IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 2, April 2024

Design and Analysis of Multi-storey (G+6) Residential Building using Staad pro And AutoCad

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Abstract: *The design and analysis of multi-storey residential buildings play a crucial role in ensuring structural integrity, safety, and efficiency in urban infrastructure The present project deals with the design & analysis of a multi storied residential building of G+6 consisting of 4 apartments in each floor. Load analysis forms a critical component of the design process, as it involves determining the magnitude and distribution of various loads acting on the building, including dead loads, live loads, wind loads, and seismic loads. STAAD Pro facilitates the application of these loads and provides robust analysis tools to assess their effects on the structure, ensuring compliance with relevant building codes and standards. The dead load &live loads are applied and the design for beams, columns, footing is obtained STAAD Pro We conclude that staad pro is a very powerful tool which can save much time and is very accurate in Designs. Thus, it is concluded that staad pro package is suitable for the design of a multi-storeyed building*
Staad pro Analysis include
Creating a plan for structural framework
Obtaining amodel
Structure analysis
Structure design.

Keywords: Staad. Pro, Multi-storey building, Residential building, gravity load, Limit state method, shear force, bending moment and axial force

I. INTRODUCTION

Load analysis is a critical aspect of the design process for multi-storey residential buildings, as it involves assessing the effects of different types of loads, such as dead loads, live loads, wind loads, and seismic loads, on the structure. STAAD Pro provides advanced analysis capabilities for applying these loads and evaluating their impact on the building's performance. Through sophisticated algorithms and simulation techniques, engineers can analyze factors such as deflections, stresses, and deformations, ensuring that the structure meets safety standards and regulatory requirements.

II. LITERATURE REVIEW

Mr. K. Prabinkumar, R. Sanjaynath in their paper "A study on design of multi-storey residential building - a review" concluded that at first, the planning of the structure is done using AutoCAD. Calculations of loads were done manually and then the structure was analyzed using STAAD Pro. STAAD Pro is straightforward to use so as that the frame are going to be drawn, load values and dimensions are given. The method used in STAAD Pro analysis is limit state method. STAAD Pro is able to calculate the reinforcement required for any concrete section. Different structural action is considered on members such as torsion, flexure, axial, etc. Shear reinforcement is sufficient to withstand each shear forces and torsional moments. Beams are designed for flexure, shear and torsion. Columns are delineated for axial forces at the ends. The building is planned as per IS: 456-2000.

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Madhurivassavai et al., (2016) he says that the most common problem country facing is the growing population. Because of the less availability of land, multi-storey building can be constructed to serve many people in limited area. Efficient modelling is performed using STAAD.Pro and AutoCAD. Manual International Journal of Pure and Applied Mathematics Special Issue 2798 calculations for more than four floor buildings are tedious and time consuming. STAAD.Pro provides us a quick, efficient and correct platform for analysing and coming up with structures

Nasreen. M. Khan (2016) has mentioned that logical data is incredibly necessary and essential talent required by each and every engineer. The project encompasses a shear wall round the elevator pit.During this project the structure is meant and tested with the help of STAAD.Pro and the scheming was done physically. Layout of beam, column, slab, shear wall, stair case, shear wall, tank and an isolated footing are done. Finally, the detailing was done using AutoCAD

II. SOFTWARE USED

- STAAD PRO
- 3D MAX
- AUTOCAD

1.1 STAAD PRO

STAAD Pro is a comprehensive and powerful tool that plays a critical role in the analysis and design of structures across a wide range of industries and applications. Its advanced features, versatility, and integration capabilities make it an essential software for structural engineers and designers worldwideIt's one of the most widely used tools by structural engineers and designers for analyzing and designing various types of structures, including buildings, bridges, towers, industrial structures.

1.2 3D MAX

3ds Max is a professional 3D computer graphics software developed by Autodesk. It's widely used in the fields of architecture, design visualization, film, television, and game development. With its powerful modeling, animation, rendering, and simulation tools, 3ds Max enables users to create stunning visualizations and immersive experiences. It supports a wide range of modeling techniques, including polygonal modeling, spline-based modeling, and parametric modeling. Its robust animation tools allow for complex character animations and procedural motion graphics.

