ANALYSIS OF REGULAR AND IRREGULAR BUILDING WITH SHEAR WALL AND SOFT STOREY UNDER THE ACTION OF WIND LOAD

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ABSTRACT- The case learn about which includes the behavior of RC structures, an investigation has been carried out to study the finest place & shape of shear wall in multistoried building & additionally the investigation has been carried out to see the conduct of structure with a soft story zone-2 level in the structures. As building heights increase and their geometric turn out to be irregular, the conventional analysis tools for wind loads such as code based totally methods and even the most advanced tools such as the High-Frequency Base Balance (HFBB) data analysis have no longer been in a position to deliver accurate effects in identifying the effect of wind load on high-rise buildings. The HFBB analysis, in spite of having been formulated the use of actual wind tunnel test data, can solely be effectively applied for structures with normal geometries. The multistoried building has been analyzed using the ETABS software which has guided in a adequate manner to determine the various parameters like Storey drifts, Storey displacement, Base Shear& Time period. The obtained results have been performed by using ESA method have been plotted in graphs and charts.

1. INTRODUCTION

1.1 GENERAL We are living in a modern era , where the construction industry has been predominant over many other aspects. As the time has progressed various engineering methodology has been utilize to make enormous and gigantic structures .This structures which has to sustain the action of Gravity loadings and the wind loadings has to be designed in such a way that it will be not fragile or brittle that they fail under the action of low intensity of earthquakes.

The earthquakes are the major cause of destruction for human life & property. These Eqs are caused due to the predominate shaking of ground , which in turn release a large amount of strain energy producing different types of waves which in turn effect the stability of the structure. The Earthquake effects impacts are due to the Path of load distributed , source of Eq generated and site conditions .

In general in a RC structure the gravity loading such as Infill brick walls , self weight of members doesn't cause much effect on the structure, but the lateral loadings such as Earthquakes & wind loadings which can induce larger amount of lateral forces in the structure which results in failure .

The RC framed structure filled with infill masonry wall has greater stiffness rather than RC framed structure without infill masonry , as the infill masonry wall enhance the stiffness of the structure during the elastic phase. It is very important for the structure to have lateral stiffness , this can be achieved by having infill walls. The building with soft storey have less stiffness rather than building having without soft storey .

As a simple way of understanding the behavior of soft storey RC framed structure is sudden change in lateral stiffness of the storey within the structure .The most common Structural system with soft storey is provided to have parking spaces below which helps for space utilization within the building . As we tend to provide a soft storey ,we have noticed the deformation occurring in the lower stories . Therefore it is necessary to check the demand and supply of the structural requirement.

2. OBJECTIVES:

- To perform analysis on G+25 story building & determine the behavior of RC framed multistory building.
- Adopting different locations of SW and studying the structural behavior.
- Adopting SW and CW with steel bracing to analysis the effect of the loading on structure.
- Performing analysis by removing infill walls and making it a soft storey on different storey to identify the behavior.
- Using equivalent static analysis, the behaviour of regular and irregular buildings compared.
- Identifying the of Time period , Base Shear , Storey Drift & Displacement the structure.

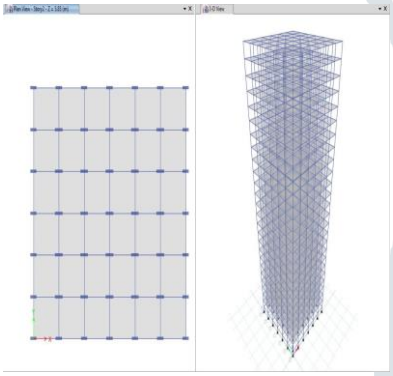
3. METHODOLOGY & STRUCTURAL PLANNING

Type of building	Residential building
Plan area regular irregular	24mX24m 31.92mX24.47m
Storey height	3.35m
Total height of building	88.27m
Type of soil	Type II (Medium soil)
Earthquake zone	2
Location of building	Gulbarga
Type of building	Residential building
Plan area regular irregular	24mX24m 31.92mX24.47m

