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Design and Analysis of G+6 Building

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Abstract: *This project involves the design, modelling, and construction of a G+6 (Ground plus 6 floors) building using Building Information Modelling (BIM) technology. BIM is utilized to enhance the coordination, collaboration, and efficiency throughout the project lifecycle, from conceptual design through to construction and facility management. The building consists of mixed-use space, including residential and commercial units, and is designed with sustainability in mind. The use of BIM software, such as Autodesk Revit and Navisworks, allows for the integration of architectural, structural, and MEP (Mechanical, Electrical, Plumbing) systems into a single digital model. This facilitates real-time visualization, clash detection, and optimization of designs, leading to reduced errors and project delays. Additionally, the BIM model aids in generating accurate quantity take-offs, cost estimation, and scheduling through the use of tools like Autodesk Navisworks and BIM 360. The project aims to streamline the construction process by improving communication among stakeholders, reducing waste, and ensuring better resource management. With BIM, all project teams—architects, engineers, contractors, and owners—can collaborate efficiently, providing a more integrated and data-driven approach to building design and construction. The G+6 building project represents a significant step towards the adoption of BIM in modern construction, demonstrating how digital tools can create more sustainable, cost-effective, and high-quality structures.*

Keywords: BIM, Software, Design, Modern Construction, Digital Tools

I. INTRODUCTION

Building Information Modeling (BIM) has transformed the way construction projects are designed, planned, and executed, offering a more efficient and collaborative approach to managing complex projects. For a G+6 building (Ground plus six floors), BIM plays a crucial role in overcoming the challenges of multi-story building design and construction. This type of building typically includes a combination of residential, commercial, or mixed-use spaces, which require careful coordination of architectural, structural, and MEP (Mechanical, Electrical, Plumbing) systems.

Key aspects of BIM in a G+6 building project include:

- **3D Visualization:** BIM allows for a detailed 3D model of the building, making it easier to visualize design elements and detect potential issues before construction beg
- **Collaboratio n and Coordination**: BIM fosters real-time collaboration between architects, engineers, and contractors, improving communication and reducing the likelihood of costly rework.
- **Clash Detection**: BIM enables early identification of design conflicts, such as clashes between structural components and MEP systems, allowing these issues to be addressed in the design phase rather than during construction.
- **Cost and Time Management**: BIM provides accurate cost estimates and allows for detailed scheduling, helping to manage resources efficiently and avoid delays or budget overruns.
- **Sustainability and Performance Analysis**: BIM tools can simulate energy performance, environmental impacts, and material efficiency, supporting sustainable building practices and ensuring the building meets performance standards.

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- **Facility Management:** Once the building is completed, the BIM model can be used for maintenance and operations, serving as a digital twin of the building that contains valuable information for ongoing facility management. In a G+6 building project, BIM not only enhances the quality and accuracy of the design but also improves efficiency during construction and long-term management. The adoption of BIM leads to faster decision making, fewer errors, better resource utilization, and ultimately, a more successful and sustainable building project. ins.

II. METHODOLOGY

Recognizing (R)

Goal: Identify and recognize all design, construction, and operational components early in the project lifecycle.

- Action: In this phase, the BIM team gathers all relevant data from stakeholders (architects, structural engineers, MEP engineers, contractors) and establishes a unified BIM model. The key risks and potential design conflicts are also identified, including structural load- bearing issues, spatial constraints, and regulatory compliance.

Evaluating (E)

- Goal: Evaluate the feasibility of the recognized components in terms of structural integrity, material usage, cost, and time.
- Action: Using BIM software (e.g., Revit, Navisworks), the team evaluates the initial design against performance standards. Clash detection tools are applied to identify conflicts between various systems

(e.g., structural beams versus HVAC ducts), and simulations (e.g., energy analysis) are run to assess environmental and sustainability factors.

Assessing (A)

- Goal: Assess the potential impacts of design and construction decisions, considering both technical and non-technical factors.
- Action: Perform a risk assessment to evaluate potential delays, safety hazards, or cost overruns. In this phase, cost estimation software (e.g., Autodesk Cost Estimating) and scheduling tools (e.g., BIM 360, Primavera) are used to assess financial risks and time-based risks (such as construction delays or material shortages).

Controlling (C)

- Goal: Control the design and construction process to mitigate risks and ensure alignment with project goals (budget, schedule, quality).
- Action: Implementing control mechanisms through BIM project management tools (e.g., BIM 360 Docs, Navisworks). Real-time tracking of project progress and resources, through the integration of project schedules and construction milestones with the BIM model, helps ensure that issues are addressed promptly and resources are optimized.

Harmonizing (H)

- Goal: Ensure harmony between different design disciplines and stakeholder teams to prevent miscommunication and ensure that all parts of the building project work seamlessly together.
- Action: Facilitating collaboration using a cloud-based platform for BIM (e.g., BIM 360 Team).
- Regular coordination meetings are held between architects, engineers, and contractors to ensure that the design, construction, and operations teams are aligned, reducing the likelihood of errors during construction.

Documenting (D)

- Goal: Maintain a comprehensive digital record of the project throughout the lifecycle.
- Action: BIM models are used to create detailed documentation, including design changes, construction progress, material specifications, and safety data. This documentation becomes part of the as-built model, which will serve as a valuable tool for future maintenance and operations of the building.

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III. MODELING AND ANALYSIS

Model and Material which are used is presented in this section. Table and model should be in prescribed format

Figure 1: 3D view of the building.

Model and Material which are used is presented in this section. Table and model should be in prescribed format

IV. RESULTS AND DISCUSSION

The results and discussion may be combined into a common section or obtained separately. They may also be broken into subsets with short, revealing captions. An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it. This section should be typed in character size 10pt Times New Roman.

Table 1. Comparison of the displacement of all 4 cases

Sr. No.	Model Type	Seismic Zone	Displacement
1	Model-A	4	10.044 mm
2	Model-B	4	11.335 mm
3	Model-C	4	10.248 mm
4	Model-D	4	11.364 mm
5	Model-E	4	12.16 mm
6	Model-F	4	10.99 mm
7	Model-G	4	11.29mm
8	Model-H	4	13.20mm
9	Model-I	4	9.2mm

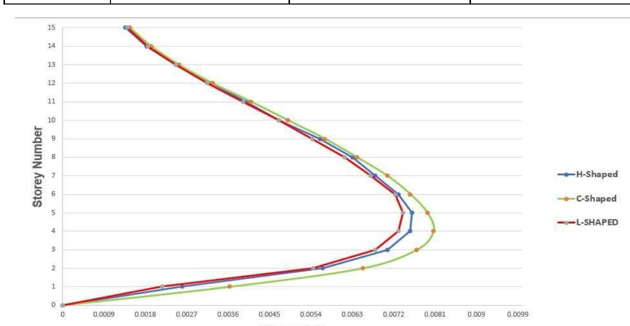

Figure 2: Name of Graph

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V. CONCLUSION

Summarize the key points on how BIM improves the design, construction, and operation of G+6 buildings, emphasizing its role in collaboration, efficiency, and sustainability. Acknowledge that while challenges remain, the continued evolution of BIM technology and adoption in the construction industry is likely to address many of these barriers, further enhancing the value of BIM for mid-rise buildings.

VI. ACKNOWLEDGMENT

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