

Planing, Analysis and Design of G+1 Residential Green Building In Azhikode

Abey Bose¹, Abhirami . M.R², Reshma J Rajan³, Sathika Santhosh Kumar⁴, Devu Richin Thomas⁵

^{1,2,3,4}B.tech Civil Engineering student , Dept. of Civil Engineering, ST.Thomas Institute for Science and Technology, Trivandrum

⁵Assistant Professor, Dept. of Civil Engineering, ST.Thomas Institute for Science and Technology, Trivandrum

Abstract—In this current scenario a living and sustainability in respect to building and environment has been taken place around us. It is very clear that to promote green architecture and sustainability, we need to go through various guidelines ,specification, method and technology. In this paper the analysis and design of a multi storied building with Staad.pro is carried out. Planing is done by using Auto and then the structure was analysed using Staad . pro. The dead load , live load with load combination are calculated and applied to the structure. Overall concept and procedures of designing the essential components of a multi storied building are described. Staad pro software also gives a detailed value of shear force and bending moment of each elements of the structure.

Keywords— Sustainability, Staad.pro, Auto CAD

I. INTRODUCTION

Green building (also known as green construction or sustainable building) refers to both a structure and the application of processes that are environmentally responsible and resource-efficient throughout a building's life cycle: from planning to design , construction, operation, maintenance , renovation, and demolition. Here in this project work based on softwares named Auto CAD and Staad. Pro have been used. Building plan is done by using Auto CAD . Auto CAD is a power tool for automating graphical work based on personal computers. Thus there is a high speed and simplicity in creation a drawing and it updating that, in turn, allow reducing essential time necessary for performance of this process, in comparison with drawing manually Staad.pro provide a us a fast , efficient, easy to use and accurate plat form for analyzing and designing structure. The purpose full design of a building is very important and requirements vary from building to building. In this paper analysis and design of multi storied structures are done by using staad.pro. And building plan is drawn using Auto CAD .Design od reinforced element by using IS 456:2000. Planning and design processes require not only imagination and conceptual thinking but also a deep knowledge of civil engineering science and practical aspects supported by new design code, by laws, integrated design, insites and decisions. Here Carbon emission of the multi storied building are reduced by using pre fabricated decoration flooring system , glass ventilations are used for make the structure sustainable and energy is stored by the installation of solar panels. In this paper the building construction is done on the basis of GRIHA. GRIHA, or Green Rating for Integrated Habitat Assessment, is the national rating system of India for any completed construction. Objective of this project is to

make the multi storied building sustainable. In this project we are going to analyze (G+1) building for bending moment , shear forces, reinforced details of structure components of building such beam, columns and slabs.

LITERATURE REVIEW

Changchun Liu (2023) “Reducing carbon emissions by using Prefabricated decoration floor systems” The key contribution of the study is that it provides valuable references for interior decoration practitioners and decision makers when considering ways to reduce carbon emission through prefabricated decoration floor systems.

Sumant Kumar (2022) “Planning and design of a Green commercial building by using Software” This study article examines the impact of adopting such technologies and materials ore their traditional counter parts in order to reduce non renewable resource abuse and the harmful impacts on our eco system .

Sule Faliz Aksihl, Eren Pascanogal (2021) “A review of LEED Green Building Certification system in Europe and Turkey”. This paper addresses that the benefit of LEED certification system would be enhanced in the minimum mandatory performance threshold of each criteria is increased above the industry standards.

Nitish Kumar Sharma (2020)[23] “Sustainable Building material for Green Building Construction”. The motivation behind this paper is to feature how manageable structure material can add to diminish the effect of ecological corruption and create sound structures which can be economical to the tenant just as our condition.

Kang zhao, Chenyao Shen, (2020) “ An overview of the Green building materials data base ” This paper purposes a 3-D frame work for Green Building performance data base. The collection and optimization method of Green Building performance data are also discussed.

Mr. A. A Choudhar, Mr . A P Patil (2019) “ Design and analysis of multi storied building (G+10) by using Staad.pro V8I (series 4)” In this paper an analysis and design of G+10 storied composite RCC are discussed.

