

COMPARATIVE STUDY ON SEISMIC ANALYSIS OF MULTISTOREY BUILDINGS WITH BRACING AND SHEAR WALL

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Abstract – The most important use of the shear wall in RCC buildings is to decrease seismic effects causing major damage to the building. Any structure should have lateral stability to resistance to loads like as buckling, lateral forces, to control lateral drift and displacement of the building. Most affected by the earthquake is nothing but multistoried buildings. In steel structures, steel bracing is used. Shear wall and bracing system have huge effect on the structural performance. The shear wall and bracing system shows different variations and behavior for the seismic load. For the analysis, a G+9 storey building with bracings and shear wall is considered. Storey drift, Storey displacement, Base shear are the major parameters considered to check seismic performance of the building. Bracings and shear walls are provided at various locations by using ETABS software.

Key Words: Base shear, storey displacement, storey drift, bracings, seismic analysis, shear wall.

1. INTRODUCTION

1.1 Bracings

One of the retrofitting techniques which give superb approach for strengthening and stiffening is nothing but bracing system. This system is very useful for resisting lateral loads like as wind loads and earthquake loads. To resist tension and compression bracing members are arranged in various ways. Bracing system decreases shear forces and bending moment present in the columns. It increases the rigidity of the building with a negligible added weight and reduces the shear forces and bending moment in the columns.

1.2 Shear wall

Both level load and different load should be resisted by the structure. A shear wall is a nothing but vertical element designed to resist in-plane lateral forces particularly seismic and wind loads. Due to the forces in horizontal direction applied to the top of the wall, uplift forces exist. Two types of forces opposed by shear walls: Uplift forces, Shear forces. Accelerations from ground movement and external forces like wind generate shear forces.

2. OBJECTIVES

- 1) To model building with G+9 storey with bracings and shear wall.
- 2) To study storey drift, storey displacement, storey shears of both shear wall and bracings.
- 3) To model building in seismic zone V and medium type soil.
- 4) To study bracings and shear wall at different locations in RCC Building.
- 5) To check the results of bracings and shear wall.

3. METHODOLOGY

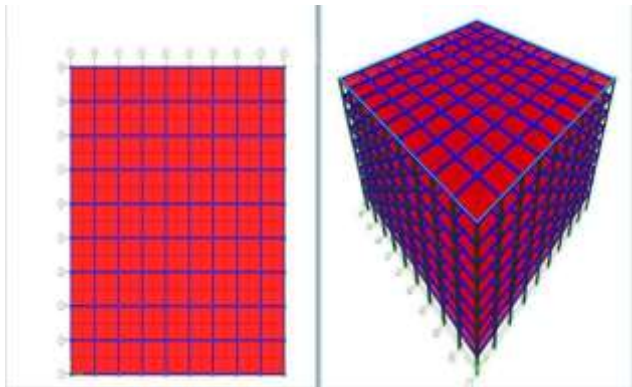
Methodology adopted as follows:

1. Modeling of the structure with G+ 9 storeys.
2. Providing bracings and shear wall at center, corner and core of the structure.
3. Analysis of parameters like storey drift, storey displacement, storey shear.
4. Compare the results for building with shear wall and bracing.

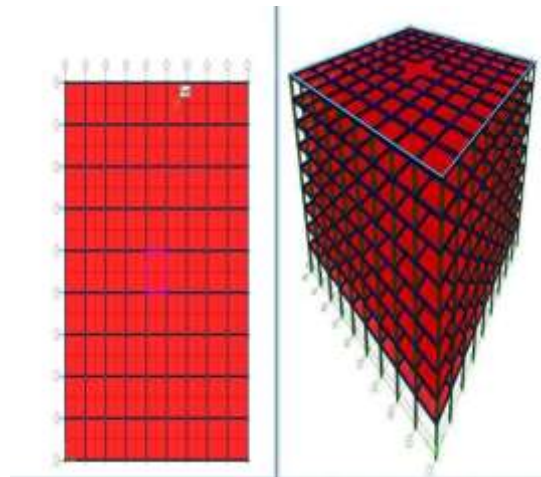
4. PARAMETERS CONSIDERED

No. of storey	G+9 storey @X-4m,@Z-3.5m, @Y-3m
Slab thickness	0.150 m
Size of beam	0.3 m x 0.3 m
Size of column	0.6 m x 0.6 m
Thickness of wall	0.23 m
Bracing	ISA 110 mm X 110 mm X 10 mm
Concrete grade	M 25
Live Load	3 kN/m ²
Floor Finish Load	1 kN/m ²
Zone	V (Medium soil type)

