IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

ANALYSIS AND DESIGN OF AG + 3 RESIDENCIAL BUILDING

V.GANESH KRISHNA, Y.HEMA SAI KIRAN ,M. DURGANJALI,
T. NAVEEN, K. NAGARJUNA .
UG Student Civil departments, SR Gudlavalleru Engineering College ,Gudlavalleru, A.P , India
UG Student Civil departments, SR Gudlavalleru Engineering College , Gudlavalleru, A.P , India
UG Student Civil departments, SR Gudlavalleru Engineering College , Gudlavalleru, A.P , India
UG Student Civil departments, SR Gudlavalleru Engineering College , Gudlavalleru, A.P , India
Assistant professor, Civil department, SR Gudlavalleru Engineering College, Gudlavalleru, A.P, India.

Abstract In order to compete in the ever growing competent market it is very important for a structural engineer to save time. As a sequel to this an attempt is made to analyse and design a Multi-storied building by using a software package staad pro. For analysing a multi storied building one has to consider all the possible loadings and see that the structure is safe against all possible loading conditions.

There are several methods for analysis of different frames like kani's method, cantilever method, portal method, Matrix method. The present project deals with the analysis of a multi storeyed residential building using staad pro. The dead load &live loads are applied and the design for beams, columns, footing is obtained STAAD Pro with its new features surpassed its predecessors, and compotators with its data sharing capabilities with other major software like AutoCAD.

We conclude that staad pro is a very powerful tool which cansave much time and is very accurate in designs. Thus it is concluded that staad pro package is suitable for the design of a multi-storeyed building.

Keywords : Autocad , Staadpro , shear force, Bending moments

1.INTRODUCTION:

Engineering that deals with the construction of buildings like homes is known as building construction. Buildings are a key gauge of a country's socioeconomic development. Everyone wants to live in a pleasant home because, on average, people spend around two-thirds of their lives there. the sense of civic duty related to security. An R.C. building with a G+6 storey structure is proposed. The building in the plan is made up of a network of monolithically constructed columns. The building is 38' 9"x 34' fts in size. There are16 columns in all. It is a complex of homes. STAAD Pro, a programme for structural analysis design, is used to create the design. The structure was put under vertical loads. consists of active loads and dead loads for structural elements like beams, columns, slabs, etc

2. LITERATURE REVIEW:

Ibrahim, et.al (April 2019): Design and Analysis of Residential Building(G+4) Volume: 04, Issue: 06, April: 2019 (IRJET): After analyzing G+4 story residential building structure ,conducted that the structure is rate in loading like dead load live load ,wind load and seismic loads. Member dimensions (beam , column ,slab) are assigned by calculating the load types and its quantity applied on it Auto CAD gives detailed information at the structure members length , heigh , depth ,size and number of parameters which are designed as per IS 456 : 2000.

Dunnala Lakshmi Anuja, et.al (2019): Planning ,Analysis and Design of Residential Building (G+5) By using STAAD Pro Volume: 06, Issue:07,July:2019(IJIRSET)): Frame analysis was by STAAD Pro .slab, Beam, Footing and Stair case were design as per the IS Code 456 -2000 by LSM. The properties such as share deflection torsion ,development length is with IS code provisions Design of column and footing were done as per the IS 456- 2000 along with the SP -16 design charts. The check like one-way shear or two-way shear within IS Code provision. Design of slab, beam, column, rectangular footing and staircase are done with limit state method. On comparison with drawing, manual design and the geometrical model using STADD Pro.

Mr K. Prabin Kumar, et.al (2018): A Study on Design of Multi- Storey Residential Building Volume: 03, Issue: 06, June: 2018(IRJET): They used STADD Pro. to analysis and designing all structure member and calculate quantity of reinforcement needed for concrete section. Various structure action is considered as members such as axial, flexure, shear and tension. Pillar are delineated for axial forces and biaxial ends at the ends. The building was planned as per IS: 456-2000.

