DESIGN OF FUNCTIONAL HALL WITH FLATS SLABS

PUJARI YAMINI[1], E. NARASIMHULU[2], S.SAMEER[3] K SAI ABHINAV[4]

[1]P.G Student, Annamacharya Institute of Technology and Sciences, Tirupati, India
[2,3,4]Annamacharya Institute of Technology and Sciences, Tirupati, AP, India

---***---

Abstract - *Structural design is the primary aspect of civil engineering. The very basis of construction of any building, residential house or dams, bridges, culverts, canals etc. is designing. Structural engineering has existed since humans first started to construct their own structures.The foremost basic in structural engineering is the design of simple basic components and members of a building viz., Slabs, Beams, Columns and Footings. In order to design them, it is important to first obtain the plan of the particular building that is, positioning of the particular rooms (such that they serve their respective purpose and also suiting to the requirement and comfort of the inhabitants. Thereby depending on the suitability; plan layout of beams and the position of columns are fixed. Thereafter, the loads are calculated namely the dead loads, which depend on the unit weight of the materials used (concrete, brick) and the live loads, which according to the code IS: 875-1987 is around 4kN/m2.In the present project the Design of Functional hall with flat slabs are designed. First of all the preliminary design for all the components is carried and then the building is analyzed by using Staad. Pro to get loads.Once the loads are obtained, the component takes the load first i.e. the slabs can be designed. In the project the slabs are designed as Flat slabs. Designing of Flat slabs depends upon the end conditions and the loading. From the flat slabs, the loads are directly transferred to the columns. For designing columns, it is necessary to know the moments they are subjected. For this purpose, frame analysis is done by Moment Distribution Method or by using Staad. Pro. After this, the designing of columns is taken up depending on end conditions, moments, eccentricity and if it is a short or slender column. All the columns designed in this project were considered to be biaxial bending. There after Stair cases are designed based on the load acting Finally, the footings are designed based on the loading from the column and also the soil bearing capacity value for that particular area. Most importantly, the sections must be checked for all the four components with regard to strength and serviceability.*

Key Words: Design, Flat slabs, Roof truss, Staad pro

1. INTRODUCTION

A function hall or banquet hall is a room or building for the purpose of hosting weddings, receptions, gatherings, reunions, religious services and retreats, Hosting a party, banquet, reception, or other social event. Function halls are often found within pubs, clubs, hotels, or restaurants. Some are run by fraternal organizations and rented out as a fundraiser for the organization. Some condominium associations and apartment buildings have these to keep the noise of parties out of the residential units.The present functional hall here is a two stored (G+1) structure. Ground floor is planned to for dining hall and the first floor mainly planned as function or party hall. The roof of the first floor is designed by using steel structure. The roof of the ground floor is designed by using flat slabs. Flat slabs are appropriate for most floor situations and also for irregular column layouts, curved floor shapes, ramps etc. The benefits of choosing flat slabs include a minimum depth solution, speed of construction, flexibility in the plan layout (both in terms of the shape and column layout), a flat soffit (clean finishes and freedom of layout of services) and scope and space for the use of flying forms. The total design of functional hall is composite type of design

All the plans are prepared with the help of AUTO CAD. The frames are analysed using STAAD.PRO v8i-2008 software package. One frame is analysed manually and the moments are crosschecked with STAAD.PRO. All the structural elements such as flat slabs, columns, stair case and footings are designed manually.

The design of steel roof is done separately by using Staad. Pro software and appropriate sections are selected by optimizing the design.

1.1 Planning

When the layout of equipment and facilities, and the general type of construction are approved, the range of the cost is still more restricted. Variations in the design can produce only a limited effect upon this expenditure.

The general types of construction materials used and often – general framing schemes and determinate largely before if any computation of the sizes of the members is done. This planning requires engineering knowledge and the ability of high order. The detailed structural design is never the less important, but deciding upon the general scheme and engineering features is likely to be more so.