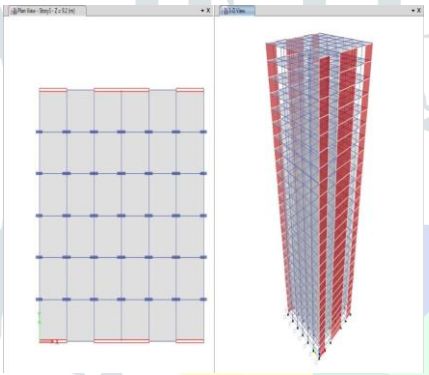
Grade of concrete Slab thickness 150mm Column Beam	 M40 M30
Density of concrete	25 kN/m^3
Grade of steel reinforcement	Fe500
Grade of steel bracings	Fe250
Live load	3 kN/m^2
Floors finish	1.5kN/m^2
Live load reduction factor	25%
Importance factor	1
Density of concrete	25 kN/m^3

Geometrical Properties Of Structure

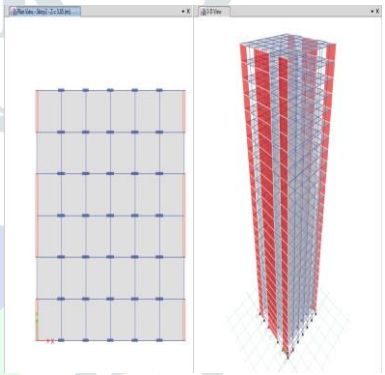
REGULAR BUILDING



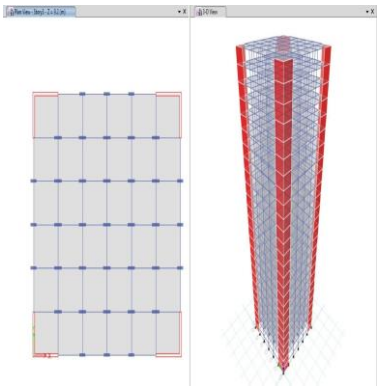
Model for plane building



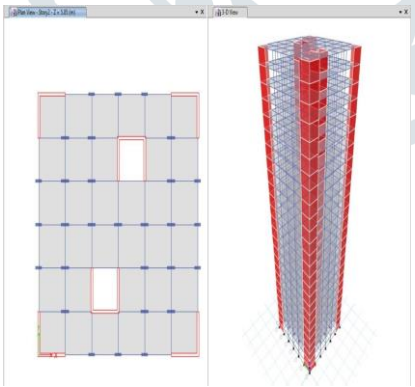
SW in X-Direction



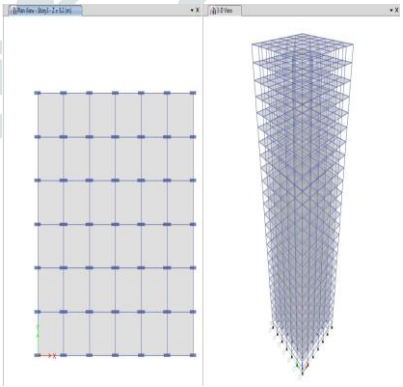
SW In Y-Direction



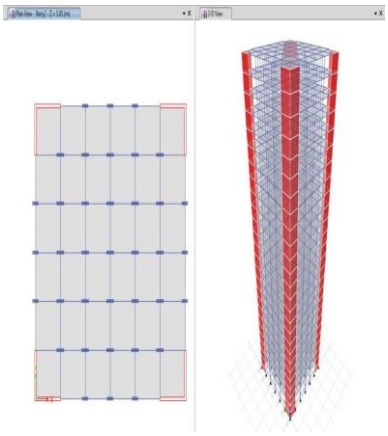
SW In Both X & Y Direction



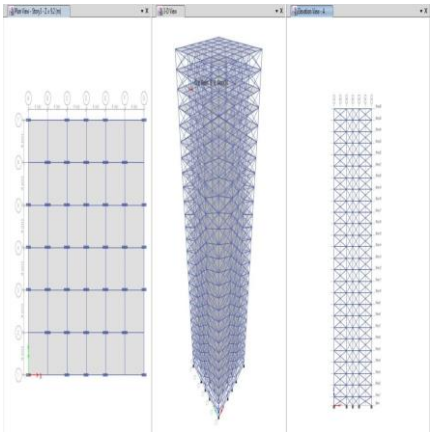
SW in corner & Corewall



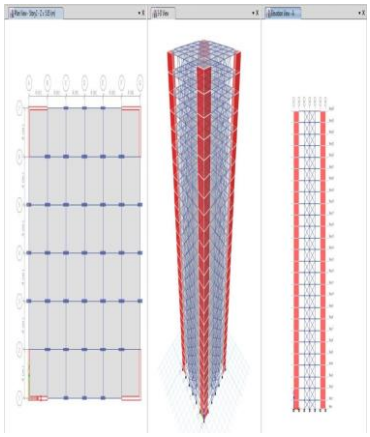
Soft Story



Soft story & SW in corner

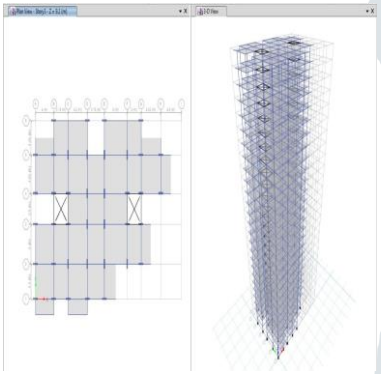


Soft story & Steel Bracing

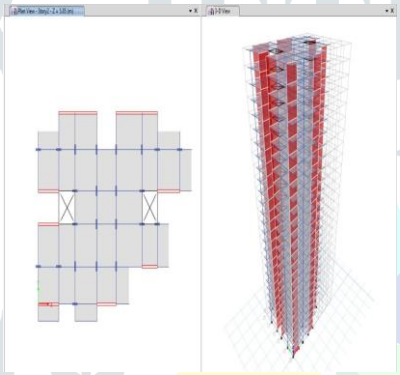


Soft story with SW including steel Bracing

