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Effect of Infill Wall on Reinforced Concrete Frame using ETABS

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***Abstract:** In the building having open ground storey has a problem with sudden changes in the stiffness of the building height and that usually consider that storey enough flexible as compared to the other storey. But in such buildings it was found that the beams, columns and slab have more stress and bending moment values as compared to the other buildings. Therefore the infill wall should be constructed so that the building shall sustain the lateral loadings due to the earthquake. Therefore the analysis is to be carried out in the software to get the proper results. The present study deals with the modeling of the reinforced concrete structure with infill walls in the software. The results shall be studied for the fully infill wall, partially infill walls and without infill wall.*

***Keywords:** Infill wall, ETABS, storey drift, storey shear & time period*

I. INTRODUCTION

Reinforced concrete (RC) structures with infusion walls are the most common types of buildings in areas prone to the earthquake in Turkey. Filling the wall, as a rule, neglected in the structural process of design due to the complications encountered in modeling them and their interaction with the surrounding frame. However, the presence of infusion walls has been proven to affect the rigidity, strength and seismic behavior of structures significantly. Depending on demand coefficients, wall filling can be either useful or detrimental for seismic requirements. Infusion walls usually increase the global rigidity and strength of constructions. This situation can be advantageous for non-ductile buildings to a certain limit.

On the other hand, a fragile nature and a rich variety of modes of failure from the infusion walls can cause unforeseen and irreversible losses. In particular, soft-story mechanisms can occur due to the concentration of drift in the lower histories of multi-storey structures. To mitigate the impact of infoutwalls, organized rigidity for the height of the structure can be used with infusion walls with different rigidity and strength properties.

II. LITERATURE REVIEW

Time periods decreases with the increase of amount of infill in the buildings (highest for without infills and lowest for the fully infilled case). This results in the attraction of more earthquake force for the lower time periods. Story drift is found to be lowest for fully infilled and highest for without infills but drift of first story is highest for the building with infills above ground floor (i.e. open ground story) (Prakash Paudel 2017).

Deviations in the case of bare frames are very large, compared with solid brick conditions. As the number of stores increases, there are additional side load responsibilities added to increase the level of the material. As a result, maximizes the maximum upper deflection of the building. The maximum deviation of each of the stores is greatly reduced by using infusion wall panels (laziness m Thomas et al 2015).

III. METHODOLOGY

The models are modeled in STAAD-PRO as follows:

1) *Model I:* Building without Infill Walls (Symmetrical Building)
2) *Model II:* Building with modelling of Infill Walls as a Single strut with IS method (Symmetrical Building) -Size of Strut = 230X400
3) *Model III:* Building with modelling of Infill Walls as a Single strut with Holmes method (Symmetrical Building) -Size of Strut = 230X1345
4) *Model IV:* Building with modelling of Infill Walls as a Single strut with Paulay and Preistley method (Symmetrical Building) -Size of Strut = 230X1009
5) *Model V:* Building with modelling of Infill Walls as a Single strut with Hendry method (Symmetrical Building) -Size of Strut = 230X1240

