ENHANCING THE SESMIC PERFORMANCE OF BUILDING USING DAMPERS

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Abstract— India is developing country, nowadays our Indian population is increasing day by day. According to some sources our Indian population is reached nearly 142.86 crores, this rapid increase in population forced engineers to adopt for high rise building. Damage caused by lateral load is needed to be control. There are so many methods to control the damage of building by lateral loads: we are adopting one of method, providing the different types of loads in the building. In present study, we have used conventional building with 15mx18m along the direction. We carried out the linear analysis by using E-TABS software, then comparing the result of displacement, storey drift, between the bare building.

Keyword— Fluid viscous dampers, Displacement, Storey Drift, E-TABS etc.

1. INTRODUCTION

The increase in population by which land deficit occurs and to overcome that, high-rise buildings are opted. These type of high-rise buildings are prone to structural failures mainly on application of lateral loads such as wind, seismic forces etc. Geographical statistics of India show that almost 54% of the land is vulnerable to earthquakes. Calamities like earthquakes are the most dangerous by means of the damage and chaos caused to the structural components and they cannot be controlled. These natural calamities caused property damage and interruptions in development of the normal lifecycle. Since it's a global concern, most of the analysis should be carried out and provided with the results to prep the structure in order to attain time period.

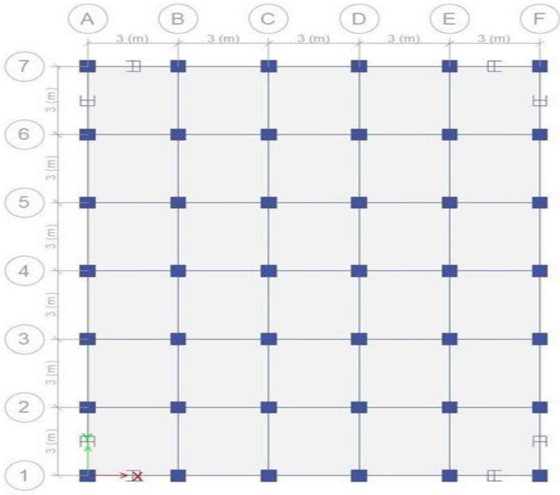


Fig COMMERCIAL BUILDING

1.1 LOADS TO BE CONSIDERED

1.1.1 Dead load

A dead load is nothing but the self- weight of its structural element. It is mainly considered for its density of materials.

1.1.2 Live load

Live loads are imposed loads that are temporary and of a short duration, are moving loads.

1.1.3 Wind load

The effect of wind load is not considered as the structure satisfies the following requirements as per the national building code of 1970.

a. The building or a part of a building of which "h" does not exceed twice the effective width.

b. A wing of such a building, if it does not project more than twice its own width.

1.1.4 Seismic load

Seismic load is the basic concept of earthquake engineering, which means the application of an earthquake's generated agitation to a shape.

2. OBJECTIVES OF STUDY

The main objectives of this study are summarized in few points as follows:

- Conventional building and building incorporated with dampers.
- To evaluate the dampers in different of seismic performance.

3. MODELING AND ANALYSIS

ETABS is analysis software. ETABS is expanded as extended three dimensional analysis of building systems. All the necessary tools, like create, modify, analyse and optimize etc., which are required for structural engineers are provided by this software.

3.1 MODELS CONSIDERD FOR ANALYSIS

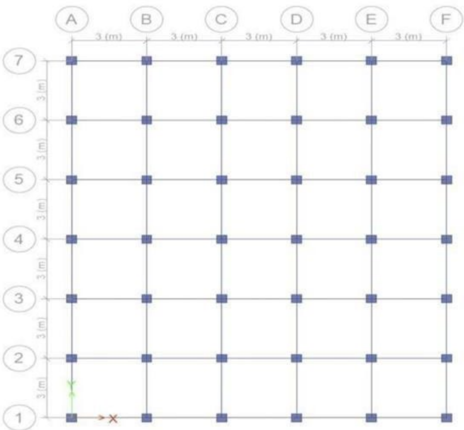


Fig 1: View of slab, beam &column

Fig 2: View of slab, beam &column

3.2 PROCEDURE FOR USING E-TABS

Step 1: Model Initialization
Step 2: Custom grid settings
Step 3: Defining the materials
Step 4: Defining frame properties
Step 5: Defining slab properties
Step 6: Draw beams and column
Step 7: Defining load patterns
Step 8: Assigning shell loads
Step 10: Analyse/Check model

