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Analyses & Design of a Tall Building for Hilly Area Zone V Using STAAD-Pro

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ABSTRACT

There are various previous studies done for proper planning and good construction practices of multistoried buildings on hilly area. Analysis and design of space building frame for seismic loading and wind pressure is very essential these days because of the construction of high rise buildings. It is also necessary to construct an economical and more durable structure. current work examines the structural behavior of reinforced concrete columns, beam, and footing in sloping geometry. In this study a 16 storey RCC building is analyzed on Hilly Surface. In this study the attempt is made to analyze the multi-storey buildings on sloping ground with and without shear walls. The performance of the building with configurations of shear walls is studied. RCC building models having 16 storeys with straight shear walls and without straight shear walls resting on sloping ground (slope 1V:2.33H) are considered for the study. response spectrum analysis of building is carried out using structural engineering software Staad Pro and the seismic performance of building with shear wall configurations is compared with respect to parameters like base shear, lateral displacement, time period and member forces.

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INTRODUCTION

India have extensive sizes of sloping locale, which are ordered under seismic zone. In this area the development of multistory RC encircled structures on slope inclines has a well-known and squeezing request, because of its monetary development and fast urbanization. This development in development movement is including increment in populace thickness. Calculation of ground slope is fundamental to many traditional Geographical Information Systems (GIS) applications. Slope is an important component in scientific, military and civilian analyses. Various methods exist for calculating slope. Manual slope generation, based upon contour line information, is a long established and generally acceptable.

OBJECTIVES

- To finalize design parameter of a Tall RCC building located of hilly location Zone V

METHODOLOG

Separate models are created on STAAD.pro to affects the performance of building throughout earthquake. So to enhance the seismic performance of building on sloping ground the shear walls play important role.