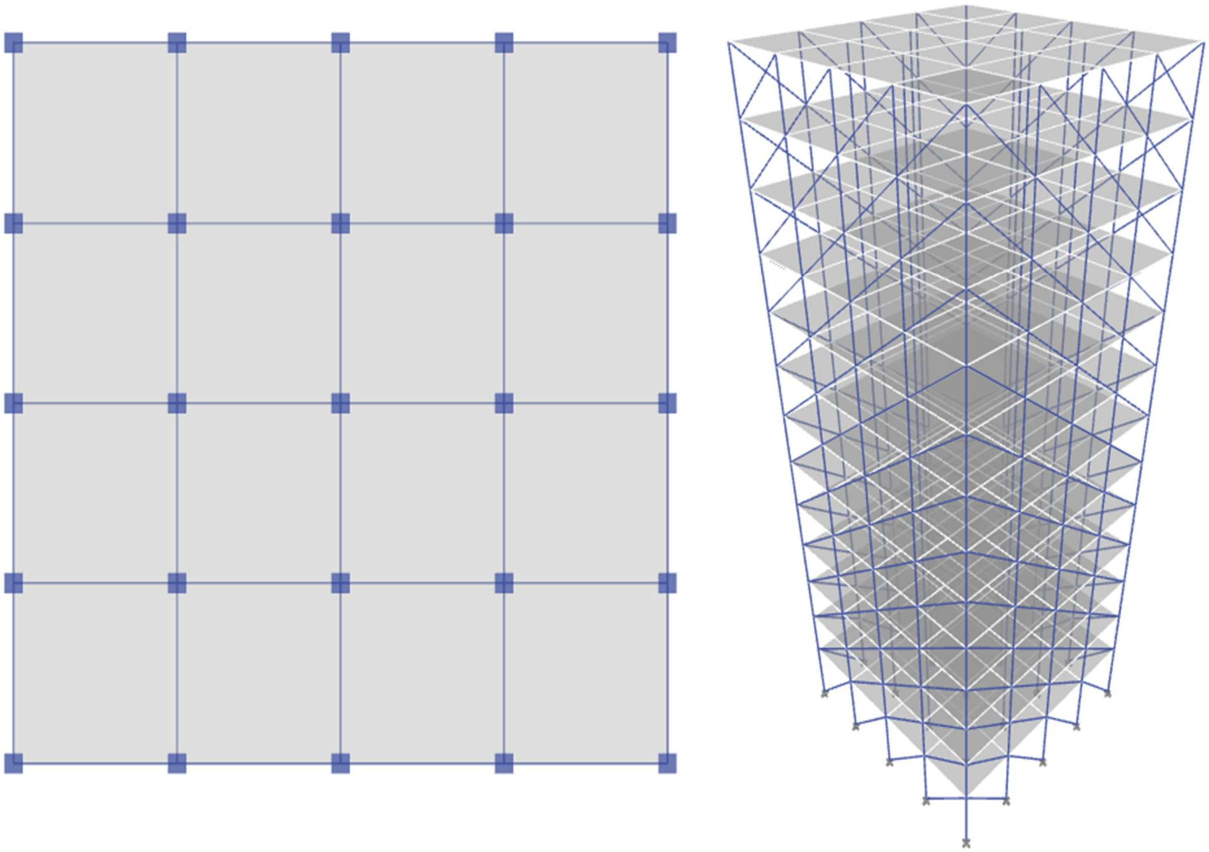

Fig.1: Plan & Elevation of the building

IV. RESULTS

The results are obtained in terms of the lateral displacement, storey drift, storey shear, storey stiffness and time period as follows.