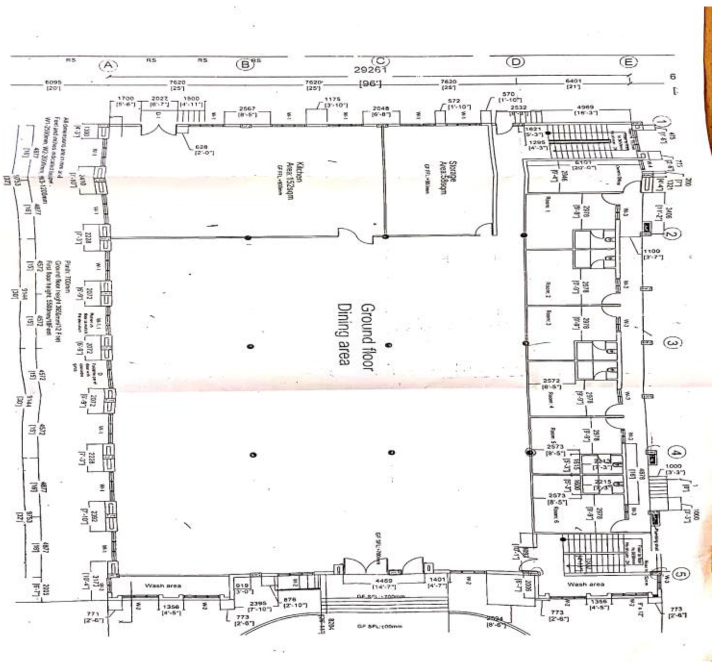


Fig 1.1 Plan

1.2DESIGN PHILOSOPHIES

R. C. structures can be designed by using the following design philosophies.

1. Working stress method for serviceability
2. Ultimate load method for safety.
3. Limit state method

2. FLAT SLABS

Common practice of design and construction is to support the slabs by beams and support the beams by columns. This may be called as beam-slab construction. The beams reduce the available net clear ceiling height. Hence in warehouses, offices and public halls sometimes beams are avoided and slabs are directly supported by columns. This types of construction is aesthetically appealing also. These slabs which are directly supported by columns are called Flat Slabs.

