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# COMPARISON OF CONVENTIONAL HIGH RISE BUILDING WITH SHEAR WALL BUILDING

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**Abstract: Now day's tall constructions are furnished with shear wall to enhance the lateral load resistance. In the current paper we are find out about the answer for shear wall location. The effectiveness of RCC shear wall constructing is studied with assist of model. Shear wall is the structural member designed to counteract the lateral forces performing on a structure. These partitions are extra vital in seismically energetic zones when shear forces on the shape will increase due to earthquakes. Shear partitions have extra power stiffness and face up to in-plane masses that are utilized alongside its height. Buildings with shear partitions which are appropriate designed and designated have proven very desirable overall performance in previous earthquakes. Various lookup research have been carried out on the diagram of shear wall and its overall performance to seismic forces. The existing learn about is on the elements which have an effect on the overall performance of shear wall such as function of shear wall. The usefulness of shear partitions in the structural planning of multi-storey constructing has lengthy been recognized. When partitions are located in fantastic positions in building, they can be very environment friendly in resisting lateral masses originating from wind or earthquake. Shear wall in constructing is usually furnished to defend the shape underneath lateral loading prerequisites like earthquake load, wind load etc. Behaviour of such kind of constructing with provision of shear wall is extraordinary than the frequent or traditional structure. So it is critical to analyze the shape with provision of shear wall. The entire modelling, analysis, and plan is completed by way of the use of structural evaluation software program ETABS.**

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## I INTRODUCTION

Seismic load are the forces that happen all through the existence of a building. Building ought to be capable to stand up to seismic load due to minor earthquake except whole collapse. Therefore structural designing requires structural evaluation and seismic evaluation of any structure. Seismic analysis is the calculation of the response of shape subjected to earthquake excitation. Various seismic information is critical to elevate out the evaluation of structure.

All over world there is excessive demand for building of tall structures due to growing urbanization and population. When multi-storeyed shape designed, they are made to fulfil simple factors and serviceability and have to supply interest closer to behaviour of shape in opposition to load imposed. RC structures body are most frequent kind of building in city India. These are subjected to numerous kinds of forces in the course of their lifetime, such as static forces due to useless and stay hundreds and dynamic forces due to wind load and earthquake loads. There are so many parameters have an effect on on constructing to responding for earthquake. By evaluation these parameters we can face up to the constructing by using destructive for the duration of earthquake.

In each and every building, sample of shear wall are no longer same. In this venture we will analyse shape by means of thinking about one-of-a-kind positions of shear wall. It is one of the aspect that we are going to reflect on consideration on for study. We evaluation these parameters inside our task and decides/conclude how it will responsible. Direction of seismic vibration it is some other parameter which has to be regarded for excessive upward push building. And in this challenge we are going to take a look at what will be it impacts on building.

Lateral displacement relies upon on top of shape or building. If top is more, then displacement will be additionally more. Storey glide is displacement of one storey with appreciate to different storey. The end result parameters such as displacement, help reaction, base shear and float ratio are compared. These responses of shape inspect for G+9 constructing are analysing by means of the use of ETABS 2016 software. For this find out about we take all the earthquake.

**Objectives**

- To compare conventional high rise building with use of shear wall in high rise building.
- To compare the G+9 storey building as per earthquake zones in India.
- To analyze the multi¬-storey building with shear wall using ETABS software
- To find most suitable position of shear wall to reduce structural response of structure during earthquake.
- To compare storey drift of structure to conventional with shear wall.

## II LITERATURE REVIEW

Ishita Arora et. al. (2017) [1] studied that the scientific study of earthquakes and the propagation of seismic wave, the waves generated from the energy caused by the sudden breaking of rocks within the earth or an explosion that moves through and around the earth is known as seismology. Earthquakes occur when two tectonic plates move suddenly against each other. The rocks usually break underground and due to this breaking of rocks the earth shakes resulting in an earthquake. Designing of such buildings which can withstand earthquake is called as earthquake resistant designing of the structure and the building thus constructed is known as the earthquake resistant structure.

