Analysis of RCC Building with and Without Shear Wall - An Overview

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***Abstract*:-There is an increase in demand in the use of earthquake resistant structures. It is necessary to design and analyse the structure for seismic effect. The paper gives an overview of different research works done based the study of RCC structures. In this paper we have aimed to study the various research works done for improving the performance of shear wall and locating its best position in a building. The shape and plan position of the shear wall influences the behavior of the structure considerably. Shear walls have proved to be very successful in resisting strong earthquake so far. The shape and plan position of the shear wall influences the behavior of the structure considerably.**

Keyword: Shear wall; seismic analysis; dynamic analysis; Etabs

I. INTRODUCTION

Shear wall, 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. While columns and load bearing walls keep buildings standing up, carrying the compression load of the structure down to its foundation, the shear wall is that keeps structures from blowing over, resisting the lateral forces of wind and seismic activity. They are among the most generally used lateral load fighting off systems in high rise structures. They have high in plane stiffness and strength that you can use to concurrently resist large horizontal loads and support gravity loads which makes them quite beneficial in lots of structural engineering programs. Shear walls are particularly important in large, or high-rise buildings, or buildings in areas of high wind and seismic activity.

II. LITERATURE REVIEW

P.P.Chandurkar , Dr.P.S.Pajgade (2013) have determined the shear wall location based on the many different factors such as lateral displacement, story drift, concrete quantity, total cost for concrete and steel and percentage of Ast in the middle column. For the analysis he took a 10 storey building with 3m height for each storey and regular in plan. Model 1 is a bare framed structure, model 2 have shear wall on each side, model 3 with shear wall at the corner with its length 4.5m and model 4 with shear wall at corner having a length of 2m. From all the above analysis he concluded that constructing building with shear wall in short dimension at the corners is more economical compared to other models. It is also observed that shear wall is effective and economical in high rise buildings. Providing shear wall at adequate location will limit the displacement caused due to earthquake.

V.Abinav et.al (2016) have determined shear wall location based on the maximum lateral deflection of the roof. An earthquake load is applied to a G+10 RCC building having 16x16m in plan. The structural analysis was done using STAAD. Pro V8i. He have introduced 4 models i.e. a framed structure and 3 other models having different position of shear wall at the corner, along the periphery and in the middle. From the analysis he concluded that the lateral deflection for the building with shear wall at the periphery is reduced in comparison to all other models.

Rinkesh R Bhandarkar , Utsav M Ratanpara, Mohammed Qureshi(2017) have design and analyse a multi storey building having a height of 22m with shear wall and without shear wall. His main objective was to analyse story drift, displacement, shear, story stiffness model period and frequency on different floor. Another objective was to make the building earthquake resistant against seismic effect.

The following conclusions was observed :

1) The displacement and story drift is less in shear wall structure when compared to framed structure.
2) The story stiffness is more in shear wall structure than in framed structure.
3) The modal period and frequency is less in framed structure.
4) The performance of shear wall structure is better compared to the framed.
5) The cost of construction of frame structure is less.
6) Due to the high stiffness of shear wall structure it is more suitable in earthquake prone area.

Sayyed A. Ahad et al.(2017) have analyzed and designed a multistoried building located in Latur, Maharashtra with B+G+10 storeys having a car parking facility provided at basement floor. The building has a shear wall around the lift pit. The modeling

and analysis of the structure is done by using ETABS and the designing was done. Design of slab, stair case and an isolated footing was done manually. The design methods involve load calculations manually and analyzing the whole structure by ETABS. It has been concluded that analysis is done by using the software ETABS V15.2, which proved to be premium of great potential in analysis and design of various sections. The structural elements like RCC frame, shear wall and retaining walls are also provided. As per the soil investigation report, an isolated footing is provided. The design of RCC frame members like beam and column was done using ETABS. The analysis and design were done according to standard specifications to the possible extend. The various difficulties encountered in the design process and the various constraints faced by the structural engineer in designing up to the architectural drawing were also understood.

Mohammed Imranuddin, Abdul Kareem, Kha Yasir(2019) have done an analysis of 16 storied high rise building with and without shear wall by computer aided software Etabs. The model is analyzed for axial load, lateral loads and wind loads. Response spectrum analyses are also done. The displacement of the 2 models having different load cases are observed. He concluded that lateral loads are reducing when shear walls are added at the corner location having minimum lateral forces. He also observed that static analysis is not sufficient for high rise buildings. It is necessary to provide dynamic analysis. Response spectrum analysis can be seen that the displacement values in both x and y directions are least in model with shear wall in core and corners when compared to other models.

III. CONCLUSION

This paper reports on research development on the seismic performance of mutli-storied building with shear wall and without shear wall. All researchers concluded that the maximum deflection of multi storied building with shear wall is less compare to that without shear wall or a framed structure. Some authors sum up that by providing shear wall it will affect the seismic behavior to a large extend by increasing the strength and stiffness of the building. Some authors also provide the economical location of the shear wall for improving the stability of the structure.

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