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Comparative Study of Shear Wall in High Raised Multi Storied R.C.C Building

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Abstract – As day by day increasing of population and the demand of construction of high rise buildings is required is high due to the scarcity of land. Shear walls are most commonly use lateral load resisting walls and Constructions made of shear walls are high in strength, they majorly resist the Earth quake and wind forces and even can be build on soils of weak bases by adopting various techniques. Not only the quickness in construction process but the effectiveness to bare horizontal loads is very high. Shear walls generally used earth quake prone areas, as they are highly efficient in taking the loads and form work used in this type of construction is of a new kind in Indian construction scenario. The location of shear wall in multi storied R.C.C buildings not much discussed in any literatures. The Research work is about comparison of different seismic analysis and wind analysis of G+15, Specially moment resisting frame (SMRF).Modeling of structure is done in stad pro v8i and Etabs.

Key Words: Multi storied building, Shear wall, Stad pro v8i, Etabs, Lateral loads

1. INTRODUCTION

Seeing the past records of earthquake, the increase and demand of earth quake resting buildings which can be fulfilled by the shear wall system. Also the major earthquakes of different paths the codal provisions are revised and improved the earthquake design structures. Earth quakes are very frequent in all over the world. It is very difficult to predict the location and time of occurrence of earth quake. Structures are designed loads like dead load, live load, wind load and they are may not be necessarily safe due to earth quake. It is either economical or practical to design of structures to remain within elastic limit during earthquake.

SEISMIC METHODS:

The analysis process are categorized based on the three factors: Externally applied loads, behavior of structure and structural model

A predefined lateral load which is scattered along the building height is then applied. And those of the consider to the members yield and external action and behavior of structure, they are classified as

1. Linear static analysis
2. Non-linear static analysis
3. Non-linear dynamic analysis
4. Linear dynamic analysis

Equivalent static analysis is analyzed in regular structure at a limited height and performed the response spectrum method or time history method the difference of the level load is distributed. Non linear dynamic analysis is most accurate method.

2. Literature Review

Various literatures reviewed which are based on the analysis of seismic forces and its impact and effect of living. Focused on the work done by various authors on the seismic analysis are consider on various softwares.

Dr.KV BALAJI & P RAJU(2015) :They did the research work on effective area of shear wall in the place showed consistent with their results they concluded that by placing of shear wall beneath of the bottom shear improved comparison of shear without shear wall in earth quake prone areas is 26% of it. And the consists through the strength is increases while providing the shear wall.

Pooja S and Pandey N (2014): They studied the shear walls at different positions and heights of building where there is consider the increase in openings in the shear wall, lateral displacements increased in great extent. By providing shear walls at periphery the displacement considerably reduced.

Pajagade N and Ainawala S (2014): They study about the shear wall vicinity on the lateral displacement and storey with the flow of a multi storey constructing that among all of the models they have in seismic response through the economical design.

Chandrasekaran S and Praksh K (2002): The research is about the Seismic performance of the multi storied building it is a comparative of the seismic performance of different zones and the consider through the shear wall how it is strengthen the building. The shear wall system a very predinoment for the building.

Deshmukh S.N and Sabihuddin S: They study about the seismic analysis of multi storied building using composite structures and earth quake analysis and design of structures they conclude that the composite structures of shear wall will resistant the load is more as compare to without shear wall.

3. OBJECTIVE

The modeling and analysis of structure using stad pro and etabs

1. The design and analysis of structure in stad pro and etabs
2. Study of wind forces and seismic performance in the structure as per IS 875 and IS 1893.

3. Comparison of results in stad pro and etabs which is economical.

4. DESIGN DATA

Density of concrete	:	25 kN/m^2
Seismic zone	:	III
Dead Load of slab	:	4.00 kN/m^2
Live load	:	2.0 kN/m^2
Live load (Balcony/corridors/utilities)	:	3.0 kN/m^2
Staircase load (DL)	:	8.0 kN/m^2
Staircase load (LL)	:	3.0 kN/m^2
Floor finish	:	1.0kN/m^2
Weight of partitions 230 mm	:	5.75kN/m^2
Depth of foundation below ground	:	2.0 m
Safe bearing capacity (SBC) of the soil	:	(>180)kN/m^2
Basement Storey height	:	2.5m
Typical Storey height	:	3.0m
Floors	:	G + 15 upper floors.
Plinth level	:	0.6 m
Water tank Slab+ finishes(DL) 150 thick	:	7 kN/m^2
Water tank (LL)	:	20 kN/m^2
LIFT Machine room (DL) 150 thick	:	4.75 kN/m^2
LIFT Machine room (LL)	:	10 kN/m^2
Zone factor of the building (Z)	:	0.24 (Zone IV)
Importance of the building (I)	:	1.0
Response reduction factor (R)	:	5(SMRF)
Soil type	:	Medium soil
Width of building in X-direction	:	64m
Width of building in Y-direction	:	31.4m
Height of the building	:	59m