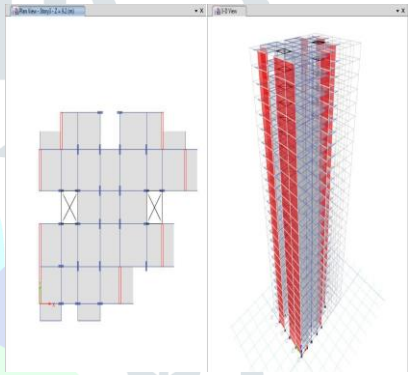
IRREGULAR BUILDING



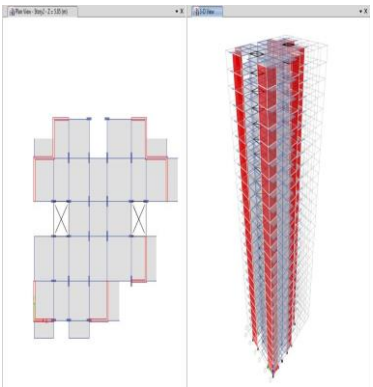
Model for plane building



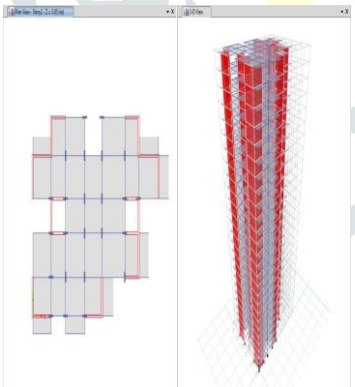
SW in X-Direction



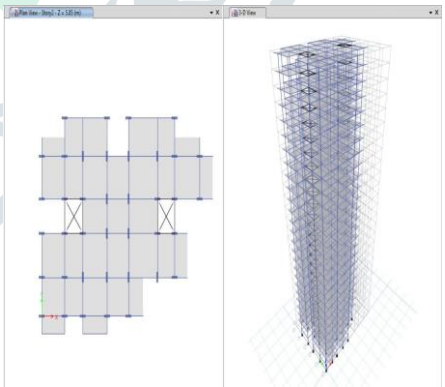
SW In Y-Direction



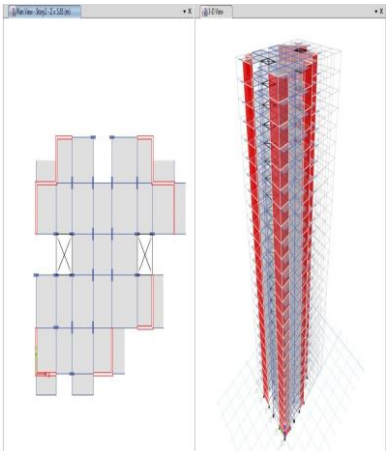
SW In Both X & Y Direction



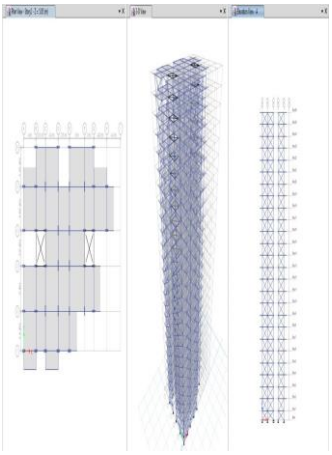
SW in corner & Corewall



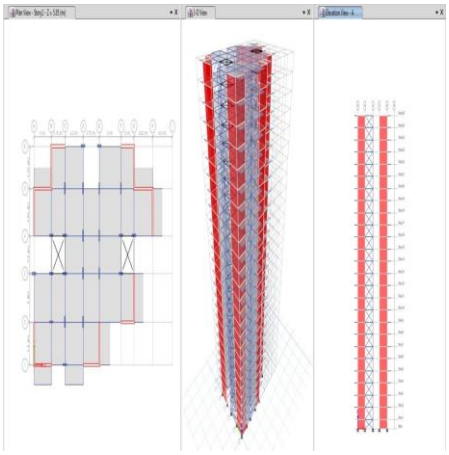
Soft Story



Soft story & SW in corner



Soft story & Steel Bracing



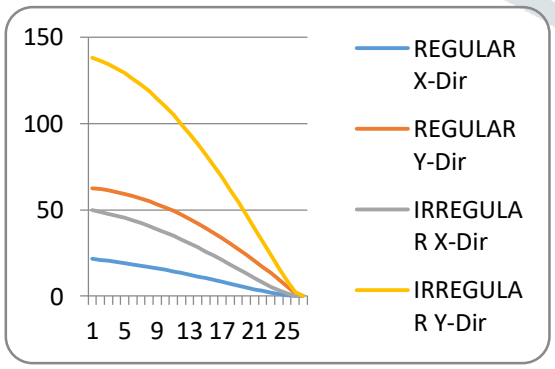
Soft story with SW including steel Bracing

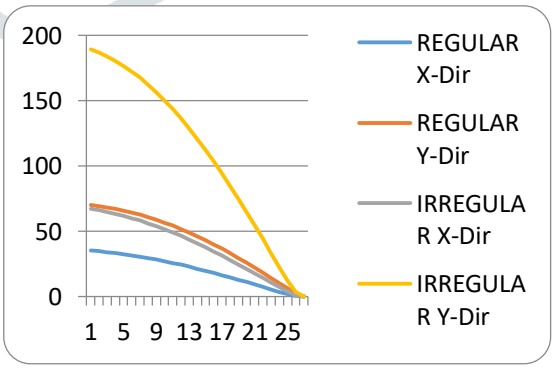
Descripton of Models:

- Model 1 : Regular & irregular model of G+25 Storey , in this model plane model & analysis has been performed by Etabs (wind analysis).
- Model 2 : Regular & irregular Model of G+25 Storey , in this model shear wall is provided in x-direction & analysis has been performed by Etabs (wind analysis).
- Model 3 : Regular & irregular Model of G+25 , in this model shear wall is provided in Y- direction & analysis performed by Etabs (wind analysis).
- Model 4 : Regular & irregular Model of G+25 , in this model shear wall is provided in corner & analysis performed by Etabs (wind analysis) .
- Model 5 : Regular & irregular Model of G+25 , in this model shear wall is provided in corners & corewall have been performend by Etabs (wind analysis).
- Model 6: Regular & irregular model of G+25 , in this model soft story have been performend by Etabs (wind analysis).
- Model 7: Regular & irregular model of G+25 , in this model soft story & shear wall in corner have been performend by Etabs (wind analysis).
- Model 8: Regular & irregular model of G+25 , in this model soft story & steel bracing have been performend by Etabs (wind analysis).
- Model 9 : Regular & irregular model of G+25 , in this model soft story with shear wall including steel bracing have been performend by Etabs (wind analysis).

