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Review on Dynamic Analysis of G+50 Building Having Outrigger and Tube in Tube System

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ABSTRACT - Nowadays, the building height is observed more and more slender, and more susceptible to sway and hence dangerous in the earthquake. Such type of the building can be strengthening by providing an appropriate lateral load resisting system. In the seismic design of the buildings, reinforced concrete structural walls or shear-wall, act as major earthquake resisting members. Structural walls provide an efficient bracing system and offer great potential for lateral load resistance. The properties of these seismic shear-walls dominate the response of the buildings and therefore, it was important to evaluate the seismic response of the walls appropriately. In this study the (G+50) storey building was analyze with different effective and economical system which can resist wind load and seismic load. Based on literature review, an attempt has been made to compare various lateral load resisting systems such as Shear wall, Outrigger, Frame tube system etc using ETABS Software

KEYWORDS: Shear wall, Outrigger, tube system, ETABS

I. INTRODUCTION

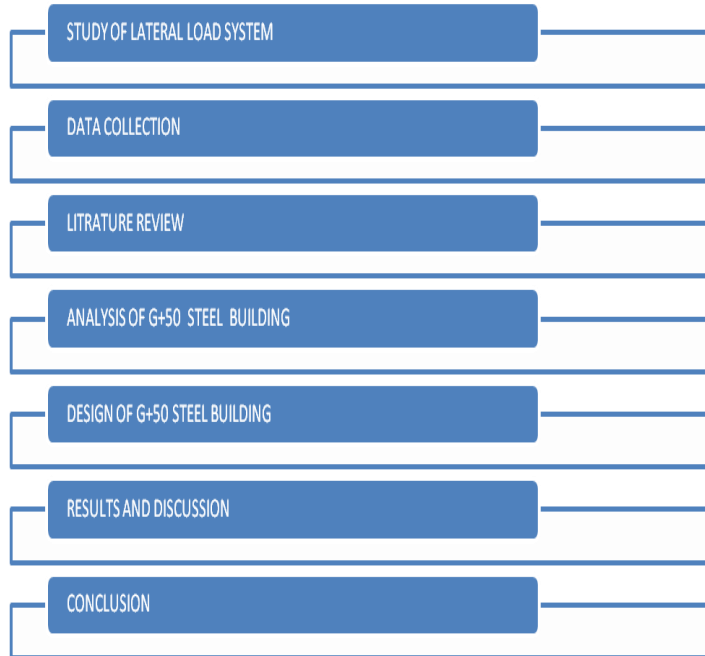
In the recent days, major cities are experiencing the shortage of land due to growing population which leads to increase in construction of tall buildings and in the other hand in view of economic power there is competitiveness in mankind to have the tallest building which make the way of opportunities in the building profession. As these tall building are critical to resist lateral loads structural engineer has been challenged to meet drift requirement and to minimize the effect. Due to limited area and the increasing expansion of urbanization it is feasible to expand in vertical direction than in horizontal direction. And due to increasing vertical urbanization it is important to adopt to more stable structure. Here, tubular structure is one such structure, where the columns are placed at the periphery of the structure. Also here tube in tube structure is used. Compared to conventional structure the tube in tube structure is more stable lateral loads, allows more interior space and helps save around 30% steel. Using an appropriate structural system is critical to good seismic performance of buildings. While moment-frame is the most commonly used lateral load resisting structural system, other structural systems also are commonly used like structural walls, frame-wall system, and braced-frame system. Sometimes, even more redundant structural systems are necessary, e.g., Tube, Tube-in-Tube and Bundled Tube systems are required in many buildings to improve their earthquake behavior. These structural systems are used depending on the size, loading, and other design requirements of the building. One structural system commonly used poses special challenges in ensuring good seismic performance of buildings; this is the Flat slab-column system. The system makes the building flexible in the lateral direction and hence the building deforms significantly even under small levels of shaking. Further, it has relatively low lateral strength, and therefore ductility demand during strong earthquake shaking tends to be large; many times, such levels of ductility cannot be incorporated in buildings with flat slab-column system. This structural system should not be used without introducing in the building stiff and strong lateral force resisting elements, like structural walls and braces



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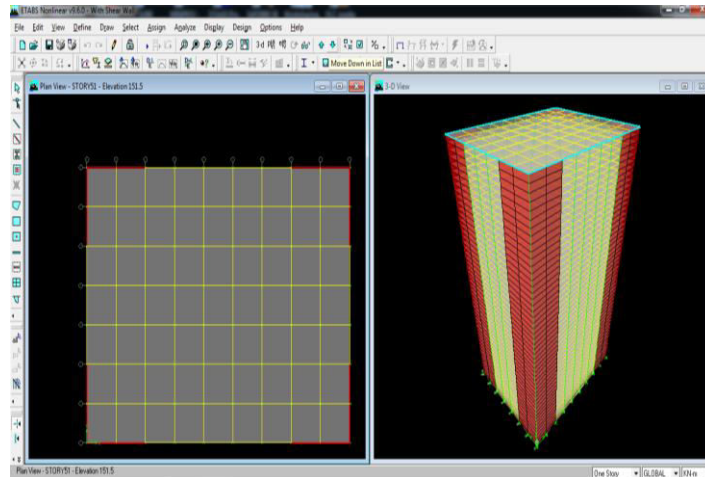
| DOI:10.15680/IJIRSET.2023.1206115 |

