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Planning Analyzing and Design of RCC Low Carbon Impact Residential Building

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Abstract—

In this project, planning, analysis and design of G+3 reinforced concrete residential building with low carbon impact has been done using Indian Standard Codes of Practice. In this project, safe, economical and sustainable residential building has to be planned and designed while minimizing the impact of environment which arises in conventional construction process. The method of project includes making building plan, deciding appropriate structural dimensions, calculation of loads, structural analysis by using STAAD.Pro software and design of structural elements. Various loads considered in this project are self weight, dead load, live load, wind load and other loads. In analysis part, calculation of axial force, bending moment, shear force, reactions and other forces acting on the structure has been done. Structural analysis has been done using STAAD.Pro software and design has been done using limit state method. Design of various reinforced concrete structural elements such as slab, beam, column and foundation has been done using Indian standard codes of practice such as IS 456 and other codes. Consideration for low carbon impact has been given through efficient structural planning and proper utilization of construction materials as well as minimization of material consumption. This project gives an idea of structural analysis

Keywords— Auto cad 2024, STAAD Pro v8i, IS Codes.



I. INTRODUCTION

The present project deals with the planning, analysis, and design of a G+3 reinforced concrete residential building which will have a low carbon footprint. This building has been designed in such a way that it provides for a safe, stable, economical, and functional residential structure.

G+3 RCC building is a multi-storied structure which is designed to offer safe and comfortable sheltering for residential purpose. It comprises of the ground floor as well as three floors above the ground with reinforcement in the structural members like slab, beam, column and foundation. The planning and design of the building largely depends upon the function of the building, architectural planning, structural planning, site consideration and different types of load applied on the building. Low carbon impact method involves minimizing the environmental impact of the construction by effective planning of structure

The objective of the project work are

- To prepare the plan of the G+3 reinforced concrete residential building using the AutoCAD software.
- To analyze and design the G+3 RCC residential building using the STAAD. Pro software.
- To design the structural components like slab, beam, column, and foundation with low carbon footprint.

The process of planning, analysis, and design of the G+3 Low Carbon Impact RCC building is based on structural planning and relevant design considerations. The building is designed in such a way that it will have proper space utilization, proper lighting, ventilation, safety, and comfort. The process of structural analysis will help in identifying the stresses due to different types of loads on the building. The structural members will be designed in such a way that they will be capable of resisting the loads applied on the building with respect to strength, stability, durability, and economical design.

- **Structural Safety:** The structure will be designed in such a way that it will safely resist the dead loads, live loads, wind loads, and seismic loads.
- **Load Distribution:** Proper arrangement of slabs, beams, and columns will ensure efficient load distribution from the structure to the foundation.

II. LITERATURE REVIEW

In the article Verma, A. & Gagandeep (2023) the authors discuss the planning, analysis, and design of multi-storey RCC residential building through advanced software structural design. It includes the development of 2D and 3D plans of the building through AutoCAD and then the structural analysis and design through STAAD.Pro software. The analysis involves consideration of different types of structural loads like dead load, live load, and wind load, as per Indian Standard code and Limit State Design criteria. From the findings, the authors concluded that the use of computer-aided design and structural analysis software can increase the efficiency and effectiveness of the structural planning and design process and minimize any possible human error during the process. The planning, analysis, and design of a **G+3 low-carbon-impact RCC residential building** could include sustainable planning techniques, efficient structural design, minimum structural material quantities, and reduction of concrete and steel usage.

Marri Wadekar, A. A. & Dahake, A. G. (2020) conducted research on planning, analysis, and design of a multistorey RCC residential building through structural analysis and design approaches. The study examined the planning and design of the structure considering different loads like dead load, live load, and

