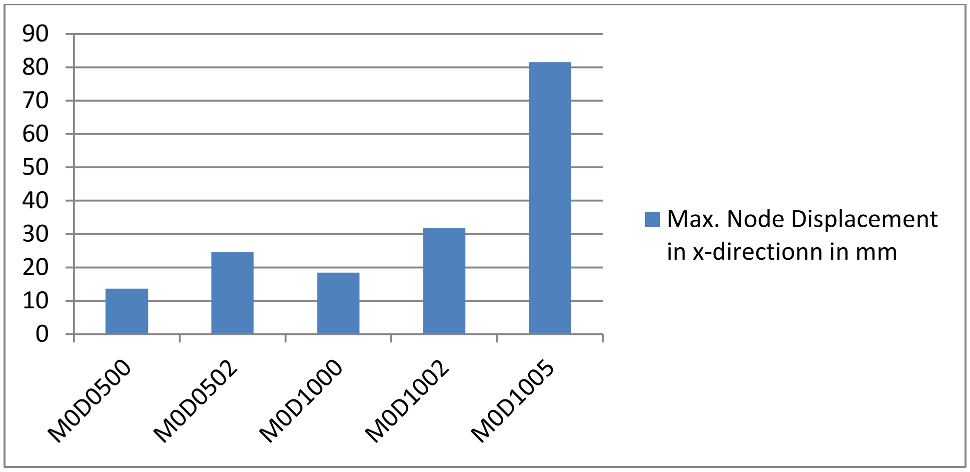

Fig. 5.9: Maximum node displacement in x-direction mm

The above Fig.(5.9) assign the displacement in x-direction in case of non floating column (model 1 &model 3) is less than the floating column (M0D0502 & M0D01002), and also if the floating are started from the 5th floor (M0D01005) displacement will be more than the column are started from 2nd floor level (M0D01002).

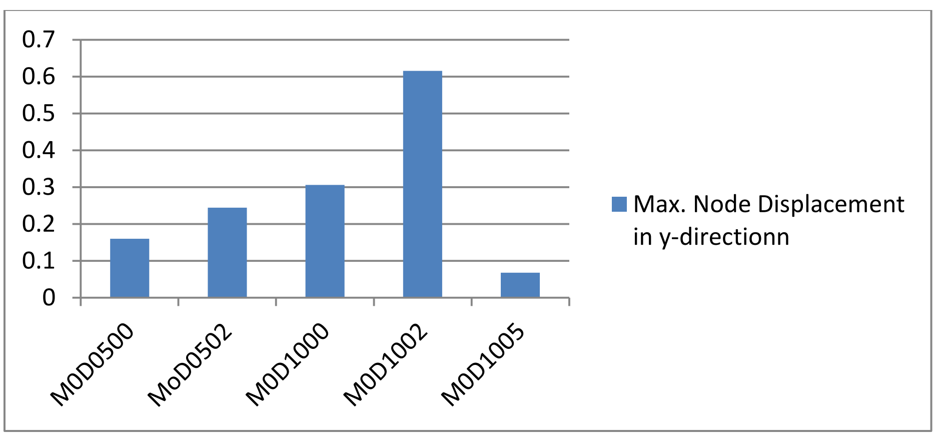

Fig. 5.10: Maximum node displacement in y-direction mm

The above Fig.(5.10) shows that the maximum node displacement y-direction in case of non floating column (M0D0500) is less than the floating column (M0D0502), but in case of 10 storey maximum node displacement in case of non floating column (M0D1000) and floating (0D01002) more than the model 5, which are started from the 5th floor (M0D1005).

