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Seismic Analysis of RCC Building on Sloping Ground with Different Angles

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ABSTRACT

This study's goal is to examine the multistory RC building on a sloped ground from various angles. In this study, multistory RC G+10 buildings with various sloping angles were examined (25 to 29 degree). We have calculated the outcomes for this G+10 construction with flat ground and no slopes or angles. Two different conditions were used for the study along sloping ground in this examination. to step back and take a step back. Node displacement and base shear are the results that can be compared from this investigation.

Keywords: *Seismic activities, inclined ground, High-rise, Step back-Setback, Base Shear, Node Displacement*

I. INTRODUCTION

The multistory RCC buildings are constructed on plane level or ground level. In the hilly areas having sloping ground it is difficult to construct the multistory RCC structures. It is very complicated situation to excavate in such regions. The constructions of sloping areas are started now days due to the shortage of plane level. These hilly areas are the most dangerous sometimes due to some natural calamities like land sides and earthquake. The earthquake is the one of the biggest factor on the sloppy and hilly areas. Thus, due to increasing level of population the biggest reason of construction on hilly areas. Earthquake causes due to the shaking of ground plates and causes the damage all over the ground level as well as sloping ground. The energy exerted from the resulting of earthquake gives the sudden impact on the structure especially on earthquake zone. This may cause damage as well as on ground and structure. To avoid such damages and such type of problem, it is necessary to observe the seismic behavior and the stability of structure and ground. Different type of method is used to for analyzing the situation. The one of the method using for analysis the structure is Response spectrum Method. Thus to analyze the seismic analysis dynamic analysis is carried out. Thus, such data and information in response spectrum method is using by I.S.-1893.

II. OBJECTIVE OF STUDY

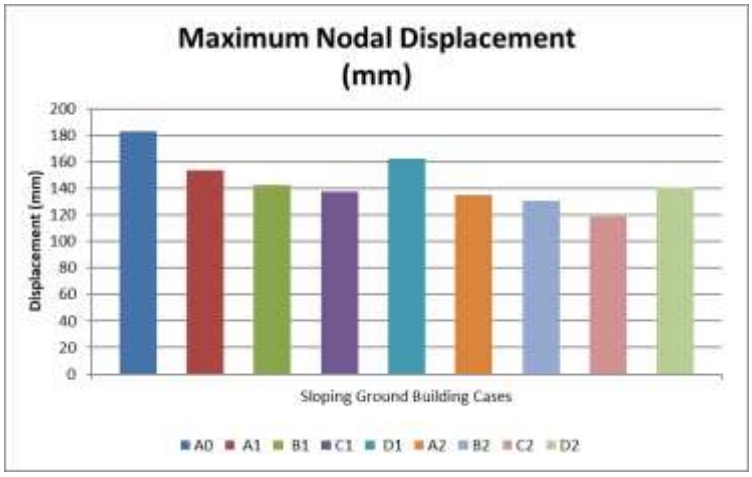
1. To explore the seismic response in the sloping terrain G+10 storied building framed with different configurations comprising building rested on sloping terrain having stepback type configuration, setback setback type configuration and building without and slope.
2. Four different sloping terrains are selected and multistoried building rested at 25 degree to 29 degree to analyze the buildings located on zone III and rested on medium soil.
3. All the models are investigated for various seismic parameters like base shear, node displacement, in both lateral and longitudinal directions.
4. And finally on the basis of comparative analysis of above parameters most optimum case in step back building and step back set back building is to decide with the help of Staad pro software.

III. RESULT & DISCUSSION

Since for the analysis of seismic effects, all the cases of the structures have been analyzed for seismic shake for longitudinal along with transverse direction. Various loads along with load combinations applied on all the cases and reflective result parameters have been analyzed with each other to determine the efficient case. Results are shown both in tabular form as well as graphical form. The analysis results obtained using Staad pro software is shown in tabular form along with various graphs with various parameters as follows:

Table 1: Maximum Nodal displacement for various building cases

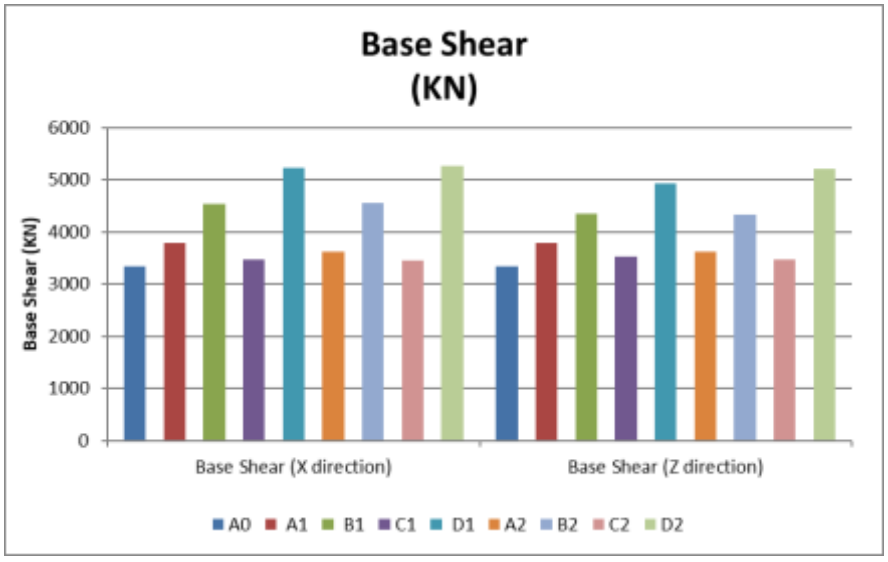
Sloping Angle in degree	Displacement (mm)	Sloping Angle in degree	Displacement (mm)
25	182.637	**25**	182.637
26	153.778	**26**	134.821
27	142.528	**27**	130.763
28	137.539	**28**	118.595
29	162.410	**29**	140.241



Graph 1: Graphical representation of Maximum Nodal Displacement for all building cases

Table 4.72: Maximum Base Shear in X & Z direction for various building cases

Sloping Angle in degree	Base Shear X (KN)	Base Shear Z (KN)	Sloping Angle in degree	Base Shear X (KN)	Base Shear Z (KN)
25	3334.25	3334.43	**25**	3334.25	3334.43
26	3784.90	3784.79	**26**	3625.40	3625.20
27	4535.20	4348.43	**27**	4545.66	4322.67
28	3461.08	3519.05	**28**	3454.85	3474.36
29	5227.73	4928.65	**29**	5259.98	5213.47



Graph 2: Graphical representation of Base Shear in X & Z direction for all building cases

IV. CONCLUSION

1. The maximum displacement has recorded a maximum value of 182.637mm for building A0 and minimum value of 137.539 mm obtained for building C1 which is a Step back building rested over 30^0 sloping ground.
2. When comparing sloping ground cases, Base shear values seem to be greatest for buildingB1 in X and Z direction for building C1.Step back building rested over 30^0 sloping ground suited best in this parameter.

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