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Comparative Study of Multistoried RC Building with Shear Wall and Outrigger Safety

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Abstract: Sliding wall-specially designed structural walls include in buildings to withstand the horizontal forces that induces in a plane wall through wind, earthquake on earth and other forces. They mainly bend members and are usually provided in high homes to avoid the complete collapse of the high growth of buildings under the seismic forces. In residential construction, the sliding walls are direct exterior walls, which usually form a C-shape, L-SHAPE, H-shape, shape box or wall shape that provides all the side supports for the building. The shear walls are designed and built correctly, and they will have strength and stiffness to withstand the horizontal forces. The study aims to study the optimum shape of the sliding walls in a tall building with a trigger. The high-altitude shear wall consists of a centrally located wall with two equal-length trusses located on top and in mid-height designs. In the present work the building has been provided with shear wall and outrigger system and the comparison is made between different models.
Keywords: Outrigger, Shear wall, Lateral Displacement, Storey Drift & Storey Shear

I. INTRODUCTION

Tilt Wall system is one of the most commonly used side-load resistance systems in high lift homes. The slope of the wall has a high plane of stiffness and durability, which can be used to simultaneously resist large horizontal loads and maintain gravitational loads, which greatly reduces lateral effects of the building and thus reduces damage to the structure and its contents. These walls in general begin at the level of the foundation and are continuous throughout the height of the building. Their thickness can be as low as 150mm, or above 400 mm in high-rise buildings. When the shear walls are located in profitable positions in the building, they can form an effective lateral resistance of the resistance system by reducing the side displacements under the earthquake loads. Therefore it is very necessary to determine the effective, efficient and ideal location of wall shear.

Sliding walls should be located at each level of the structure, including the crawl space. To Forman an effective box design, an equal length shear walls should be placed symmetrically on all four exterior walls of the building. Sliding walls should be bead into the building interior, when the exterior walls can not provide sufficient strength and rigidity or when the permissible ratio of width on the floor or diaphragm of the roof is exceeded. For subfloors with a conventional diagonal sheath, the proportions of width 3:1. This means that a 25-foot building with this underfloor will not require the interior wall shift until its length exceeds 75 feet if the strength or stiffness of the exterior walls of the shear are not insufficient.

The form and plan of the offset wall position affects the behavior of the structure significantly. Structurally, the best position to tilt the wall-the center of each half of the building. This is rarely practical, however, since it dictates the use of space so that they are located at the ends.

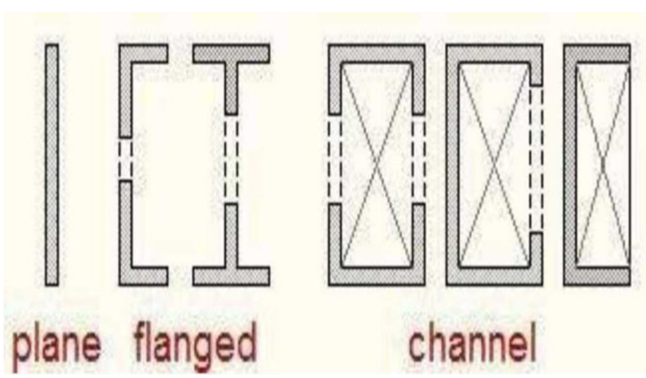

Fig. 2 positioning of shear wall

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II. REVIEW OF LITERATURE

It presents a brief summary of the literature review. The following literature review gives a prediction on the behavior of the R.C. building with a wall tilt and Outrigger security '

Anil Baral ET. Al. (2015); ' Seismic analysis ' RC frame building for different positions slope wall tilt wall included in building confront lateral forces and maintaining gravity loads. The RC tilt Wall has a high rigidity plane. Shear wall positioning affects the overall behavior of the building. For efficient and efficient operation of the building it is important to place the shear wall in an ideal location. This paper presents the reaction of buildings with different placement of the slope of the walls using as an equivalent static method (seismic coefficient method), and analysis of the spectrum of reaction. The five different models of the building APC are investigated, one without tilting the walls and the other four models with different wall tilt position, which undergoes an earthquake load in zone V.

Anshul Sud ET. Al. (2014) ' The best location of shear walls in the space frame RCC, based on seismic recursive walls is one of the most major lateral load of resistance elements in earthquake resistant buildings. To avoid torsion in the buildings, sliding walls should be placed symmetrically in the plan. In this work, a five-storey building RC, located in the seismic zone-V, is considered four walls shear. Considered five different configurations of shear walls Z. Bare frame, symmetrically placed walls on the outer bays (centrally), in a core and adjacent placed in the exterior of the building. These frames are analyzed for seismic forces to assess performance from the point of view of baseline shear, floor shift, member force and joint displacements. A frame with sliding walls in a core and centrally placed on the outer bays showed a significant decrease in the order of 29% to 83% with sidewall.

Asish S. Agharwal e. Al. (2012) ' Research optimization of multi-storey building configuration is subjected to lateral loads by modifying slope wall inclination of wall systems is one of the most commonly used lateral load resistance in a high building growth. The slope of the wall has a high plane of stiffness and durability, which can be used to simultaneously withstand large horizontal load and maintain gravitational loads. The inclusion of the wall tilt has become inevitable in the high-rise building to withstand lateral forces. It is very necessary to determine the effective, efficient and ideal location of wall shear. In this paper the study of a 25-storey building in the V zone is presented with some prior research that analyzed by modifying different wall slope positions with different shapes to determine the parameters such as bending the moment, baseline offset and superficial drift. This analysis is provided by a standard ETAB package.

