SEISMIC ANALYSIS OF COMPOSITE RCC SHEAR WALL WITH OR WITHOUT SHEAR WALL, CONSIDERING SOIL STRUCTURE INTERACTION

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Keywords:

Shear wall, base shear, Storey drift, Displacement, SSI, ETABS.

Introduction:

The rapid growth of the urban population and the consequent pressure on limited space has considerably influenced city residential development. The local topographical restrictions in the urban area only possible solutions for construction of multi-story buildings to full fill the residential needs. Looking to the past records of earthquake, there is increase in the demand of earthquake resisting building which can be fulfilled by providing the shear wall systems in the building. As waves from an earthquake reach a structure, they produce motions in the structure. These motions depend on the structure's vibrational characteristics and the layout of structure. The process in which the response of the soil influences the motion of the structure and the motion of the structure influences the response of the soil is termed as soil-structure interaction.

P. P. Chandurkar et al., (2013): conducted a study on seismic analysis of RCC building with and without shear walls. They have selected a ten storied building located in zone II, zone III, zone IV and zone V. Parameters like Lateral displacement, story drift and total cost required for ground floor were calculated in both the cases.

Anand et.al (2010). "Soil-Structure Interaction Effects on RC framed Shear wall Buildings" In this paper. 15 storey building is considered for analysis of the above with and without shear wall for different kinds of soil properties. Between two frames the parameters such as base shear, axial force and lateral displacement were compared. Author concluded that above parameters mentioned increases from hard to soft soil.

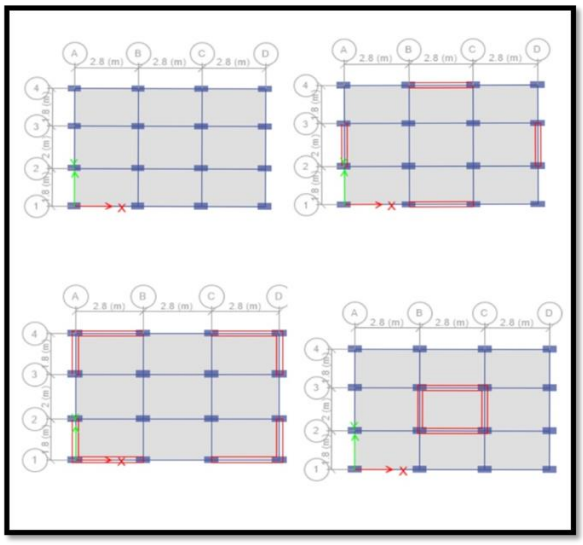
Objectives:

1. To analyse G+11 storey building using ETABS.
2. To study four models with different positioning of shear wall.
3. To investigate shear wall frame and bare frame by the effect of soil structure interaction by considering hard, medium and soft soil and study these using different loading conditions.
4. To study the models with different zones and compare the results obtained by equivalent static analysis (storey drift, lateral displacement and base shear).

Methodology:

The methodology worked out to achieve the mentioned objectives

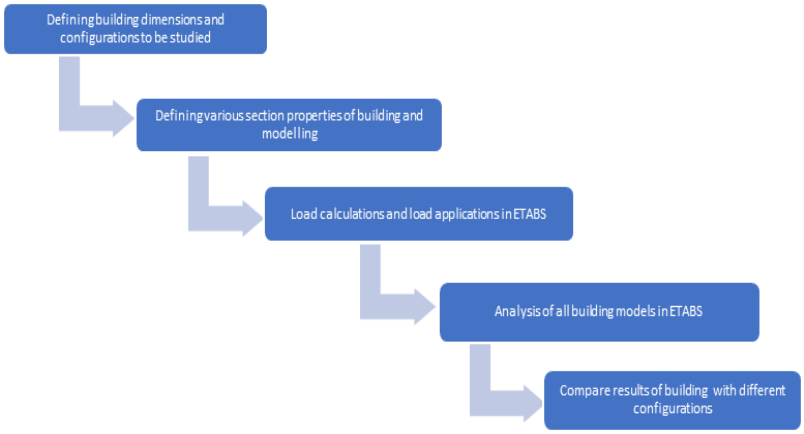
1. In this study G+11 storey building is considered
2. Modelling of the selected building in ETABS
3. Analysis of RCC building with or without shear wall is considered as per IS code for different zones i.e. Zone III and Zone IV considering different soil strata as Hard, Medium and soft soil.
4. Analysed models are compared with Lateral Displacement, Storey Drift and Base shear to evaluate the stability of structure.
5. Calculations of seismic forces and load combinations as per IS 1893:2002



Materials:

MATERIAL PROPERTIES:	
Grade Of Concrete	M30 IN ALL CASE
Grade Of Steel	Fe415(HYSD Bars)
Density Of Reinforced Concrete	25 KN/m^3
Density Of Brick Masonry	20 KN/m^2

Working Process:



Conclusion:

1. The values of base shear obtained for building models with shear wall are more when compared with bare frame.
2. ZONE-IV has shown high base shear values compared to ZONE-III.
3. The storey displacement is more in top storey of Zone-IV which is bare frame with SSI in soft soil when compared to bare frame at Zone-III with SSI in medium and hard soil.
4. Storey drifts is found to be higher middle floors of the structure for both with or without shear wall structure.
5. From the results it was found that the model 3 (The building with shear walls on corner**)** has the least displacement and storey drifts and maximum base shear values compared to all other models.
6. The effect of SSI should be considered in the building which are located in earthquake prone areas.
7. The stiff structure are more affected by the SSI
8. Structure with Shear wall is more stable than that of a structure without shear wall.

Future Scope:

Shear walls are considered to be a gift to the future construction industry. Scope of shear walls in construction field is immense. As per analysis, it is concluded that displacement as well as its storey drift & base shear also at different level in multi-storeyed building with shear wall is comparatively lesser as compared analysis building Without Shear Wall. So now a day we can adopt with shear wall at analysed and optimized location.

1. Present study uses static analysis, it can be extended to dynamic analysis or Non-linear analysis.

2. In this study analysis is carried out for reinforced concrete building frame. Steel structures can also be analysed similarly.
3. We can use different light material, which have high strength with light weight such as plastic mix concrete material.
4. The SSI can be analysed for different irregularities such as mass irregularities, plan irregularities, vertical irregularities and even for diaphragm horizontal irregularities.