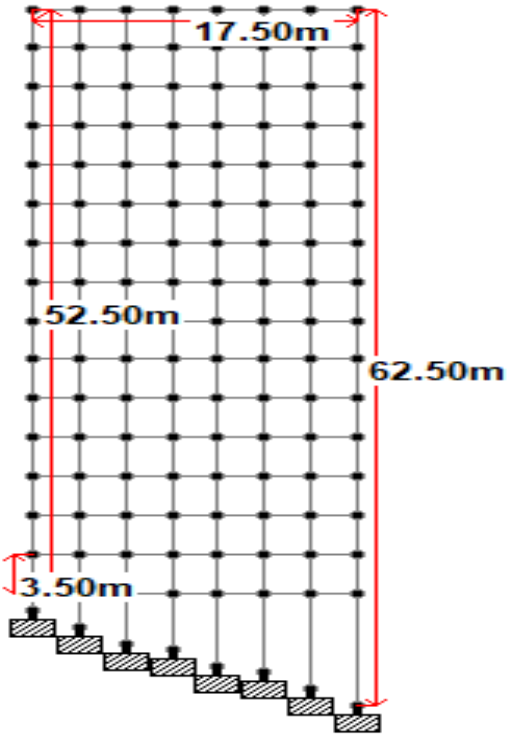


Fig. 4.3: Building frame on slopping ground

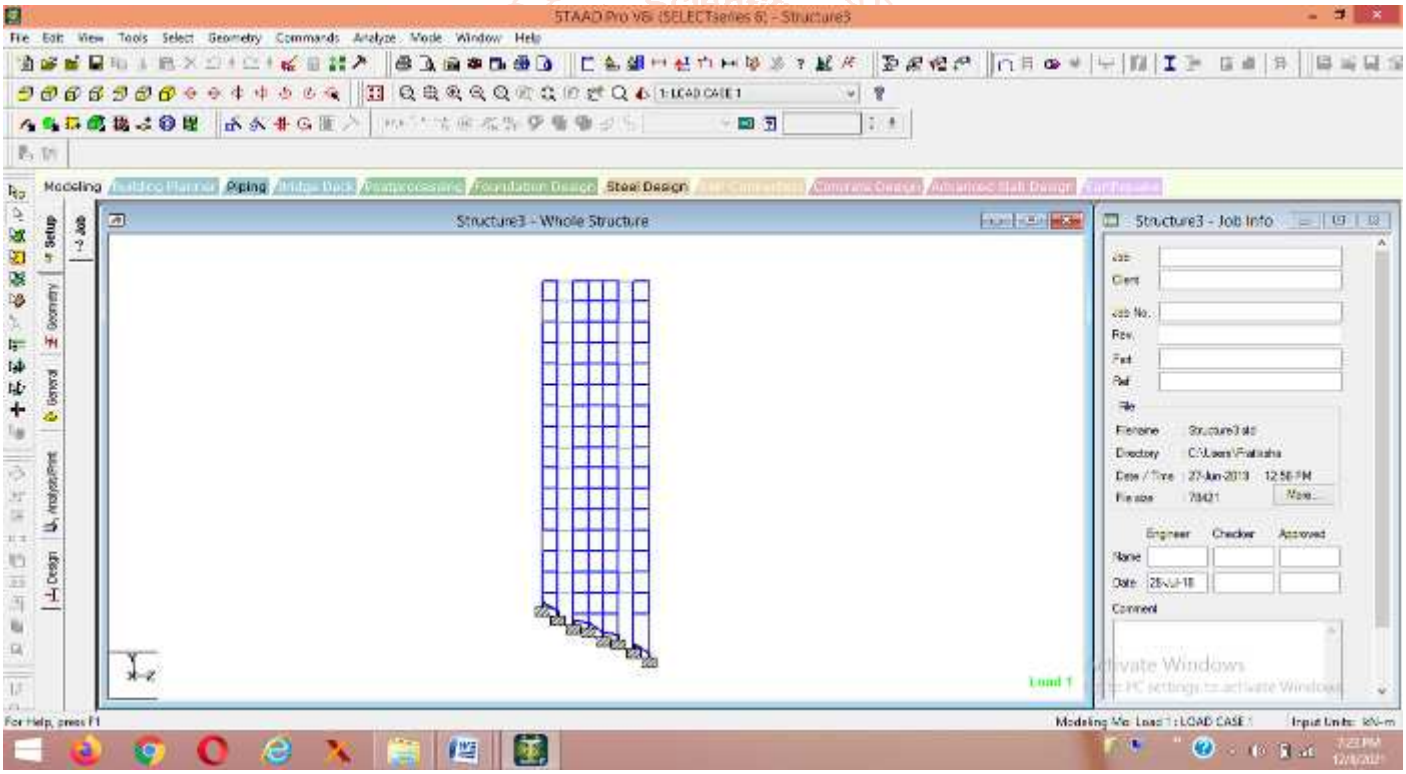


Fig. 4.4: Building frame on slopping ground

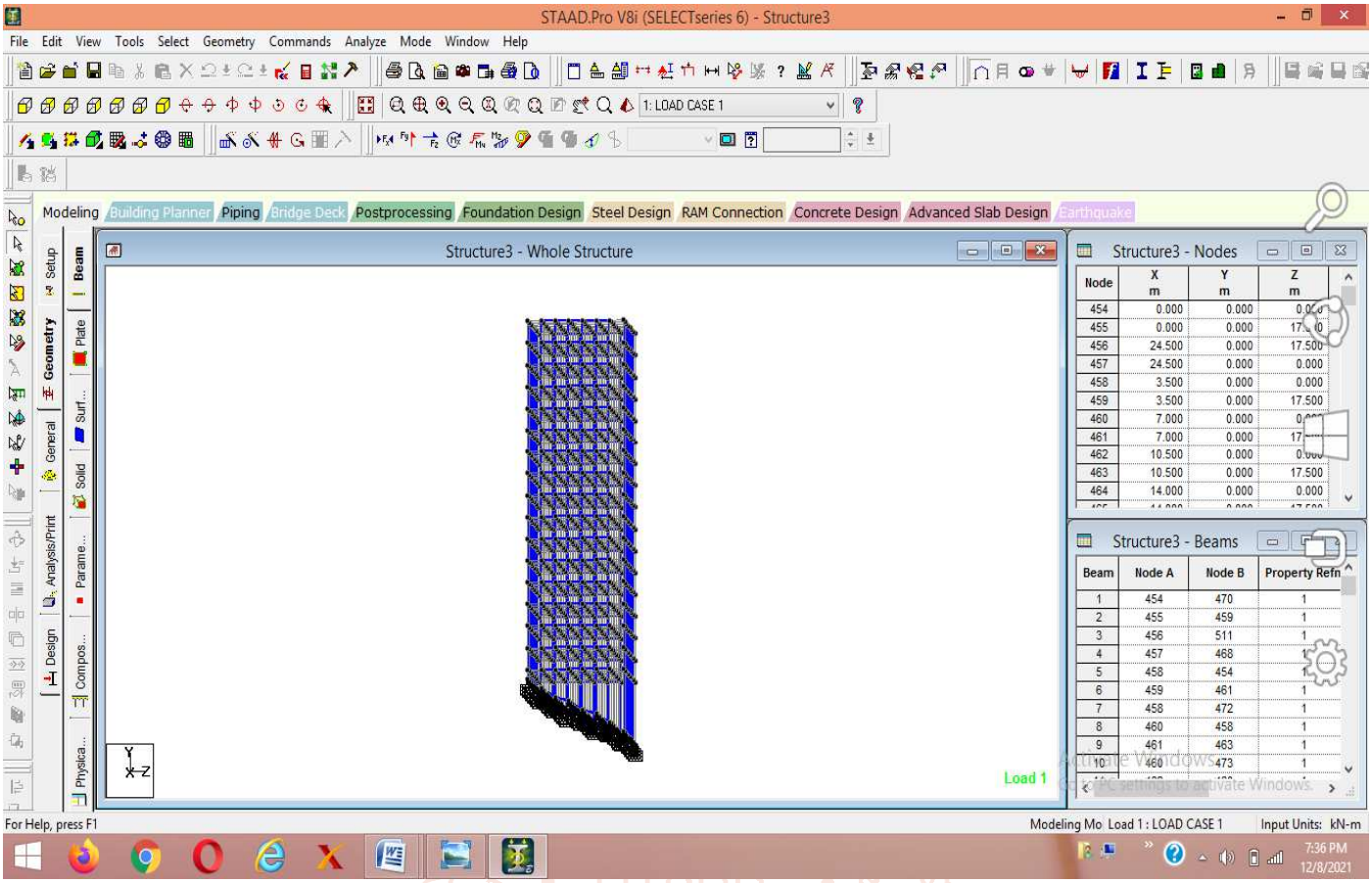


Fig. 4.5: Building frame on slopping ground with shear wall For Loading

LOAD COMBINATIONS

The following load combination has been used for the calculating the member forces and for comparing its results as per IS 1893 (Part 1): 2002.

