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# PLANNING AND DESIGN OF MULTI STAR HOTEL

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## ABSTRACT

*The business and tourist sector flourishing in Hyderabad city, we planned and designed the construction of the main building of a multi star caravansary of approved Indian standards to fulfill the needs of the current situation.*

*In our project, Park Hyatt, Banjara Hills, we have aimed to satisfy the basic requirements of a multi star caravansary. Allocating the available space for different functions the entire structure was developed. The structure was then analyzed and designed in STAAD PRO. Park Hyatt, Banjara Hills, A luxury hotel that combines business with pleasure, style with substance, form with function. Centrally located in the upscale Banjara Hills, our 5-star luxury hotel offers personalized services and unforgettable experiences to business travelers and discerning local guests. With 209 spaciously appointed rooms, three award winning restaurants, technology friendly meeting spaces and a Nizami themed Spa, luxury at its best awaits to create seamless experiences for you. Park Hyatt Hyderabad offers free onsite parking facilities for up to 500 vehicles.*

*Built across on an area of 32,256 square metres (347,200 sq ft) the construction of the hotel started in 2006. Owned by Gayatri Hi-tech Hotels and managed by Hyatt, the hotel was inaugurated on 29 April 2012 costing Rs 7 billion approximately.*

*The Hotel has 185 rooms, 24 suites on the first six floors and 42 furnished service apartments called The Residence on the two upmost floors. Each of the hotel's guestrooms are among the largest in Hyderabad, measuring at least 463 square feet. The lobby is designed with sparkling water feature and plants that surround a 35-foot tall white abstract sculpture. Park Hyatt Hyderabad is the first hotel in India to feature Hyatt's residential-style meeting concept named The Manor.*

*The total meetings and events facilities measure more than 1,600 square metres (17,000 sq ft). Accommodating a range of dining the hotel has a Lobby Lounge – The Living Room, The Dining Room – All Day Dining Restaurant, Tre-Forni Bar & Restaurant - Northern Italian Cuisine, Oriental Bar & Kitchen – South East Asian Cuisine. The Hotel is also equipped with Spa & Fitness Facilities.*

## I INTRODUCTION

Hyderabad City progressing at a very quick pace within the commercial sector, major comes are undertaken to quench the forth returning wants. Technology soaring heights, its impact is clearly visible during this tiny, beautiful city.

Hyderabad City, a blend of beauty and technology, has become a major attraction for both tourists and business entrepreneurs. Though, towards the core, that is heavily charged with which means and activity, the suburbs of this city are within the progress of clinging to the standards. With the functioning of the Rajiv Gandhi International airport at shamshabad, India's second largest, the requirement for hotels of approved standards and hospitality arose in its proximity. Since accessibility is that the key for not only practical but also psychological reasons, the choice of site should suite the acceptable wants.

Our project, the planning and design of the main building of a 5 star hotel, has aimed toward filling this void. The project was developed so as to include the analysis and design a part of civil engineering. Our project is that the accomplishment of the structural design of the main building of the hotel, Park Hyatt, Banjara Hills.

### Structural Analysis

### LOAD CALCULATIONS

The different loads on the structure are taken based on the relevant Indian Standard Specifications BIS 1987. The following loads were considered for the design.

### LIVE LOAD

- Banquet hall $5\frac{KN}{mm^2}$
- Other areas $3\frac{KN}{mm^2}$

### DEAD LOAD

- Dead load for concrete $25\frac{KN}{m^3}$
- Dead load for brick wall $22\,\frac{KN}{m^3}$

### STRUCTURAL DESIGN

The design of the structural members is done using the limit state method of design. This method is selected for doing the design, mainly due to the fact that it considers a factor of safety for the design with which the members are designed. The design of members by this method is commonly practiced now-a-days mainly due to its reliability over the working stress method. All designs are done according to the provisions of the Bureau of Indian Standards.

**DESIGN OF SLABS**

DATA: Two way slab

Suitable span: 12.2m

Limiting criterion: Deflection

Rebar: 2.94Kg/$m^2$

PT; 3.87Kg/$m^2$

MATERIAL PROPERTIES:

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Concrete:

$F_{c28}$ = Compressive strength on concrete 28 days

$F_{cd}$ = Design value for compressive strength on concrete

= $0.6\times F_{c28}$ = 21N/mm$^2$

Pre-stressing steel:

$A_p$ = cross sectional area of pj steel 146mm$^2$

$F_{py}$ = yield strength of PT steel 1570N/mm$^2$

$F_{pu}$ = characteristics strength of PT steel 1770N/mm$^2$

Pre-tensioning steel:

$E_p$ = modulus of elasticity of pre stressing steel $1.95\times10^5$N/mm$^2$

(Very low relaxation 3%)

Admissible stressing 0.75 $f_{pu}$

Reinforcing steel:

$F_{sy}$ = yield strength of reinforcing steel is 460N/mm$^2$

Long-term losses (assumed to be 10%)