3.OBJECTIVES:

1. Carrying out a complete analysis and design of the main structural elements of a multi-storey building including slabs, columns, shear walls.

2. Getting familiar with structural soft wares (Stand Pro AutoCAD)

3.Getting real life experience with engineering practices

.

4. METHODOLOGY:

Table 4.1 methodology

PLANNING	using auto cad
ANALYSIS	using staad pro as well as comparison with manual calculation
DESIGN	using staad pro as well as comparison with manual calculation

5.BUILDING DATA FOR ANALYSIS:

Table 5.1 The dimensions and size of individual elements

Parameter	Dimensions
Height of the Each storey	3.2m
Number of floors	G+3
Column Size	0.23m x 0.40 m
Beam Size	0.23m x 0.45m
Slab Thickness	0.12m
Proposed Software	Staad pro

Table 5.2 Properties of Materials & Gravity Loads

Property of Material	Loads
Grade of Concrete	M_{25}
Grade of Steel	Fe415
Unit Weight of Concrete	25 kN/m^2
Live Load(Roof Level)	3kN/m^2
Live Load (Terrace)	1.5kN/m^2
Floor Finish Load	1kN/m^2
Terrace Finish Load	1.5kN/m^2

6.ANALYSIS USING STAAD Pro

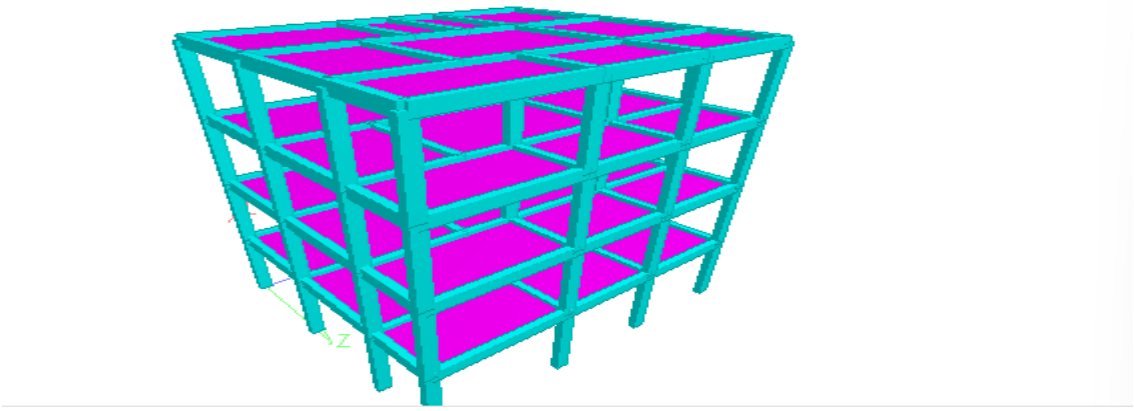


Fig1.3D STRUCTURE IN STAAD PRO

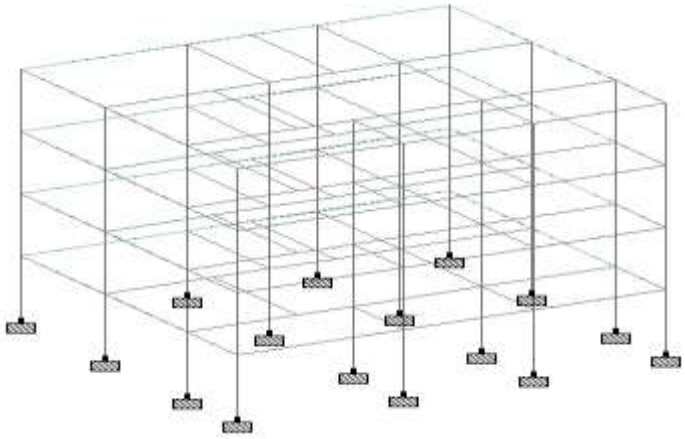


Fig 2 Frame structure

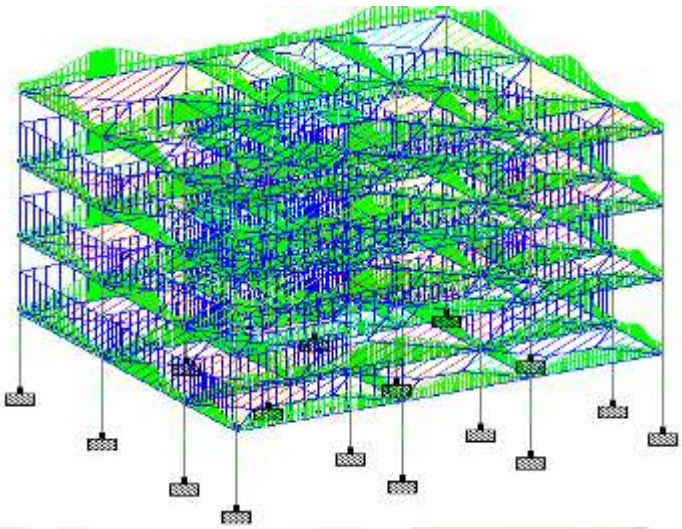


Fig 3Wall load

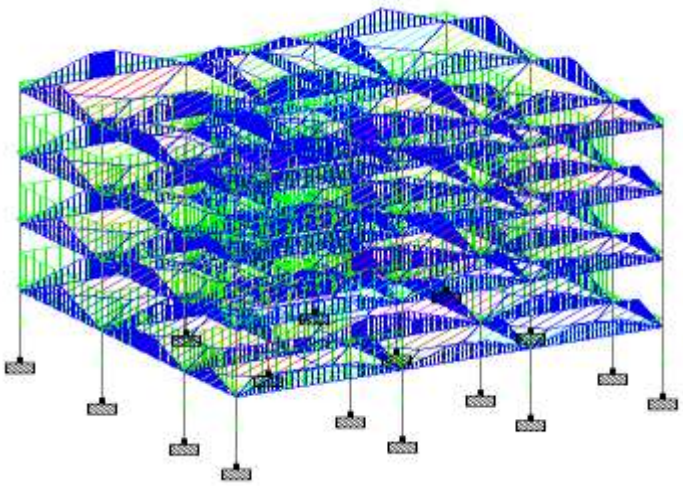


Fig .4 Live Load

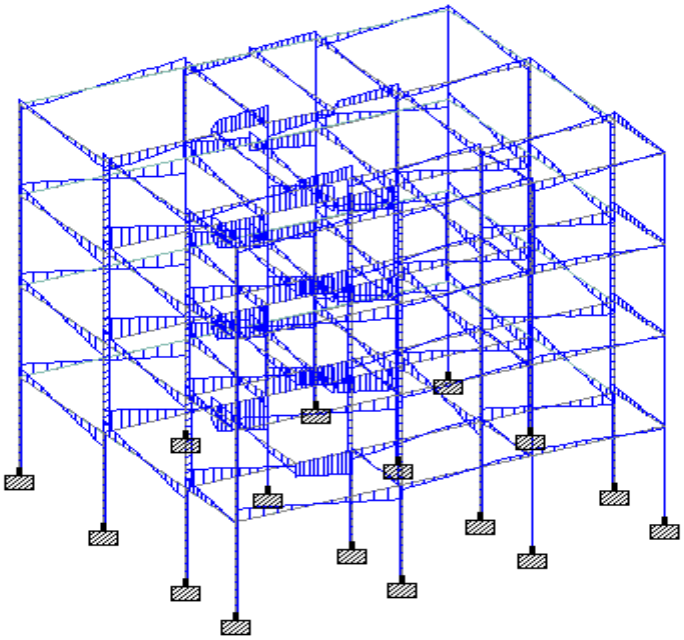


Fig 5 Shear force diagram

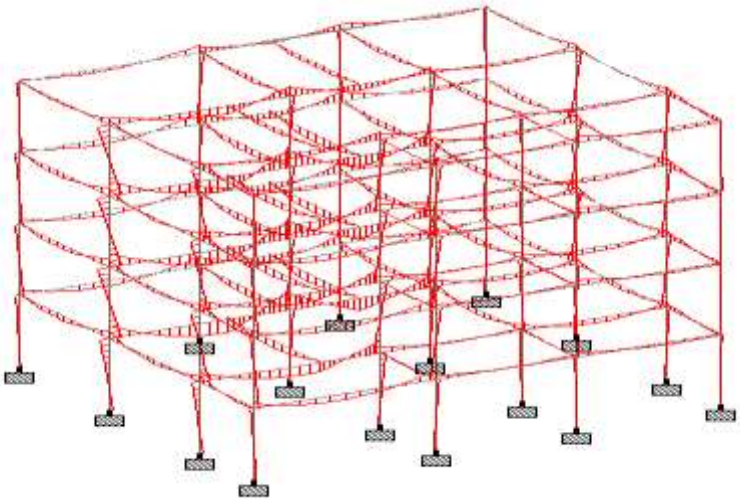


Fig .6 Bending moment diagram

7.DESIGN OF RCC ELEMENTS

7.1 Design of slab:

Generally slab are classified into two types they are one slab and two slab:

In a one-way slab, the bending moment occurs in a singular direction, while in a two-way slab it occurs in both directions.

7.2 Design of beam

A reinforced concrete beam must be able to withstand the tensile, compressive, and shear stresses that the loads placed on the beam cause in it. Concrete has a weak tensile strength but is rather robust in compression. Thus, the low tensile strength avoids the carrying capacity of plain concrete beams. Steel has a high tension