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Analysis and Design of Multi-Storey Building by Using STAAD PRO Software

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ABSTRACT:The design and analysis of multi-story buildings using STAAD PRO software is a significant topic in the field of civil engineering. STAAD PRO is a widely-used structural analysis and design software tool that helps engineers analyze and design complex structures such as multi-story buildings. In this process, engineers use STAAD PRO software to perform a variety of analyses, including static and dynamic analyses, to determine the stability and strength of a building under different load conditions. This includes loads such as dead loads, live loads, seismic loads, wind loads, and others.

The software also helps engineers with the design of structural members such as beams, columns, and slabs, by calculating their sizes and other properties to meet specific design requirements. STAAD PRO software also allows for the modeling of various building materials such as concrete, steel, and timber, and considers the interaction between them. Overall, the analysis and design of multi-story buildings using STAAD PRO software is a critical process in ensuring the safety, durability, and structural integrity of buildings. It enables engineers to design structures that can withstand the loads and forces to which they are exposed and meet the required design standards and codes.

KEYWORDS:Design, analysis, Multistorey Building, limit state, planning, staad pro.

I. INTRODUCTION

Structural Analysis and Design is the main branch of civil engineering. The Designing and analysis part is the main part and if we are going to solve this analysis and Design part manually then it is time consuming as well as it can also occur a lot of error by doing this calculation manually. Hence nowadays software is used for the analysis purpose and design purpose as well as for planning software are used.

Structural analysis is the backbone of civil engineering. During recent years, there has been a growing emphasis on Using computer aided software and tools to analyze the Structures. There has also been advancement in finite Element analysis of structures using Finite Element Analysis methods or matrix analysis. These developments Are most welcome, as they relieve the engineer of the often Lengthy calculations and procedures required to be followed While large or complicated structures are analyzed using Classical methods. But not all the time such detailed Analysis are necessary to be performed i.e. sometimes, just Approximate analysis could suffice our requirements as in Case of preparing the rough estimates and participating in The bidding process for a tender.

1.2 Literature review

B. Gireesh Babu, (2017) it has been done in design of G + 7 residential building using seismic analysis in Staad.pro. He collected various necessary seismic data to conduct a seismic analysis of the structure. This modal study the earthquake forces expressed as member forces, support reaction, storey drift and joint displacement.

Anoop. A, (2016) has explained that the scope of the project is to provide a multi storied building of G+ 5 floors. Revit 2011 and Auto CAD 2014 software is used for developing 3- D models. The structure analysis and design are done using STAAD.Pro. The results are checked for selected members using limit state method of design as per IS 456-2000.



II.METHODOLOGY

2.1 Model Generation

We generate the structure in STAAD.Pro by using coordinates. Out of those three methods, most typically used is run structure wizard method by using these three methods a structure of any geometry is created.

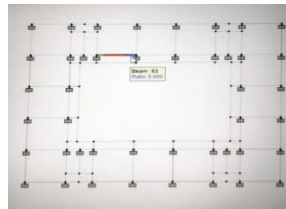


Figure 1: model Generation

2.2 By using Coordinates

By preparing the coordinates within the shuttering plan by considering x, y and z axis the node points are generated in STAAD.Pro so the beams are inter connected to node points.

2.3 Input Properties

The structural details of primary beams, secondary beams and columns of various dimensions and materials are given within the table to assign the subsequent properties to the structure.

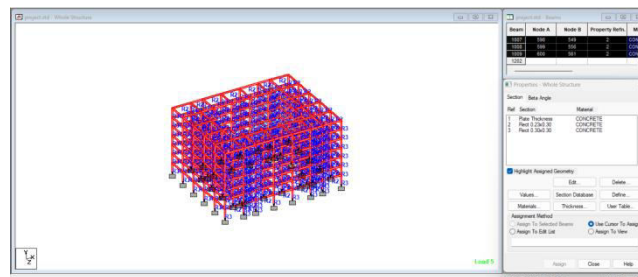


Figure 2: assigning properties

2.4 Assigning Loads

Any structure is subjected to basically these types of loads:

- Dead Load
- Live Load
- Wind Load

Seismic Load is applied in x direction and z direction. Wind load is also acting in x direction and z direction and also in $-x$ direction and $-z$ direction.

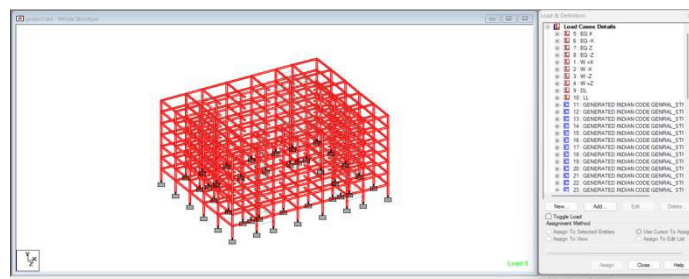


Figure 3 :assigning Loads

2.5 Analysis: Structural analysis is that the determination of the results of loads on physical structures and their components. The results of the analysis are accustomed verify a structure's fitness to be used, often saving physical tests. Structural analysis is thus a key a part of the engineering design of structures.

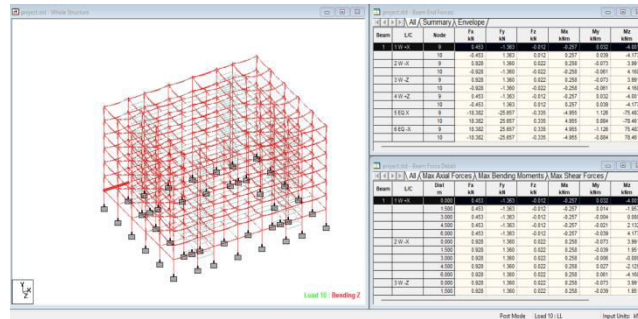


Figure 4 : analysis

III. EXPERIMENTAL RESULTS

The maximum bending moment and shear force in a beam occur at the location where the external loads create the highest stresses. In this case maximum bending moment of 4.17 kN-m and shear force of 1.363 kN-m developed.

IV. CONCLUSION

In the present scenario, a structural engineer cannot afford to generate the results manually as it involves tedious procedures and complicated calculations, which requires considerable time and patience. Thus there is always a need of a simpler alternative like the use of various; Computer Aided Software's which would offer great flexibility and efficiency. In this project, analysis and design of structure was done with the aid of software called STAAD pro which is quite feasible in using and offers more efficient designs and flexibility. The (G+7) building has been designed and analysed and it is economical and safe.

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