DESIGN:

Determination of slab thickness:

Assumption l/h = 35

Self weight of slab g = yc×h

L = length of slab 8.4

h = 0.24m

Yc = volumetric weight of concrete = 2.5KN/m$^3$

g = 6 KN/m$^3$

q = 5 KN/m$^3$

(g+q)/g = 6+5/6 =1.83

(l/h as a function (g+q)/g)

For value of 1.83 on y-axis l/h is coming to 36

0.233 Which is approximately 0.24

Determination of pre-stress:

μ = it is transfer component from pre stressing/ unit length (g+q)/g =1.83 based on previous calculation

Pre stress in longitudinal direction:

For 1.83 the u/g value is 1.3

u = 8.34KN/m$^2$

K = woober's coefficient = $(0.24\times10^3) / (8.4^2\times25)$ = 0.136

h = 0.274

Length of slab =8.4

yc = 25

εc = concrete tensile stress = 1000

Pre tensioning force:

$$P = 4 \times {l^2}/{8} \times h_p$$

Sag of tendon parabola

$$h_p = 0.178m\ (p = 8.34 \times {8.4^2}/{8} \times 0.178$$

P = 413KN/m

P = 7.8×413 for a width of 78mts

P = 3221 KN/strand

PI= pre tensioning force per strand

PI =$A_p \times f_{pu} \times 0.7 \times 10^{-3}$

$A_p$ = 416mm$^2$

$F_{pu}$ = 1770N/mm$^2$

PI = 181KN

STRANDS:

No. of strands = p/pi = 413/pi = 17.8 (say 18)

18 strands of dia 15mm on 78mt width

For 7.4mt width = 7.4/7.8×17.8 = 16.88

17 mono strands of dia 15mm of 7.4mt width

On 6.6mt width = 6.6/7.8×17.8 = 15.1

16 mono strands of dia 15mm of 6.6mt width

For 2.4mt width = 2.4/7.8×17.8 = 5.5

6 mono strand of dia of 15mm on 2.4mt width

Transverse direction:

g+q/g = 1.83

K =0.24×1000/7.8$^2$×25

K = 0.158

On design chart 2 for k value of 0.158 and (g+q/g) value of 1.83 the value of u/g is found be 1.41

u = 8.46KN/m$^2$

$$P = u \times {l^2}/{8} \times h_p$$

$$= 8.46 \times {7.8^2}/{8} \times 0.167$$

P = 3.85KN/m

On 8.4mt width p =8.4×385

P = 32334KN

$P_c$ = 181KN

No. of strands $N_p$ = p/pi = 3234/181 =17.9

18 mono strands of dia 15mm on 8.4mt width

On 7.2mt width np =7.2/8.4×7.9 = 15.3

16 mono strands of dia 15mm on 7.2mt width

## DESIGN OF BEAMS

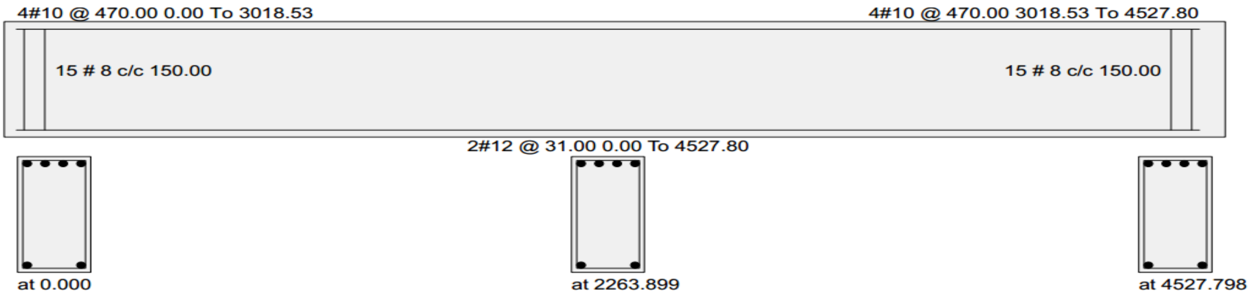


Fig.8.2a Design Load

**Table.8.2a Design Parameter**

| | |
|---|---|
| Fy(Mpa) | 415.000000 |
| Fc(Mpa) | 25.000000 |
| Depth(m) | 0.500000 |
| Width(m) | 0.230000 |
| Length(m) | 4.527800 |

**Table.8.2b Bending along Z in EQX**

| Mz(Kn Met) | Dist.et | Load |
|---|---|---|
| 18.969999 | 1.500000 | 10 |
| -32.950001 | 0.000000 | 11 |
| -46.360001 | 4.500000 | 10 |

