Analysis and design of multistoreyed parking building proposed at Jalahalli cross, Bangaluru

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Abstract - Now-a-day there is an increase in the number of vehicles on road. For proper storage of vehicle when not in use "parking space" is needed. When the person has to stop on route for some purpose other than traffic related, the vehicle needs some halting facility, without disturbing traffic flow otherwise on the street Such a facility is called parking. Due to increase in population there is increase in vehicle demand and we require more parking space thus in control by constructing multi-storeyed parking building.

Where parking area is unplanned, there is a need to make an improvement in the parking area by constructing multi-storeyed parking building. Parking structures has been an important element in today's urban and suburban environments.

*Key Words***:** analysis, design, shear wall.

1. INTRODUCTION

Parking is the act of stopping and disengaging a vehicle and leaving it unoccupied. Parking on one or both sides of a road is often permitted, though sometimes with restrictions. Some buildings have parking facilities for use of the buildings' users.

TYPES OF PARKING LOT

- ➤ On street parking
  It is having three types:
  - a) Parallel parking
  - b) Perpendicular parking
  - c) Angle parking

- ➤ Off street parking
  Off street parking are having five types:
  - a) Surface car parking
  - b) Multi story car parking
  - c) Roof parking
  - d) Mechanical car parking
  - e) Underground car parking

Most multi-storey car parks are located where land costs are so high, e.g. in or about the central areas of large towns, that it is more economical to build vertical facilities rather than purchase additional land for surface parking. Multi-storey facilities can be or multi-purpose, i.e. containing other uses (e.g. offices or shopping) within the same structure; however, the more expensive the land the greater the likelihood of a parking facility being designed for multi-usage purposes. The city of Bengaluru is seeking proposals from professional designing teams to provide all labour, materials and provisions necessary to produce conceptual designs, final design, construction documents and construction of a parking building at Jalahalli cross, Bengaluru. The facility will provide a suitable parking environment for citizens and visitors to the commercial area.

2. LITERATURE REVIEW

1. Design And Analysis Of Multistorey Parking
B Vamsi, Dr. Dumpa Venkateswarlu, Dr. D V Rama Murthy [Ijrsae].
This project is aimed to design an efficient parking system and helps to minimize the parking area in the city. In the modern world where the parking space has become a major concern, in our city. The VISAKHAPATNAM city is recommended for smart city, which includes all the facilities like tourism, commercial complexes, institutions etc.
The traffic scenario is changing from day to day. All these facilities leads to the traffic congestion and efficient need for parking. To avoid this problem we suggest the design of "Multi-storey parking" at Dandubazar market near Jagadamba center, which might be a shopping hub in future. To control parking problems we suggest multi story parking system in this place. This multi storey parking enables the parking of vehicles, floor after floor and thus reducing the wastage of space. Here, we provided parking for more than 277 cars according to design. In order to determine the requirements of such parking system, we designed the building for G+3 floors.

2. A study of analysis and design of multi level parking
Upendra singh dandotia1 , Rakesh Gupta2 , Mukesh Pandey3 (IJEDR)
        Car parking has been a serious issue due to rapid increase in vehicles and to cater this problem we require parking slots in important markets. We have limited land source so the construction of multilevel parking is very important as it accommodates large no. of vehicles at one place. In this project we have designed multi-level parking for capacity of 600 cars and 550 bikes. Multilevel parking is of G+2+2 Basement having 13 shops on ground floor and its design is based on framed structure. In this work we have designed different components of the multi-level parking i.e. raft foundation, retaining walls, beams, column and flat slab

using STAAD-Pro, manual bases and AUTO-CAD software for making various structural drawings. For daily demand and fire demand we have also designed overhead tank and tank resting on ground.

3. Analysis and design of commercial building using etabs

Ragy Jose, Restina Mathew, Sandra Devan, Sankeerthana Ven(IRJET)

Structural Analysis is a branch which involves in the determination of behaviour of structures in order to predict the responses of different structural components due to effect of loads. Each and every structure will be subjected to either one or the groups of loads, the various kinds of loads normally considered are dead load, live load, earth quake load and wind load. ETABS (Extended Three Dimensional Analysis of Building System) is a software which is incorporated with all the major analysis engines that is static, dynamic, Linear and non-linear, etc. and especially this Software is used to analyze and design the buildings. Our project "Analysis and Design of Commercial building using ETABS software" is an attempt to analyze and design a commercial building using ETABS. A G+3 storey building is considered for this study. Analysis is carried out by static method and design is done as per IS 456:2000 guidelines. Also an attempt has been made to design the structural elements manually. Drawing and detailing are done using Auto CAD as per SP 34.

