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Modelling and Analysis of High Rise Structure Using Different Shapes of RC Shear Wall for High Seismic Zone Using Flat Slab

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ABSTRACT

RCC walls including shear walls are the usual multi-Storied Buildings requirements. In past researches high rise structure without RC Shear Wall is not safe for earthquake force. No comparative analysis of structures on seismic behavior of high rise structure by using of RC Shear wall with flat slab.

Present work is comparative study of the behaviour of high rise 16 Storey buildings with and without RC Shear wall using flat slab. Modelling and Analysis of high rise structure using STAAD PRO V8i Software. STAAD PRO software which is based on the application of Finite Element Method. This software is a widely used in the field of structural design and analysis. Now a day this software is very much friendly for the analysis of different type of structures and to calculate the result at every node & element wise. Here three cases are consider for study 16 Storey buildings and analysis displacement, shear force & bending moments generated in structure with and without RC Shear wall using flat slab.

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INTRODUCTION

RC SHEAR WALL comprises of strengthened solid dividers and fortified solid sections their divider thicknesses range from 140 mm to 500 mm, contingent upon development age and warm protection requirements. Usually, these dividers stay at the stature of the whole structure; anyway a few dividers are shut down to the street front or cellar level to allow for mechanical or stopping areas. Sometimes, the divider structure is symmetric regarding in any event one hub inside the plan. Usually, divider support comprises of two layers of fortifications appropriated through the length of the wall. Also, vertical fortification bars are offered close to the entryway and window openings on the divider end zones.

OBJECTIVES

Present work is comparative study of the behaviour of high rise 16 Storey buildings with and without RC Shear wall using flat slab.

METHODOLOGY

The RCC building models having 16 storeys with shear walls and without shear walls are considered for the study. The FEM RS analysis of building is carried out using structural engineering software StaadPro V8i and the seismic performance of building with various shear walls configurations is compared with respect to parameters like base shear, lateral displacement, time period and member forces.

THE FOLLOWING MODELS OF BUILDING ARE CONSIDERED

- Case I without shear wall
- Case II with L shape shear walls
- Case III with C shape shear walls

