

ANALYSIS AND DESIGN OF MULTI-STOREY RC FRAMED BUILDING USING STRUD SOFTWARE

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Abstract- The main object of our project is to analysis and design of a G+7 RC frame building according to Indian standard by using the software named STRUDS. The design of a building can be done manually or with the help of Software. We have chosen to do our project with Software because designing manually consumes lot of time, effort and can contain errors whereas by using software we can save time and obtain results without errors. The procedure followed by us is as follows, we have selected the drawing plan along with its specification. After studying the plan and its criteria we have commenced our project by designing the structural components of building namely slabs, beams, columns, and footings. The design of slab was designed by us as mentioned in the plan after which we have placed the columns in their desired locations. Then we have given the material properties along with their grades to beams and columns.

KEYWORDS: - STRUDS, MULTI-STOREY BUILDING, DESIGN AND ANALYSYS.

I. Introduction

Design of building is an important task assigned for civil engineer. In recent year the rapid increase of population, commerce and trade and the cost of land in cities have resulted in a considerable increase in the number of tall buildings. Complicated and high-rise structures need and very time taking and complicated calculations using conventional manual methods. Nowadays there are several software are available in market for analysis and design of civil engineering structures like ETABS, STAAD PRO and STRUDS etc. By using these software's, we can save time and obtain result without any errors.

Design must meet certain basic requirements such as serviceability, longevity, strength, economy, practicality, practicality and acceptance to ensure and enhance security. In this project we are going to analyse and design a multi-storey RC building (G+7) according to Indian standard codes by using STRUDS. STRUDS is abbreviated as "STRUCTURAL ANALYSIS DESIGN AND DETAINLING SOFTWARE" which is developed by TEKLA. The major significance offered by this software is that it is user friendly and has exceptional features like designs the structural components individually along with the analysis and

result. The additional useful features of the software are that we can view the shear force and bending moment diagram, torsion diagram etc at each level of building.

II. objectives of the Study

1. The main object of this project is to perform analysis and design of multi-storey RC framed building by using STRUDS without any type of failure.
2. To understand the preparation procedure of the 3D model of the structure in STRUDS.
3. To understand the terms and parameters in the design of different structural components such as slab, beam, column and footing etc, and produce various detailing and details like SFD, BMD, BBS.
4. To understand the basic principles used in the design of building structures with respect to IS codes for particular site conditions.

III. Scope of this Study

To provide the appropriate analysis and design procedure, for building frame structure in computer software STRUDS which requires less time as compare to manual method of calculation. These steps are also somewhat similar to other software which are used in the structural design industry for analysis and design purpose.

About SRUDS

STRUDS is a powerful software for designing, modelling and analysing concrete structures. This software performs structural analysis for vertical as well as horizontal (seismic/wind) loads for RC framed structures and performs design as per IS norms. The program provides a great deal of capabilities in all three parts of design, modelling and analysis that meet all the needs of engineers. For example, in the modelling section it can easily do modelling operations in a graphical environment. We can import and work on architectural designs and models from other CAD software such as Staad Pro or ETABS.

Following are the main features of STRUDS.

1. Easy design of multi-storey buildings and skyscrapers in the least time and with the most accurate analysis
2. Ability to design different parts of the building including concrete slabs, metal beams, columns, shear walls, foundations, etc.
3. Design, modelling and analysis of steel components.
4. Ability to evaluate and analyse buildings in critical situations such as earthquakes, loads, high winds and severe shocks.
5. Full design of foundation and stair foundation.
6. Perform advanced 3D space frame analysis, with optional plane grid and plane frame analysis.
7. Produce detailed CAD maps, schedules, computational reports and BOQs.