III. MODELING

The modeling is carried out in the ETABS software, the elevation considered for modeling is as follows.

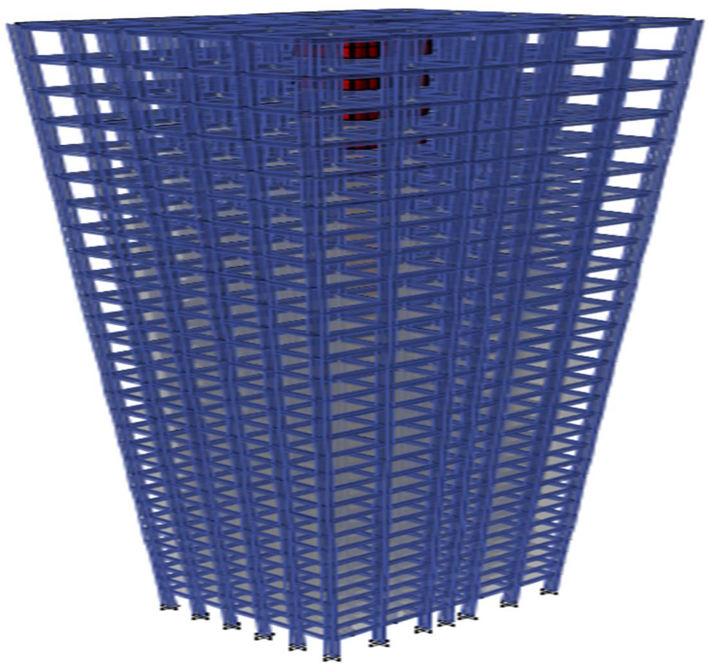

Fig.1 : Elevation of model in ETABS

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In the present work the shear wall thickness is considered as 230 mm, the building considered as total of 30 storey building. The three models are considered for modeling:

Model-I: Building with Shear Walls Outrigger system is connected with Core at 1/3rd height, Model-II: Building with Shear Walls Outrigger system is connected with Core at mid height & Model-III: Building with Shear Walls Outrigger system is connected with Core at top.

IV. RESULTS

The analysis is carried out in ETABS software and the results in terms of storey drift, storey shear, time period is obtained as follows.

