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STRUCTURAL DESIGN OF A COMPOSITE BUILDING

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ABSTRACT

This paper work focuses on thestructural design of a composite building. The principle objective of this project is to analyze and design a composite building by manual calculations and by using STAAD Pro. The design involves load calculations manually and analyzing the whole structureby STAAD Pro. Comparison of manual and software calculations is mainly focused in this paper presentation. Finally, the paper will present quantitative result for the design.

Keyword: Composite building, Multi-storeybuilding, steel, RCC

I. Introduction

The project involves Stadd-ProDesign of a commercial Building with steel-concrete composite construction. To design a building consisting of R.C.C foundation with steel columns or R.C.C foundation with R.C.C columns along with a steel section consisting of beams and slabs or R.C.C columns with steel beams and R.C.C slab i.e. composite structure.

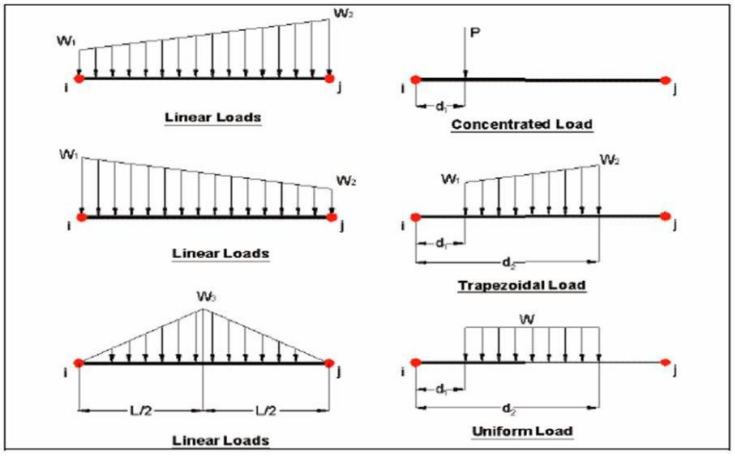
We have chosen STAAD Pro because of its has advantages as easy to use interface, conformation with the Indian Standard Codes, versatile nature of solving any type of problem, Accuracy of the solution. The STAAD Pro Graphical User Interface: It is used to generate the model, which can then analysed using the STAAD engine. After analysis and design is completed, the GUI canalso be used to view the results graphically. The STAAD analysis and design engine: It is a general-purpose calculation engine for structural analysis and integrated Steel, Concrete, Timber and Aluminium design.

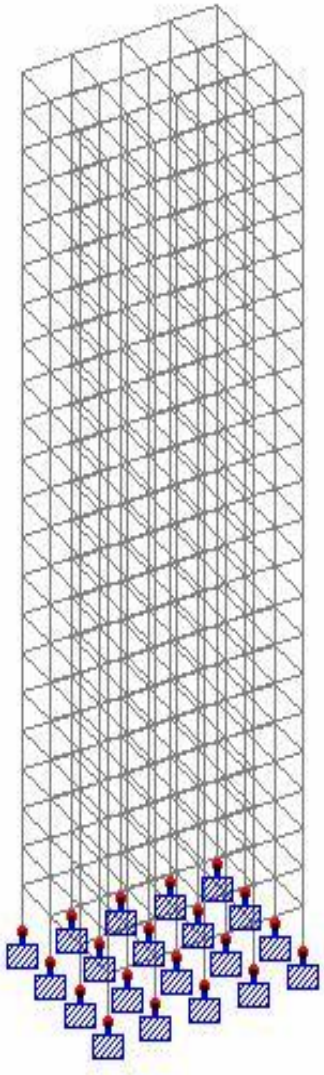
STAAD PRO has the capability to calculate the reinforcement needed for any concrete section. The program contains a number of parameters which are designed as per IS: 456(2000). Beams are designed for flexure, shear and torsion. Maximum sagging (creating tensile stress at the bottom face of the beam) and hogging (creating tensile stress at the top face) moments are calculated for all active load cases at each ofthe above mentioned sections. Each of these sections are designed to resist both of these critical sagging and hogging moments. Where ever the rectangular section is inadequate as singly reinforced section, doubly reinforced section is tried.