Fig.2: Lateral displacement for model-I

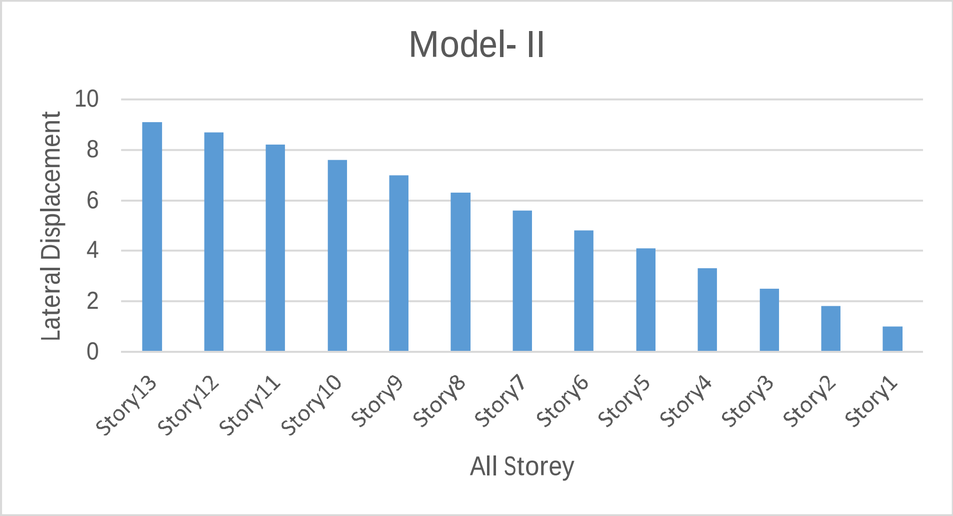

Fig.3: Lateral displacement for model-II

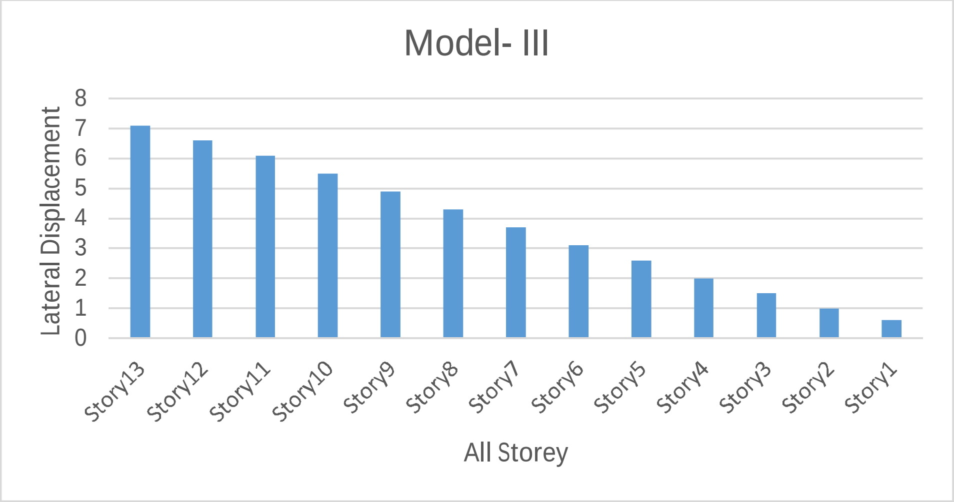

Fig.4: Lateral displacement for model-III

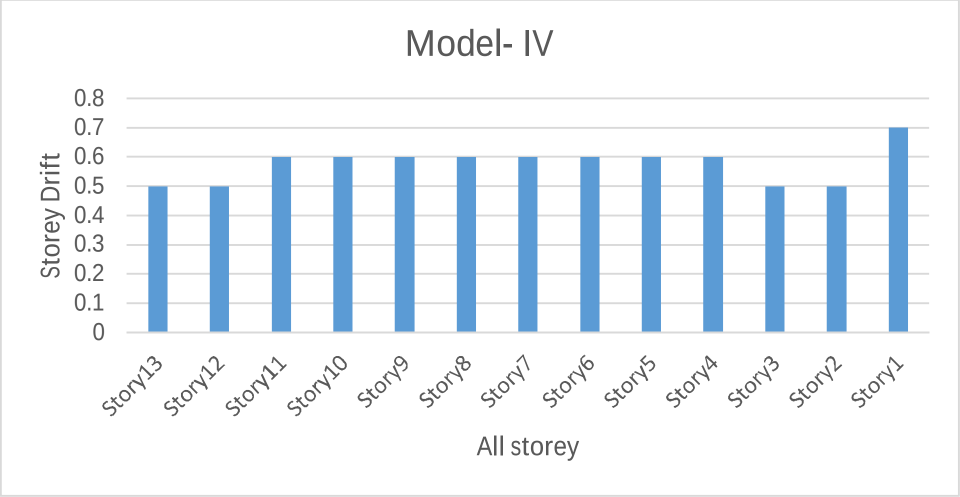

Fig.5: Storey Drift for model-IV

