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Planning, Designing and Estimation of G+2 Residential Building using Autocad and STAAD PRO

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Abstract: ***This paper presents a comprehensive methodology for the planning, design, and estimation of a G+2 residential building utilizing AutoCAD for architectural drafting and STAAD.Pro for structural analysis and design. The process involves several key stages including site analysis, conceptual design, detailed architectural planning, structural analysis and design, and cost estimation.***

The initial phase involves site analysis to understand site constraints, orientation, and surroundings, followed by conceptual design to establish the building layout and spatial arrangement. AutoCAD is employed for creating detailed architectural plans, including floor plans, elevations, and sections, ensuring compliance with local building codes and regulations.

Subsequently, structural analysis and design are performed using STAAD.Pro, incorporating factors such as loads, material properties, and structural elements. The software facilitates the analysis of various structural systems and helps optimize the design for efficiency and safety.

Finally, the estimation phase involves quantifying materials and labor costs based on the finalized architectural and structural designs. This includes itemized lists of materials such as concrete, steel, bricks, and finishing materials, as well as labor costs for construction activities.

The proposed methodology integrates AutoCAD and STAAD.Pro to streamline the planning, design, and estimation process for G+2 residential buildings, offering efficiency, accuracy, and adherence to regulatory requirements. The approach presented in this paper serves as a valuable guide for architects, engineers, and construction professionals involved in similar projects

Keywords: Residential building,AutoCAD,STAAD.Pro,Planning,Designing,Estimation,G+2 structure, Structural analysis, Architectural design, Construction planning

I. INTRODUCTION

Brief overview of the project: G+2 residential building design.
Importance of proper planning, designing, and estimation in construction projects.
Introduction to AutoCAD and STAAD.Pro software for architectural and structural design.
Planning Phase
Site selection criteria and analysis.
Zoning regulations and building codes compliance.
Functional requirements and space planning.
Conceptual design development using AutoCAD: Floor plans, elevations, and sections.
Designing Phase
Structural analysis and design using STAAD.Pro:
Load calculations and analysis.
Selection of appropriate structural systems (e.g., beams, columns, slabs).
Design of foundation, columns, beams, and slabs.
Architectural design refinement in AutoCAD:
Incorporating structural elements into the architectural drawings.
Detailed floor plans, elevations, and sections with structural annotations.
Material selection and finishes.
Integration Phase

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Coordination between architectural and structural designs.
Clash detection and resolution using BIM (Building Information Modeling) if applicable.
Review and optimization of designs for efficiency and cost-effectiveness.
Estimation Phase
Quantity takeoff: Measurement of materials required for construction.
Cost estimation using industry-standard rates and pricing data.
Incorporating labor and overhead costs.
Contingency planning for unforeseen expenses.

II. SOFTWARE USED

A. *Autocad*

Autocad is a computer aided design (CAD) software developed by Autodesk. Its widely used in various industries, including architecture, engineering, construction, manufacturing and more. Autocad allows users to create precise 2D and 3D drawings and models, aiding in the design, drafting, and documentation of projects.
In this project we use AutoCAD for the 2d drawing of the plan
by the help of AutoCAD the 2D drawing of a plan of a building is easier, time efficient, minimum error chance, and easy to handle.
With this tool an engineer would be ready to design their entire site including access roads, car entrances, side boundaries, and contour lenses.
Where the software we also do the elevations.
Elevations:-They show the configuration of premier vaults, stairwells, size of stretches, or vertical grazing systems, indicating forces in the member together with end moments.

B. *Staad Pro Analysis*

Start Pro is a powerful structural analysis and design software used by civil and structural engineers. It enables engineers to analyze and design a wide range of structures, including buildings, bridges, towels, and industrial structures. Using staad pro, engineers can perform tasks such as finite element analysis FAA, dynamic analysis, and design according to international codes and standards. It offers a user-friendly interface and robust capabilities for modeling, analyzing , end optimizing structural systems.
In this project we use the statement for structural analysis and columns and beam layout.
Types of goats on it iPhoto tickle buildings are as follows.

1) Vertical loads
2) Dead loads
3) Live loads
4) Snow loads
5) Wind loads
6) seismic and wind loads

C. *Revit Structures:-*

Except it is a building information modeling so first specifically designed for structural engineering and construction construction professionals. It allows users to create digital representations of building structures, enabling them to design, analyze, simulate, and document various types of structures such as buildings, bridges, and other infrastructure projects. He waits factor facilitates collaboration among artists former engineers, and construction teams by providing A unified platform for sharing and coordinating leasing information throughout the project life cycle. It offers tools for modeling structure elements, generating detailed drawings, performing structural analysis, and coordinating with other disciplines within the BIM environment.

III. RESULT AND DISCUSSION

1) By using AutoCAD we provide comprehensive information about the buildings layout, dimensions, materials, structural components, electrical wiring, plumbing fixtures, and other specifications necessary for construction. Additionally, AutoCAD arose for 3D modeling and visualization, which can be helpful for better understanding the spatial arrangement and appearance of the building.

2) By using start pro we obtain structure analysis results: this includes reactions, member forces, displacements, and stresses in various structural elements like columns, beams, and slabs. Design results: staad pro can also fail from sexual design based on various design code and standards this includes sizing structural elements to ensure their meat safety and performance requirements. load combinations: this software can generate load Combinations based on applicable design codes to access the structures response under different loading conditions, including dead loads, wind, seismic loads. Overall, using staad I lost engineers to ensure the structural integrity, safety, and efficiency of g + 2 residential building 2 analysis and design processes.
3) By using revit structures what is g + 2 residential building project provides A comprehensive platform for designing, analyzing, visualizing, and coordinating all aspects of the buildings design and construction.
4) Start this by the help of start please time consuming and easier than manual.

