WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Optimize the Efficient Height Combination of Twin Tower under Earthquake loading

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ABSTRACT

Structural development in the metro city has rapidly increased as there are many high-rise construction projects that have been carried out. Structural analysis is the fundamental part of the design of the high-rise structure which shad the same height and same geometry. It is effective solution for residential purpose however; few of the challenging problems have been facing such as vehicle parking and other basic enmities space. Therefore, many structures provide a common either in single, multiple floors, or underground basements parking in this kind of structure often seen in the residential as well as a commercial complex.. By combined and miscellaneous floor arrangement on similar ground wants the consistency on the structural approach. This types of structure are Twin tower structure used in this modern world. In this examine, the parameter of evaluation of result such as displacement and storey drift are obtained in requisites of the twin tower multistoried structure located in earthquake Zone-III, earthquake effects are performing on the construction under 11 different height combination and analyze with the assistant of Staad pro design software.

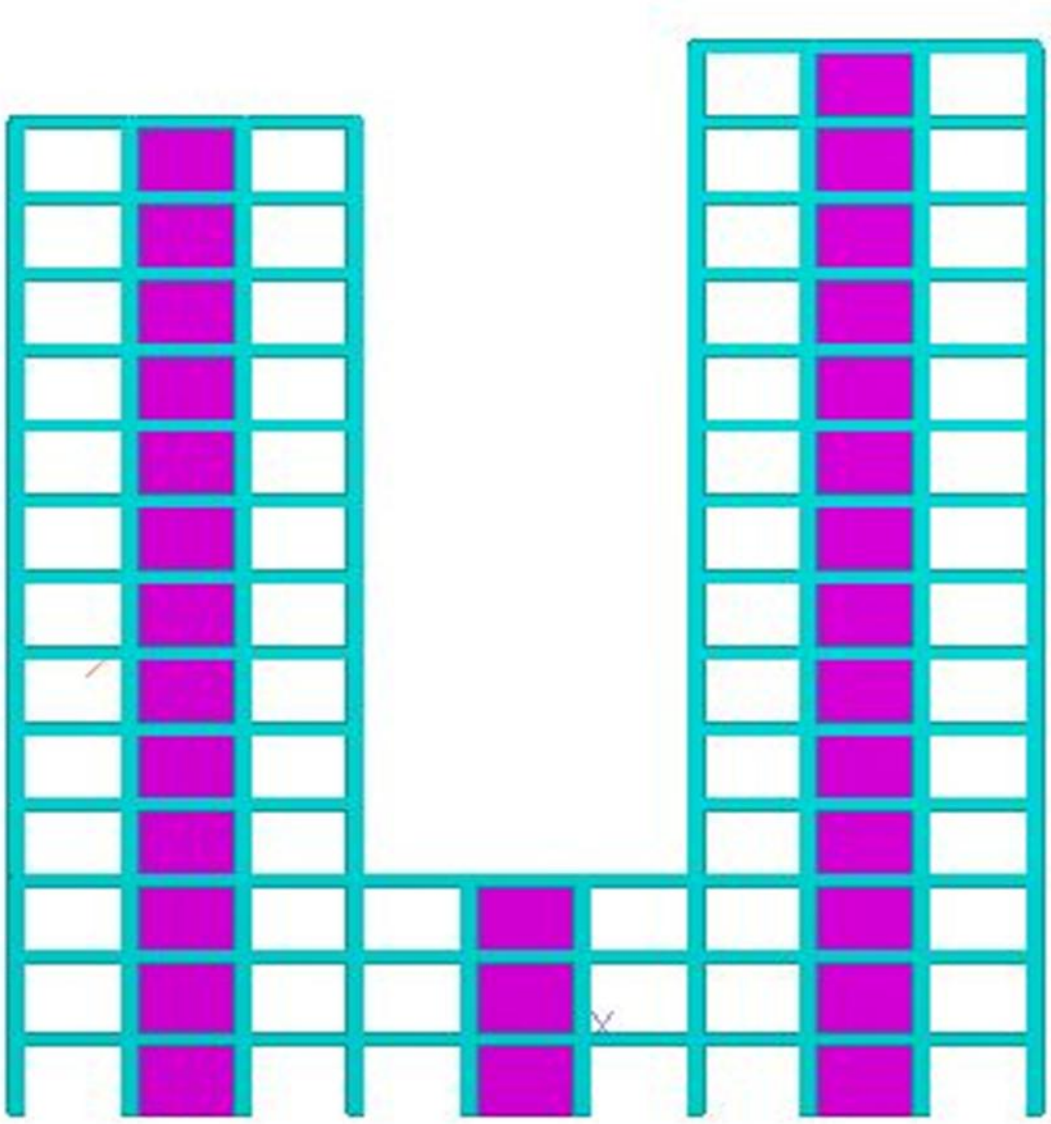
Keywords—Twins Tower, Efficient, Height, Lateral Loading, Response spectrum analysis, Seismic Effects, Staad pro software,

