



(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



### Impact Factor: 8.699

## Volume 14, Issue 6, June 2025

⊕ www.ijirset.com ⊠ ijirset@gmail.com 🖄 +91-9940572462 🕓 +91 63819 07438





www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

#### Volume 14, Issue 6, June 2025

#### |DOI: 10.15680/IJIRSET.2025.1406106|

## Modelling and Layout of a G+3 Residential Building

#### Korra Nikhitha, Marri Ashish, Harini Reddy

U.G. Student, Department of Civil Engineering, Guru Nanak Institutions Technical Campus, Ibrahimpatnam,

Telangana, India

U.G. Student, Department of Civil Engineering, Guru Nanak Institutions Technical Campus, Ibrahimpatnam,

Telangana, India

Assistant Professor, Department of Civil Engineering, Guru Nanak Institutions Technical Campus, Ibrahimpatnam,

Telangana, India

**ABSTRACT:** The modelling and layout of a G+3 (Ground plus Three floors) residential building involves the comprehensive planning, architectural design, and structural analysis required for the construction of a multi-storey housing facility. This project aims to develop a complete digital model and layout plan that adheres to relevant building codes, safety regulations, and functional requirements.

The primary objective is to design a structurally sound and aesthetically pleasing building that maximizes space efficiency while ensuring comfort, accessibility, and sustainability. The building layout includes provisions for living rooms, bedrooms, kitchens, bathrooms, staircases, balconies, and service areas for each floor. The modelling phase incorporates both 2D and 3D representations using software tools such as AutoCAD, Revit, or STAAD.Pro for architectural, structural, and MEP (Mechanical, Electrical, and Plumbing) design elements.

Key considerations include soil characteristics, load calculations (dead load, live load, seismic forces), ventilation, lighting, and fire safety norms. The design also integrates modern construction practices, eco-friendly materials, and potential smart home features.

Through this project, the proposed G+3 building demonstrates a practical approach to urban residential development, offering a scalable solution for housing in densely populated areas.

**KEYWORDS:** G+3 Residential Building, Multi-storey Construction, Urban Housing, Space Optimization, Building Layout Design, Digital Modelling

#### I. INTRODUCTION

Urbanization and population growth have led to an increasing demand for vertical housing solutions, particularly in densely populated areas. One such solution is the construction of G+3 (Ground plus Three) residential buildings, which offer an efficient use of limited land while accommodating multiple families or units within a compact footprint.

This project focuses on the modelling and layout design of a G+3 residential building, incorporating architectural planning, structural design, and space management. The objective is to develop a functional, safe, and aesthetically appealing multi-storey residential structure using modern design tools and techniques.

The design process involves creating detailed floor plans, elevations, sections, and structural layouts using software such as AutoCAD, Revit, or STAAD.Pro. These tools help in visualizing the building in both 2D and 3D, allowing for accurate representation and evaluation of the design. Key aspects such as load-bearing capacity, ventilation, lighting, circulation, and compliance with local building codes and standards are carefully considered.

The project not only addresses technical aspects like dead and live load calculations, stair and slab design, and column placement but also emphasizes comfort, usability, and sustainability. This type of residential building is increasingly common in urban and semi-urban areas, offering a practical solution to housing challenges.





www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

#### Volume 14, Issue 6, June 2025

#### |DOI: 10.15680/IJIRSET.2025.1406106|

Through this study, a comprehensive understanding of building design principles and construction practices is developed, forming the foundation for more complex architectural and civil engineering projects in the future.

#### II. LITERATURE

Several studies have highlighted the advantages of using 3ds Max in the early stages of building design. According to **Patel and Shah (2018)**, 3ds Max enhances architectural communication by enabling designers to present highly detailed and realistic models that improve client understanding and feedback. The software supports importing 2D layouts from AutoCAD, which can then be converted into detailed 3D structures, thus improving workflow integration across design platforms.

**Kumar et al. (2017)** emphasized the role of 3ds Max in urban residential projects, noting that its ability to apply realistic materials, textures, and lighting effects allows designers to assess both aesthetics and functional aspects of buildings. This is particularly important in multi-storey projects like G+3 buildings, where visualizing interior spaces and exterior elevations is critical for planning.

