



A REVIEW OF STRUCTURAL PERFORMANCE OF HIGH-RISE BUILDING WITH AND WITHOUT SHEAR WALL

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Abstract:

Shear wall is most widely used in buildings structure Based on its seismic performance, a shear wall building resist the lateral load from wind and earthquake load. it is giving more better result than RC framed structure. They have high plane stiffness and strength. Shear wall can support gravity loads and resist heavy horizontal loads at the same time. Shear walls are constructed from reinforced concrete, plywood and timber etc. ETABS software used in this work to study a (G+21)-storey RCC structure. in this research paper comparing the parameter like base shear, storey displacement and storey drift in tall building with and without shear wall.

Index Terms - ETABS software, Seismic Analysis, shear walls, Structural performance.

I. INTRODUCTION

shear wall is a vertical structures element. its commonly used in tall building. Shear walls are positioned carefully throughout the building to withstand lateral loads. They are usually made of reinforced concrete. Shear wall thickness is depending on several factors like, building height, design requirements, and local building codes. As you mentioned, Shear walls thicknesses can vary from 150 mm to 400 mm or even higher in some cases. In structural engineering field, ETABS software is used for especially analysis and designed of high-rise structures and easy to find out any type of problem. shear wall is mostly used for construction field in prone area because they have higher seismic zone. It is depending on the what we have shear wall location in the building. this research comparing the parameters between check the storey drift ratio, storey displacement, base shear in (G+21) structure with the help of ETABS software.

II. LITERATURE REVIEW

Axay Thapa & Sajal Sarkar [1], In this paper, three different height RCC storey (G+15), (G+10) and (G+5) were created with and without shear wall. STAAD.Pro software are analyzed a RCC Model by the use of Dynamic analysis methods and Static Method in seismic zone V. For each model, it is determining the various components, such as base shear, Storey drift, lateral displacement, and mode shapes etc.

Sarwan Gupta, Shubham Gaikar, Swapnil Shelar, Kewal Patil and Harshad Thakare [2], Analyzed the high-rise building both in the shear wall and without shear wall with the use of the response spectrum methods. in this Study how the structure performed at various shear wall locations. Compared the results between story displacement and story drift for both shear walls and non-shear walls as per IS 1893:2016

Raja Gowhar, Nitin Mehta [3], This study explains how the ETABS is used to compare the model between columns replacement with shear wall in (G+25) multistoried building with different kinds of load combination, including seismic loads. in Seismic zone IV this structure is designed using ETABS software. The main objective of structures designed to withstand earthquakes is to keep its ductility. It is best to build with shear walls to withstand horizontal forces. The maximum storey drift is smaller than IS 1893-2016 from the maximum storey drift 0.0306 permitted drift value of 0.312. According to seismic zone IV analysis, the building is safe but the results is differed when we changed seismic zone.

Sanisha Santhosh1, Linda Ann Mathew [4], in this study, to analyzed the multistoried structure (G+29 and G+14 with shear wall) by using ETABS software with a symmetrical plan for the two different seismic zone (zones III and V) and compared the results between base shear, storey drift. Based on base shear value and storey drift in (G+14), the structure with the Shear walls shaped like W and U give a better result (X-direction) in zone III and V.

Pawan R. Thakare [5], This project is based on (G+15) multistoried structure by using ETABS software mainly three method are involved in this paper. 1. Response Spectrum Analysis. 2. Equivalent Static Analysis. 3. Time History Analysis. The main objective of this project is comparing between the result with zone 2 and zone 3. zone 3 has higher value of drift as compared the zone 2. The Behavior of the high rise building in this project as shown per graph clearly.

P. Rajeswari1, Mr. A. Koti Neelakantam [6], In this Paper, Prepared a (G+10) asymmetrical residential building plan in ETABS software with both methods are used static and dynamic analysis. These models are analyzed by using ETABS software and compared the results between storey drift, storey displacement at zone II, III, IV and V.

Jaimin Dodiya, Mayank Devani, Akash Dobariya, Mehul Bhuva, Kamalsinh Padhiar, [7], ETABS software used for analyzed the multi-story building with a shear wall by the use of Dynamic analysis methods and Static Method. The building measured 376 m² in area and 60 m in height. There were 20 storeys in all, and each slab had a thickness of 150 mm. It was a 900x600 mm column. the conclusion that the best and most effective solution was to provide a shear wall facing the other direction. Additionally, having a shear wall in the right place is beneficial and improves the performance of the building, whether it is new or old.

Shear wall: It is a vertical structural element. In frame structures, it is used to resist lateral forces because of the earthquake also lateral wind-load. In RC frame structures the result of wind forces increase in significance as the structures increases in height.

Types of shear wall:

The following different kinds of shear walls can be classified as per the kind of material was used.

- i. Concrete Block Shear Wall
- ii. Reinforced Concrete Shear Wall
- iii. Steel Shear Wall
- iv. Mid-Ply Shear Wall
- v. Plywood Shear Wall

III. CONCLUSION

The previous studies focused on multiple problems in different cases like wind and earthquakes on multistory buildings. Considering the seismic zone cases, this research with RC structures on the different seismic zones are developed based on situations involving seismic zones. The idea is that as a seismic zone increases, the large changes are observed in structural parameter compared to existing zone. Shear wall construction will increase the buildings' stiffness and reduce damage to the structure. It is clear that buildings with shear walls perform better during seismic activity. Shear wall can be constructed to resist damage caused by lateral loads from winds and earthquakes. The research paper, that replacements columns with shear walls in non-shear wall buildings where shear walls are used in place of outer columns and inner portion. it will be better result.

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