5. MODELING AND ANALYSIS

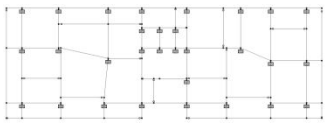

Fig1. Typical Floor Plan

Top View (Stad Pro)

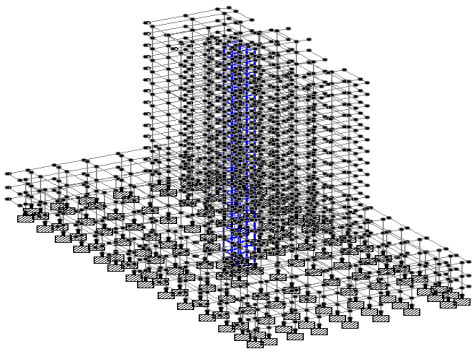

Fig.1 Geometric view of building With shear wall (Stad Pro)

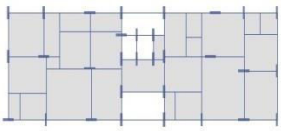

Fig2. Typical Floor Plan (Etabs)

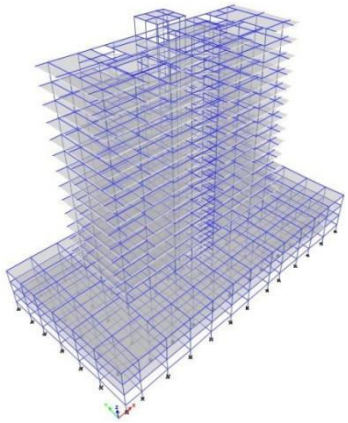

Fig.2 Geometric view of building With shear wall (Etabs)

6. RESULTS AND DISCUSSION

It has observed that the when G+15 Multi storied high rise building with shear wall with same beam and column analyzed and design loads using both the soft ware's there are many similarities. The frame models include different loading conditions. The parameters are which are studied which are shown below.

Table 1: Comparison of Results of Stad and Etabs

	STAAD	ETAB	DIFF	
9" WALL LOAD	29569	29568	1	0.00
4.5"WALLLOAD	13468	13468	0	0.00
PARAPET	449	449	0	0.00
STAIR DEAD	4110	4110	0	0.00
STAIR LIVE	1538	1538	0	0.00
EXTRA DEAD	6532	6532	0	0.00
EXTRA LIVE	3266	3266	0	0.00
POINT	5784	5874	-90	-0.02
BALCONY	1916	1916	0	0.00
WIND X1	4891	4891	0	0.00
WIND –X2	4878	4878	0	0.00
WIND Y1	1918	1918	0	0.00
WIND –Y2	1919	1919	0	0.00
FILLING	20020	20020	0	0.00
TER LIVE	991	991	0	0.00
FLOOR LIVE	17614	17612	2	0.00
FLOOR DL	19742	19742	0	0.00
EQX	4660	4838	-178	-0.04
EQY	7916	8218	-302	-0.04
COMB 9	231273	231447	-176	0.00
SELF WEIGHT	104816	104987	-171	0.00

Table 2: Design Results of Sample Beam and Column

Section	Total Reinforcement (sq mm)	
	Stad pro	Etabs
Beam	1142	1042
Column	3342	3342

Table 3: Storey Stiffness of Shear wall

Storey	Floor Height(m)	Storey Stiffness(KN/m)	
		Stad	Etabs
Terrace	59	14115.23	14015.23
15Floor	56	83654.23	83625.22
14Floor	53	132772.34	131773.56
13Floor	50	202512.22	202352.32
12Floor	47	260285.25	259956.65
11Floor	44	295622.32	285256.39
10Floor	41	335289.23	331528.25
9Floor	38	361258.59	360832.56
8Floor	35	405283.25	402535.35
7Floor	32	448456.65	441258.89
6Floor	29	498577.25	498155.32
5Floor	26	543252.77	541256.58
4Floor	23	603222.32	601225.35
3Floor	20	642589.99	641258.88
2Floor	17	698512.56	698213.52
1Floor	14	803562.52	801235.95
G.Floor	11	1058654.39	1051258.32
Cel.Floor	8	1652598.33	1651258.23
Sub.cel.Floor	5	2632855.98	2612585.36
Plinth	2	5256893.22	5251286.65
Base	0	0	0
		5256893.22	5251286.65

7. CONCLUSIONS

1. Shear wall elements are very much efficient in reducing the Earth quake displacements of structure with horizontal deflection.
2. Shear wall construction will provide the large stiffness to the building by reducing the damage of structure.
3. Compare to the stad pro and etabs results etabs is economical for design.
4. According Table 2 The Reinforcement is economical in etabs compared to stad pro.
5. Stad pro softwear more flexiable to work compare to etabs

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