- 1.5 (DL + IL)
- 1.5 (DL ± EL)
- 0.9 (DL ± EL)

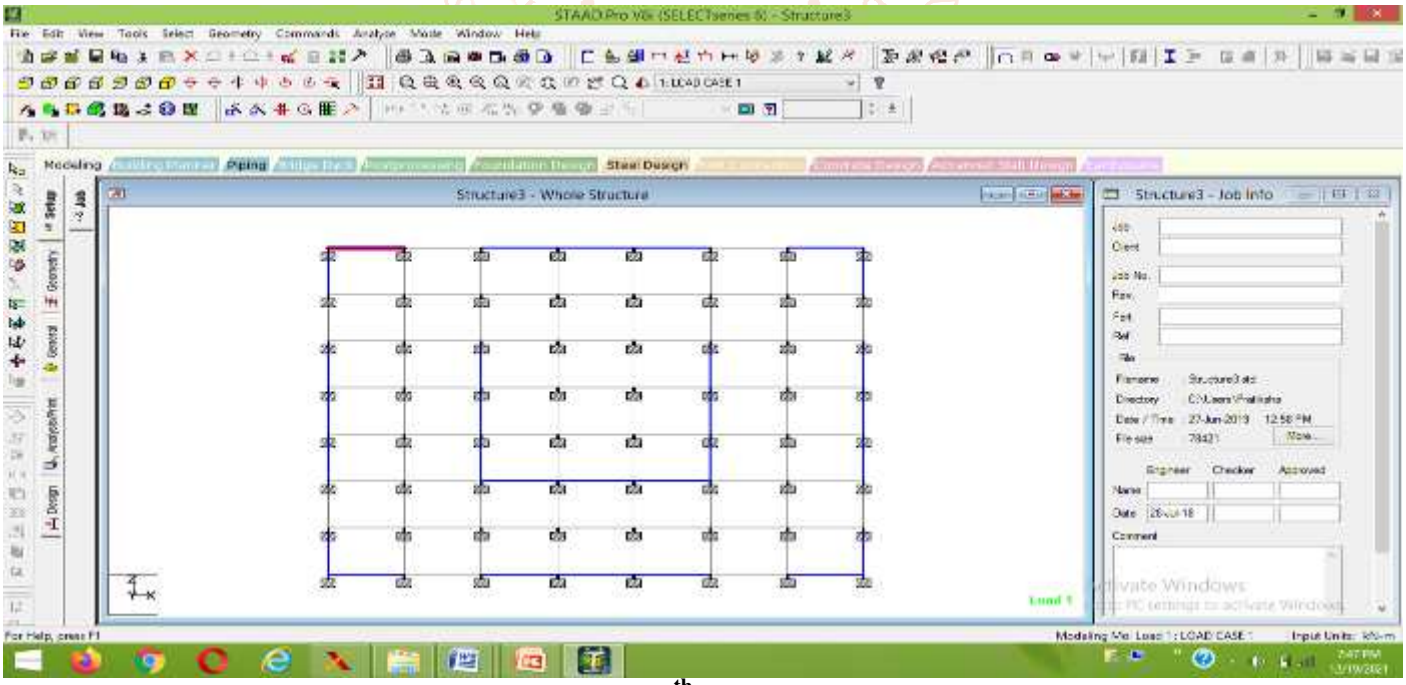


Fig. 4.1: Plan of the model of 16th storey building on sloping ground

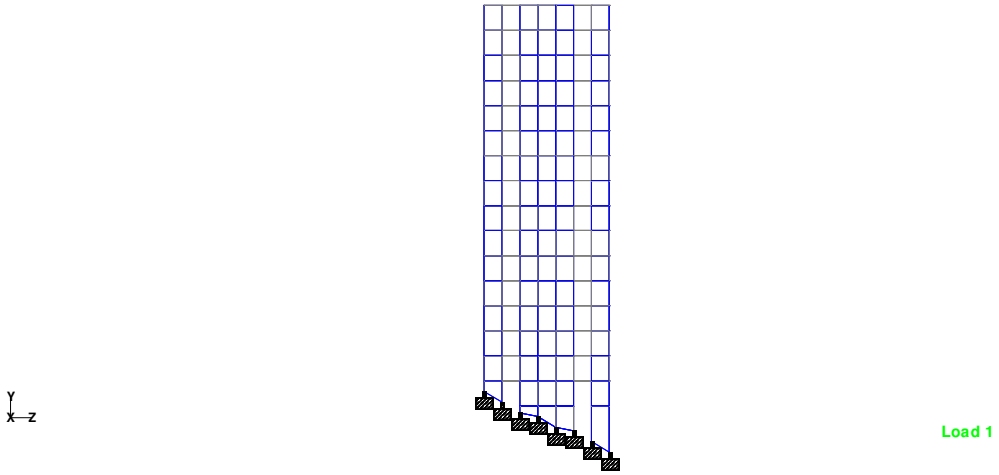


Fig. 4.6: Loading on Building without shear wall on sloping ground

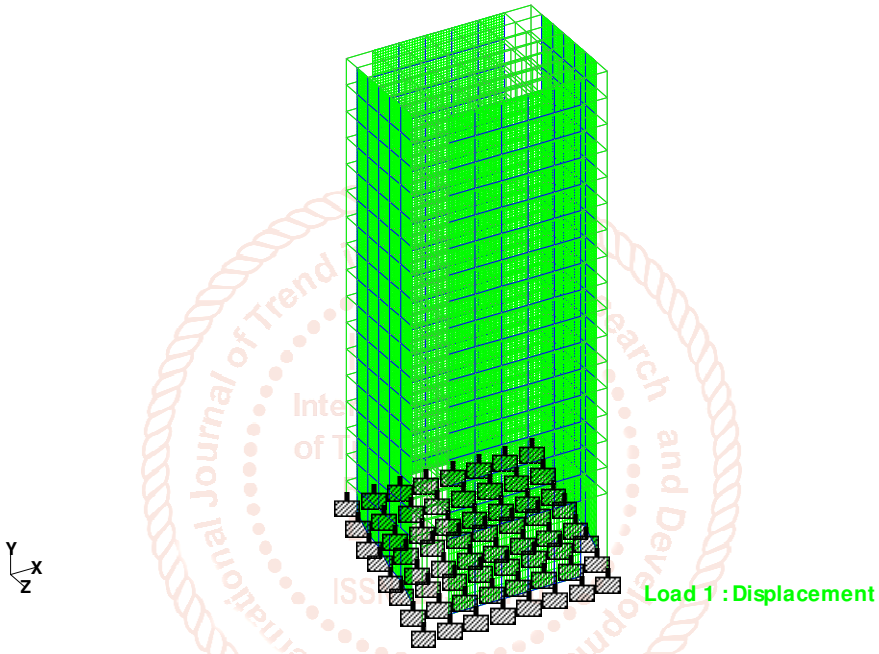


Fig. 4.7: Building with straight shape shear wall on sloping ground

RESULTS

Table 5.1: Base shear results for structure on sloping ground

	Zone = 5
Models	Base shear (KN)
Model 1	2936.32
Model 2	3896.38

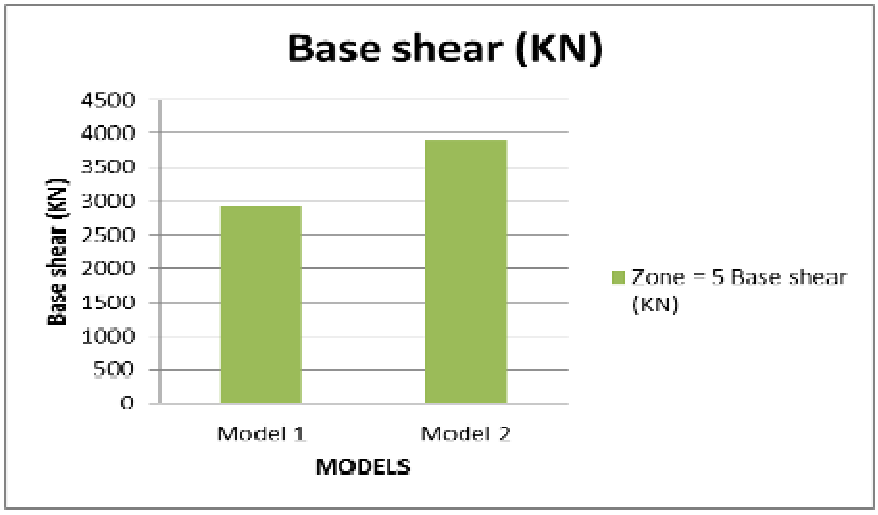


Fig. 5.1: Variation of base shear for building on slopping ground

From the results obtained from this study it will be discovered that the incorporation of shear enclose RCC frame will increase the base shear because of increase in lateral stiffness. The period of time of structure reduces and there's considerable reduction in lateral displacement of structure additionally. Therefore it will be same that the incorporation of shear wall will increase the base shear this impact is additionally seen in after we modification the zone 5.