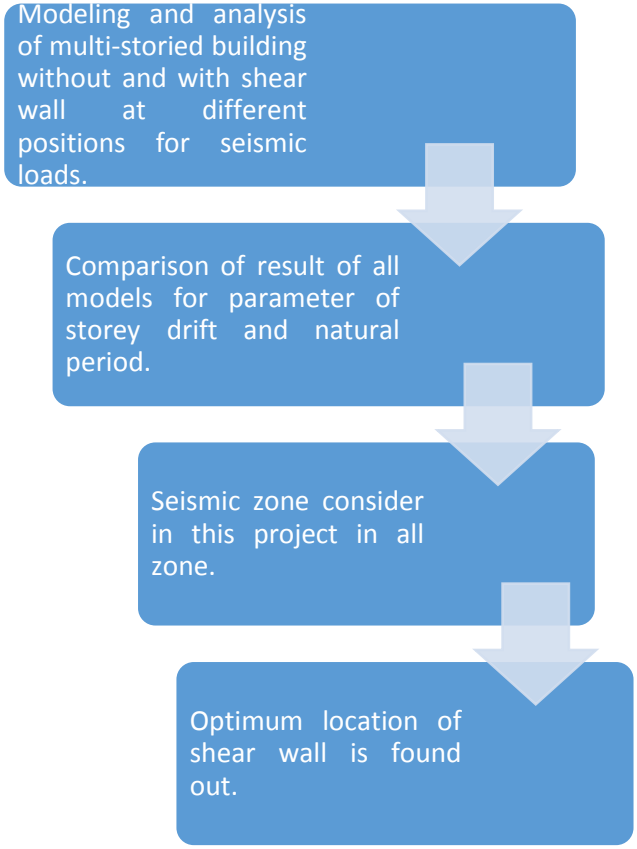
Ravi Sonani et. al. (2016) [2] analysed that the Structural frame only are not sufficient to stand against various loading act on the building. In RC building, Shear wall is the most appropriate structure form, which improves structural behaviour in tall buildings. This resists lateral loads like wind & earthquake force efficiently and therefore studying of the shear wall in structural system is necessary. In this study the behaviour of the R.C. building with shear wall is analyzed by providing openings in the shear wall and the resultant parameters like displacement, time period, stiffness etc. are compared by using structural software ETABS.

**R.RESMI** ET. AL. (2016) [3] reviewed that the shear wall is a structural member designed to counteract the lateral forces acting on a structure. These walls are more important in seismically active zones when shear forces on the structure increases due to earthquakes. Shear walls have more strength, stiffness and resist in-plane loads that are applied along its height. Buildings with shear walls which are properly designed and detailed have shown very good performance in past earthquakes. Various research studies have been conducted on the design of shear wall and its performance to seismic forces. The present study is on the factors which affect the performance of shear wall such as position of shear wall, configuration and different types of materials used. This paper compiles the evaluation of seismic performance of shear wall.

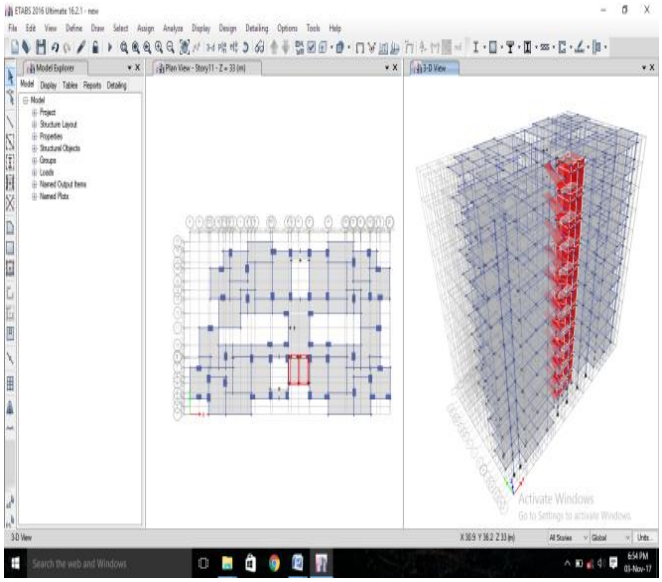
Ravikant Chittiprolu et. al. (2014) [4] analysed that the usefulness of shear walls in the structural planning of multi-storey buildings has long been recognized. When walls are situated in advantageous positions in a building, they can be very efficient in resisting lateral loads originating from wind or earthquakes. Reinforced concrete framed buildings are adequate for resisting both vertical and horizontal loads acting on them. Extensive research has been done in the design and analysis of shear wall highrise buildings. However, significance of shear wall in high-rise irregular structures is not much discussed in literature. A study on an irregular high-rise building with shear wall and without shear wall was studied to understand the lateral loads, story drifts and torsion effects. From the results it is inferred that shear walls are more resistant to lateral loads in an irregular structure.

