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ANALYSIS AND DESIGN OF G+5 BUILDING WITH CONVENTIONAL AND FLAT SLAB

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Abstract - *Flat slab is also called as beamless slab, this slab directly rests on the column without beam and load from the slab is directly transfer to the columns and then to the foundation. Columns are generally provided with column heads or drops. The main advantage of providing flat ceiling is, in the absence of beam gives a better architectural appearance and provides plain ceiling which spread out light, better, easier to construct and requires cheaper formwork. The main aim of this project is to plan and analyse the office building in comparison with flat slab and conventional slab using relevant software's such as E-tabs.*

Key Words: **Flat Slab, Conventional slab,Etabs,Bending moment, shear force, Comparison**

1. INTRODUCTION

In metro cities there is a rapid growth in population along with development of commercial and industrial activities. Due to this there is lot of opportunities for jobs. The metro cities like Bangalore, India there is a shortage of space so we have to adopt multi story buildings. The project proposed is a commercial building of G+5 storey, in Bangalore ,India ,planning is done using AutoCAD , model is analysed and designed using E-Tab software.

1.1 Objectives

1.The objective of this project is to produce a versatile plan consisting of Multi-storeyed commercial building of G+5 floors, having high quality in terms of comfort, land usage and economy.

2.To plan the building using all the rules and guidelines incorporated in the NBC 2016 building code regulations.

3. To do structural analysis of building elements, i.e., slabs, beams and columns are to be calculated by utilizing the esteemed software ETABS.

4. The designs of various building elements are to be designed utilizing software ETABS and has to be cross-checked manually.

5. To know the cost comparison between flat slab and conventional slab.

1.2 Methodology

The first step is to prepare the plan by studying the location and availability of area and this plan is prepared as per the requirement of office buildings. The design of a structure consists of 2 parts. The first part is to analyse the building using various loads such as live load, dead load, seismic load and wind load. The second part is to design the dimensions of members on the basis of trial and error, later the dimensions of the structural members are revised by checking it for failure of members in E-Tabs. Code followed for the design is Indian Standard 456-2000.The flat slab is provided with drop. The results are extracted after the analysis and detailing of the structural members are done using AutoCAD.

Fig-1 3D view of proposed G+5 office building

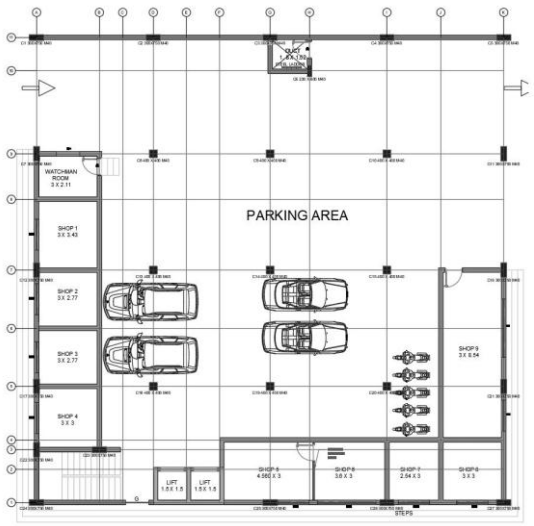

Fig-2 Ground floor plan

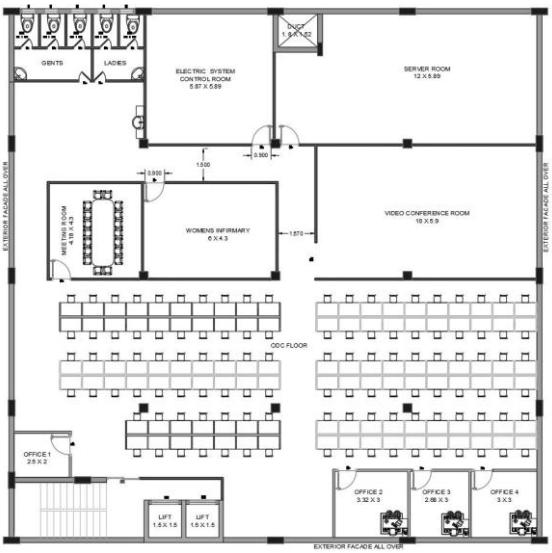

Fig-3 Typical plan (first floor to fifth floor)

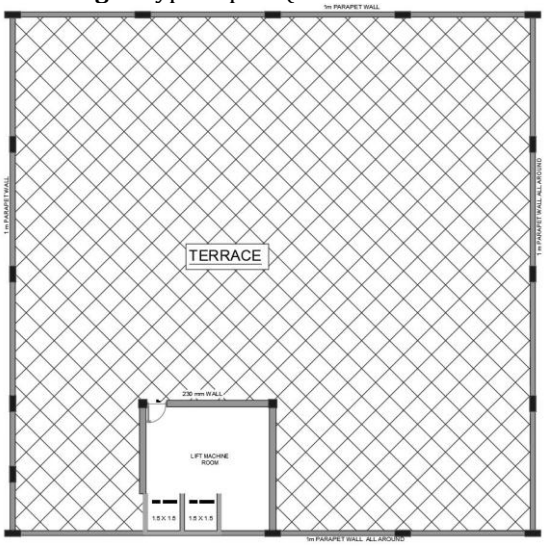

Fig-4 OHT / Terrace floor plan.

