iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** V **Month of publication:** May 2023

DOI: https://doi.org/10.22214/ijraset.2023.51888

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Analysis & Design of G+5 Residential Building Using STAAD-PRO

Akash Deep, Akshay Deep

Abstract: ***Structural planning and design is an art and science of designing with economy elegance and durable structure. The entire process of structural planning and designing is not only requires imagination and conceptual thinking but also sound knowledge of structural engineering besides knowledge of practical aspects such as relevant design codes and by-loss backed up by example experiences. The purpose of standards is to ensure and enhance the safety, keeping careful balance between economy and safety. In the present study G+5 building of 9.0mX15.2m.Area 136.8sqmeter at Badarpur New Delhi , is designed (Slabs, Beams, Columns and Footings) using STADD PRO software. In order to design them, it is important to first obtain the plan of the particular building that is, positioning of the particular rooms (Drawing room, bed room, kitchen toilet etc.) such that they serve their respective purpose and also suiting to the requirement and comfort of the inhabitants. Thereby depending on the suitability; plan layout of beams and the position of columns are fixed.***

Keywords: AutoCAD and STAAD PRO

I. INTRODUCTION

A building frame consists of number of bays and storey. A multistorey, multi-paneled frame is a complicated statically intermediate structure. A design of R.C building of G+5storey frame work is taken up. The building in plan (9.0mX15.2m) consists of columns built monolithicall forming a network. The size of building is 8.5X14.7m. The number of columns are 17. it is`1 residential complex. The design is made using software on structural analysis design
(staad-pro). The building subjected to both the vertical loads as well as horizontal loads. The vertical load consists of dead load of structural components such as beams, columns, slabs etc and live loads. The horizontal load consists of the wind forces thus building is designed for dead load, live load and wind load as per IS 875. The building is designed as two dimensional vertical frame and analyzed for the maximum and minimum bending moments and shear forces by trial and error methods as per IS456-2000. The help is taken by software available in institute and the computations of loads, moments and shear forces and obtained from this software.

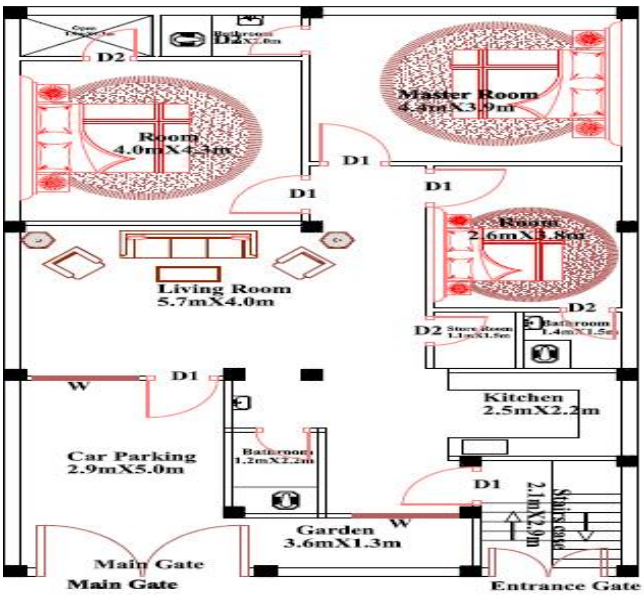


Figure 1: Plan Considered in designing
Source: Drawn in AutoCAD 2008

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II. METHODOLOGY

Salient features of Building properties:
Utility of building: residential complex
No of stories: G+5
Shape of the building: 5 FLOORS
No of staircases: 1
No. of flats: 6
Type of construction: R.C.C framed structure
Types of walls: brick wall
Geometric details:
Ground floor: 3m
Floor to floor height: 3m.
Height of plinth: 1.m
Depth of foundation: 500mm
Materials:
Concrete grade: M25
All steel grades: Fe415 grade
Bearing capacity of soil: 300KN/M2

III. LOADS CONSIDERED

Types of loads on an hypothetical building are as follows.