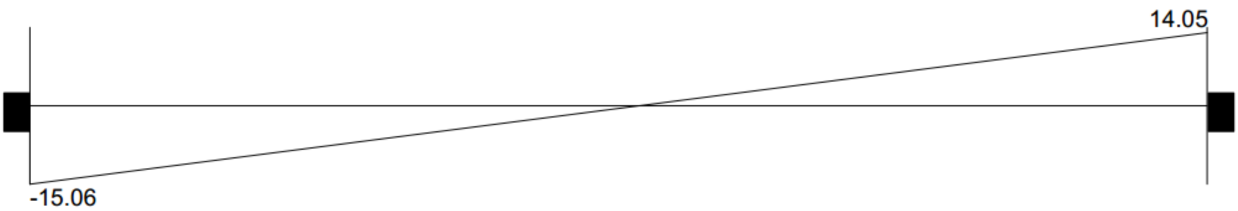


Fig.8.2b Bending along Z in EQX

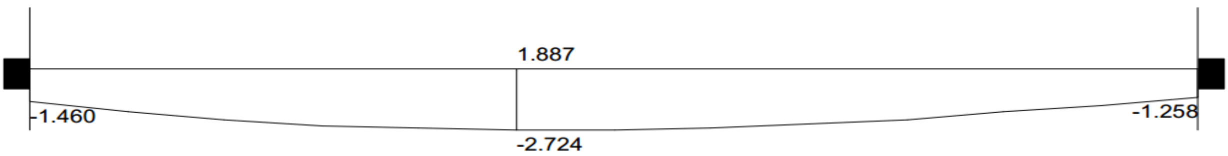


Fig.8.2c Shear along Z in EQX


Fig.8.2d Deflection along Z in EQX

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Table.8.2c Shear along Z in EQX

| Dist.m | Fz(kN) | My(kNm) |
|---|---|---|
| 0.000000 | -1.4587 | -9.0752 |
| 0.377317 | -1.4587 | -8.5248 |
| 0.754633 | -1.4587 | -7.9745 |
| 1.131950 | -1.4587 | -7.4241 |
| 1.509267 | -1.4587 | -6.8737 |
| 1.886583 | -1.4587 | -6.3233 |
| 2.263900 | -1.4587 | -5.7729 |
| 2.641216 | -1.4587 | -5.2226 |
| 3.018533 | -1.4587 | -4.6722 |
| 3.395850 | -1.4587 | -4.1218 |
| 3.773166 | -1.4587 | -3.5714 |
| 4.150483 | -1.4587 | -3.0211 |
| 4.527800 | -1.4587 | -2.4707 |

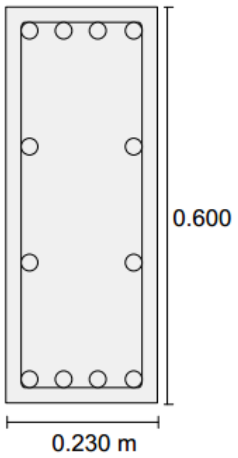
Table.8.2c Shear along Z in EQX

| Dist.m | Fy(kN) | Mz(kNm) |
|---|---|---|
| 0.000000 | -6.4309 | -15.0630 |
| 0.377317 | -6.4309 | -12.6365 |
| 0.754633 | -6.4309 | -10.2100 |
| 1.131950 | -6.4309 | -7.7835 |
| 1.509267 | -6.4309 | -5.3571 |
| 1.886583 | -6.4309 | -2.9306 |
| 2.263900 | -6.4309 | -0.5041 |
| 2.641216 | -6.4309 | 1.9224 |
| 3.018533 | -6.4309 | 4.3489 |
| 3.395850 | -6.4309 | 6.7754 |
| 3.773166 | -6.4309 | 9.2018 |
| 4.150483 | -6.4309 | 11.6283 |
| 4.527800 | -6.4309 | 14.0548 |

Table8.2d Deflection along Z in EQX

| Dist.m | X(mm) | Y(mm) | Z(mm) |
|---|---|---|---|
| 0.000000 | 22.3242 | -0.4279 | -1.4604 |
| 0.377317 | 22.3242 | -0.4609 | -1.9193 |
| 0.754633 | 22.3242 | -0.4594 | -2.2680 |
| 1.131950 | 22.3242 | -0.4299 | -2.5135 |
| 1.509267 | 22.3242 | -0.3792 | -2.6631 |
| 1.886583 | 22.3242 | -0.3138 | -2.7238 |
| 2.263900 | 22.3242 | -0.2403 | -2.7027 |
| 2.641216 | 22.3242 | -0.1655 | -2.6069 |
| 3.018533 | 22.3242 | -0.0959 | -2.4436 |
| 3.395850 | 22.3242 | -0.0383 | -2.2199 |
| 3.773166 | 22.3242 | 0.0008 | -1.9430 |
| 4.150483 | 22.3242 | 0.0148 | -1.6198 |
| 4.527800 | 22.3242 | -0.0031 | -1.2575 |