4. Analysis and Design of a Commercial Building

Harsitha M N1, Binod Kumar Das2,Rajiv Kumar Chaudhary3,Saurabh Singh4,Shivam Shivhare5 (IRJET)
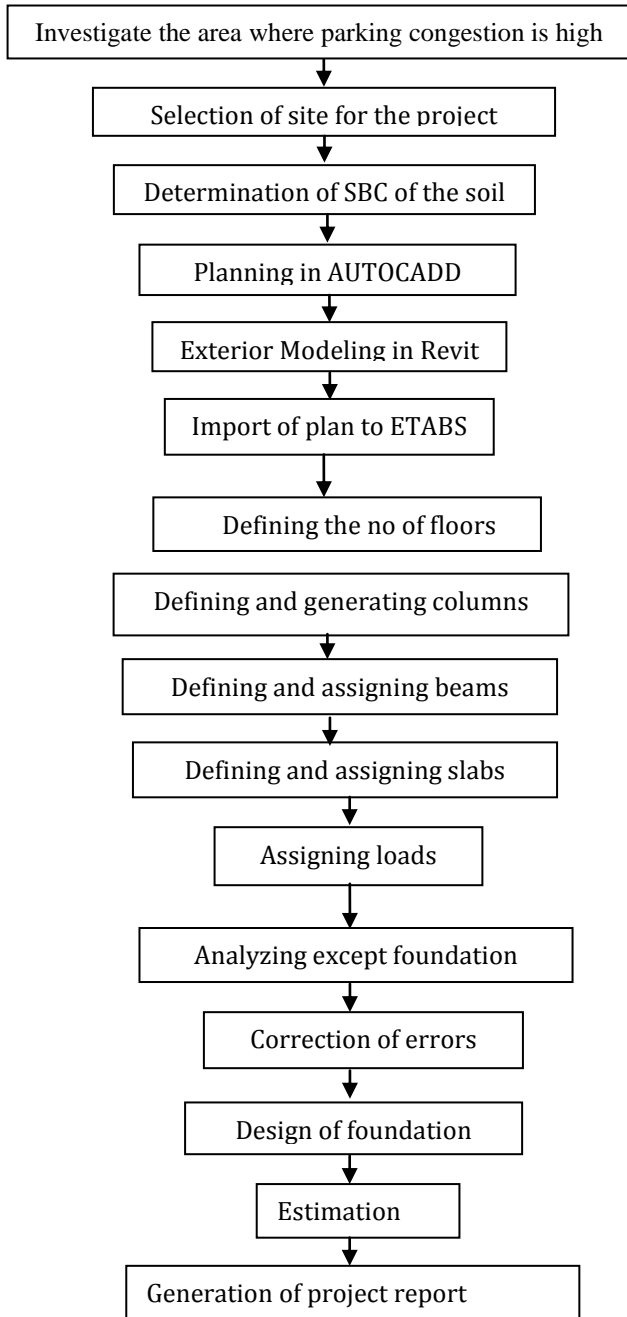
The primary objective of this project is to gain sufficient knowledge in planning, analysis, and design of building. Our project deals with the Analysis and design of a commercial building was done in ETABS(2016). It is a reinforced concrete framed structure consisting of G+4. And also we provide a two wheeler & car parking facility in the ground floor. IS 456:2000 codes is the basic code for general construction in concrete structures, hence all the structural members are designed using limit state method in accordance with the IS 456:2000 code and design aids. The planning of any building in India will be recognized by National Building Code (NBC), hence the building is planned in accordance with the National Building Code of India. The commercial building has proper ventilation, it is provided with sufficient Exits, Water supply and electrification are also provided. The ceiling height is provided as 1m, for assembly buildings as mentioned Building Code (NBC). This project also enables in establishing in sufficient water supply, electric power supply, proper sanitary system, and rain water harvesting facility are given.

3. OBJECTIVES

- To propose a multi storeyed building near Jalahalli cross

- To reduce the parking area by providing multi-storeyed parking building.
- To provide the safety and secured environment for the parked vehicles.
- To reduce the traffic congestion.

4. METHODOLOGY

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Investigate the area where parking congestion is high
                        ↓
        Selection of site for the project
                        ↓
        Determination of SBC of the soil
                        ↓
            Planning in AUTOCADD
                        ↓
          Exterior Modeling in Revit
                        ↓
          Import of plan to ETABS
                        ↓
          Defining the no of floors
                        ↓
      Defining and generating columns
                        ↓
       Defining and assigning beams
                        ↓
        Defining and assigning slabs
                        ↓
              Assigning loads
                        ↓
        Analyzing except foundation
                        ↓
          Correction of errors
                        ↓
          Design of foundation
                        ↓
              Estimation
                        ↓
      Generation of project report
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5. Planning of Multi storeyed Parking Building using AutoCAD.

