INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY
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Technology, Social Impact

Analysis Of Hill Slope Buildings For Twist Variation With Change In Aspect Ratio

Introduction

Buildings on hilly region are asymmetrical due to its increase in height of columns in valley direction. Because of this asymmetry there is eccentricity in the structure which leads to torsion and twist in the structure. This twist is smaller but gives a large axial forces on the beams of the floor which are near to ground level(0^{th} level) and can pull out the beam from ground which has high tension axial forces.

Method

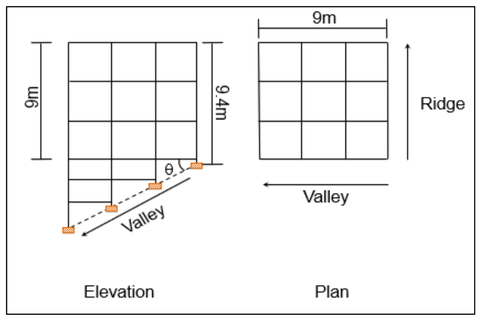

Figure 1: Plan and elevation of the building

As shown in the Figure 1 Three storey building above ground where slope of the ground is considered as 15º,30º,45º and the length of the building in ridge direction is changed and the changes in the twist for the top floor(maximum twist) and axial loads in the ground floor beam(0^{th} level) is observed.

Aim

To understand the behaviour of building with respect to torsion and twist, Building is subjected to an earthquake Chamoli normalised to 1g, a numerical study is performed so that the twist can be calculated for a rigid floor using vector spaces.

Results

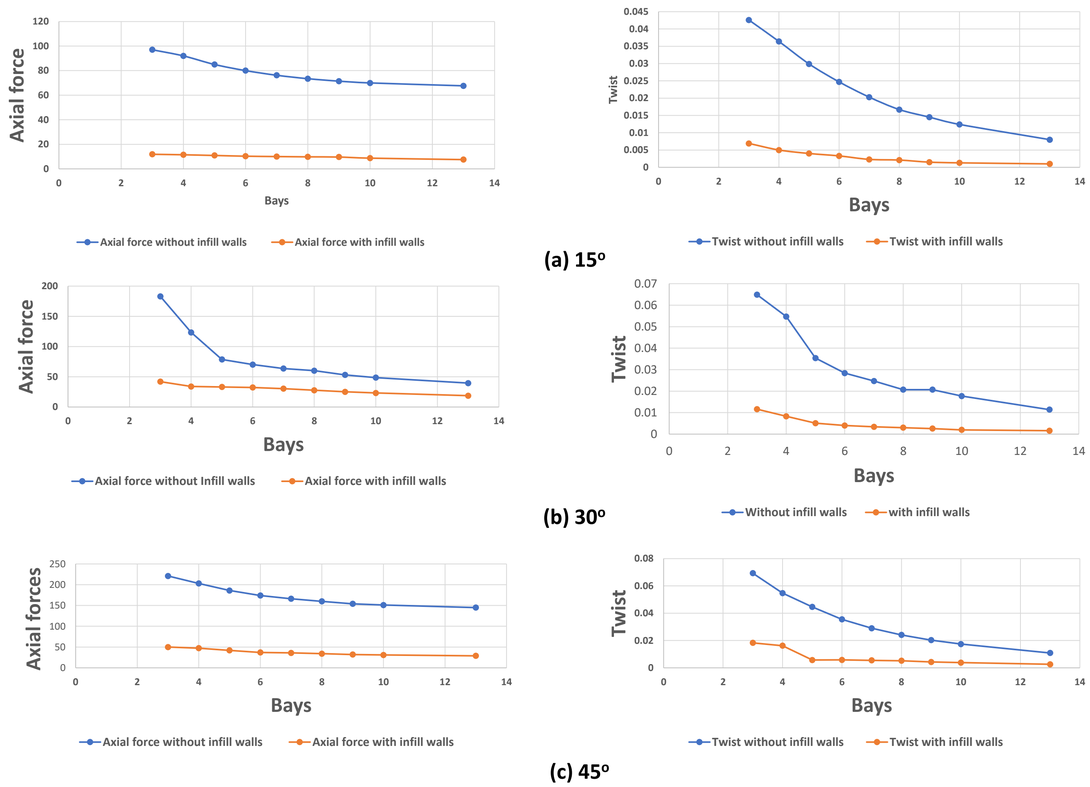

Figure 2: Twist and Axial force vs Number of bays

Conclusion

After the analysis of these structures on hill slopes we are able to conclude to propose that the plan aspect ratio for the sloppy region with a constant 3 number of bays along valley direction must be more than 2 with fully walled or braced i.e. minimum 6 number of bays in ridge direction. The graph's and table's shows that the graph line of axial force and Twist is becoming almost straight for the structure whose number of bays is more than and equal to 6. The building can't be bare frame but if it is so we need to consider to minimization of this higher risk for the construction of such buildings with larger twist and larger axial force on the ground floor beam based on the requirements. This paper is done for only 3 bays in the valley direction but in future it can be done for many

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