Fundamental time period

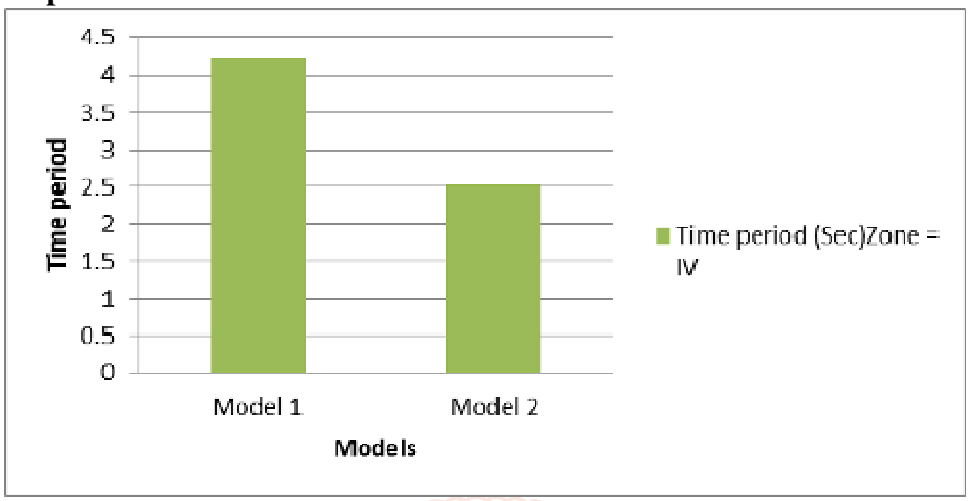


Fig. 5.2: Variation of time period for building on slopping ground

Both the models with and without shear walls have less time period as compared with model 1. Model 2 has minimum time period for zone 5.

Member forces

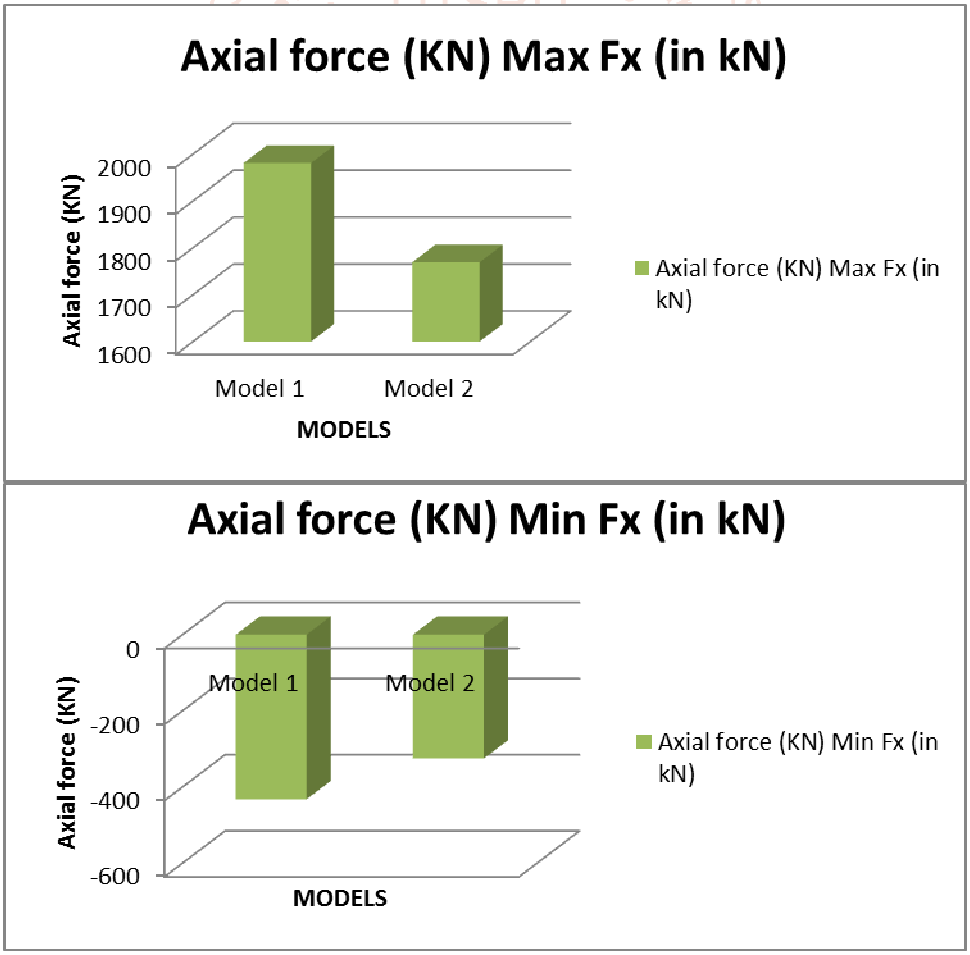
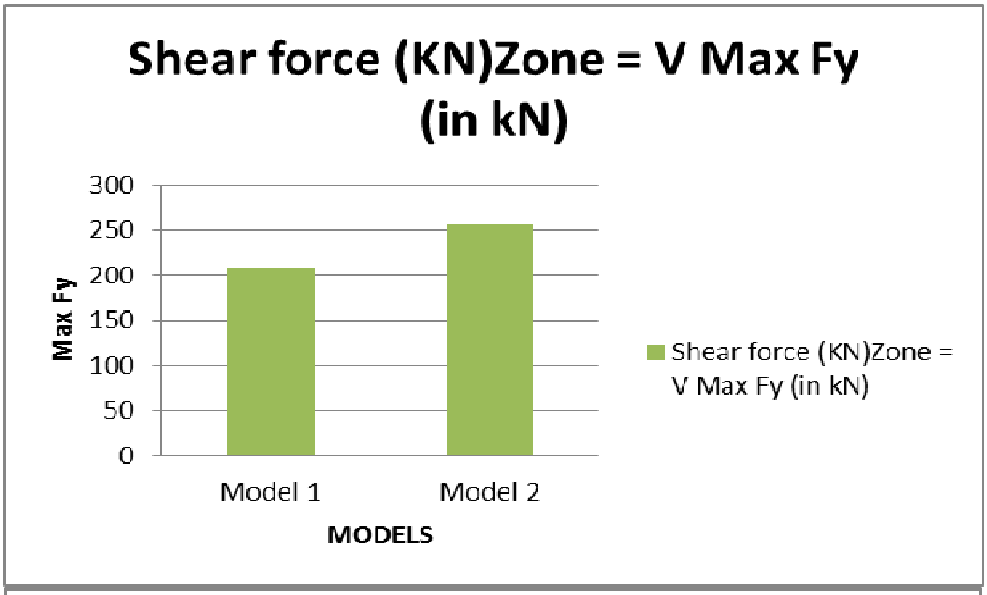