The building consists of following amenities.

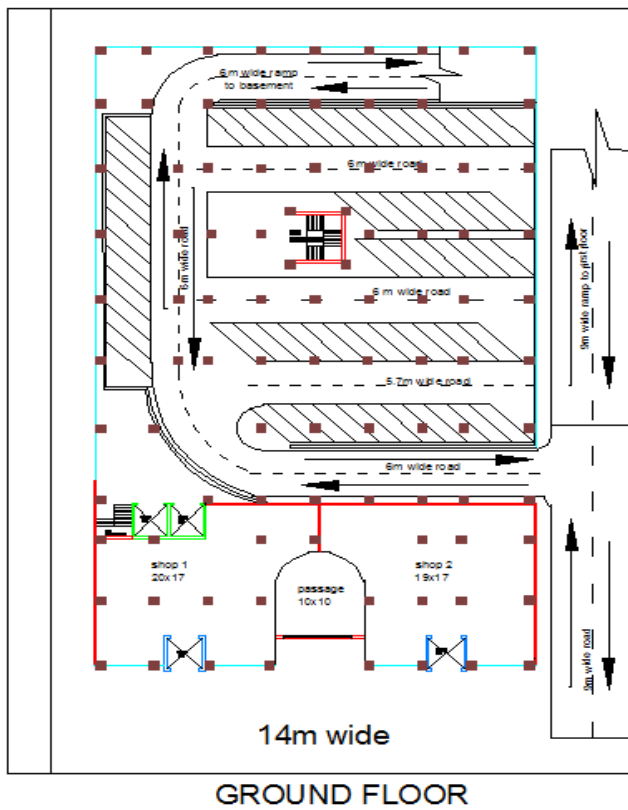| Basement	Car Parking
Ground floor	Commercial space, Car Parking
First floor, Second floor	Motorcycle Parking
Third floor, Fourth floor, Fifth floor	Commercial complex

GROUND FLOOR

Fig1. Plan of first floor.

THIRD FLOOR
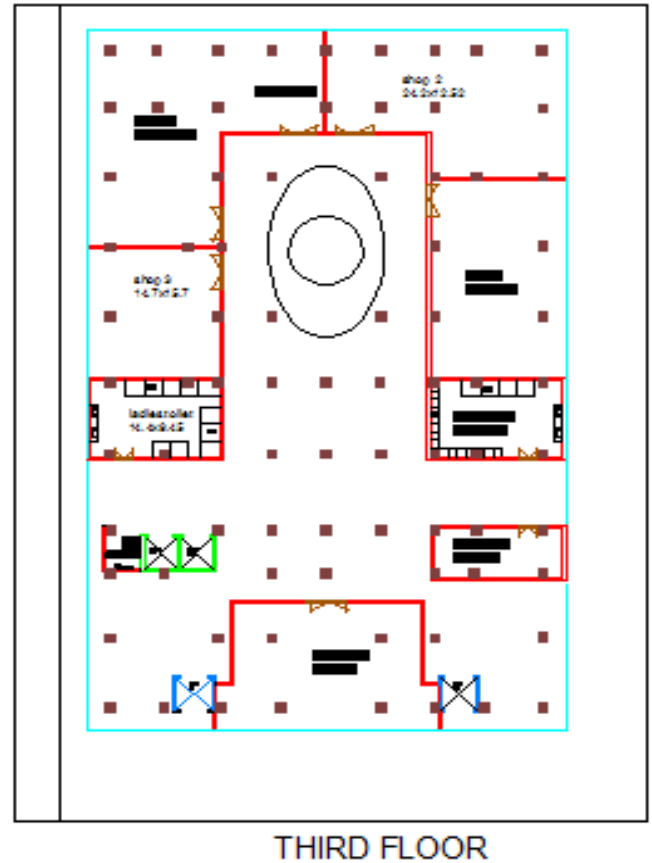
Fig1.1. Plan of 3rd 4th and 5th floors (complex)

6. EXTERIOR MODELLING IN REVIT

Fig2. 3D Modeling in revit.

