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A Study on Optimum Location of Shear Wall under Seismic Loads

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Abstract- In the recent researches it was found to be the most utilized loads resisting system in recent and present years is shear walls system. In the seismic analysis of structures, strengthened cement basic walls, or shear wall , go about as significant effects opposing individuals. Shear walls are high in plane solidness and quality, can be utilized to oppose all huge even loads and gravity load, making them very beneficial in numerous auxiliary building applications. They are for the most flexural individuals and typically gave in structures to the aggregate fall of the structures under seismic forces .The properties of these seismic shear walls overwhelm the reaction of the structures, and hence, it is vital to assess the seismic reaction of the walls suitably. The extent of present work is to think about impact of seismic load on optimum locations of a shear wall in working at various elective area Effectiveness of shear wall has located with different location in six models. Demonstrate one is exposed casing auxiliary framework and different models have distinctive plans of shear walls. Response range strategy are utilized for investigation in ETABS programming and structure was to be located in zone 5. In this analysis work, the structures with G+15 stories building is made for the study of structure. From investigation some parameter are decide like base shear, Drift and relocation of STRUCTURE., In this investigation, 3d models of G+15 storied structure has been produced for symmetric structures Models and examined utilizing auxiliary examination instrument ETABS. The analysis model of building incorporates immensely imperative segments that influence the mass, quality, stiffness and deformation of the multistorey structure.

Keywords-Shear wall; Displacement,Drift,Stiffness,Response spectrum analysis; ETABS.

1. INTRODUCTION

In the previous records of earthquake it seems that the demand of the shear wall increasing to fulfil earthquake resisting structure. In tall buildings, to resists the seismic forces, Shear wall are used with Codes provision are considered in the type of analysis.

Multistoreyed structure are subjected to Static & Dyamic loads. Static are consistent while dynamic are not steady with time. In greater part affable structures just static loads are considered while dynamic loads are not figured in light as low and the estimations are more convoluted. This may cause effect especially amid Earthquake because of seismic actions. By giving shear wall in tall building we can oppose seismic loads. They are computed by E-TABS programming by giving shear wall at optimum locations of building.

Tall building were known for withstanding against the vertical and also lateral loads when analysis and designed with the earthquake resisting parameters. In this type of buildings the column, beams ,slabs are designed heavy so to withstand loads and to resists the vibrations due to earthquakes and to provide the safety of the structure. Shear walls is considered the most usefull in this multistoreyed structures. Shear walls provide the strong bond in the tall buildings as they prevent the collapse from the seismic forces. The building heights are increasing as the materials and new technics developing, the height increases stiffness also becomes important factor when they are subjected though loads which may be lateral. Seismic power had reliably been one of the extensive trademark trust upon the mankind since time immemorial and obtaining its wake untold miseries and hardship to the overall public impacted. Indian regions has been proficient about presumably the most extraordinary seismic effect on the planet.

The design paramaters becoming more challenging and must be designed to resists this type of loads.

Earthquake ,wind forces are creating more challenges to the designers for which designers were facing problems to provide the required amount of strength, stability against earthquakes . Structures composed by the latest seismic codes give least security to protect life and in a earth quake, they guarantee in any event gravity stack bearing components of unimportant offices will at present capacity and give some edge of wellbeing. In the case, consistence with a standard will not ensure such execution. They normally don't address execution of non-basic parts neither give contrasts in execution between various auxiliary frameworks. This is on the grounds that it can't precisely appraise the inelastic quality and misshapening of every part because of direct flexible investigation.

2. OBJECTIVES

- The main purpose of the project to study as well as compare the seismic response of G+15 building for optimum location of shear wall so that we can select the best possible ways construction in earthquake zone.
- Different location of shear wall in R.C. Building will be modelled in the ETABS software and their results obtained are natural period, frequency, storey displacement, storey drift, storey shear is compared.
- Determination of storey drifts, storey displacements and storey shears, base shear and time period
- Determination of location of shear wall under response seismic loading

3. ANALYTICAL MODELLING

Model 1 : Model 1 is Bare frame.
Model 2 : Shear walls are at 1,5,26,30.
Model 3 : Shear walls are at a, e, z, a_1.
Model 4 : Shear walls are at 1, b, d, 26, 5, a, a_3,30.
Model 5 : Shear walls are at 5, a_2, 30 1, c,26.
Model 6 : Shear walls are at 1, a, e,26, 5,z,a_4,30.