II. METHODOLOGY

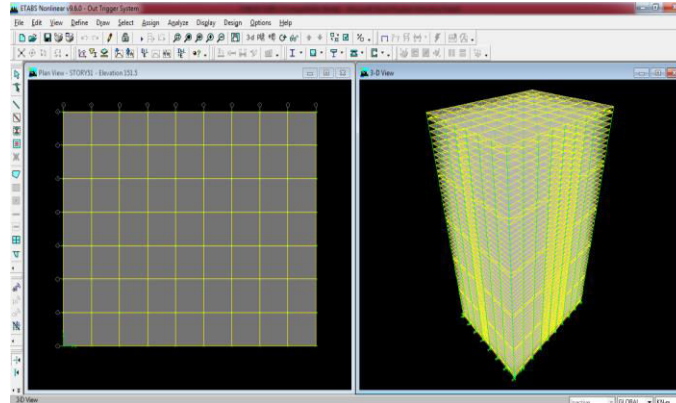


III. PROBLEM STATEMENT

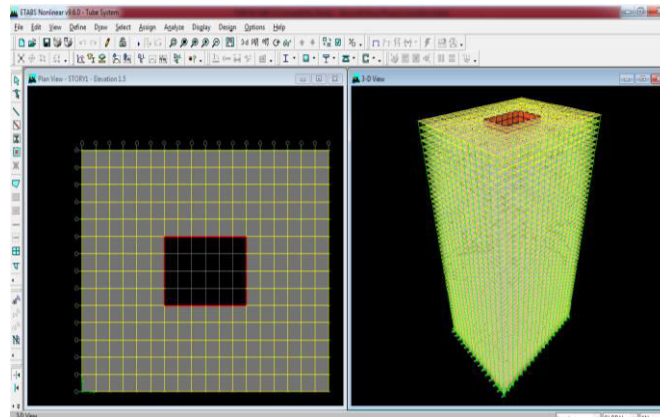
3.2.1 Model 1 - With Shear Wall



3.2.2 Model 2 – With Outrigger System

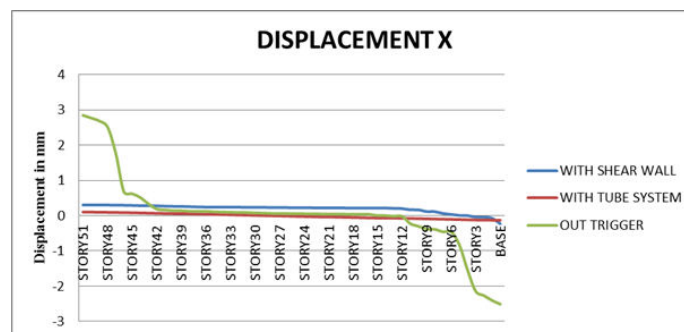


3.2.3 Model 3 – Tube System



V. RESULTS AND DISCUSSION

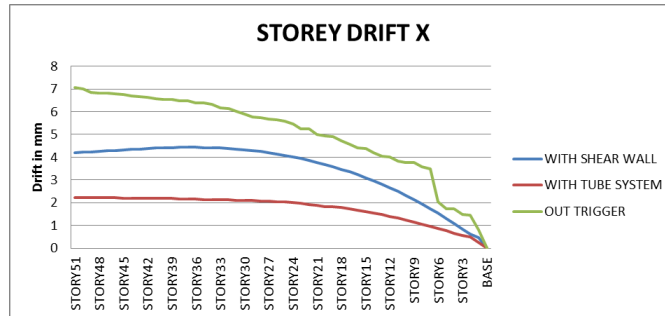
5.1 Displacement X



Graph 1 Comparison Storey Displacements in X

The above graph represents the Storey Displacement in X direction with three cases. Displacements with out trigger are 2.84 at top. And with shear wall 0.3668 and with tube system displacement is 0.1125. As compare to shear wall , tube system is increased by 20-30% and as compare to tube system, out trigger is increased by 35-40 %

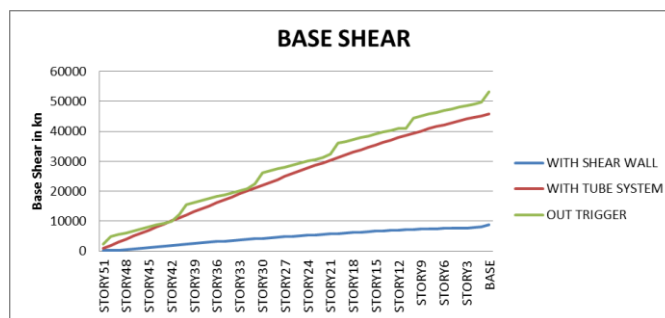
5.2 Story Drift X



Graph 2 Comparison Storey Drift in X

The above graph represents the Storey Drift in X direction with three cases. Out trigger system storey drift is 7.06 and tube system is 2.22 and with shear wall is 4.21. As compare to tube system, shear wall is increased by 45-48% and As compare to shear wall, out trigger is increased by 40-45 %.

5.3 Base Shear



Graph 2 Comparison Base Shear

The above graph represents the Base Shear of three cases. Out trigger system Base Shear is 159.95 and tube system is 900.06 and with shear wall is 2256.9. As compare to Out trigger, tube system is increased by 60-70% and As compare to tube system, shear wall is increased by 70-75%

V. CONCLUSION

STOREY DISPLACEMENT:

- The Storey Displacement in X direction with three cases. Displacements without trigger are 2.84 at top. And with shear wall 0.3668 and with tube system displacement is 0.1125. As compare to shear wall , tube system is increased by 20-30% and as compare to tube system, out trigger is increased by 35-40 %

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