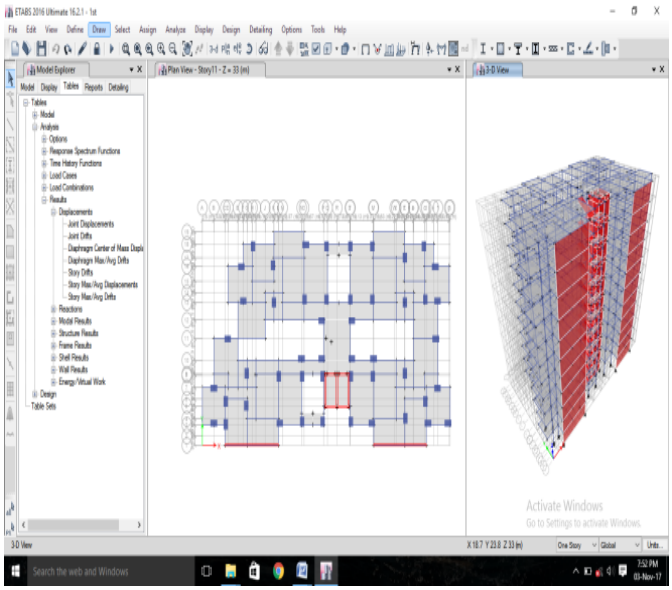
P. V. Sumanth Chowdary et. al. (2014) [5] studied that the tall buildings are provided with shear walls to improve the lateral load resistance. In the present paper we are study the solution for shear wall location and type of shear wall in seismic prone areas. The effectiveness of RCC shear wall building is studied with help of four different models. Model one is bare frame system and remaining three types are different shear wall buildings. An earthquake load is applied to 8 storey building located in different zones. The performance of building is evaluated in terms of lateral displacements of each storey. The analysis is done by using structural finite element analysis (SAP2000) software.