2. MODELING AND ANALYSIS IN E-TABs
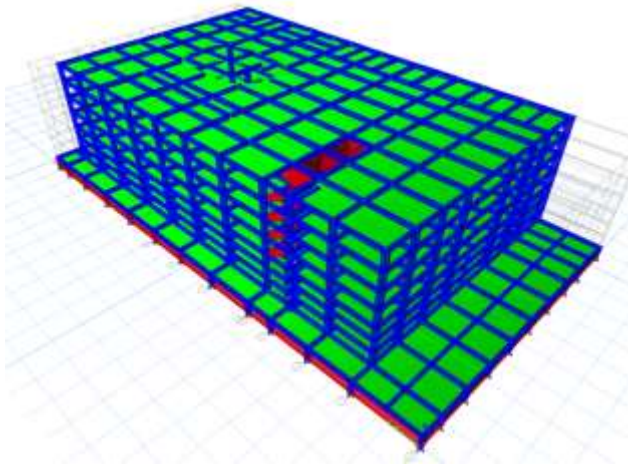
Fig3. 3D view of beam column layout.

Fig4. Moment in X direction.
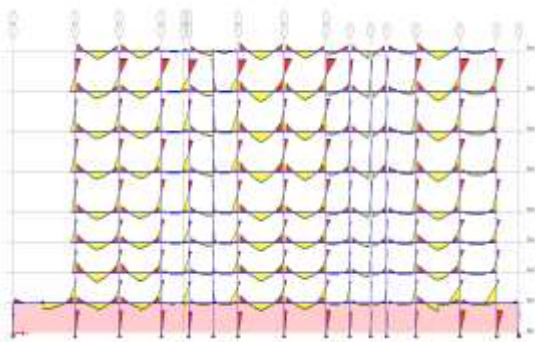
Fig5. Moment in Y direction.

8. DESIGN OF BUILDING COMPONENTS.

8.1. BEAM AND COLUMN IN E-TABS.

Fig5. Concrete frame design check.

8.1.1. DESIGN OF COLUMN AND FOOTING

Column: 400mm x 800mm
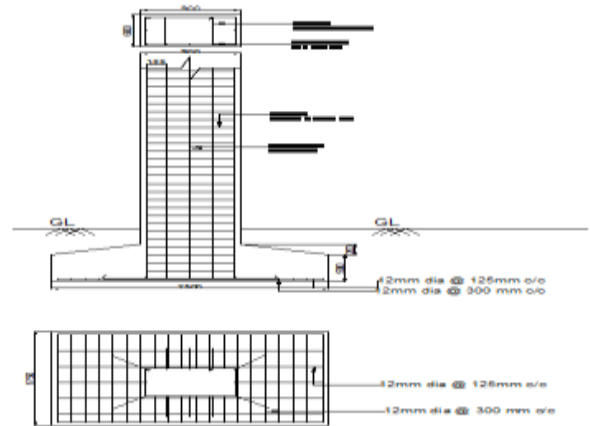Footing: 2m x 1.75m
M30 concrete & Fe 415 steel used

Fig5. Reinforcement details of column with footing.

8.1.2. DESIGN OF BEAM

Sectional area: 750mm x 600mm
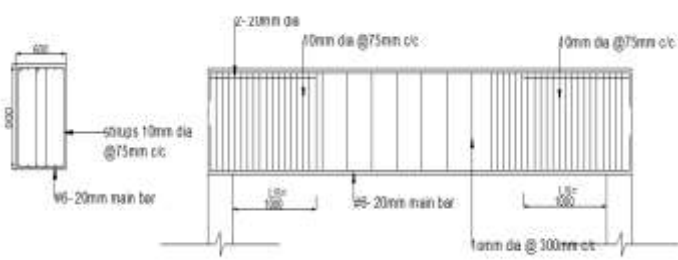Grade of materials:
Concrete: M30, Steel: Fe415

Fig5. Reinforcement details of beam.

8.2. DESIGN OF SLABS.

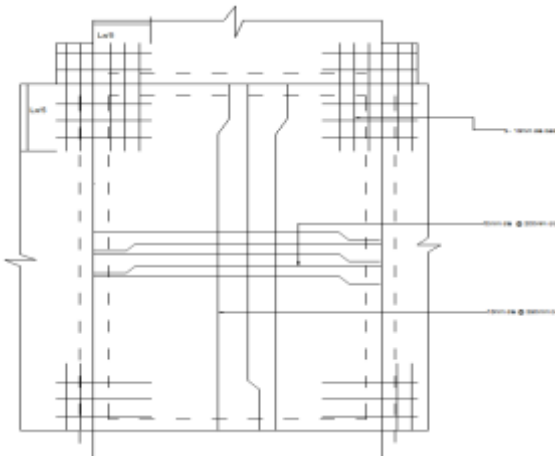Slab dimension: 6m x 9.41m
Concrete grade: M30
Steel used: Fe415

Fig5. Reinforcement details of slab.

