iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** VI **Month of publication:** June 2023

DOI: https://doi.org/10.22214/ijraset.2023.53902

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue VI Jun 2023- Available at www.ijraset.com

Structural & Architectural Design of a New Building

Sanjita Mohanty[1], Akash Panigrahy[2], Abinash.S.Baral[3], Matruprasad Saktijit Malik[4], Surajit Pattnaik[5]
[1, 2, 3, 4]B.Tech Student, [5]Prof, Department of Civil Engineering (GIFT), Bhubaneswar

Abstract: ***Structural design is the methodical investigation of the stability, strength and rigidity of structures. The basic objective in structural analysis and design is to produce a structure capable of resisting all applied loads without failure during its intended life. An architectural designer is someone who design research, coordinates and manages such enhancement project. we would be allotted the area of new project settlement with maps and survey co-ordinates to design the plan, as the plan gets the approval from the decision making body the structural analysis would be done to check various factors of the structure, we need to design the plan so that the approval drawings become perfect and can be sent to various governing bodies. Different parameters are to be observed like Architectural Design SOFTWARES TO BE USED Staad pro & Autocad drafting.***
Keywords: Auto cad; Staad pro; Systematic literature survey.

I. INTRODUCTION

Building construction is the engineering deals with the construction of Building such as residential houses. In a simple building can be define as an enclose space by walls with roof, food, cloth and the basic needs of human beings. In the early ancient times humans lived in caves, overt trees of under trees, to protect themselves from wild animals, ram, sun, etc. as the times passed as humans being started living in huts made of timber branches. The shelters of those old have been developed nowadays into beautiful houses. Rich people live in sophisticated condition houses. Buildings are the important indicator of social progress of the county. Every human has two- third life times in the houses. The security civic sense of the responsibility. These are the few reasons which are responsible that the person do utmost effort and spend hard earned saving in owning houses. Nowadays the house building is major work of the social progress of the county. Daily new techniques are being developed for the construction of houses economically, quickly and fulfilling the requirements of the community engineers and architects do the design work, planning and layout etc , of the buildings. Draughtsman is responsible for doing the drawing works of building as for the direction of engineers and architects, The draughtsman must know his job and should be able to follow the instruction of the engineer and should be able to draw the required drawing of the building, site plans and layout plans etc, as for the requirements. Building consists of number of bays storey . A multi-storey, multi- Paneled frame is a complicated statically Intermediate Structure. A design of R.C building of G+2 storey frame Work is taken up.

II. DESCRIPTION

A structure can be defined as a body which can resist the applied loads without appreciable deformations Civil engineering structures are created to serve some specific functions like human habitation, transportation, bridges, storage etc. in a safe and economical way A structure is an assemblage of individual elements like pinned elements (truss elements), beam element, column, shear wall slab cable or arch. Structural engineering is concerned with the planning, designing and the construction of structures.
Structure analysis involves the determination of the forces and displacements of the structures or components of a structure. Design process involves the selection and detailing of the components that make up the structural system.

A. Staad

Staad is powerful designs of software licensed by Bentley. Staad stands for structural analysis and design any object which is stable under a given loading can be considered as structure. So first find the outline of the structure, where as analysis is the estimation of what are the type of loads that acts on the beam and calculation of shear force and bending moment comes under analysis stage. Design phase is designing the type of materials and its dimensions to resist the load. This we do after the analysis.
To calculate Shear force diagram and bending moment diagram, of a complex loading beam it takes about an hour. So when it comes into the building with several members it will take a week. Staad pro is a very powerful tool which does this job in just an hour's staad is a best alternative for high rise buildings.

B. Staad Editor

Staad has very great advantage to other software's i.e., Staad editor. Staad editor is the programming For the structure we created and loads we taken all details are presented in programming format in staad editor. This program can be used to analyze other structures also by just making some modifications, but this require some programming skills. So load cases created for a structure can be used for another structure using staad editor.

