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ANALYSIS AND DESIGN OF MULTISTOREY(G+5) RESIDENTIAL BUILDING

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Abstract - *In order to compete in the ever-growing competent market it is very important for a structural engineer to save time as a sequel to this, an attempt is made to analyse and design a building by using a software Staad pro. For analysing a building one has to consider all the possible loadings and see that the structure is safe against all possible loading conditions. The increasing demand for urban residential spaces necessitates efficient and reliable structural designs for multistorey buildings. This project focuses on the analysis and design of a (G+5) residential building using STAAD Pro, a versatile structural engineering software. The primary objective is to ensure the building's structural stability, safety, and compliance with relevant standards and codes. The study involves modelling the building's structural components, including such as dead loads, live loads, seismic loads, and wind loads. The STAAD Pro software is employed to perform static and dynamic analyses to evaluate the building's response under these loads. Key aspects such as material optimization, cost efficiency, and adherence to IS codes (IS 456:2000 for RCC design and IS 875 for load considerations) are prioritized throughout the design process. STAAD. Pro is a very powerful tool which can save much time and is very accurate in designs.*

***Key Words*: : Staad pro, multistorey buildings, shear force, bending moment.**

1. INTRODUCTION

The demand for residential spaces in urban areas has led to an increase in the construction of multistorey buildings. A multistorey (G+5) residential building is a complex structural system that requires careful analysis and design to ensure safety, stability, and comfort. This project aims to analyse and design a multistorey (G+5) residential building, taking into account various loads, building codes, and structural requirements. Any structure for any purpose and constructed of any material and every part of that whether used for human habitation or not, includes all the structural elements like foundation, masonry, roof etc. with all the services like W. C., bath, stair etc. is called a building

1.1 Classification of buildings:

The buildings are classified according to the use or the character of occupancy as:

Residential building, Educational building, Institutional building, Assembly building, Business building, Mercantile building Industrial building, Storage building, Hazardous building.

1.2 Method of Analysis:

The various method of analysis are:

Method of flexibility coefficients, Moment distribution method, Kani's method, Approximate method, Matrix methods.

2. METHODOLOGY

This project involves the analysis and design of a multistorey (G+5) residential building, ensuring safety, stability, and comfort while adhering to building codes and structural requirements.

1. Data collection
2. Building modeling (3D)
3. Structural analysis (linear, dynamic, modal)
4. Design of structural elements (columns, beams, slabs)
5. Foundation design
6. Seismic and wind load design
7. Result verification
8. Documentation and reporting

Column:

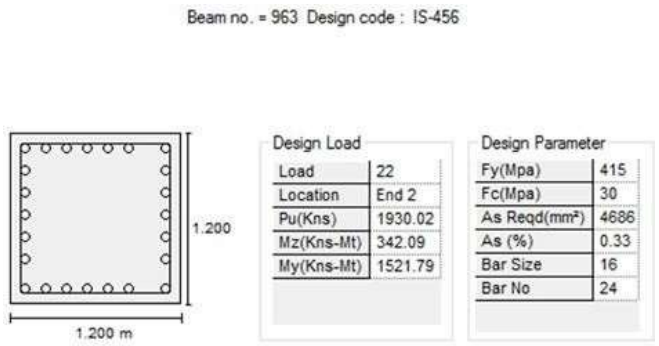

Fig -1: Design of column

Slabs: One-way slabs are those which are supported on the two opposite sides and loads are carried in one direction only. Two-way slab is called the span. This steel is called as distribution steel or secondary reinforcement.

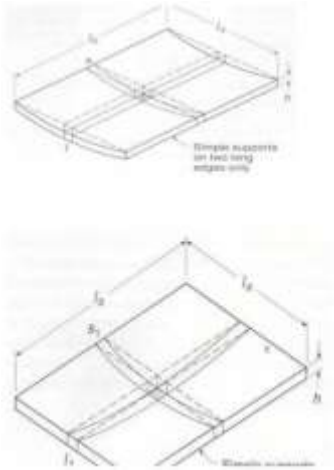

Fig -2: Slabs

Types of Footings: Footings are structural members used to support columns and walls and to transmit and distribute their loads to the soil in such a way that the load bearing capacity of the soil is not exceeded, excessive settlement, differential settlement, or rotation are prevented and adequate safety against overturning or sliding is maintained.