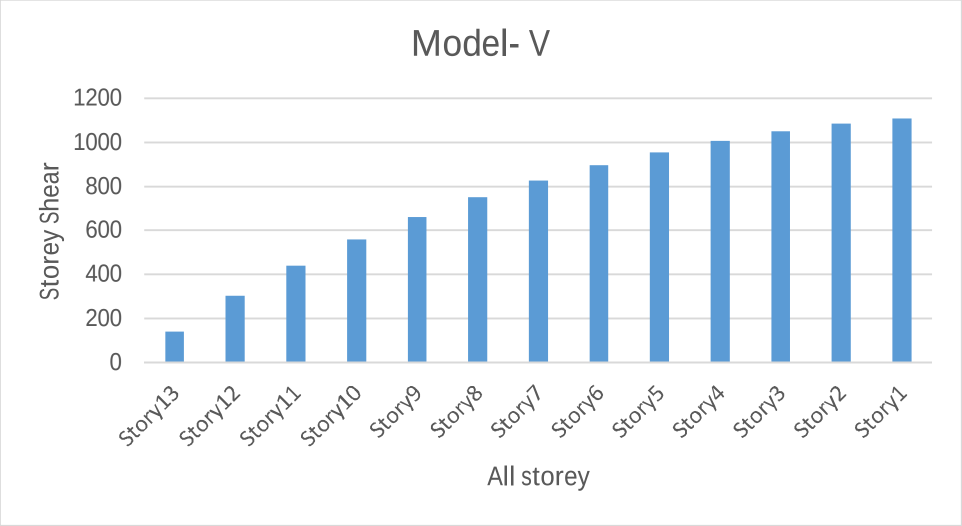

Fig.6: Storey Shear for model-V

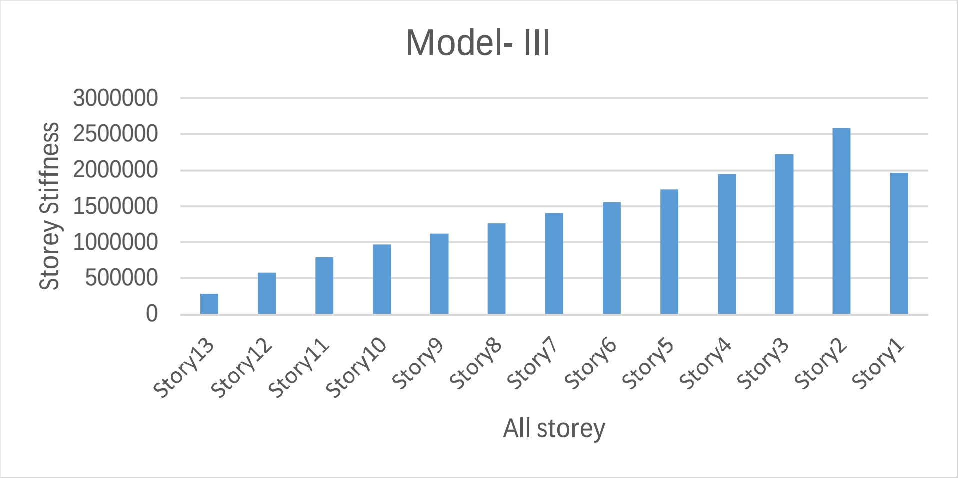

Fig.7: Storey stiffness for model-III

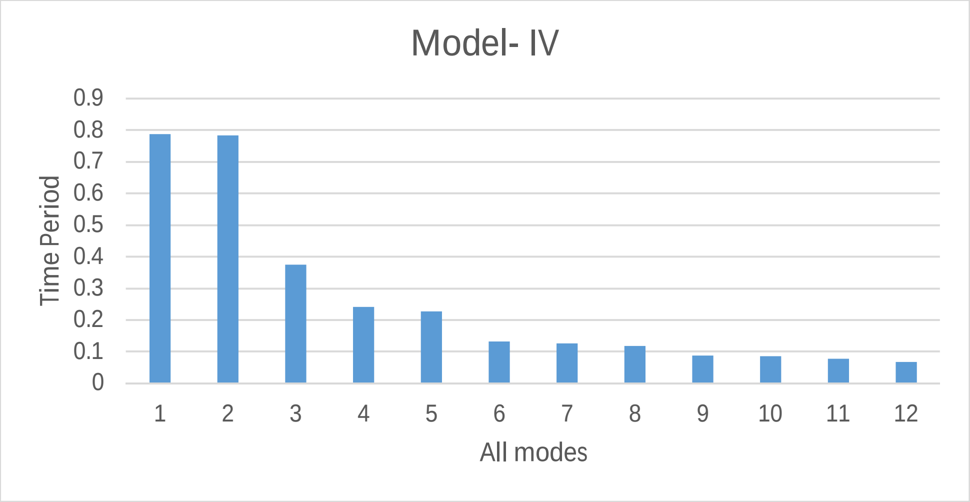

Fig.8: Time Period for model-IV

V. CONCLUSION

From the above study following conclusion can be drawn:

