

1. To carry out analysis for 20 and 35 storey structure with fixed base (FB), braced fixed base (BFB), base isolated (BI) and braced base isolated (BBI) using SAP2000.
2. To explore effect of earthquake ground motion.
3. To compare the results of time period, base shear, displacement, storey drift, absolute acceleration, relative acceleration.

Base shear, displacement, storey drifts, absolute accelerations and relative acceleration in the middle column are taken into consideration as the comparison criteria.

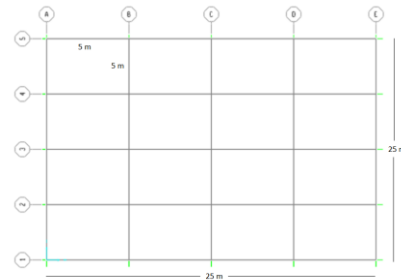


Fig -1: plan of 20 storey and 35 storey structure

4. PROBLEM DESCRIPTION

20 storey structure details

Height of story	-	3 m
Modal damping ratio	-	5 %
Plan area	-	25 m x 25 m
Grade of concrete	-	M30
Grade of steel bracing	-	Fe250
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Size of Beams	-	0.3 m x 0.6 m
Slab thickness	-	0.150 m
Live load on slab	-	3 kN/m ²
Brace section	-	ISA 150 x 150 x 18
Size of Column		
1 st to 10 th floor	-	0.45 m x 0.45 m
11 th to 20 th floor	-	0.4 m x 0.4 m

35 storey structure details

Height of story	-	3 m
Modal damping ratio	-	5 %
Plan area	-	25 m x 25 m
Grade of concrete	-	M30
Grade of steel bracing	-	Fe250
Reinforcing bar	-	HYSD 500
Size of Beams	-	0.3 m x 0.6 m
Slab thickness	-	0.150 m
Live load on slab	-	3 kN/m ²
Brace section	-	ISA 200 x 200 x 15
Size of Column		
1 st to 7 th floor	-	0.6 m x 0.6 m
8 th to 14 th floor	-	0.55 m x 0.55 m
15 th to 21 st floor	-	0.5 m x 0.5 m
22 nd to 28 th floor	-	0.45m x 0.45 m
29 th to 35 th floor	-	0.4 m x 0.4 m

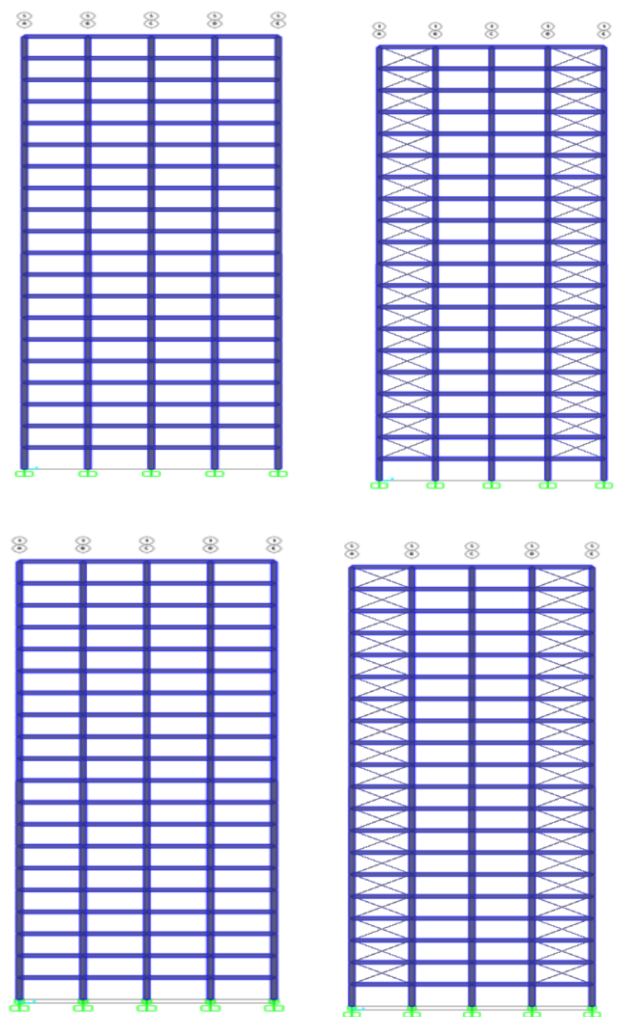


Fig -2: elevation of 20 storey structure fixed base, braced fixed base, base isolated and braced base isolated structure

Properties of lead rubber isolator for 20 storey:

Effective stiffness U1	-	180000
Effective stiffness U2 & U3	-	600
Nonlinear Effective stiffness U2	-	600

- & U3
- Yield Strength U2 & U3 - 40
- Post yield stiffness ratio U2 & U3 - 0.1
- Properties of lead rubber isolator for 35 storey:
- Effective stiffness U1 - 350000
- Effective stiffness U2 & U3 - 1000
- Nonlinear Effective stiffness U2 & U3 - 1000
- Yield Strength U2 & U3 - 70
- Post yield stiffness ratio U2 & U3 - 0.1

