HBRP PUBLICATION
Journal of Environmental Engineering and its Scope
Volume 1 Issue 2

A Relative Report on Different Even Viewpoint Proportions on Seismic Execution of Ordinary Shape G+10 Story RCC Building

Nazmus Sakib
Department of Civil Engineering, UITS, Dhaka-1212, Bangladesh
****Corresponding Author***
Email Id: ahmed2@gmail.com

ABSTRACT
There are a few sorts of viewpoint proportions relying predominantly upon math and level of the structure. The way of behaving of a structure during tremors relies upon its general shape, size, level and math. To make a structure seismic tremor safe, the structure ought to have sufficient strength, solidness and inelastic distortion limit. This can be accomplished through the determination of a suitable structure setup and the cautious enumerating of underlying individuals. Vertical perspective proportion (H/L or H/B) and even viewpoint proportion (Lmax/Lmin) influence the proficiency of design for opposing sidelong loadings. In the current review, six structure models having G+10 story moderate second opposing casing building yet unique flat angle proportions, for example, 1, 2, 4, 6, 8 and 10 have been thought of and their impact on the way of behaving of the RCC structures is illustrated, involving the boundaries for the plan according to the BNBC-1993 for the seismic zone-2. With the assistance of programming the outcomes acquired on seismic reaction of structures have been summed up by charts and tables. The examination yields have been explored to choose the suitable flat viewpoint proportion for the structure exposed to seismic tremor loadings.
Keywords: Horizontal aspect ratio, building configuration, inter storey drift, maximum lateral displacement, seismic base shear, overturning moment.

INTRODUCTION
Earthquake is a sudden motion or series of motion of the earth surface originating in a limited underground region spreading from there all directions. Earthquake events are usually described by some parameters such as date, origin time, epicenter coordinates, focal depth, magnitude and maximum intensity. Other useful parameters are the fault dimensions and orientation, seismic moment and spectral characteristics of recorded ground motions. All buildings must be designed for the combined effects of gravity and lateral loads. Seismic forces are generated by the dead weight of the building. These inertial forces are essentially created by the shaking of the building foundation by a seismic disturbance. The horizontal components of the inertial forces have a more significant effect on a building than the vertical components. The general philosophy of earthquake resistant design is to allow some structural and non-structural damage of a building subjected to the design ground motion while minimizing the hazard to life. This is to be achieved by utilizing the inelastic deformability of the structure and allowing the dissipation of the earthquake energy.

LITERATURE REVIEW
The configuration of a building can significantly affect its overall performance during an earthquake. Aspect ratio is defined as the ratio between the length (usually the longer dimension) and the width (usually the shorter dimension) of a rectangular shape.
Since the aspect ratio is defined as the ratio of two lengths, it does not have any units and is just a number. An object with a

large aspect ratio will appear to be more slender than an object with a small aspect ratio. Increase in length of a building increases the stresses in a floor working as a horizontal distribution diaphragm in a transverse direction. Therefore, proportions of buildings length-wise need to be considered carefully.

Floor and floor systems act as horizontal diaphragms in building structure. These collect and transmit the inertia forces to the vertical elements of lateral resistant systems. They also ensure that vertical components act together under gravity and seismic loads. Normally built buildings can be placed in two categories, namely simple and complex. Buildings with rectangular plans and straight elevation stand the best chance of doing well during an earthquake, because inertia forces are transferred without having to bend due to the geometry of the building. But, buildings with setbacks and central openings offer geometric constraint to the flow of inertia forces; these inertia force paths have to bend before reaching the ground. Uniform distribution of structural elements in plan and elevation allows smooth and direct transmission of the inertial forces generated by the masses of structural and non-structural components.