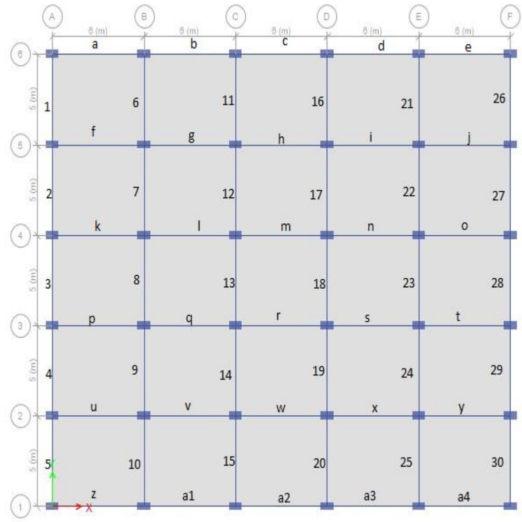


Fig1: Model Ref.

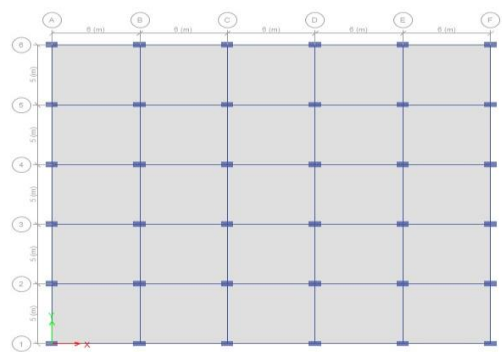


Fig2: Model 1

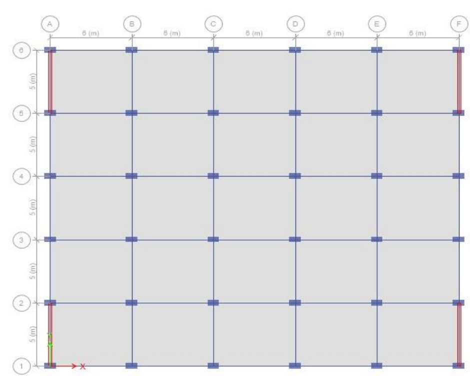


Fig3:Model 2

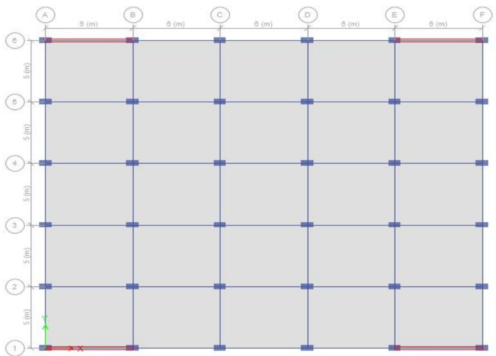


Fig4: Model 3

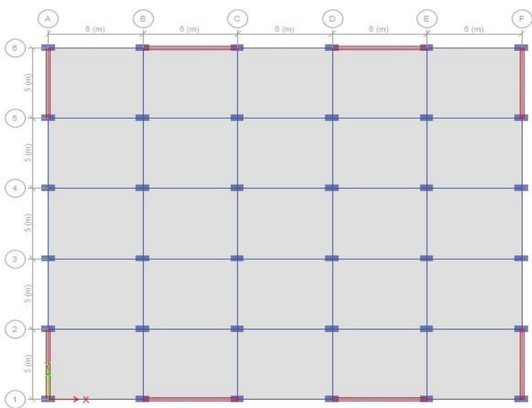


Fig5: Model 4

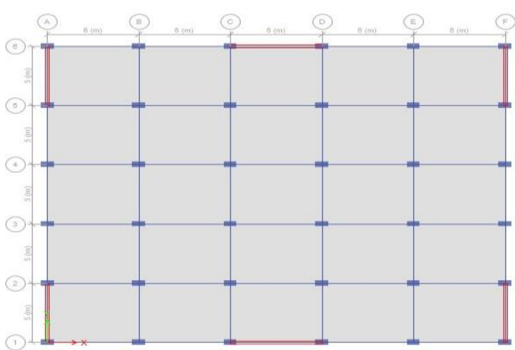


Fig6: Model 5

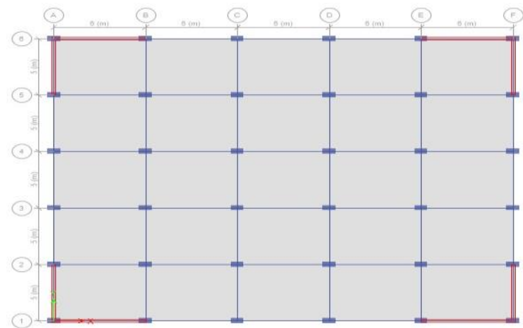


Fig7: Model 6

4. DESIGN DATA

MATERIALS PROPERTIES:

