ANALYSIS AND DESIGN OF HOTEL BUILDING WITH UNDERGROUND CAR PARKING

DHANALAKSHMI.B[1], MEENA.P[2], RAMYA.G[3] , MONIKA.A[4] , RANITHA.S.R[5]
BE-final year and Assistant Professor[5]
Department of CIVIL,
Bharathiyar Institute Of Engineering for women ,
Deviyakurichi(po), Attur(tk),
Salem(dt), Tamilnadu, India.
Dhanalakshmi4897@gmail.com[1], pmeena1761997@gmail.com[2] ,boomaramya0309@gmail.com[3] ,
vcanmonika@gmail.com[4],romemadu@gmail.com[5]

ABSTRACT

In this project the hotel building with underground car parking is designed. Thus to satisfy the needs of present situation, project for hotel building . This building regular and irregular shape in plan and has three floors.

The first floor is similar on the second and third floors.

The present project deals with the analysis of a multi storied building of G+3 with underground car parking consisting of different types of rooms in each floor.
18 single bed rooms.

The dead load & live loads are applied and the design for beams, columns & load for footing is obtained from are done using STAAD Pro software. In our project, analysis and design were carried out. Design was done as per IS: 456-2000 for dead load and live load using limit state method.

INTRODUCTION

Hotel building with underground car parking has been a major attraction for both tourist and entrepreneurs with functioning of big hospitals, historical places, etc., there is a need for big hotels. At the same time, if not properly evaluated, parking structure can be built in places and in methods that have significant negative impacts.

TYPES OF BUILDING

1. Agricultural buildings
2. Commercial buildings
3. Residential buildings
4. Medical buildings
5. Educational buildings
6. Government buildings
7. Industrial buildings
8. Military buildings
9. Parking structures and storage
10. Religious buildings
11. Transport buildings
12. Non-buildings

HOTEL BUILDING

A commercial establishment providing lodging, meals, and other guest services. In general, to be called a hotel, an establishment must have a minimum of six letting bedrooms, at least three of which must have attached (ensuite) private bathroom facilities.

1. A 1-Star hotel provides a limited range of amenities and services, but

adheres to a high standard of facility-wide cleanliness.

2. A 2-Star hotel provides good accommodation and better equipped bedrooms, each with a telephone and attached private bathroom.

3. A 3-Star hotel has more spacious rooms and adds high-class decorations and furnishings and color TV. It also offers one or more bars or lounges.

4. A 4-Star hotel is much more comfortable and larger, and provides excellent cuisine (table d'hôte and a la carte), room service, and other amenities.

5. A 5-Star hotel offers most luxurious premises, widest range of guest services, as well as swimming pool and sport and exercisefacilities.

The Official Hotel Guide (published in the US, and followed worldwide) has its own classification scheme that ranks hotels in nine categories as

(1) Moderate Tourist Class
(2) Tourist Class
(3) Superior Tourist Class
(4) Moderate First Class
(5) Limited Service First Class
(6) First Class
(7) Moderate Deluxe
(8) Deluxe
(9) Superior Deluxe

PARKING

Parking space is provided towards the side of structure as per the requirements. Underground car parking is also provided.

RECEPTION

A reception and information counter attended by a person is placed near the main entrance.

DINNING HALL

It's a large room. In which meals are served to members of a special group and their guests.

DESIGN OF SLAB

Slab is plate elements forming floor and roofs of buildingscarryingdistributedloads. .

DESIGN OF BEAM

Beams transfer load from slabs to columns. Beams are designed for bending. In general we have two types of beam: single and double primarily by flexure.

DESIGN OF COLUMN

A column may be defined as an element used primary to support axial compressive loads and with a height of a least three times its lateral dimension.

DESIGN OF RECTANGULAR FOOTING

Foundations are structural elements that transfer loads from the building or individual column to the earth.

These may be square, rectangle, or circular in plan that the choice of type of foundation to be used

DESIGN OF RETAINING WALL

Retaining walls are generally used to retain earth or such materials to maintain unequal levels on its two faces.

DESIGN OF STAIRCASE

Staircases provide means of ment from one floor to another in a structure.

DESIGN OF CANTILIVER SLAB

TYPE OF SLAB

4.26 >2

The slab is one way slab.

DEPTH CALCULATION

Effective depth (d) = 195mm

Overall Depth (D) = 220mm

EFFECTIVE SPAN

Effective span = 2095.5 mm

CHECK FOR DEPTH

195 > 82.33

Hence ok check safe

A_{ST}

A_{st} = 273.52 mm^2

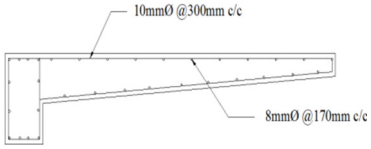
CHECK FOR SHEAR

$V_u = 0.091$

τ_C = 0.2888 N/mm^2

$\tau_v < \tau_C < \tau c_{max}$

Hence ok shear safe



DESIGN OF BEAMS

Effective span = 275mm

C.s = 575mm

MOMENT CALCULATION

$M_u < M_{u\,lim}$

The section is under reinforced section

A_{st} CALCULATIONS

A_{st} = 413.64mm^2

Provide 8 mm dia 122 mm c/c spacing

CHECK FOR SHEAR

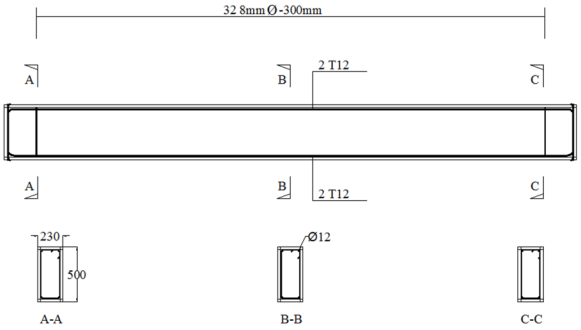
$\tau_V < \tau_c$

Hence shear is safe

CHECK FOR DEFLECTION

$(L/d)_{max} > (L/d)$

Hence the deflection is safe



DESIGN OF WIND LOAD

Location Assume

V_b = 47m/s

From steel table page number 88

DESIGN WIND SPEED

$V_z = V_b x k_1 x k_2 x k_3$

General building

K = 1

Consider the category 3

Class-B

$K_2 = 0.904$

$K_3 = 1$

DESIGN WIND SPEED

V_z = VbxK1xK2xK3

= 47 x 1 x 0.904 x 1

V_z = 42.48m/s

DESIGN WIND PRESSURE

$P_z = 0.6 x V_z^2$

$= 0.6 x 42.48^2$

P_Z = 1.08kN/m^2

CONCLUSION

- ✓ The planning of the project was done only after having case studies and reviews of different such projects and also reference and interview with well-known civil Engineers.
- ✓ This project has enabled us to have a review of what we have learnt.
- ✓ All assumptions are made as per codes IS-456: 2000, steel tables
- ✓ The other members like staircase, retaining wall, Footings, all done manually.
- ✓ Limit state method is used for other members design.

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