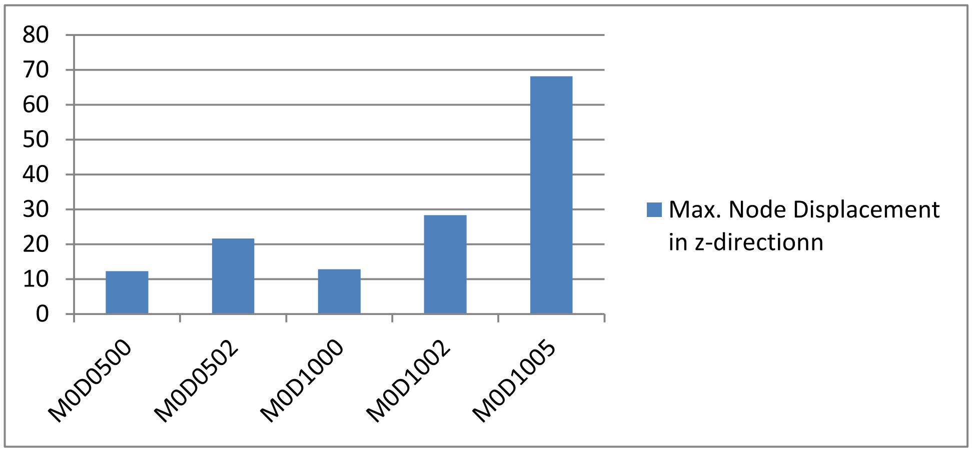

Fig. 5.11: Maximum node displacement in z-direction mm

The above Fig.(5.11) shows that the displacement in z-direction in case of non floating column (MODO5OO & M0D1000) is less than the floating column (M0D1002 & M0D01002), also more in floating column are started from the 5th floor (M0D01005).

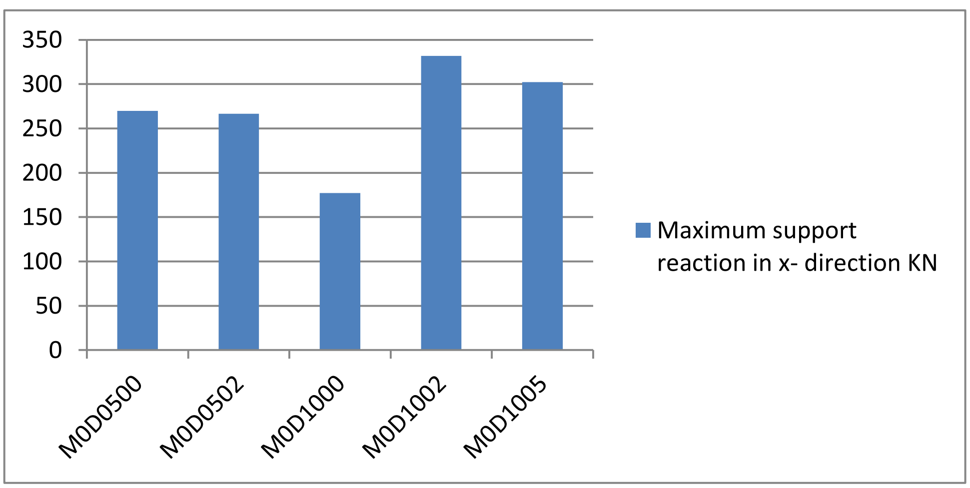

Fig. 4.12: Maximum support reaction in x- direction KN

The above Fig.(4.12) shows that the maximum support reaction in x-direction in case of non floating column (M0D0500 & M0D0502) is less than the floating column (M0D0502, M0D1002 & M0D1005).

