

# ANALYSIS OF MULTI STOREY FRAMED STRUCTURE BY USING STAAD PRO: A REVIEW

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**Abstract:** In the field of Structural engineering, structural analysis and design of high rise buildings are predominant in finding out significant threats to improve the integrity and stability of the structure. When Multi storied structures are designed, they are made to fulfil the basic aspects, requirements and serviceability. Since the stability of the structure depends on loads acting on the structure, so it is required to pay attention over the analysis of the various loads such as dead load, imposed load, Wind load and seismic load. For simple structures analysis and design of structure can be done easily but in case of multi-storey structure, it is cumbersome to calculate the various loads manually. Hence it is a challenge to calculate the structural loads for a structural engineer. The problems faced by structural engineers were taken as opportunities for the development of software such as STAAD PRO with ease in analysis and designing of the structure. STAAD PRO is leading structural analysis and designing software worldwide. The design results using STAAD PRO of a framed RCC structure, for both regular and irregular plan configuration, are used. RCC framed structures are most commonly adopted a structure in the city of India. Such types of structures are affected due to various types of forces acting during their service life, such as static forces due to dead and live loads and dynamic forces due to the wind and seismic loads. This study presents a review of the previous work done on multistoried buildings about various loads analysis. The aim of the study is to focus on the static and dynamic behaviour of the structure.

**Keywords:** STAAD PRO.; Framed structure; High rise structure; Analysis.

## 1 INTRODUCTION

Structural engineering is the branch of civil engineering which deals with the construction of structures such as residential and commercial buildings. Simply a building can be defined as an enclosed area with walls and roof. In the early ancient time, humans used to live in caves, to save their life from the harsh environment and wild animals. As the time passed the living standard of human being changed. They started living in huts made of timber branches. Now their shelters have been replaced by the beautiful and luxurious houses. Day by day new inventions being introduced in the field of civil engineering for the development of houses economically to fulfil the requirements of our society. Structural engineers and architectures are responsible for the preparation of the design of the structure, planning and layout, etc. of the buildings. Draughtsman prepares the drawing of the building as per the direction of engineers and architects. A framed structure consists of a number of bays and storey.

In order to improve the performance of high rise structures, many types of research and studies have been done on the various loads acting on it. It has been observed that the main causes of the failure of the structure are the soft stories, floating columns, irregularities of masses, lower quality of construction material and poor workmanship, loose soil and foundation. All over the world, there is a great demand for construction of high rise structures because of the transformation of small cities into metro cities and rising population. The Loads acting on the structures are capable of damaging to high rise structures. Since these forces are random in nature, the engineers are required to keenly observe the structures to understand the action of these forces. STAAD PRO is the world's leading software for the analyzing and designing the high rise complicated structure in very less time with high accuracy.

## 2. Literature Review

Study of 30 stories high rise building for analysis of wind load and the seismic load is done by using staad pro 2008 [1]. They concluded that more reinforcement is required for the top beam. Hence more area of steel is required in static analysis than dynamic analysis. As compare to static analysis deflection and shear bending is more in dynamic analysis. More steel is required in the lower beam of the structure in the dynamic analysis as compared to static analysis. From the analysis of columns, the area of steel and percentage of steel is found greater for dynamic load combination compared to static load combination.

The study of the tall G+28 storied building which is designed and analysed by design software STAAD pro done by [2]. The combination of static and wind loads are taken into consideration. The results in terms of bending moment, support reaction, shear force, axial force are analysed. Due to the effect of wind load on the structure, the story wise variation of the result with respect to different parameters are compared and the reinforcement is also calculated that will ensure the structural safety of the building.

The project is done for the analysis of the multi-storey framed structure of G+6 which consists of apartments on each floor by [3]. They applied the dead load and live load on the structure hence obtained the size of beam, columns and footing of the structure. They come to the conclusion that STAAD PRO is a very powerful designing and analyzing software in less time with accuracy. Thus STAAD pro package is suitable for the design of a multi-storied building.

In the project analysis and designing of a G+5 multi-storey framed structure [4] calculated the loads manually and analyzing the data through the STAAD PRO software. The design method adopted for the designing purpose is limit state method of design

confirming to Indian standard code of practice. They analyze and design the multi-storey building for the various load combinations.

Study of seismic behaviour of the multi-storey structure in the dynamic and static analysis is performed by [5]. They have considered ordinary moment resisting frame and special moment resisting frame in his project. For their project, they considered a G+ 15 multi-storey structure which is located in the seismic zone II. After designing the whole structure is analyzed by the STAAD PRO software and observed the response reduction for the ordinary moment resisting frame and special moment resisting frame with deflection diagram in dynamic and static analysis and come into conclusion that special moment resisting frame is better to resist the seismic forces.

The design and analysis of multi-storied G+5 building are done by [6]. The study includes design and analysis of footings, columns, beams and slabs by using Staad pro. Also, the dead load and live load and their combination are analyzed by this software. The project is done to design a multi-storied building of G+ 5 floors, the design of the building is done by taking in to account the requirements and standards recommended by Indian Standard code of practice, Kerala building rules and national building rules [7]. The structural analysis and design of the building are done using STAAD.PRO and a cross-check are done for the selected members using limit state method of design as per IS 456-2000.

A study performed on Seismic analysis and design of RCC framed structure which is subjected to a Dead load, Live load and Seismic load. In this project work equivalent, static analysis is performed on the multi-storey framed structure [8]. The project work of analysis and design is carried out with the help of structural analysis leading software STAAD PRO. Considering the parameter for comparison purpose of seismic performance of the structures are Bending moment, Shear force, Deflection and the axial force. This framed structure consists of G+3 storey.

In this project work a study is performed on seismic response of the framed structure and observed under earthquake excitation which is expressed in the term of storey drift, joint displacement, support reaction and member forces [9]. The seismic response of the structure is performed for the G+7 storey building using STAAD PRO software. The response reduction is examined for the ordinary moment resisting frame in which earthquake zone II is considered. Initially, they examined the accuracy of the software by designing a simple 2D frame and manually check the obtained results. Then analyze the structure and design it for G+7 storey building.

A project report is prepared on the effect of the wind velocity on the structure and structural response of the structure on the sloped ground [10]. For this project work various frame geometries, a combination of static load and wind load is taken into account. 10 cases of the different wind zone are examined for this combination. Analyzing the results for different heights in term of axial force, displacement, moment, storey drift and shear force by using STAAD PRO software.

### 3. CONCLUSIONS

Many types of research and studies have carried out in the field of analysis and designing of high rise structures. Engineers require to keenly observe the response of structures against various load and load combination so that the different structural parameter can be accurately examined and designing of structure can be done with the help of STAAD PRO software to the desired accuracy.

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