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Seismic Analysis of Multistory Rc Building For Various Lateral LoadResisting System By Response Spectrum Method

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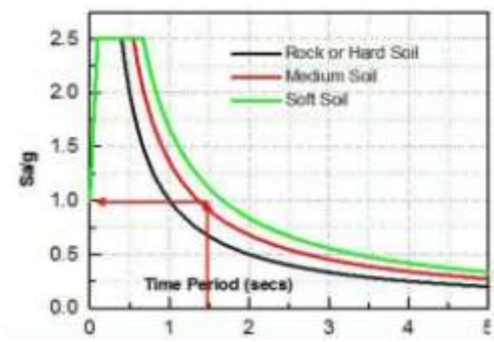
ABSTRACT-This study refers to the analysis of medium and high rise building for earthquake that create lateral load in the building using response spectrum method. In this method, maximum earthquake accelerationaffects the building model and the analysis is performed using ETABS software. Models under consideration include transverse stiffening system such as columns and shear walls to support lateral loads. They are in different locations and use seismic parameters to study their impact. The most efficient swap system observed with increased performances and stiffens system.

INDEX TERMS-Bracings, Shearwall,Lateral load resisting system Response spectrum method.

I. 1)INTRODUCTION

Seismic design is based on the generally recognized principles, design methods and criteria developed for the design of new structures and the modernization of existing structures. Seismic analysis is a dynamic analysis because magnitude of an earthquake is dynamic and acceleration varies significantlyfrom moment to moment compared to natural frequency of the structures. Dynamic analysis provides the real time results of seismic loads in terms of dynamic displacement, temporal results and the modal analysis

To overcome these difficulties, the most powerful structural design tool is the seismic response spectrum. Since this analysis method gives the values of maximum displacement and maximum element force for each type of vibration it uses an accurate calculated spectrum obtained by averaging the movements of several earthquake.



Design response spectrum IS 1893: 2002

Lateral Load Resisting Systems (LLRS)

The various types of lateral loadresistive systems (LLRS) are

1) Moment resisting frames.
2) Braced frames.
3) Shear walls based frames.

1) Moment resisting frames

Because moment transfer is via a link, there is must debate about whether the term can be used as a basis .Previously, the term "rigid frame" was most commonly used. We classify connection as strong and immovable. Hard links lose their ability to transfer moments,while hard links do. This type of truss has more deformation than a shouldertruss or a frame equipped with vertical reinforcement

2) Braced frames

The bracket is a kind of side load resistance system used to reduce the reaction force and the induced torque of the building due to an earthquake. There are many ways to strengthen the frame, but the most popular is the method of attachment. The buildings use a vertical truss structure with conventional horizontal members. Sometimes you can also use fixed borders for horizontal elements

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or combine vertical and horizontal borders with fixed 3D borders.

2) Shear walls based frames

Shear walls are also a kind of LLRS used for reducing the responses and induced torsion in the building due to earthquakes. These are thewalls that are built in structures to counter act lateral forces produced from wind and earthquakes. Shear walls have a large in plane stiffness thus it resists the lateral loads and control deflection more efficiently.

II. METHODOLOGY

In this method design spectrum is selected from IS 1893:2002(part 1).Zone, Importance factor, Response reduction Time period and damping ratio is defined. ETABS calculate Sa/g value for each mode defined utilizing the above data. CQC and SRSS method is defined by user. Scale factor is set and the exactness of response spectrum method is checked and scale factor is corrected.