**DESIGN OF COLUMNS**




| Load | 5 |
|---|---|
| Location | End 1 |
| Pu(Kns) | -0.130000 |
| Mz(Kns-Mt) | 0.250000 |
| My(Kns-Mt) | 0.090000 |

| Fy(Mpa) | 415 |
|---|---|
| Fc(Mpa) | 25 |
| As Reqd(mm²) | 1104.000000 |
| As (%) | 0.983000 |
| Bar Size | 12 |
| Bar No | 12 |


Fig.8.3b Bending along Z in EQX

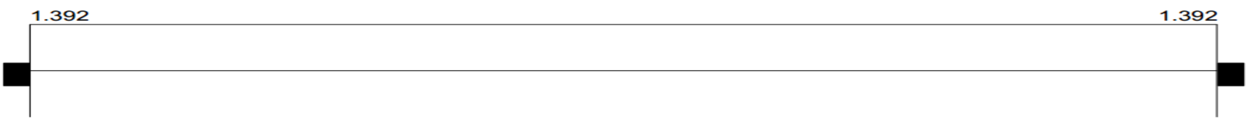



Fig.8.3c Shear along Z in EQX

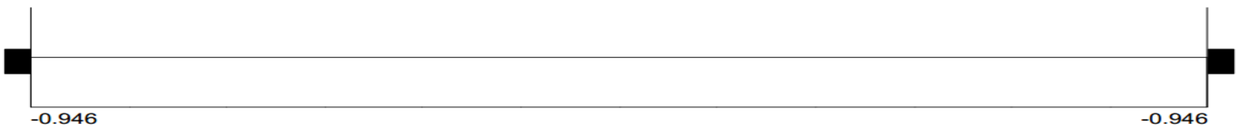



Fig.8.3d Deflection along Z in EQX

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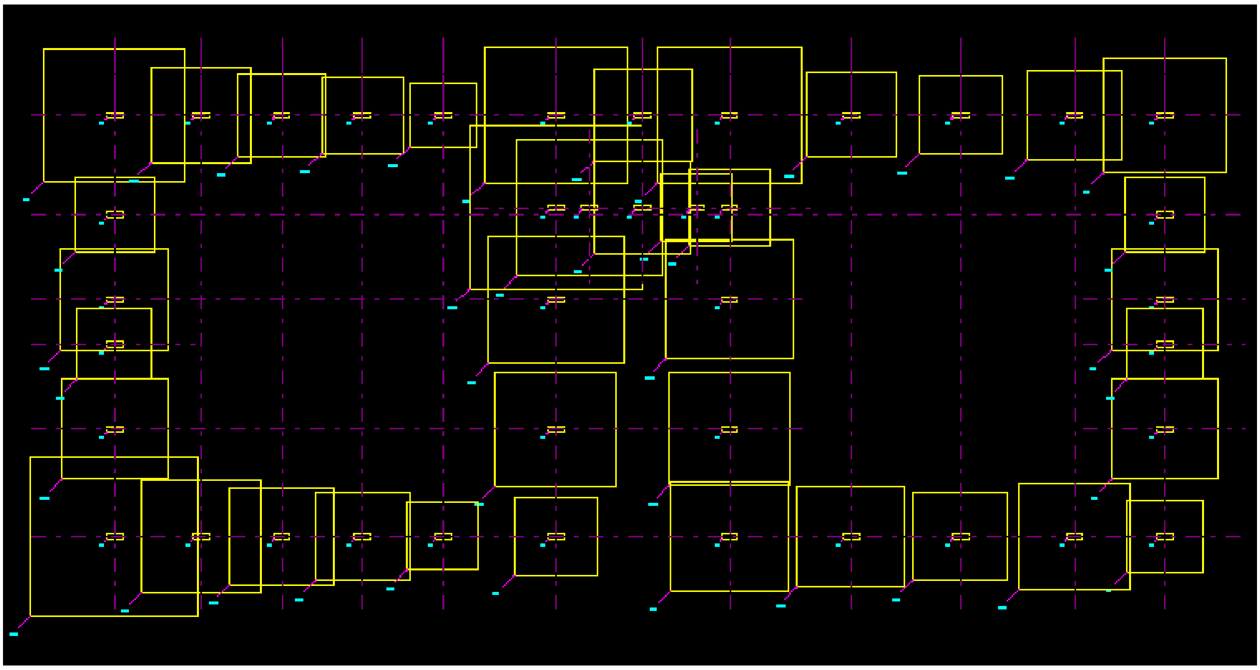
Table.8.3b Bending along Z in EQX Table..8.3c Shear along Z in EQX Table.8.3d Deflection along Z in EQX

| Dist.m | Fy(kN) | Mz(kNm) |
|---|---|---|
| 0.000000 | -0.3210 | -3.9159 |
| 0.275000 | -0.3210 | -3.8276 |
| 0.550000 | -0.3210 | -3.7393 |
| 0.825000 | -0.3210 | -3.6511 |
| 1.100000 | -0.3210 | -3.5628 |
| 1.375000 | -0.3210 | -3.4745 |
| 1.650000 | -0.3210 | -3.3862 |
| 1.925000 | -0.3210 | -3.2980 |
| 2.199999 | -0.3210 | -3.2097 |
| 2.474999 | -0.3210 | -3.1214 |
| 2.749999 | -0.3210 | -3.0332 |
| 3.024999 | -0.3210 | -2.9449 |
| 3.299999 | -0.3210 | -2.8566 |