Shear reinforcement is calculated to resist both shear forces and torsional moments. Shear capacity calculation at different sections without the shear reinforcement is based on the actual tensile reinforcement provided by STAAD program. Two-legged stirrups arereinforcement is called the critical load. Column design is done for square section. Square columns are designed withreinforcement distributed on each side equally for the sectionsunder biaxial moments and with reinforcement distributedequally in two faces for sections under uni-axial moment.

Three types of member loads may be applied directly to a member of a structure.

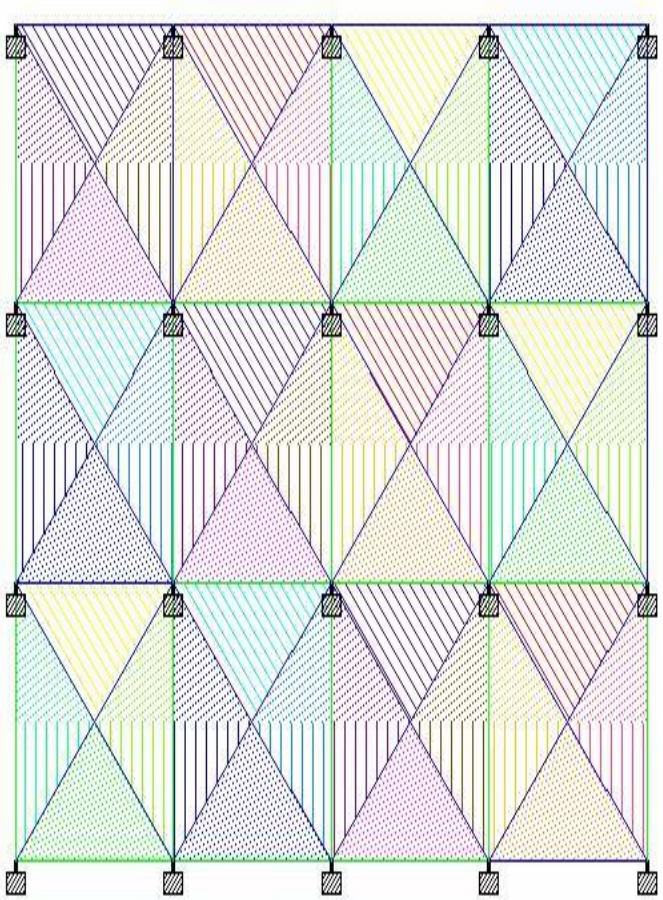
- Uniformly distributed members load.
- Trapezoidal linearly varying loads.
- Concentrated loads