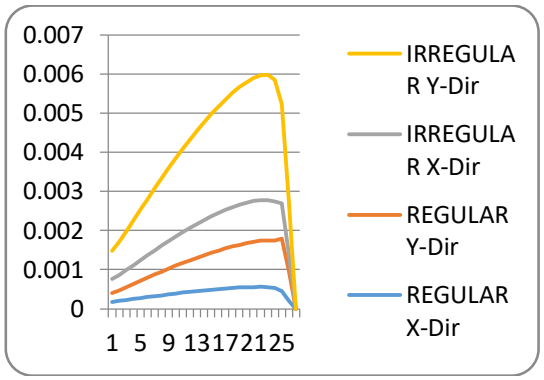
4. RESULTS & DISCUSSIONS

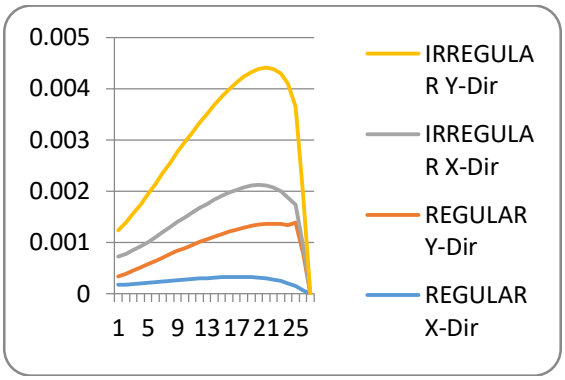
- **Storey displacement:**





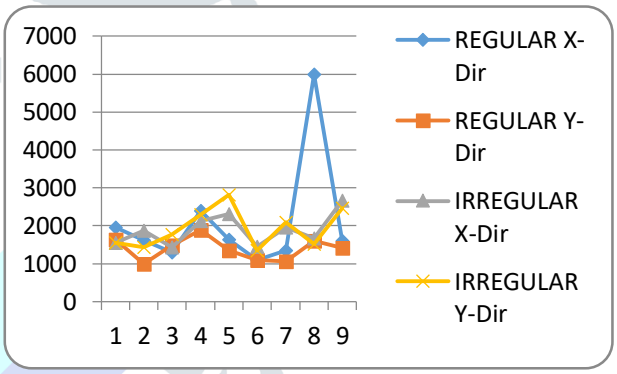
➢ **Storey Drift:**





➢ **Base shear:**

BASE SHEAR (KN)				
MODEL	REGULAR		IRREGULAR	
	X-Dir	Y-Dir	X-Dir	Y-Dir
1	1962.28	1642.527	1553.056	1553.05
2	1623.77	992.7566	1875.12	1439.54
3	1302.48	1486.77	1435.133	1768.40
4	2391.31	1881.68	2125.01	2292.68
5	1627.48	1351.52	2306.848	2815.81
6	1093.77	1093.77	1446.296	1354.70
7	1344.92	1058.27	1963.314	2094.95
8	5994.88	1599.89	1669.29	1514.93
9	1598.54	1424.24	2663.328	2468.83



➢ **Time period:**

TIME PERIOD		
MODEL NO.	REGULAR	IRREGULAR
1	2.988	4.771
2	4.27	3.98
3	3.045	3.999
4	3.458	2.845
5	2.88	2.647
6	4.545	4.768
7	3.458	2.773
8	2.319	3.348
9	2.598	2.229

5. CONCLUSIONS

The study of various cases shows different results for storey displacement, story drift & base shear.

- Compared to irregular model lateral displacement is less in regular model.
- The behaviour of the structure is different for the different shape of the structure. Thus, the structure should be analyzed for each particular angle, and it should be intended for the maximum value of displacement , drift , base shear and time period.
- When compared the both the regular and irregular configuration , the base shear value is more in the regular configuration. Because of the structure have more symmetrical dimensions.
- Time period in irregular configuration has higher value than in regular configuration .
- When comparing the both regular and irregular model , storey drift is found to have maximum value in irregular model .
- Irregular building is found to be more critical hence special observation and safety measures is to be adopted while designing.

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