Beam:

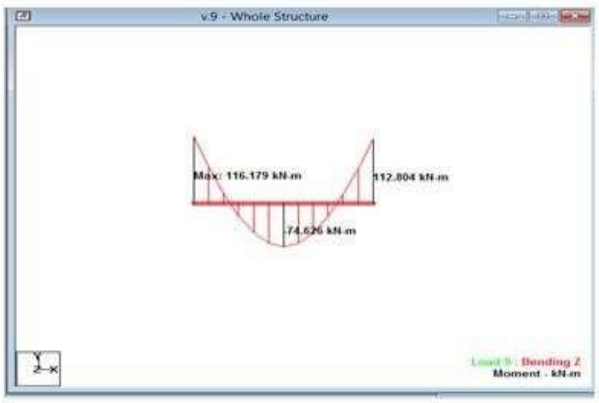

Fig -3: Check for Bending moment

A reinforced concrete beam should be able to resist tensile, compressive and shear stresses induced in it due to loads on the beam. Plain concrete beams are thus limited in carrying capacity by the load tensile strength. The tensile weakness of concrete is overcome by the provisions of reinforcing steel in the tension

zone around the concrete in the concrete to make a reinforced beam.

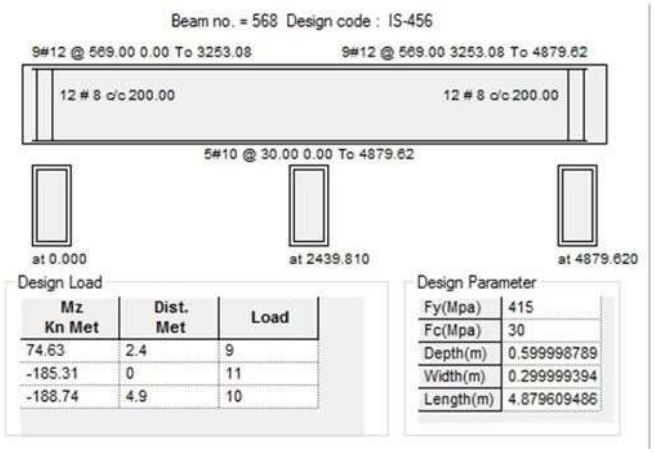

Fig -4: Design of Beam

3. CONCLUSIONS

This project aimed to analyze and design a multistorey (G+5) residential building using STAAD Pro. The analysis revealed that the building's structural system, comprising beams, columns, and slabs, can withstand various loads, including dead loads, live loads, and wind loads. The design satisfied the relevant building codes and regulations, ensuring the building's safety and stability.The use of STAAD Pro facilitated a detailed analysis of the building's structural behavior, enabling the optimization of the design and reducing the risk of structural failures. The software's capabilities in modeling, analyzing, and designing complex structures made it an essential tool in this project.

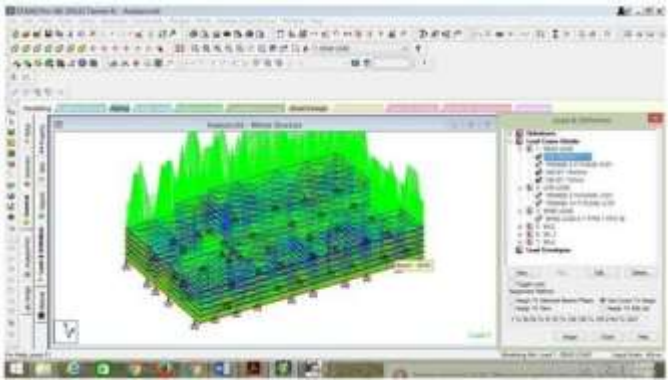

Fig -5: Dead Load, Live load , Wind load

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