"TO STUDY THE ANALYSIS OF SHEAR WALL WITH OPENINGS OF DIFFERENT SIZES"

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Abstract: - *In current elevated structures, shear walls are for the most part utilized as a vertical basic component for opposing the horizontal loads that is prompted by the impact of wind and quakes. A shear wall may contain many openings due to the functional requirements such as doors and windows, which may largely affect the overall seismic response of the structure. This study is carried out on a fifteen storey frame structure shear wall building, with the help of ETABS software in using time history method. The scope of the present work was to study seismic responses of the fifteen storeys RC shear wall building with or without openings. The volume of shear wall reduced in the boundary elements are analysed using software ETABS using time history method (1893 (Part-1)-2002). Its check the parameters results of storey drift , displacement, base shear of the structure openings in shear wall buildings. Shear walls are for the most part situated along the edges of structures center that houses stairs and lifts.The magnitude of strength reduction depends on the size of openings.*

Key Words: **Opening in shear wall, Coupled wall, RC shear wall building, Time history analysis, Rectangular opening, Square openings, ETABS.**

1. INTRODUCTION

Earthquake causes very tremendous damages as it is unexpected in nature. Disasters due to earthquake have become a great issue now-a-days. It frequently occurs all over the world. The prediction of location, the time of occurrence, intensity of earthquake is very difficult to understand. So it is very necessary to adopt the suitable assumptions before design by keeping in mind the dangerous seismic effects. Generally, structures are designed for dead load, live load, wind load, etc. which is not sufficient for taking earthquake load. It is not necessarily safe against seismic load. Shear wall and bracing system are the most efficient system reduces lateral displacements and dissipate energy during strong motions. Damages due to earthquake can be prevented by adding such structural elements like shear wall and bracing systems. This paper includes detailed step by step procedure of modelling and analysis of the models considered in the present study using standard ETABS software. The size and location of shear wall is extremely critical. In the time history method EERI oral history series, written in 1997, Professor George W.Housner summarized the early history of the creation of a spectrum from a recorded earthquake acceleration record. The sizes of openings may play a significant role in the response of shear walls.

1.1 PURPOSE OF OPENING IN SHEAR WALL

Openings are used as architectural needs to have window or doors, besides Engineers want to design buildings. The stiffness of walls is dependent on the size of the openings with less record to their horizontal.

2. WORK METHODOLOGY

A ground acceleration time history is used for both linear and non linear time history analysis. This analysis gives the comparative values of different size openings and actual distribution of force in elastic range in good way. Time history analysis is most accurate method to determine the seismic responses of structures. Design of 15 storey high rise building and optimization of shear wall is done by computer aided E-tabs software and providing the openings of shear walls in two shapes (square and rectangular openings) are different sizes. This model is analysed for openings sizes and lateral loads and the results are studied.

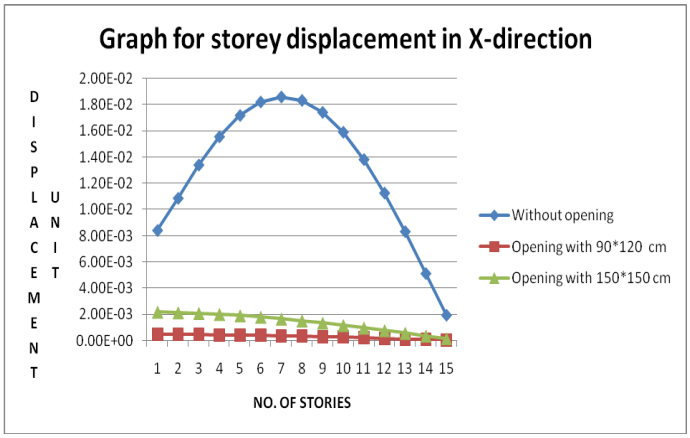
2.1 COMPARISION OF MAXIMUM VARIATION OF STOREY DISPLACEMENT IN DIFFERENT SIZES

The displacement refers to the distance that points on the ground are moved from their initial locations by the seismic waves. The displacement varies accordingly in each direction.

Table -1 Variation of storey displacement

MODEL	MAX DISPLACEMENT
WITHOUT OPENING	-8.417 mm
90*120 CM OPENING	-4.774 mm
150*150 CM OPENING	-2.183 mm

The storey displacement graph in X-direction respectively. It is evident that the top storey displacement is more varies in different sizes of opening than in the comparison of without opening. The shear wall without openings experiences a higher displacement than sizes of openings due to the fact that, in the case of buildings with a long natural period, the buildings will experience lower accelerations but larger displacements. It is the total displacement of the storey with respect to the ground.



3. CONCLUSIONS

Based upon the research carried as above, Lateral load resisting capacity of shear wall frame increases significantly on decreasing the size of opening in shear wall, as clear from the seismic parameter result and following conclusions have been drawn.

when openings are large enough, the load capacity becomes less.

Ear wall without opening proved to be highly advantageous and they were found to provide better lateral resistance than shear walls with openings. The increase of stresses in shear wall without openings is small when compared to shear walls with opening. The displacement and drift shear wall without agreed quite well than that of shear wall with openings.

For openings up to 14%, the load carrying capacity and ultimate displacement response were not found to be severely affected by openings. However, for openings beyond 14%, the load carrying capacity of shear wall gets affected due to the presence of openings.

Shear walls with different opening sizes and different reinforcing patterns can be further analyzed for future research work, so that the failure mechanism of shear walls with openings can be understood in a better way and a proper design code can be formulated for practice.

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