https://dx.doi.org/10.24001/ijaems.3.3.23 *ISSN: 2454-1311*

Design & Analysis of Multi Storeyed Building (G+10) By Using Stadd Pro V8i (Series 4)

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Abstract— *The principle objectives of this project are comparison between staad-pro software and manually calculations and design a multi-storied building using STAAD Pro. The design involves load calculations and analyzing the whole structure by STAAD Pro. The design methods used in STAAD Pro analysis are Limit State Design conforming to Indian Standard Code of Practice. These involve Staad Modeling, Analysis the members due to the effect of Wind & Seismic load & Compare them for a 33 meter height Building with Concrete & Steel construction. The proposal structure is a G+10 storied building with 3.00 m as the height of each floor. The overall plan dimension of the building is 21.30 m x 14.0m.*

Keywords—Multistoried building, wind effect, seismic effect, manually calculations, Steel and concrete composite structure and Staad-pro.

I. INTRODUCTION

In every aspect of human civilization needed structures to live in. Due to rapid growth of population the area is decreasing, so for human needs it is require build multi-storied building. Complicated and high-rise structures need very time taking and cumbersome calculations using conventional manual methods. Here in this project work based on software named staad pro has been used. STAAD.Pro provides us a fast, efficient, easy to use and accurate platform for analyzing and designing structures.

Objective of this project is the comparative study on design and analysis of multistoried building (G+10) by staad-pro software and manually design. In this project we are going to analyze (G+10) building for bending moment, shear forces, deflections, reinforced details for structure components of buildings such as Beam, Columns and Slabs to develop economic design. Few standard problems also have been solved to show how staad pro can be used in different cases. These typical problems have been solved using basic concept of loading, analysis, condition as per IS code.

The problems which we have done in a staad that we are comparing the problems or designing which done manually. It is the most popular software used now a day. There are four steps using STAAD-PRO to reach the goal.

- Prepare the input file.
- Analyze the input file.
- Watch the results and verify them.
- Send the analysis result to steel design and concrete design engines for designing purpose.

II. ASSUMPTIONS AND EQUITATION'S

1.1 Assumptions

1.1.1 Materials:

i. Concrete grade: M30
ii. All steel grade: Fe415 grade
iii. Bearing capacity of soil: 300KN/M²

1.1.2 Density of materials used:

i. Plain concrete: 24 kn/m³
ii. Reinforced: 25 kn/m³
iii. Flooring material (cm): 20 kn/m³
iv. Brick masonry: 19 kn/m³

1.1.3 Live Loads:

i. Live load on slabs = 2.0kn/m²
ii. Live load on passage=4.0kn/m²
iii. Live load on stairs = 4.0kn/m²

1.1.4 Assumptions in Design:

i. Using partial safety factor for loads in accordance with clause 36.4 of IS-456-2000 as ϒt=1.5
ii. Partial safety factor for material in accordance with clause 36.4.2 is IS-456-2000 is taken as 1.5 for concrete and 1.15 for steel.
iii. Using partial safety factors in accordance with clause 36.4 of IS-456-2000 combination of load.
iv. D.L+L.L. 1.5
v. D.L+L.L+W.L 1.2

1.2 Equitation's

1.2.1 Dead Load:

Self-Weight = C/S Area × Density (kn/m)
Slab Self-Weight = Thickness × Density

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Wall self-weight = Tw × γ bri + 2(Tp × γ pls)

1.2.2 Wind load:

Vz =Vb×K1×K2×K3

$P_z = 0.6\ V_z^2$

2. FIGURES AND TABLES

Srn	beam no.	DESIGN					
		STADD PRO			MANUALLY		
		Vu (KN)	Ast mm²	Bar Combination	Vu (KN)	Ast (mm²)	Bar Combination
1.	1735	157.3	799.1	Provide 2legged 10ϕ @120mm C/C Stirrups	157.3	800	Provide 2legged 10ϕ @120mm C/C Stirrups