1.3 AUTOCAD

AutoCAD is a computer-aided design (CAD) software developed by Autodesk. It is widely used by architects, engineers, designers, and drafters for creating 2D and 3D drawings, models, and designs. AutoCAD offers a comprehensive set of tools for drafting, annotation, and detailing, allowing users to create precise and accurate drawings. Its intuitive user interface and extensive documentation make it accessible to both novice and experienced users. AutoCAD supports a variety of file formats for interoperability and integrates with other Autodesk software and third-party applications. Its versatility and wide-ranging capabilities make it a standard tool in industries such as architecture, engineering, construction, and manufacturing.

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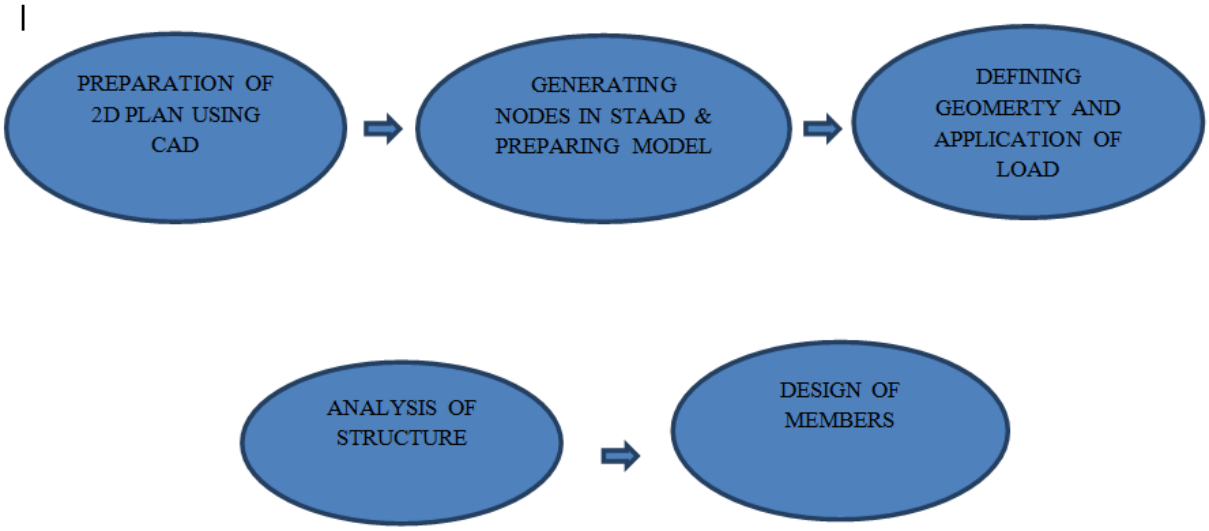
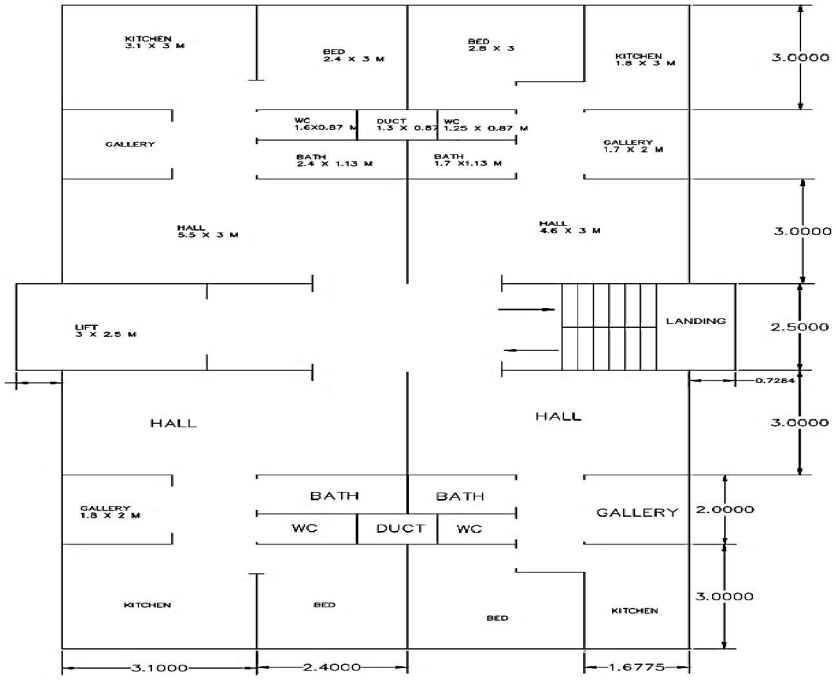
III. METHODOLOGY USED



