Seismic Analysis of a Multistoried RCC Frame with and without Shear Wall

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Abstract— Shear wall technique is used to resist lateral-load in multistoried buildings. Shear walls are very high in plane stiffness and strength, which can be used in structures to resist the effects of gravity loads and story shears due to earthquake forces. There are lots of literatures available analyze the shear wall. About seismic analysis not much discuss in any public literature review. In this present study, the main focus is to discuss has been studied with the help of two different models (G+11). Model one is RCC frame structural system without shear wall and model two is RCC frame structural system with shear wall. An earthquake load is calculated and applied to a building of multi-stories. Here work on displacements of models and finding out their displacements and storey drift results. Here main work is to find the displacement of two models by using software. Find the location of failure in model 1 after that providing shear wall. First analyze the model 1 displacement of storey and second is analyze the model 2 displacement with help of STADD PRO V8i. Also analyze the storey drift ratio of two models and draw with help of graph. Find the maximum and minimum displacement of models. An analysis was performed using STAAD PRO V8i software packages.

Key words: Building Without Shear Wall, Multistoried RCC Frame

I. INTRODUCTION

The significant innovation in high-rises idea of using a hollow thin wall tube with punched holes to form the exterior of buildings. By reducing the spacing of exterior columns, the entire system of beams and columns lying on the external perimeter of a building can be made to act as a perforated or framed tube. The analysis methods for RCC high-rise buildings have special requirements different from low to middle rise buildings, especially for the typical structural system that consists of slender members in frames and more RCC stocky structural walls. The complexities of concrete properties, wall frame interaction and three dimensional effects need to be accounted for in structural modeling.

- To analyze an R.C.C building frame using STAAD PRO V8i.
- To judge the effect of an R.C. shear walls on an R.C. Building when provided at locations.
- To study the results of node displacement and maximum storey drift obtained.
- To understand the purpose of using shears walls.

In this present paper one model for bare frame type residential building.

In this present paper model for OMRF type residential building and models for dual type structural system are generated with the help of STADD PRO V8i.

By using two models seismic analysis has been done.

- Model 1: Building without shear Wall.
- Model 2: Building with shear wall.

II. METHOD OF STUDY

A. *Aim and objective*

- To analyze the building without shear wall.
- Select typical position of shear wall.
- To analyze the building with shear wall.
- Compare analysis results of model 1 and 2.

B. *Modelling and Analysis of Models*

- Create models on STADD PRO V8i.
- An analysis the displacement.
- Story drift is the displacement of one level relative to the other level above or below. Story drift ratio according to the zones of each model.

Story drift ratio = difference between displacement of two stories / height of one story

- Calculating the seismic load, displacements, storey drift ratio.

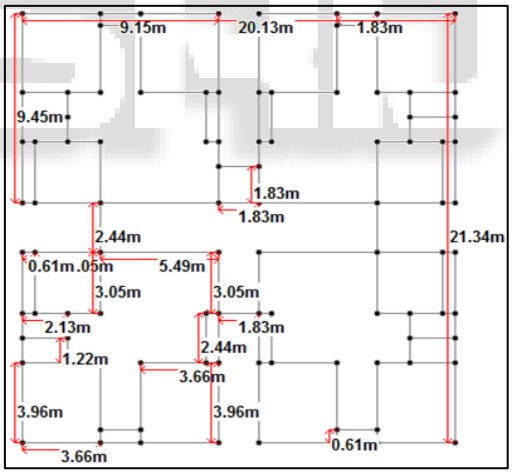

Fig. 1: Plan of Structure

Sr. No	Description of Model Plan For Both Model 1& 2	
1	Building Type	Residential Building
2	Seismic Zone	2
3	No. of Storey	G+11
4	Plot Dimension	25m×22m
5	Plot Area	550 sq.m
6	Building Dimension	21.34m×20.13m
7	Property	
8	Beam	0.3m×0.23m
9	Column	0.35m×0.3m
	Slab Thickness	160mm
	Shear Wall Thickness (only for model 2)	230mm

