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A Review on Design and Analysis of Multi-Storey Building with a Single Column

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Abstract – *Nowadays, The rapid increase in populations tends to develop verticality in buildings and tends to lead an innovative ideas for vertical development. The parking and aesthetic views are one of them. Therefore, it is better to have multistory or G+4 or G+5 building rested on single column which gives the superior aesthetic view and gives the clear space at ground level. The structure is said to be stable when it withstand with all gravity and lateral loads. so, for checking those structural conditions and implementations as per IS codes it is suppose to be design in structural soft wares like E-tabs, Staad pro etc. The acting load in this review paper were dead load, live load, floor finish load and seismic load.*

Key Words: **Parking, Aesthetic view, Single column, E-tabs, Staad pro, Seismic load**

1. INTRODUCTION

The structure suppose to withstand with a single column gives great aesthetic purpose and demands highly alertness. Because building should be a commercial building or residential building and it also have stairs, lifts, etc. Further, there are two types of structure having single column, 1. Building rested on single column with floating column and 2. Building totally withstand with single column. "Floating column'' is also a vertical element which at its lower level rests on beam which is a horizontal member [4].

The loads acted on the structure were gravity and lateral loads. In gravity there are self weight of member itself , floor finish, sunk load ,etc. and in lateral loads there are earthquake and wind loads but usually none of the lateral loads acts simultaneously and in general for RCC building earthquake load is considered. The building is totally RCC building, sometimes it also built with composite material like steel and concrete or any other. The grade of concrete and sizes of members, which creates the main highlight of this topic. The load transfer pattern is also unique in these structures , because normally the basic load transfer pattern is load acted on slabs transfers to the supporting beams and from beams it transfers to the columns and from column it transfers toward foundation and from foundation it transfers to the strata or soil. But the building supported on single column transfers loads from slabs to supported beams, beams to cross beam which is towards single column at center and from single column to foundation and then in soil or strata.

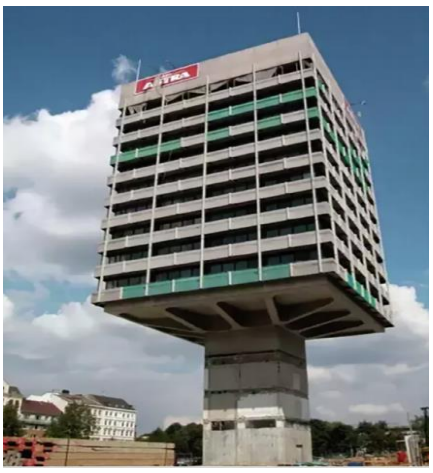

Fig -1: La torre Astra, enHamburgo[1]

The RCC building is modeled in many soft wares like E-tabs, Staad pro, etc. And for design a model in software the basic designing or placement of member or loacation of member should be suppose to be design in AutoCAD

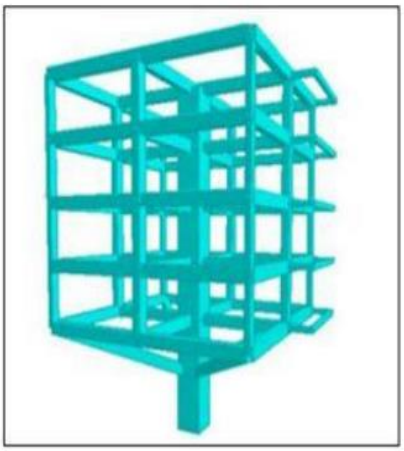

Fig -2: Single column structure [2]

The complete size, shape and geometry of a structure play a vital part to keep structure safe while earthquake arises[5].

1.1OBJECTIVE

- To describe the philosophy of structural design.
- To introduce various aspects of structural and material behaviour.

- To study on the variations in the structural response due to the earthquake motions are tabulated.
- To design building with single column having structural complexity into consideration.
- To compare the result between normal multi storey building and multi storey building with single column which majorly includes deflection ,frame displacement, storey drift, affect of lateral force.

2. Literature Review

[1] Chintakrindi V. Kanaka Sarath a, K. Ashok Kumar a, N. Lingeshwaran b, S. VigneshKannan c, S. Pratheba," Study on analysis and design of a multi-storey building with a single column using STAAD. Pro" Materials today : Proceedings, Received 26 April 2020 Received in revised form 3 June 2020 Accepted 5 June 2020

In this research paper the location of structural member like beams, slabs , columns etc are shown in autocad. So basically the location of members are drawn in autocad and the modeling is done in staad pro. In this research paper the column size is allocated and that size is taken at modeling for various analysis like static and dynamic.

This research paper conclude that using staad pro the analysis of multistory buildings has completed much quicker when compared with manual analysis. And the design using software reduces the time in designing work.

[2] Dr. S. G. Makarande , Mr. Jayant S. Ramteke , Mr. M. R. Nikhar , Mr. G. D. Dhawale "A Review on Comparative Study on Analysis of a Conventional Multi-Storey Building & a Single Column Building " Journal of Emerging Technologies and Innovative Research (JETIR) 2019 JETIR May 2019, Volume 6, Issue 5

In this research paper the comparative study is done between conventional building and single column building. This research paper more focuses on analytic point in software. The results are shown in this research paper between conventional and single column building.

This research paper conclude that the building withstand with mono column is 20% more costly when compared with conventional building..

[3] Madireddy Satyanarayana "Design Of Multi Storey Building Resting On Single Column" IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163,pISSN: 2321-7308

In this research paper the design of multistory building using single column is done by Autocad and staad pro with given data and loading conditions In this research paper only static analysis is done there are no any earthquake loads considered or mentioned on it.

This research paper conclude that using software analysis of different fundamental of analysis like deflection, reactions, bending moments, shear forces are calculated easily.

[4] Priya Prasannan, Ancy Mathew "Seismic Performance of RC Floating Column Considering Different Configurations" International Journal of Engineering Research & Technology(IJERT) ISSN:2278-0181 IJERTV6IS050050 Vol. 6 Issue 05, May – 2017

In this research paper the role and behavior of RCC floating column is explained. In this research paper the behavior of building having floating column is shown. The model is prepared in E-tabs.

This research paper conclude that the time period is more when floating column is provided at ground floor and the displacement, drifts , base shear are more when floating column is provided in building.

[5] Shaik Khaled Ahmed, Khaja Sami Uddin,Mohammed Saif Uddin, Mirza Musavir Ahmed Baig, Shaik Aslam, Mr. Irfan Ahmed,S. Ramyakala, "Seismic Analysis of Multi-Storey R.C Structural Frames with and Without Floating Columns" International Journal of Engineering Research & Technology (IJERT)

In this research paper it shown that the comparative study between building with floating columns and without floating column.This research paper shows the location of floating that where should it be for the beneficial of building overall. The various models having floating columns is done using E-tabs is done in this research paper. All gravity and lateral loads are considered.

This research paper conclude that floating columns requires special consideration and special reinforcement at that particular area because the storey having floating columns becomes weak as compare to other storey.

3. CONCLUSION

From the above research paper it is conclude that the building having single column is possible but requires special arrangement of structural member and it gives higher analytical values as compare to conventional building but it also fulfill the purpose like better aesthetic view and parking.

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