3.1 PLAN OF BUILDING



G+6 STOREY RESIDENTIAL BUILDING

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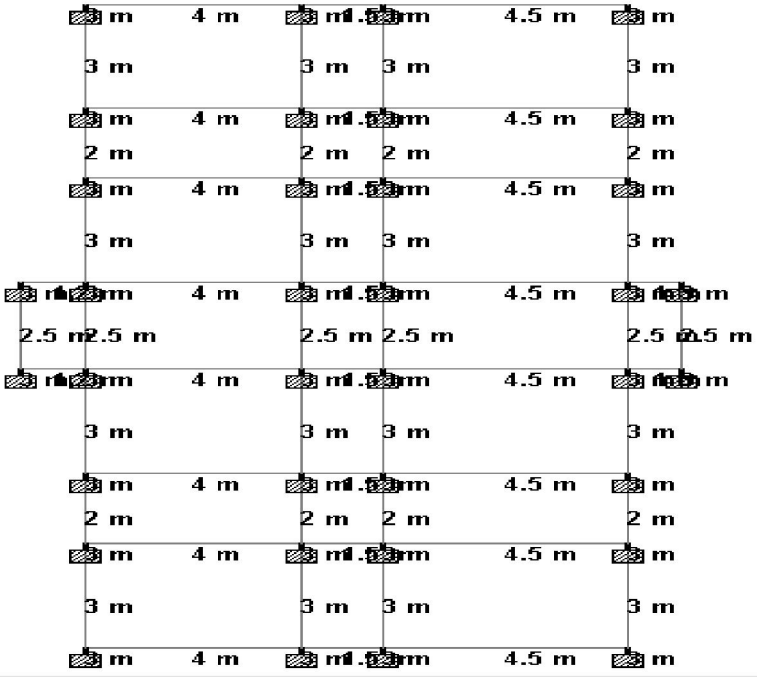
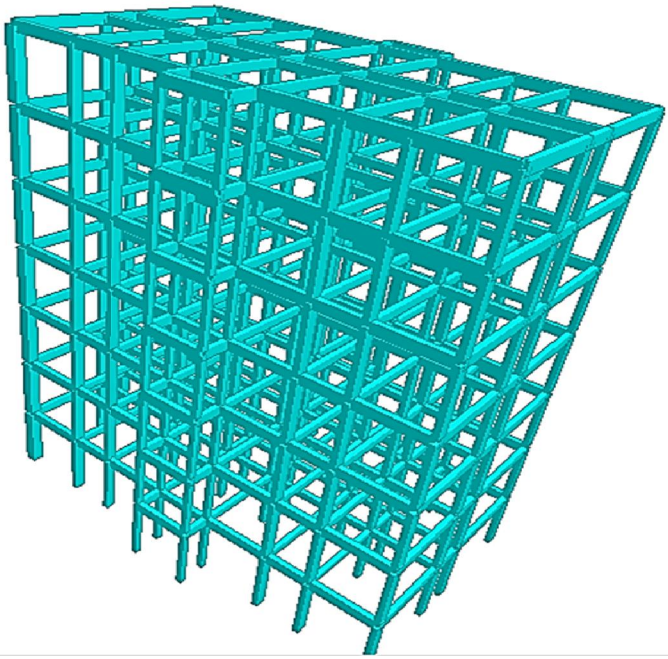
3.2 PREPARING NODES AND APPLYING SUPPORT



3.3 3D RENDRING VIEW



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3.4 MODEL PREPARATION IN 3D MAX

IV. STRUCTURAL DETAILS

Dimensions of Building – 10.1 X 18.5 M
Utility of Building –Residential
No of Storeys – G+6
Floor Height – 3M
Height of Plinth – 1.5 M
Dead load -
Live Load –
Slab Thickness- 150 MM
No Of Units – 24 (4 on each floor)
Area Of Each Apartment -600 Sq. feet
Height of Building – 26M

