COMPARATIVE STUDY ON SEISMIC BEHAVIOUR OF MULTI-STORY BUILDING WITH SHEAR WALL

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Abstract

In recent decades, shear walls are the most appropriate structural forms. Shear walls are structural systems which provide stability to structures from lateral loads like wind loads and seismic loads. Here in this paper we will study aspects of one tall building (G + 9), located in different zones of earthquake. Its analysis based on software and result was being comparison of base shear, displacement, storey drift at different zones of earthquake.

Keywords – Seismic analysis, Shear wall, Base Shear, Displacement, Storey drift.

1. INTRODUCTION

Shear walls have been the most common lateral force resisting elements for tall building besides frame systems. It is an efficient method of ensuring the lateral stability of tall buildings and also efficient against torsional effects when combined together with frame structures. Their stiffness is such that sway movement under lateral load can be minimized. Lateral forces caused by wind, earthquake, and uneven settlement loads, in addition to the weight of structure and occupants; create powerful twisting (torsion) forces. These forces can literally tear (shear) a building apart. Shear walls are especially important in high-rise buildings subjected to lateral wind and seismic forces.

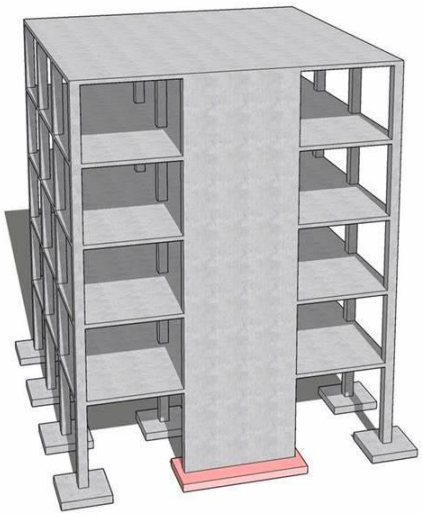

Fig. 1: Typical view of shear wall

2. OBJECTIVE

The main objective is to carry seismic analysis of G + 9 building with shear wall and compare seismic parameters like base shear, displacement, storey drift for different zones of earthquake.

3. ANALYSIS

For this present study parameters are considered as follows:-

1. Height of building :- 31.5m
2. Number of stories :- 10 (G+9)
3. Length in X direction :- 30m
4. Length in Y direction :- 20m
5. Beam size :- 300mm x 600mm
6. Column size :- 900mm x 900mm for first 3 storeys

750mm x 750mm for 4th, 5th, 6th, 7th & 8th storeys
400mm x 400mm for last 2 storeys

7. Slab Thickness :- 150mm
8. Shear wall Thickness :- 300mm
9. Material :- Concrete - M20, Steel - Fe415
10. Loading :- Weight of brick Wall – 12.50 kN/m
Live load on floor – 3 kN/m
Live load on top floor – 1.5 kN/m
Floor finish– 1 kN/m
Roof finish– 2 kN/m

