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TO STUDY EFFECT OF SHAER WALL POSITIONS ON SEISMIC PARAMETERS STORY DISPLACEMENT AND STORY SHEAR

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Abstract - *This paper is concerned with the study of seismic analysis of G+6 symmetrical building by using ETABS. To study the behavior of RCC building under seismic force in the basic direction (X and Y). The parameters involved for the analysis is story displacement, base shear, for various patterns of shear wall for seismic zone III.*

Key Words: *Story displacement, base shear, ETABS*

I.INTRODUCTION

All over world there is high demand for construction of tall building due to increasing urbanization and population. Since earthquake force are random in nature and unpredictable, the static and dynamic analysis of the structures have become the primary concern of civil engineering. When multistoried structure designed, they are made to fulfill basic aspects and serviceability and should give attention towards behavior of structure against load imposed. Seismic load are the force that occur during the life of a building. Building should be able to withstand seismic load due to minor earthquake. This work is concerned with the study of seismic analysis and design of G+6 symmetric building. Etabs software is used here.

There are so many parameters affect on building to responding for earthquake. By analysis these parameters we can resist the building by damaging during earthquake. Following are considered for study.

1.Position of shear wall

2.Story Displacement

3.Base shear

II. OBJECTIVE OF WORK -

- To Analysis & design RCC structure (G+6) by using ETABS.
- To study the behavior of RCC building under seismic force in basis direction. (Along X and Y)
- To analyze parameters base shear and lateral displacement for various patterns of shear wall.
- To compare effect of various patterns of shear, wall on parameters base shear and lateral displacement

III.METHODOLOGY

Here, the study is carried out for the behavior of G+6 RC buildings. Building is modelled for Indian seismic zone IV from IS 1893-2002. Modeling and analysis is done by using ETABS Software.

Table no-1- Models and their description

Sr.no	Model	Description
1	Model-1	Structure Without shear wall
2	Model-2	Shear wall provided at core at top and bottom story
3	Model-3	Shear wall provided at core at alternate story
4	Model-4	Shear wall provided symmetrically at core at all stories
5	Model-5	Shear wall provided symmetrically along a periphery at top and bottom story
6	Model-6	Shear wall provided symmetrically along a periphery at alternate story
7	Model-7	Shear wall provided symmetrically along a periphery at all stories

Table no -2- Building Details

Type of frame	**SMRF**
Response Reduction factor	5
Importance Factor (I)	1
Soil Type	II
Zone factor	0.16
No of Story	G+6
Height of bottom story	1.5 m
Height of upper Stories	3 m
Size of Beam	0.3 mx 0.45 m
Size of column	0.3m x 0.45m
Thickness of slab	0.125 m
Live load	2 KN/M²
Dead load	1 KN/M²
Internal wall Thickness	0.230 M
External Wall Thickness	0.150 M
Grade of Concrete	M25
Grade of Steel Reinforcement	Fe 500 Mild 250