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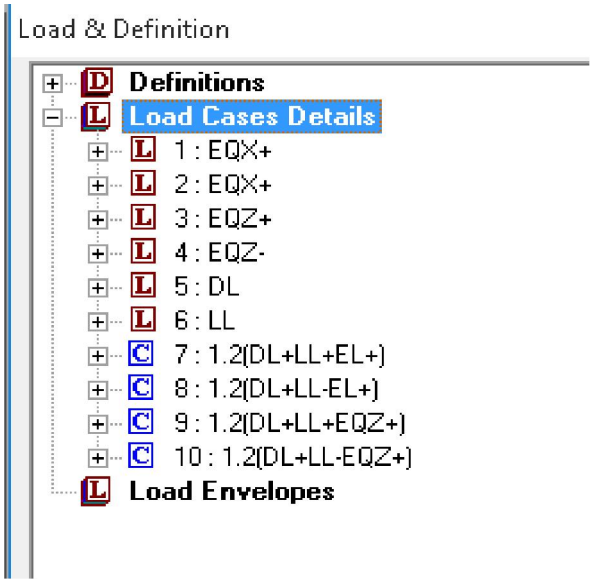
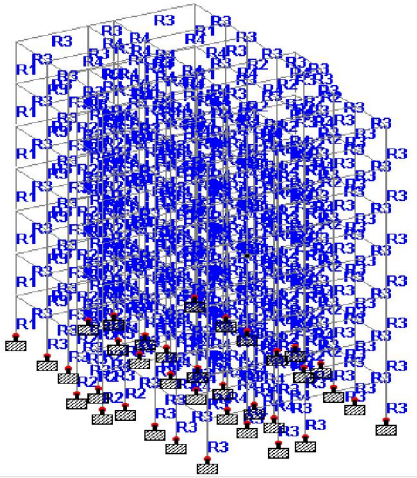
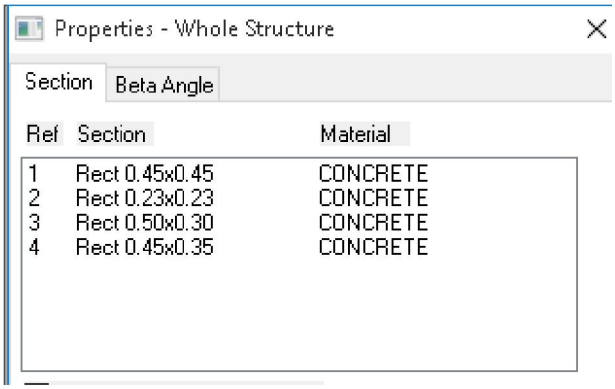
4.1. LOADING DETAILS& MATERIAL USED



Name	E kN/mm2	Poisson's Ratio	Density kg/m3
ALUMINUM	68.948	330E-3	2712.631
CONCRETE	21.718	170E-3	2402.615
STAINLESSSTEEL	197.930	300E-3	7833.413
STEEL	205.000	300E-3	7833.413

