A study of analysis and design of multi level parking

Upendra singh dandotia[1] , Rakesh Gupta[2] , Mukesh Pandey[3]
[1] M.Tech, Civil Engineering Department, ITM University, Gwalior, India
[2]Assistant Professor Civil Engineering Department, ITM University, Gwalior, India
3 Head Civil Engineering Department, ITM University, Gwalior, India

***Abstract* - 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.**

I. INTRODUCTION

It is a advancement of Science and Technology, the number of cars and other vehicles have increased on roads of all city of the world. The rural roads construction in the past in old new way have proved competent to accommodate increases number of vehicles. The existing towns are also lacking the facility of parking, due to which the vehicles are being parked along the highway sides, residential roadway, pathway and green points of the roads which causes frequent traffic jams. The precious time of workers is wasted due to traffic jams and if this problem is not solved at this stage, then it would become a serious and complicated problem in future. The problem is required to be solved urgently by construction multi level parking structure at prominent places. The lack of funds may be the problem next in the way of local development authorities for the execution of such projects. For explain the above problems, selection of **"Multi level Parking member"** as described below is recommended.
In order to make such projects economically viable, about 10 percent of total floor area of such projects may be allow to be abused for market purpose by the private developer so that such facilities could be promoted.

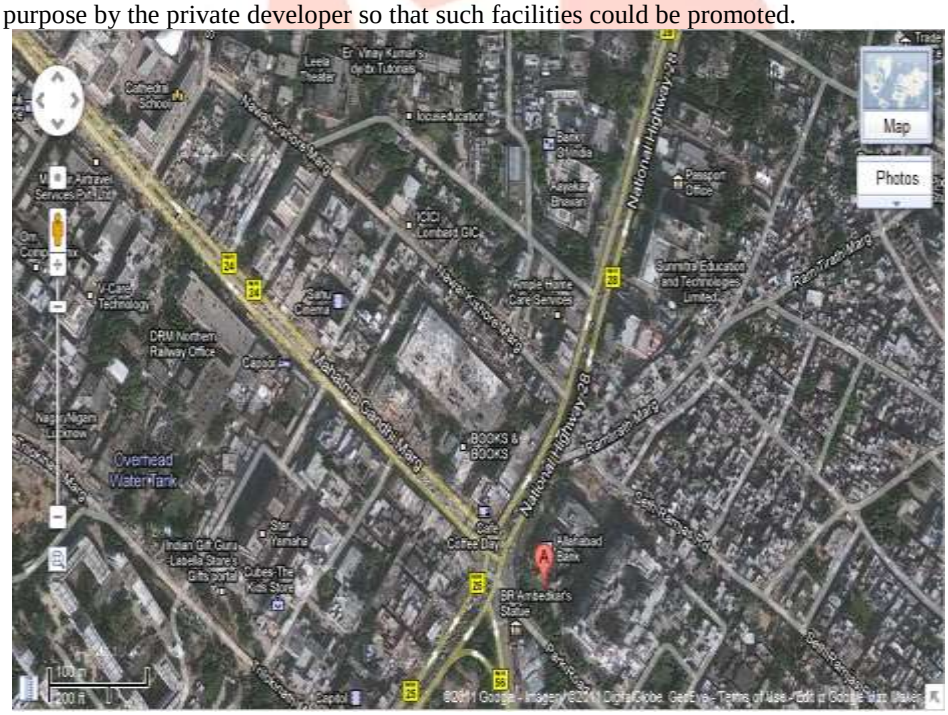


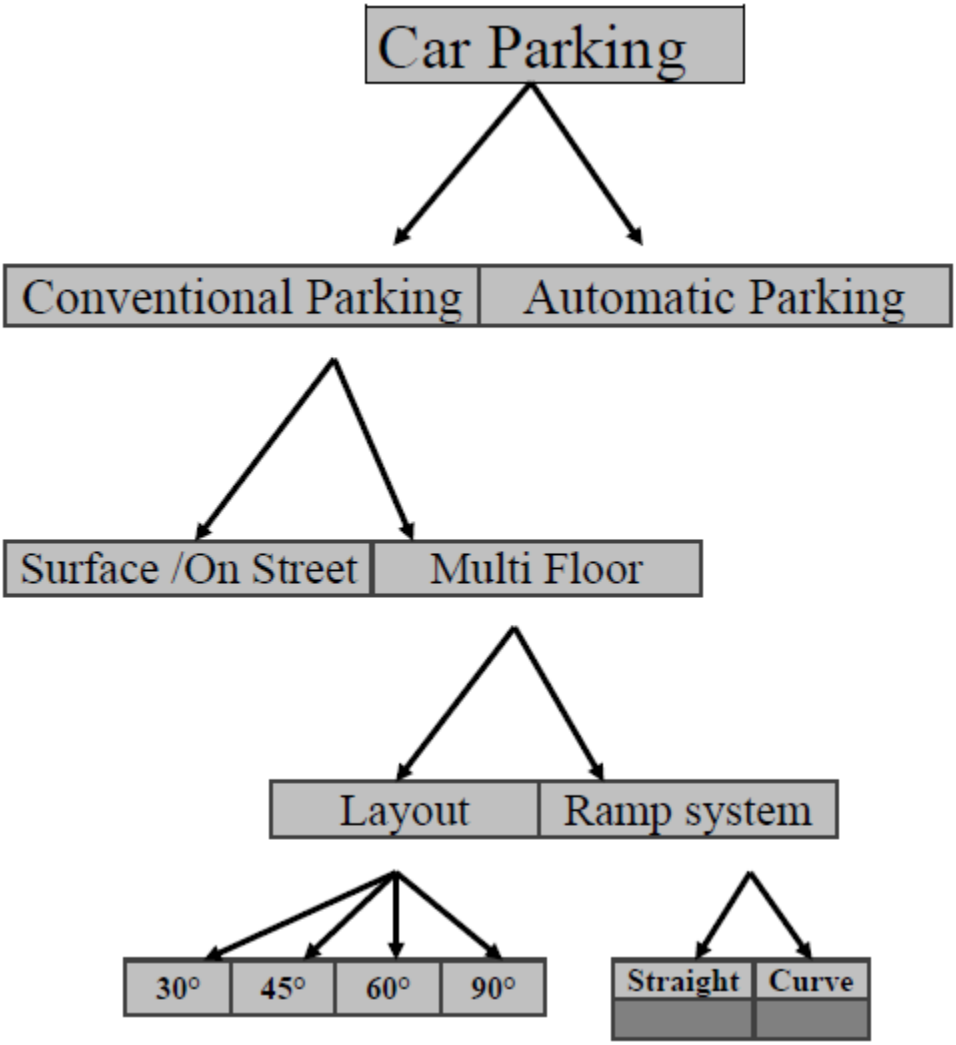
Fig No. 1

Arrow indicate the project area where we plan multi level parking building. This area is located in Hazaratganj at Lucknow (U.P).

II. HISTORY

The first multi level parking was build in 1918 for the Hotel La Salle at 215 West Washington Street in the West Loop area of downtown Chicago, Illinois. It was designed by Holabird and Roche. The Hotel La Salle was destroy in 1976, but the parking structure remained because it had been designated as preliminary landmark status and the structure was several blocks away from the hotel. It was smash in 2005 after failing to receive landmark status from the city of Chicago A 49-storey apartment tower, 215 West, it was taken place, also features a multi-level parking garage.

III. TYPES OF PARKING



IV. METHODOLOGY

Design beam

A reinforced concrete beam should be able to check tensile, compressive and shear stresses as induced by the loads on the beam. *Mulim* of the given section is calculated and is compared with the maximum bending moment of the section. If *Mulim* less than , the section is designed as a doubly reinforced section. *Mu/bd2* is calculated and percentage of steel is required in tension and compression corresponding to grade of steel are obtained from IS 456-1978. Reinforcement required for bending and shear in beams is calculated in according with the provision laid down in clauses 26.5, 40.1 and 40.3 of IS456-2000.

There are two types of reinforced concrete beams.

a) Singly reinforced beams.

b) Doubly reinforced beams.

Formula used :

- $M_u = 0.87\sigma_y A_{st}(d-\sigma_y A_{st}/\sigma_{ck}b)$