INTRODUCTION

With the help of multistory structure guide the structural engineer to analyze and design as per harmful earthquake effects. Current days, Twin towers are very much in demand due to its goodarchitectural and structural design, individual plan along with additional space with similar base support. For that, we should know the well-organized point parameters when these types of structures are in the get in touch with of earthquake loads. Normally, the structures are considered to be tall structure, if its structural analysis and design are in some way affected by the lateral loads, particularly sway caused by such loads. When the two adjacent buildings connected at some level is defined as twin tower (i.e., PETRONAS Twin Towers in malaise, Indonesia 1 Tower). The two adjacent buildings connected by the bottom, middle, and top of the building with providing this link it is structurally strength to support such kind of structure and contest seismic and wind loads. In a metro city, urbanization growth aesthetic look in infrastructure is expanding the structure vertically mean the need for a high-rise structure in developing city. It is good for residential and commercial purpose however there are facing the problem of vehicle parking. The solution may be provided either in single, multiple floors or underground single, and multiple basement parking. Twin tower is the best example to rectify such kind of problem which not only comply the demand but also a mark of social and economic prosperity. The major aspect in these kinds of building is to bridge the gap by providing a functional link which not only a architecture material but encompasses various functional allocation of the special structure due to a fact that the link proofs the critical fragment of the structure. It is also seen that without providing this link it is not structurally viable to support such kind of structure and contest seismic and wind loads.

OBJECTIVE

This study analyses the different parameters like base shear, shear force, bending moment displacements in longitudinal and transverse direction. After this ,story drift is calculated in both X as well as Z direction. The most efficient twins tower height combination will be analyzed after all parameters. There is total 11 height combination of twin tower multistoried building at medium soil condition under seismic forces for earthquake zone III exist.



Front view of twins tower.

Table 1:Details of building

Building configuration	G+12
No. of bays in X direction	9
No. of bays in Z direction	9
Height of building	51.580m
Dimensions of building	45M X 45M
Size of beam	750mmX650mm
Size of column	550mmX450mm
Concrete and Steel Grade	M 30 & FE415

Table 2: Detail of loading

Earthquake parameters	Zone III with RF 4 & 5% damping ratio
Period in X & Z direction	0.692 & 0.692 for both direction
Dead load for floor and waterproofing	2KN/m^2& 0.5 KN/m^2
Live load for floor and roof	3.8KN/M^2& 1.2u KN/M^2

