

A Review on Mono-Column Structure

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Abstract

A building is the first structure, entering one's mind as soon as one thinks of civil engineering. The building not only provides housing for the occupants but also protects them from many natural disasters. Preventing all the forces that cause such incidents is a requirement for the design of the building. But designing a building requires a lot of processes.

In a typical building, there are many columns at ground level to support the structure. Thanks to this Column, the system is safe, but there is some problem with space due to any column number. It takes up more space and issues in the parking lot and another service area. Due to the need for large service spaces, the mono column structure of the building may help to solve the problem. With the use of a mono column building system, a lot of space will be available on the earth's surface, and it will contribute to better construction.

Keywords: - Mono-column structure, Multi-storey building, E-tabs, Composite material, Floating column

INTRODUCTION

A large number of buildings are being developed at present. The maximum structure built at present tends to be wind sensitive because of their shapes, slenderness, flexibility, size and lightness and with multi-column at ground floor. Extensive work is carried out on the mono-column column supported structure. A review is done on the comparison of mono-column structure with multi-column structure with several configurations.

Structure supported on a multi-column has less usable floor space compared to structure supported on a single column. Multi-column uses more

ground space as it requires an area for providing a foundation and offers less room for parking. Extensive work is carried out on the single-column supported floor in a multi-storey building using composite material—most previous results over steel-concrete composite material in the structure. A very few works are available over the analysis & design of a structure supported on a single column. Basically, in all research works, different types of structure supported on the mono column by using the material, i.e., RCC OR steel, are taken for keeping the whole structural block. Still, each floor in a multi-storey structure independently

supported on a single column using composite material is not carried out in any research work. Literature Review is divided into three sections.

LITERATURE REVIEW

In this literature review study, there are three categories, namely mono-column design, member of a structure, comparison of single RCC column with a multi-column RCC structure and the use of a composite object.

1. Mono-Column Design

Prathamesh Ghare [1] shows his great inspiration for this paper by describing the composition of the tree. The mass of the leaves and branches is transmitted to the trunk and disturbed by the root in the ground. Analyzes planning, structural analysis and the construction of a single building are considered for a survey. The structure consists of a central core that carries a load of surface metal. All members will act as cantilevers. E-TABS software is used for structural Analysis and Design based on a limited feature process. It is analyzed and designed for a critical situation. It is considered to be created only within the state boundary of the road. Load numbers assigned the IS 875 (part-1) dead cargo structure, 2 part live cargo, three air cargo 3, IS 1893 (1 part) 1 seismic load. We have concluded that the building is safe from all types of loading and is safe from earthquakes and winds, and according to IS 456, the building is safe from permissible deviation.

Palaram Nikhil and Sanaka Vineela [2] demonstrate that the structure and analysis of the RCC framework are based on a single column. Structured modelling, compression, bending, shaving power, and structural design considerations using E-TABS V9.7.2 and comparing one Column of RCC with RCC multi-

column. We conclude that the cost of towing a building is increasing with the increase in space. It also concludes that the shear value, the shear strength, the shear strength also increase with the growing area. It is supposed that a mono column building should only be built on the ground floor, and a building with a mono column structure is a high price.

S. Ramramani, S. Priyanka, E. Sahul Hameeth [3] analyzes and designs the proposed site-building in Salem. The total area of the program is 190 sq.m. Both analytical and manual calculations are described in the proposed format. It is concluded that the cost of a mono column is much higher than the structure of most columns. The single-column formula has been successfully designed to withstand all hundreds of earthquakes and hurricanes.

Ambati Venu Babu, Dr Dumpa Venkateswarlu [4] described the planning, structural analysis, composition and drawings of various elements, and estimated cost of the entire structure. A single-column structure is supported by a single rectangular column in the centre. There is an addition of five storeys on the ground floor. The concrete range of M20 and M30 is used in one column. The composition of every member of the building is guaranteed in IS 456-2000. They study the effects of lateral migration in various areas and wind energy's effectiveness in an unusual structure in less than six places.

Member of the Structure

U-E K Mohanraj [5] analyzed one column supporting the structure. All other members act as cantilevers—reducing the cantilever time for columns that convert two-thirds of the length as long as they are supported by providing two ring

beams and inclined beams. The structure is analyzed and constructed using the STRAP (Structural Analysis Package) based on the Stiffness Matrix process. Conclude that if using high space is considered during planning and design, it will significantly enhance its high performance.

Ambati Venu Babu [6] analyzed the structure of a triangular structure in which a mono column is located at the edges of the triangle and not it is centre and found that a single-column structure is sensitive when it is in an equal and vertical loading position. As one column supports the entire structure, all the other members will act as cantilevers. It reduces the cantilever time for columns that convert two-thirds of the length as long as they are supported by providing two steel beams and inclined beams. The structure is analyzed and constructed using the Staad pro (structural analysis package) based on the matrix strength method. The above structure has been studied for many loading conditions, and criticism has been selected for construction.