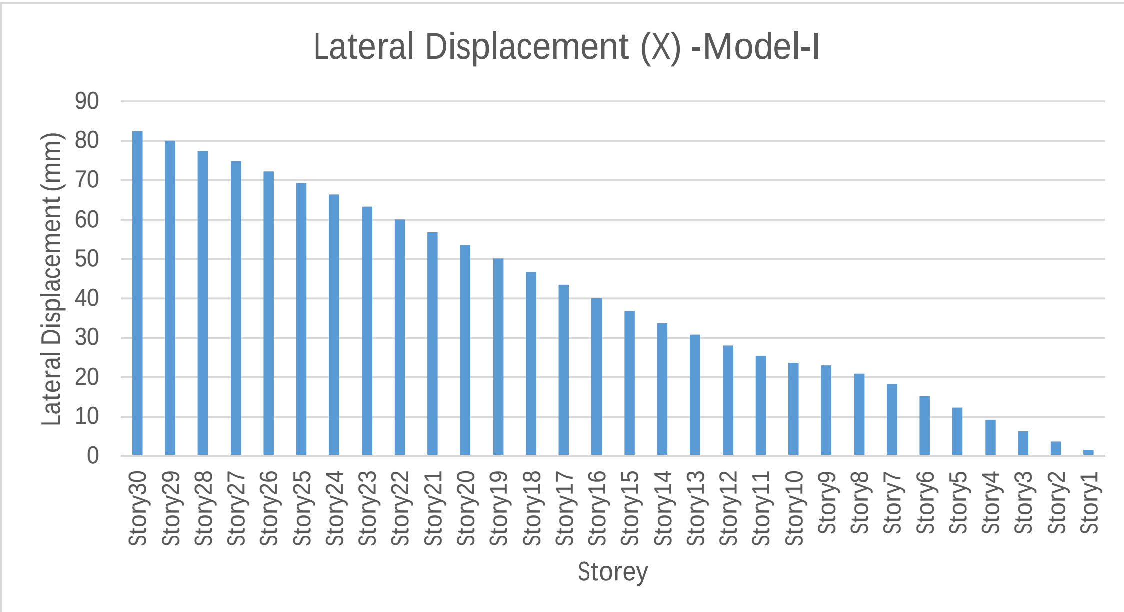

Fig.2 : Lateral Displacement (X)- Model-I

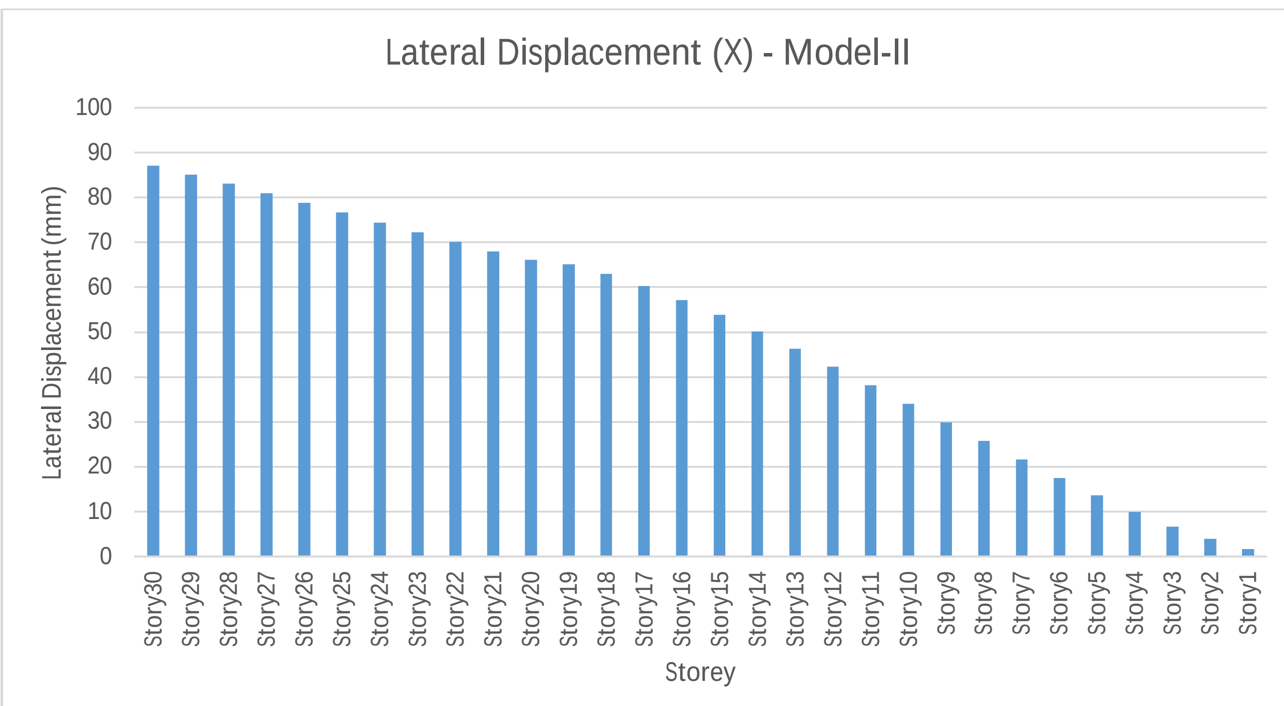

Fig.3 : Lateral Displacement (X)- Model-II

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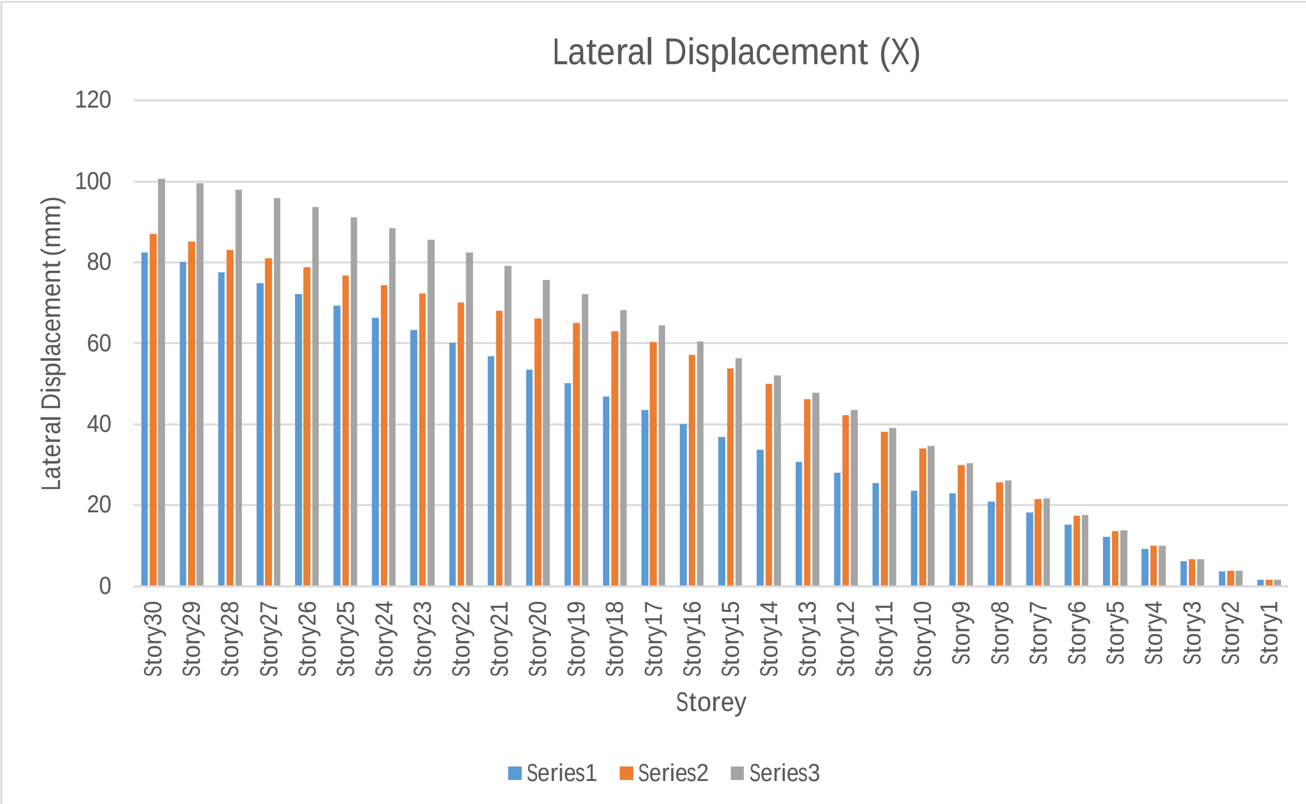