4.2. PROPERTY OF WHOLE SRUCTURE





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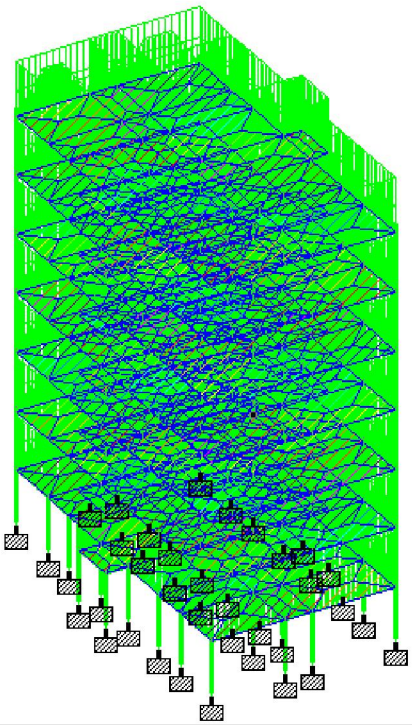
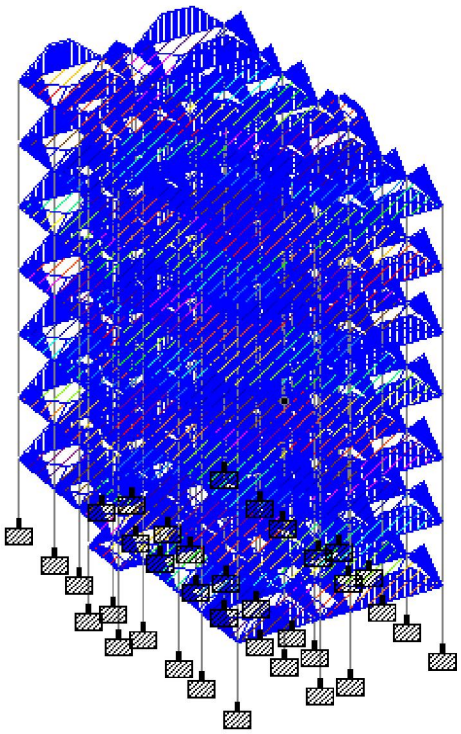
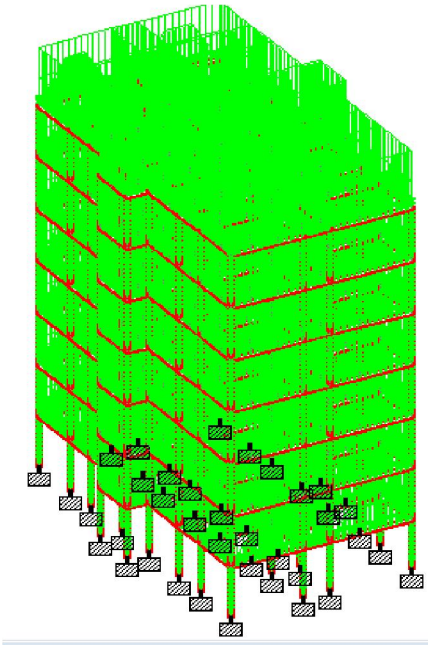
V.0 STUCTURAL ANALYSIS



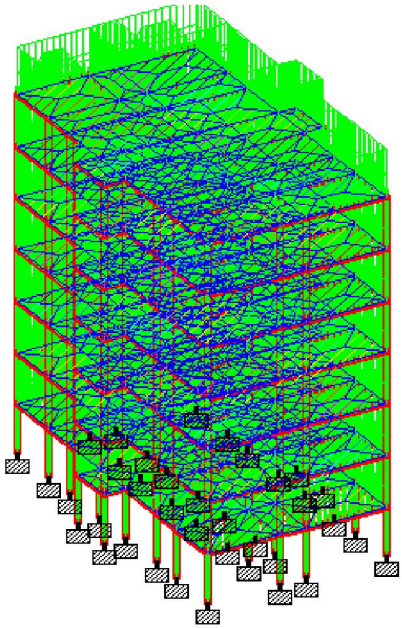
DEAD LOAD



LIVE LOAD



1.2 (DL+LL+EL)