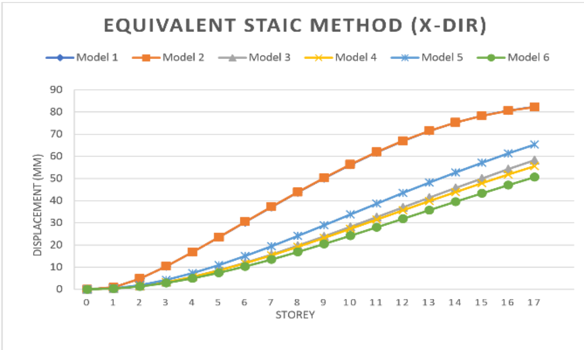
Density of R.C.C	= 25KN /m³
Assumed Data	
Roof Finish	= 2 KN /m²
Floor Finish	= 1kN/m²
Live load intensities:	
Live loads	= 3.0KN/ m²
Section properties:	
Slab thickness	= 0.120m
Column:	= (0.4 m x 0.8 m)
Beam:	= (0.3 m x 0.45 m)
Concrete wall thickness	

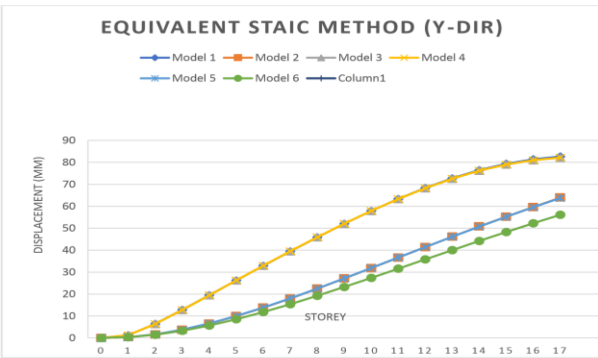
5. RESULTS

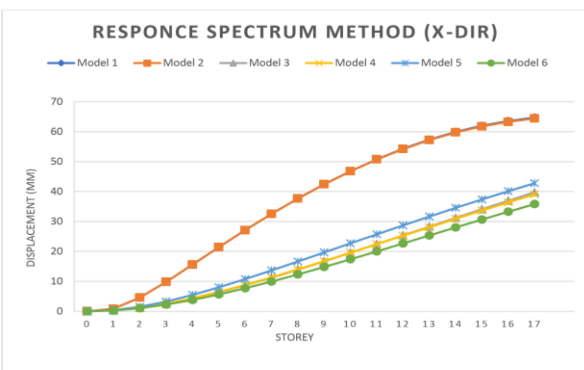
The results of Displacement, Drift, Stiffness, and Base shear are obtained by Linear static and Linear Dynamic Method are compared below.

