TO STUDY EFFECT OF SHAER WALL POSITIONS ON SEISMIC PARAMETERS STORY DRIFT AND BASE REACTION

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Abstract

This paper is concerned with the study of seismic analysis of G+6 symmetrical building by using ETABS. To study the behaviour of RCC building under seismic force in the basic direction (X and Y). The parameters involved for the analysis is story displacement, base shear, for various patterns of shear wall for seismic zone III.

***Key Words*:** *Story drift, base reaction, ETABS*

I. INTRODUCTION

All over world there is high demand for construction of tall building due to increasing urbanization and population. Since earthquake force are random in nature and unpredictable, the static and dynamic analysis of the structures have become the primary concern of civil engineering. When multistoried structure designed, they are made to fulfil basic aspects and serviceability and should give attention towards behaviour of structure against load imposed. Seismic load is the force that occur during the life of a building. Building should be able to withstand seismic load due to minor earthquake. This work is concerned with the study of seismic analysis and design of G+6 symmetric building. Etabs software is used here.

There are so many parameters effect on building to responding for earthquake. By analysis these parameters we can resist the building by damaging during earthquake. Following are considered for study.

1.Position of shear wall

2.Story Displacement

3.Base shear

II. OBJECTIVE OF WORK -

- To Analysis & design RCC structure (G+6) by using ETABS.
- To study the behaviour of RCC building under seismic force in basis direction. (Along X and Y).
- To analyse parameter's base reaction and story drift for various patterns of shear wall.
- To compare effect of various patterns of shear wall on parameters base reaction and story drift.

III.METHODOLOGY

Here, the study is carried out for the behaviour of G+6 RC buildings. Building is modelled for Indian seismic zone IV from IS 1893-2002. Modelling and analysis are done by using ETABS Software

Table no -2- Building Details

Type of frame	**SMRF**
Response Reduction factor	5
Importance Factor (I)	1
Soil Type	II
Zone factor	0.16
No of Story	G+6
Height of bottom story	1.5 m
Height of upper Stories	3 m
Size of Beam	0.3 mx 0.45 m
Size of column	0.3m x 0.45m
Thickness of slab	0.125 m
Live load	2 KN/M^2
Dead load	1 KN/M^2
Internal wall Thickness	0.230 M
External Wall Thickness	0.150 M
Grade of Concrete	M25
Grade of Steel Reinforcement	Fe 500 Mild 250

Table no-1- Models and their description

Sr.no	Model	Description
1	Model-1	Structure Without shear wall
2	Model-2	Shear wall provided at core at top and bottom story
3	Model-3	Shear wall provided at core at alternate story
4	Model-4	Shear wall provided symmetrically at core at all stories
5	Model-5	Shear wall provided symmetrically along a periphery at top and bottom story
6	Model-6	Shear wall provided symmetrically along a periphery at alternate story
7	Model-7	Shear wall provided symmetrically along a periphery at all stories