RESULT AND DISCUSSION

These resultsis observed by the following COMBs-

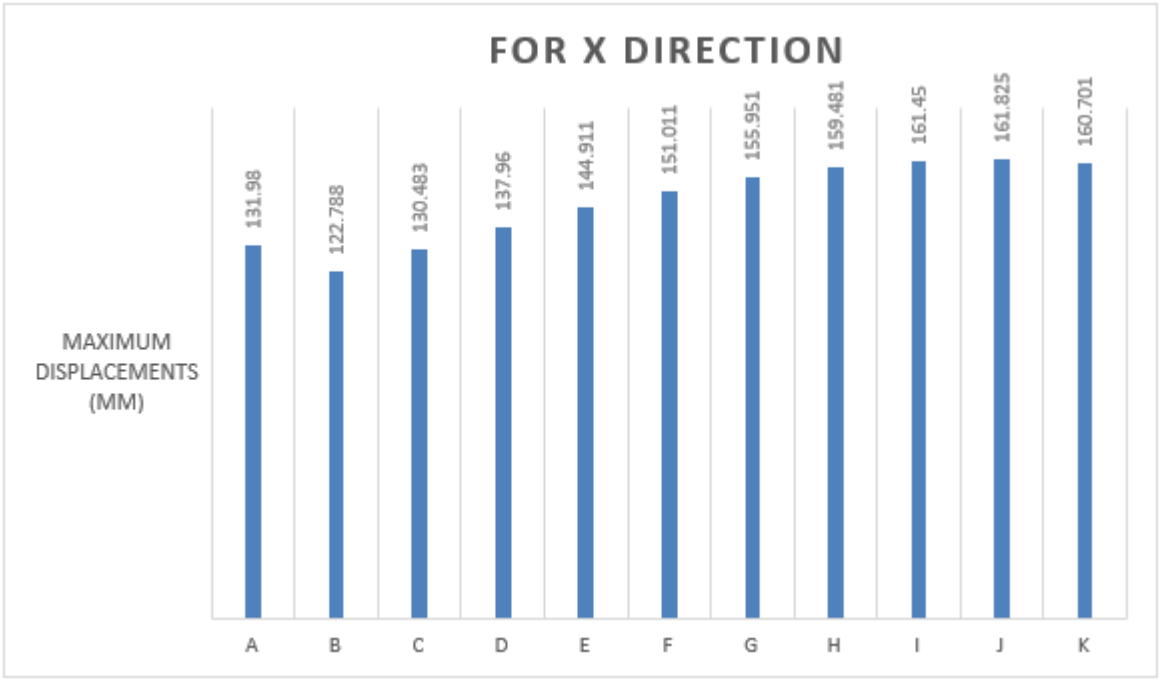


Fig. 1: Maximum Displacement shown in X direction Zone III

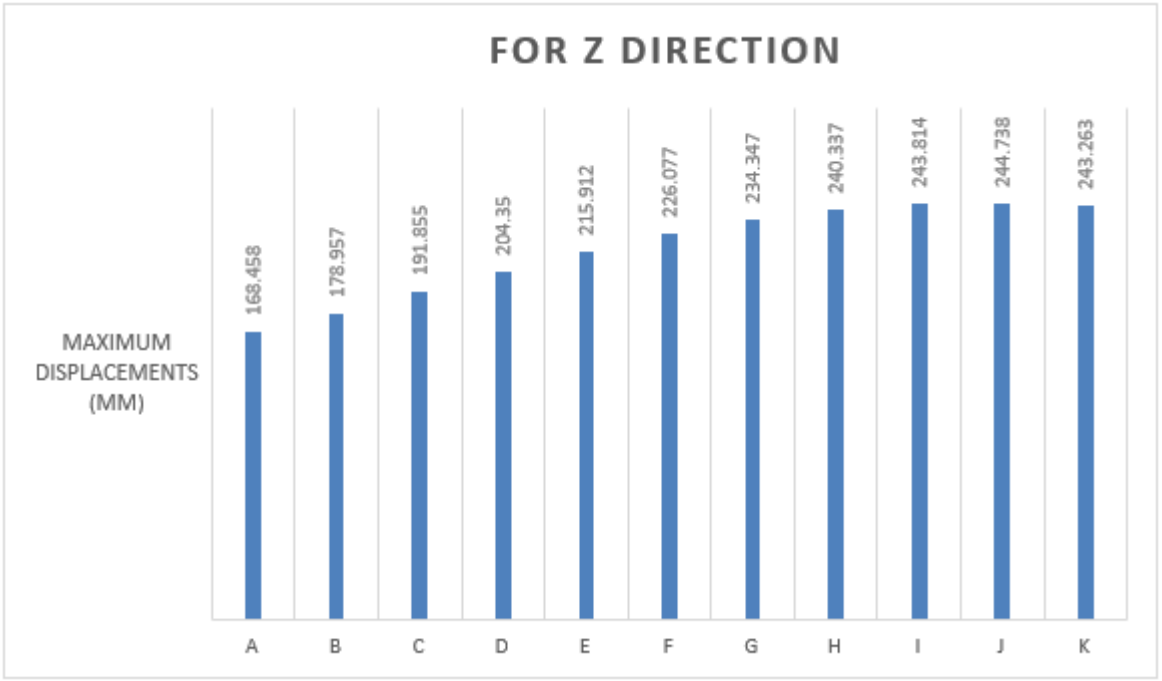