Fig.4 : Lateral Displacement (X)

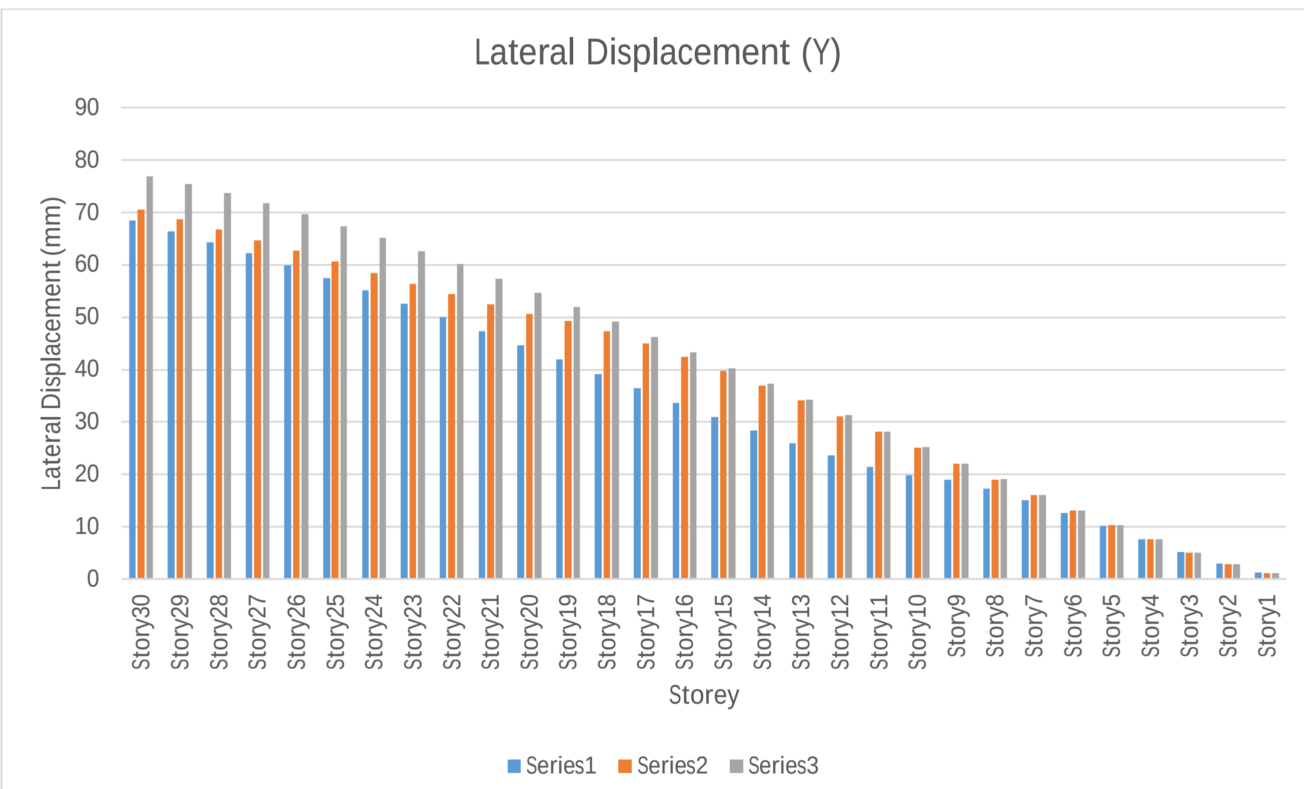

Fig.5 : Lateral Displacement (Y)

