International Journal of Scientific Research & Engineering Trends
Volume 6, Issue 6, Nov-Dec-2020, ISSN (Online): 2395-566X

Review of Shear wall in High Rise

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Abstract- **In current world scenario with ongoing research for new methodology and techniques to improve the stability of building against seismic and other lateral forces. This paper reviews the effect of frames with and without the shear wall system of simulation conducted by various researchers. Comparison of response of shear wall and RC framed structure will have to be done in future scope of this research work. In order to minimize the damages due to earthquake, shear wall are efficient in terms of cost and effectiveness. On the other hand bracings can absorb great degree of energy which is exerted by earthquake.**

Keywords- **Stiffness, High Rise, Structural stability, Spectrum.**

I.INTRODUCTION

The primary purpose of all kinds of structural systems used in the building type of structures is to support gravity loads. The most common loads resulting from the effect of gravity are dead load, live load and snow load. Besides these vertical loads, buildings are also subjected to lateral loads caused by wind, blasting or earthquake. Lateral loads can develop high stresses, produce sway movement or cause vibration. Therefore, it is very important for the structure to have sufficient strength against vertical loads together with adequate stiffness to resist lateral forces. In India, a considerable number of buildings have reinforced concrete structural systems;

1. Structural Frame Systems- The structural system consists of frames. Floor slabs, beams and columns are the basic elements of the structural system. Such frames can carry gravity loads while providing adequate stiffness.

2. Shear wall- Structural Wall RCC Residential buildings are characterized mainly by cast-in-place, load-bearing, reinforced-concrete shear walls in both principal directions. The buildings are usually multiple housing units found in the major urban areas. These buildings typically have 7 to 20 stories, generally with a cast-in-place reinforced-concrete floor slab system. In general, these buildings have good seismic performance because of their regular mass distribution in height and symmetrical plan configuration and the great stiffness and strength of the walls that can restrict story drift to less than or equal to 0.004*h. Shear wall is vertically oriented planar element that is primarily designed to resist lateral force effects (axial, shear and bending) in its own plane.

The main Advantages of Structural Wall is follows as:

- Provide greater stiffness and strength than Frame Infill.
- Provide many housing unit in relatively small area.
- Generally can be constructed upto 20 storey.

II. RESEARCH FINDING

Ugaldea et. al. (2017), modelled a G+16 and G+25 RCC framed buildings which were then analysed using linear and non-linear method of approach against Chile (2010) earthquake . Demand vs Capacity ratio were generated for various stories that considered three cases viz. frame only, frame with shear wall and foundation uplift. It was reported that the third case viz. skeletal frame with foundation uplift was prominent factor in design, as the Demand vs. Capacity ratio was nearest to unity in this case which means members were not over strength.

Zhang and Mueller (2017), generated a Genetic Algorithm in MATLAB which was used to optimize shear wall and the parameters used to compare were fitness score, structural weight and distance between centre of stiffness and centre of mass for unfixed and fixed plan of the building. It was observed that from a variety of design alternatives which were obtained, the structural arrangement with shear wall placed near the core and at corners for a given dead load, live load and wind load provided efficient structural arrangement in terms of moment carrying capacity axial force resistance.

Damam (2015), modelled a 3D framed G+10 building and simulated against the seismic load with four kinds of arrangements of shear wall and checked for the lateral displacement and storey drift in various seismic zones according to IS 1893: 2002. It was inferred that as the dimension of shear wall are increased, the amount of horizontal forces are taken by shear wall are also increased. Therefore o for zone IV and V which are high earthquake intensity areas, shear walls should be provided on all four corners and centroid of the building to reduce deflection.

***Deore** (2015)*, modelled and simulated a RCC framed G+12 building in Zone V. Lateral dynamic forces were calculated according to IS 1893:2002 for various percentages of opening keeping the location of the wall constant and lateral displacement and storey drift were determined. It was noticed that reducing the opening in shear wall by 50% the displacement is reduced up to 44.7% and the control over displacement, drift, can be achieved by keeping the minimum possible opening provided in shear wall .

***Itti** and **Hegde**(2014)*,modelled a G+4 framed building of 3m floor height with shear wall in zone IV with seismic loading according to IS1893:2002 for a non-linear static analysis which was performed in ANSYS for two parameters i.e. location of the base opening and the percentage area of base opening for the shear wall. It was noticed that as we increase symmetric opening sizes i.e. 35%, 50%, 60% and 75% at base, percentage reduction of load capacity observed were 8%, 22%, 25%and 66% respectively. It was also observed that the shear wall load capacity reduces by 10% for symmetric opening at base and 44% for eccentric opening at base compared to solid for same load applied.

III. CONCLUSIONS

1. Shear wall greatly decrease the lateral displacement and drift.
2. Shear wall at core or corners give efficient structural lateral moment carrying capacity.
3. Opening in the shear wall are directly interlinked to the lateral displacement.

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