Fig. 5.3: Axial force results for structure on sloping ground for zone 5

It is observed that maximum axial forces are seen in model-I is 1981.05KN it reduces model- II 1769.25KN for zone 5. From both the models.



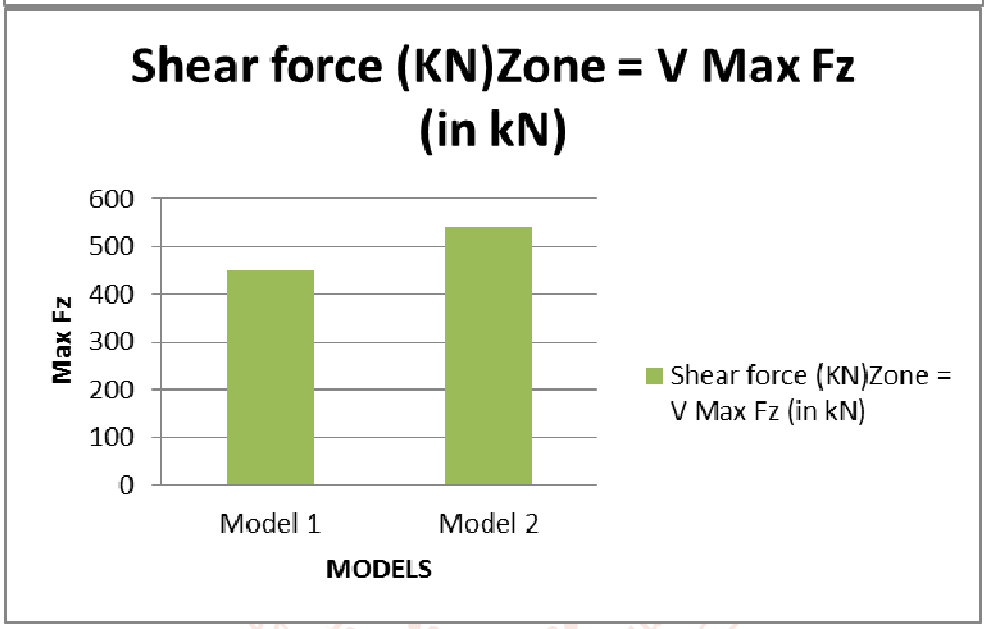
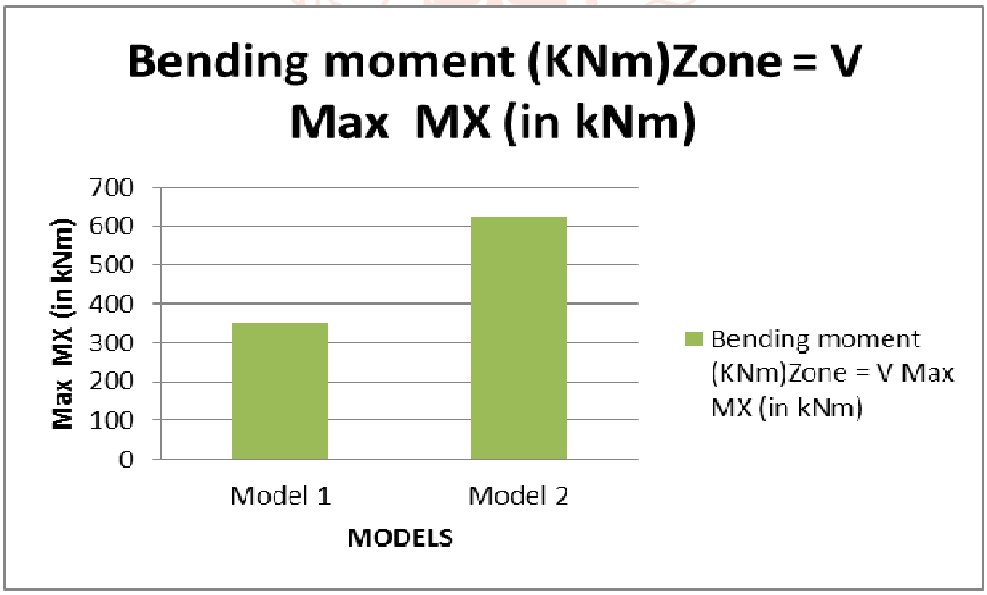