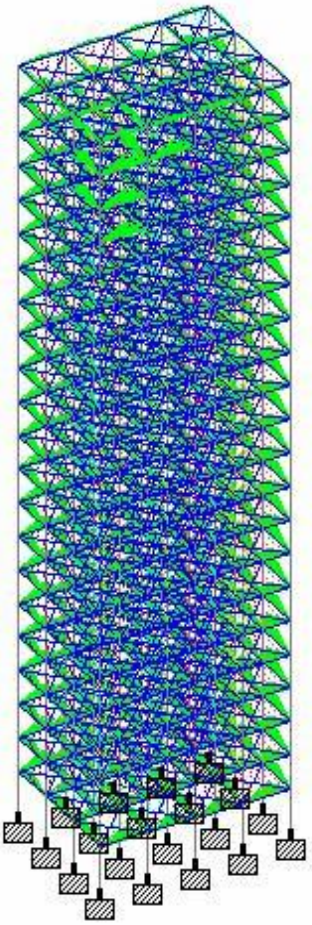




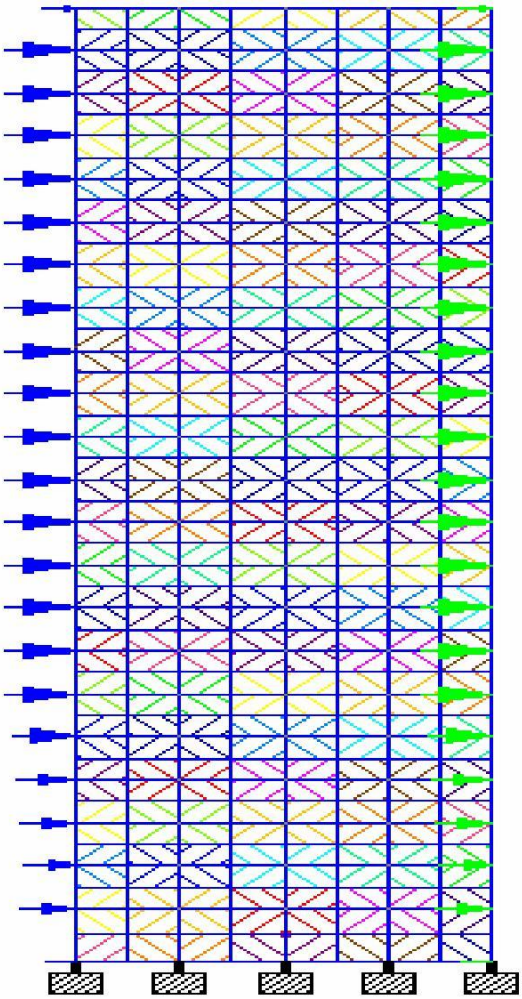
The base supports of the structure were. The Supports were generatedusing the STAAD PRO support generator. Structural analysis/design may require multipleanalyses in the same run. STAAD allows the user to change input such as member properties, support conditions etc. in an input file to facilitate multiple analyses in the same run. Results from different analyses may be combined for design purposes. For structures with bracing, it may be necessary to make certain members inactive for a particular load case and subsequently activate them for another. STAAD provides an INACTIVE facility for this type of analysis. Slenderness ratios are calculated for all members and checked against the appropriate maximum values. IS: 800 summarize the maximum slenderness ratios for different types of members. This facility allows the user to consider deflection as criteria in the CODE CHECK and MEMBER SELECTION processes. ***The loading cases were categorized as:***

- ***Live load***
- ***Dead Load From slab***
- ***Live load***
- ***Wind Load***
- ***Seismic Load***
- ***Load Combination***