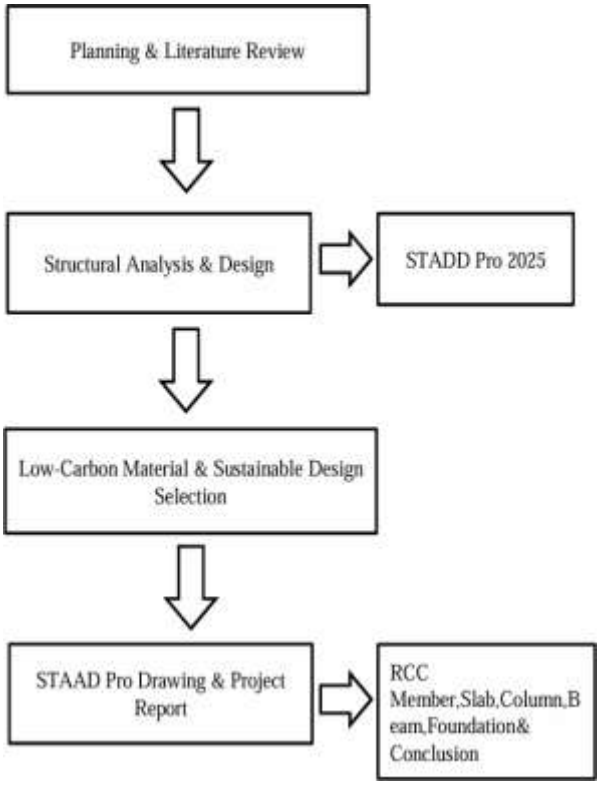


wind load in order to come up with a safe and economical design of the structure. Structural members were planned and designed using Indian Standard code considering Limit State Design approach. The results show the significance of planning, structural analysis and optimization of structural elements in ensuring safety, stability, and economy of the structure. The results are highly relevant to the present study on a G+3 low-carbon-impact RCC residential building.

Joshi, A. & Sharma, R. (2022) carried out the analysis and design of a G+5 residential multi-story RCC building. It discussed the various structural loads considered during the designing process, such as dead load, live load, and wind load. The analysis was carried out in accordance with the basic principles of structural design. Structural components like beams, columns, slabs, and foundations were designed in compliance with the Indian Standard codes as per the Limit State Design method. The significance of structural planning and optimization of design for saving unnecessary materials and providing sufficient strength to the building was pointed out in the study. This is related to the current project of G+3 low-carbon-impact residential building.

III. METHODOLOGY

The initial stage is the planning and literature review that helps understand what has already been done within the field of investigation, including the available design norms and sustainability measures in construction. The following step involves structural analysis and design that are conducted by means of STAAD.Pro 2026 software in order to test the structural behavior, stability, and safety of the building under consideration. Then, based on the results of analysis, the low-carbon construction materials as well as sustainable design principles are chosen.



The next stage involves preparation of structural drawings and the project report according to the data acquired in analysis and design through the application of STAAD.Pro 2026. RCC (reinforced cement concrete) structural members such as slabs, beams, columns, and foundations are designed and used in order to meet all strength, stability, and serviceability requirements according to design standards. The final stage of the project is related to presentation of structural drawings, design calculations, materials used, and conclusions made.

IV. RESULTS AND DISCUSSION

1. Floor Plan

Floor Plan is a residential building plan containing a living room, bedroom, kitchen, toilet, dining area, staircase, and parking area. Bedroom dimensions are 12' × 12', offering adequate room for comfortable living. The kitchen has dimensions of 11' × 12' and the toilet has dimensions of 4' × 3'. Living room dimensions are 17' × 14', offering an ample space to relax and perform family activities. Dining room dimensions are about 11'19" × 9'5". Staircase is incorporated in the plan for movement from one floor to another. Parking

area dimensions are 11' × 16' to accommodate the vehicle.

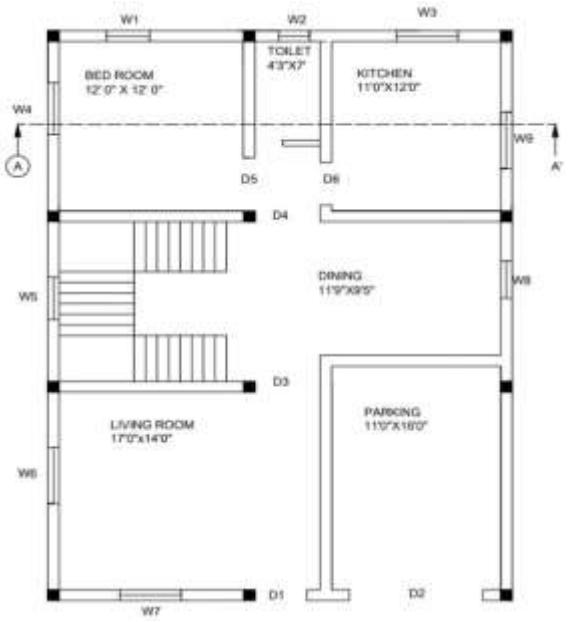


Figure 1: Floor Plan

2. Sectional Plan

A sectional plan is a vertical section of the proposed G+3 RCC residential building. It shows the building as if it were cut vertically to illustrate the different structural and architectural details in the form of heights, which include the floors' levels, slab's thickness, beams & columns, stairs, walls' thickness, plinth, foundation, etc.