| Dist.m | X(mm) | Y(mm) | Z(mm) |
|---|---|---|---|
| 0.000000 | 29.9703 | -0.9457 | 0.0884 |
| 0.275000 | 30.1052 | -0.9457 | 0.1081 |
| 0.550000 | 30.2369 | -0.9457 | 0.1177 |
| 0.825000 | 30.3655 | -0.9457 | 0.1192 |
| 1.100000 | 30.4910 | -0.9457 | 0.1149 |
| 1.375000 | 30.6135 | -0.9457 | 0.1069 |
| 1.650000 | 30.7331 | -0.9457 | 0.0975 |
| 1.925000 | 30.8499 | -0.9457 | 0.0888 |
| 2.199999 | 30.9638 | -0.9457 | 0.0831 |
| 2.474999 | 31.0751 | -0.9457 | 0.0825 |
| 2.749999 | 31.1837 | -0.9457 | 0.0892 |
| 3.024999 | 31.2898 | -0.9457 | 0.1054 |
| 3.299999 | 31.3934 | -0.9457 | 0.1333 |

| Dist.m | Fz(kN) | My(kNm) |
|---|---|---|
| 0.000000 | 1.3925 | 2.1682 |
| 0.275000 | 1.3925 | 1.7852 |
| 0.550000 | 1.3925 | 1.4023 |
| 0.825000 | 1.3925 | 1.0194 |
| 1.100000 | 1.3925 | 0.6365 |
| 1.375000 | 1.3925 | 0.2535 |
| 1.650000 | 1.3925 | -0.1294 |
| 1.925000 | 1.3925 | -0.5123 |
| 2.199999 | 1.3925 | -0.8952 |
| 2.474999 | 1.3925 | -1.2782 |
| 2.749999 | 1.3925 | -1.6611 |
| 3.024999 | 1.3925 | -2.0440 |
| 3.299999 | 1.3925 | -2.4269 |



**DESIGN OF FOOOTINGS**

| Footing No. | Group ID | Foundation Geometry | | |
|---|---|---|---|---|
| - | - | Length | Width | Thickness |
| 41 | 1 | 5.250 m | 5.250 m | 0.305 m |
| 42 | 2 | 5.350 m | 5.350 m | 0.355 m |
| 43 | 3 | 5.400 m | 5.400 m | 0.356 m |
| 44 | 4 | 4.550 m | 4.550 m | 0.355 m |
| 45 | 5 | 4.000 m | 4.000 m | 0.606 m |
| 46 | 6 | 3.950 m | 3.950 m | 0.656 m |
| 47 | 7 | 2.850 m | 2.850 m | 0.505 m |
| 48 | 8 | 4.350 m | 4.350 m | 0.506 m |

| | | | | |
|---|---|---|---|---|
| 49 | 9 | 3.100 m | 3.100 m | 0.655 m |
| 50 | 10 | 6.250 m | 6.250 m | 0.355 m |
| 51 | 11 | 3.950 m | 3.950 m | 0.656 m |
| 52 | 12 | 4.000 m | 4.000 m | 0.656 m |
| 53 | 13 | 5.050 m | 5.050 m | 0.657 m |
| 54 | 14 | 4.500 m | 4.500 m | 0.756 m |
| 55 | 15 | 4.700 m | 4.700 m | 0.757 m |
| 56 | 16 | 4.450 m | 4.450 m | 0.756 m |
| 57 | 17 | 6.450 m | 6.450 m | 0.356 m |
| 58 | 18 | 3.000 m | 3.000 m | 0.555 m |
| 59 | 19 | 3.750 m | 3.750 m | 0.305 m |
| 60 | 20 | 3.300 m | 3.300 m | 0.305 m |
| 61 | 21 | 3.050 m | 3.050 m | 0.305 m |
| 62 | 22 | 2.500 m | 2.500 m | 0.455 m |
| 63 | 23 | 3.650 m | 3.650 m | 0.305 m |
| 64 | 24 | 5.400 m | 5.400 m | 0.305 m |
| 65 | 25 | 3.600 m | 3.600 m | 0.305 m |
| 66 | 26 | 2.650 m | 2.650 m | 0.455 m |
| 67 | 27 | 2.950 m | 2.950 m | 0.505 m |
| 68 | 28 | 2.950 m | 2.950 m | 0.505 m |
| 69 | 29 | 2.800 m | 2.800 m | 0.555 m |
| 70 | 30 | 2.800 m | 2.800 m | 0.555 m |
| 71 | 31 | 3.350 m | 3.350 m | 0.355 m |
| 72 | 32 | 3.100 m | 3.100 m | 0.405 m |
| 73 | 33 | 3.550 m | 3.550 m | 0.355 m |
| 74 | 34 | 4.450 m | 4.450 m | 0.305 m |
| 75 | 35 | 3.850 m | 3.850 m | 0.305 m |
| 76 | 36 | 3.500 m | 3.500 m | 0.305 m |
| 77 | 37 | 2.650 m | 2.650 m | 0.455 m |
| 78 | 38 | 4.000 m | 4.000 m | 0.355 m |
| 79 | 39 | 3.500 m | 3.500 m | 0.355 m |
| 80 | 40 | 4.150 m | 4.150 m | 0.355 m |