strength. Thus, the addition of reinforcing steel in the tension zone surrounding the concrete to create a reinforced concrete beam overcomes the weakness of concrete. Fixing the beam's width and depth allows

designers to determine how much steel will be needed, as well as the diameters of the bars that will be employed.

To prevent offset within the room, the width of the beam is often kept equal to the thickness of the wall. For the weight to be effectively transferred from the beam to the column, it must not be wider than the column. L/10 to L/6 take up the beam's depth. Since all of the beams in the current design are rectangular, their width and depth are 0. 23 m and 0.3 m, however. Two varieties of reinforced concrete beams exist.

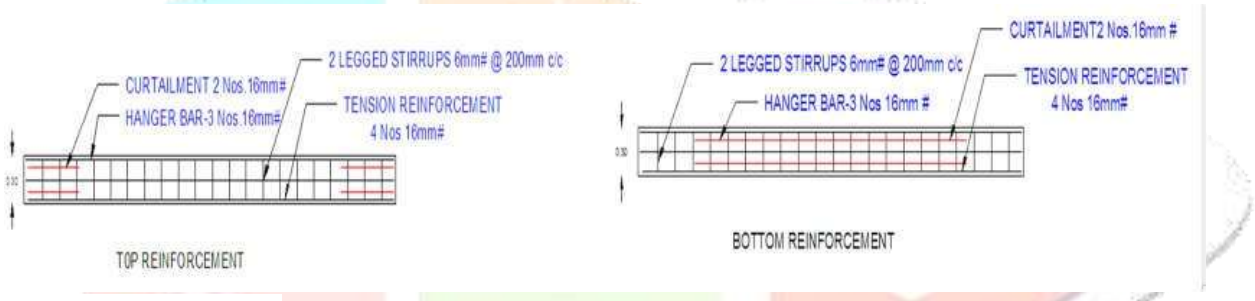
1. Single reinforced beams
2. Double reinforced beams

1.Single reinforced beams

Steel bars are positioned near the bottom of simply supported, singly reinforced beams because this is where they are most effective at resisting tensile bending stress.