2.1 Figures:

2.1.1 Flow chart diagram:

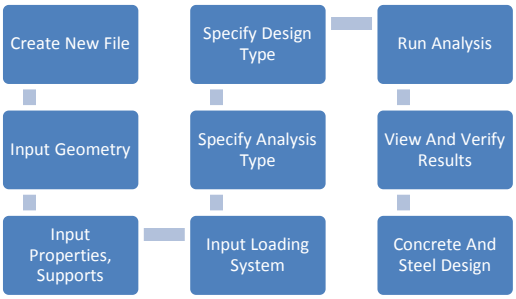

Fig.1: flow chart diagram

3.1.2 3D View of structure

Fig. 2: 3D view of structure

3.1.3 Self-weight:

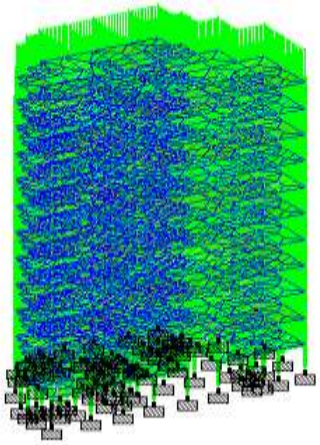

Fig. 3: Self weight of structure

3.1.4 Deflection:

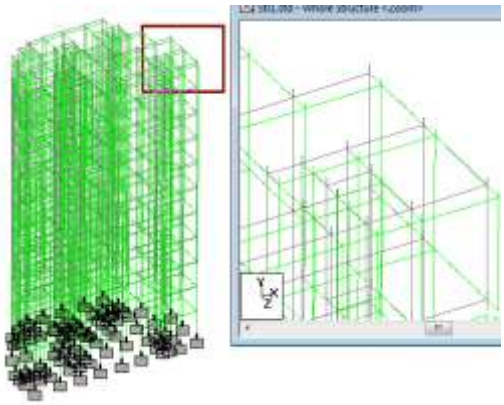

Fig 4: deflection of structure

3.1.4 Bending moment

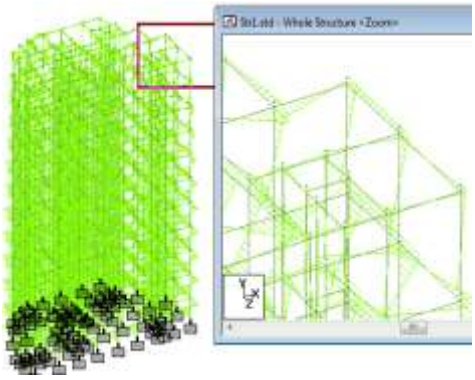

Fig 5: Bending moment @ Y

3.2 Tables:

3.2.1Comparison between staad-pro and manually calculations of beam:

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Table.1: comparison between staad-pro and manually calculations of beam

Sr no	column no.	DESIGN					
		STADD PRO			MANUALLY		
		Puz (KN)	Ast (mm^2)	R/f	Puz (KN)	Ast (mm^2)	Bar Combination
1.	1216	1954.7	1872.6	12Bar - 16mm ϕ	1954.7	1716.5	12Bars - 16mm ϕ

3.2.2 Comparison between staad-pro and manually calculations of column:

Table.2: comparison between staad-pro and manually calculations of column

BAR DIA (mm)	STEEL (newton)
8	**13577**
10	**7992**
12	**19759**
16	**22671**
20	**1161**
Total	**65161**

3.3 Result of Quantity of steel Required:

Reinforcing steel quantity represents reinforcing steel in beams and columns designed above. Reinforcing steel in plates is not included in the reported quantity. Total volume of concrete = 50.8 cu. Meter.

III. CONCLUSION

In this chapter an analysis and design of G+10 storied composite R.C.C. and steel Building is given. The Results shows that:

1. By using staad pro software time is consumed and work is reduced.
2. All details of each and every members are obtained by using staad pro software.
3. The wind load combinations are more than Earthquake load combinations in Bending moment and shear force.
4. Area of steel in column is slightly greater in wind load combinations as compare to an earthquake load combinations.
5. The deflection of all members is less than 20 mm. Hence it is safe.
6. The structural component of building is safe.
7. In structural member it is required to rearrangement of reinforcement for practical considerations.
8. It is not possible to show each and every member of details that is reinforcement, so it is required to create a grouping of members and provide reinforcement details.

IV. ACKNOWLEDGEMENTS

We have great pleasure to express our sense of gratitude to our guide Mr. Amol Patil for his valuable and encouraging guidance in all phases of project/seminar work. He has been always source of inspiration to use and we are highly thankful for his kind help.

I would like to thank parents, friends and teachers for their encouragement and support.

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