**Isolated Footing 41**

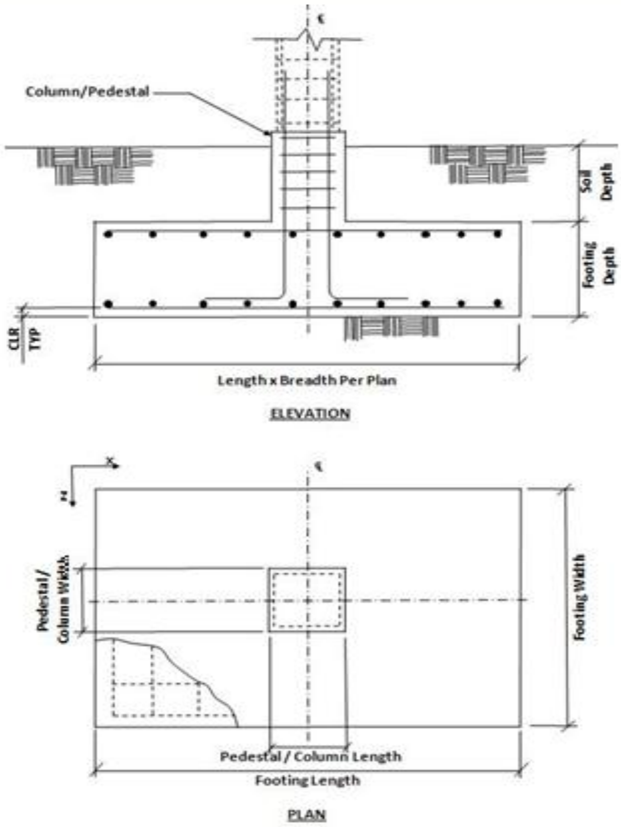



Fig.8.7 Isolated Footing

**Input Values**

**Footing Geometry**

Design Type: Calculate Dimension

Footing Thickness (Ft): 305.000 mm

Footing Length - X (Fl): 1000.000 mm

Footing Width - Z (Fw): 1000.000 mm

Eccentricity along X (Oxd): 0.000 mm

Eccentricity along Z (Ozd): 0.000 mm

Column Dimensions

Column Shape: Rectangular

Column Length - X (Pl): 0.600 m

Column Width - Z (Pw): 0.230 m

**Pedestal**

Include Pedestal? No

Pedestal Shape: N/A

Pedestal Height (Ph): N/A

Pedestal Length - X (Pl): N/A

Pedestal Width - Z (Pw): N/A

**Design Parameters**

**Concrete and Rebar Properties**

Unit Weight of Concrete: 30.000 KN/$m^3$

Strength of Concrete: 30.000 N/$mm^2$

Yield Strength of Steel: 415.000 N/$mm^2$

Minimum Bar Size: Ø8

Maximum Bar Size: Ø16

Minimum Bar Spacing: 50.000 mm

Maximum Bar Spacing: 300.000 mm

Pedestal Clear Cover (P, CL): 50.000 mm

Footing Clear Cover (F, CL): 50.000 mm

**Soil Properties**

| | |
|---|---|
| Soil Type : | Drained |
| Unit Weight : | 22.000 kN/$m^3$ |
| Soil Bearing Capacity : | 200.000 kN/$m^2$ |

**Sliding and Overturning**

Coefficient of Friction: 0.500

Factor of Safety against Sliding: 1.500

Factor of Safety against Overturning: 1.500

**Design Calculations Footing Size**

Initial Length ($L_o$) = 1.000 m

Initial Width ($W_o$) = 1.000 m

Uplift force due to buoyancy = 0.000 KN

Effect due to adhesion = 0.000 KN

Area from initial length and width, $A_o = L_o \times W_o$ = 1.000 $m^2$

Min. area required from bearing pressure, $A_{min} = P / q_{max}$ = 3.470 $m^2$

**Note: $A_{min}$ is an initial estimation.**

**P = Critical Factored Axial Load (without self weight/buoyancy/soil).**

**$q_{max}$ = Respective Factored Bearing Capacity.**

| Final Footing Size | | | | |
|---|---|---|---|---|
| Length ($L_2$) = | 5.250 | m | Governing Load Case : | # 1 |
| Width ($W_2$) = | 5.250 | m | Governing Load Case : | # 1 |
| Depth ($D_2$) = | 0.305 | m | Governing Load Case : | # 1 |
| Area ($A_2$) =27.563$m^2$ | | | | |