SELF WEIGHT

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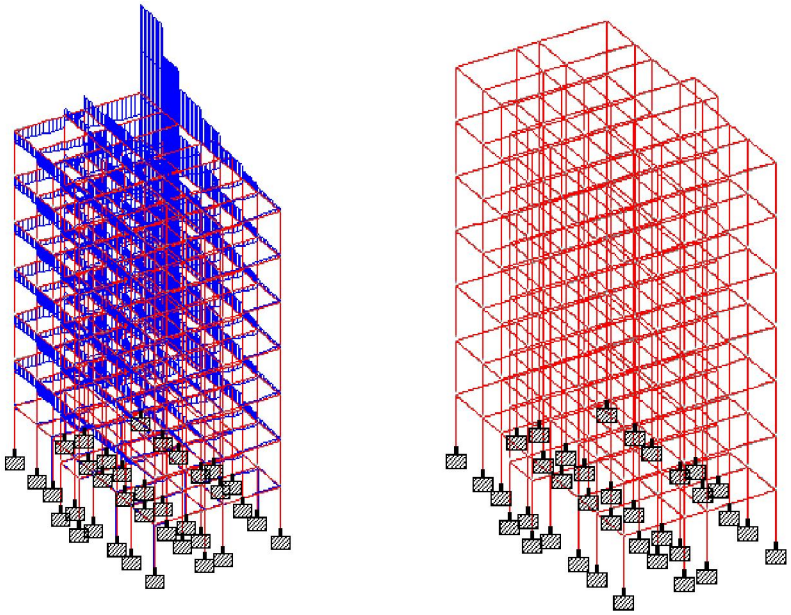
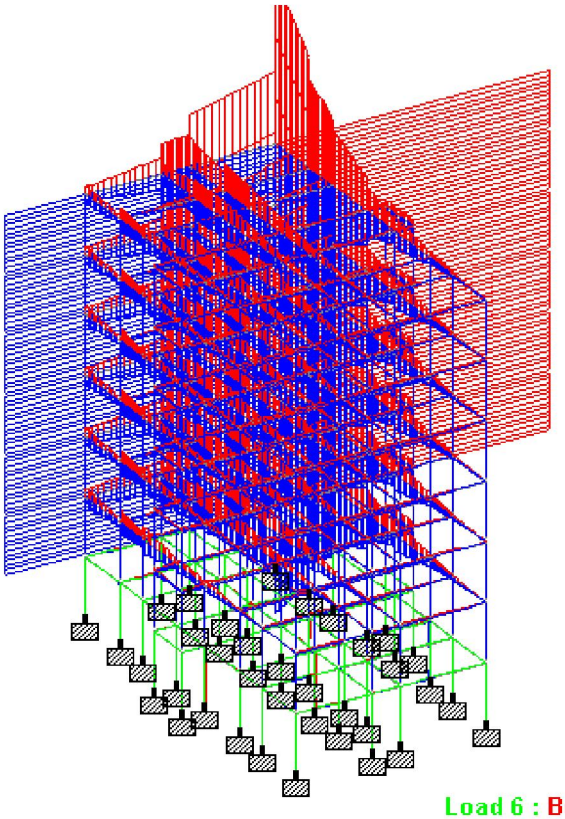


Load 6 : Shear Z



Load 6 : Beam Stress : Displacement

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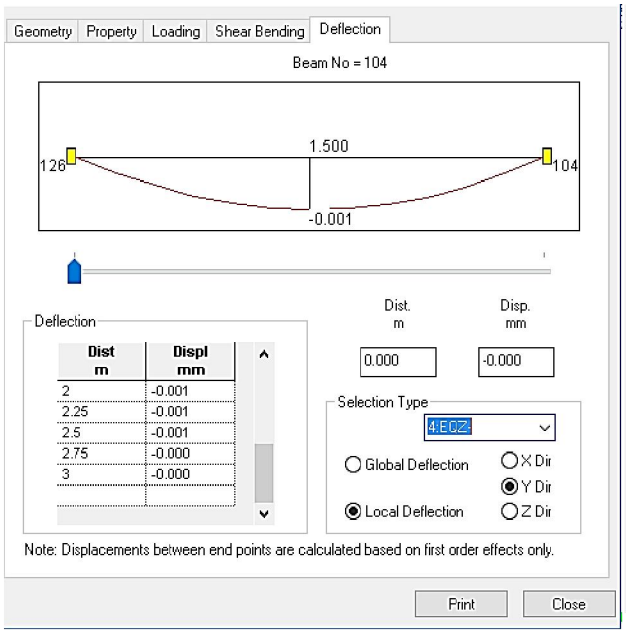
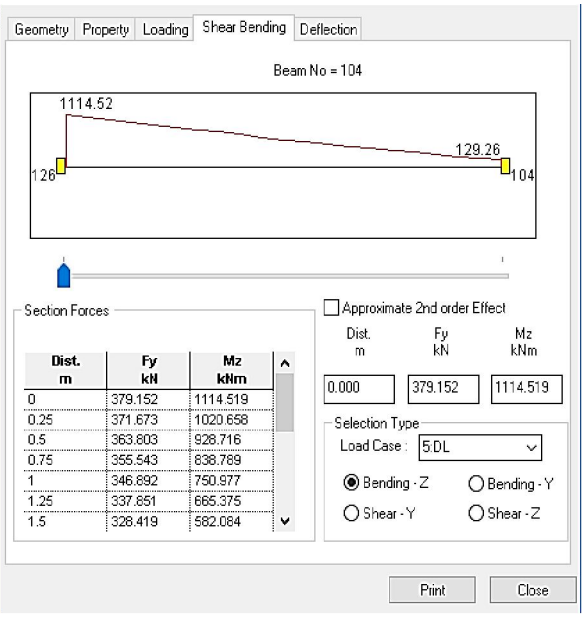
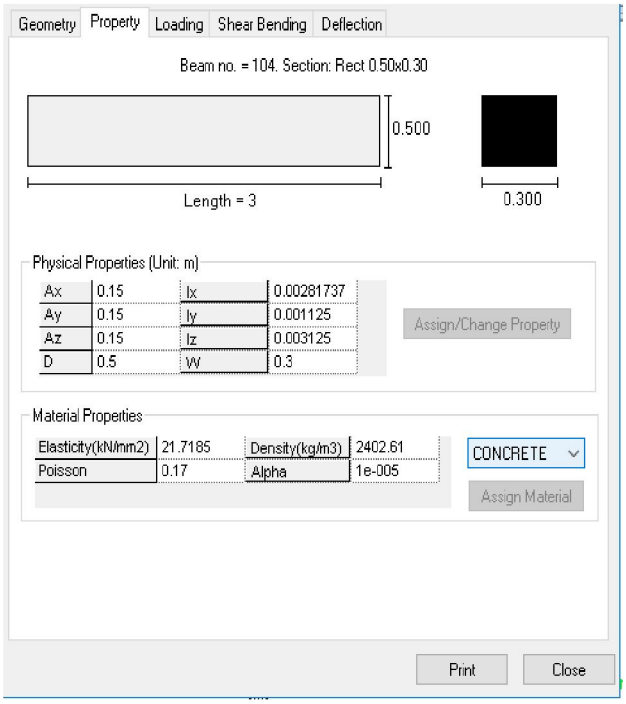
VI. DESIGN OF MEMBER (BEAM)