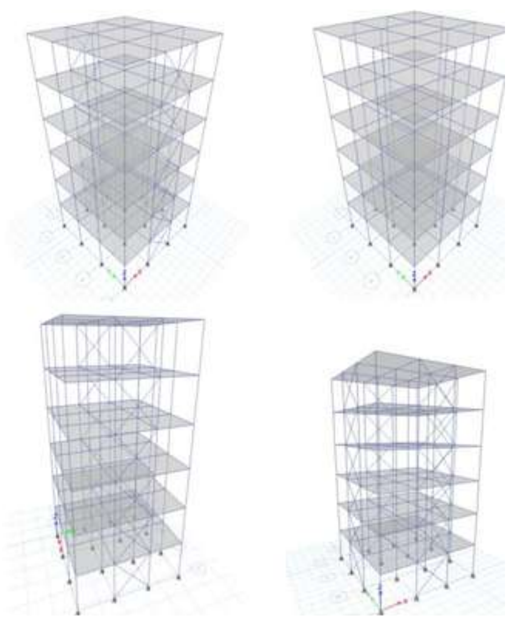
Dimension of G+5 building

Members	For lower 3 stories	For upper 3 stories
column	230x450mm	230x300mm
Beam	230x450mm	230x450mm
Slab	150mm	150mm
Bracings	230x230mm	230x230mm
Shear walls	230mm	230mm

Members	**For lower 6 Stories**	**For middle 4 stories**	**For top 5 stories**
Column	300 x 600mm	230 x 450mm	230 x 300mm
Beam	300 x 450mm	300 x 450mm	300 x 450mm
Slab	150 mm	150 mm	150 mm
Bracings	300 x300mm	230 x 230	230 x 230mm
Shear walls	230 mm	230 mm	230 mm

Model description of G+5 and G+14

Model 1	Bare frame
Model 2	Concentrically braced f
Model 3	Concentrically braced frame along longer span
Model 4	Concentrically braced frame along shorter and longer span
Model 5	Concentrically braced frame along corners
Model 6	Shear based frame along shorter span
Model 7	Shear based frame along longer span
Model 8	Shear based frame along shorter and longer span
Model 9	Shear based frame along corners
Model 10	Shear based frame along center



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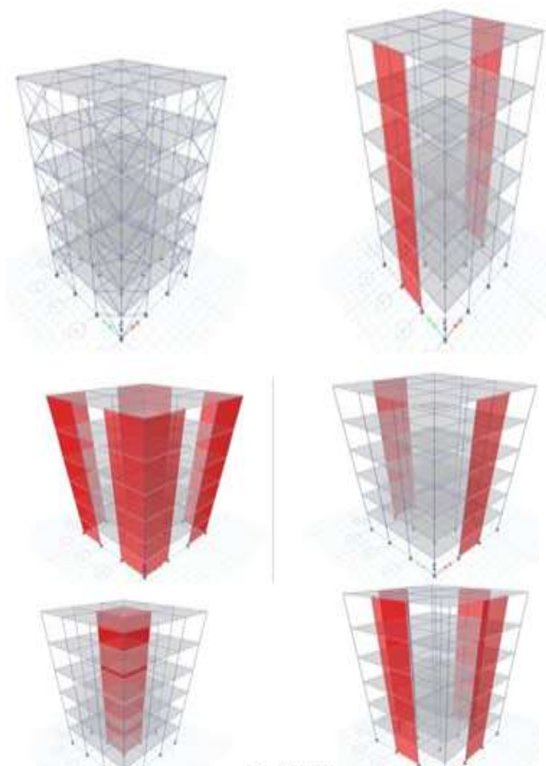
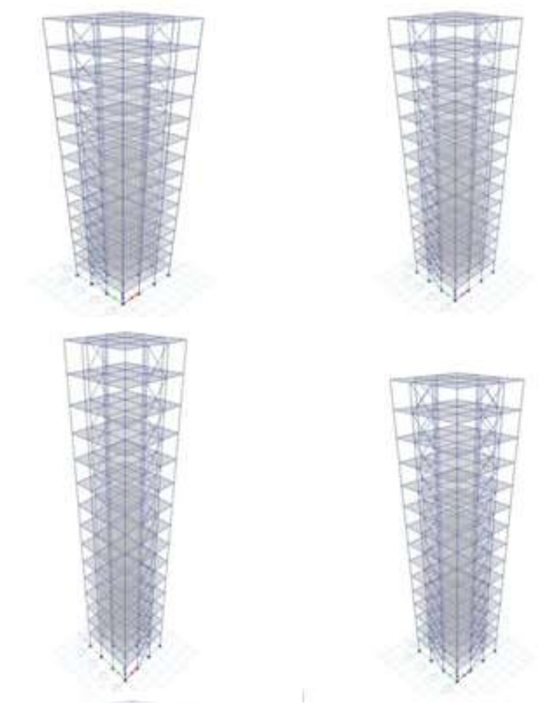
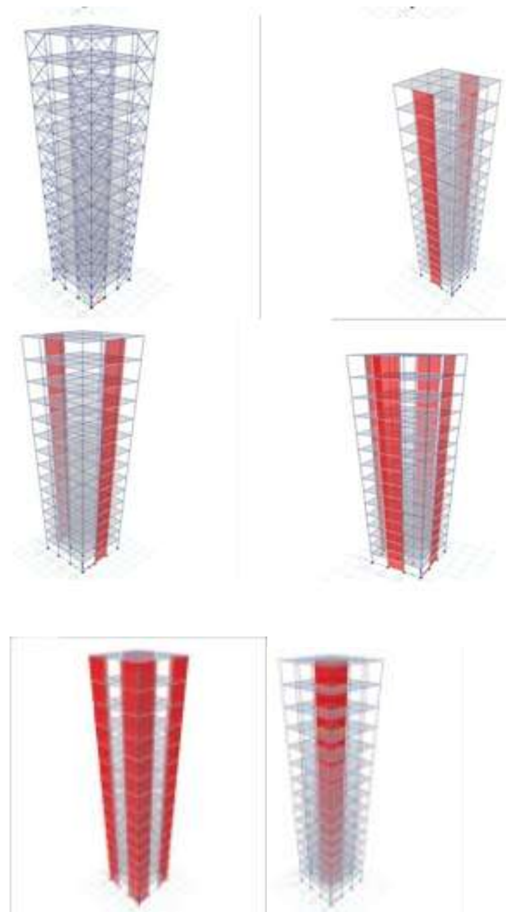