IV. CONCLUSION

1) We can easily plan the design of the building according to the CLIENT.
2) By the help of staad we can do structural analysis of the building.
3) We conclude that, there is a much need of consideration on building design 2 software, and practically doing a residential building is the toughest part. It is denser buildings should be placed in a peaceful environment as well as economic for the people.
4) By the help of is it we do that 3D design of the plan.
5) Help of statue is time consuming and easier than manual.
6) Software based planning is easier and time consuming as well as low chance of error.
7) By the help of software like AutoCAD, staad pro ,revit it's much easier, quick, time efficient.

V. FUTURE WORK

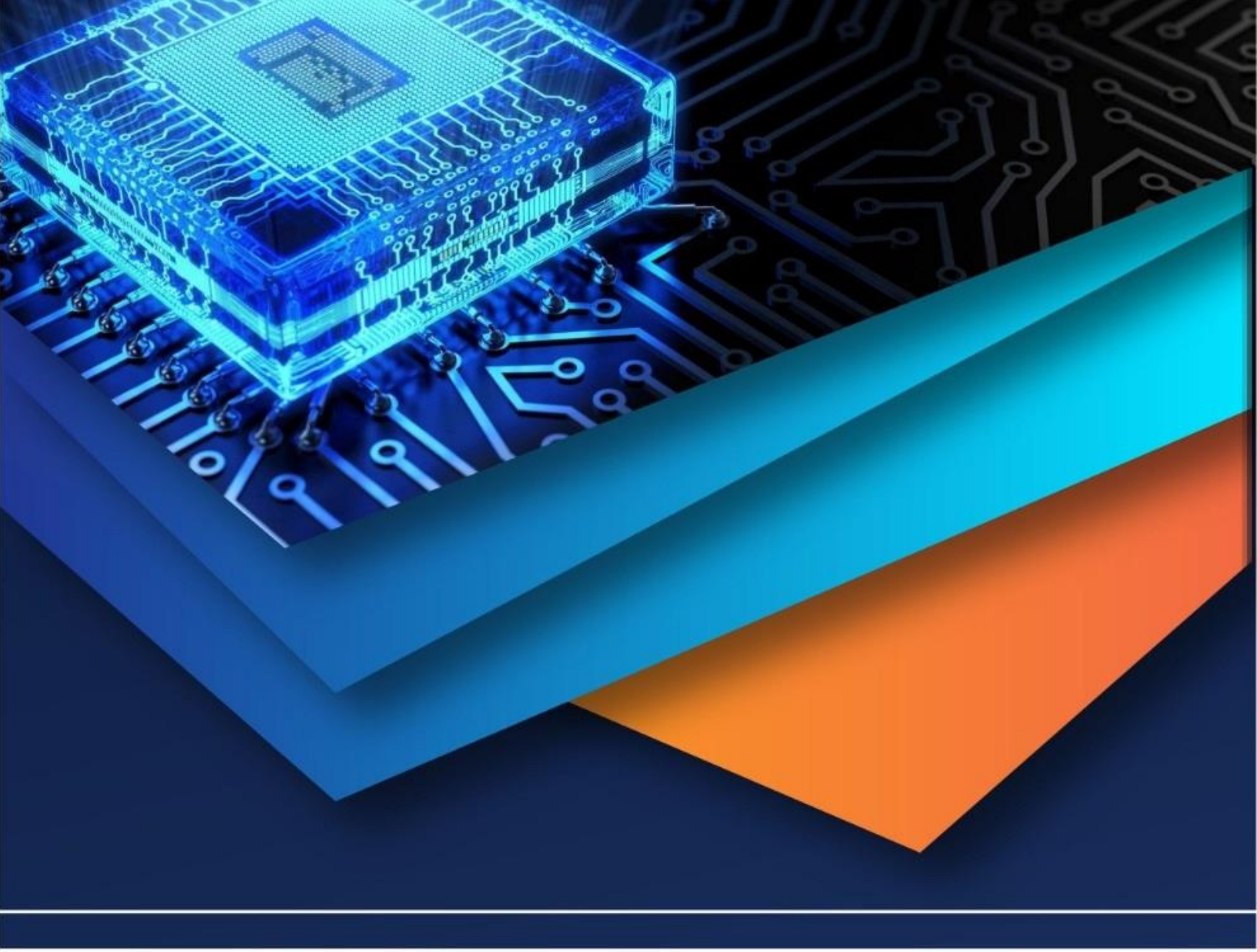
1) Smart infrastructure becomes more favorite, software tools may integrate IoT sensors and data analytics capabilities to monitor and manage the performance of building and infrastructure systems in real time. This could include predictive maintenance, energy optimization, and attractive building control systems.
2) Software solutions may play greater role in automatic construction process, such as robotic fabrications, autonomous construction equipment, and 3D printing of building components. This could relate to greater efficiency, reduce rather cost, and improved safety and on construction sites.
3) Software tools will increasing incorporate futures to support sustainable buildings and practices, including energy bordering, lifestyle assessment, and material selection based on environment criteria integration with the green building certification programs like LEED or BREEAM may also become more seamless
4) future software may offer more advanced simulation and visualization capabilities, and allowing engineers to simulate various sceneries, such as environmental impacts, structural environments under extreme conditions, and occupant behaviour. Vitual and augmented reality tools could also become more favorable for immersive design reviews and stakeholder engagement.
5) Building information modeling software will likely continue to evolve to facilitate better collaborate and coordinate among project stakeholders. This could involved improved cloud based collaboration platforms, task detection, and seamless integration with project management software.

Overall future software development in civil engine building project will likely focus on advanced technology to help improve efficiency, sustainability, corporation, and innovation throughout the design, construction, and operation phases of building projects.

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