## ANALYSIS AND DESIGN USING STAAD

## DETAILS OF THE ANALYSIS SOFTWARE

STAAD for windows is comprehensive structural engineering software that addresses all aspects of engineering-model development, analysis, design, verification and visualization. Staad for windows is based on the principles of finite element analysis and is available in a "concurrent engineering" profile. It is capable of analyzing and designing structures consisting of both frames and shell elements. Following are the main options available from the concurrent graphics environment.

| | |
|---|---|
| STAAD | Analysis and design |
| STAAD PRE | Graphical input generator |
| STAAD POST | Graphical post processing |
| STAAD INTDES | Interactive design of structural components |

STAAD uses a command language based input format which can be created through a text editor or through STAAD PRE, graphical or through CAD, based formats.

Analysis facilities available in STAAD are:

1. Stiffness Analysis-based on the matrix displacement method.
2. Second Order Analysis
   i. P-Delta Analysis-incorporates secondary loading.
   ii. Non Linear Analysis-incorporates both secondary loading and geometric stiffness correction.
3. Dynamic Analysis-solution of free vibration problems response spectrum analysis and fixed vibration analysis.

## IDEALIZATION OF STRUCTURE

All the beams and columns of the main building of our hotel were included as prismatic members with six degrees of freedom (3D beam elements). The columns at the foundation level were assumed to be pinned.

## LOAD COMBINATION

The load on beams from slabs from slabs has been considered as uniformly distributed on the entire span. This loading was arrived at by considering equivalent uniformly distributed load from the triangular or trapezoidal pattern in the case of one-way slabs. In this case dead load, live load, wind load and their combination has been considered. The load cases 1, 2 and 3 correspond to dead load, live load and wind load respectively. Load cases 4 and 5 correspond to combination of dead load and live load, dead load and wind load. The intensities of wind load are calculated from the IS: 875(Part-3). The whole structure was analyzed for these 6 different loading conditions and the design was carried out based on the most critical loading condition.

The analysis result consists of member end forces, which includes shear forces and bending moments, deflection of members, support reactions etc.

The analysis turned out well with the deflection of the structure within the permissible limits. The member forces, support displacements and support reactions obtained are given in tables.

**SEISMIC PARAMATERS**

FROM IS 1893 (PART-1)-2002

| | | |
|---|---|---|
| Zone Factor (Z) (Seismic Zone 3 – Table-2Clause 6.4.2) | = | 0.1 |
| Importance factor (I) (Table-6 Clause 6.4.2) | = | 1.0 |
| Response Reduction Factor (R) (Table 7 Clause 6.4.2) | = | 5.0 |
| Structural Soil (SS) (Fig 2 type 1 Rock or Hard soil) | = | 1.0 |
| Structure Type (ST) (RC Frame Building) | = | 1.0 |
| Damping Ratio ($D_{mp}$) | = | 0.05 |

**COLLAPSE LOAD COMBINATIONS (KN/M)**

1. 1.5 (DL +LL)
2. 1.5 (DL+EQ X)
3. 1.5 (DL+EQ Z)
4. 1.2 (DL+LL+EQ X)
5. 1.2 (DL+LL+EQ Z)
6. 0.9 DL+1.5 EQ X
7. 0.9 DL + 1.5 EQ Z
8. 1.0 (DL + LL)
9. 1.5(DL + WL X)
10. 1.5 (DL + WL Z)
11. 1.2 (DL + LL + WL X)
12. 1.2 (DL + LL + WL Z)
13. 0.9 DL + 1.5 WL X
14. 0.9 DL + 1.5 WLZ

**SERVICEABILITY LOAD COMBINATIONS**

To examine the Sway and Drift in different columns of the building by using Serviceability load combinations are as follows:

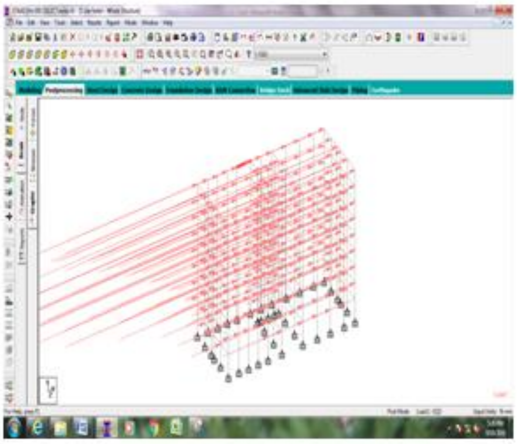
1. 1.0 (DL + EQ X)
2. 1.0 (DL – EQ X)
3. 1.0 (DL + EQ Z)
4. 1.0 (DL – EQ Z)
5. 1.0 (DL + WL X)
6. 1.0 (DL – WL X)
7. 1.0 (DL + WL Z)
8. 1.0 (DL – WL Z)
9. DL + 0.8 (LL + EQ X)
10. DL + 0.8 (LL – EQ X)
11. DL + 0.8 (LL + EQ Z)
12. DL + 0.8 (LL – EQ Z)
13. DL + 0.8 (LL + WLX)
14. DL + 0.8 (LL – WLX)
15. DL + 0.8 (LL + WLZ)
16. DL + 0.8 (LL – WLZ)