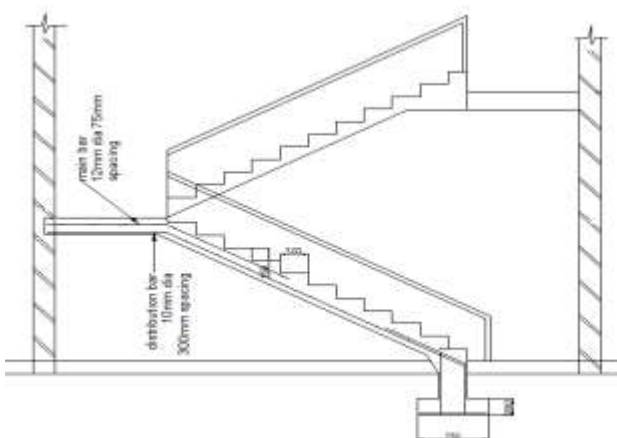## 8.3. DESIGN OF STAIR CASE.

Concrete grade: M30
Steel used: Fe415

Fig5. Reinforcement details of slab.

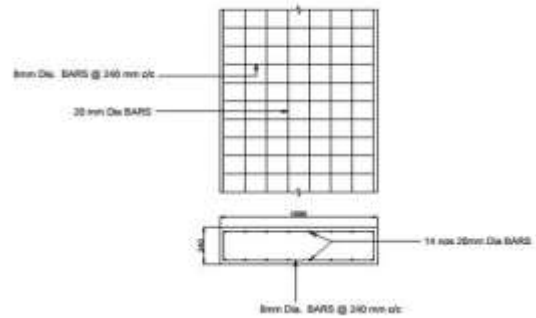## 8.4 DESIGN OF SHEAR WALL

Concrete grade: M30, Steel used: Fe415

Fig5. Reinforcement details of shear wall.

9. CONCLUSION

From our present parking studies

The traffic congestion problem can be regulated by providing multi storey parking at JALAHALLI CROSS. We hope this project will serve as a solution to various traffic congestion problems and can be used as a model in the development of multi-storey parking's.

We have designed the multilevel parking building using concept of framed structure which will survive the purpose of traffic congestion. Multilevel parking is of G+5. Basement and half of ground floor will be accommodated by cars. Half of the ground floor will be accommodated by a commercial shops. 1st and 2nd floor will be accommodated by motor cycle parking. 3rd, 4th and 5th floors will be accommodated by commercial shops. This system can help in economy and security based aspects for the society. It is a currently, management information system Play an important part in the life, however many of rules are poor and need to be progress. This research have been focus on improving the Bangalore parking system to be suitable for the life style .

REFERENCES

1. Design And Analysis Of Multistorey Parking

B Vamsi, Dr. Dumpa Venkateswarlu, Dr. D V Rama Murthy [Ijrsae].

2. A Study Of Analysis And Design Of Multi Level Parking

Upendra singh dandotia1 , Rakesh Gupta2 , Mukesh Pandey3 (IJEDR)

3. Analysis And Design Of Commercial Building Using E-Tabs

Ragy Jose, Restina Mathew, Sandra Devan, Sankeerthana Ven(IRJET)

4. Structural Analysis Of A Multi-Storeyed Building Using E-Tabs or Different Plan Configurations Abhay Guleria (IJERT)

5. Analysis and Design OF G+5 RESIDENTIAL BUILDING BY USING E-TABS

K. Naga Sai Gopal, N. Lingeshwaran IJCIET)

6. Analysis and Design of a Commercial Building

Harsitha M N1, Binod Kumar Das2,Rajiv Kumar Chaudhary3,Saurabh Singh4,Shivam Shivhare5 (IRJET)

7. Analysis and Design of a Commercial Building

Prof. Alice T.V1, Cynthia Fernandez 2, Ihjaz Aslam K.E3, Sreeshma P.U4, Unnikrishnan G5 (IRJET)

8. Journal of Construction Engineering and Management

Samaneh Zolfagharian and Javier Irizarry, Ph.D., P.E., M.ASCE

9. Code books referred:

[1] SP : 7 - National Building Code.

[2] IS 456:2000-Design of reinforced structures

[3] IS 875 Part 1: Dead load considerations,

[4] Part 2: Live load considerations,

[5] Part 3: Wind load consideration.

[6] IS 1893:2002- Earthquake effects

[7] SP: 16 - Design aid for reinforced concrete to IS 456.