OBJECTIVE OF THE STUDY

The main objectives of this study are given below:

1 To perform a comparative study of the various seismic parameters of reinforced concrete moment resisting frames with varying number of bays/spans in horizontal direction to investigate the effect of aspect ratios.
2 To study the change in different seismic response parameters due to increasing spans.
3 To evaluate-base shear, overturning moment, storey drift and storey displacements for different horizontal aspect ratios.
4 To compare on base shear, overturning moment, storey drift and storey displacements for different horizontal aspect ratios.
5 To propose the best suitable building plan configuration in the existing condition.
6 Also, to compare the charts and graphs to arrive to a conclusion on stability among different aspect ratios.

METHODOLOGY OF THE PRESENT STUDY

In the present study, BNBC (1993) based Static Analysis is performed. This study includes comparative study of behavior of G+10 story R.C.C. building frames considering different geometrical plan configurations based on different aspect ratios under earthquake forces.
Following steps of methods of analysis are adopted in this study:

Step-1: Selection of different models having different building geometry, number of spans for Horizontal Aspect Ratios.
Step-4: Modeling of building frames using software where width of the building along y-direction remains constant having 2 spans, 4m each.
Step-5: Analyses each models considering each load combinations for (6 Model Cases) by Static Analysis.
Step-6: Comparative study of results in terms of base shear, storey overturning moments, storey drift and storey displacement.

