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Comparison of Different Lateral Load Resisting Systems for Steel Buildings

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Abstract: ***This paper describes the comparison of different lateral load resisting systems in steel buildings. In this work time history analysis is carried out for 25 storey building situated in seismic zone 3.Analysis is carried out by ETab software. The models are analyzed as per IS1893:2002and IS800:2007.***

Keywords: Lateral load resisting system, time history analysis

1. Introduction

Nowadays there has been large increase in the number of tall buildings. Tall buildings have fascinated mankind from the beginning of civilization; there construction being initially for defense but now it is for commercial and residential purposes. Commercial tall buildings arises when the demand of business activities to be as close to each other, and to the city center as possible. The rapid growth of urban population and limited availability of land influenced residential tall building development. In some cities local topographical restrictions make tall buildings the only feasible solution for housing needs. Usually steel building elements are used for tall buildings. Under large seismic events structure subjected to forces greater than elastic limit. Therefore the effects of lateral load have greater importance.

a) Sources of Lateral Loads

There are different sources of lateral loads. Thatis

- Wind
- Seismic
- Flood orTsunami
- Earthpressure

b) Lateral Load Resisting Systems

- Moment resisting frames
- Bracings
- Steel plate shear wall (unstiffened, stiffened, composite)

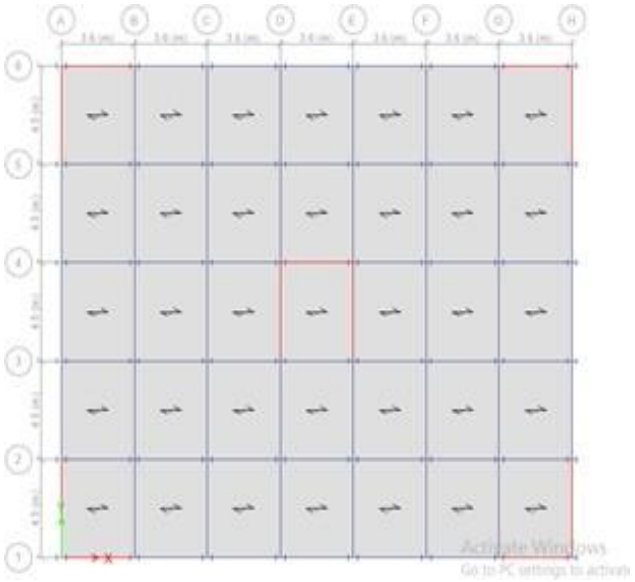
Objective of this paper is to find the effective lateral load resisting system for steel buildings. The effective location of lateral load resisting system is at corner position and at core[1].

2. Methodology

Step 1: Application of different lateral load resisting systems on same building.

Step 2: Analysis of structure.
Comparison of results and find the best lateral load resisting systems for zone III

A. Structural Plan



B. Dimensional Details

Plan dimension	25.2 x 22.5
Height of each floor	3 m
Vertical columns	ISHB 450
Horizontal beams	ISWB 450
Selected zone	Zone III
Live load	3 KN/m^2
Dead load	2 KN/m
Floor finish	1 KN/m^2

Load combinations are as per IS 1893:2000.The parameters used for compare seismic performance are ; displacement and base shear

3. Comparison of Results

Table 1

	Moment Resisting Frames	Unstiffened Spsw	Stiffened Spsw	Composite Spsw
Base Shear (KN)	110	197	198	257
Displacement (mm)	259	40	37	21

4. Conclusion

Here we can see that maximum base shear is for composite Spsw. But its thickness is greater than the others. Also in zone III the seismic effect is less. And the construction of composite and stiffened is difficult than the unstiffened Spsw. Therefore this study concluded that unstiffened Spsw is suitable lateral load resisting system for zoneIII.

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