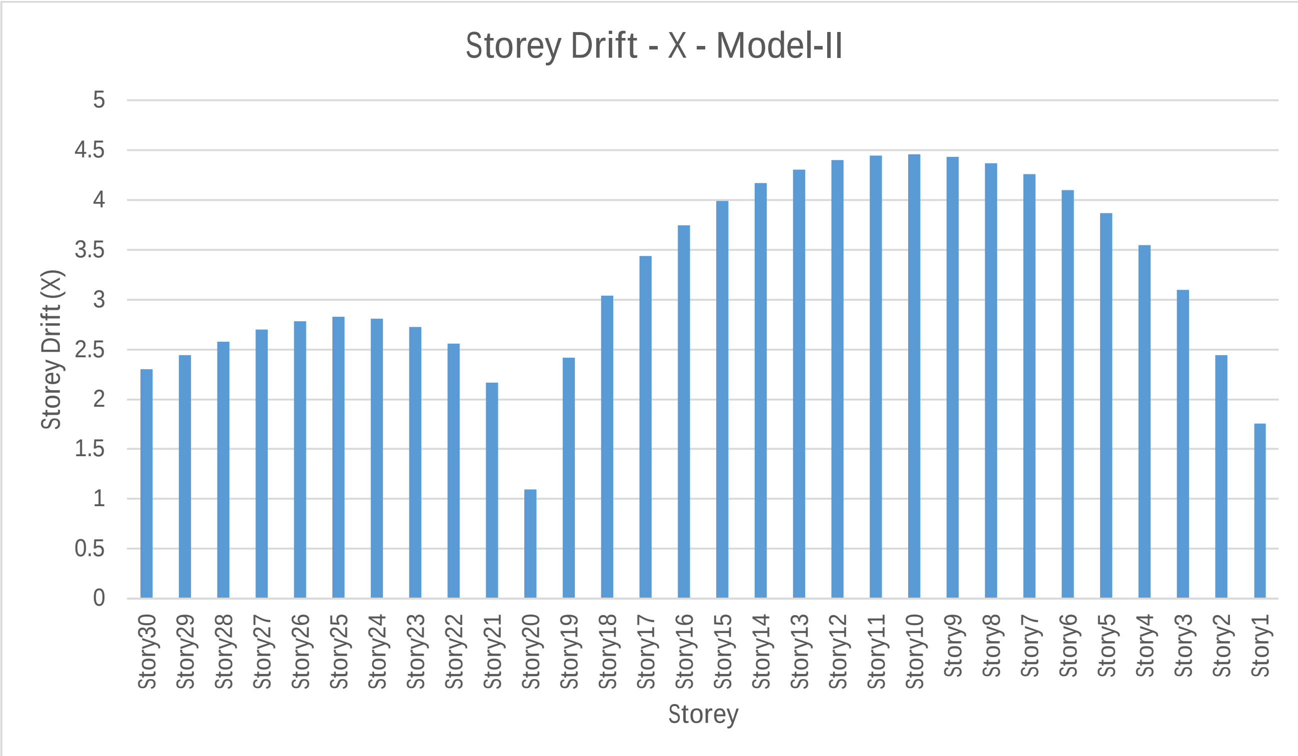

Fig.6 : Storey Drift (X)-Model-II

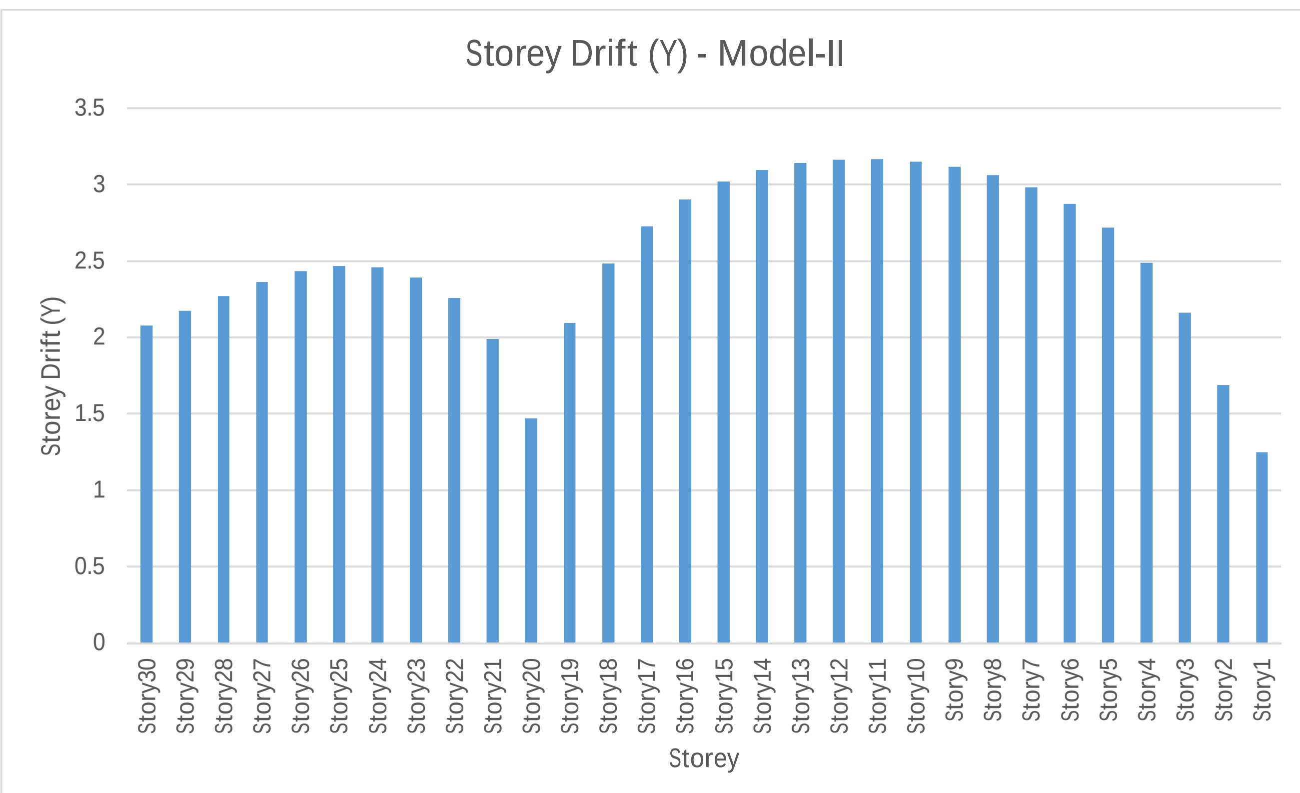