II. METHODOLOGY SOFTWARES REQUIRED

1. AUTO CAD

AutoCAD (Automatic Computer Aided Design) is a mercantile application for 2D plan and 3D modeling drawing available since 1982, as a desktop application and since 2010 available as a mobile web and cloud based apps. It is a computer aided drawing application used for creating blue-prints for buildings, Create a bridges and Computer chips. CAD is mainly used by draftsman, although engineer, surveyors and architecture, may need to use the software application.

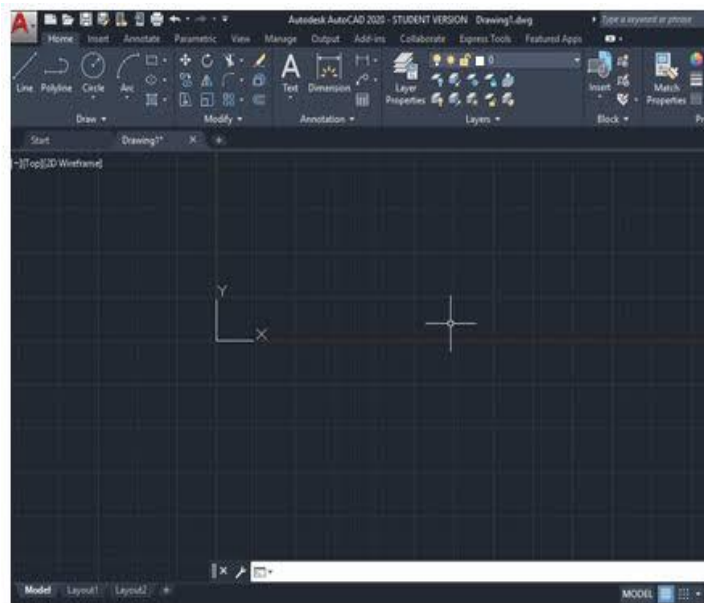


Fig.1. Auto CAD display

2. STAAD.Pro

STAAD.Pro (Structural Analysis And Design) is a popular structural analysis application known for analysis ,diverse applications of use, interoperability, and time saving capabilities. STAAD helps structural engineers perform 3D structural analysis and design for both steel and concrete structures. A physical model created in the structural design software can be transformed into an analytical model for structural analysis .Many design code standards are incorporated into STAAD to make sure that the structural design complies with local regulations.

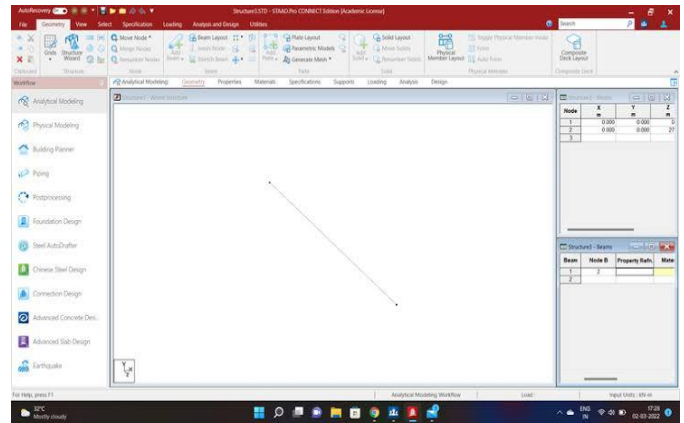


Fig.2. STAAD.Pro display

STEPS FOR SOFTWARE DRAWING

AutoCAD :