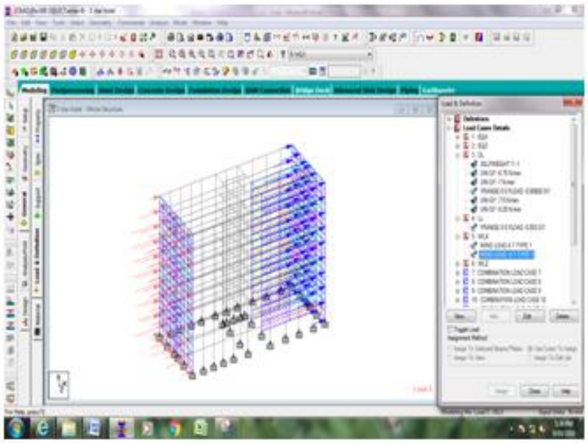
## Member End Forces

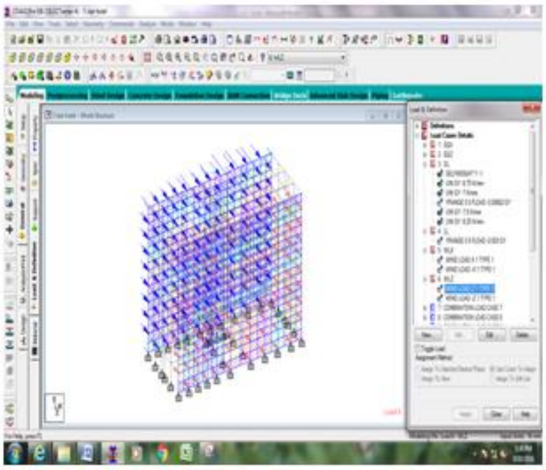
Units Force - KN ,

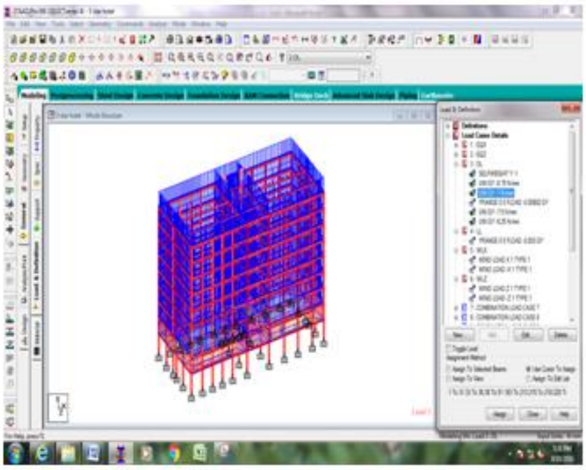
Length - m

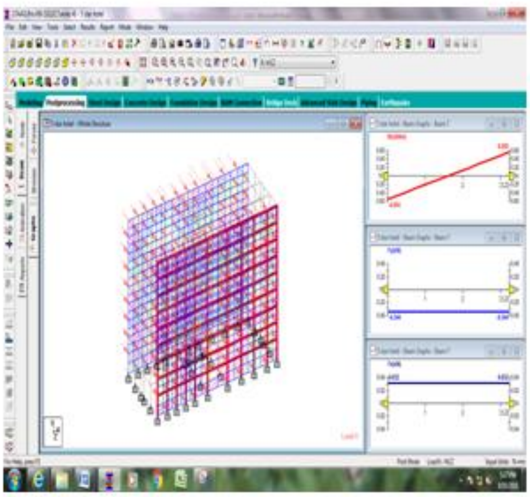
**Staad output**

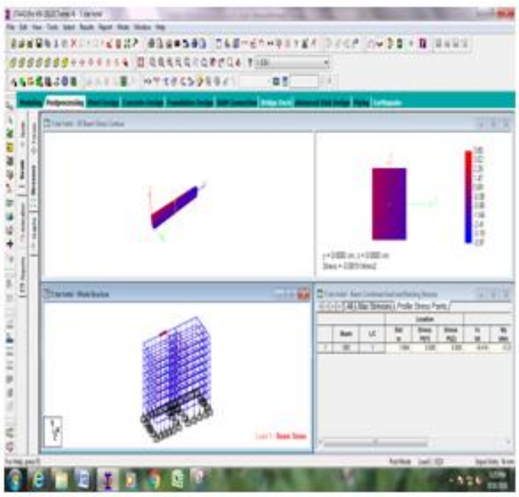












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