Fig. 5.4: Shear force results for structure on sloping ground for zone 5



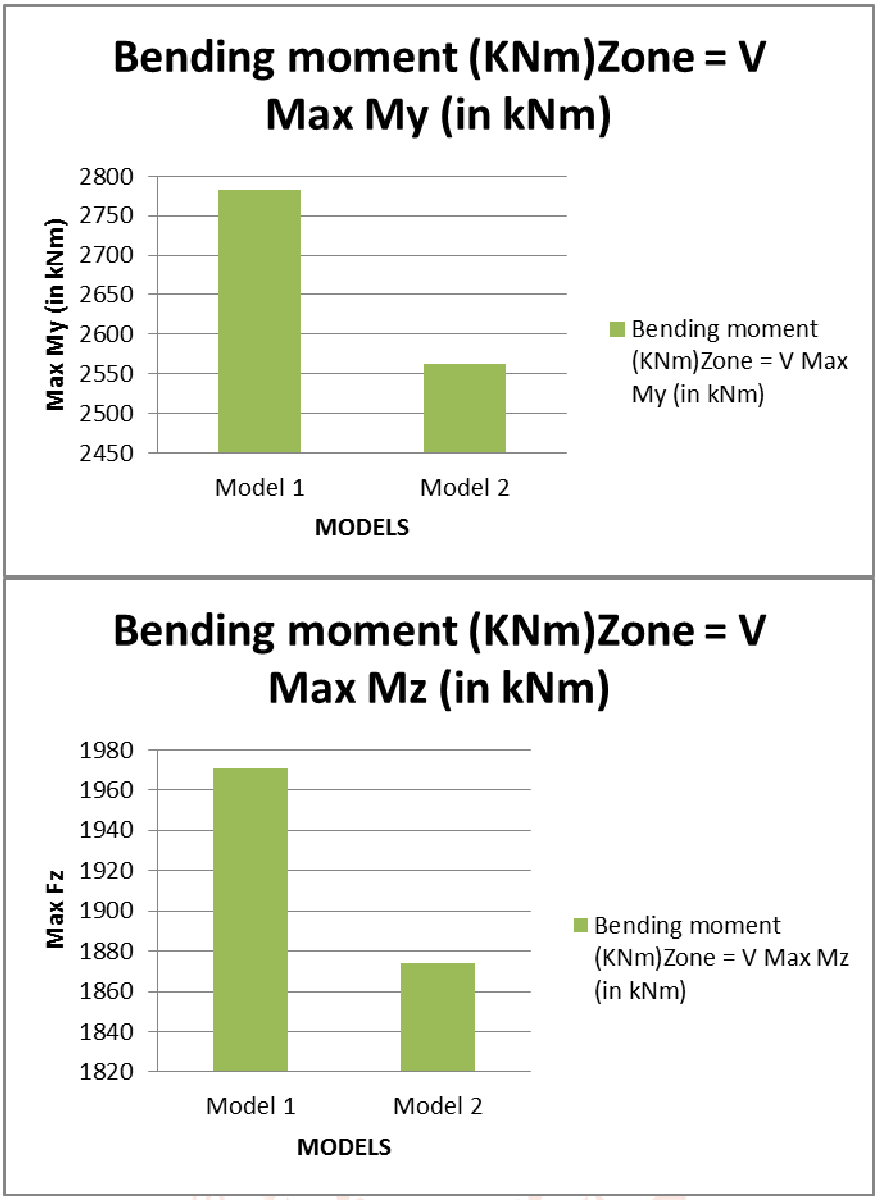
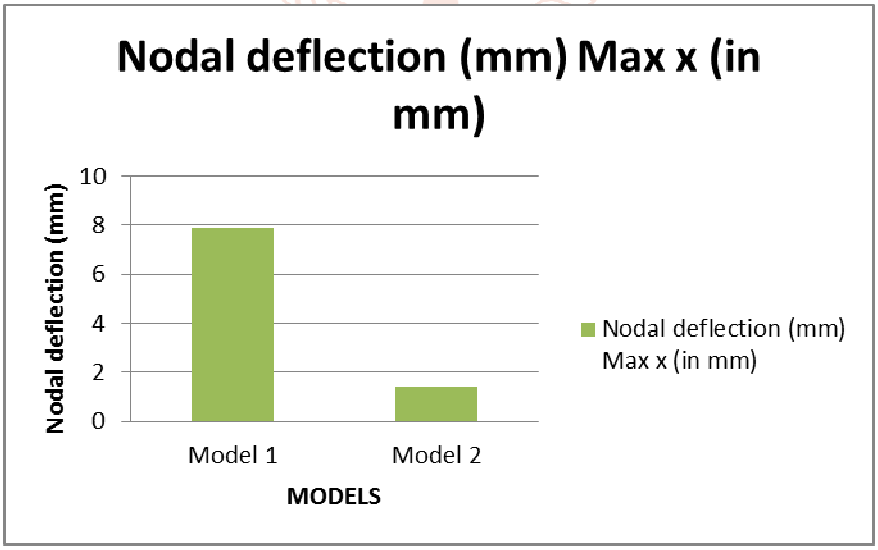


