

Preparation of Plan and Analysis of a Multistoried Medical College

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Abstract The project includes preparation of plan and design of a three hundred bedded Medical College. Building drawing was prepared by using the software AutoCAD. It indicates plan, section and elevation of the proposed building drawn to scale of 1:100. Design of the structural elements was done by using the software STAAD Pro 2007 and validated manually. The aim of design is the achievement of an acceptable probability that structures designed will perform satisfactorily during their intended life. With an appropriate degree of safety they should sustain all the loads and deformations of normal construction and use and give adequate resistance to the effects of misuse and fire. In structural design, account shall be taken of the dead, imposed and wind loads and forces such as those caused by earthquake and effect due to shrinkage, creep, temperature etc. Results obtained from STAAD Pro and manual designs were compared. The results seemed to be converging. The designing and detailing was done according to the standard specifications of various codes to the possible extend. The various difficulties encountered in the design process and various constraints faced by the Structural Engineer in designing were well understood.

Index Terms -Plan, Design, AutoCAD, STAAD Pro2007

I. INTRODUCTION

A building project may be defined as any process involving sub divisions and layout of land and putting up of structures whether used for human habitation or not, including all related constructions aspects. The general rules and requirements for building projects are incorporated in the building codes in order to protect the public interest with regard to the structural safety, fire hazards and health aspects in this process. Building plan indicating plans elevation and sections of the proposed building drawn to scale of 1:100 which shall include all floor plans showing size and use of rooms, openings, position of staircase, all street elevations and sectional drawings indicating construction details, from foundation to roof, vertical height and location and details of common lobbies, chutes ramps, lifts, electric control room for multistoried buildings. AutoCAD is a commercial software application for 2D and 3D. It was available since 1982 as a desktop application. It was developed and marketed by Auto desk.

Structural analysis, which is an integral part of any engineering project, is the process of predicting the performance of a given structure under a prescribed loading condition. STAADPro V8i is structural analysis design

program software. It includes a state of the art user interface, visualization tools and international design codes. It is used for 3D model generation, analysis and multi-material design. The commercial version of STAADPro V8i supports several steel concrete and timber design codes. It is one of the software applications created to help structural engineers to automate their tasks and to remove the tedious and long procedures of the manual methods.

II. BUILDING PLAN

It indicates plan, elevation and section of the proposed building drawn to scale of 1:100. The building drawing was prepared using Auto CADD. It is a commercial software application for 2D and 3D. It was available since 1982 as a desktop application. It was developed and marketed by Auto desk. The advantages include:

- ❖ Produce very accurate designs.
- ❖ Drawings can be created in 2D or 3D and can be rotated.
- ❖ Drawings can be modified using options like mirror, rotate, trim, stretch etc....
- ❖ Object properties can also be modified

The plan, section and elevation of the proposed medical college are given below



Fig 1: Ground floor and First floor Plan



Fig 2: Second floor and Third floor Plan

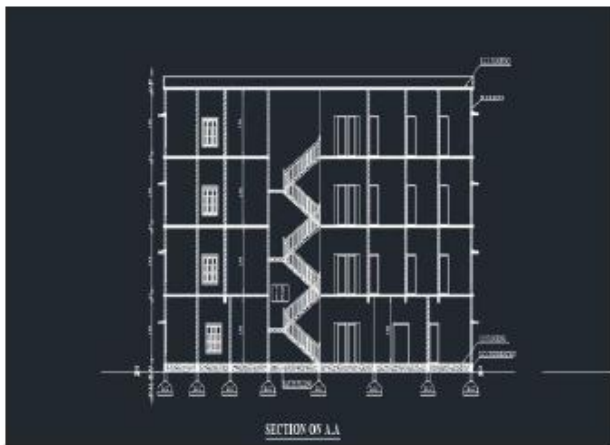


Fig 3: Sectional View of the Building



Fig 4: Elevation of the Building

III. ANALYSIS IN STAAD Pro 2007

STAAD Pro V8i is a structural analysis design program software. It includes a state of the art user interface, visualization tools and international design codes. It is used for 3D model generation, analysis and multi-material design. The commercial version of STAAD Pro V8i supports several steel concrete and timber design codes. It is one of the software applications created to help structural engineers to automate their tasks and to remove the tedious and long procedures of the manual methods.