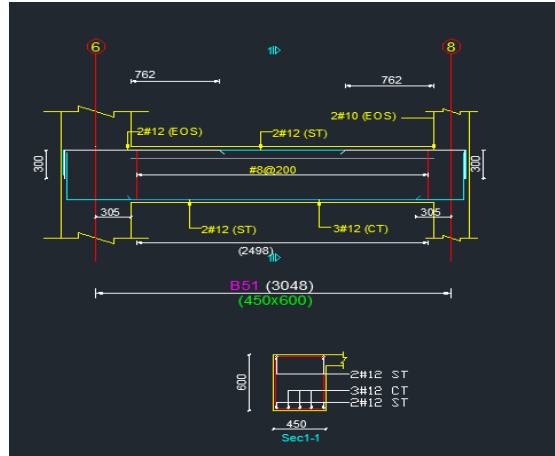


Fig 4 beam detailing

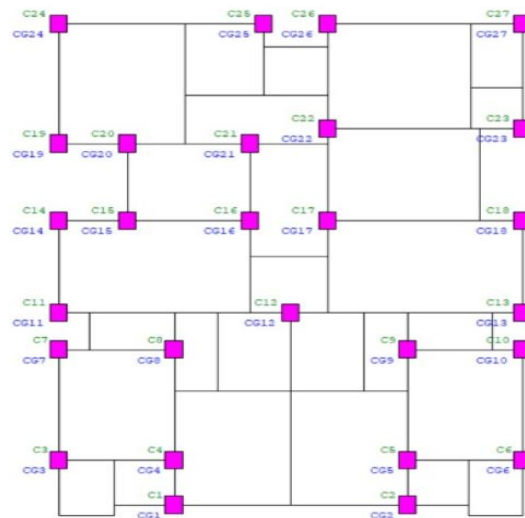
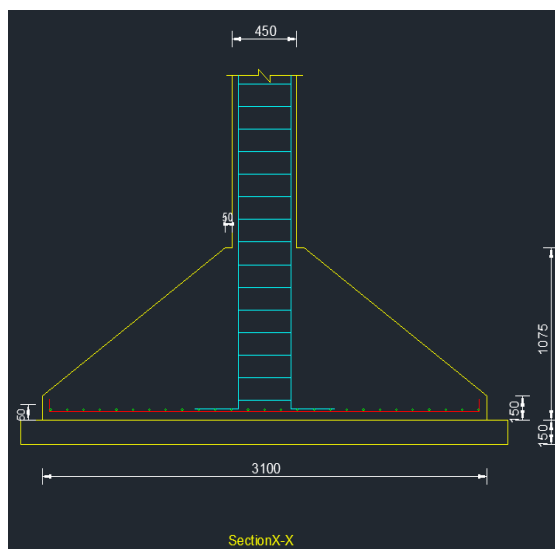


Fig 5 column layout



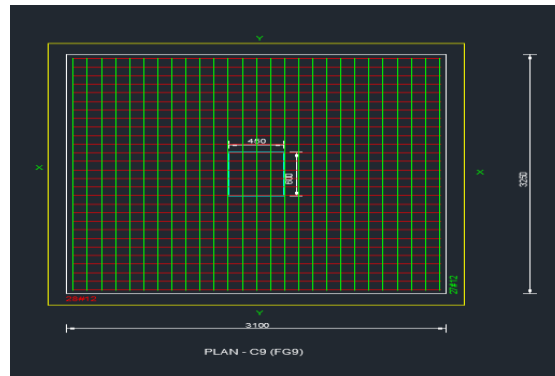


Fig 6 Footing detailing

4.1 Slab Design Details

Totally there are 25 slabs in the structure, which comprises of both one way and two-way slabs of 125mm thick. Reinforcement for all the slabs in the both directions was 8mm@200mm/c and 8mm@300mm/c

4.2 Design of Beams

In each floor there are totally 92 beams which comprises of both singly reinforced and doubly reinforced beams. Beam size of 450mmX600mm is constant throughout the floor and the 8mm diameter stirrups are provided for all beams at 200mm c/c

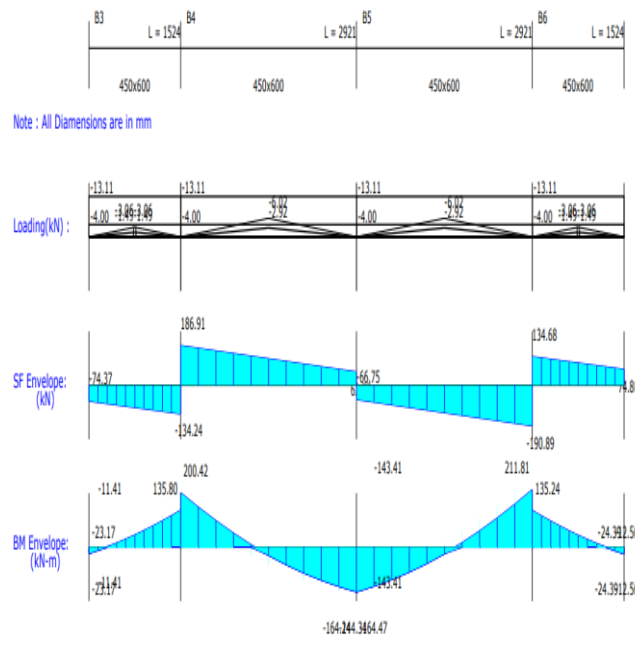


Fig 7 BMD and SFD of beam 3,4,5 and 6

4.3 Design of Column

Totally there are 27 columns in the building with M25 grade concrete and Fe415 steel. Intable below complete column details of C27 column is mentioned. Similar details are obtained for all other columns also. COLUMN size provided is 450mmx600mm

4.4 Footing Design Details (as per IS 456:2000)

There are 27 trapezoidal shape footing groups with M20 grade concrete and Fe415 grade steel. Total 74.654 metric cube concrete is required for the footing work and 39.585 metric cube framework is needed. STRUDS has designed an isolated trapezoidal footing for all the columns. The footing dimensions and reinforcement details are tabulated in the table below.

V. Conclusion

Based on the completion of this project, the following conclusions are made:

Our project suggest that manpower is much more profitable investment. The success of our project depended upon the precisely coordinated specifications and coded equations on the STRUD software. It reduces lot of time in design work. Another main advantage is while designing the structure if any failures occur the software will be noticed immediately so we can correct the design immediately. We can analyse accurately and quickly by using STRUDS than manual design with negligible differences. Detailing of each and every element can be obtained by using this software. the results can be obtained in AUTOCAD file format is another important feature of software. Thus, we can use STRUD software for Analysis and Design of structure. It's simple and providing more advantages to users.

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