Fig.7 : Storey Drift (Y)-Model-II

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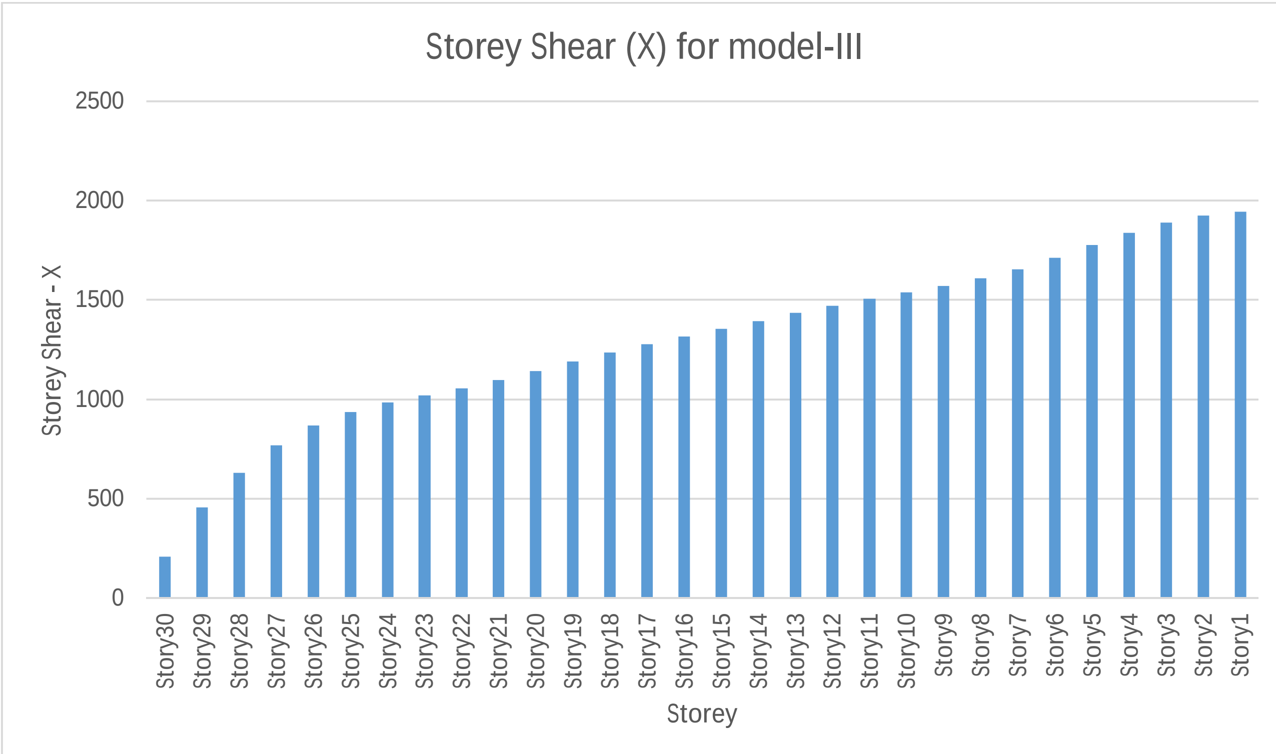