Fig. 2: Maximum Displacement shown in Z direction in Zone III

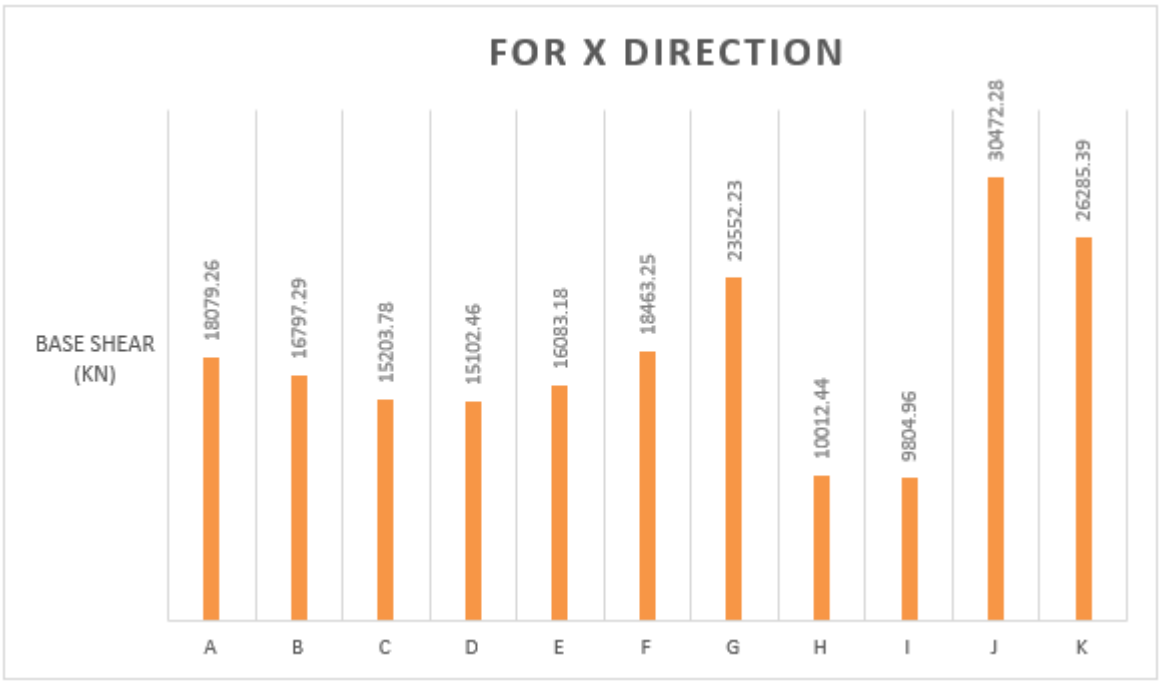


Fig. 3: Base Shear shown in X direction in zone III

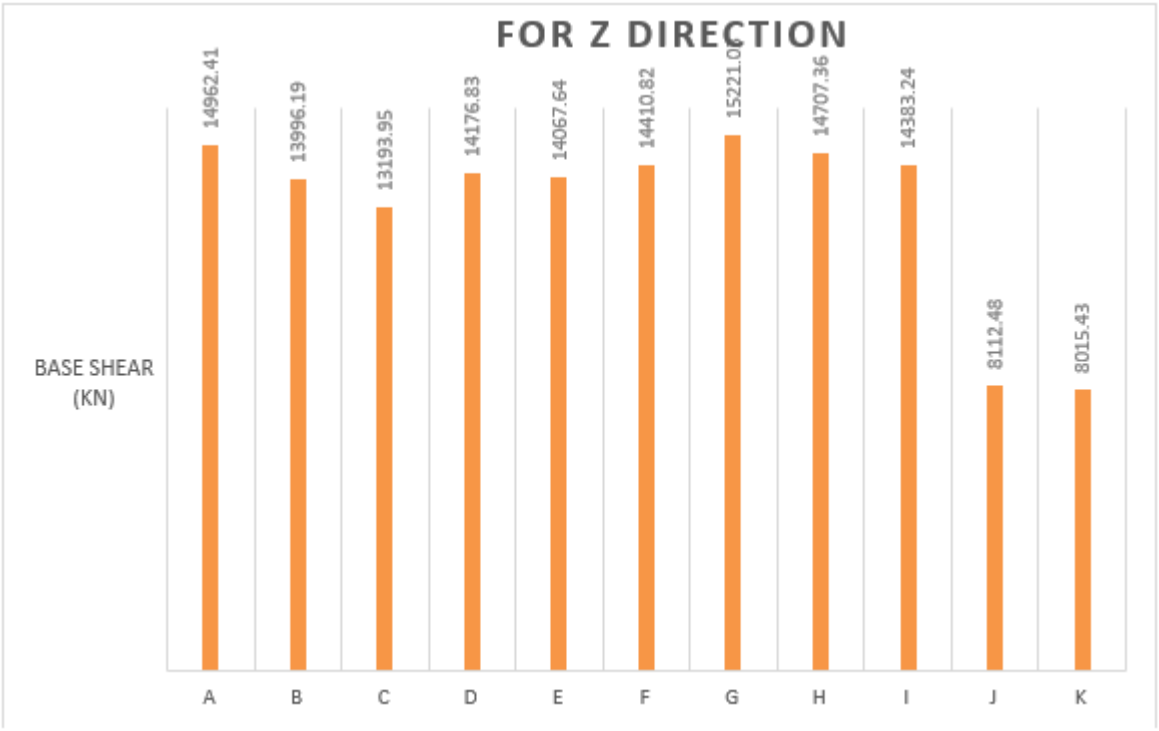


Fig. 4: Base Shear shown in Z direction in zone III

