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Designing Green Building: Sculpture a Sustainable Future for Our Cities

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Abstract:*CAD and Revit are crucial in India's construction and design industries for enhancing efficiency, accuracy, and collaboration. CAD software, like AutoCAD, facilitates the creation of detailed 2D and 3D drawings, while Revit is a BIM (Building Information Modeling) tool that enables integrated design and documentation.*

The procedure involves using CAD software for initial design and drafting, creating 2D drawings and schematics, while Revit is utilized for Building Information Modeling (BIM), developing detailed 3D models, analyzing energy efficiency, and simulating building performance to optimize green building design and sustainability features.

The integration of CAD and Revit in green building design enables significant improvements in accuracy and efficiency. CAD software allows for precise 2D drafting, creating detailed drawings and schematics that serve as a foundation for the design. This accuracy ensures that all elements of the building are well-planned, reducing errors and enhancing the overall quality of the project.

Revit's Building Information Modeling (BIM) capabilities further enhance green building design by facilitating detailed 3D modeling and analysis. With Revit, designers can simulate building performance, analyze energy consumption, and optimize sustainability features such as natural lighting and ventilation.

The combination of CAD and Revit ultimately leads to better-designed green buildings that minimize environmental impact while maximizing occupant comfort and efficiency.

Keywords: auto-cad, revit, green building, 2D drafting, 3D modeling

I. INTRODUCTION

Green building is an approach to designing and constructing structures that minimize environmental impact while promoting sustainability. By incorporating energy-efficient systems, water conservation measures, sustainable materials, and waste reduction strategies, green buildings reduce their carbon footprint and contribute to a healthier environment. This approach not only benefits the planet but also enhances occupant well-being, reduces operational costs, and increases property value, making it a valuable investment for a sustainable future. Green buildings have a profoundly positive impact on wildlife by reducing environmental footprint through sustainable practices like efficient water use, reduced pollution, and minimized habitat disruption. By incorporating features like green roofs, native landscaping, and wildlife-friendly design elements, green buildings promote biodiversity and support local ecosystems. Green roofs provide habitats for birds, insects, and other species, while native landscaping supports pollinators and other wildlife.

II. METHODOLOGY

- Data collection methods
- Sustainable construction materials
- Design development
- Tools and softwares
- Analysis method

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- Final documentation and green design considerations

III. PROCEDURE

This study employed a quantitative research approach to assess the performance of green building using autocad and revit. Using AutoCAD and Revit is essential for designing a green building—especially for architecture, engineering, and construction. These tools support **precision, efficiency, sustainability integration, and interdisciplinary collaboration**, all of which are critical for successful green building design.

1 Primary Data Collection:
A) Area of building: 1895.63 square feet.
B) Annual energy consumption:2193.65 kWh/year.

2 Secondary Data Collection:
AutoCAD and Revit provide precise drawings and models, reducing errors and inconsistencies. These software tools automate many tasks, saving time and increasing productivity. Digital files can be easily scaled up or down, making it simple to modify designs. AutoCAD and Revit enable seamless collaboration among team members, stakeholders, and clients. These software tools allow for efficient data management, including version control and tracking changes. 2D and 3D visualizations help stakeholders better understand designs, facilitating communication and decision-making.

3 Digital Modeling and Energy Simulation:
3D models of the buildings were created using revit.

4 Comparative Analysis:
While both Autodesk products, AutoCAD and Revit serve distinct purposes within the AEC industry. AutoCAD is primarily a 2D drafting and versatile 3D modeling tool, focusing on creating precise geometric drawings with lines, arcs, and circles, ideal for tasks requiring detailed 2D documentation or highly customized 3D components without inherent intelligent data. In contrast, Revit is a Building Information Modeling (BIM) software that focuses on creating intelligent, parametric 3D models where building elements (walls, doors, windows, etc.) are objects with embedded data, allowing for automated updates across all views, clash detection, integrated analysis (energy, daylighting), and seamless collaboration across disciplines, making it superior for complex, data-rich architectural and engineering projects.

IV. RESULT

Factor	Normal Building	Green Building
RWH installation	Optional/rare	Mandatory/recommended
Water captured (est.)	0–2,000 liters/year (if any)	Up to 12,500 liters/year
Use of harvested water	None	Toilet flushing, irrigation, cleaning
Environmental benefit	Low	High (reduced runoff, recharge, efficiency)
Cost	Low upfront, high long-term water cost	Medium upfront, lower operating cost

Table 1. Rainwater harvesting of Normal building compare to Green building is given below

Parameter	Normal Building	Green Building
VOC concentration	High	Low to zero
CO□ levels	>1000 ppm	<800 ppm
PM2.5 levels	Often >50 µg/m³	Typically<12 µg/m³
Ventilation rate	Poor (below ASHRAE std.)	Meets/exceeds ASHRAE standards

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IAQ Monitoring	Not included	Often integrated (IoT-based)
Occupant health comfort	Lower	Higher

Table 2. Air quality of Normal building compare to Green building is given below

Use Case	**Normal Building**	**Green Building**
Fiber Cement Used	~1,000–1,500 sq ft of panels	~800–1,200 sq ft (if used)
Lifecycle Focus	Low	High (reuse, recycling, non-toxic use)

Table 3. Fiber cement of Normal building compare to Green building is given below

Aspect	**Normal Building**	**Green Building**
Hardwood flooring area	~1,200–1,800 sq ft	~1,000–1,500 sq ft (or partially substituted)
Material type	Generic hardwood or engineered wood	FSC-certified, reclaimed, or bamboo
Finish impact (VOC)	High (solvent-based finishes)	Low or zero (natural oils, water-based)
Environmental impact	Higher (non-renewable, high carbon footprint)	Lower (sustainable sourcing, low emissions)

Table 4. Hardwood flooring of Normal building compare to Green building is given below

V. CONCLUSION

The proposed bungalow with a total built-up area of 1118.15 sq. ft., demonstrates several positive attributes aligned with green building principles. The architectural layout supports effective natural lighting, cross ventilation, and zoning of spaces, promoting indoor comfort and energy efficiency. With designated green areas such as a lawn and appropriate space allocation for parking and utility, the design offers potential for sustainable enhancements such as rainwater harvesting, solar power installation, and eco-friendly construction materials like fiber cement boards.

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