Fig.8 : Storey Shear (X)-Model-III

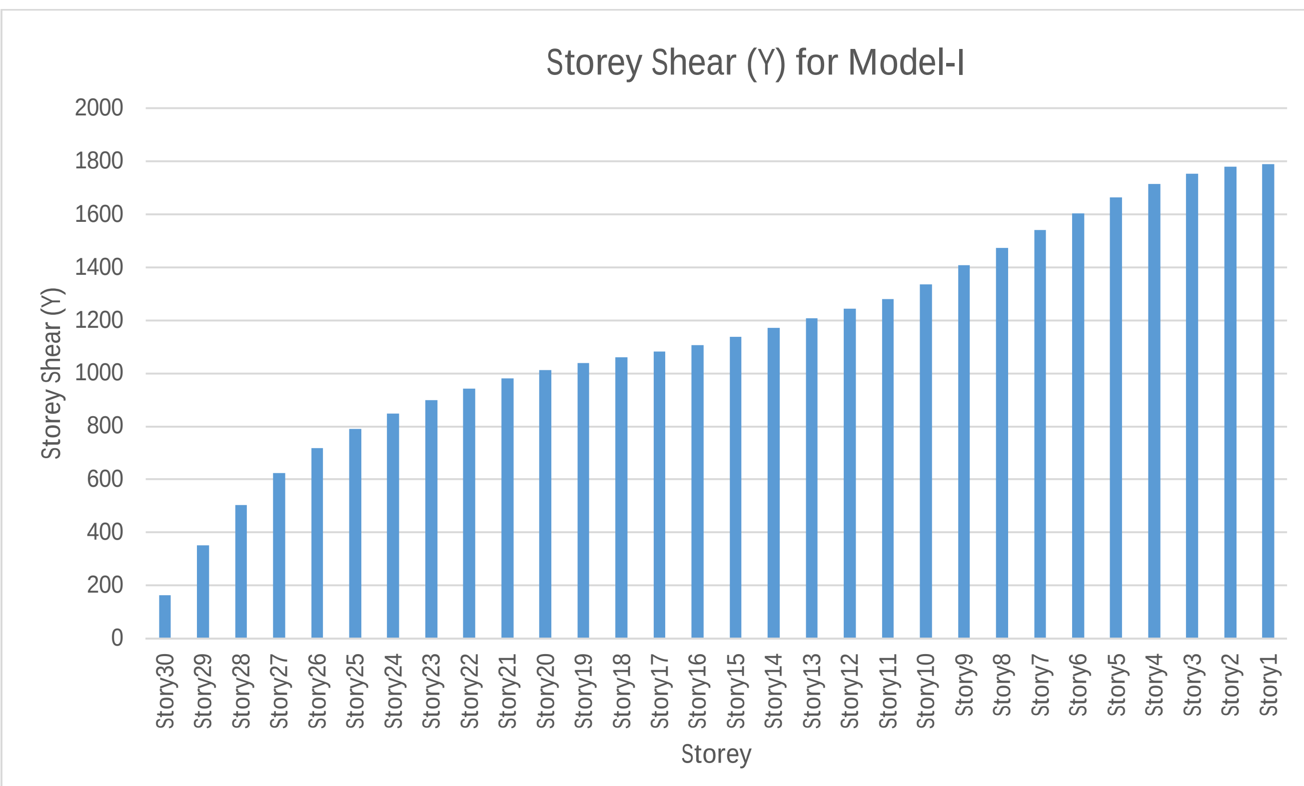

Fig.9 : Storey Shear (Y)-Model-I

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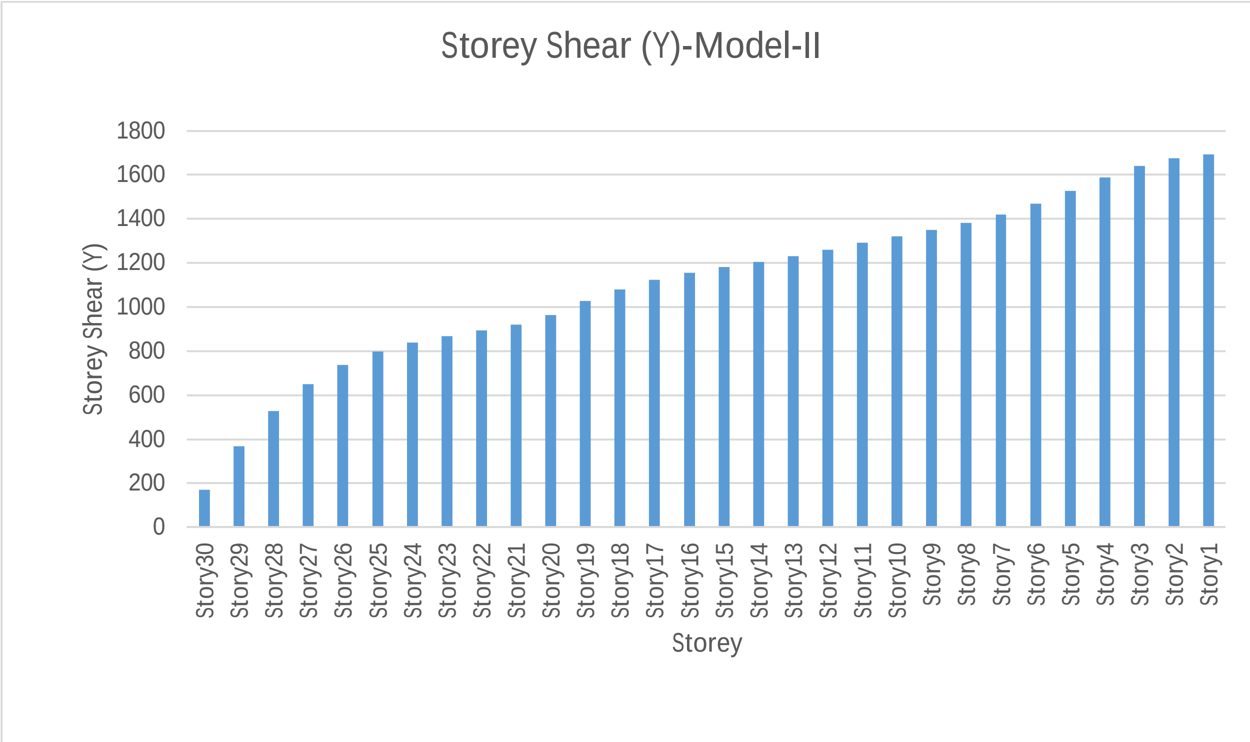

Fig.10 : Storey Shear (Y)-Model-II

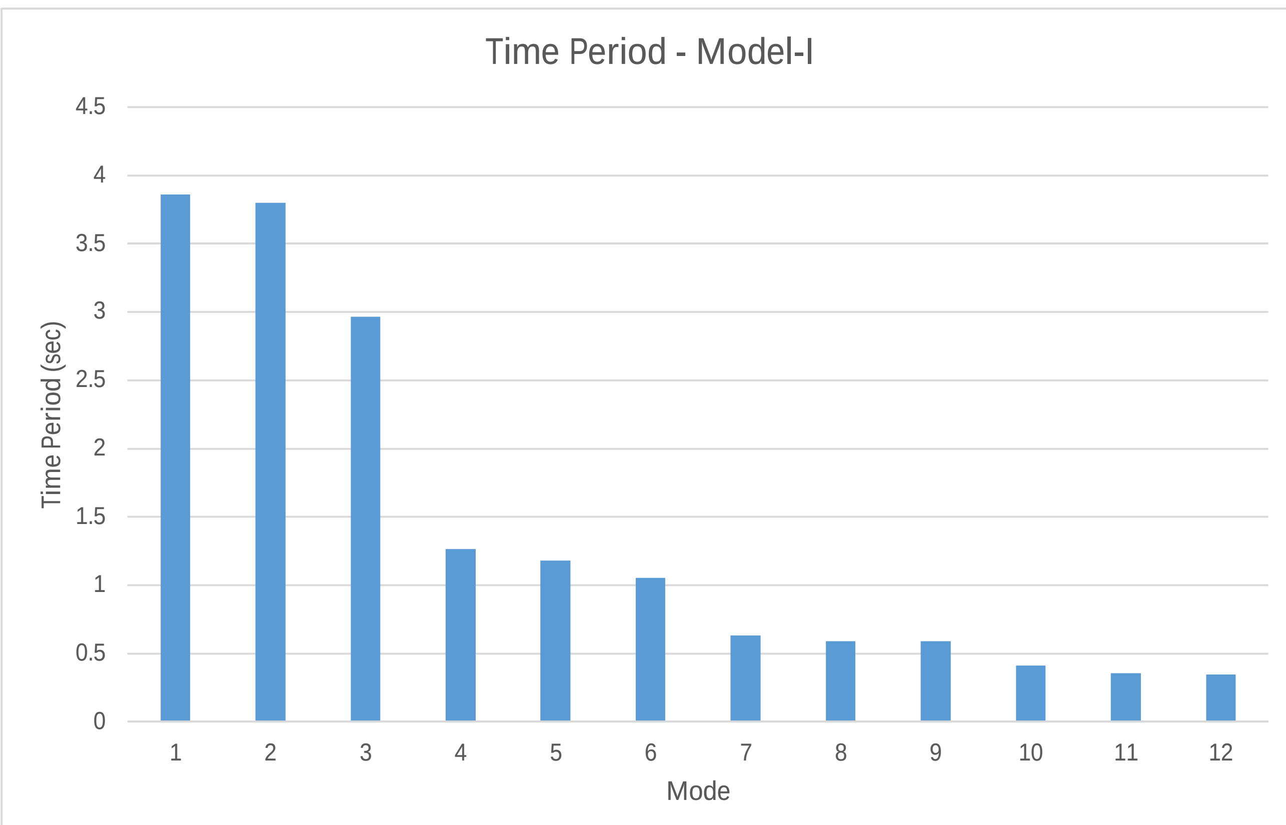

Fig.11 : Time Period-Model-I

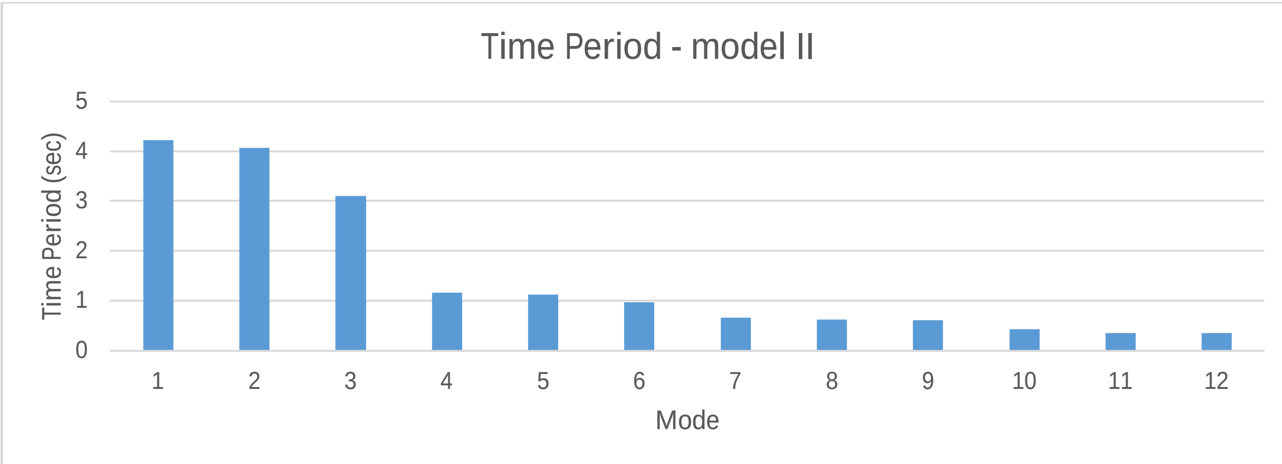

Fig.12 : Time Period-Model-II

The results are obtained for the different parameters for building with shear wall and outrigger system.

V. CONCLUSION

The conclusions from the above study are as follows:

A. Lateral displacement is found to be more in model-III as compared to other models
B. Storey drift is found to be more in model-I
C. Time period is more in model-III
D. Storey shear is more in model-I

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