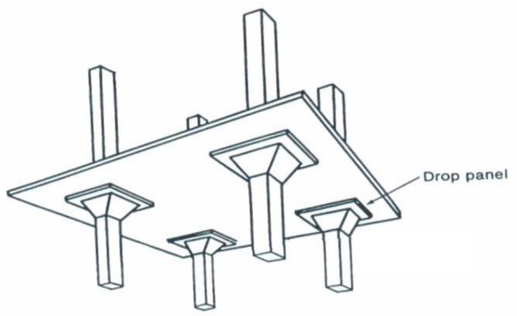


Fig 2.1 Flat slab

3. WORKING WITH STAAD. PRO

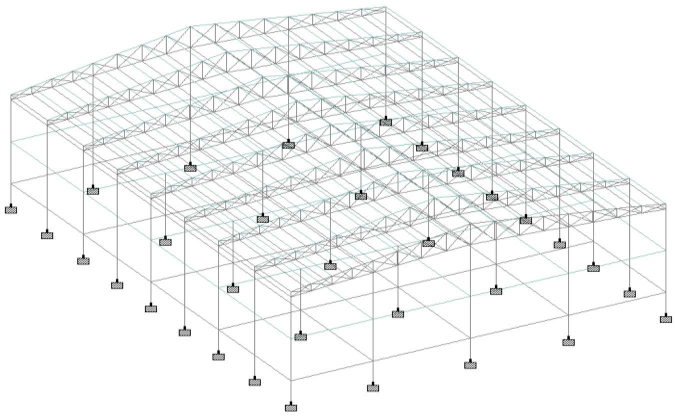


Fig 3.1 Geometry

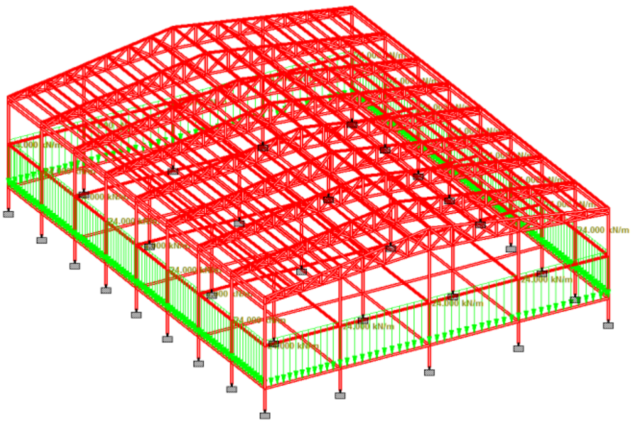


Fig 3.2 Loads

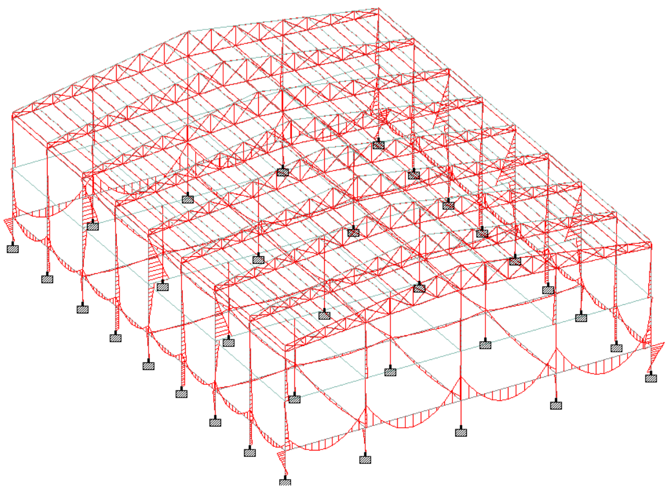


Fig 3.3 Moment Diagram

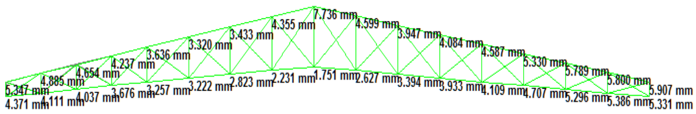


Fig 3.4 Steel deflection

4. DESIGN

Table 4.1Slab Details

Dimension (mm)	direction	Column strip reinforcement (interior)				Column strip reinforcement (exterior)	
		(-ve)	Spacing	(+ve)	spacing	(-ve)	spacing
7620x9753mm	x	12 mm	90mm	12 mm	200 mm	12 mm	90mm
7620x9753mm	y	12 mm	60mm	12 mm	150 mm	12 mm	90mm
Dimension (mm)	**direction**	**middle strip reinforcement (interior)**				**middle strip reinforcement (exterior)**	
		(-ve)	**Spacing**	**(+ve)**	**spacing**	**(-ve)**	**spacing**
7620x9753mm	x	12 mm	260 mm	12 mm	300 mm	0	0
7620x9753mm	y	12 mm	250 mm	12 mm	300 mm	0	0

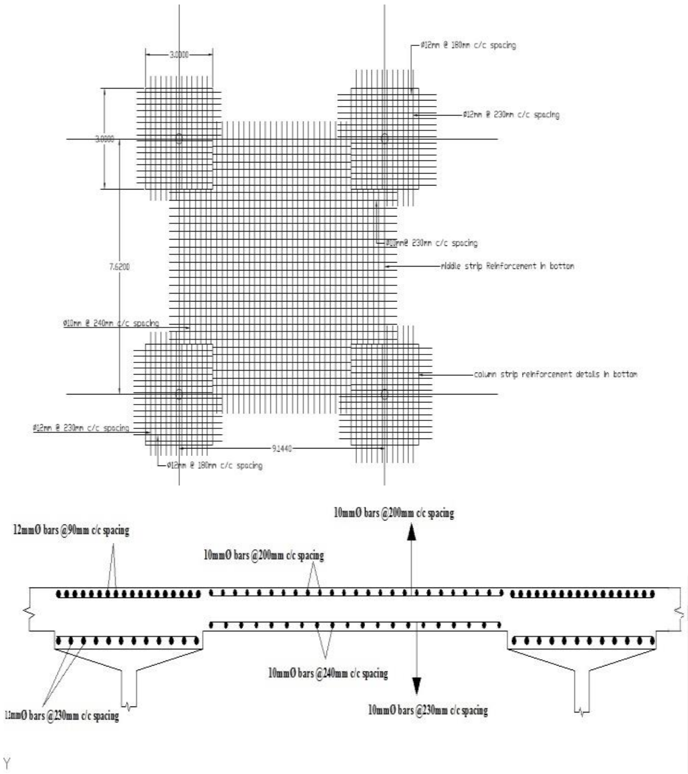
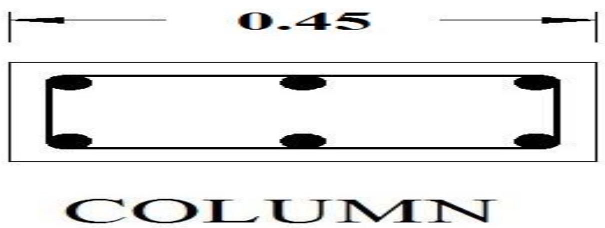
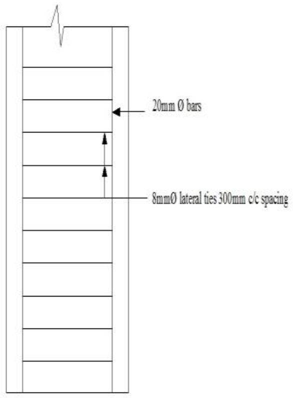