Choose a template

Choose a scale for drawing

Draw exterior walls , doors and windows

Add other elements

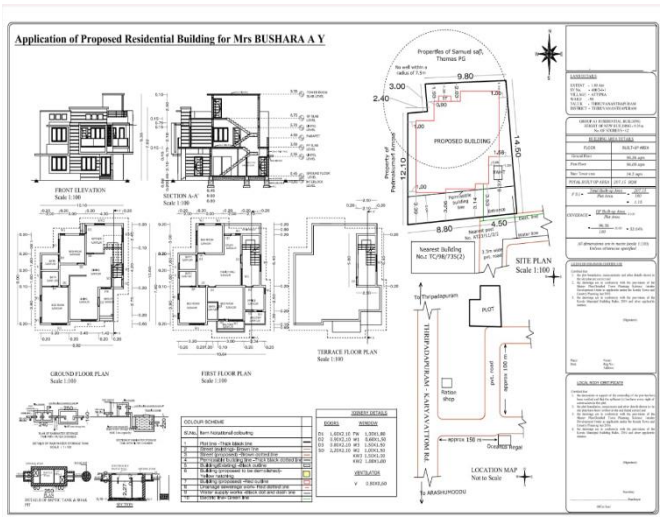
Set up dimension line

TABLE .1. Building area details

FLOOR	BUILT UP AREA
Ground floor	96.56 sqm
First floor	96.09 sqm
Stair tower area	14.5 sqm
TOTAL BUILT-UP AREA	207.15 SQM

$$F S I = \frac{\text{Total built-up area}}{\text{Plot area}} = \frac{207.15}{180} = 1.15$$

$$\text{COVERAGE} = \frac{\text{GF Built-up area}}{\text{Plot area}} \times 100 = \frac{96.56}{180} \times 100 = 53.64\%$$



180Fig.3. Building Plan

STEPS FOR STAAD.PRO

1. Creation of geometry
 - (a) Import from cad
 - (b) 3-D frame structure
2. Creation of property and assign
3. Creation of support and assign
4. Creation of nodes and assign
5. Adding combinations
6. Design

