Review Paper On Shear Wall Design Of Residential Building

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Abstract- *The aim is construction of shear wall is constructed in residential building (G+2) for safety feature from earthquake and wind. In the alternate use of brick bond masonry work. Shear walls are structural systems which provide stability to structures from lateral loads like wind, seismic loads. Shear walls generally used in high earth quake prone areas, as they are highly efficient in taking the loads. Not only the earthquake loads but also wind loads which are quite high in some zones can be taken by these shear walls efficiently and effectively. The earthquake load is to be calculated and applied to a residential building of plan 9mx10m and 2 no. of (G+2) floors with 9 meters height. For this model, results are calculated and analyzed for the effective location of shear wall.*

Keywords- Shear wall, STAAD. Pro, ETABS, Shear wall in residential building etc.

I. INTRODUCTION

The study investigates the analytical results and designing provisions for the shear walls obtained from available literature. In the seismic design of building reinforced concrete structural walls or shear wall act as major earthquake resisting members. Structural shear wall provide an efficient bracing system and offer great potential for lateral load resistance. The properties of these seismic shear walls dominate the response of the building and therefore it is important to evaluate the seismic response of the walls appropriately. Shear wall are commonly used in reinforced concrete construction to resist the shear force induced by earthquake. Shear walls situated in advantageous positions in the building they can form an efficient lateral force resisting system.

The construction of residential building constructs using brick bond masonry work the alternate use is shear wall. Shear walls are vertical elements of the horizontal force resisting system. Shear walls are constructed to counter the effects of lateral load acting on a structure. In residential construction, shear walls are straight external walls that typically form a box which provides all of the lateral support for the building. When shear walls are designed and constructed properly, and they will have the strength and stiffness to resist the horizontal forces.

In building construction, a rigid vertical diaphragm capable of transferring lateral forces from exterior walls, floors, and roofs to the ground foundation in a direction parallel to their planes. Examples are the reinforced-concrete wall or vertical truss. 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. Reinforcing a frame by attaching or placing a rigid wall inside it maintains the shape of the frame and prevents. As part of an earthquake resistant building design, these walls are placed in building plans reducing lateral displacements under earthquake loads.

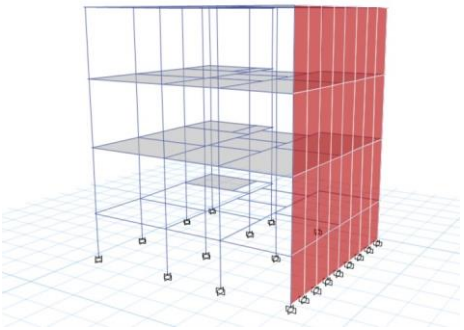

Fig. 1: 3D View of Residential Building with Shear wall

II. LITERATURE REVIEW

Concrete shear walls are most useful type of shear wall for residential building. Many researchers and scholars had researched on the shear wall configuration in any building and types of shear wall. The ability of shear wall to resist lateral forces generated by earthquake and wind force is studied. An effort had been made to study these literatures and conclude over this topic.

Dr.B.Kameshwari analysed the influence of drift and inter storey drift of the structure on various configuration of shear wall panels on high rise structures. The bare frame was compared with various configurations like i) Conventional

shear wall ii) Alternate arrangement of shear wall iii) Diagonal arrangement of shear wall iv) Zig Zag arrangement of shear wall v) Influence of lift core shear wall. From the study it was found that Zig Zag shear wall enhanced the strength and stiffness of structure compared to other types. In earthquake prone areas diagonal shear wall was found to be effective for structure.

B. R. Reddy used Stadd Pro software for analysis and design of earthquake resistant structures using Shearwall. According to their research work, **c**onstructions made of shear walls not only provide lateral strength but also increase the strength parameters and effectiveness to bare horizontal loads. Shear walls have a peculiar behavior towards various types of loads. Research work was adopted to the college building of VITS block, Deshmukhi Hyderabad city using shear wall.

Syed Ehtesham Ali and Mohd Minhaj Uddin Aquil is studied the decision about the location of shear wall in multi-storey building is not much discussed in any literatures. In this paper, therefore main focus is to determine the solution for shear wall location in multi-storey building. A RCC building of six storey placed in Hyderabad subjected to earthquake loading in zone-II is considered. An earthquake load is calculated by seismic coefficient method using IS 1893 (PART -I):2002. These analyses were performed using ETABS.

P.Kalpana, R. D. Prasad and B.Kranthi Kumar is studied of an analytical parameter study is done for the structural shear walls with varying height for different models. The load combinations are consideration as per IS 1893 (Part-1):2002. The result in terms of axial forces, lateral displacement and bending moment in the structural shear walls with varying height are compared for different building models considered. Five-storied buildings were taken with shear-walls and without shear-walls. The design is above verified for this same structure using extended three dimensional analysis of buildings (STAAD Pro V8i) software.