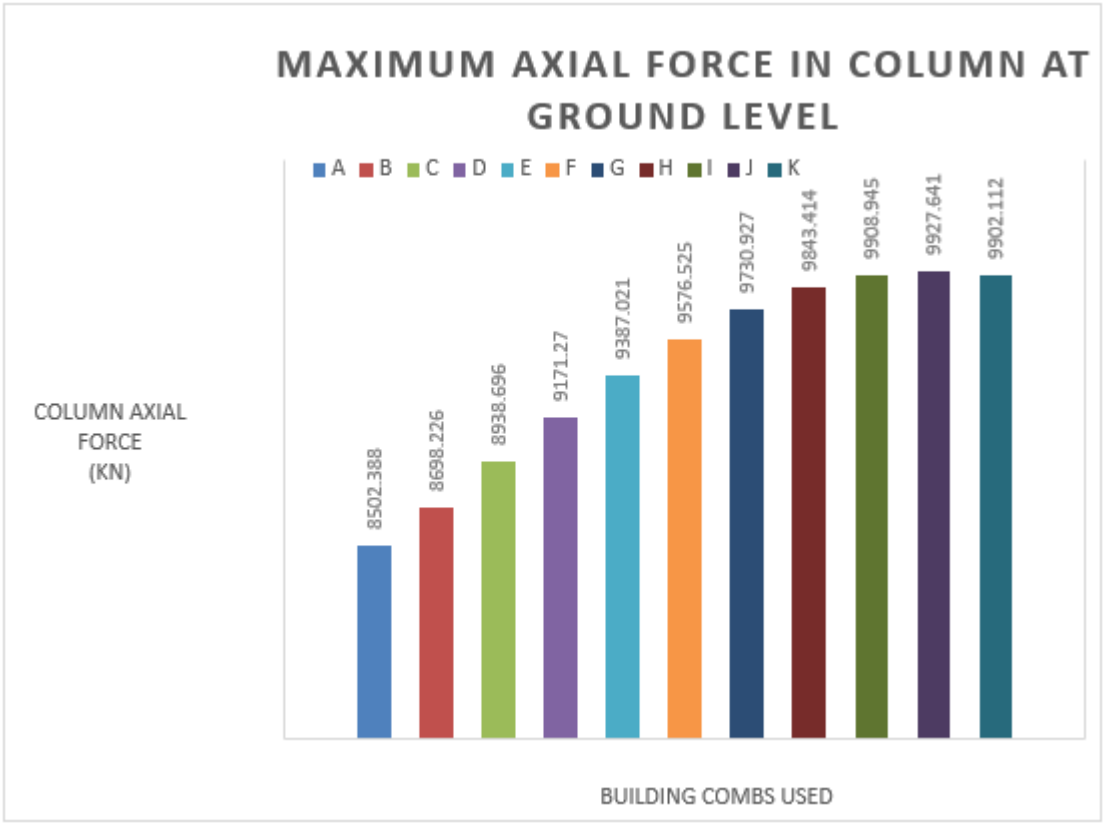


Fig. 5: Maximum Axial Forces shown in Column at ground level in zone III

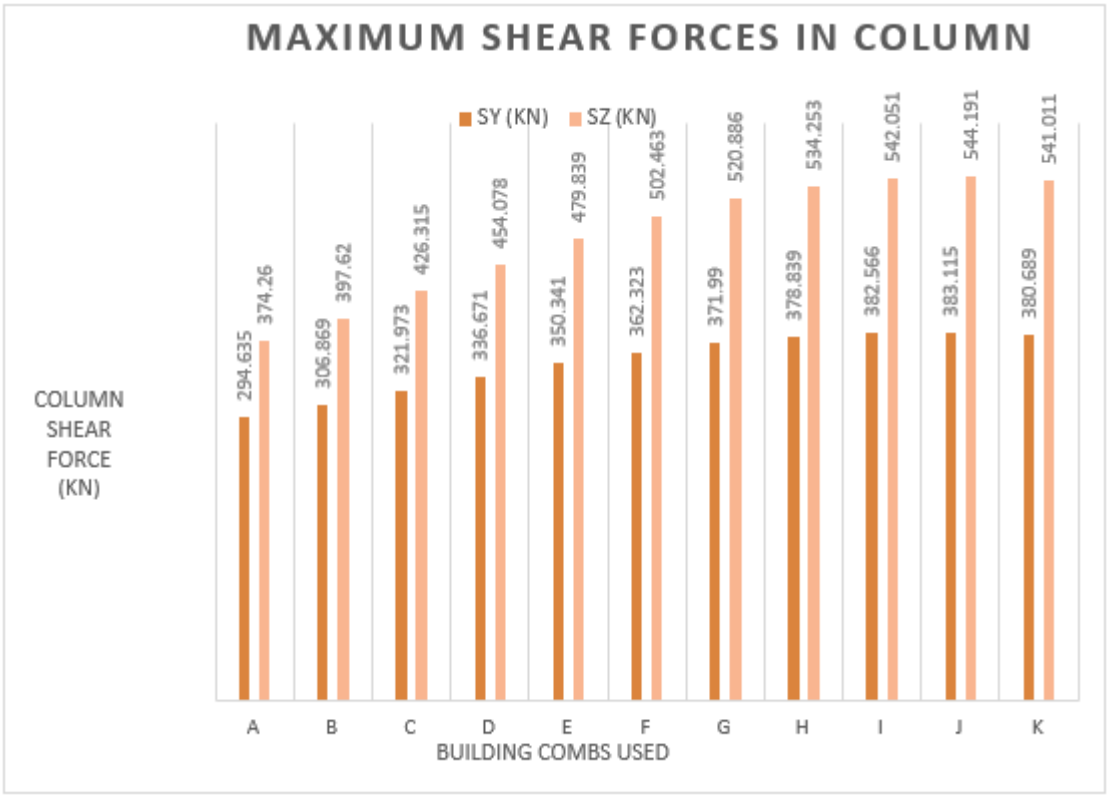


Fig. 6: Maximum Shear Forces shown in Columns in zone III