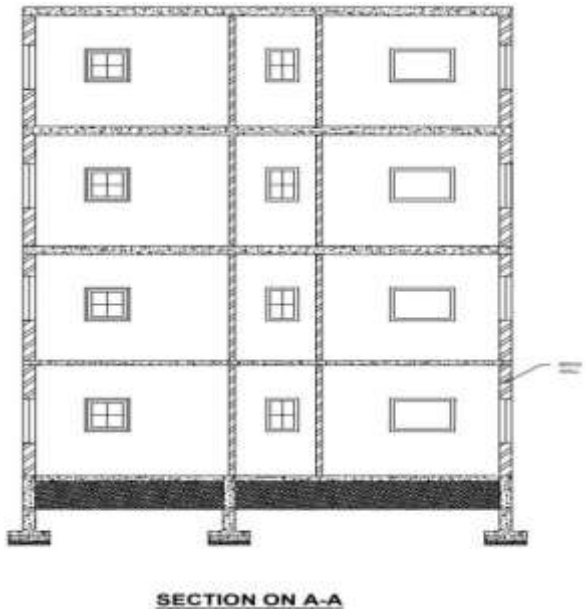


Figure 2 Sectional Plan

The given sectional view is that of a residential building on section A-A. It shows the layout of the various building parts vertically such as the floors, brick wall, windows, columns, and foundations. The sectional view gives a clear illustration of the structure of the building and how various floors interact. Columns act as intermediaries that pass the load from slabs and beams to the foundation that distributes the load safely into the ground. Brick walls serve as enclosure for the building spaces while the windows offer natural light and ventilation.

3. Elevation

Front elevation is a two-dimensional plan which depicts the façade view of the proposed G+3 RCC residential building. The front elevation represents the total height of the building, floors, outer walls, doors, windows, balcony, staircases, and all other architectural components.

This building elevation is made up of several floors with windows and ventilated openings arranged evenly. There are two sets of small rectangular windows on the left side of each floor and one large rectangular window on the right side.

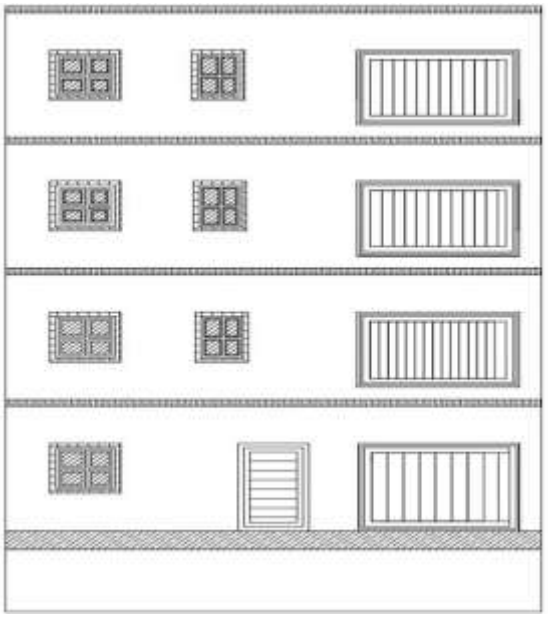


Figure 3 Elevation

The windows have been constructed using detailed frames and are divided into vertical portions to give an even look. The ground floor



contains a main entrance door which has been divided into horizontal panels and two windows; one small and one large. Horizontal lines differentiate between each floor and also distinguish the building.

4. PLAN AND DETAILS

S.NO	DESCRIPTION	DIMENSIONS
1	Building & Layout	50 ft x 70 ft
2	Square feet of a building	3500 sq.ft
3	Total square feet	3700 sq.ft
4	Ventilator size	2 ft x 2 ft
5	Door size (MD)	8 ft x 7 ft
6	Door size	2 ft x 6 ft
7	Window size	5 ft x 4 ft