2. STRUCTURAL DETAILS

Table -1: Structural elements with properties

Number of storey	G + 5
Storey height	3.3 m
Interior column	0.4 m x 0.4 m
Exterior column	0.3 m x 0.75 m
Beam	0.23 m x 0.6 m
Floor finishes	1.0 kN/m^2
Live load	4 kN/m^2
Thickness of normal slab	150 mm
Thickness of flat slab	250 mm
Size of drop	2 m x 2 m
Grade of concrete for column	M40
Grade of concrete for beam	M30
Grade of concrete for slab	M30
Grade of steel	Fe-500 and Fe 415
Restraints	Fixed support

3 RESULT

3.1 Software outputs

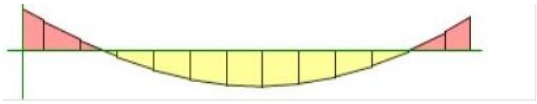

Fig-5 Max. bending moment diagram

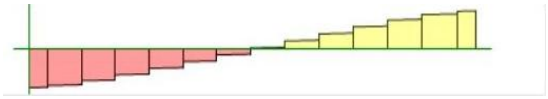

Fig-6 Max. shear force diagram

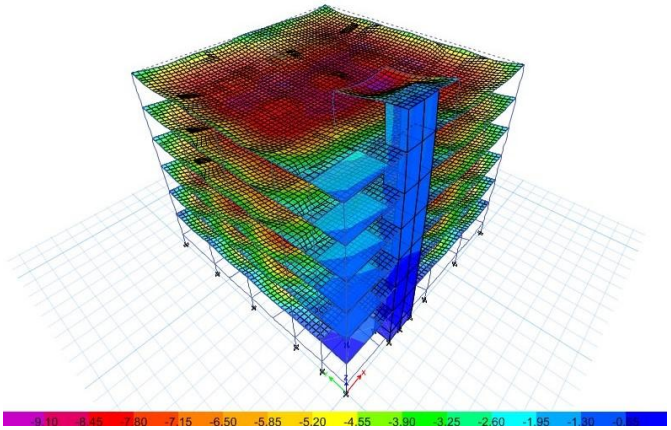

Fig-7 Deflection diagram

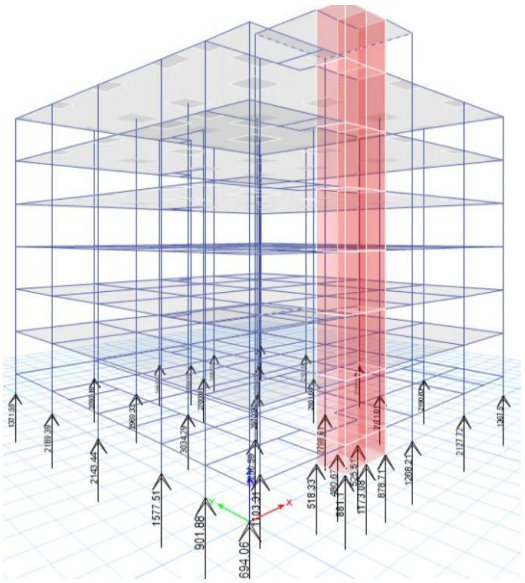

Fig-8 Design reactions for footings.

Based on these reactions the footings are designed. It is designed manually. Since E-tab doesn't support the sub structure and slab design. In this project all the footings are designed as the isolated footings. To find the area of the footing S.B.C of the field soil is required.