G+15

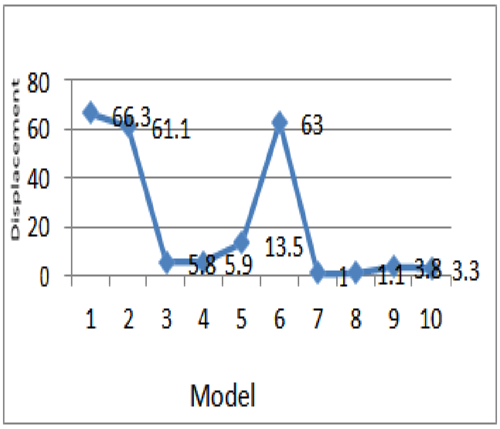




Loads consider are: DL- program calculated LL:3.5kN/m^2
FF:1.5 kN/m^2

III. RESULT AND DISCUSSION

Maximum story displacement of G+5



Displacement in X direction

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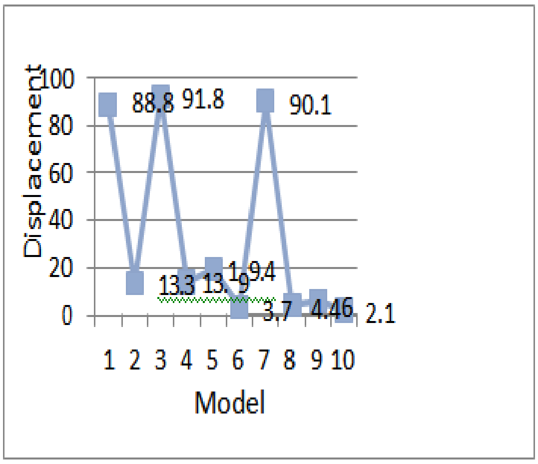
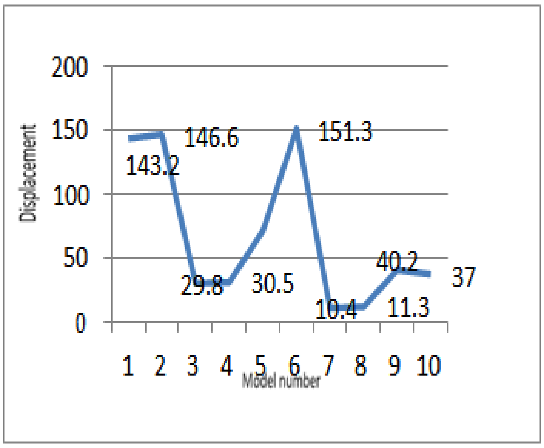
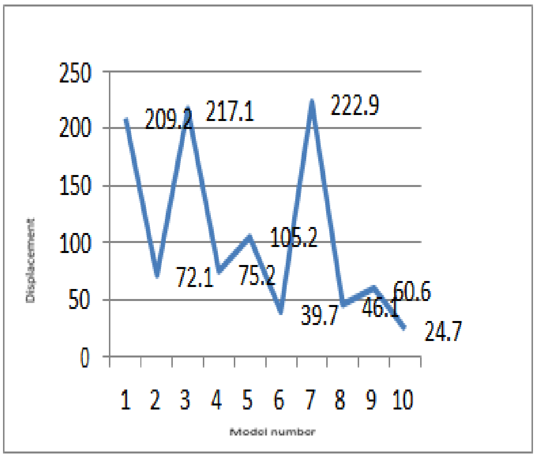