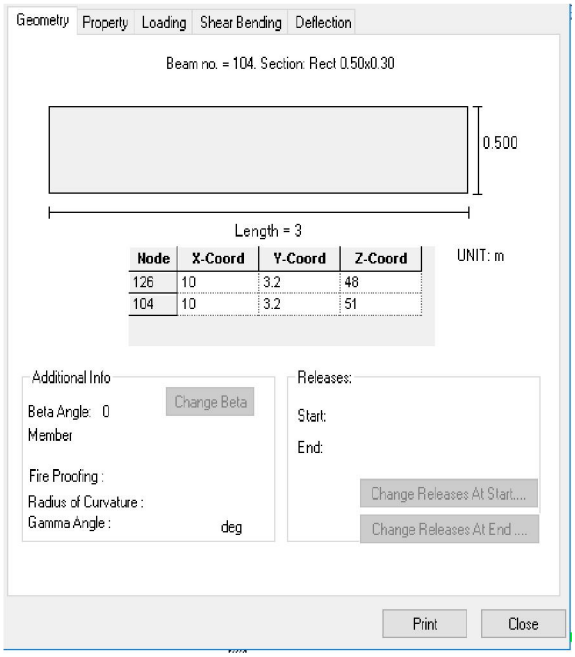
DEFLECTION



SHEAR BENDING



PROPERTY



GEOMETRY

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VII. CONCLUSION

The aim of our project was bringing idea to plan, analysis and design of a multi-storeyed, earthquake resistant residential building. We were unsuccessful to fully complete the project in a successful and efficient manner by considering all the relevant features given. The design is completely depend on relevant Indian Standard Codes. The analysis and design has been done with the help of STAAD Pro and 3d max software and also the drawings have been made with the help of AutoCAD. The structural components of the building are safe in shear and flexure. We will complete this project to the best of our knowledge and ability.

ACKNOWLEDGMENT

We express our heartfelt gratitude to our esteemed mentors and professors, especially, for their invaluable guidance in our academic and project endeavours. We also extend our thanks to the CivilDepartment and its staff for their continuous support. Our sincere thanks go to Principal of CSMSS College of Engineering Aurangabad for his support and permission to complete this project. We appreciate the assistance of our department's support staff, and we're grateful to our parents, friends, and all those who supported us throughout this project.

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