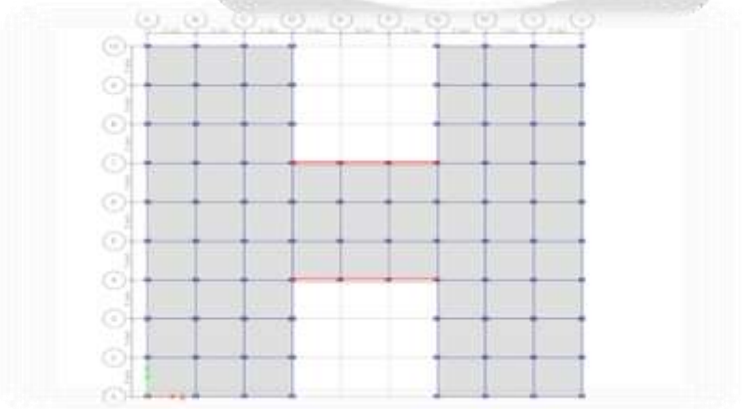

Fig -1-Top view of shear wall at side

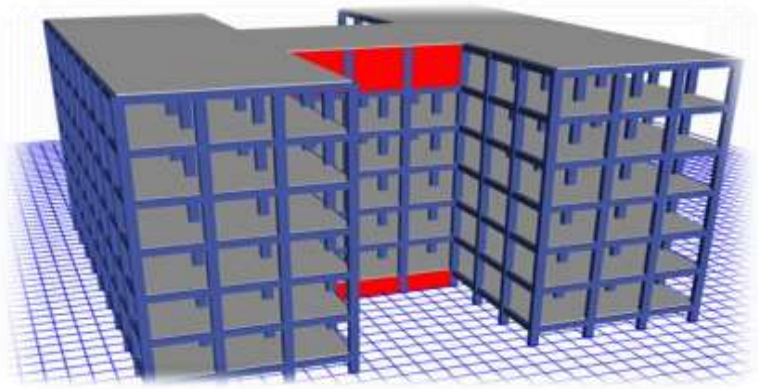

Fig -2- 3D view of model 2

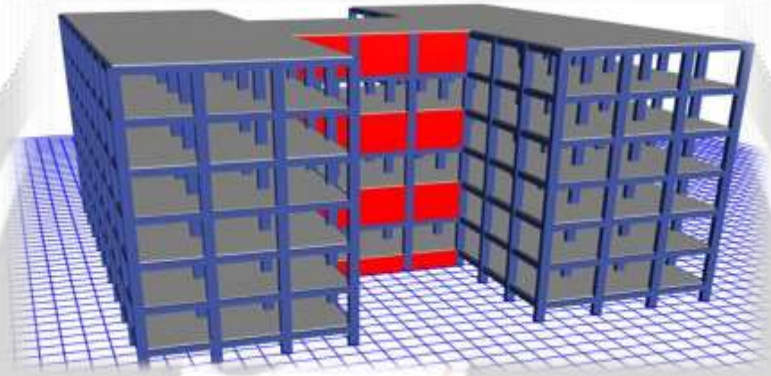

Fig -3- 3D view of model 3

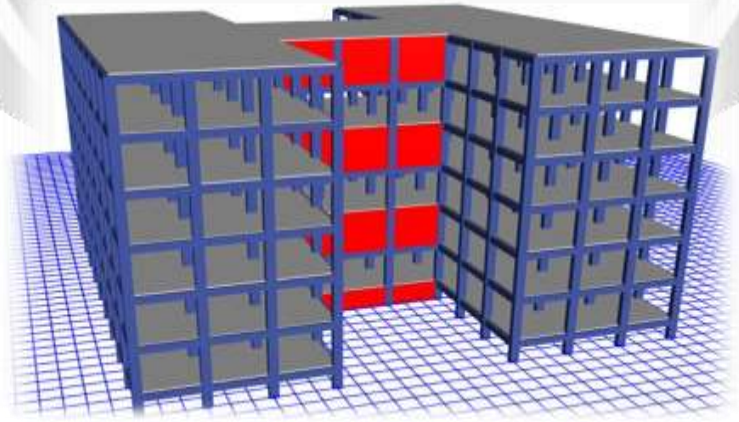

Fig -4- 3D view of model 4

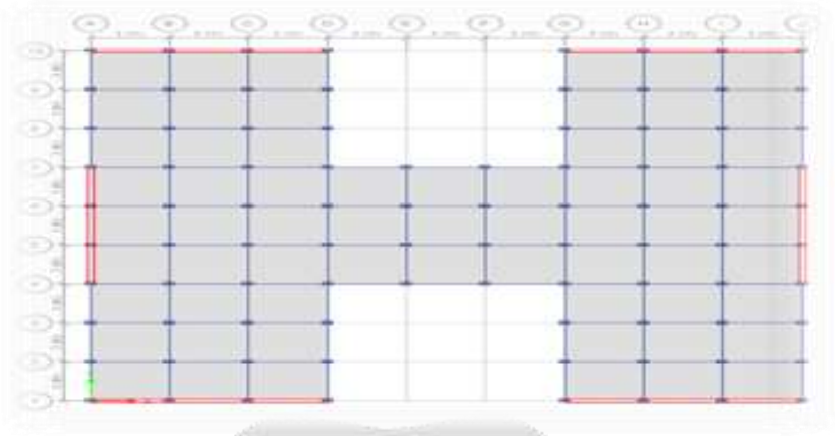

Fig -5- Top view of shear wall at side

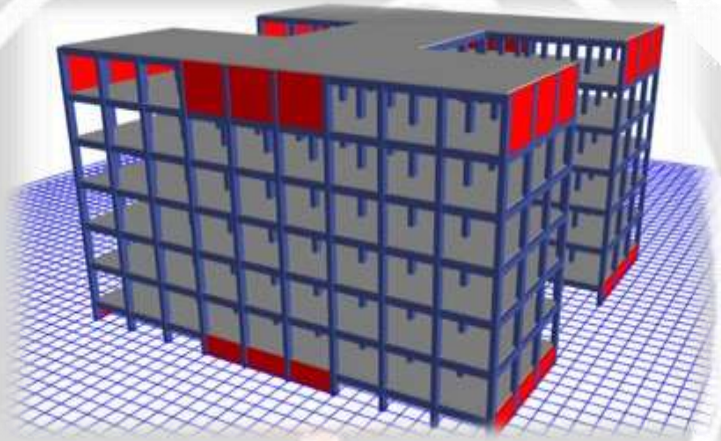

Fig -6- 3D view of model 5

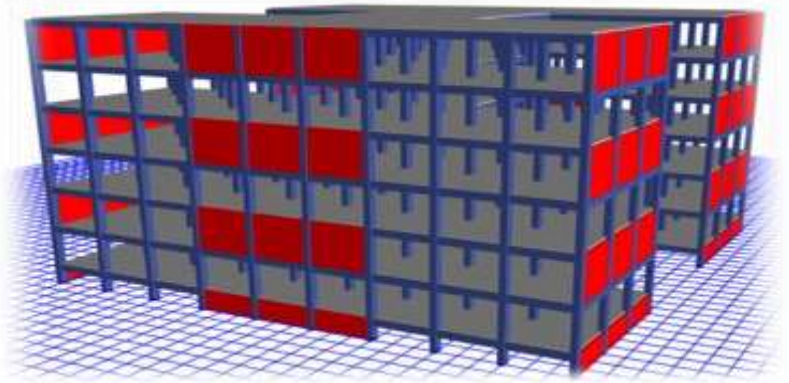

Fig -7- 3D view of model 6

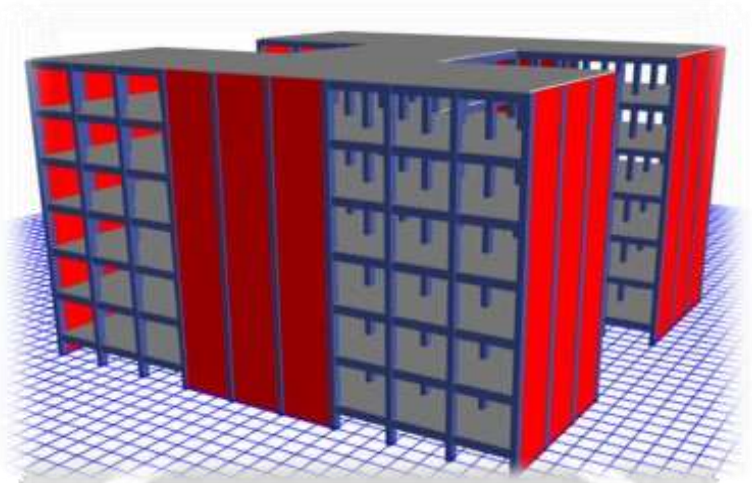

Fig -8-3D view of model 7

IV. RESULT AND DISCUSSION

Table 3. Story drift in the of direction

Story	Model-1	Model-2	Model-3	Model-4	Model-5	Model-6	Model-7
Story7	0.000009	0.000014	0.000016	0.000012	0.000022	0.000019	0.000026
Story6	0.000002	0.000005	0.000019	0.000003	0.000013	0.000007	0.000005
Story5	0.0000002	0.000001	0.000015	0.000004	0.000001	0.00001	0.000005
Story4	0.0000001	0.0000004	0.000017	0.000003	0.0000002	0.000006	0.000005
Story3	0.0000001	0.000001	0.000012	0.000002	0.000001	0.000007	0.000004
Story2	0.000002	0.00001	0.000008	0.000007	0.000008	0.000008	0.000005
Story1	0.000002	0.000022	0.000021	0.000019	0.000017	0.000018	0.00002
Base	0	0	0	0	0	0	0