1) Dead (gravity)
2) Live (gravity)
3) Wind (uplift on roof)

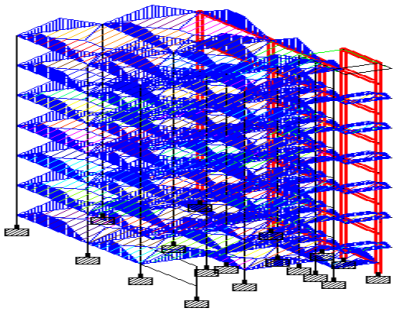


Figure:2 Model after assigning the loads
Source: from staad pro software

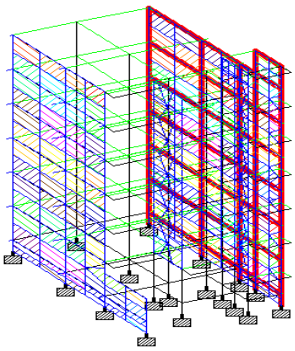


Figure 3: Building after applying wind loads
Source: from staad pro software

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IV. REINFORCEMENT DETAILS

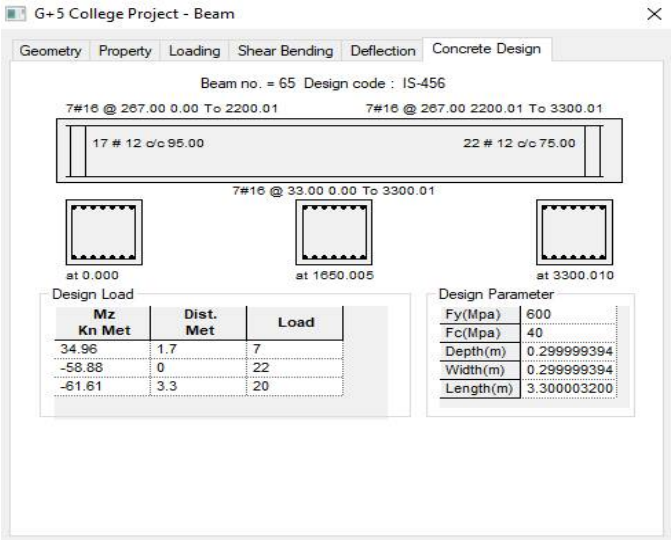


Figure 4: Reinforcement details of beam after designing
Source : from staadpro software

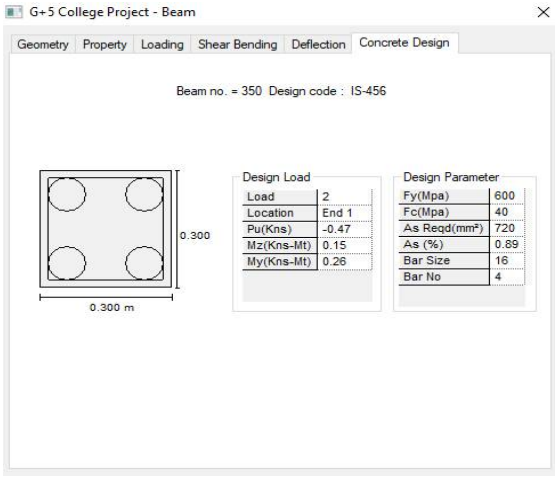


Figure 5: Reinforcement details of column after designing
Source : from staadpro software

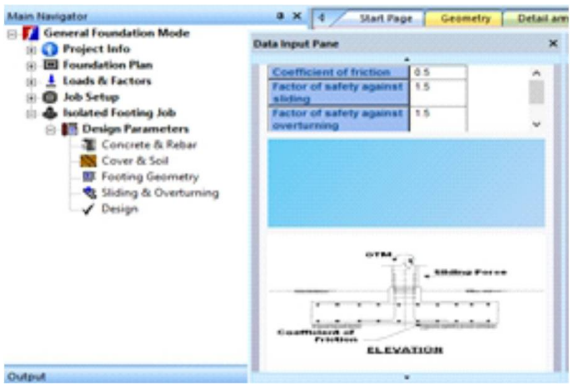


Figure 6: Reinforcement details of footing after designing
Source: from staad foundation software