C. Plan

The auto cad plotting no.1 represents the plan of a g+2 building. The plan clearly shows that it is a combination of two apartments in each block. We can observe there is a combination between each and every apartment.

In each block the entire floor consists of a eight rooms which occupies entire floor of a block.It is a G+1 proposed building, so for three storey building we have 2x2-4 flats represents a middleclass locality with minimum areas for each house.

The plan shows the details of dimensions of each and every room and the type of room and orientation of the different rooms like bed room, bathroom, kitchen, hall etc. There are total four balconies in this building. Each flat consist of one balcony.

The entire plan area is about 139.355 sq.m.

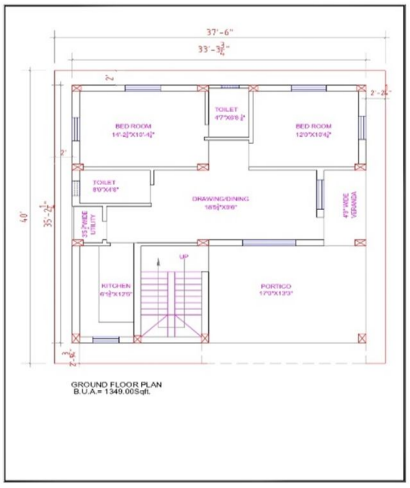


Figure : 1 Ground floor plan

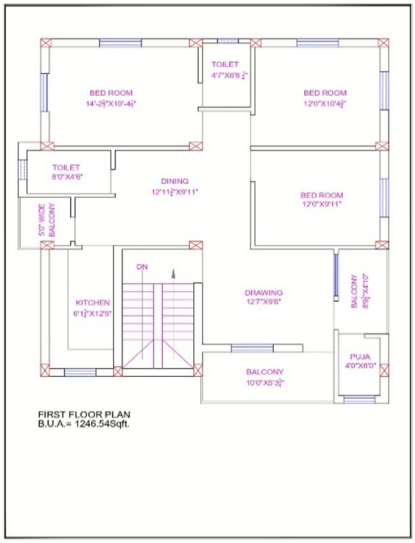


Figure : 2 First floor plan

D. Load Conditions and Structural System Response

The concepts presented in this section provide an overview of building loads and their effect on the structural response of typical wood-framed homes. Building loads can be divided into types based on the orientation of the structural action or forces that they induce; vertical and horizontal (i.e., lateral) loads. Classifications of loads are described in the following sections.

E. Reinforced Concrete Beams

It is reinforced under compression tension regions. The necessity of steel of compression region arises due to two reasons. When depth of beam is restricted. The strength availability singly reinforced beam is in adequate. At a support of continuous beam where bending moment changes sign such as situation may also arise in design of a beam circular in plan. Figure shows the bottom and top reinforcement details at

three different sections. These calculations are interpreted manually.