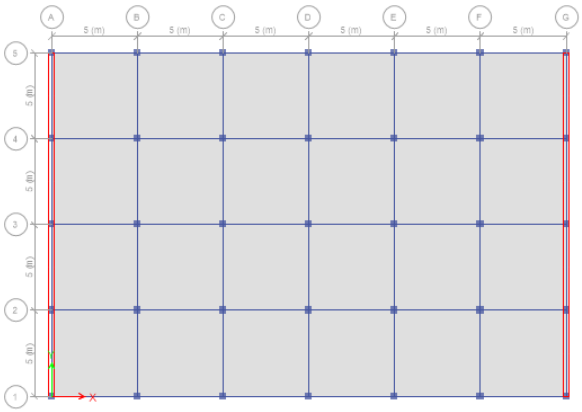

Fig. 2:- Plan of Building

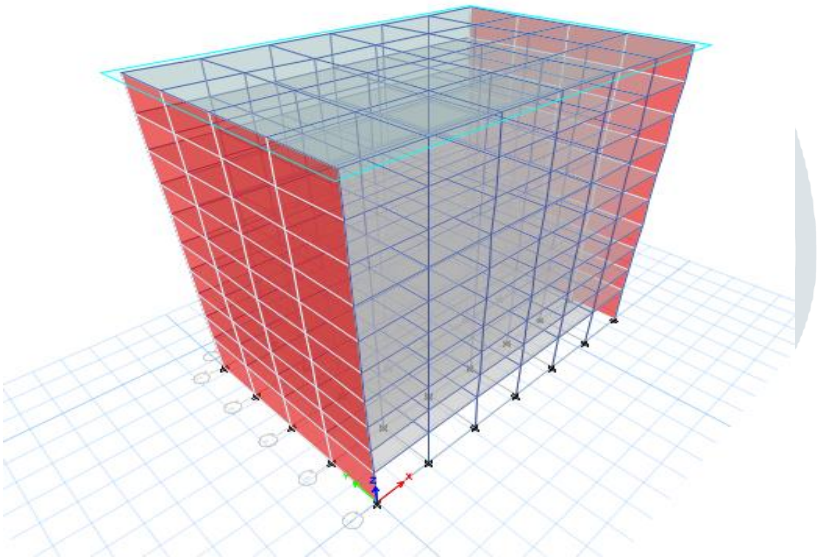

Fig. 3:- 3D view of Building

4. RESULTS

A. Base Shear

Base Shear (mm)		
ZONE	X DIRECTION	Y DIRECTION
Zone 2	828.51	1412.15
Zone 3	1325.62	2259.44
Zone 4	1990.17	3336.28
Zone 5	3288.14	5604.16