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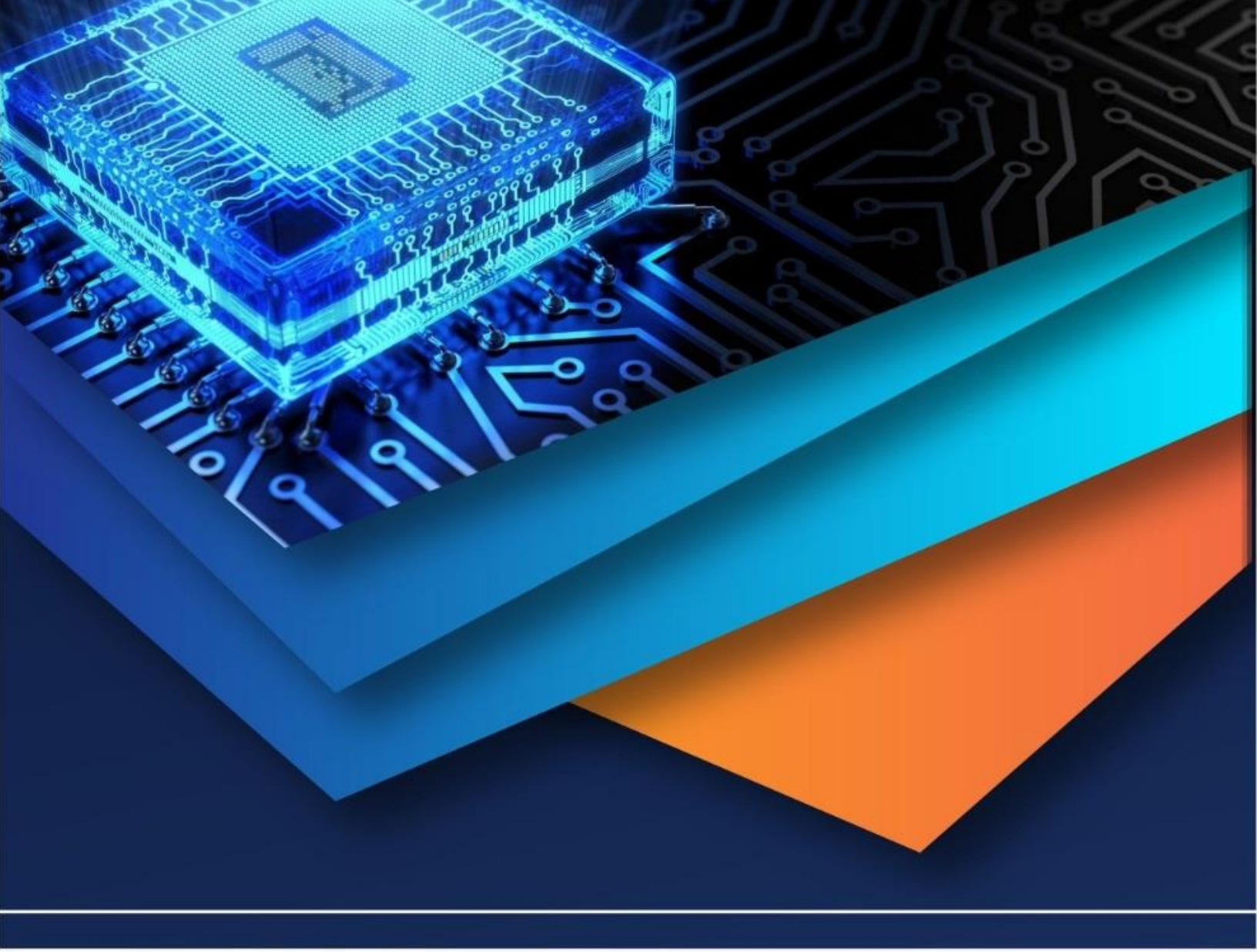
V. CONCLUSIONS

From the work carried out in staad pro we can conclude that

1) Using STAAD.Pro the analysis of multi storey building has completed much quicker when compare with manual analysis (Kani's method)
2) It is observed that the reinforcement percentage in the sections is more in the case of software design when compared to manual calculations.
3) Designing using Software's like Staad reduces lot of time in design work.
4) Reinforcement Details of each and every member can be obtained using staad pro.
5) All the List of failed frame sections can be Obtained in the report given by Staad Pro so that we can change the property data for a better setion.
6) Shear variation and moment variation of particular section can be observed clearly on the building.
7) Accuracy is improved by using software.
8) Reinforcement details of each member can obtain directly after analysing the building.

REFERENCES

[1] IS 456:2000 Code of practice for plain and reinforced concrete
[2] SP 16(S&T): 1980 Design aids for reinforced concrete to IS 456:1978



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