The advantages of STAAD Pro are:

1. Covers all aspects of structural engineering
2. Broad spectra of design codes
3. International codes
4. Quality Assurance

Structural components like beam and column are designed in STAAD Pro V8i and the reinforcement details obtained are given below

Beam no. = 1876 Design code : IS-456

3#10 @ 370.00 0.00 To 2200.00 11#10 @ 370.00 2200.00 To 3300.00

11 # 8 @ 140.00 11 # 8 @ 140.00

4#10 @ 30.00 0.00 To 3300.00

at 0.000 at 1650.000 at 3300.000

Design Load			Design Parameter	
Mz	Dist.	Load	Fy(Mpa)	Fc(Mpa)
Kn Met	Met			
34.59	0.6	3	415	20
-1.73	0	2		0.40000005
-89.45	3.3	3		0.30000011
				Length(m)
				3.29999952

Fig 5: Reinforcement Details of Beam

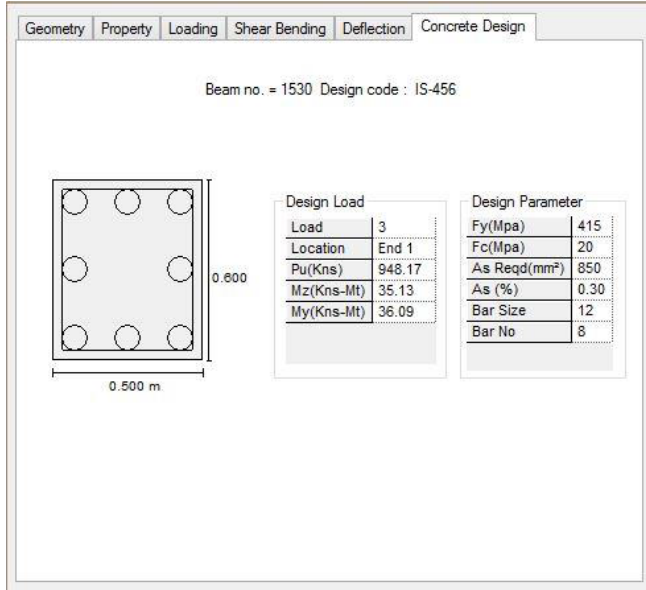


Fig 6: Reinforcement Details of Column

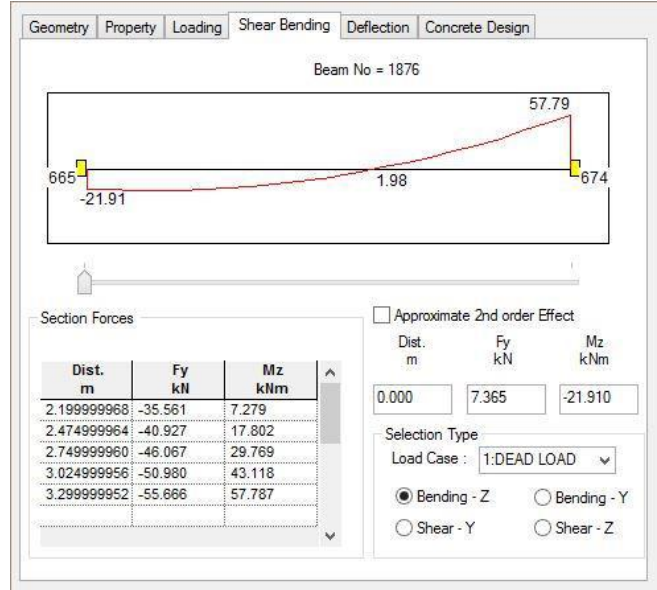


Fig 9: Shear force Diagram of Beam

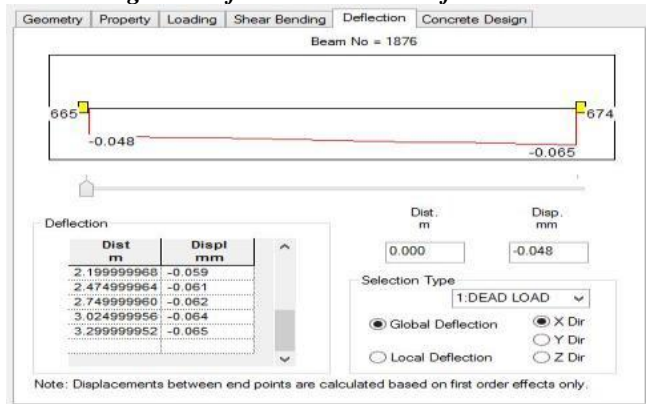


Fig 7: Deflection diagram of Beam

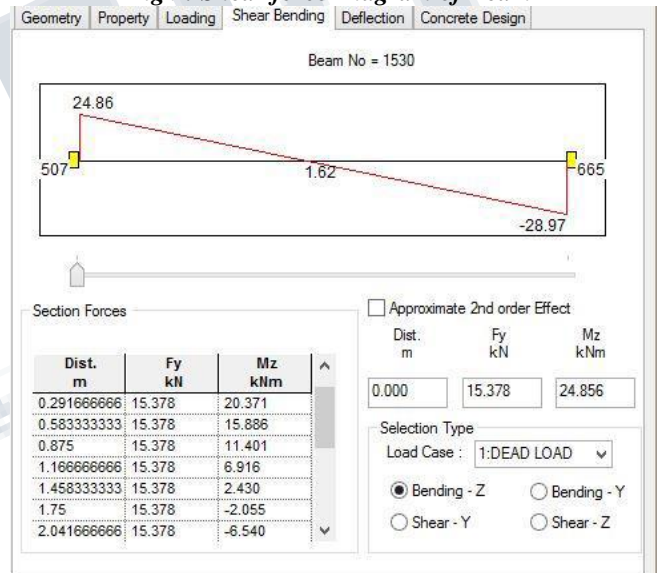


Fig 10: Shear force Diagram of Column

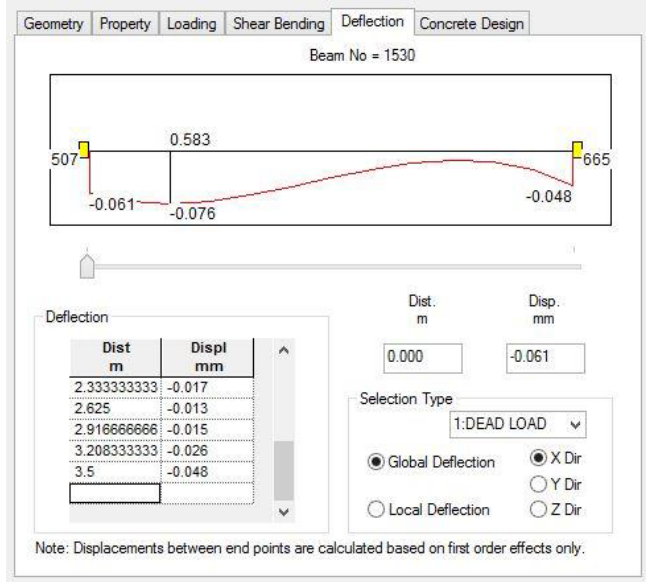


Fig 8: Deflection diagram of Column