BB Babicki[7] provide details on the layout of the building and facilities in the West Coast Office Building located in Vancouver, Canada, in an excellent location and one of the city's significant ducts connecting the city centre and residences. The building has 152,000 square feet of office space and has a parking space for 200 cars. The idea of the building was a slight disruption to the ecosystem and earthquake resistance since Vancouver is located in one of the most critical earthquake areas from California to Alaska.

The state-of-the-art building has 277 square feet of concrete space with 36x36 meters in the planning area and occupies 21 levels from the base to the

top. Three levels of underground parking, equivalent to three levels of the open plaza, 12 floors of common office space, 110 x 110 meters in a fixed location from the centre of the centre above the plaza space and, three levels within the upper deck of the cable elevator are considered for asurvey.

Badikala Sravanthi [8] done Design and Analysis of a single-column RCC structure is performed on this project (Figure 1). Cost Comparisons are made between one RCC column and an RCC column structure. This paper presents structured modelling, pressure, bending time, shear strength and structural design considerations and is analyzed using STAAD Pro.

The various steps involved in building an RCC structure are based on a single column using STAAD pro and comparing a single RCC column with a multi-column RCC framework. They conclude as follows: -

- a) A single-column structure is successfully designed to with standall loads, including earthquakes and the burden of the spirit.
- b) The formation of a single column is 20% more expensive compared to the shape of a multi-column.
- c) A single-column structure provides a better view of the construction and open space of the world despite the cost slightly beyond the formation of multiple columns.

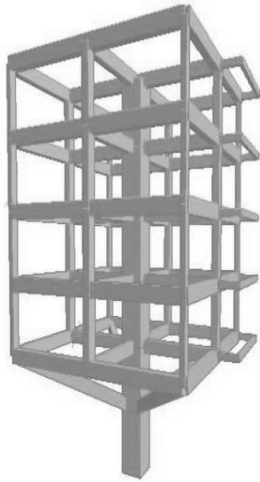


Figure 1 RCC Structure Based on one column

Madireddy Satyanarayana [9] analyzes and designs a multi-storey building that occupies a single column using a different code provision. A detailed plan for this proposed building is drawn up using AutoCAD 2010. The building has a ground floor and five storeys; He planned the construction as the standard Indian code instructed. Construction frames are manually analyzed by the Limit state method and provide a detailed structure for RC.C members.

Donald MacLeod [10] has done a research study in which a mono-column is directly supported by a pile of existing jackets on the sea bed and utilizes the disused platform capacity of the platform to increase the economic space available for new areas of pressure. The simple spigot interface between the mono column and the existing bulk also counteracts the need for grouting, temporary adjustment, and subsea intervention.

Traditional methods of expanding housing and land on overseas foundations include installing cantilevers or shoe shakers in inefficient spaces leading to overseas hours and extended closures. An important consideration for this building is its ability to survive in the event of a ship's impact.

To address this, the facility adopted advanced technology for the transportation of nuclear materials. Energy-absorbing and processing technologies have been used to create a 'crumple' space to protect a new building. This new mono-column structure looks deceptively sophisticated but straightforward when balancing the impact of a ship's wreck, fatigue and overload of the environment. It has often been done to restore Design of the Design as much as possible while keeping the structure free of challenges or too expensive to maintain. In the latter solution, we found significant cost savings. We had a positive economic impact on the project, thus helping to expand the product from the North Sea sector, which may have been abandoned immediately.

COMPARISON OF ONE RCC COLUMN WITH A MULTI-COLUMN RCC STRUCTURE

Mr Jayant S. Ramteke, Mr M. R. Nikhar [11] describes comparisons of a one-column RCC structure and a multi-column RCC structure. They edit and analyze multiple columns and single-column structure G + 4 in software. The design is based on the requirements and standards recommended by IS codes and national building codes. Editing is done using 3D modelling software with the help of AutoCAD 2014. The purpose is to develop, edit and analyze a high-level model in STAAD-Pro and study the seismic load used in the building by IS 1893-2002. Also, confirm the reduction of one column and multi-column structures and learn the lateral function of lateral migration in area II. It has been concluded that a single-column structure is 20% more expensive and a multi-column structure. It also concluded that the RCC column provides

satisfactory results under normal loading conditions. The rise of the news in the form of a high ascent refers to the extreme deviation.

Ankur Pandey, Vaibhav Singh, and Gaurav Awasthi [12] analyzed single-column storey structure using the software. Various steps are geometric modelling, provision of visual aids and phase structures, foundations and boundary conditions, a requirement of loads and loading integration, analysis specification and design instruction— comparison of composite materials and reinforced cement. The survey confirmed that the RCC column provided satisfactory results under the constant loading conditions. The composite structure with less dead weight than the RCC structure and increasing migration of co-deliver floor node displacement is also growing.

CONCLUSION

1. A large floor area can be economically constructed using a steel frame for columns, belts and under reinforced concrete.
2. Single column structure is critical when it is in the same loading position.
3. A single-column design provides a better view of the building and opens the world's space, even if it costs more than a multi-column structure.
4. The integrated element in the mono column structure makes the design more user-friendly than the standard RCC mono column structure.

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