Analysis and Design of a Multistoried Building Using STAAD. Pro

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Abstract - *The present project deals with the analysis and design of a six-storied building and the main aim is to ensure that the building is safe against all possible load combinations. For the design purpose; Dead load, Live load, Wind load and Seismic load are considered.*
In the present scenario, the construction of seismic resistant structure is a great challenge faced by structural engineers. For high rise structures with different architectural problems, the challenges further increases.
STAAD Pro is a powerful tool for design projects. The STAAD results will also compared with manual calculations done as per IS 456-2000.

1.INTRODUCTION

STAAD Pro.is an analysis and design software package for structural Engineering. Structural design is an art and science dealing with the design of buildings considering economy, elegance, safety, serviceability and durability. The design process starts from structural planning, so as to fulfil the functional requirements of clients. In general, functional requirements and aesthetic aspects are managed by an architect while the parameters like safety, serviceability, economy and durability of the structure for its intended use are attended by structural engineers.

1.1 Literature Review

P. Jayachandran : It deals with structural analysis and design of a (G+4) multistoried building at Salem, Tamilnadu, India. The analysis and design of slabs, beams , girders, columns and footings completed using theory of Reinforced concrete design and Structural analysis by STAAD. Pro software, which uses finite element methods.

V.Varalakshmi : It deals with analysis and design of (G+5) multistoried building at Kukatpally ,Hyderabad, India. The study includes design and analysis of columns, beams, footings and slabs by using STAAD.Pro.

2.OBJECTIVES

1.Test for Safe Bearing Capacity
2.Creation of Structural plan
3.Creation of STAAD Model
4.Application of loads on the member
5.Analysis using STAAD

6.Design

3. LOADS

1.Dead Loads (as per IS 875-PART1) : It is the total load of all the components of the building that generally do not change over time. In STAAD.Pro assignment of dead load is automatically done by giving property of the member.

2.Live Loads (as per IS 875-PART2) : Live loads are produced by use and occupancy of a building.

3.Wind Loads (as per IS 875- PART3) : These are computed as per Cl.5.3 of IS 875-PART3

4.Seismic Loads (as per IS 1893-2002) : These loads forms the basic concepts of Earthquake Engineering.

4.PRELIMINARY DATA COLLECTION

- ❖ Type of structure: Multistoried RC building
- ❖ Zone:3
- ❖ Importance of building: Art Gallery
- ❖ Number of stories:6
- ❖ Floor to floor height =3m
- ❖ Live Load:4 kN/m²(at floor)
           1.5kN/m²(On terrace)
- ❖ Floor finish:1kN/m²
- ❖ Terrace finish: 1kN/m²
- ❖ Location: Odakkali(near Perumbavoor)