STAAD Pro Query Concrete Design

Beam no 24 Design Code IS-456

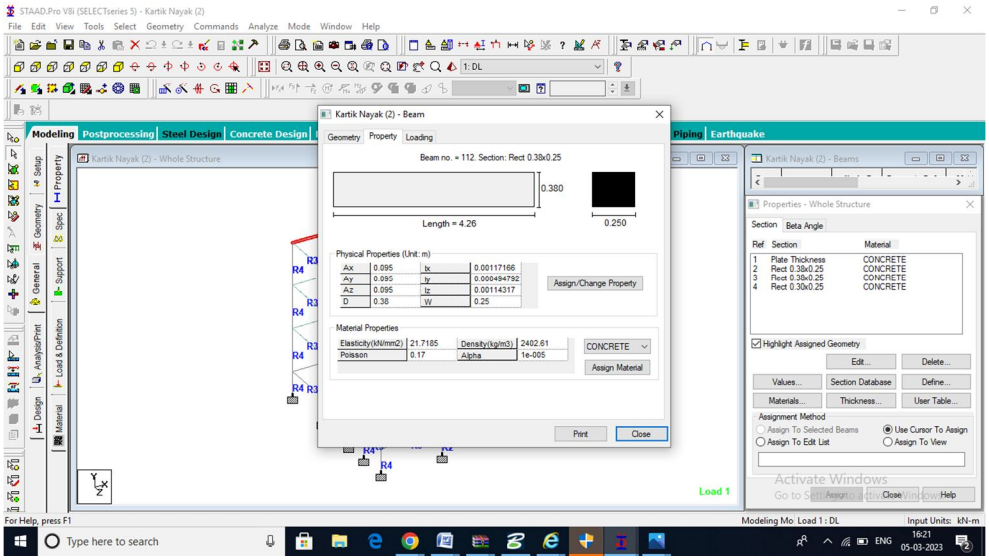
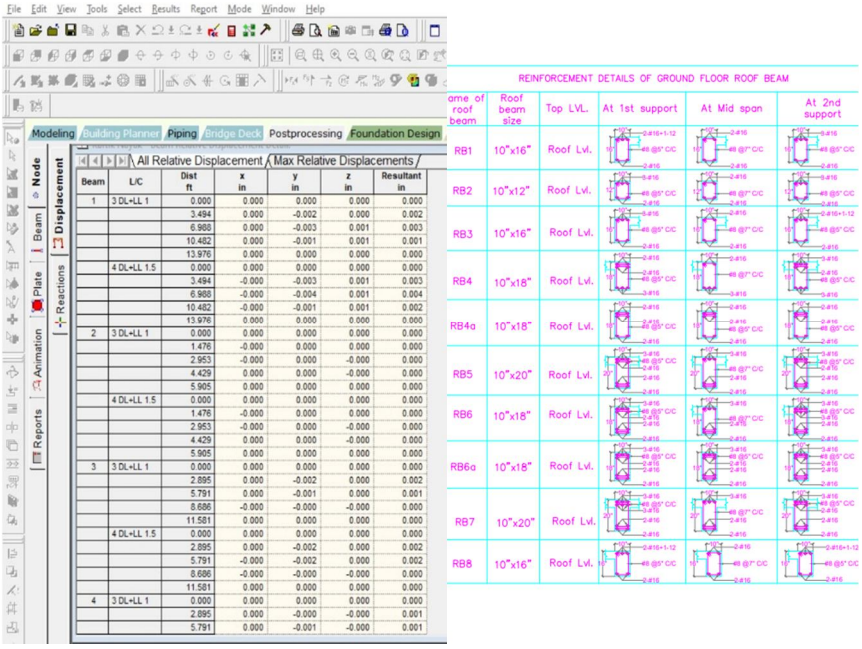


Figure: 3A diagram of the reinforcement details of beam



F. Footing

Foundations A Are Structural Elements That Transfer Loads From The Building Or Individual Column To The Earth If These Loads Are To Be Properly Transmitted, Foundations Must Be Designed To Prevent Excessive Settlement Or Rotation, To Minimize Differential Settlement And To Provide Adequate Safety Against Sliding And Overturning.

G. General

1) Footing Shall Be Designed To Sustain The Applied Loads, Moments And Forces And The Induced Reactions And To Assure That Any Settlements Which May Occur Will Be As Nearly Uniform As Possible And The Safe Bearing Capacity Of Soil Is Not Exceeded.
2) Thickness At The Edge Of The Footing: In Reinforced And Plain Concrete Footing At The Edge Shall Be Not Less Than 150 Mm For Footing On The Soil Not Less Than 300mm Above The Tops Of The Pile For Footing On Piles.

H. Bearing Capacity Of Soil

The Size Foundation Depends On Permissible Bearing Capacity Of Soil. The Total Load Per Unit Area Under The Footing Must Be Less Than The Permissible Bearing Capacity Of Soil To The Excessive Settlements.