2.Double reinforced beams

Both the compression zone and the tension zone are reinforced. Two factors lead to the need for steel in the compression zone. The Beam details is shown in Fig. 7. In the compression zone, there are three nos. of 16mm dia. bars and four nos. of 16mm dia. in the tension zone with two legged stirrups of 6mm @ 200mm c/c.



7.3 Design of column

In general, a column can be described as a part that bears a direct axial load and experiences compressive stresses that are so significant that they heavily influence the column's construction. Axial loads (Pu) and a uniaxial bending moment (Mu) are applied to the columns. The larger of the two reinforcements must be used in the column section, which must be designed just above and just below the connection between the beam and column. The design was continued using IS 456:2000. Figure 8 depicts the precise placement of the reinforcement in the column, which consists of 16 mm diameter bars spaced 200 mm apart.

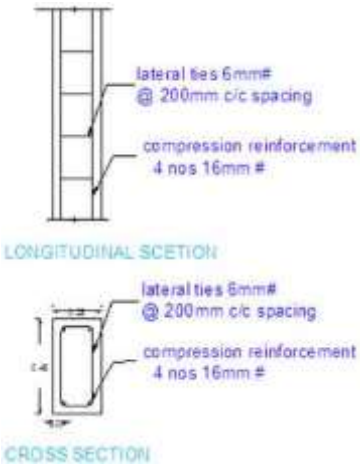


Fig 8 column

6.4 Design of Footing

The structural component known as a foundation is responsible for transferring loads from a building or individual column to the earth .The foundations must be built to prevent differential settlement, to reduce it, and to offer enough safety against slipping and overturning if these loads are to be conveyed properly. A geotechnical research is used to determine the best sort of foundation, and a structural design is used to calculate the size of the footing. The contact area between the soil and the footing is substantially bigger than that of the columns and walls because the compressive strength of the soil is often much weaker than that of the concrete. According to the current assessment, the site is situated in granite rock, which is appropriate for a shallow foundation. The safe bearing capacity of soil is 300kN/m2 at a depth of 6 feet, and the same soil should extend 1.5 times the breadth of the footing below the base of the footing, according to laboratory testing of undisturbed soil samples.

Separated square footings and rectangular footings made of M-25 mix that are reinforced with HYSD bars made of Fe-450 are used, depending on the soil's bearing capacity and the design of the structure. The adopted footing is a solitary rectangular slope. The slope is offered to reduce the amount of concrete used in the construction, leading to more cost-effective building.

8.CONCLUSIONS

- Percentage variation between manual calculation on critical column and staad pro (shear forces) =7%
- Percentage variation between manual and staad pro (column Ast) =1.3%
- Percentage variation between manual calculation on critical beam and staad pro moments = 9.5 %
- Percentage variation Ast between manual calculation on critical beam and staad pro moments = 11.45%
- Using STADD Pro., analysis and design of multi-storey building has completed much quickly and easier than the manual calculation.
- Bending moments and shear forces are checked for beams, columns and slabs.
- Manual analysis using kani's method has been done and composed these results with results obtained from the software of STAAD Pro.

9.REFERNCES

- Ibrahim, et.al (April 2019): Design and Analysis of Residential Building(G+4) Volume: 04, Issue: 06, April: 2019 (IRJET)
- Dunnala Lakshmi Anuja, et.al (2019): Planning ,Analysis and Design of Residential Building (G+5) By using STAAD Pro Volume: 06, Issue:07,July:2019(IJIRSET)
- Mr K. Prabin Kumar, et.al (2018): A Study on Design of Multi- Storey Residential Building Volume: 03, Issue: 06, June: 2018(IRJET)
- Indian Standard plain and reinforced concrete - code of practice(fourth revision) IS:456-2000
- IS-875(PART-1) : 1987 Indian Standard code of practice for design loads (other than earthquake) for buildings and structures part 1 dead loads — unit weights of building materials and stored materials.
- SP-16: design aids for reinforced concrete to IS : 456-2000