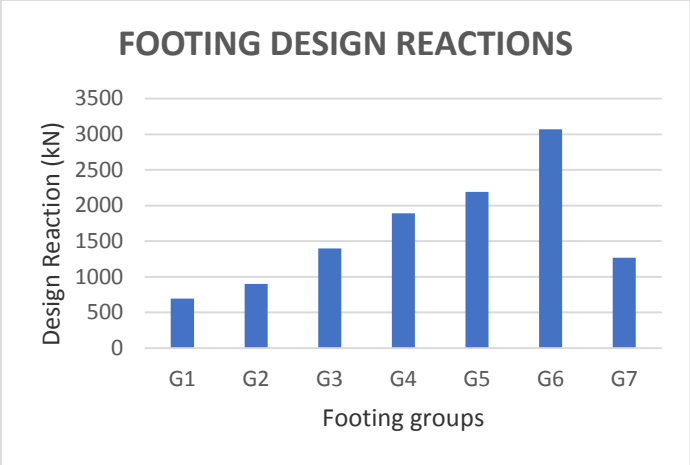

Chart -1: Footing design reactions

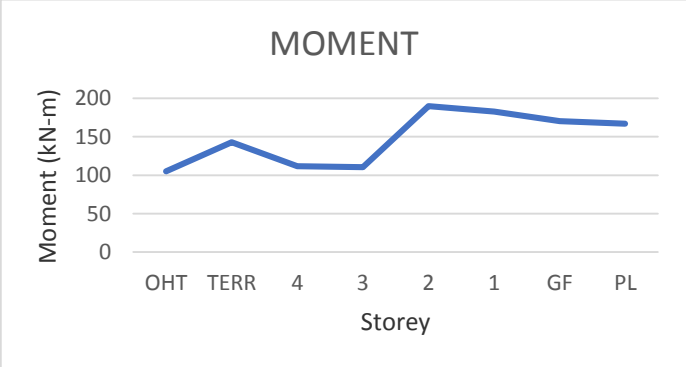

Chart -2: Max. Bending Moment

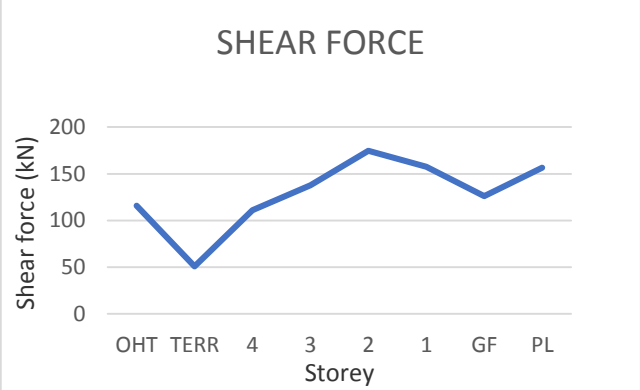

Chart -3: Max. Shear force

The maximum bending moment is 189 kN-m and maximum shear force is 174 kN.
The maximun footing design reaction is 3000 kN.

3.2 Comparison

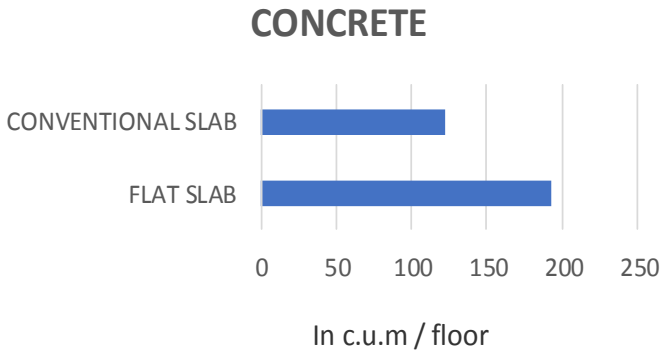

Chart -4: Concrete quantity

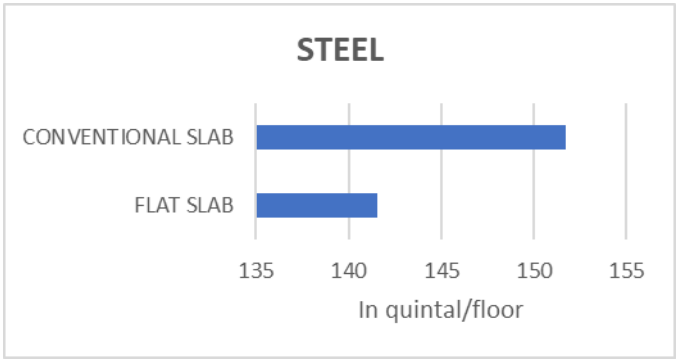

Chart -5: Steel quantity

4. CONCLUSIONS

From the results it is concluded that the cost of flat slab is more compared to normal conventional slab. The quantity of concrete in flat slab is more because the size of the slab and drop panel is more. Hence the decrease in the slab and drop panel thickness will reduce the quantity of concrete in safer way.
The flat slab is the good option for modern construction which provides the structural stability and aesthetic appearance.

REFERENCES

[1] N.Krishna Raju, "Advanced Reinforced concrete design", CBS publishers & distributors, Delhi.
[2] SP:16-1980 "Design aids Reinforced Concrete" to IS:4561978, Bureau of Indian Standards, New Delhi
[3] IS 800:2007, "General Construction in steel- Code of Practice Bureau of Indian standards, New Delhi.
[4] IS 456:2000, "Indian Standard code of practice for plain and reinforced Cement Concrete", Bureau of Indian standards, New Delhi.

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