4. Rendering View

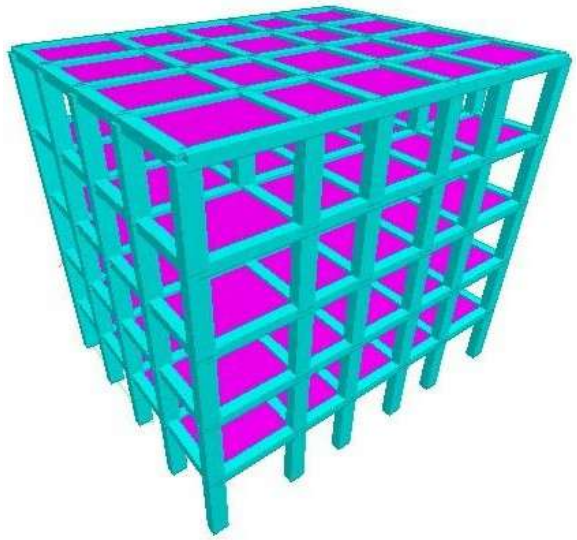


Figure 4 Rendering View

The rendering view represents a three-dimensional structural model of a multi-storey building developed using structural modelling software. The model consists of vertical columns and horizontal beams arranged in a regular grid pattern to form the building framework. Floor slabs are represented by magenta surfaces, while the structural members are displayed in cyan colour for clear identification. The 3D perspective view helps visualize the overall building geometry, floor arrangements, column positions, beam connections, and structural layout. This rendering view is useful for understanding the building configuration, identifying structural components, checking the modelling arrangement, and presenting the proposed structure before further analysis and design.

V. CONCLUSION

The title of the project was "Planning, Analysing and Design of RCC Low Carbon Impact Residential Building". The objective of the project was to design a safe, stable, economical and environmentally sustainable residential building. AutoCAD was used for making the building plan and the structural drawings. The structural modeling, analysis and design of the building was done using the software STAAD.Pro. The design was made considering the IS 456 for plain and reinforced concrete and the IS 875 for design loads. The various loads on the structure such as dead load, live load, etc., were considered in order to study the structural performance of the building. The main focus of the low carbon concept is to reduce the environmental impact of the building through material optimization and designing. Through this project, we could gain a lot of insight into the importance of planning, analyzing and designing a residential building.

ACKNOWLEDGMENT

[1] Autodesk Inc., *AutoCAD – User Documentation*, Autodesk Inc.

[2] Bentley Systems, *STAAD.Pro CONNECT Edition – Technical Reference Manual*, Bentley Systems.

[3] Bureau of Indian Standards, *IS 456:2000 – Plain and Reinforced Concrete – Code of Practice*, New Delhi, India, 2000.

[5] Bureau of Indian Standards, *IS 875 (Part 1):1987 – Design Loads (Other than Earthquake) for Buildings and Structures: Dead Loads*, New Delhi, India, 1987.

[6] Bureau of Indian Standards, *IS 875 (Part 2):1987 – Design Loads (Other than Earthquake)



for Buildings and Structures: Imposed Loads*, New Delhi, India, 1987.

[7] Bureau of Indian Standards, *IS 875 (Part 3):2015 – Design Loads (Other than Earthquake) for Buildings and Structures: Wind Loads*, New Delhi, India, 2015.

REFERENCES

1. Verma, A. & Gagandeep (2023), "Dynamic Analysis of Irregular Multi-Storied Building Using STAAD Pro", IOP Conference Series: Earth and Environmental Science, Vol. 1110, Issue 1, pp. 012039.

2. Marri Wadekar, A. A. & Dahake, A. G. (2020), "Planning, Analysis and Design of Multistorey RCC Residential Building".

3. Joshi, A. & Sharma, R. (2022), "A Research Paper on Design and Analysis of a Multistorey Building (G+4) Using STAAD.Pro with Different Grade of Concrete", International Journal for Research in Applied Science and Engineering Technology (IJRASET).

4. Salmaan, S., Rajkumar, V., Phaniteja, N. & Poluraju, P. (2017), "Analysis and Design of Multistoreyed Residential Building Using STAAD Pro", International Journal of Civil Engineering and Technology, Vol. 8, Issue 5, pp. 552–558.

5. Shajahan, M. A., Kumaran, S., Arivazhagan, R. & Ilango, T. (2024), "Planning, Analysis and Design of Multistorey RCC Residential Building".

6. Kavya, H. K. (2020), "Planning, Analysis and Design of a Multi-Storey RCC Residential Building".

7. Rahman, M. R. & Mamun, M. M. (2025), "Planning, Analysis and Design of a Multistorey RCC Residential Building".

8. Amar, Hugar, A. et al. (2016), "Analysis and Design of a Commercial cum Residential Building by Using STAAD Pro", International Research Journal of Engineering and Technology (IRJET), Vol. 3, Issue 6.

9. Madhurivassavai, V., Bhargavi, E. V. & Raghava Rao, E. V. (2016), "Analysis and Design of Multistoried Building with G+8 Floors by Using STAAD Pro", International Journal of Advanced Technology and Innovative Research, Vol. 8, Issue 2, pp. 0225–0230.