- $M_{lim} = 0.87\sigma_y A_{st}(d-0.42x_m)$
- $A_{sc}=(M_u-M_{lim})/(\sigma_{sc}(d-d')$

  Where,

  M_u = moment of resistance

  σ_y = characteristics strength of reinforcement ,

  A_{st} = area of tension reinforcement ,

  d = effective depth,

  b = breath of the compression face,

  σ_{ck} = characteristics compressive strength of concrete ,

  M_{lim} = limiting moment of resistance of a section without compression reinforcement,

  A_{sc} = area of compression reinforcement ,

  σ_{sc} = design stress in compression reinforcement corresponding to a strain

Design of column

Column or block is a compression member, the effective depth of which Exceeds three times the least lateral dimension.
The lack of column depends on the strength of the material , structure and size
of the cross section, length directional resistance at its end. column may be classification as
based on the different criteria, such as:

a) Shape of cross section
b) Slenderness ratio
c) Minimum Eccentricity
d) Types of Reinforcement

A column may be rectangle , square , circular or in cross section. A column may be classification follows based on the types of loading.
Axially loaded column
a) A column subjected axial load and section-axial bending
b) A column subjected axial load bi-axial bending

A compression member may be consider as short when both slenderness ratios lex / D and ley /b are less than 12.
Where,

Lex = effective length in respect of the major axis ,
D = depth in respect of the major axis ,
Ley = effective length in respect of the minor axis,
B = width of the member .

Design of slab

Flat slab counter in the sample were of discontinous configurations and hence the simpily code method for determining the strain action by dividing the slab into column stirrups and field stirrups was not applicable. Analysis may be function by using STAAD PRO V8i for 2004.
The flat slab thickness used was 250 mm and the concrete cover was assumed to be 50 mm for the purpose of design calculations. 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. Hence in storehouses, offices and public entrance some times beams are avoid and slabs are directly supported by columns. This type of construction is esthetic present also. These slabs which are directly supported by columns are called Flat Slabs.

Benefits of flat slab

- Saving in building height
- Shorter construction time
- Lower storey height will reduce building weight due to lower obstruction and outer wall to cover.
- approx. saves 10% in vertical members.

V. CONCLUSION

We have design the latest and economical multilevel parking building using concept of framed structure.
Multilevel parking is of G+2+2 Basement having 13 shops on ground floor and its design is based on framed structure at Hazaratganj at Lucknow (U.P) india . Design (beams, columns, slabs and foundations) using STAAD PRO. Software .In this system can help the economy, popular and security based aspects of 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 lucknow parking system to be suitable for the life style , this paper also discuss how to use the information technologies and image processing to implement a high management parking system to reduce the problems and the weak that already appointed in the parking system.

VI. REFERENCE

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