1) Footing Geomtery

Design Type: Calculate Dimension
Footing Thickness (Ft): 305.000 mm
Footing Length-X (FI): 1000.000 mm
Footing Width -Z (Fw): 1000.000 mm
Eccentricity along X (Oxd): 0.000 mm
Eccentricity along Z (Ozd): 0.000 mm

2) Column Dimensions

Column Shape: Rectangular
Column Length: X (PI): 0.300 m
Column Width Z (Pw): 0.250 m

3) Pedestal

Include Pedestal? No
Pedestal Shape: N/A
Pedestal Height (Ph): N/A
Pedestal Length-X (PI): N/A
Pedestal Width 2 (PW) N/A

4) Design Parameters Concrete and tebar Properties

Unit Weight of Concrete: 25.000 kN/m3
Strength of Concrete: 25.000 N/mm2
Yield Strength of Steel 415.000 N/mm2

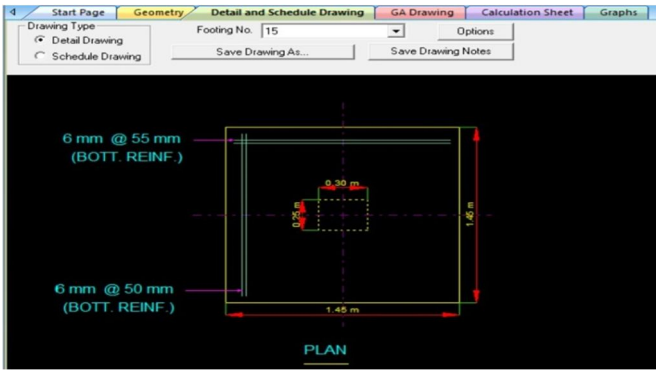


Fig : 4 Plan of reinforcements

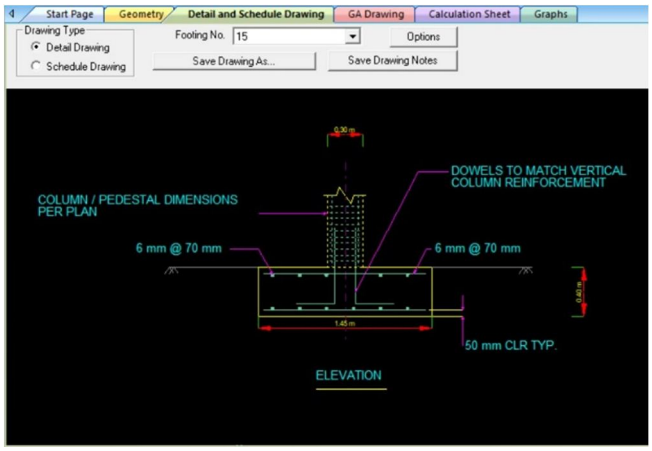


Fig : 5 Elevation of reinforcements

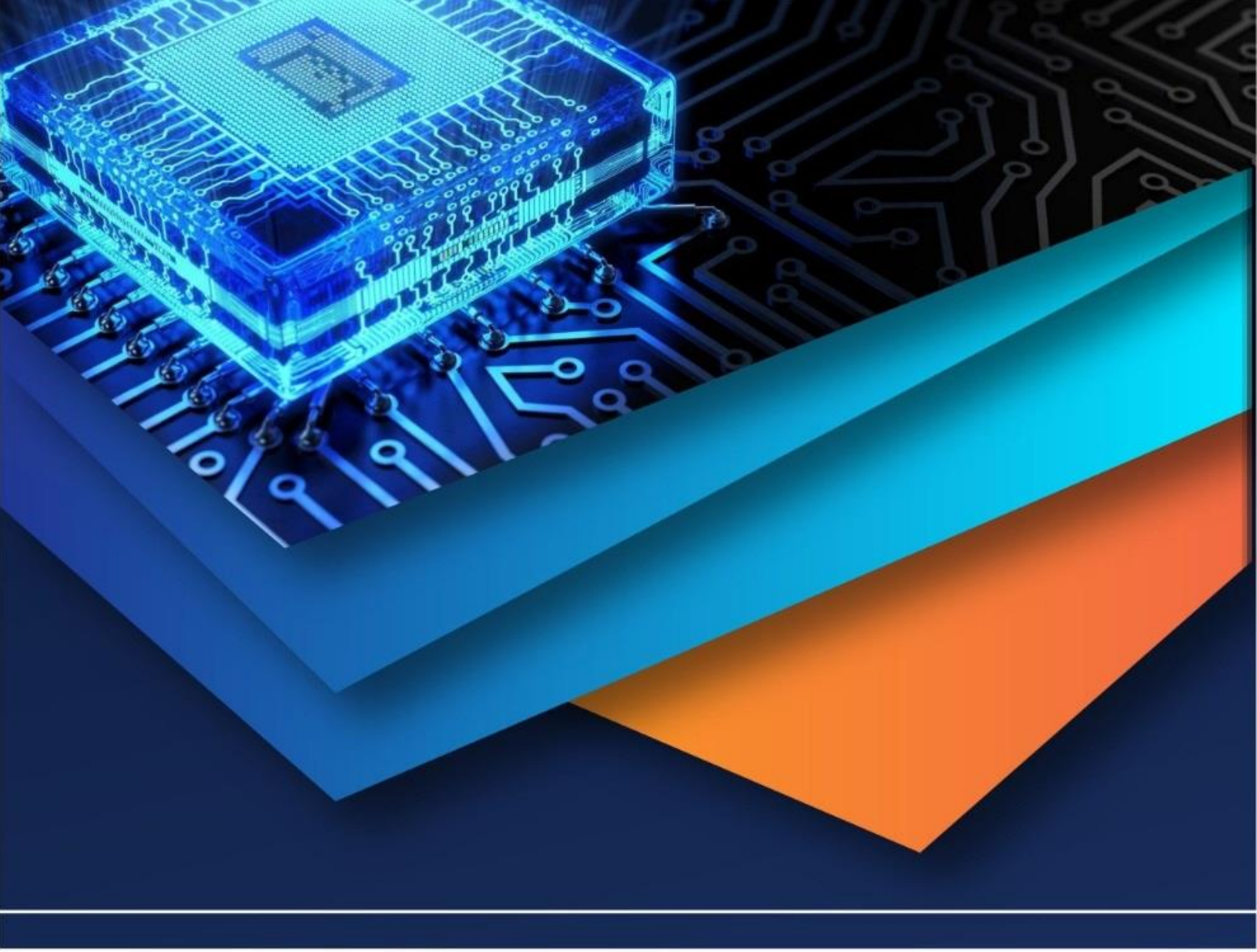
III. CONCLUSION

In this report, a design of multi - storey building for residential purpose is presented. We have successfully completed the planning and designing of a multi- storey (G+1) Structure .

Designing using Software's like Staad reduces lot of time in design work. Details of each and every member can be obtained using staad pro. All the List of failed beams can be obtained and also Better Section is given by the software Accuracy is improved by using this software . Many load combinations were applied to different structural members with the help of the design provisions .All the aspects of design were met while analyzing and designing was done using STAAD Pro.

REFERENCES

[1] ACT318-08 (2009) Building code requirements for structural concrete and commentary, ACI, Farmington Hills, MI, USA.
[2] Agarwal P, Shrikhande M (2006) Earthquake resistant design of structures. PHI Learning Pvt Ltd., Delhi.
[3] Anderson D. Brzev S (2009) Seismic design guide for masonry buildings. Canadian Concrete Masonry Producers Association, Toronto.
[4] Aoyama H (ed) (2001) Design of modern high rise RC structures, vol 3.Imperial College Press, London.
[5] ATC 72-1 (2010) Modelling and acceptance criteria for seismic analysis and design of tall buildings. PEERC and ATC, Redwood City.
[6] BasuD , SalgadoR , PrezziM (2008)Analysis of laterally loaded piles in multi-layered soil deposits. JTRP tech report, Purdue University, West Lafayette, Indiana.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY