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ANALYSIS OF MONO COLUMN BUILDING BY USING STAAD PRO

[1] M.Sowmya, [2] K.Thapaswini,[3] Thammanagari Sampoorna, [4] Satharapu Pravallika,[5] N.Jhansi Laxmi

[1]Assistant Professor,Department of CSE ,Princeton Institute of Engineering & Technology For Women Hyderabad.

[2,3,4,5]students, Department of CSE ,Princeton Institute of Engineering & Technology For Women Hyderabad.

ABSTRACT

The aim of the project is to analyze of Mono column building and multi column building by using different code provisions. This project compares the review of RCC frame structures assisted by a mono column and multi column structures. Modelling, analysis of mono column and multi column building using STAAD Pro software. Mono column provides maximum space utilization. The process involved in the analysis of RCC frame structure that is supported by a mono column and multi column is Geometric modelling, material properties and sectional properties, fixing supports, providing loads and load combinations, special commands, analysis specification, & report are all things that can be with software. In static analysis, the influence of plan geometry is crucial.

Shear wall is modelled in STAAD Pro & provided with required material properties and thickness. A comparison is made between Mono column & Multi column based on empirical performance. The project involves using software to analyze a multi-story and single-column building with G+3 floors. The design is performed in accordance with the specifications and standards set out by the IS code and national building regulations. STAAD-Pro uses a command language-based input format that can be generated with an editor called the editor.

I.INTRODUCTION

Structure supported only on single column is known as mono column structural system. Since mono column is supporting whole structure, all other members act as cantilevers. Mono column structure has supported on a single column which provides large serviceable area as compare to conventional RCC frame structure. Such type of structures provides more proper spaces for office and parking. Mono column provides maximum serviceability due to maximum space utilization.

Structure supported on a single column provides better architectural view compared to structure supported on many columns. They save ground space as requires less area for providing foundation and provides more space for parking. They are also unique. Single column structure can be made both with the aid of the use of RCC or metallic. RCC systems are greater common now days in India. It has incredibly high compressive strength and

higher hearth resistance than steel. It has lengthy provider life with low preservation price. The motive for taking in this undertaking is to layout an entire constructing rest on single

column.

Shear wall is a vertical structural element used to resist the horizontal forces such as wind force, seismic force. These forces act parallel to the plane of the wall. Shear walls are generally used in high rise buildings where effect of wind forces and seismic forces is more.

Floating Column is a type of column which is constructed over beams or slabs of any intermediate floor of a structure. These columns are not attached to any footing or pedestal. Floating columns are also known as hanging column. A column is a vertical member which transfers the loads from beam to foundation whereas a floating column is a vertical member which transfers the load from beam to another beam. The load transfer in any building is usually from slab to beams to columns and then foundation.

1.1 Objective

1. To study the concept of Mono column in RC building.
2. To analysis of Mono Column
3. To analysis multi-column RC building using STAAD pro.
4. To study the performance of Mono Column building result for such as displacement, forces, shear etc.
5. Analysis of study the performance of lateral displacement
6. Compare the results Mono-Column & Multi Column Building.

1.2 Methodology

1. Review the past journal papers for
2. Study the concept of Mono Column
3. Select the G+3 plan & Prepare in Autocad
4. Select the combination in STAAD pro
5. Analysis of Structure using STAAD Pro
6. Check the Lateral Displacement & Shear, Displacement, Forces etc.
7. Calculate Result & Finding Conclusion

II. Modelling methodology of Mono column and Multi column building

The general plotting represents the plan of a G+3 single column building. For single column& multi column building considered bays structure, which contains 6 bays in X and Z direction.Building design measure is 24m X 24m.

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Model 1: Prepare software model on STAAD Pro of G+3 building.

Model 2: Provide Shear wall in mono column building.

Model 3: Assign support, properties, material to the mono and multi column model.

Model 4: Specifying load combinations & assign it.

3.1 Mono column Building Details

All beam = 0.45 m x 0.45 m Floating column = 0.6 m x 0.6 m middle column = 3.0 m x 3.0 m
Shear wall thickness = 0.18 m Length= 6 bays @6.0m= 24 m
Width = 6 bays @ 6.1 m = 24 m Grade of concrete = M30
Grade of Steel = Fe 550 Live Load = 4 KN/m^2
Floor load = 2 K N/m^2

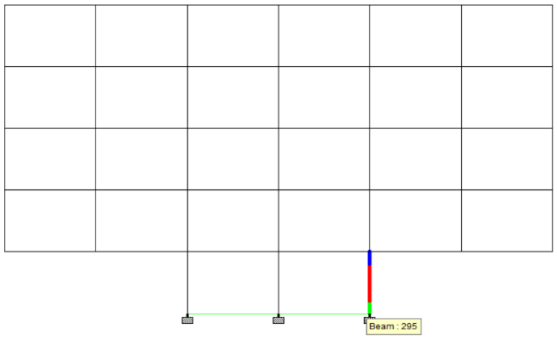

Fig.1 Plan of Mono Column building building

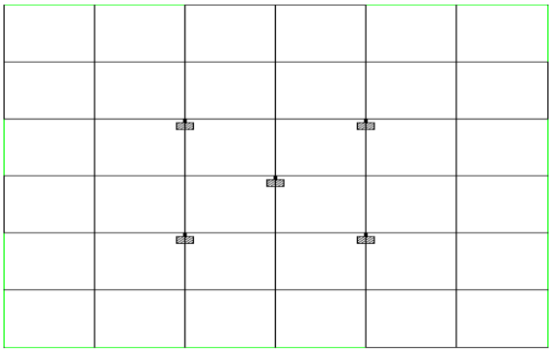

Fig.2 Elevation of Mono column

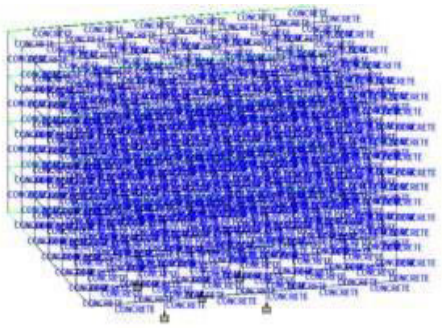

Fig.3 Assigning Properties

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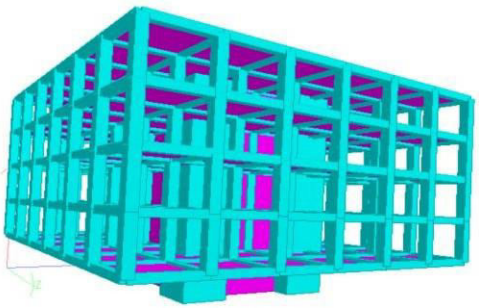

Fig 4. Rendered Model Mono column

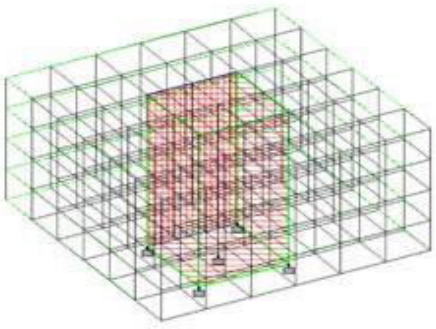

Fig 5. Shear wall

3.2 Loads acting on the structure

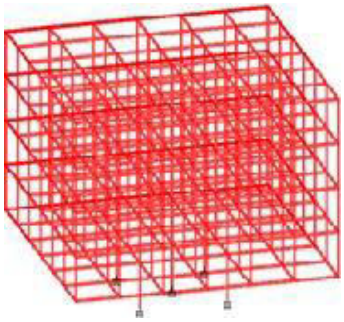

Fig 6. Dead Load

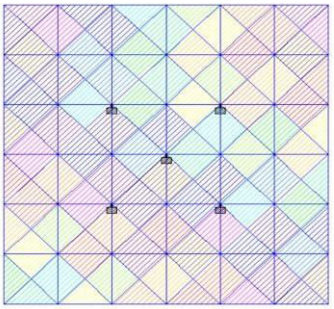

Fig 7. Live Load

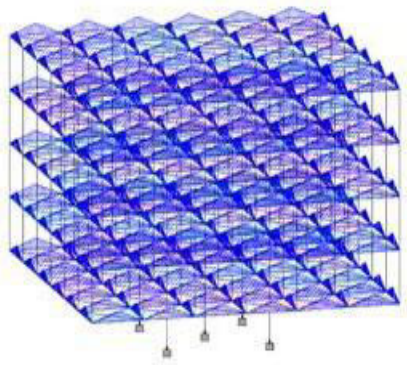

Fig 8. Floor Load

3.3 Mono column Building Details

All beam = 0.4 m x 0.3 m All column = 0.4 m x 0.4 m
Length= 6 bays @6.0m= 24 m Width = 6 bays @ 6.1 m = 24 m
Grade of concrete = M30 Grade of Steel = Fe 550