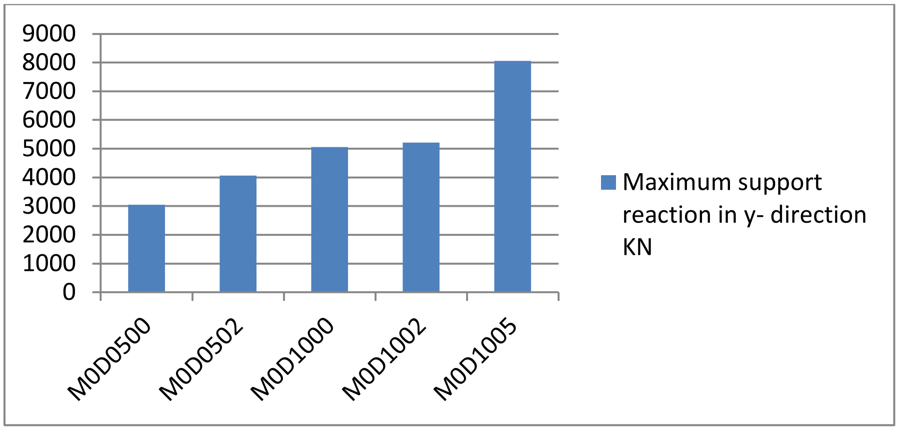

Fig. 5.13: Maximum supports reaction in y- direction KN

The above Fig.(5.13) shows that the maximum supports reaction in y-direction in case of non floating column (M0D0500) is less than the floating column (M0D1000). If the storey height is increase it will be same.

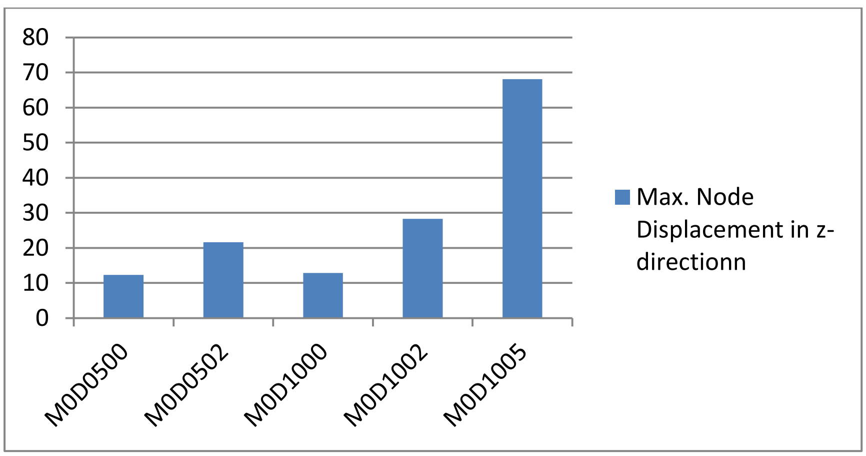

Fig. 5.14: Maximum support reaction in z- direction KN

The above Fig. (5.14) shows that the maximum support reaction in x-direction in case of non floating column (M0D0500 & M0D1000) is less than the floating column (M0D0502, M0D1002 & M0D1005).The maximum support reaction in z-direction in case of non floating column (M0D0500) is less than the floating column (M0D0502), but in case of 10 storey the support reaction in M0D01002 more than the M0D1005. If the floating are started from the 5^{th} floor (M0D1005) maximum support reaction in z-direction will be less than the column are started from 2^{nd} floor level.

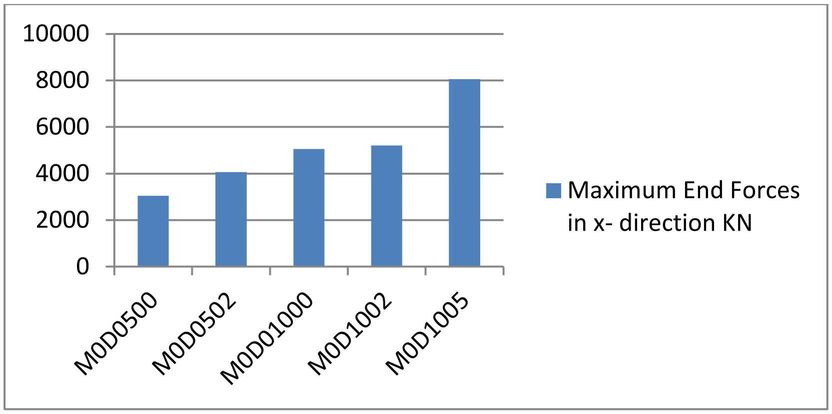

Fig. 5.15: Maximum End Forces in x- direction KN

The above Fig. (5.15) assign the maximum support reaction in x-direction in case of non floating column (M0D0500 & M0D01000) is less than the floating column (M0D0502, M0D1002 & M0D1005).that the maximum end forces in x-direction in case of non floating column (M0D0500 & M0D1000) is less than the floating column (M0D0502 & M0D01002), and also if the floating are started from the 5th floor (M0D1005) maximum end forces in x-direction more than the column are started from 2nd floor level.

