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Optimum Position and Location of Shear Wall and Braces as Outrigger System

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ABSTRACT: The high development of buildings is growing rapidly around the world, introducing new challenges that need to be addressed through engineering judgments. In modern tall buildings, side loads caused by wind or earthquake often oppose the system of connected sliding walls. But when a building increases in height, the rigidity of the structure becomes more important, and the introduction of an outrigger system is often used to ensure sufficient lateral rigidity of the structure. Hood and is commonly used as one of the structural systems to effectively control excessive drift due to lateral load, so that during a small or medium lateral load due to wind or earthquake load, the risk of structural and non-structural damage can be minimized.

KEYWORDS: Outrigger, tall buildings, story drift, displacement & time period

I. INTRODUCTION

The system of outriggers and belt farms is one of the systems of resistance of lateral loads, in which the outer columns are tied to the central wall of the core with very rigid outriggers and belt farms on one or more levels. The belt farm tied the peripheral column of the building, while the outriggers involved them in the main or central wall of the shift. The system of outriggers and belt farms is usually used as one of the structural systems for the effective control of excessive drift due to lateral loading, so that during small or medium lateral loading due to wind or earthquake loads, the risk of structural and non-structural damage can be minimized. For high-rise buildings, especially in the seismic active area or the dominant wind load, this system can be selected as the appropriate structure. Sliding walls and braces are a system that is superior, they are very effective in reducing the reaction of buildings; therefore, their optimization should be checked on the building.

II. LITERATURE REVIEW

The results of the analysis show that the displacement values were less than the structure of the pipes and the structure ahead. Also, the stability of the structure will be increased, and the columns oscillate, using an L-shaped wall of shear at angles in a geometrically irregular structure. When a structural autrigger system is provided in a history that has maximum drift, it can be performed as the maximum drift controller [2,3].

The analysis was performed on a 30-storey three-dimensional model with different outrigger configurations, such as a single and double exposure system, changing the cross-sectional dimensions of the columns and the wall thickness of the shift. This model was analyzed by analyzing the range of responses according to standard Indian codes and the following conclusion was drawn [4,6].

When only one exposure was provided, the system was not effective in drift. There were significant changes in the drift profile when two outriggers were provided. One important conclusion presented in this study is not a story that was found as a soft story for all 9 tests made in a two-discovery model with a change in the cross-sectional dimensions of the columns and the thickness of the shear wall [8.9].

III. MODELING

The following models are prepared using ETABS software.

i. Model I: Building without any Outrigger system



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- ii. Model II: Building with X Bracing Outrigger system is connected with Core at 1/3rd height i.e. at 10th storey
- iii. Model III: Building with X Bracing Outrigger system is connected with Core at mid height i.e. at 20th storey



Fig.1: Model I: Building without any Outrigger system

IV. RESULTS

The results obtained are in terms of the storey displacement, storey shear, storey stiffness as obtained in the ETABS software.

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Fig.1: Lateral Displacement-X for all models



Fig.2:Storey Drift-X for all models

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Fig.3: Time Period for all models



Fig.3: Storey-Shear (X) for all models



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V. CONCLUSION

From the above study following conclusions can be drawn:

- i. Lateral Displacement is maximum in the Storey 30 for the case of model-1.
- ii. Storey drift is minimum for the model-3 in the storey 15.
- iii. Time period is maximum for the model-1 as compared to other models.
- iv. Storey shear is maximum for the model-II as compared to other models.

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