In a comparative analysis conducted by **Reddy and Bansal (2019)**, 3ds Max was found to be more effective than traditional 2D drafting methods in terms of detecting design clashes, space optimization, and improving design accuracy. The study also noted that the software's animation and walkthrough features enable better spatial understanding, especially in complex structures with multiple floors.

Recent advancements in rendering engines like **V-Ray and Arnold**, which integrate seamlessly with 3ds Max, have further improved the realism and output quality of residential models. These tools are particularly beneficial in presentations, stakeholder meetings, and pre-construction visualization, contributing to faster project approvals and more efficient design cycles.

Moreover, **Sharma et al. (2020)** explored the use of 3ds Max in sustainability-focused designs. They found that incorporating daylight analysis and energy-efficient layout features into the 3D model helped in designing buildings that align with green building standards and improve energy performance.

#### **III. METHODOLOGY**

The methodology for this project follows a systematic approach aimed at designing and visualizing a G+3 residential building using Autodesk 3ds Max. The process begins with the identification of the need for efficient vertical residential structures in urban areas, followed by defining the project objectives—primarily focusing on creating a realistic 3D model of a multi-storey building that meets both functional and aesthetic requirements.

The initial stage involves collecting essential data, including building dimensions, space requirements, user needs, and applicable building codes or local bye-laws. This helps in determining the number of rooms, floor distribution, circulation space, and provisions for utilities. After establishing the basic requirements, conceptual planning is carried out. Floor plans, elevations, and sections are drafted, typically using AutoCAD, to create a clear 2D representation of the layout. This step defines key structural and architectural components such as beams, columns, slabs, staircases, and room arrangements for all floors.

Once the 2D design is finalized, the layout is imported into Autodesk 3ds Max to begin 3D modelling. Using the software's extensive modelling tools, the structure is built floor-by-floor with accurate proportions and detailing. Architectural features like doors, windows, railings, and interior partitions are also added during this phase. After completing the basic model, textures and materials are applied to various surfaces to simulate real-world finishes such as paint, glass, tiles, wood, and metal. Lighting is then configured using both natural and artificial sources to enhance the realism of the model. This includes setting up global illumination and sun positioning to replicate real-life lighting conditions.

Following the modelling and material application, high-quality rendering is done using advanced rendering engines like V-Ray or Arnold. These tools produce photorealistic images and animations of the building from different angles.





www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

#### Volume 14, Issue 6, June 2025

#### |DOI: 10.15680/IJIRSET.2025.1406106|

Walkthrough animations may also be generated to provide an immersive experience of the building's interior and exterior. The rendered outputs are then analyzed for design accuracy, space utilization, and visual appeal. Any required changes or refinements are made based on feedback or observations.

The final stage involves compiling all the design documentation, including 3D renders, floor plans, material specifications, and analysis results into a comprehensive report. This serves as a presentation-ready document for academic or professional review. Overall, this methodology ensures an efficient, visually rich, and technically sound approach to designing a G+3 residential building using modern 3D modelling techniques.

#### IV. RESULTS AND DISCUSSION

#### 4.1 3DS MAX INTERFACE OVERVIEW

The 3ds max interface includes controls, status information, and viewports, which is the place where you work and view your scene. Using 3ds max flexibility is one of the key aspects. A lot of program functions can be reached from several interface elements.

For example, you can open track view for animation control from the main toolbar as well as the graph editors menu, but the easiest way to get to a specific object's track in track view is to right-click the object and then choose track view selected from the quad menu. Customizing User Interface As its name tells you, user interface is customizable in ways like keyboard shortcuts, adding toolbars and command panels by placing them around, creating a new toolbar, and recording scripts into buttons on toolbars. This user interface is high dpi aware; it ensures optimum use experience with the display hardware. A structured approach and systematic process in the attainment of specific objectives of a project or study/creative endeavor. In design, it involves the conceptualization, planning, and actualization of ideas in the creation of functional and aesthetically pleasing outcomes. Whereas methodology refers to the framework or set of principles guiding how the design process or research is carried out, it encompasses the selection of tools, techniques, and strategies tailored to address the project's requirements.

A well-defined design and methodology ensure clarity, efficiency, and consistency, enabling designers, researchers, or engineers to get the desired results. For example, in creative industries, the design process could be brainstorming, prototyping, and iterative testing, while the methodology will ensure that each step is aligned with project goals. In research, methodology describes the methods used qualitative, quantitative, or mixed and details data collection, analysis, and interpretation. Note: some images of the user interface (icons, toolbars, etc.) Found within 3ds max help may be older versions of the software.