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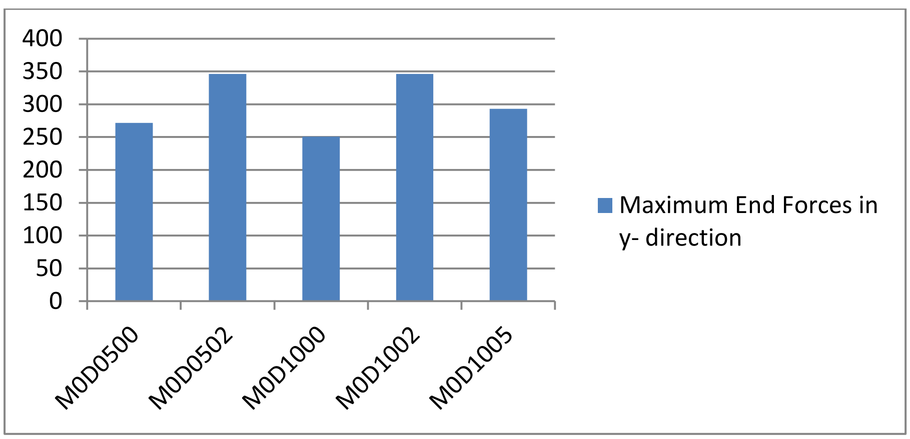

Fig. 5.16: Maximum End Forces in y- direction KN

The above Fig. 5.16 shows that the maximum end forces in y-direction in case of non floating column (M0D0500) is more than the floating column (M0D0502), but in case of 10 storey maximum end forces in case of non floating column (M0D1000) less than the M0D1005, but if the floating are started from the 5th floor (M0D01005) maximum end forces in z-direction also more than the column are started from 2nd floor level (M0D01002).

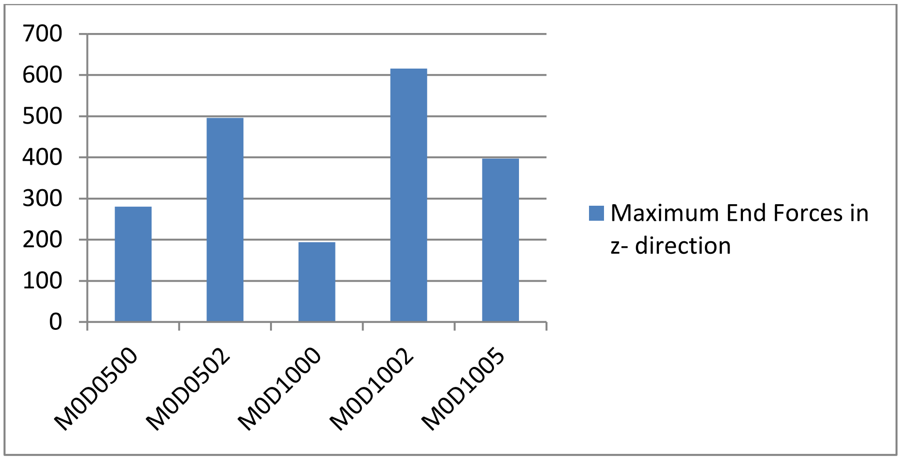

Fig. 5.17: Maximum End Forces in z- direction KN

The above Fig. 5.17 shows that the maximum end forces in z-direction in case of non floating column (M0D0500) is more than the floating column (M0D0502), but in case of 10 storey maximum end forces in case of non floating column (M0D1000) less than the M0D1005, but if the floating are started from the 5th floor (M0D01005) maximum end forces in z-direction also less than the column are started from 2nd floor level (M0D1002).

CHAPTER 6

CONCLUSION

The seismic analysis the different type of RCC Framed structure which are with or without floating column which are located in a seismic zone IV at a medium soil. In this observed that if floating column are used in framed structure it will reduce the dead load of structures. Storey Drift is decrease with increase the height of structure in each model. This study also represent the end forces decrease if floating column are started from5th floor level than the 2^{nd} floor level.

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