A. Ravi Kumar & K. Sundar Kumar they are work on to determine the solution for shear wall location in multi-storey building based on its both elastic and elasto-plastic behaviors. The earthquake load is to be calculated and applied to a multi-storied building of plan 26mx26m and 10 no. of (G+9) floors with 40 meters height. For this model, results are calculated and analysed for the effective location of shear wall. The design above is verified for this same structure using extended three dimensional analysis of buildings (ETABS) software.

Sanjeebanee Behera and P.K Parhi studies on location of shear wall in buildings for Structural stability Shear walls provide adequate stiffness to the structure. So that the lateral drift will be in limits. Generally shear walls are the vertical cantilever which acts as a column. This investigation presents the study and comparison of earthquake behaviour of buildings with and without shear wall using STAAD Pro. In this study, reinforced concrete buildings are analyzed by changing the various position of shear wall with different locations considering various parameters such as story drift, lateral displacement and others.

S. P. Sharma and J. P. Bhandari they are studied the Seismic Performance of Multi-Storey Building with Different Locations of Shear Wall and Diagri. The present paper gives an overview of different research works to be done regarding the study of multi-storey RC frame structure with lateral load resisting systems such as shear wall and diagrid system. The present work concerned with the comparative study of seismic analysis of multi-storied building with shear wall and bracing, analysis of multi-storey structure of different shear wall locations and heights and proper location of shear wall in the multi-storey building etc.

Mr. Ankur vaidya & Mr. Shahayajali Sayyed they studied on on Comparing the Seismic Effect on Shear wall building and Without- Shear Wall Building. In this paper review of different researchers on the concept of multistoried building with and without shear wall is paraphrased. In India, most adopted type of earthquake resistant structures is with shear wall. These structural walls may differ based on their design and utility and their position in any building plays an important role for resisting lateral force.

Ashwini A. Gadling & Dr. P. S. Pajgade work on Analysis and Design of RCC Shear Walls with and Without Opening To know the responses of providing openings and the behavior of shear wall without openings is the aim of the given study. Hence, it is necessary to demonstrate work on the analysis, design and post effects of shear walls when seismic forces are applied. In this paper, a review is taken out over the analysis and design of RCC shear walls with and without openings to study more detail analytical results and conclusions.

Manoj S. Mendhekar stated the economic means by which lateral load resistance can be achieved in a multistoried building. In their study, seismic behavior, modes of failure, and factors influencing the structural response of buildings were discussed. Many expressions were developed to estimate the flexural strength of slender rectangular shear wall sections with uniformly distributed vertical reinforcement. In this study various aspects of analysis and design of a shear wall are discussed, also different types of shear wall are discussed with their failure modes. Algebraic expressions for calculating

flexural strength of shear wall sections were developed and load-moment interaction diagram were generated using this expressions.

III. METHODOLOGY

In the construction of shear wall is mostly constructed in high rise building 10 storey's or 20 storey's building but the main motive of this review paper is the construction of shear wall can also constructed in residential building upto 2 storey for safety from earthquake to reduce lateral forces. The shear wall gives strength and durability in construction it can also resist lateral forces during earthquake. Structural analysis was carried out by means of well-known computer program E-tabs issued for the linear structural analysis of buildings subjected to static and dynamic loads, is documented. Efficient model formulation and problem solution is achieved by idealizing the building as a system of frame and shear wall substructures inter-connected by floor diaphragms. Design of 2 storey residential building and optimization of shear wall is done by computer aided software E-Tabs. Plan generated in Auto cad is imported and modeled by manual and in ETABS.

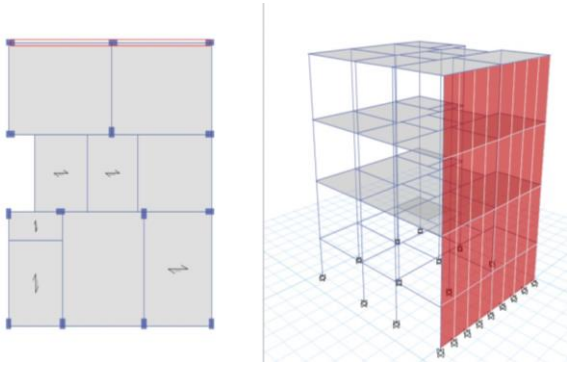

Fig. 2: Plan And 3D View of Residential Building with Shear wall

IV. CONCLUSION

- The shear walls are most effective building elements in resisting lateral forces during earthquake.
- The providing shear wall in residential building its gives the strength and durability to the building.
- By constructing shear walls damages due to effect of lateral forces due to earthquake and high winds can be minimized.
- Shear walls construction will provide larger stiffness to the buildings there by reducing the damage to structure and its contents.
- Shear capacity and lateral stiffness of the shear wall are reduced because of the openings, the ductility and energy-dissipation capacity can be improved and the seismic behaviours of the shear wall.
- The study of shear wall it can be concluded that, different researchers had studied different type of problems related to earthquake and addressed that shear wall are more prominent to resist lateral force due to earthquakes

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