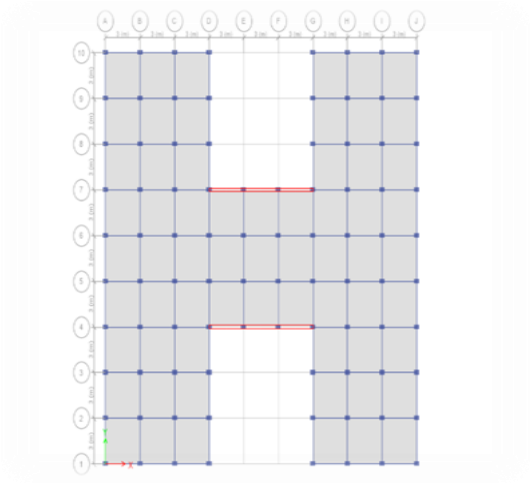

Fig -1-Top view of shear wall at side

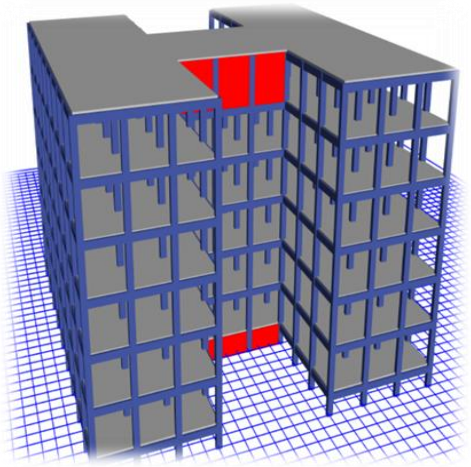

Fig -2- 3D view of model 2

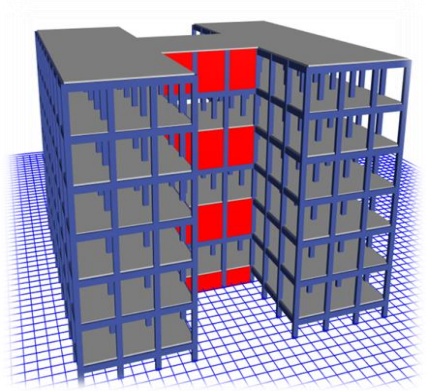

Fig -3- 3D view of model 3

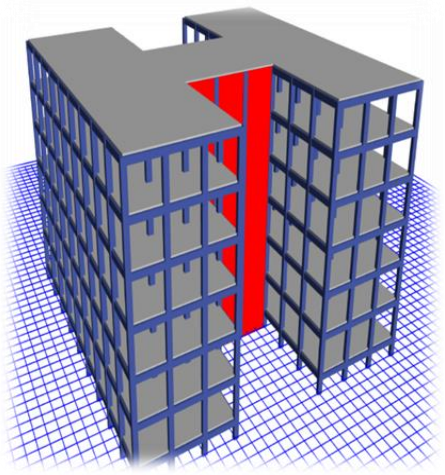

Fig -4- 3D view of model 4

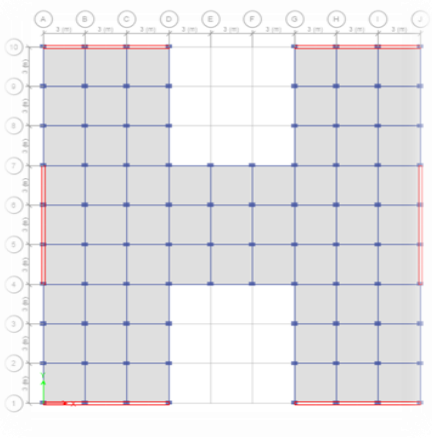

Fig -5-Top view of shear wall at side

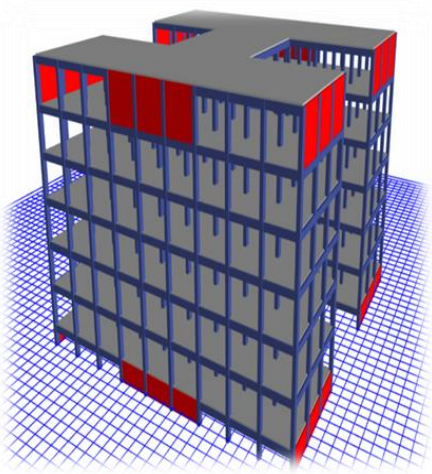

Fig -6- 3D view of model 5

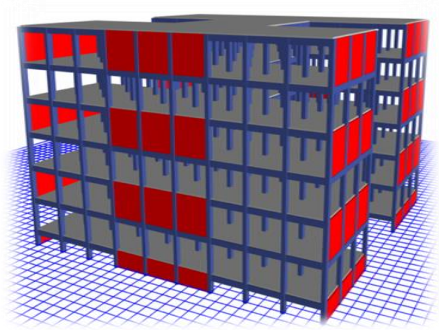

Fig -7- 3D view of model 6

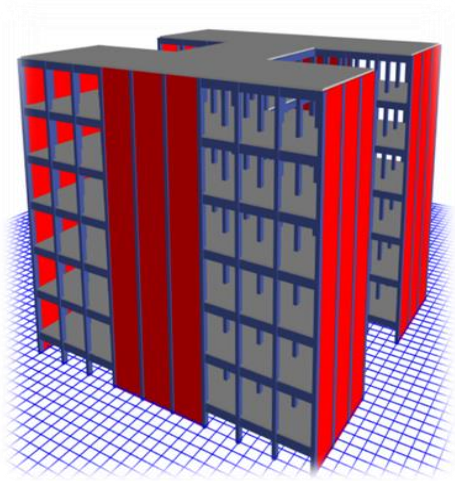

Fig -8-3D view of model 7

IV. RESULT AND DISCUSSION

Table 3. Earthquake Along X Direction and displacement in X direction

Story	Model-1	Model-2	Model-3	Model-4	Model-5	Model-6	Model-7
Story7	14.744	13.961	12.236	6.666	13.541	10.761	3.522
Story6	13.45	13.168	11.153	5.714	13.14	10.032	2.93
Story5	11.434	11.331	9.317	4.517	11.182	7.756	2.24
Story4	8.903	8.792	7.481	3.279	8.592	7.035	1.561
Story3	6.073	5.916	5.034	2.102	5.721	4.079	0.952
Story2	3.133	2.957	3.188	1.049	2.7	3.301	0.466
Story1	0.463	0.407	0.458	0.198	0.316	0.335	0.13
Base	0	0	0	0	0	0	0