Table 1: Description of model

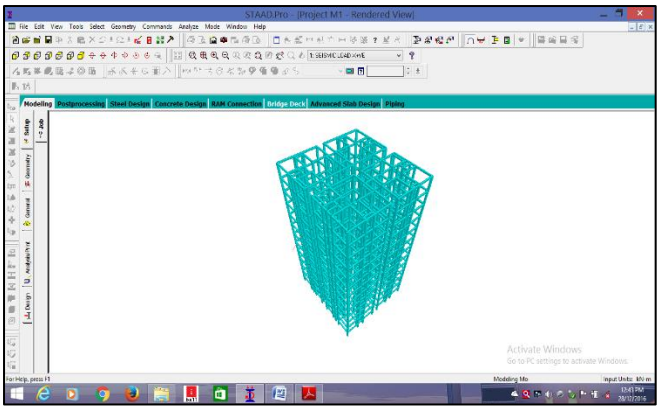

Fig. 2: Model-1 Building without Shear wall

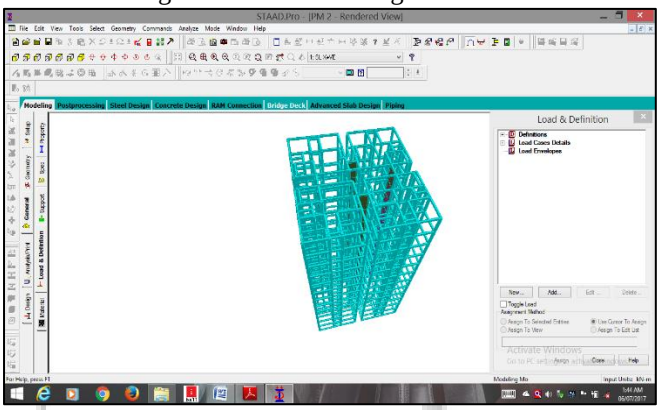

Fig. 3: Model-2 Building with Shear wall

III. RESULTS AND DISCUSSIONS

From the analysis results obtained following parameters are taken into consideration for the present study. STADD PRO V8i software is used for the analysis of structure for Zone II.

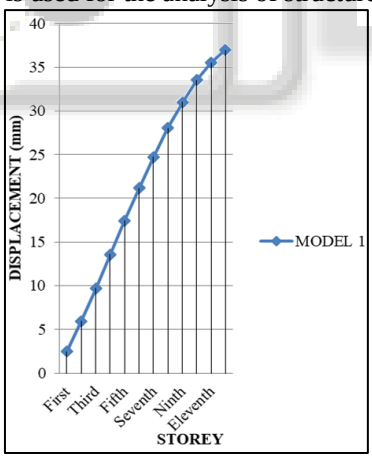

Fig. 4: Storey v/s Displacement of model 1

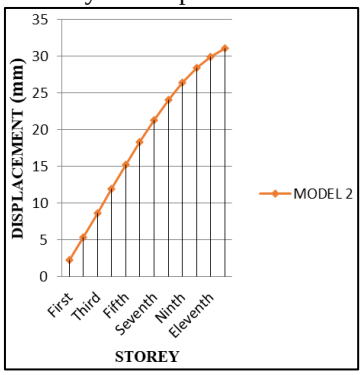

Fig. 5: Storey v/s Displacement of model 2

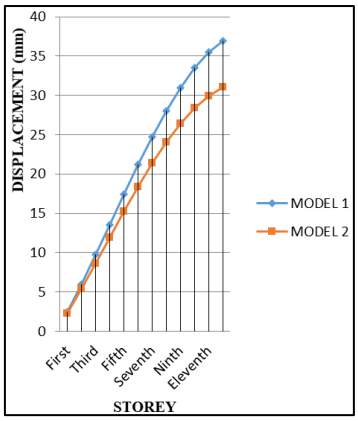

Fig. 6: Storey v/s Displacement of model 1 & 2

Storey	Displacement (mm) Model 1	Displacement (mm) Model 2
First	2.459	2.275
Second	5.951	5.360
Third	9.720	8.651
Fourth	13.577	11.968
Fifth	17.425	15.236
Sixth	21.178	18.387
Seventh	24.753	21.351
Eighth	28.060	24.056
Ninth	31.011	26.056
Tenth	33.518	28.408
Eleventh	35.503	29.945
Twelfth	36.954	31.067

Table 2: Displacement

From analysis the displacement observed in first model, which is without shear wall building shows maximum displacement & in second model which is with shear wall building shows minimum displacement.

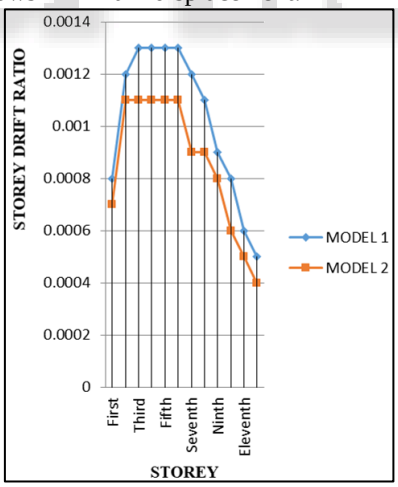

Fig. 7: Storey v/s Storey drift ratio of model 1 & 2

Storey	Storey drift ratio	
	Model 1	Model 2
First	0.0008	0.0007
Second	0.0012	0.0011
Third	0.0013	0.0011
Fourth	0.0013	0.0011
Fifth	0.0013	0.0011
Sixth	0.0013	0.0011
Seventh	0.0012	0.0009
Eighth	0.0011	0.0009
Ninth	0.0009	0.0008

Tenth	0.0008	0.0006
Eleventh	0.0006	0.0005
Twelfth	0.0005	0.0004

Table 3: Storey drift ratio

IV. CONCLUSIONS

1) Model 2 with shear wall which is more stable than model 1 (without shear wall).
2) Shear wall building shows less displacement as compare to Model 1 i.e. without shear wall.

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