#### 4.2 MAX SCRIPT INTERFACE

max script is the 3ds max built-in scripting language. its main interface, the max script menu, contains various commands for creating and working with scripts. besides, the status bar has a max script mini listener, and max script functionality. is also available from the utilities panel model objects in your scene by creating standard objects, such as 3d geometry and 2d shapes, and then applying modifiers to those then applying modifiers to those objects. 3ds max includes a wide range of standard objects and modifiers.

- 1. Modify Panel
- 2. Create Panel
- 3. Object Categories





www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

## Volume 14, Issue 6, June 2025 |DOI: 10.15680/IJIRSET.2025.1406106|



Fig 1: elevation



**Fig 2 : living room** 





Fig 4: bedroom

Fig 3 : kitchen

#### **V. CONCLUSION**

The project, "modelling and layout of g+3 residential building using AutoCAD and 3ds max", has successfully demonstrated how the integration of advanced software tools is essential for architectural design and visualization. Through this, the use of AutoCAD for creating accurate 2d layouts and structural plans and 3ds max for realistic 3d





www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

#### Volume 14, Issue 6, June 2025

#### |DOI: 10.15680/IJIRSET.2025.1406106|

modeling and rendering, the project has exhibited the holistic approach to modern building design. The 2d layouts from AutoCAD were able to show a detailed representation of structural elements in the building designs such as floor plans, sections, and elevations while at the same time fulfilling the requirements of construction standards in an efficient use of available space. This was also supported by 3d modeling in 3ds max where the designs came out looking very realistic with the presence of proper textures, lighting, and material. One of the major accomplishments of this project was that it bridged the gap between technical precision and creative visualization. The detailed 2d plans ensured that the building design was in line with structural and safety regulations, while the 3d renderings provided a clear understanding of the spatial and aesthetic aspects of the building. This dual approach improved the entire process of design and further enhanced communication with stakeholders, including architects, engineers, and clients, who were informed about decisions at every step of the project. Digital tools also ensured that there were minimal chances for errors and inconsistencies, hence a more streamlined workflow with substantial time and cost savings. The project underlines the increasing role of technology in helping to address contemporary architectural challenges. As urban spaces are becoming increasingly constrained, the demand for efficient and sustainable designs for residential living is at a high level.

#### REFERENCES

- 1. Divya kmath. K. Vandana Reddy, Analysis and design of reinforced concrete structures-A G+3 building model, mini project report, Gokaraju Ranga raju Institute of Engineering and Technology. Hyderabad, India, 2012.
- 2. Soil and Foundation hand book, State Materials Office Gainesville, Florida, 2004.
- IS: 875 (Part 1), Part 1: Dead Loads-Unit Weights of Building Materials (Second revision), Code of Practice for Design Loads (Other Than Earthquake) For Buildings and Structures. Bureau of Indian Standards, New Delhi, 2000,
- 4. IS: 875 (Part 2), Part 2: imposed loads (Second revision), Code of Practice for Design Loads (Other Than Earthquake) For Buildings and Structures, Bureau of Indian Standards, New Delhi, 1987.
- 5. IS: 13920, Ductile detailing of reinforced concrete structures subjected to seismic forces, Bureau of Indian Standards, New Delhi, 1987.
- 6. IS: 456 (Fourth Revision), Plain And Reinforced Concrete Indian Standard code of practice, Bureau of Indian Standards. New Delhi, 2000.
- 7. Design And Practical Limitations In Earthquake Resistant Structures And. INTERNATIONAL JOURNAL OF CIVIL ENGINEERING AND CIVIL ENGINEERING (UCIET), Volume 5, Issue 6, June (2014), pp. 89-93.
- 8. Comparison of design results of a Structure designed using STAAD and Software, INTERNATIONAL JOURNAL OF CIVIL ANDSTRUCTURAL ENGINEERING, Volume 2, No 3, 2012.
- 9. Analysis of residential building with load bearing walls. INTERNATIONAL JOURNAL OF CIVIL AND STRUCTURAL ENGINEERING, Volume 4, No 2, 2013.









# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY





www.ijirset.com