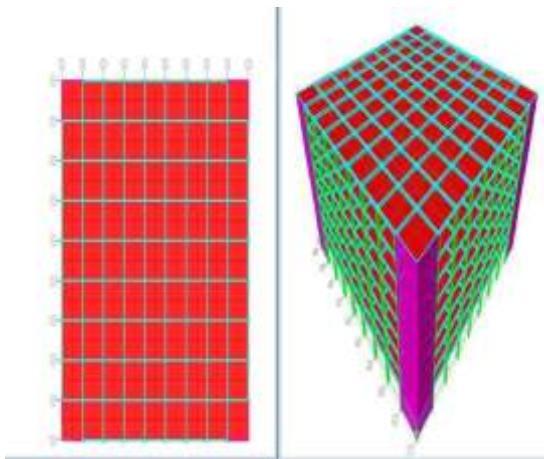
5. BUILDING MODELS



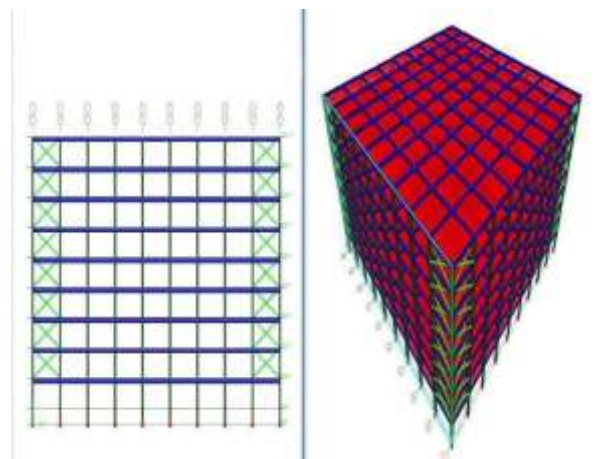
1) Bare Frame Model



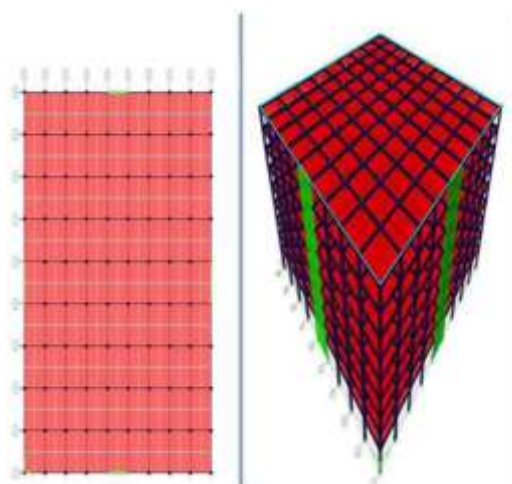
4) Shear wall - core



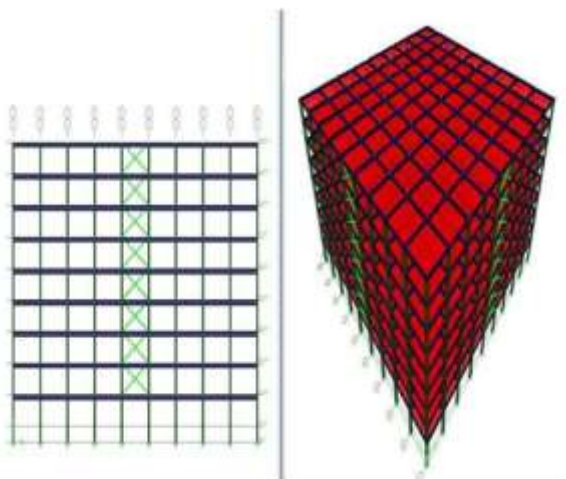
2) Shear wall - corner



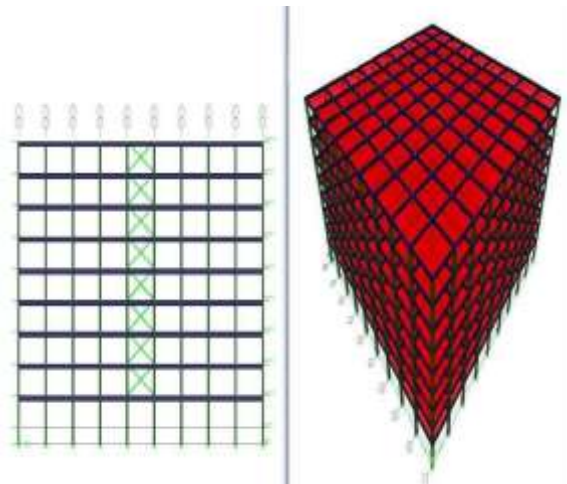
5) Bracings - corner



3) Shear Wall - sides



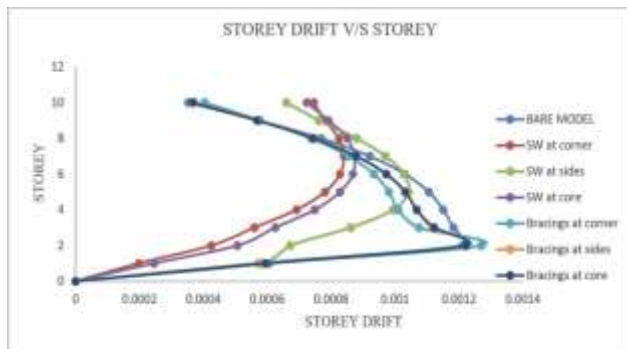
6) Bracings - sides



7) Bracings - core

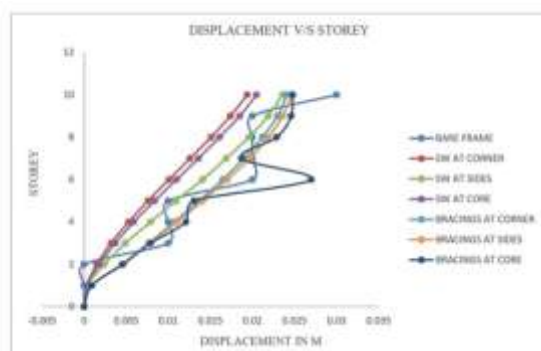
Storey displacement is reduced with bracings and shear walls. Shear wall - corners it is reduced by 35.329 %, shear wall - sides by 21.329 %, shear wall - core by 31.659 %, bracings - corner by 19.659 %, bracings - sides by 17.669 %, bracings - core by 17.329 %. It can be evaluated that bare frame gives maximum value when compared with shear wall - core, shear wall - sides, shear wall - corners, bracings - core, bracings -sides, bracings - corners.

6. RESULTS AND ANALYSIS

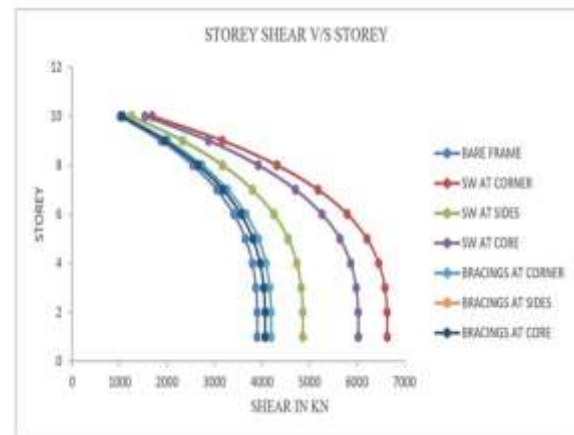


Graph no.1 - Storey Drift & Storey

Storey drift is increased with bracings and reduced with shear walls. Shear wall - corners it is decreased by 64.89 %, shear wall - sides by 44.35 %, shear wall - core by 58.129 % and bracings - corner increased by 4.029 %, bracings- sides by 1.059 %, bracings - core by 0.89 %.It can be evaluated from the graph that bare frame model gives maximum value when compared with shear wall - core, sides, corners and gives minimum value when compared with the bracings - core, sides, corners.