Fig4.1 Reinforcement details

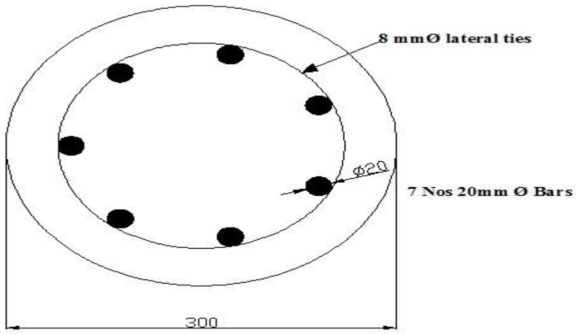
4.2 Column Details



S.NO.	COLUMN DIMENSIONS (mm)	REINFORCEMENT DETAILS	
		MAIN	LATERAL TIES
1	300x450	6- 20mmΦ	8mm Φ 300 mm c/c

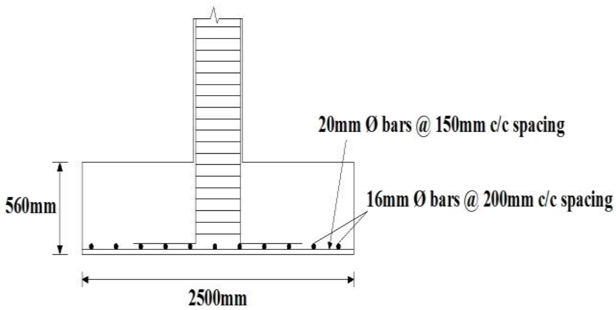


longitudinal section of column

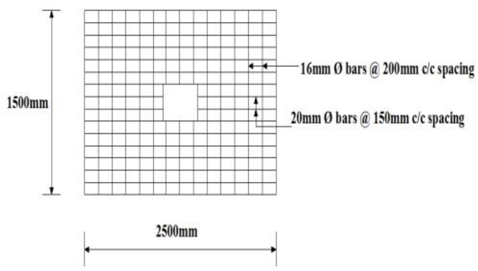


plan of circular column

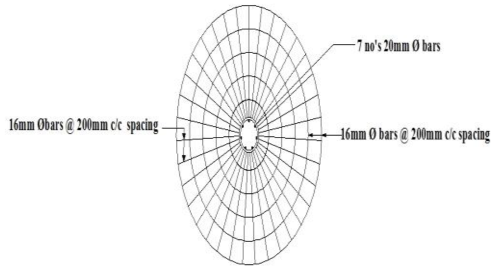
4.2 Footing Details

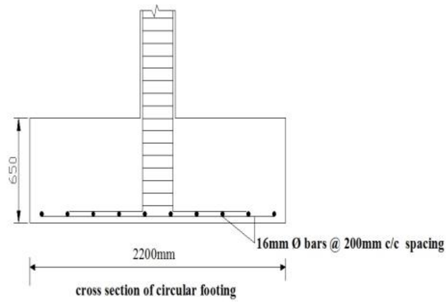


cross sectional of rectangular footing

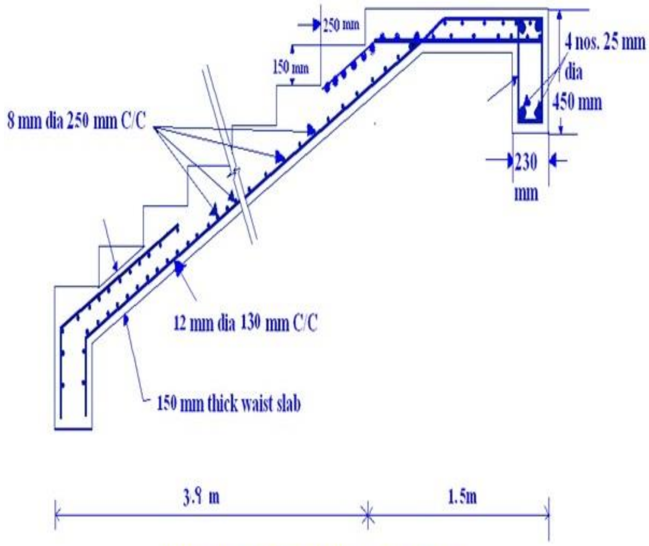


plan of a rectangular footing





cross section of circular footing



REINFORCEMENT DETAILS OF STAIR CASE

5. DESIGN OF STEEL ROOF DETAILS BY USING STAAD. PRO

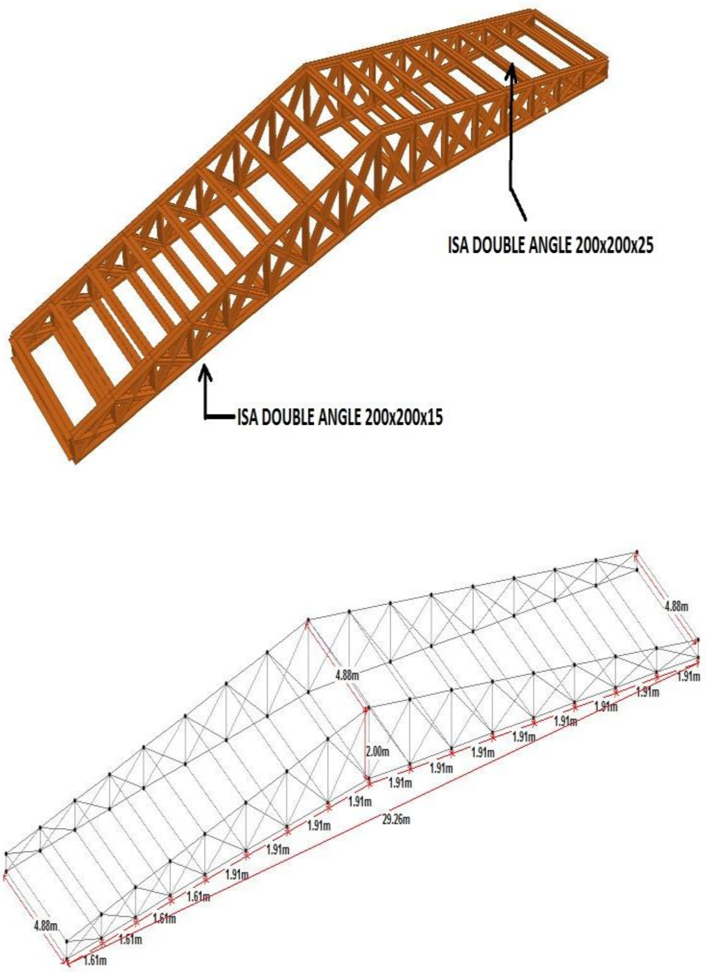


Fig 5.1 Roof structure

6. CONCLUSIONS

1. Functional hall is a very important amenity items, especially at crowded area like cities.

2. The analysis of Functional hall is carried out successfully by using STAAD. Pro V8i.

3. The design of functional hall is carried out manually.

4. All the slabs are designed by using flat slabs