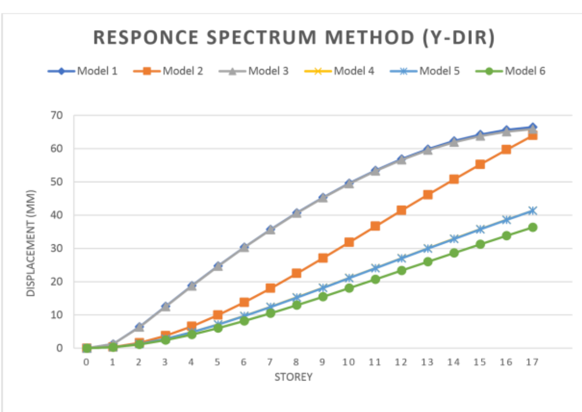
5.1 STOREY DISPLACEMENT

Storey Displacement in X & Y Directions



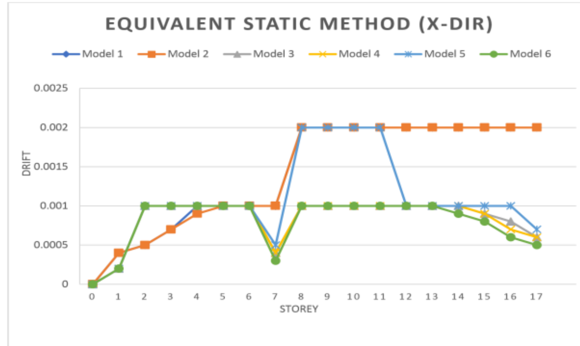


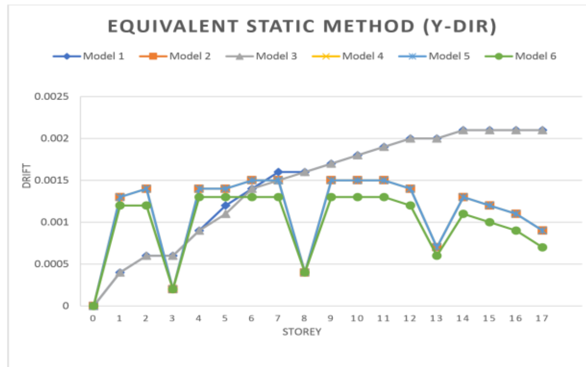


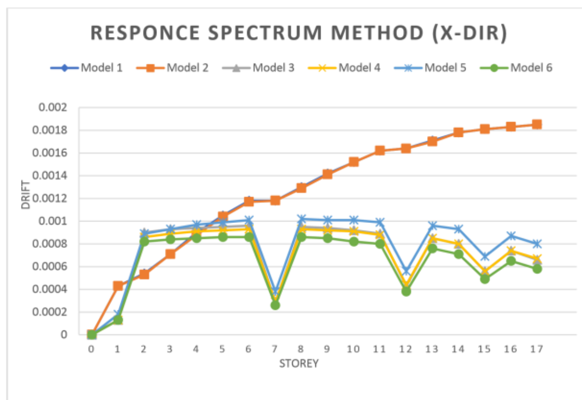


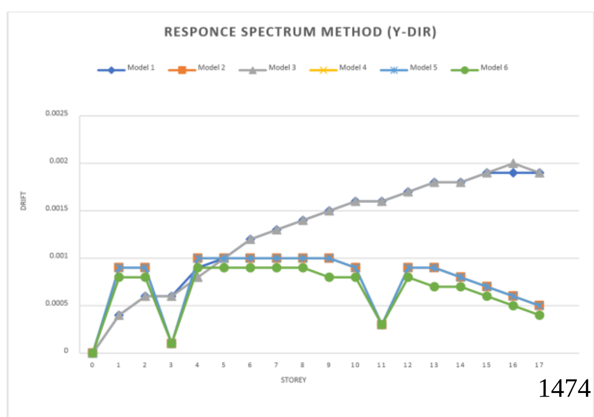
5.2 STOREY DRIFT

Storey Drift in X & Y Directions



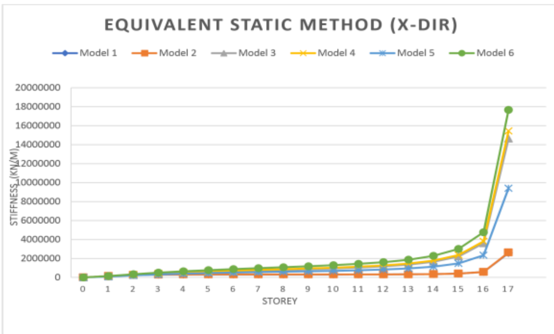


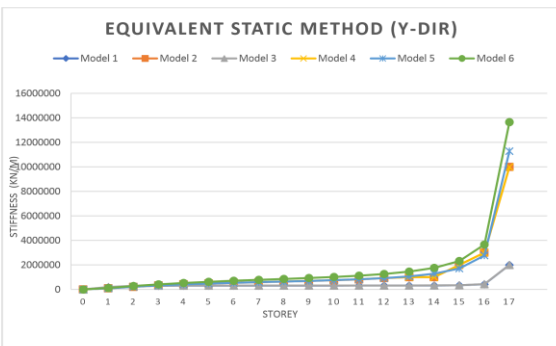


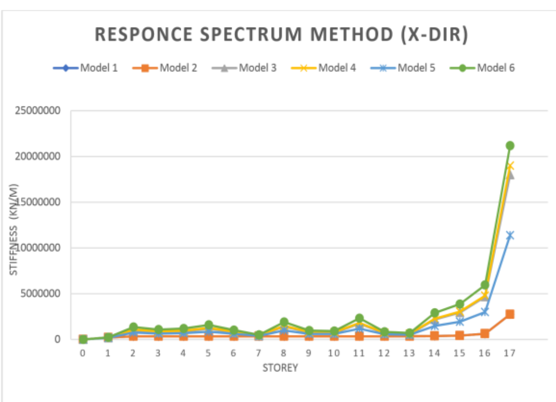


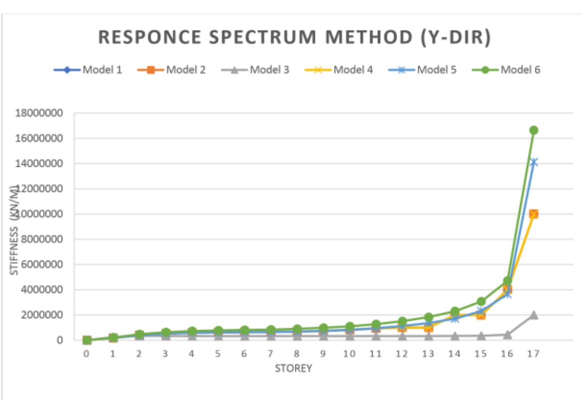
5.3 STIFFNESS

Stiffness in X & Y Directions



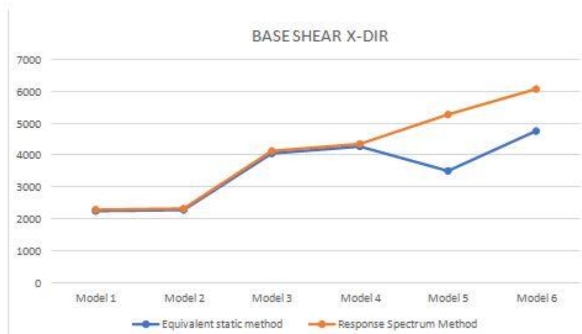


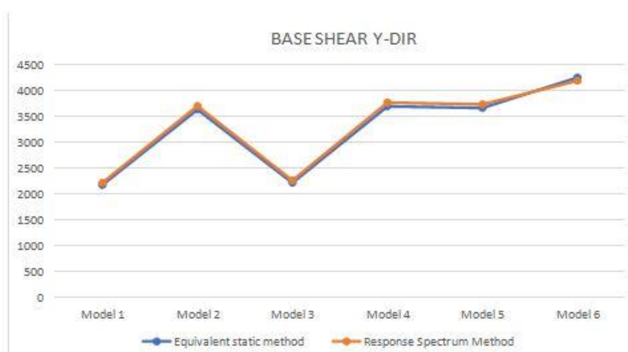




5.4 BASE SHEAR

MODEL No.	Equivalent Static Method		Response Spectrum Method	
	X- Dir	Y- Dir	X- Dir	Y- Dir
1	2243.39	2172.296	2284.914	2212.989
2	2273.706	3626.538	2316.780	3694.762
3	4052.434	2214.79	4128.883	2257.660
4	4271.391	3689.121	4350.249	3760.570
5	3503.122	3655.609	3568.542	3725.708
6	4754.380	4243.149	4820.577	4180.940





6. DISCUSSIONS

The present analysis study attempts that the, G+15 building which is located in the seismic zone 5 is analysed and the level of performance of a RC building. The important component of the multistorey building which effects the stiffness , mass, strength & deflection of structure are studied in this analytical model. To study, shear wall is located at various locations at the eccentricity of the building. The drift of every model and the maximum deflections of every model at the different level are compared with the linear dynamic analysis. From the study the conclusion are follow.

7. CONCLUSION

In this study displacement, stiffness, drift, time period and the base shear were performed for G+15 RC building structure with providing shear wall at different locations some of the conclusions of the study are follows.

- The bare frame has lower value of base shear then RC frame with shear wall.
- The RC frame with shear wall shows stiff behaviour then bare frame.
- Time period of building increases when the shear wall is placed on edge.
- Maximum storey displacement of the building increased when shear walls is provided on edge.
- When shear wall were provided on edge storey drift is increased.
- From this study building with shear wall proved to be better alternative methods for RC frame building in earthquake area.

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