Live Load = 4 KN/m^2

Floor load = 2 K N/m^2

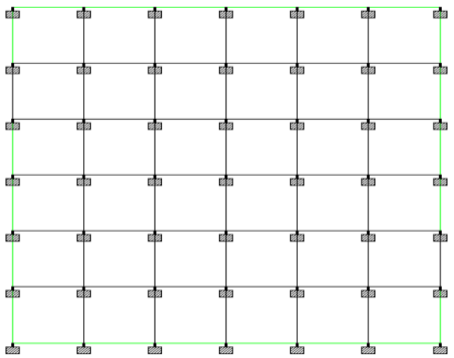

Fig 9. Plan of multi column

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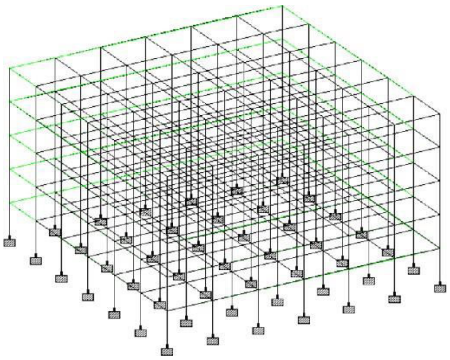


Fig. 10 Elevation of Multi column

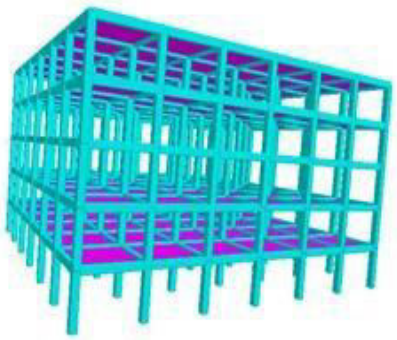
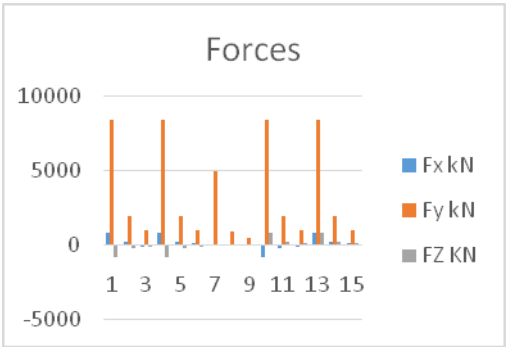


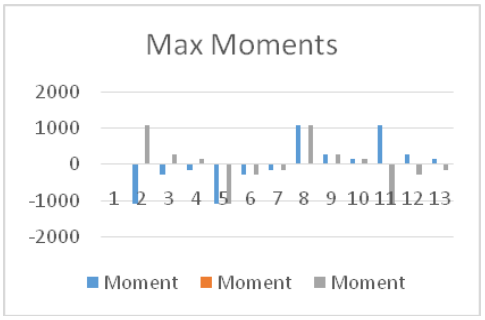
Fig 11. Rendered view

III. RESULT OF MONO COLUMN

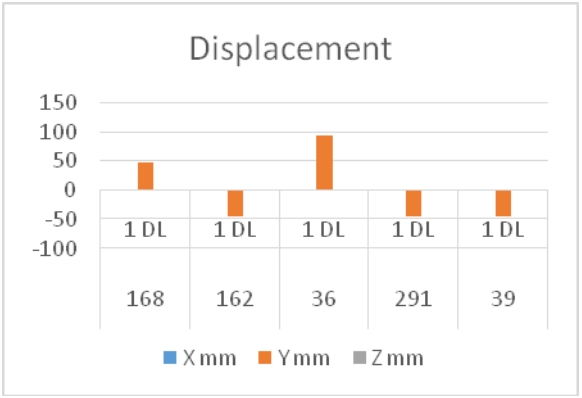
4.1 Support reactions



Graph 1. Maximum Forces



Graph 2. Maximum moment



Graph 3. Max and Min Displacement

IV. CONCLUSIONS

- Mono column building is morecostly when compared with multi column building.
- Single column building provides more space to use.
- Details of each and every member can be obtained using STAAD Pro.
- The result of deflection obtained from the software for a conventional multi column and mono column building.
- Mono column structure with shear wall provide more safety against lateral forces.
- Single column structure is a critical one when it is being to an symmetrical and eccentric loading conditions.

5.1 Future Scope of work

1. To perform the analysis of mono column multi-storey building using RCC subjected to Zones using STAAD Pro.
2. It is beneficial to verify deflection for a single column & multi column structure.
3. It gives more space for use.

V. ACKNOWLEDGMENT

We would like to place on record our extreme gratitude to our guide, Prof. M. Y. Jadhav, for this valuable guidance and help in completing this project and Prof. S. A. Chougule, Head of Department, Civil Engineering, we own a gratitude for giving us all the facilities required to our project.Our sincere thanks are also due to Dr. A. C. Bhagali, Director, ATS's SBGI, Miraj. We thanks to all teachers and staff of Civil Engineering Department, Lab and Library for extending a helping hand whenever necessary.We thank all our friend and others, who helped us directly or indirectly during this project work.

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