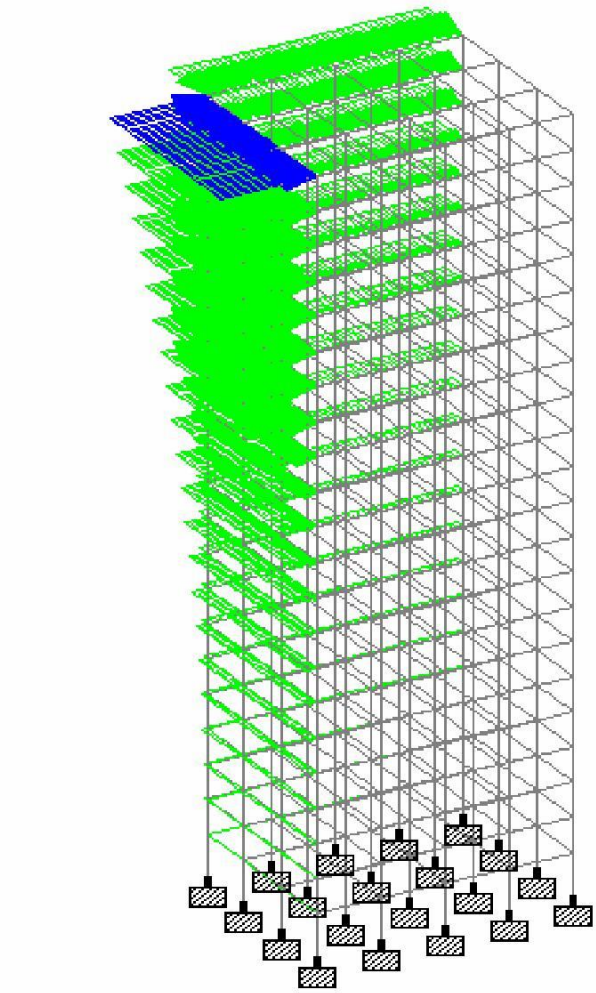




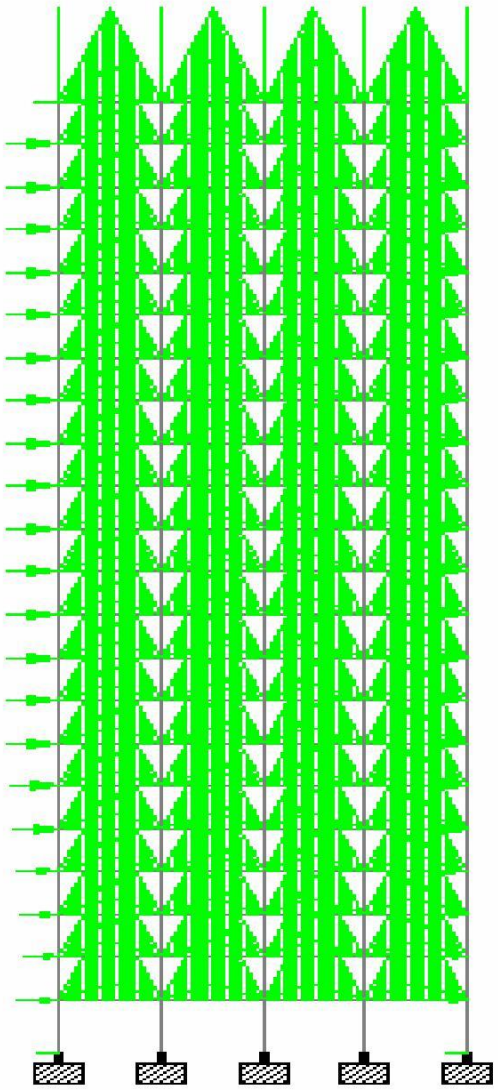
WIND LOAD



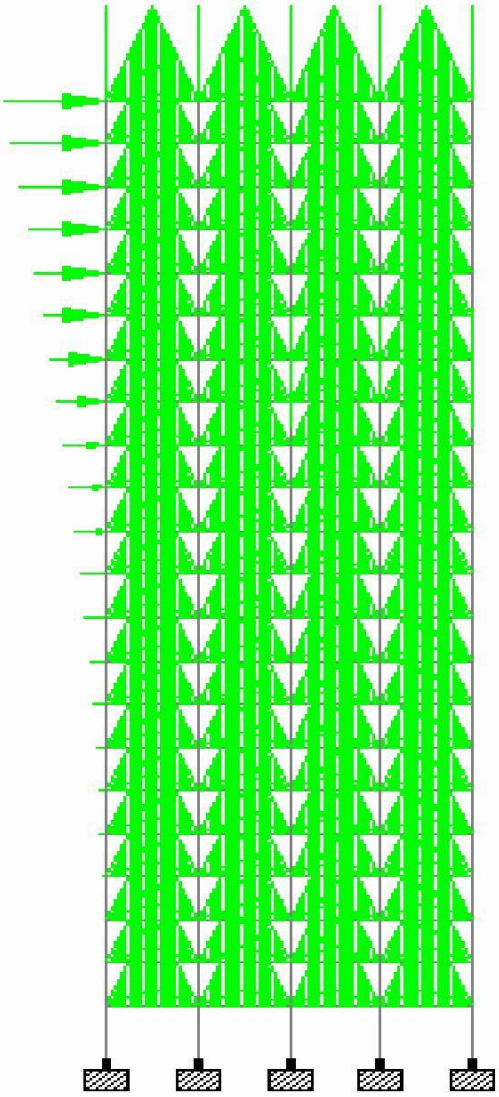
SEISMIC LOAD



SELFWEIGHT + L.L + D.L + WIND LOAD



SELFWEIGHT + L.L + D.L + SEISMIC LOAD



Conclusion – From the project the output is thatthe software design is more precise and accurate than the manual design.

References –

1. Dr.S.R.Karve&Dr.V.L.Sha- "**Illustrateddesign of Reinforced concrete Buildings**"

2. N.KrishnaRaju-"**Advanced ReinforcedConcrete design**"

3. "**STAADPro2004– Gettingstarted&tutorials**"
    a. Published by: R .E. I.

4. "**STAADPro2004–Technical referencemanual**"
    a. Published by: R.E.I.

5. **IS875** -BUREAU OF INDIAN STANDARDS.

6. **IS456**- BUREAU OF INDIAN STANDARDS.