Displacement in Y direction

Maximum story displacement of G+14

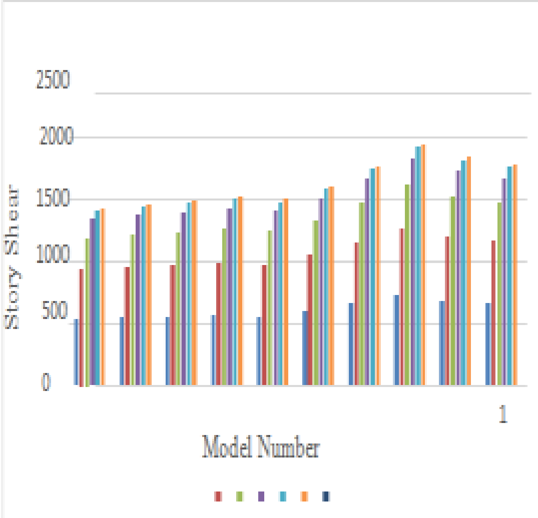


Displacement in X direction

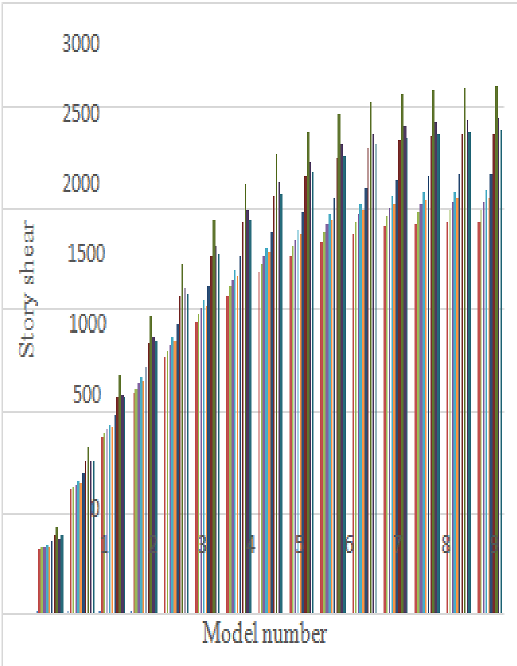


Displacement in Y direction

Maximum story shear for G+5



Maximum story shear for G+14



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Time period of G+5 and G+14

IV. CONCLUSION

1. After analyzing the building models combined action of the clamps at shorter span and longer span gives smaller displacement.
2. After placing shear walls in the middle of the building it yields better results than placing at any other position.
3. Displacement increases as height of story increases and maximum story displacement is observed in the top of the story.
4. When shear core is placed there is significant decrease in story displacement, story shear, story drift and the time period.
5. Lateral load resisting system increases the elastic stiffness of the building rather than just having the bare frames.
6. Shear core is found to be more efficient lateral stiffness system than any other systems.

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