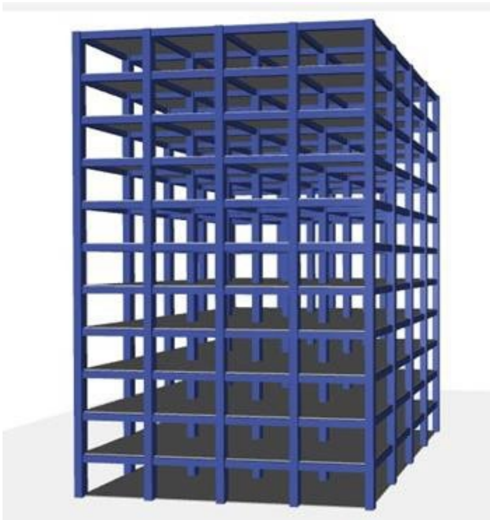


Figure 4: Rendered view

Results lateral displacement along for the different load combinations with Conventional dampers are expressed table.

Table 5.1: Maximum storey displacement in X-direction.

Story	Elevation(m)	Without Dampers in mm	With Dampers in mm
Story12	36	177.881	106.847
Story11	33	167.289	94.171
Story10	30	154.739	81.462
Story9	27	140.527	68.861
Story8	24	124.953	56.55
Story7	21	108.304	44.743
Story6	18	90.853	33.684
Story5	15	72.878	23.646
Story4	12	54.703	14.924
Story3	9	36.808	7.841
Story2	6	20.076	2.74
Story1	3	6.385	0
Base	0	0	0

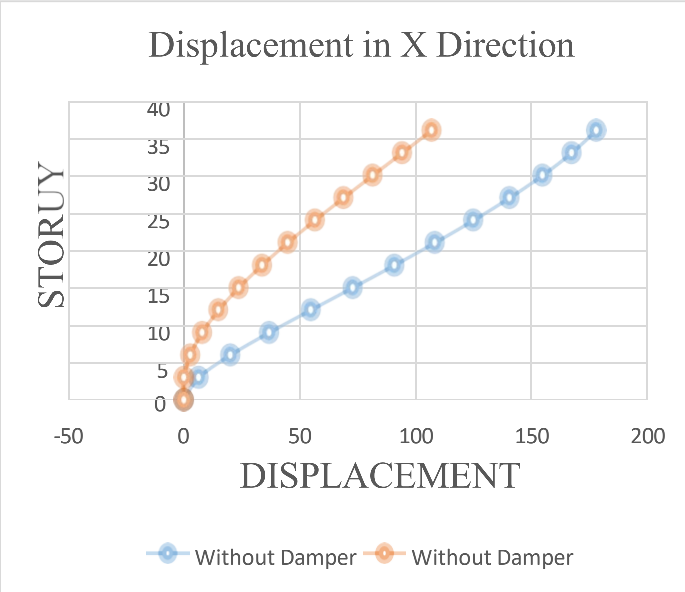
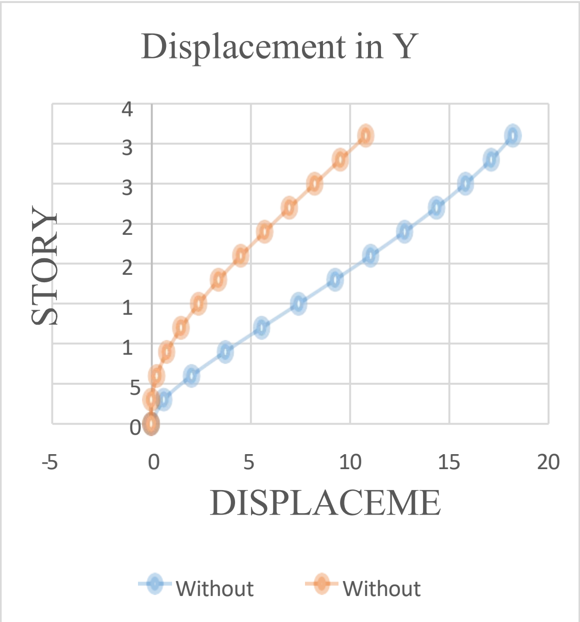


Fig 5.2: Maximum storey along Y- direction.

Story	Elevation(m)	Without Dampers in mm	With Dampers in mm
Story12	36	181.804	107.912
Story11	33	170.891	95.059
Story10	30	157.989	82.186
Story9	27	143.399	69.435
Story8	24	127.425	56.99
Story7	21	110.36	45.066
Story6	18	92.488	33.909
Story5	15	74.098	23.79
Story4	12	55.529	15.007
Story3	9	37.282	7.879
Story2	6	20.273	2.752
Story1	3	6.421	0
Base	0	0	0



3.3 STOREY DRIFT

Table 3: Maximum drift in X direction.