STAGES

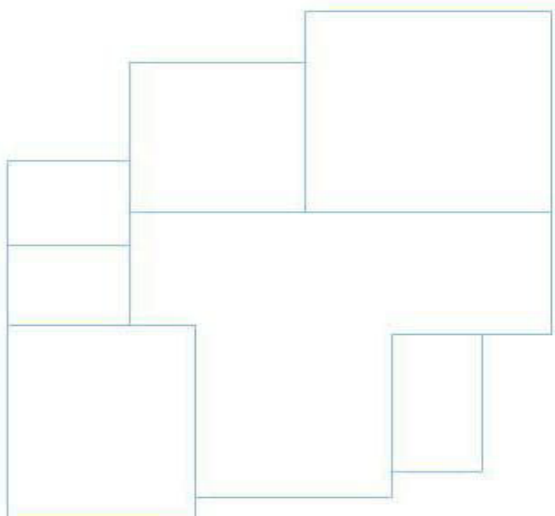


Fig.4 . Stage 1

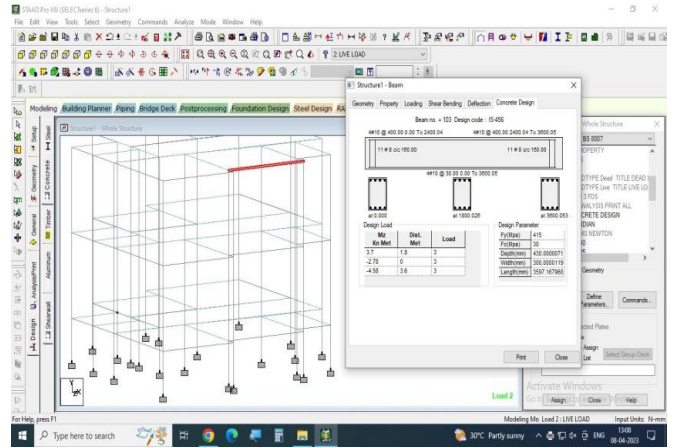


Fig . 5 . concrete design

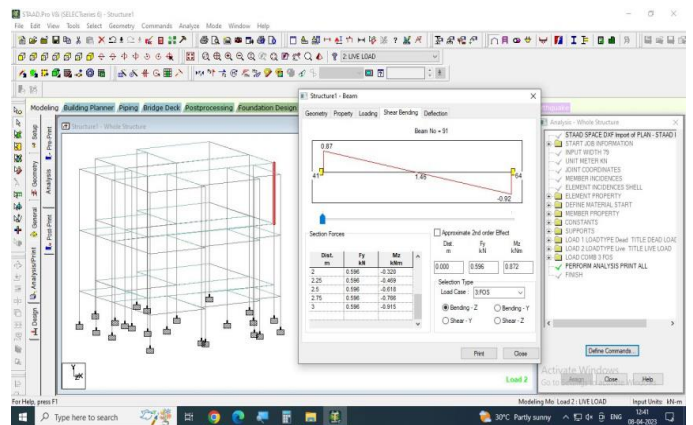


Fig .6 . Shear Bending

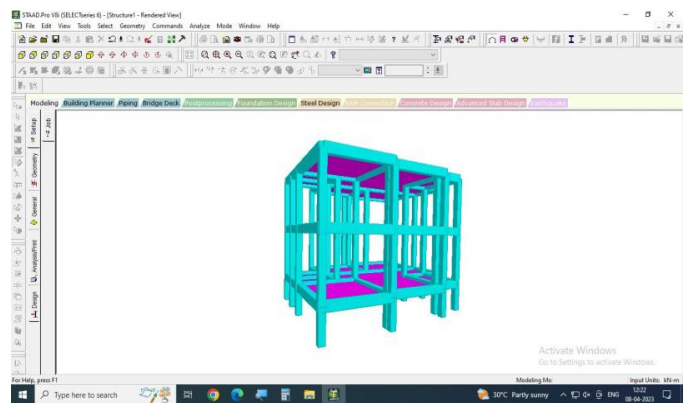


Fig .7 . Model

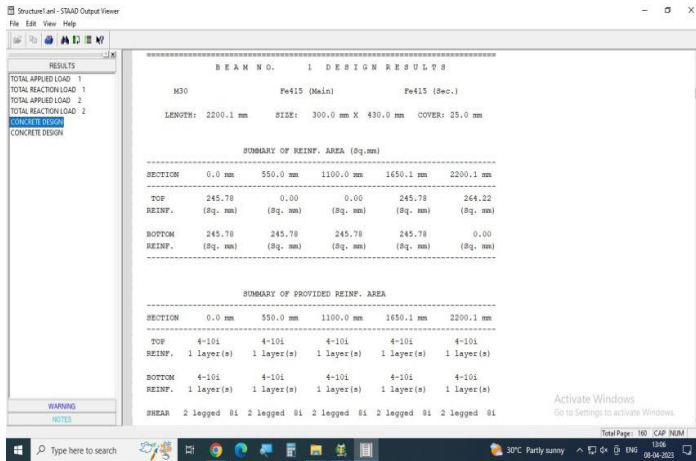


Fig .8. Design result

ADVANTAGES AND DISADVANTAGES

ADVANTAGES

- More accurate result
- No hand calculations
- Produce beautiful report
- Easy collaboration
- Save time

DISADVANTAGES

- Work can be lost because of sudden break done of computers
- Work is prone to viruses
- Limitations in modeling
- Proper detailing of report is not available

II.CONCLUSIONS

- The aim of this paper was to understand plan and design green building.
- That has been achieved by studying different green technologies for buildings .
- By planning and designing building layout, development of plan , elevation, section etc.
- Various green technologies and materials proposed with their feasibility study.
- The plan and design of the building is designed using Auto Cad and Staad . pro software .
- And finally a self-assessment is also done by considering LEED and GRIHA certification standard

III. REFERENCE

- [1] **Nithish Kumar Sharma . (2020)**. "Sustainable building material for green building construction , conservation and refurbishing" . This paper is to feature how manageable structure material can add to diminish the effect of ecological corruption and create sound structure which can be ecological to the tenant just as our condition.
- [2] **Dibas Manna. (2019)**. "A review on Green building movement in India ."
- [3] **Hussein Mohammed Abualrejal .(2019)**. "Green Building toward construction sustainability : Energy efficiency with material and design aspects" . This paper refers to the ways of how the developers design , develpe , build and control a project that make as little negative impact on the environment and public as possible.
- [4] **Alli O.O ,Alli . A.J and Akolade A .S .(2018)**. "Environmental sustainable building design and construction" This research work shows how it is affecting the way buildings are being constructed , that it is making a difference in our external and internal environment.
- [5] **Yuqian Han ,(2017)**. "Green building design support system based on BIM and LEED" This paper describes a method that integrats the BIM with a green building rating system to help improving the building performance.

V.