Table 4. Earthquake Along X Direction and displacement in Y direction

	Model-1	Model-2	Model-3	Model-4	Model-5	Model-6	Model-7
Story7	2.064	2.056	2.25	1.943	1.824	1.156	0.401
Story6	1.866	1.915	2.042	1.742	1.775	1.029	0.34
Story5	1.585	1.605	1.787	1.412	1.487	0.963	0.252
Story4	1.232	1.238	1.419	1.047	1.129	0.858	0.177
Story3	0.841	0.842	1.004	0.686	0.746	0.616	0.116
Story2	0.438	0.443	0.623	0.347	0.38	0.574	0.07
Story1	0.064	0.107	0.109	0.057	0.131	0.129	0.031
Base	0	0	0	0	0	0	0

Table 5. Earthquake Along Y Direction and displacement in X direction

	Model-1	Model-2	Model-3	Model-4	Model-5	Model-6	Model-7
Story7	16.982	16.817	16.557	16.108	15.63	12.594	5.562
Story6	15.621	15.534	15.251	14.775	15.286	11.867	4.616
Story5	13.355	13.284	12.997	12.602	13.065	9.384	3.571
Story4	10.471	10.407	10.254	9.849	10.148	8.502	2.531
Story3	7.22	7.161	7.009	6.76	6.849	4.907	1.568
Story2	3.801	3.747	3.769	3.529	3.382	4.109	0.765
Story1	0.52	0.488	0.491	0.485	0.263	0.322	0.196
Base	0	0	0	0	0	0	0

Table 6. Earthquake Along Y Direction and displacement in Y direction

	Model-1	Model-2	Model-3	Model-4	Model-5	Model-6	Model-7
Story7	1.658	1.583	1.441	1.097	1.572	1.137	0.723
Story6	1.494	1.468	1.286	0.94	1.404	0.968	0.591
Story5	1.263	1.249	1.112	0.758	1.192	0.771	0.462
Story4	0.98	0.966	0.854	0.569	0.91	0.617	0.337
Story3	0.667	0.656	0.618	0.383	0.601	0.382	0.222
Story2	0.347	0.35	0.34	0.207	0.297	0.361	0.126
Story1	0.052	0.068	0.069	0.039	0.046	0.047	0.046
Base	0	0	0	0	0	0	0

Table 7. Earthquake in the direction of X then base shear at the bottom of the story

	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	MODEL 7
Story7	891.4214	889.3817	1097.902	1285.382	877.8382	1113.623	1284.85
Story6	1563.529	1603.772	1979.786	2294.12	1599.561	2029.198	2308.212
Story5	2013.453	2064.245	2534.646	2970.904	2058.517	2592.288	2993.273
Story4	2285.629	2342.803	2893.836	3381.817	2336.157	2963.058	3407.693
Story3	2424.494	2484.925	3065.089	3592.943	2477.81	3136.851	3619.132
Story2	2474.486	2536.088	3132.727	3670.365	2528.805	3204.952	3695.249
Story1	2479.9	2541.486	3139.39	3679.945	2533.993	3211.533	3703.28
Base	0	0	0	0	0	0	0

Table 8. Earthquake in the direction of X then base shear at the top of the story.

	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	MODEL 7
Story7	891.4214	889.3817	1097.902	1285.382	877.8382	1113.623	1284.85
Story6	1563.529	1603.772	1979.786	2294.12	1599.561	2029.198	2308.212
Story5	2013.453	2064.245	2534.646	2970.904	2058.517	2592.288	2993.273
Story4	2285.629	2342.803	2893.836	3381.817	2336.157	2963.058	3407.693
Story3	2424.494	2484.925	3065.089	3592.943	2477.81	3136.851	3619.132
Story2	2474.486	2536.088	3132.727	3670.365	2528.805	3204.952	3695.249
Story1	2479.9	2541.486	3139.39	3679.945	2533.993	3211.533	3703.28
Base	0	0	0	0	0	0	0