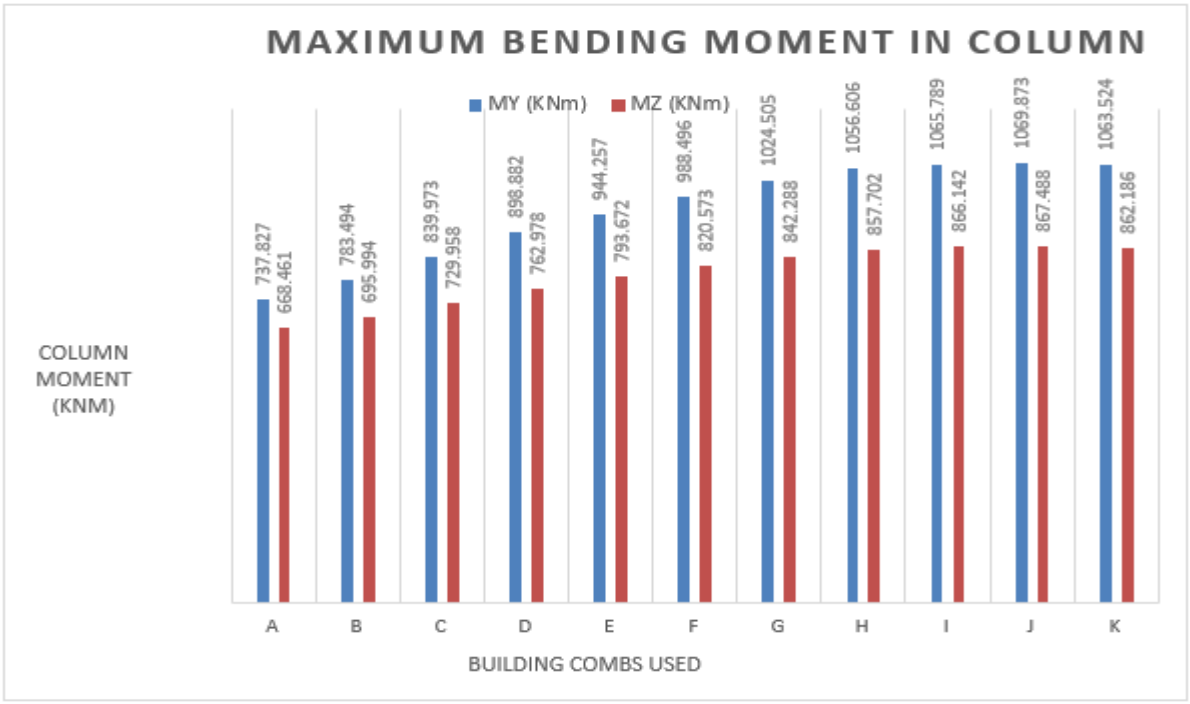


Fig. 7: Maximum Bending Moment shown in Columns in zone III

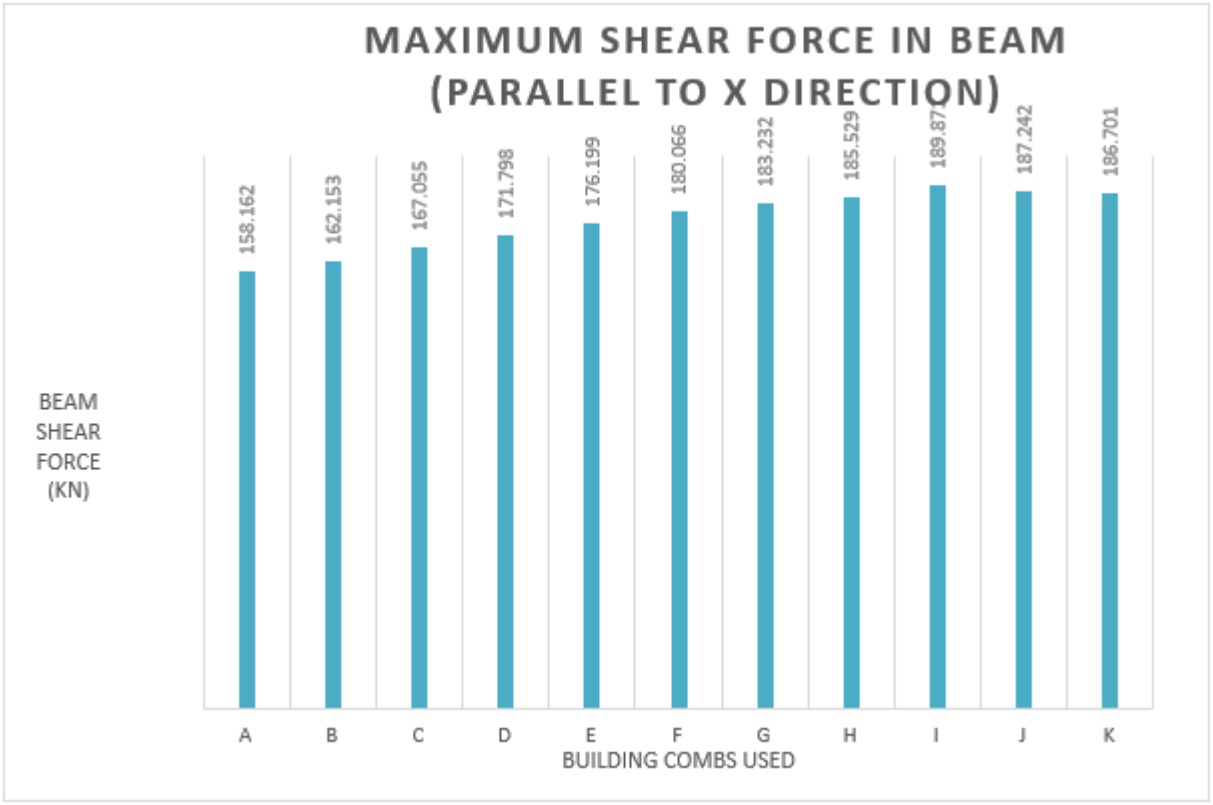


Fig. 8: Maximum Shear Force shown in Beam for X in zone III