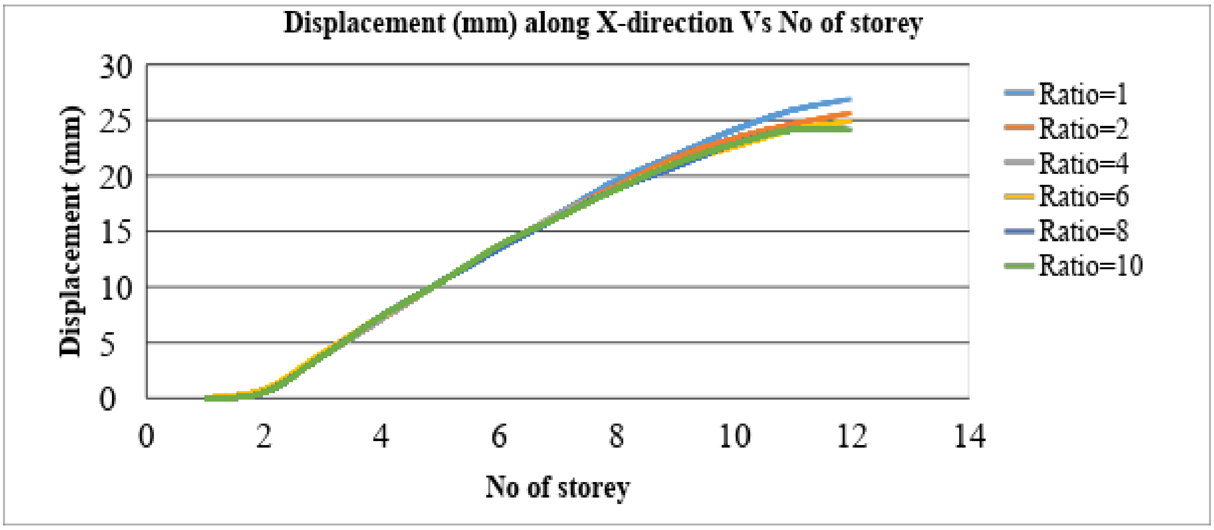

Fig: 1 *Displacement (mm) along X-direction Vs. No of Storey*

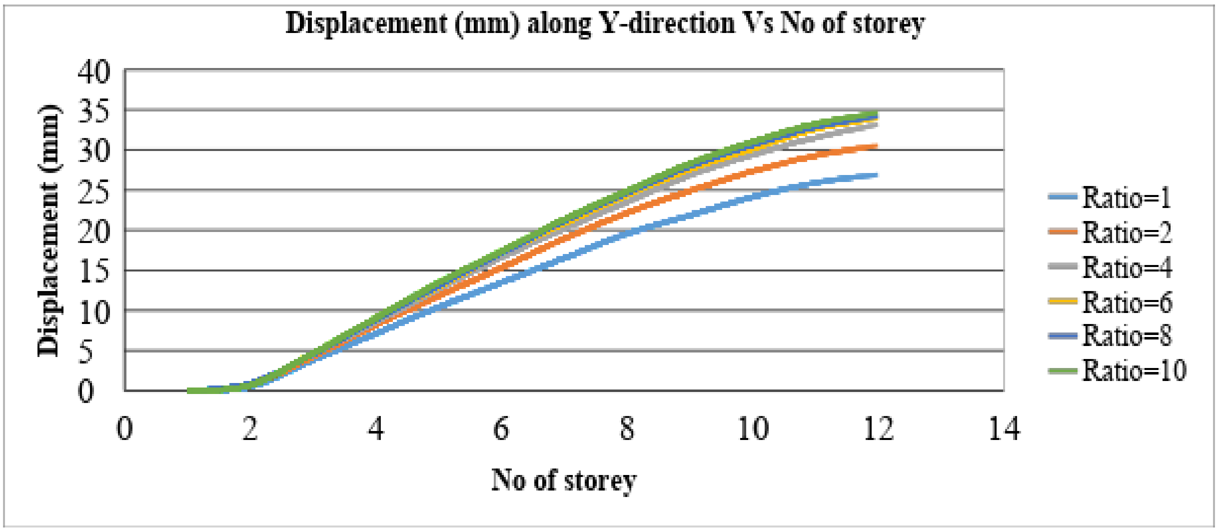

Fig: 2 *Displacement (mm) along Y-direction Vs. No of Storey*

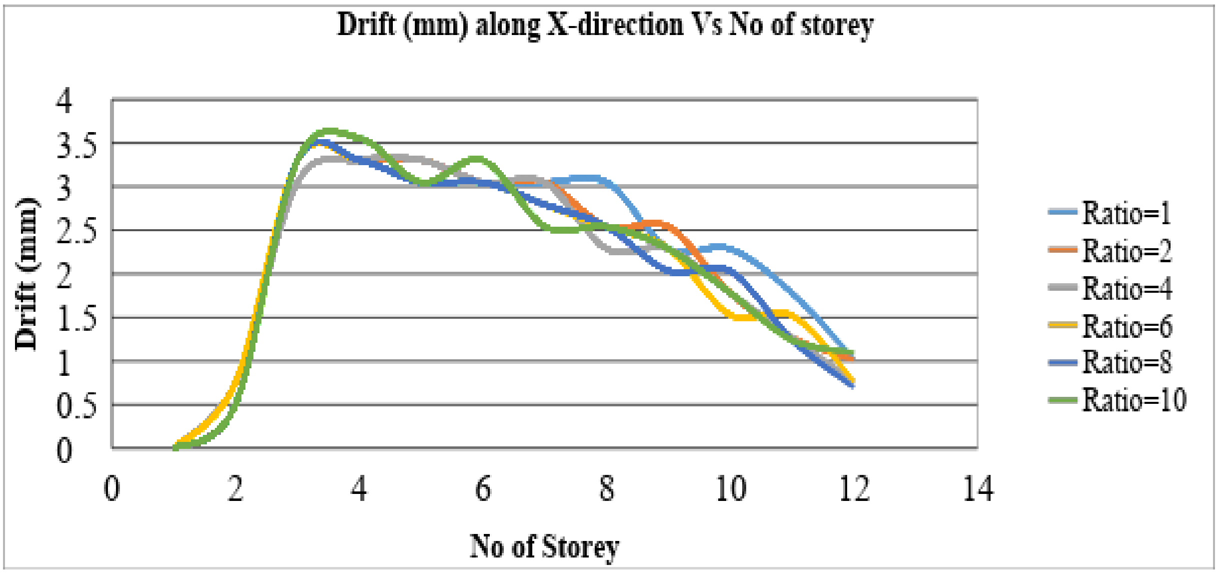

Fig: 3 *Drift (mm) along X-direction Vs. No of Storey*

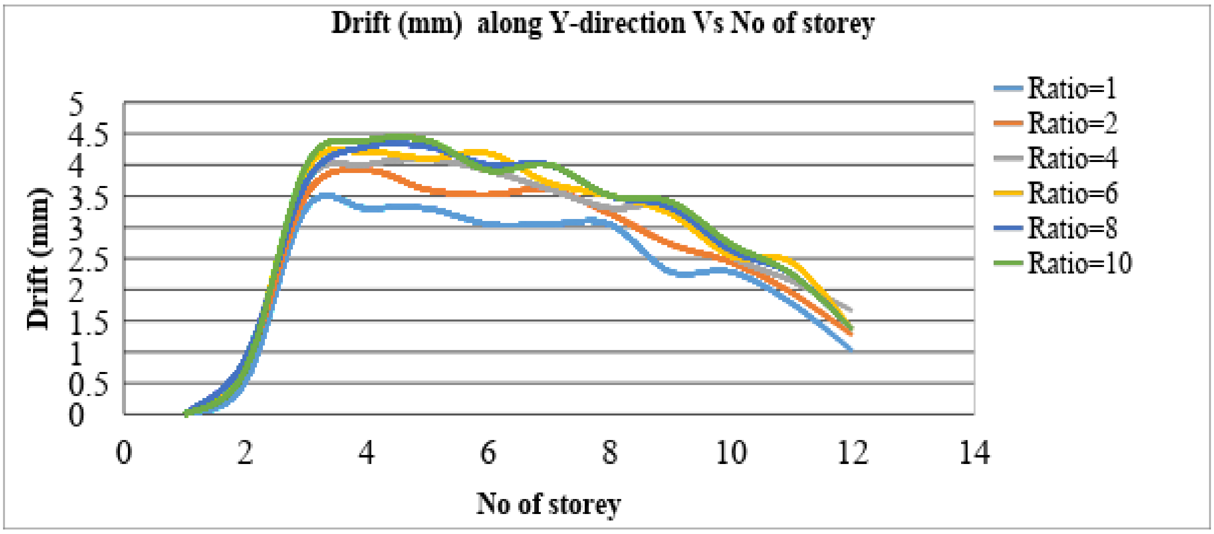

Fig: 4 *Drift (mm) along X-direction Vs. No of Storey*

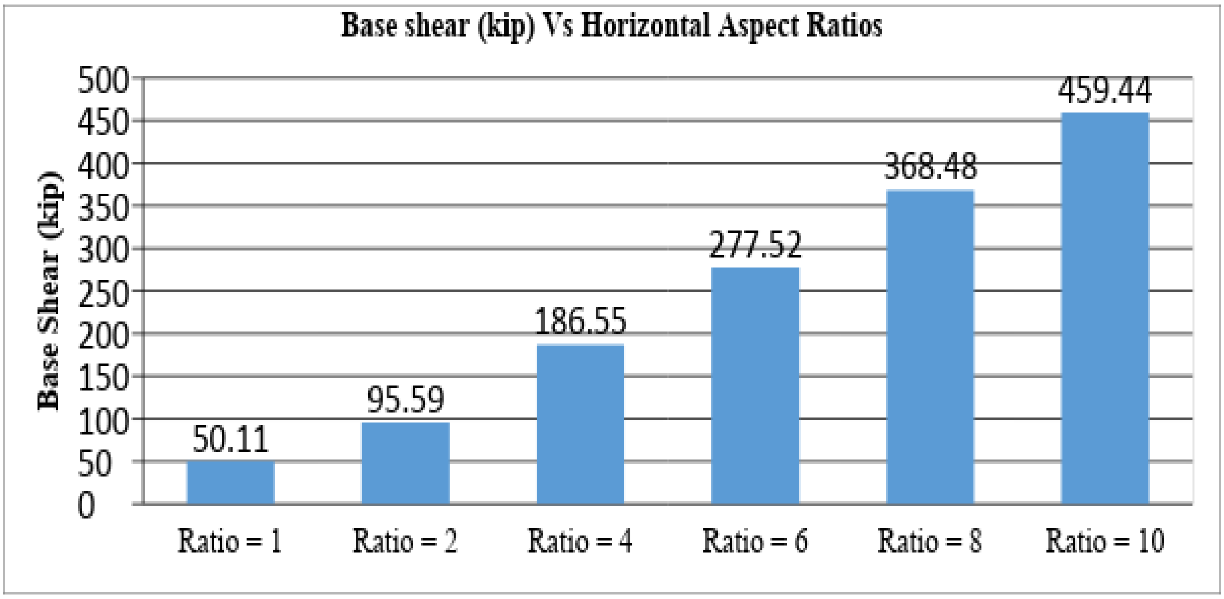

Fig: 5: *Base shear (kip) Vs. Horizontal Aspect ratios*

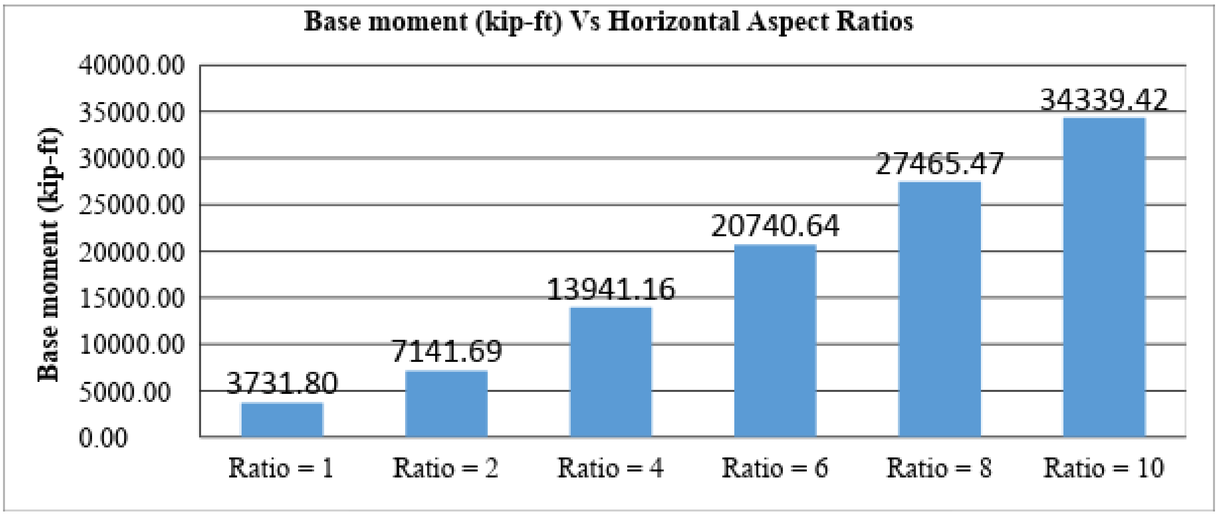

Fig: 6 *Base moments (kip-ft) Vs. Horizontal Aspect ratios*

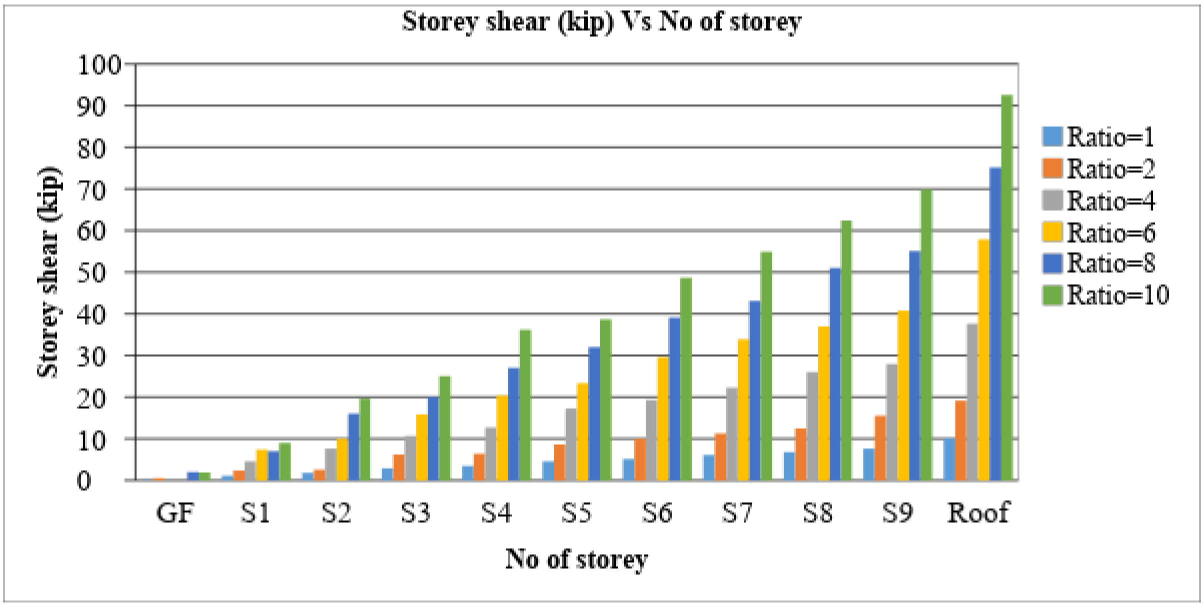