Table 1. Base shear in X and Y direction

B. Displacement

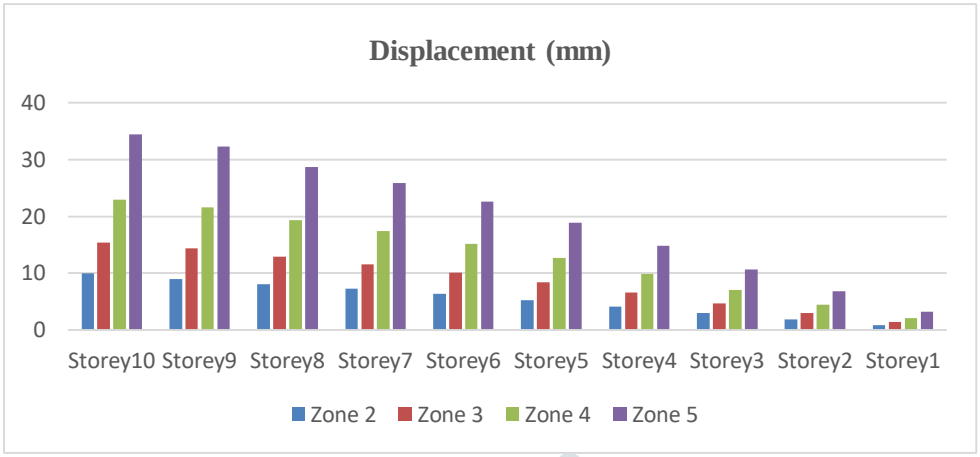

Fig 4. Displacement in X direction

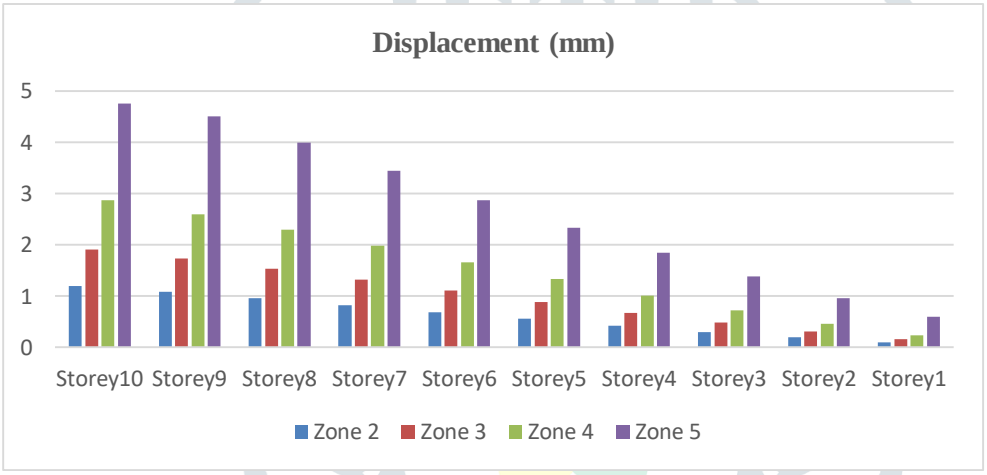

Fig 5. Displacement in Y direction

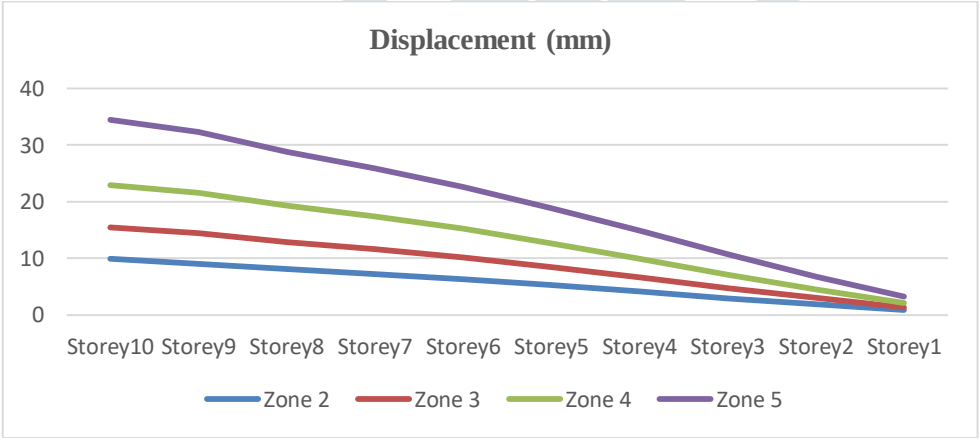

Fig 6. Displacement in X direction

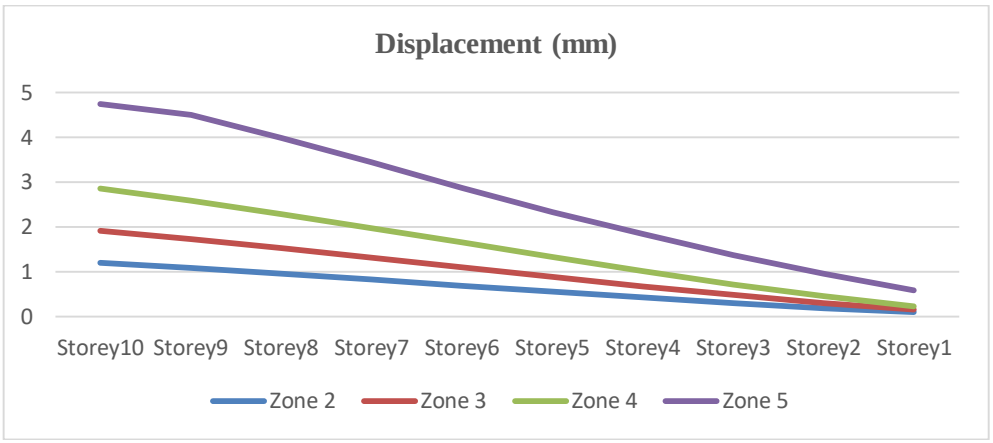

Fig 7. Displacement in Y direction

C. Drift

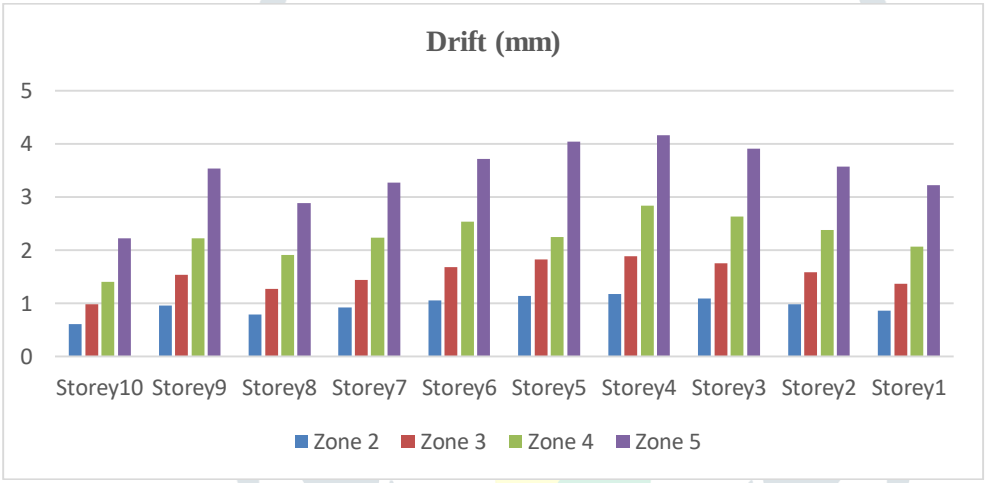

Fig 8. Drift in X direction

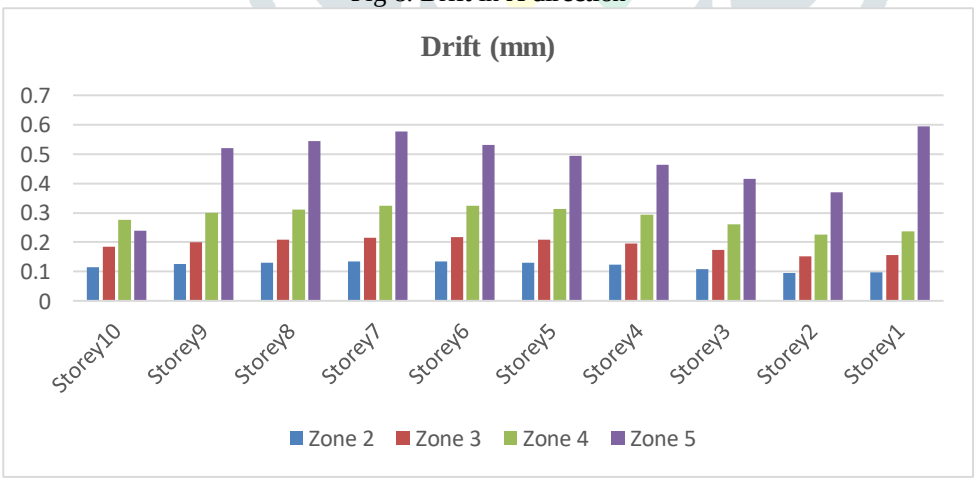

Fig 9. Drift in Y direction