Table 4. Story drift in the of direction Y

	Model-1	Model-2	Model-3	Model-4	Model-5	Model-6	Model-7
Story7	0.000007	0.00009	0.000009	0.000007	0.000021	0.000024	0.000026
Story6	0.000001	0.00002	0.000005	0.000002	0.000009	0.00004	0.000005
Story5	0.000001	0.0000003	0.000004	0.000001	0.000001	0.000014	0.000003
Story4	0.000001	0.0000002	0.000004	0.0000002	0.0000001	0.000011	0.000002
Story3	0.000002	0.0000002	0.000003	0.000001	0.000001	0.000011	0.000002
Story2	0.000002	0.000004	0.000005	0.000002	0.000008	0.000014	0.000006
Story1	0.000002	0.000006	0.000006	0.000005	0.000017	0.000016	0.000018
Base	0.000007	0.000009	0.000009	0.000007	0.000021	0.000024	0.000026

Table 5. Base reaction

Load Combinations	Model-1 (KN)	Model-2 (KN)	Model-3 (KN)	Model-4 (KN)	Model-5 (KN)	Model-6 (KN)	Model-7 (KN)
1.5(DL+LL)	101424.92	101335.05	101477.99	101692.40	101146.21	101565.91	102195.47
1.5(DL+EQX)	89517.93	89428.06	89570.99	89785.40	89239.21	89658.92	90288.47
1.5(DL+EQY)	89517.93	89428.06	89570.99	89785.40	89239.21	89658.92	90288.47
1.2(DL+LL+EQX)	81139.94	81068.05	81182.39	81353.92	80916.97	81252.73	81756.38
1.2(DL+LL+EQY)	81139.94	81068.05	81182.39	81353.92	80916.97	81252.73	81756.38
0.9DL+1.5EQX	53710.76	53656.83	53742.59	53871.24	53543.53	53795.35	54173.08
0.9DL+1.5EQY	53710.76	53656.83	53742.59	53871.24	53543.53	53795.35	54173.08

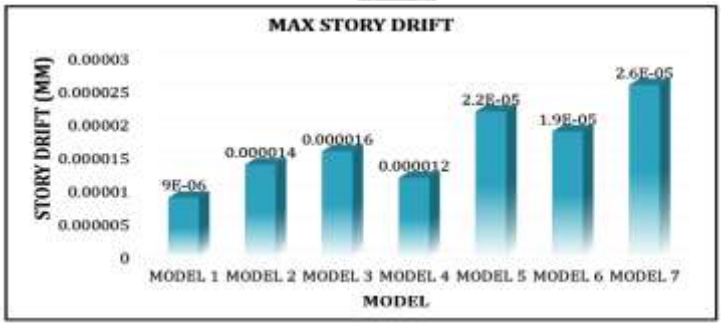

Fig 9. Story drift for different position of shear wall

From above graph it is observed that maximum story drift 0.000026mm is occurred for model-7 in which shear wall provided at side at all stories and minimum story drift 0.000009 is occurred for model-1 in which shear wall is not provided.

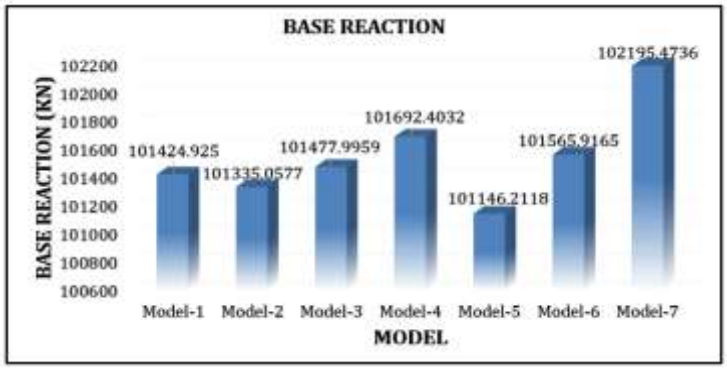

Fig 10. Base reaction

From above graph it is observed that minimum base reaction is 102195.4736 KN is occurred for model-7 in which shear wall provided at side at all stories and minimum base reaction is 101146.2118 KN is occurred for model-5 on which shear wall provided at side at top and bottom stories.

V. CONCLUSIONS

1. In this investigation it is observed shear wall position gives different performance with different location patterns.

2. The model in which the shear wall provided symmetrically along a periphery at all stories (Model 7) increases story drift up to 18.88 %. All the values of story drift are within the limit.

3. The model in which Shear wall provided symmetrically along a periphery at all stories (Model 7) increases maximum base reaction up to 0.75 %

VI. REFERENCES

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