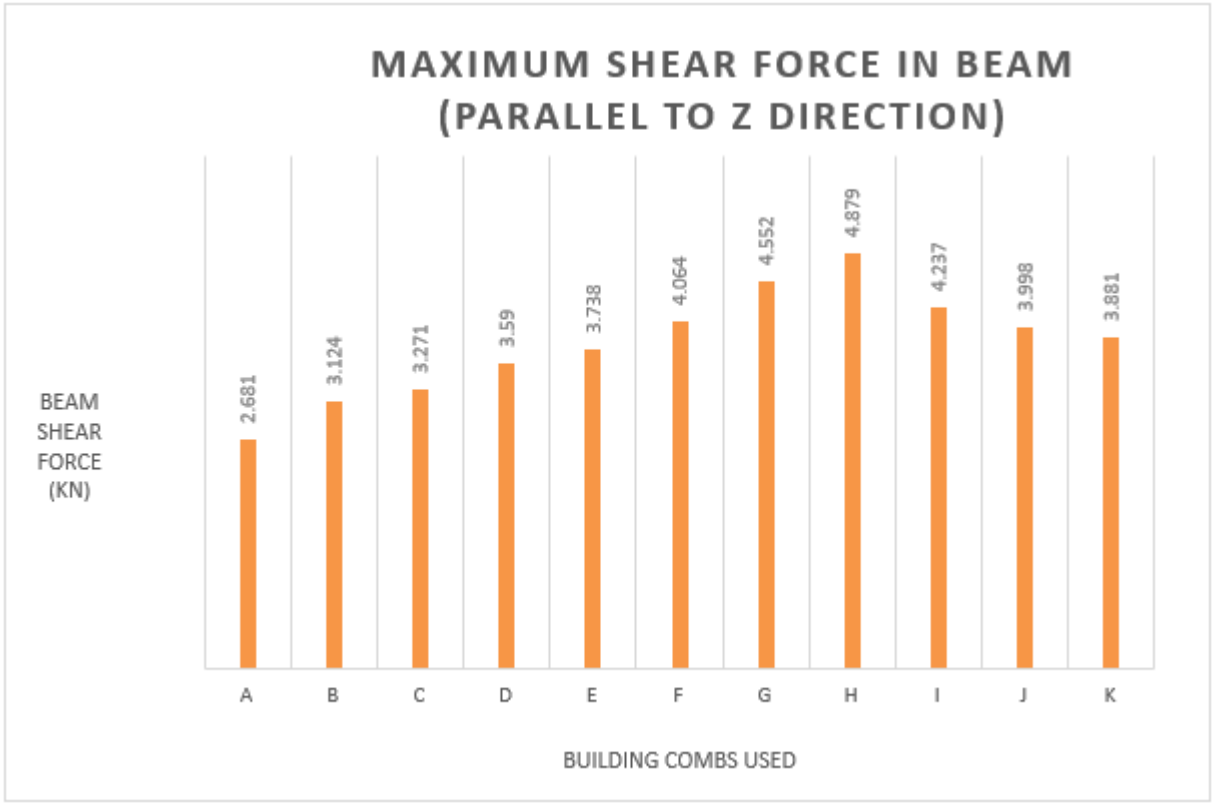


Fig. 9: Maximum Shear Force shown in Beam for Z direction in zone III

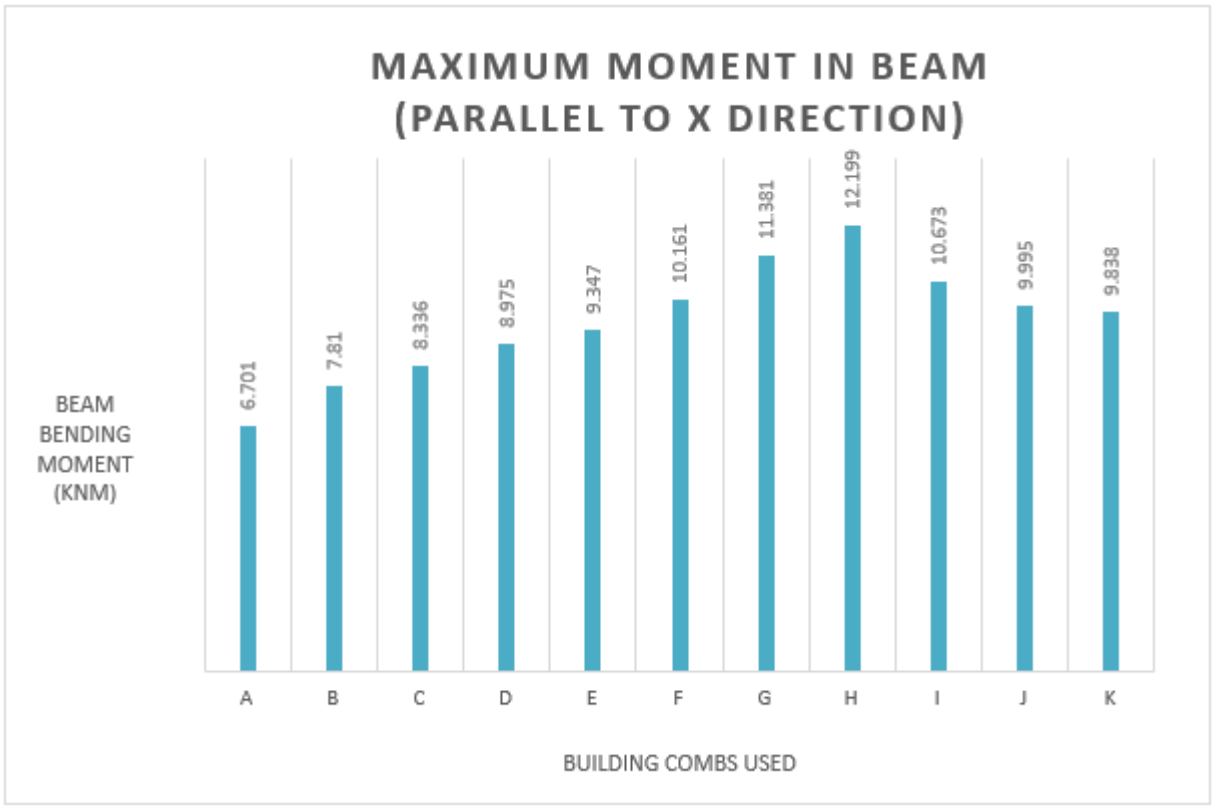


Fig. 10: Maximum Bending Moment shown in beams parallel to X direction in zone III