5. RESULTS

Natural time period

Table -1: Time period of 20 storey

Mode shape	Type of Structure			
	Fixed base	Braced fixed base	Base isolated	Braced base isolated
1	2.43	1.89	4.55	4.38
2	2.43	1.89	4.55	4.38
3	2.15	1.26	4.01	3.72
4	0.83	0.59	1.25	1.10
5	0.83	0.59	1.25	1.10

Table -2: Time period of 35 storey

Mode shape	Type of Structure			
	Fixed base	Braced fixed base	Base isolated	Braced base isolated
1	4.04	3.41	5.81	5.48
2	4.04	3.41	5.81	5.48
3	3.4	2.14	4.89	4.25
4	1.39	1.05	1.94	1.77
5	1.39	1.05	1.94	1.77

Base shear

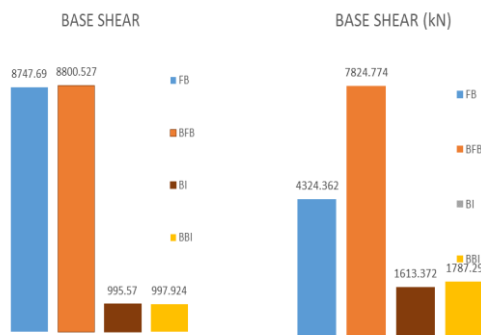


Fig -1: base shear of 20 storey and 35 storey structure

Displacement

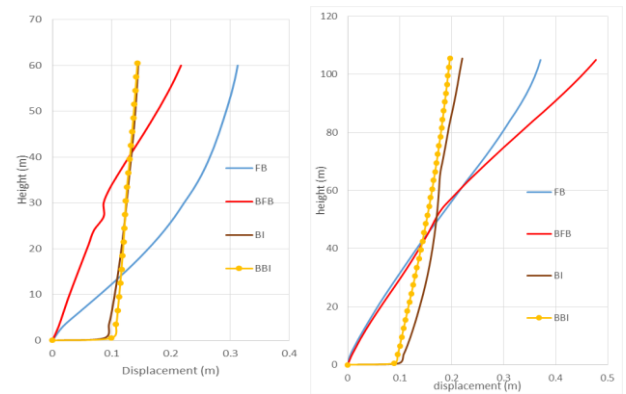


Fig -2: displacement of 20 storey and 35 storey structure

Storey Drift

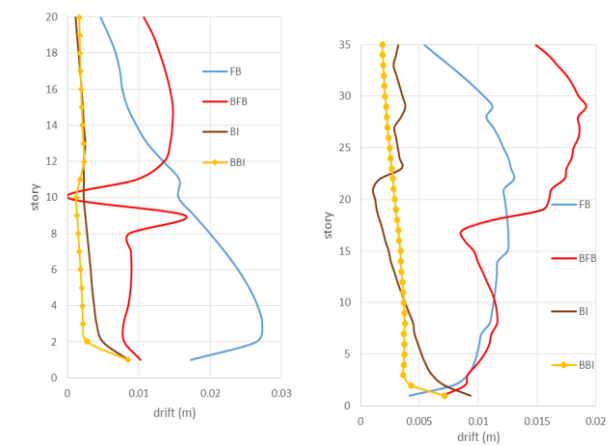


Fig -3: storey drift of 20 structure and 35 story structure

Absolute acceleration

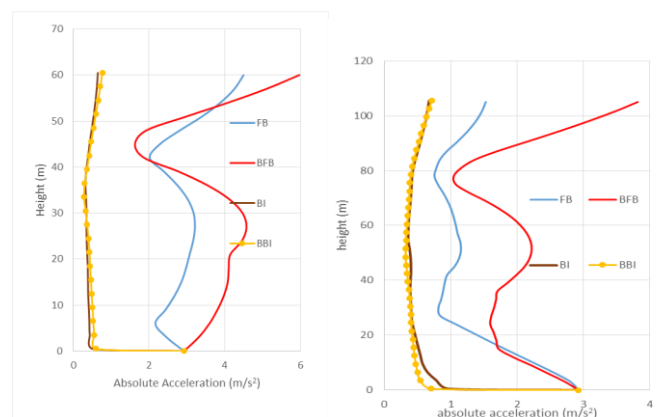


Fig -4: absolute acceleration of 20 storey and 35 storey structure

6. CONCLUSIONS

In this dissertation work an attempt is made to check the performance of RC frame structure with bracing under base

isolation. 4 different models of 20 storey and 4 models of 35 storey are considered for the analysis. The analysis results are tabulated and compared.

- For 20 story building base shear is reduced by 88% for base isolated building and for 35 storey building, base shear is reduced 63% for base isolated building compared to fixed base building.
- For 20 story structure displacement is decreased in braced base isolated structure compared to fixed base and base isolated structure.
- Storey drift is reduced in base isolated structure compared to fixed base building.
- Time period of braced structure is also reduced compared to structures without bracing because of its increased stiffness.
- Storey acceleration is also reduced for base isolated structure for both 20 storey and 35 storey structure.

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