Story	Elevation(m)	Without Dampers in mm	With Dampers in mm
Story12	36	0.003531	0.004225
Story11	33	0.004183	0.004236
Story10	30	0.004737	0.0042
Story9	27	0.005191	0.004104
Story8	24	0.00555	0.003936
Story7	21	0.005817	0.003686
Story6	18	0.005992	0.003346
Story5	15	0.006058	0.002907
Story4	12	0.005965	0.002361
Story3	9	0.005577	0.0017
Story2	6	0.004563	0.000913
Story1	3	0.002128	0
Base	0	0	0

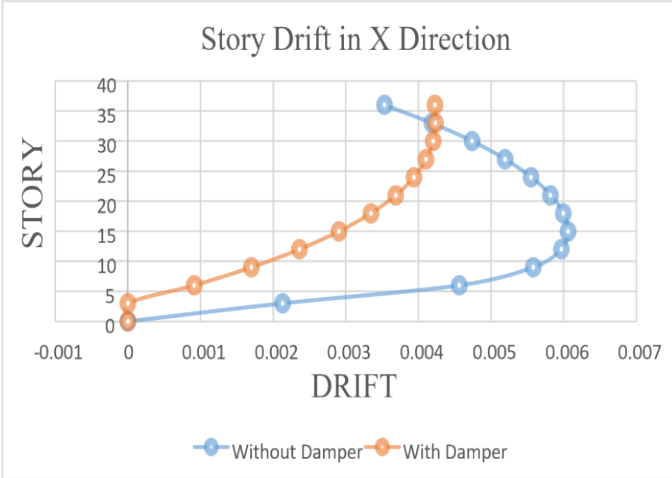
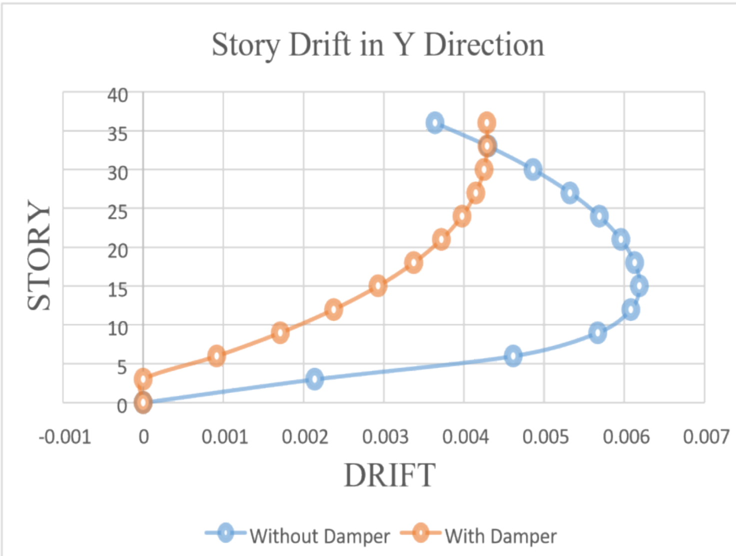


Table 5.4 Maximum drift in Y- direction.

Story	Elevation(m)	Without Dampers in mm	With Dampers in mm
Story12	36	0.003638	0.004284
Story11	33	0.004301	0.004291
Story10	30	0.004864	0.00425
Story9	27	0.005325	0.004148
Story8	24	0.005688	0.003975
Story7	21	0.005957	0.003719
Story6	18	0.00613	0.003373
Story5	15	0.00619	0.002928
Story4	12	0.006082	0.002376
Story3	9	0.00567	0.001709
Story2	6	0.004617	0.000917
Story1	3	0.00214	0
Base	0	0	0



CONCLUSION

- The displacement in X direction the conventional / bare or without dampers in building shows that 39.93% lesser than with dampers in building.
- The displacement in Y Direction the conventional / bare or without dampers in building shows that 40.63% lesser than with dampers in building.
- The story drift in X Direction the conventional / bare or without dampers in building shows that 44.15% lesser than with dampers in building.
- The story drift in Y Direction the conventional / bare or without dampers in building shows that 52.69% lesser than with dampers in building.
- From the overall result the displacement and story drift are minimum in with dampers building as compared to the without damper building.
- Compared to the building connected with dampers the story displacement is increases with increase in stiffness of the buildings.
- The story drift will decrease as the flexibility decreases in building, due to dampers connected to the building.

SCOPE OF FUTURE STUDY

Within the limited scope of the present work, the broad conclusion drawn from this work have been reported. However, further study can be undertaken in the following areas.

- Irregular plan buildings are considered for analysis that can be further extended to vertical irregular plan of building.
- Dampers provided at the corners only, further study also may be undertaken by providing different location
- fixed base structure, further study may also be undertaken by considering of soil structure interaction.
- The study is further being extended to progressive collapse mechanism.

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