Fig: 7 *Base moment (kip-ft) Vs. Horizontal Aspect ratios*

CONCLUSION

- In this study, it has been revealed that the base shear increases gradually with increase in number of spans.
- The base shear is obtained lower for 2 spans building and higher for 20 spans building. Lowest value is obtained in case of 2 bay (square) building whereas highest in case of 20 bay (rectangular) building.
- The storey overturning moment increases gradually with increase in number of span. Lowest value is obtained in case of 2 bay (square) building whereas highest in case of 20 bay (rectangular) building.
- In x-direction, the storey drift decreases gradually with increase in number of spans. The storey drift is obtained lower for 20 spans building and higher for 2 spans building.
- In x-direction, the storey displacement decreases with increase in number of spans. The storey displacement is obtained highest in case of 2 spans (square) building and lowest in 20 spans (rectangular) building.
- The storey drift in y-direction increases gradually with increase in number of spans since it is much narrow side comparative to x-direction.
- It has been observed that the storey displacement in y-direction increases with the increase of spans.

REFERENCES

1. Sadan, M., Rahman, S., Kumar, A., Hasan, M. Z., & Khan, N. (2020). Seismic Analysis of G+ 6 Residential Building. Babu Banarasi Das University.
2. Manohar, S., & Madhekar, S. (2015). Seismic design of RC buildings. Springer Transactions in Civil and Environmental Engineering.
3. VARAPRASAD, B. V. S. J. COMPARATIVE STUDY OF STATIC AND DYNAMIC SESIMIC ANALYSIS OF MULTI STORIED BUILDING RCC BUILDING BY USING ETABS SOFTWARE.
4. YADAV, M. S. (2016). SEISMIC EVALUATION OF UN-REINFORCED MASONARY HOSPITAL BUIDLING (Doctoral dissertation).
5. Jarapala, R., & Menon, A. (2023). Seismic performance of reinforced

concrete buildings on hill slopes: a review. Journal of The Institution of Engineers (India): Series A, 104(3), 721-745.