A. Lateral displacement for storey 13 is maximum in case of all models
B. Storey drift is maximum in storey 1 for all models
C. Storey shear is also maximum in case of storey 1 as compared to other models
D. Storey stiffness is maximum in storey 2
E. Time period is minimum for mode 12

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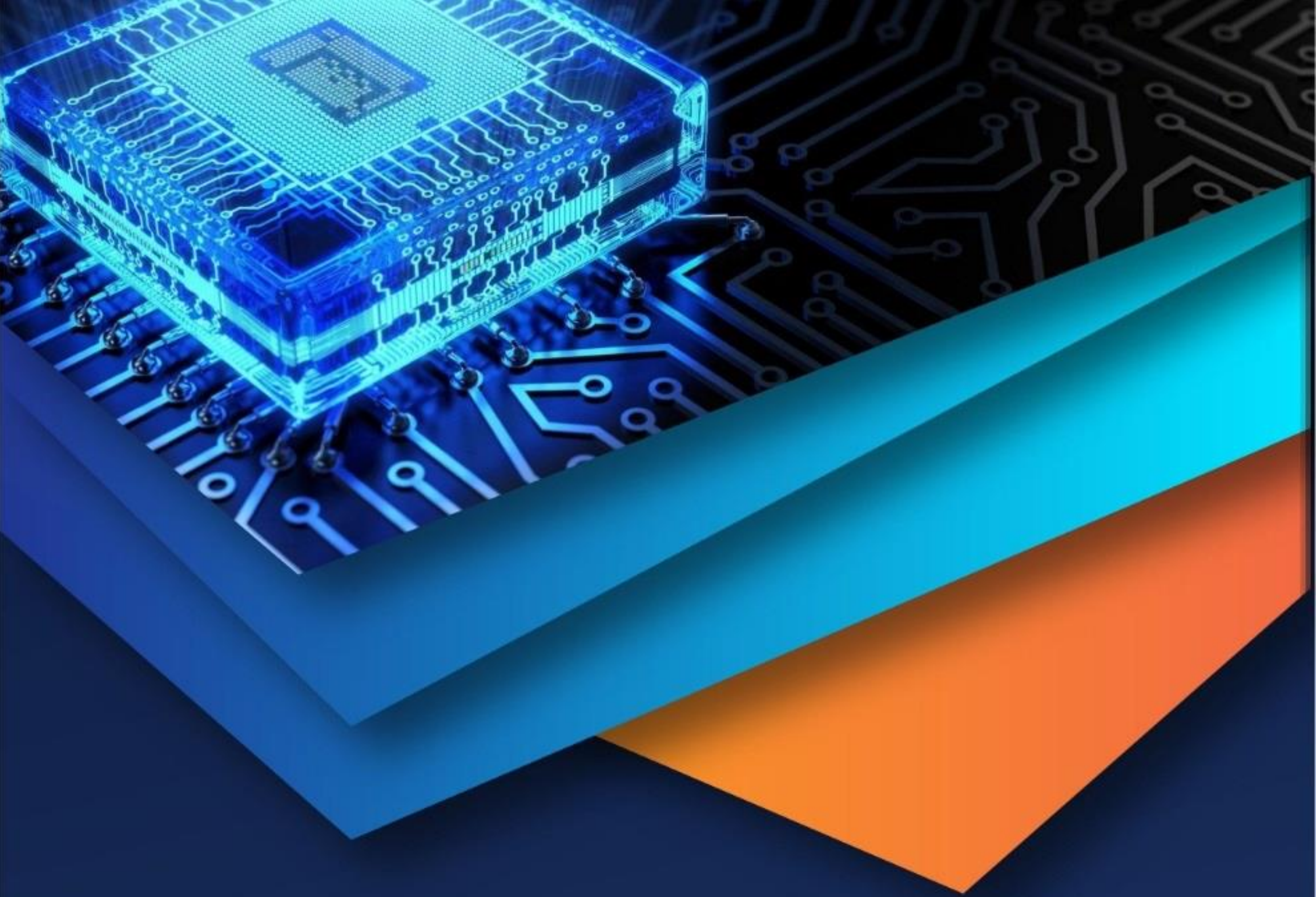

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