Graph no.2 - Storey Displacement & Storey



Graph no.3 - Storey Shear & Storey

Storey shear is increased with bracings and shear walls. Story shear for the shear wall - corners increased by 41.239 %, shear wall - sides by 19.769 %, shear wall - core by 35.29 %, bracings - corner by 6.939 %, bracings - sides by 4.059 %, bracings - core by 4.139 %. Bare frame gives maximum value when compared with shear wall - corners, shear wall - sides, shear wall - core, bracings -core, bracings - sides, bracings - corners.

7. CONCLUSIONS

1. The effect with position of bracings - corner and shear walls - corner, sides is more important than the bare frame.
2. Compared with bare frame, storey displacement is reduced by 35.329 % for placing of shear wall at corners.
3. Compared with bare frame, storey drift is reduced by 64.89 % for placing of shear wall at corners.
4. Compared with bare frame, base shear value is increased by 41.239 % for placing of shear wall at corners.
5. Shear wall at corners are most efficient in minimizing actions induced in structure with less drift & deflection.
6. Provision of shear wall gives more efficient outcomes in minimizing lateral displacement of building as drift and horizontal deflection induced in shear wall are

much less when compared with bracings and bare frame.

The above results shows that compared with bare model frame and also with bracings, provision of shear wall at corner giving more strength.

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