Fig. 5.5: Bending moment results for structure on sloping ground for zone 5

Nodal deflection



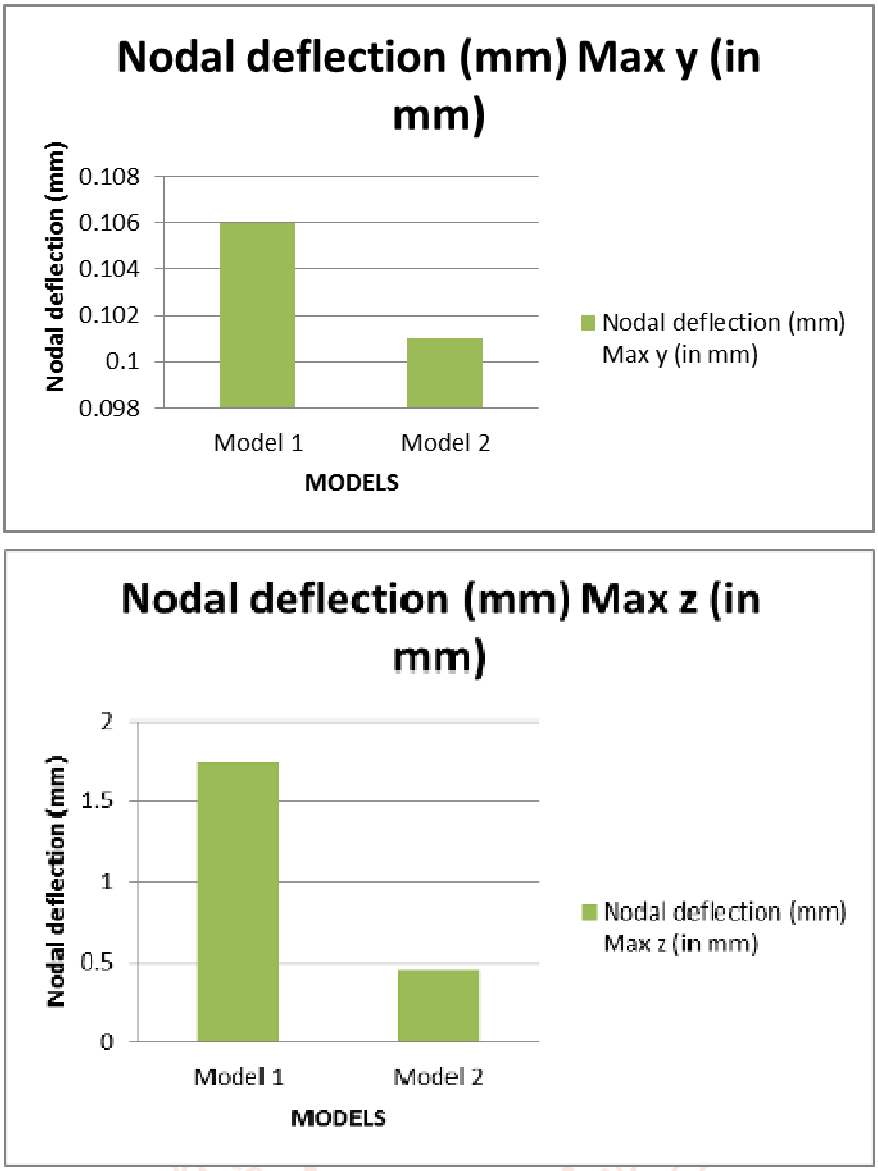


Fig. 5.6: Nodal deflection results for structure on slopping ground for zone 5

It is observed that maximum Nodal deflection (mm) is seen in model-I is 7.890mm it reduces model- II 1.40mm for zone5 From both the models.

CONCLUSION

- Maximum shear forces are seen in model-I is 208.22KN it Increases in model- II 256.54KN for zone 5.
- Maximum Bending moment (KNm) is seen in model-I is 2783.32 it reduces model- II 2562.11 for zone 5. From both the models.
- Maximum Nodal deflection (mm) is seen in model-I is 7.890mm it reduces model- II 1.40mm for zone 5. From both the models in terms of nodal deflection model 2 with shear wall shows best result.
- Hence in case of slope ground building with straight shear wall perform best.

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