IV. RESULTS FROM MANUAL DESIGN

The reinforcement details obtained by manual design are given below

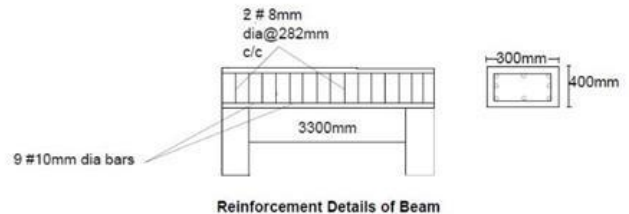


Fig 11: Reinforcement Details of Beam

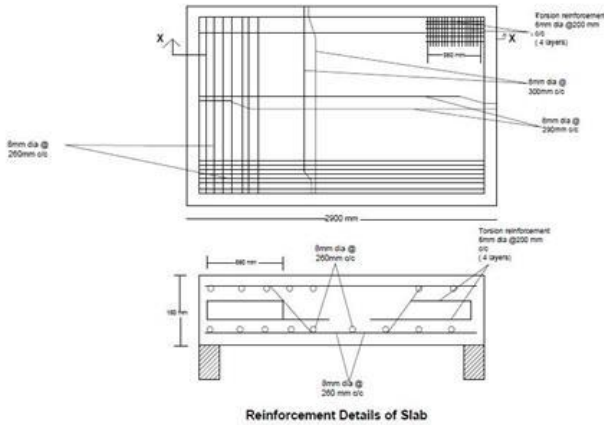


Fig 12: Reinforcement Details of Slab

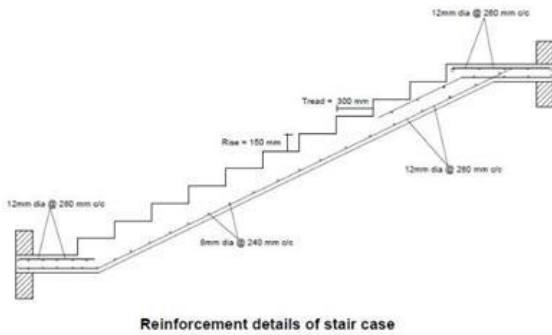


Fig 13: Reinforcement Details of Staircase

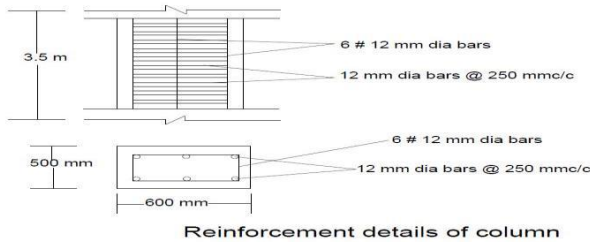


Fig 14: Reinforcement Details of Coloumn

V. COMPARISON OF RESULTS OBTAINED FROM MANUAL DESIGN AND STAAD ProV8i

The results obtained from manual design and staid design are compared and the reinforcement details for beam and column from both the designs are given below.

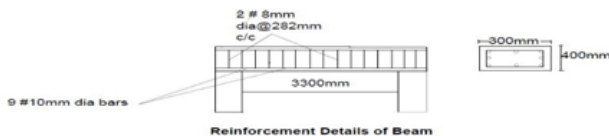


Fig 15: Reinforcement Details of Beam from Manual Design

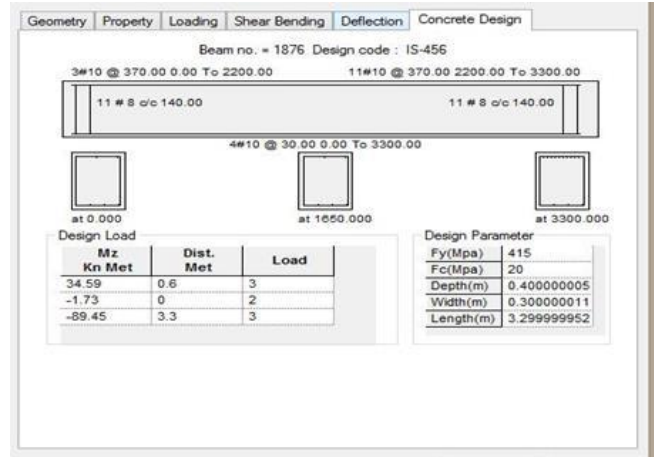


Fig 16: Reinforcement Details of Beam from StaadPro

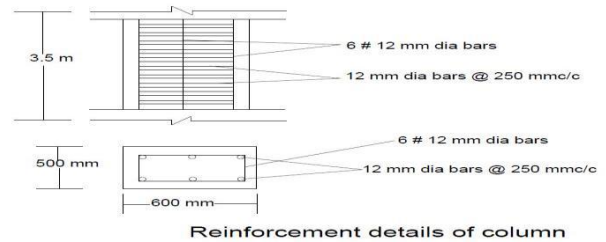


Fig 17: Reinforcement Details of Column from Manual Design

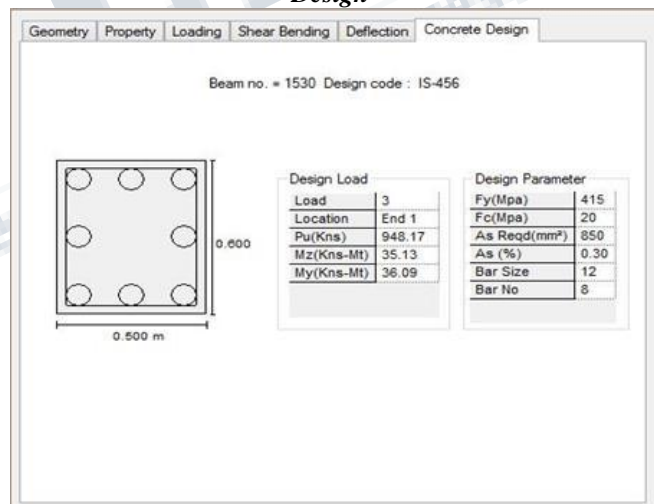


Fig 18: Reinforcement Details of Coloumn from StaadPro

VI. CONCLUSION

The project helped us to gain ample exposure to various field practices in the analysis and design of multistoried buildings and also in various construction techniques used in the industry. The analysis was done in STAAD Pro.2007 and detailing was done in AutoCAD 2010. All the structural components were designed manually. Structural analysis of building using STAAD Pro.2007 software is more feasible reliable and offers saving in time. The analysis shows that the results of both STAAD

approach and manual approach are almost same but STAAD design gives over reinforced sections. The designing and detailing was done according to the standard specifications of various codes to the possible extend. The various difficulties encountered in the design process and various constraints faced by the Structural Engineer in designing were well understood..We gained more experience and practical knowledge about the construction industry. This enables us to understand the problems of society and apply technology to the society.

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