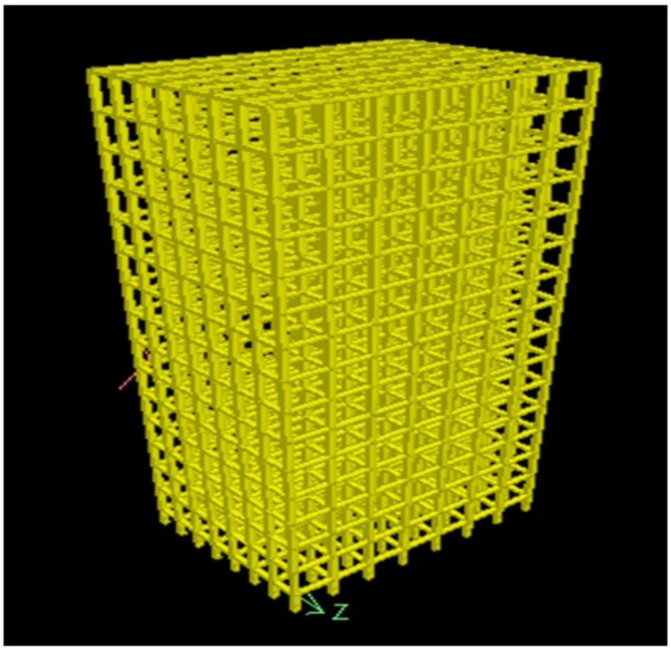

Fig. 1: Building without RC shear wall

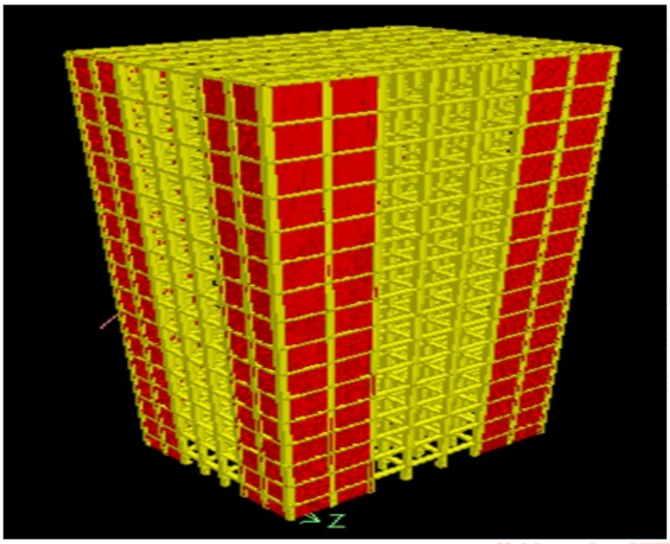

Fig. 2: Building with L shape RC shear wall

Results

Shear force results for high rise structure

Table 1: Shear force results for high rise structure

Models	**Shear force (KN)Zone = IV**
	Max Fy (in kN)
Case I	37.9
Case II	58.2
Case III	66.2
Models	Shear force (KN)Zone = IV
	Min Fy (in kN)
Case I	-37.9
Case II	-215.1
Case III	-278.2
Models	Shear force (KN)Zone = IV
	Max Fz (in kN)
Case I	12.0
Case II	113.6
Case III	156.9
Models	Shear force (KN)Zone = IV
	Min Fz (in kN)
Case I	-12.0
Case II	-315.4
Case III	285.6

It is observed that maximum shear forces are seen in CaseIII for zoneIV. From all the models, Case II shown min shear forces.

Table 2: Bending moment results for high rise structure

MODELS	**Bending moment (KNm)**					
	Max Mx	**Min Mx**	**Max My**	**Min My**	**Max Mz**	**Min Fz**
	(in kNm)	**(in kNm)**	**(in kNm)**	**(in kNm)**	**(in kNm)**	**(in kN)**
Case I	9.93	-9.93	216.6	-216.6	771.1	-284.1
Case II	114.26	-84.23	1141.24	-742.3	2023.11	-684.1
Case III	87.21	-110.14	745.34	-671.6	1013.58	-842.3

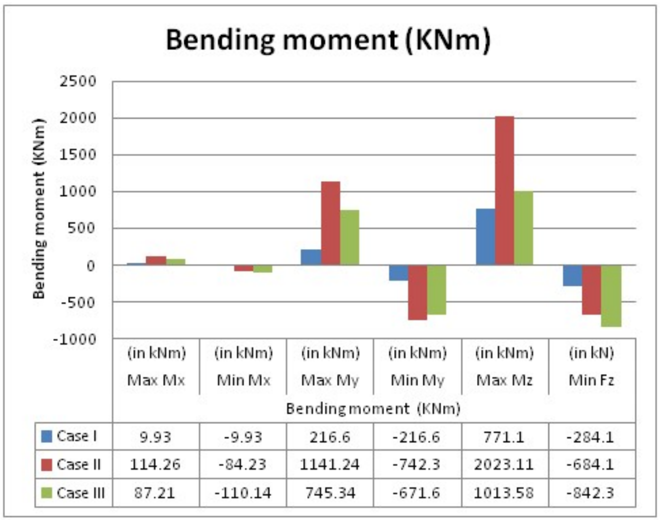

Fig. 3: Bending moment results for high rise structure

It is observed that maximum bending moments are seen in case 2 for zone IV. From all the models, Case II shown min shear forces for zone 4.

CONCLUSION

- The Minimum Nodal deflection results for high rise structure in Case I II and III is respectively Min Y 2.38, 3.24 and 3.98.
- The Minimum Nodal deflection results for high rise structure in Case I II and III is respectively Min X -0.076, -0.116 and -0.127.
- The maximum Nodal deflection results for high rise structure in Case I II and III is respectively Max Y -12.06, -34.71 and -12.06.
- It is observed that maximum shear forces are seen in Case III for zone IV. From all the models, Case II shown min shear forces.
- All the models with shear walls have approximately 60% less time period as compared with Case II has minimum time period.

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