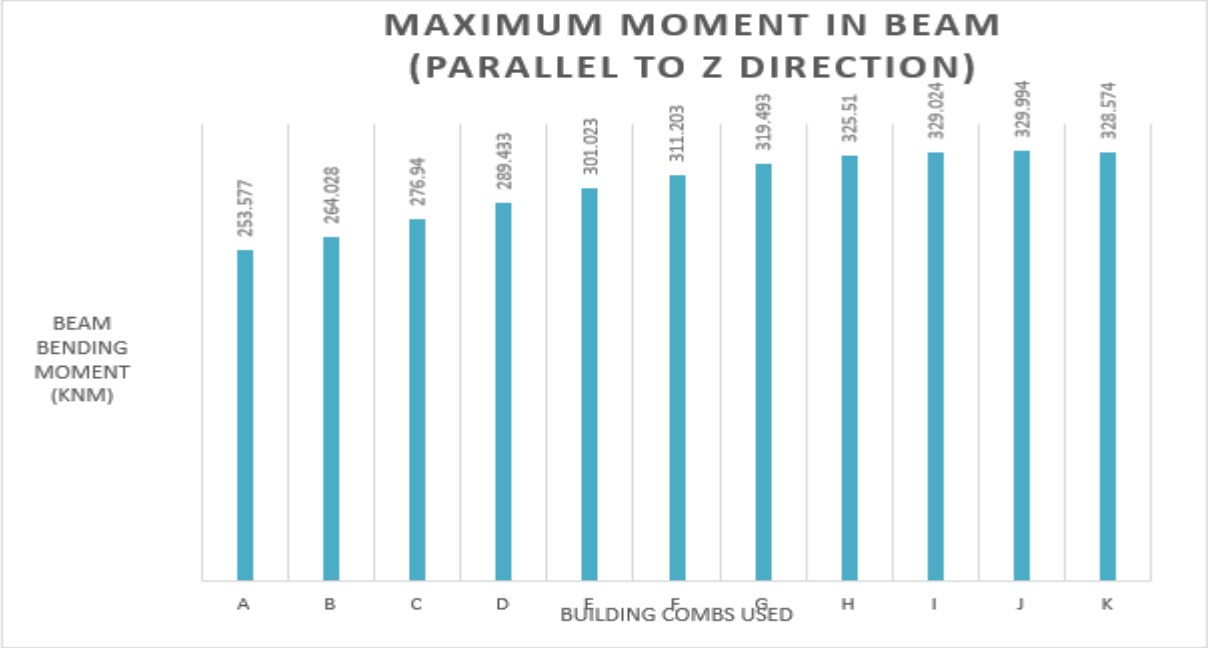


Fig. 11: Maximum Bending Moment shown in beams parallel to Z direction in zone III

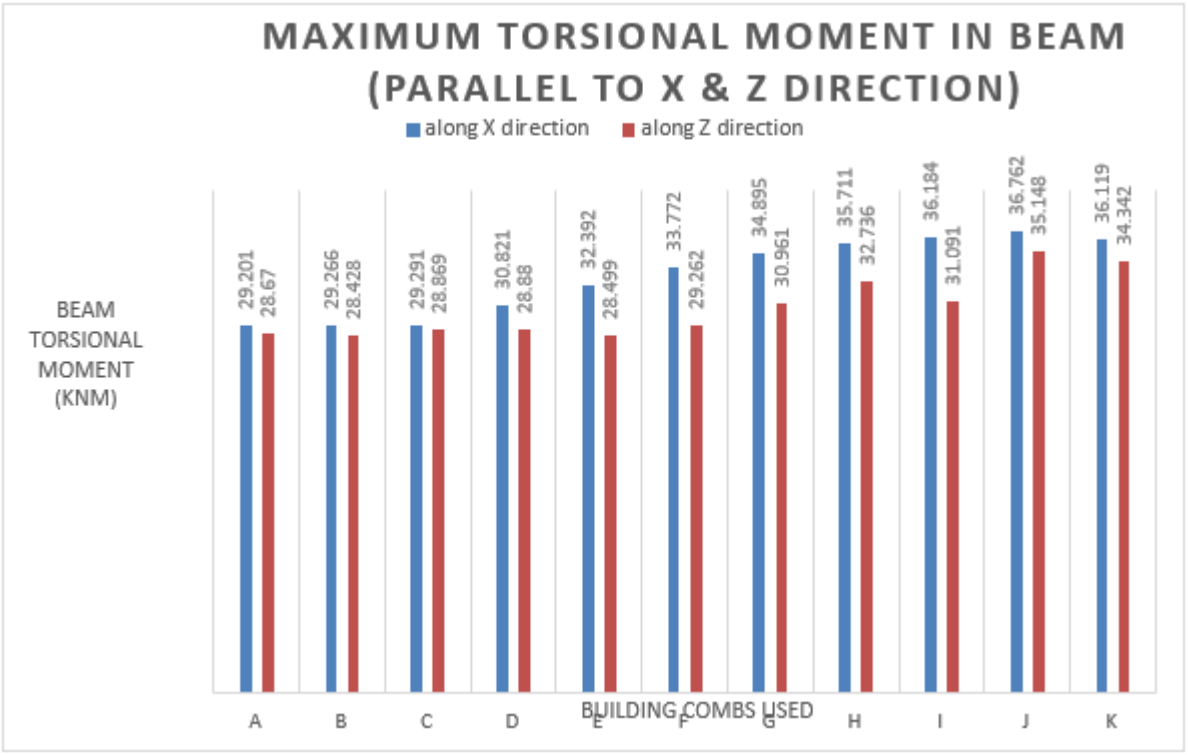


Fig. 12: Maximum Torsional Moment in beams parallel to X and Z direction in zone III

CONCLUSION

The Optimize the Efficient Height Combination of Twin Tower Under Earthquake loading effects the analytical results obtained from 11 combination of twins tower multistoried structure. As seen in results the minimum displacement in X direction height COMB B and Z direction height COMB B,

minimum base shear in height COMB I and K in respectively X and Z direction, minimum axial force in height COMB B , minimum column shear force in height COMB B in both direction , minimum column bending moment height COMB B in both direction, beam shear force height COMB B is optimum as well result same for torsional force. That means height COMB B is very efficient COMBs for twins tower in height combination.

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