Table 9. Earthquake in the direction of Y then story shear at the bottom of the story

	model 1	model 2	model 3	model 4	model 5	model 6	model 7
Story7	727.0192	708.6054	716.4418	724.5986	715.5697	899.5572	1284.85
Story6	1275.172	1277.789	1291.92	1293.246	1303.882	1639.137	2308.212
Story5	1642.118	1644.666	1653.996	1674.764	1678	2093.987	2993.273
Story4	1864.097	1866.603	1888.388	1906.406	1904.318	2393.486	3407.693
Story3	1977.352	1979.837	2000.14	2025.422	2019.787	2533.872	3619.132
Story2	2018.123	2020.601	2044.277	2069.066	2061.355	2588.882	3695.249
Story1	2022.539	2024.902	2048.625	2074.467	2065.584	2594.198	3703.28
Base	0	0	0	0	0	0	0

Table 10. Earthquake in the direction of Y then story shear at the top of the story.

	model 1	model 2	model 3	model 4	model 5	model 6	model 7
Story7	727.0192	726.5295	734.5641	742.9273	715.5697	899.5572	1284.85
Story6	1275.172	1277.789	1291.92	1306.369	1303.882	1639.137	2308.212
Story5	1642.118	1644.666	1662.682	1683.549	1678	2093.987	2993.273
Story4	1864.097	1866.603	1888.388	1911.72	1904.318	2393.486	3407.693
Story3	1977.352	1979.837	2002.821	2028.133	2019.787	2533.872	3619.132
Story2	2018.123	2020.601	2044.277	2070.042	2061.355	2588.882	3695.249
Story1	2022.539	2024.941	2048.665	2074.508	2065.584	2594.198	3703.28
Base	0	0	0	0	0	0	0

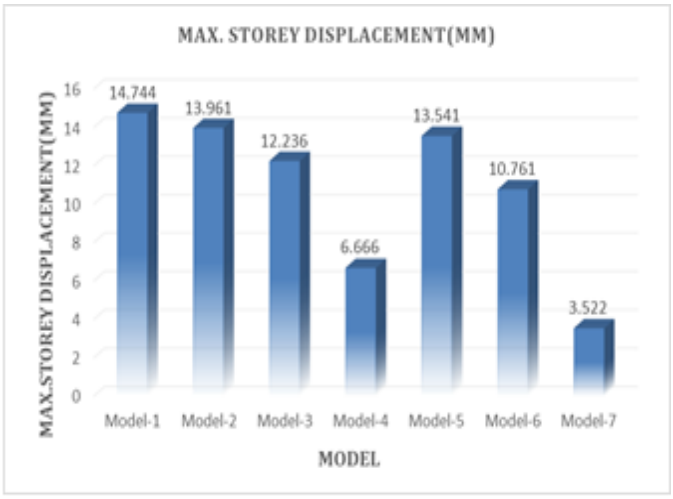

Fig No -1: Story displacement for different positions of shear wall.

From above graph it is observed that maximum displacement 14.744mm is occurred for model 1 in which shear wall is not providing and minimum displacement 3.522 mm is occurred for model 7 in which Shear wall provided centrally at side faces to all stories.

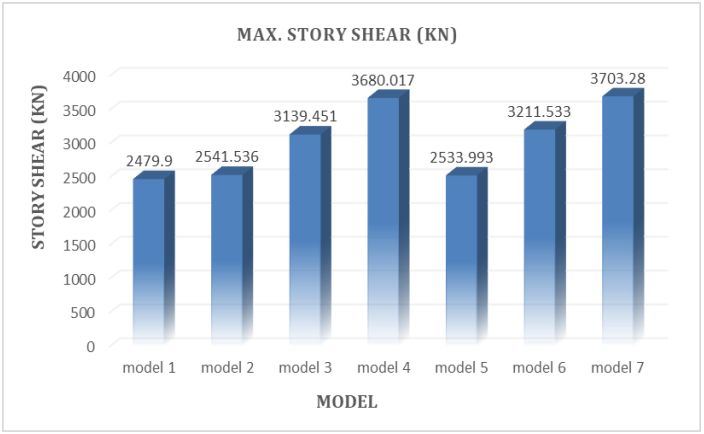

Fig No - 2: Base shear for different positions of shear wall.

From above graph it is observed that maximum base shear 3703.28 KN is occurred for model-7 in which Shear wall provided centrally at side faces to all stories and minimum story shear 2479.9 KN is occurred for model-1 in which shear wall is not provided

V. CONCLUSIONS-

1. In this investigation it is observed shear wall position gives different performance with different location patterns.
2. Here the model in which Shear wall provided symmetrically along a periphery at all stories (model 7) reduce maximum displacement upto 23.88 %

3.From above results it is observed that storey shear increases with increase in story height for all models.

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