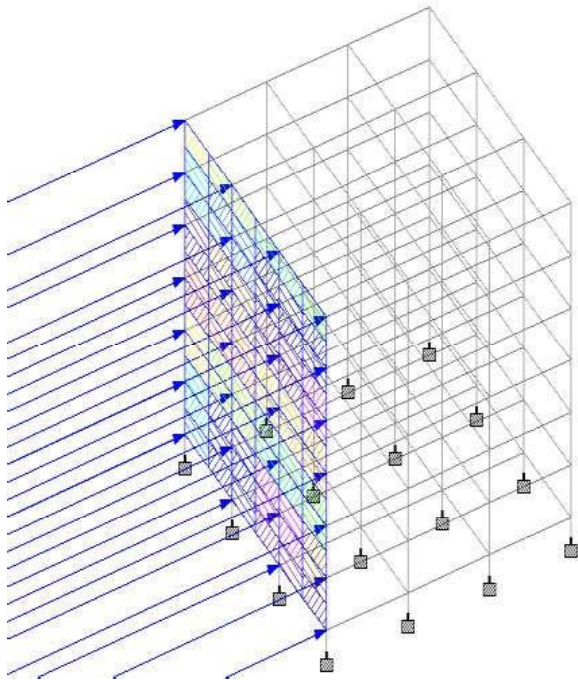## 5.SOIL INVESTIGATION

Soil investigation was conducted to determine the safe bearing capacity of soil. SBC was found out by conducting direct shear test.
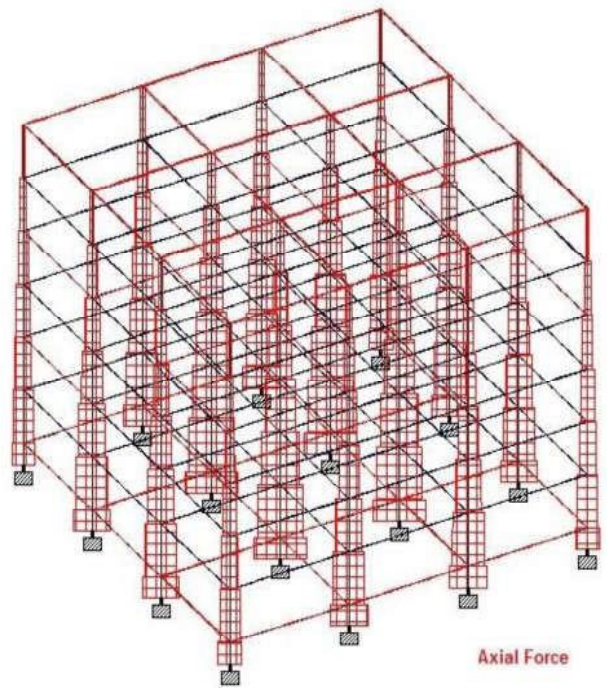
$$q_u = CN_c + qN_q + 0.5B\gamma N_\gamma$$
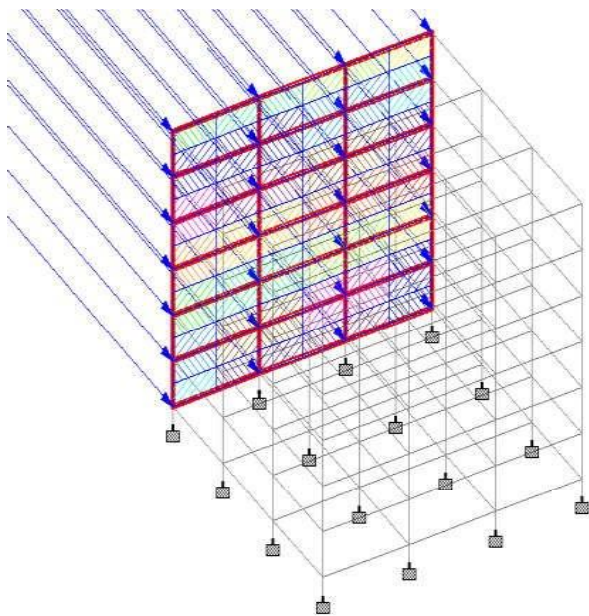
From the equation,SBC was obtained as 290 kPa.
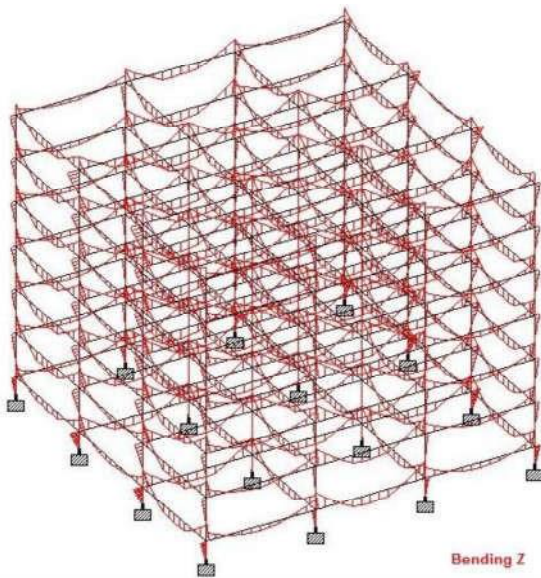
6.ANALYSIS DIAGRAMS
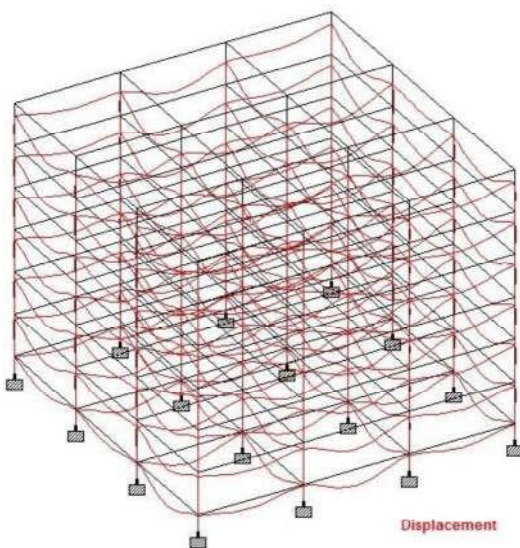

Wind load in +Ve X-direction

Axial force Diagram

Wind load in +ve Z-direction

Bending moment diagram

Deflection diagram

7.DESIGN OF RCC ELEMENTS

The entire building was analyzed in a single stage and different structural elements like beams, columns and staircase are designed for M20 grade concrete and Fe-415 grade steel.

8.DUCTILE DETAILING

After designing different structural members by limit state method as per IS456:2000, all aspects regarding longitudinal steel, shear capacities, confining reinforcement requirements, stirrups and ties etc..is worked out using provisions of IS 13920:1993.

9.CONCLUSIONS

The analysis and design of a multistoried art gallery have been completed. This project helped to know about the modern aspects of planning and designing. The structural analysis and design of the proposed building was done with the help of STAAD.PRO. It provided a fast, efficient and accurate platform for analyzing and designing proposed structure. It considerably reduced the calculation time to a great extent. Wind and Seismic analysis was also carried out with different load combinations as specified by Indian Standard code.

10.REFERENCES

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