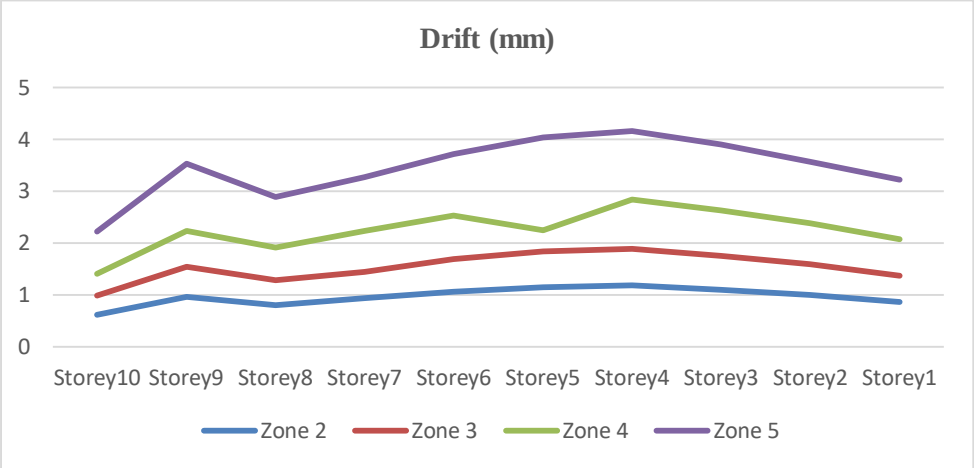

Fig 10. Drift in X direction

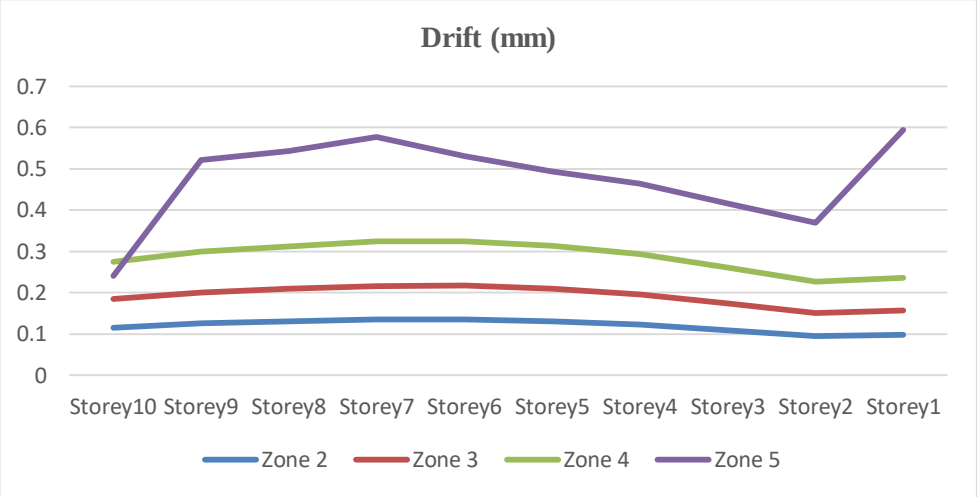

Fig 11. Drift in Y direction

5. CONCLUSIONS

By considering all the results of analysis base shear, displacement, story drift is increases in zone 3, zone 4, zone 5 as compared to zone 2 in X - and Y - direction.

Story drift in maximum at story 5 and story 4 in X – direction and for Y – direction it is maximum at story 7 for all zones and for zone 2 it is maximum at story 1.

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