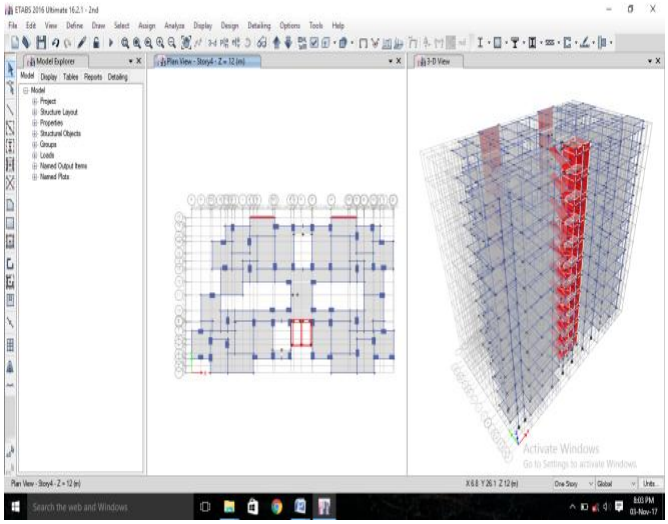
## III METHODOLOGY

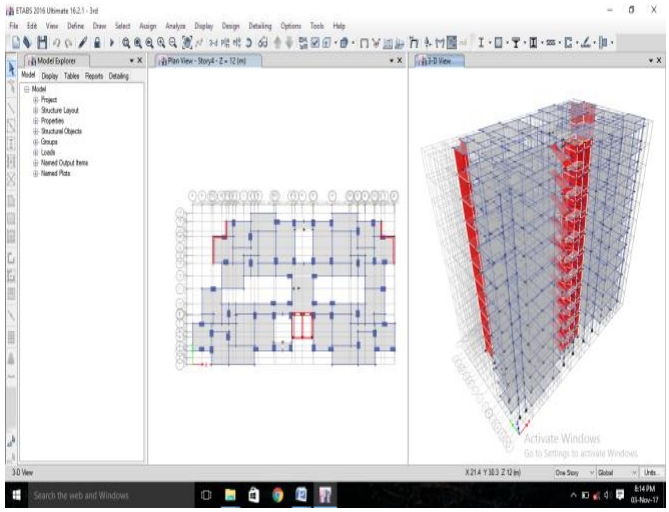


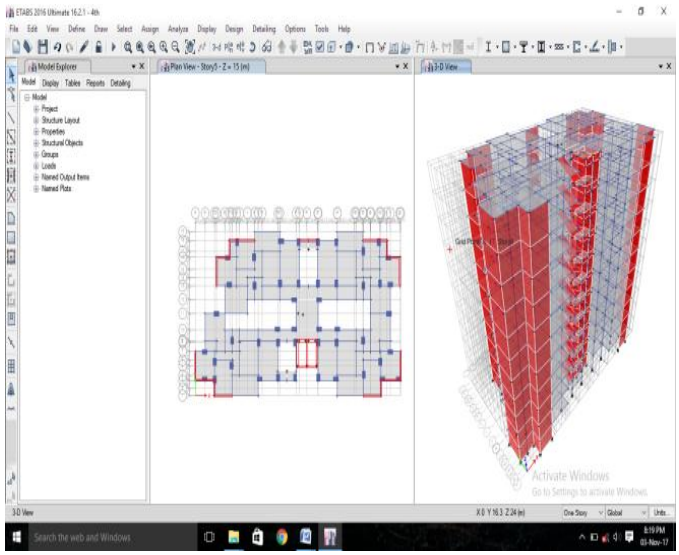
## IV MODELS











## V RESULTS

### MAXIMUM STOREY DRIFT

| | EARTH QUAKE ZONE 2/ CHENNAI | EARTH QUAKE ZONE 3 / MUMBAI | EARTH QUAKE ZONE 4 / SRINAGAR | EARTH QUAKE ZONE 5 / GUWAHATI |
|---|---|---|---|---|
| **CONVENTIONAL STRUCTURE** | 1.845 mm | 2.839 mm | 3.839 mm | 5.878mm |
| **MODEL NO. 1** | 1.673 mm | 2.535 mm | 3.79 mm | 5.671 mm |
| **MODEL NO. 2** | 1.71 mm | 2.726 mm | 4.08 mm | 6.112 mm |
| **MODEL NO. 3** | 1.267 mm | 2.017 mm | 3.016 mm | 4.515 mm |
| **MODEL NO. 4** | 0.754 mm | 1.182 mm | 1.772 mm | 2.507 mm |

**AVERAGE STOREY DRIFT**

| | EARTH QUAKE ZONE 2/ CHENNAI | EARTH QUAKE ZONE 3 / MUMBAI | EARTH QUAKE ZONE 4 / SRINAGAR | EARTH QUAKE ZONE 5 / GUWAHATI |
|---|---|---|---|---|
| **CONVENTIONAL STRUCTURE** | 1.07 mm | 1.883 mm | 2.799 mm | 3.924 mm |
| **MODEL NO. 1** | 0.967 mm | 1.474 mm | 2.206 mm | 3.301 mm |
| **MODEL NO. 2** | 1.072 mm | 1.712 mm | 2.562 mm | 3.836 mm |
| **MODEL NO. 3** | 0.993 mm | 1.56 mm | 2.317 mm | 3.452 mm |
| **MODEL NO. 4** | 0.705 mm | 1.107 mm | 1.652 mm | 2.147 mm |

- The results shows conventional structure fails in earthquake zone 4 & 5.
- In earthquake zone 4 model no. 2 fails.
- In earthquake zone 5 model no. 1,2&3 all fails due high wind speed and seismic force.
- Model no. 2 also fail in earthquake zone 4 due to its short length of shear wall.

## VI CONCLUSION

- After analysing all the models we found that the model no. 4 gives optimum result in storey drifts in all earthquake zones in India
- After analysing all the models model no. 4 restrict 40-50 % lateral movements as compared to conventional structure.
- In earthquake zone 4&5 shear wall is must be provided in high rise structure.
- The conventional structure can be effective in zone 2.
- In earthquake zone 3&4 model no. 1 is effective and safe. Also it is economical as the length of shear wall is short.

## VII FUTURE SCOPE

- To construct high rise and safe structure in earthquake zone 5.
- Also the structure should be economical as well as safe.
- To more use of shear wall in earthquake zone 4&5.
- To reduce risk of structure failure in high magnitude earthquake.

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