5. This Functional hall is designed by limit state method by considering the stresses at limit states of serviceability as per IS: 456-2000.

6. Proper care is taken at various stages of designing to ensure proper service and life of the Building and to ensure safety of the Building against various loads.

7. The design of Functional hall is carried out in properly and most economical manner to achieve an acceptable probability that structures will perform satisfactorily for the intended purpose during the design life.

REFERENCES

[1] IS: 456-2000 PLAIN AND REINFORCED CONCRETE – CODE OF PRACTICE.

[2] IS: 875 1987 PART (1 – 5) CODE OF PRACTICE FOR DESIGN LOADS FOR BUILDING AND STRUCTURES.

[3] DESIGN OF CONCRETE STRUCTURES BY RAMAMRUTHAM

[4] DESIGN OF CONCRETE STRUCTURES BY N KRISHNA RAJU

[5] SOIL MECHANICS AND FOUNDATION ENGINEERING BY DR. A. R. ARORA, STANDARD PUBLISHERS DISTRIBUTERS, NEW DELHI.

[6] REINFORCED CONCRETE LIMIT STATE DESIGN BY ASHOK. K. JAIN, NEW CHAND AND BROS, ROORKEE.

[7] SOIL MECHANICS BY BRIJA M DAS

[8] 8.DESIGN OF CONCRETE STRUCTURES BY DAYARATNAM