Development And Design of Royal City

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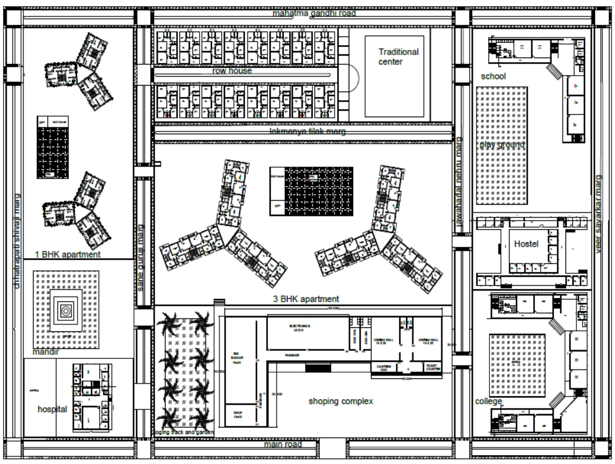
Abstract – *In old time stone bricks were popular building material nowadays cement concrete is conveniently used for construction of multistoried construction reinforced cement concrete (R.C.C) is used .r.c.c. is composite structure made up of concrete and steel .reinforcement is used to carry tensile stresses of building as well as compressive stresses upto some extent of any building .it also used to construct more safely earthquake resistant structurefor this construction we design various members of building such as beam , column, slab, footing,staircase,by considering factor of safety in which economy is also taken in account*

Key Words- **cement concrete,reinforced cement concrete,tensile& compressive stresses,earthquake**



resisting structure, factor of safety ,economy

plan of royal city

1.INTRODUCTION

There are many cities constructed in India and Maharashtra like amanora city in pune and magarpatta city in pune also a nanded city. The main purpose for construction of that cites is to improve the poshness of the area also to give entertain able things people and to give optional things for the people who have to take luxurious look by investing their money And hence by inspiring by that cities and to improve appearance of Shrirampur city area a work of surveying,estimating, and rcc designing for that city. This includes 3bhk apartments, 3bhk row houses, school. Collage, hostel, 1bhk apartment, in the 50 acres, and which named as royal city

1.1 Methods

Steps use to find slab design

Step 1 if the shorter span lx

(<) less then 3.5 m & live load less then 3 kN/m^2

Then , $D_l = lx/35$ ……….for Fe250

$D_l = lx/0.8 X 35$ ……….forFe415

If the shorter span l_x (>) greater than 3.5m

Live load > 3 kN/m^2

$d = lx/20 X M_f$

$D = d + cover$

Step 2- calculate effective span

$l_x = lx + d$

OR

c/c distance between two support whichever is less

step 3 – loading calculate

calculate factored laod (Wd) as calculated in simply supported slab step 4 – calculate factored moment

$M_{xd} = \alpha_x \ X \ W_d \ X \ l_{xe}^2$

$M_{yd} = \alpha_y \ X \ W_d \ X \ l_{xe}^2$

Where, M_{xd} = factored moment about x-x axis

M_{yd} = factoed moment about y_y axis

α_x & α_y = bending moment coefficient for slab (table no . 7.1 page no. 91) from IS 456-2000

step 5- determine required depth

d for bending

$M_d = 0.149$ FCK bd^2 ………….. for Fe250

$M_d = 0.138$ FCK bd^2 …………... for Fe 415

$M_d = 0.133$ FCK bd^2 ……………for Fe500

check $d_{(required)} < d_{(Assume)}$

step 6 – determine main steel –

A) Area of steel in x- direction

$M_{xd} = 0.87 \ fy \ A_{st} \ (d- 0.42X_u)$

Where , $xu = (0.87 \ fy \ A_{st}) / (0.36 \ Fck \ b)$

Find spacing $s_x = 1000 \ X \ A\phi \ / \ A_{stx}$

Where , $A\phi$ = area of one bar

B) Area of steel in Y –direction

$M_{yd} = 0.87 \ fy \ A_{sty} \ (d_y – 0.42X_u)$

Where $d_y = d – \phi$

Find spacing $s_y = 1000 \ X \ A\phi / \ A_{sty}$

check for spacing S_x & $S_y \ngtr$ 3d or 300 mm

step 7 – check for shear

as shear for in slab is very small no need to check for shear

step 8 – check for deflection

step 9 – summary

1) depth of slab
2) cover
3) main steel along X - direction
4) main steel along Y – direction

step 10 – reinforcement details

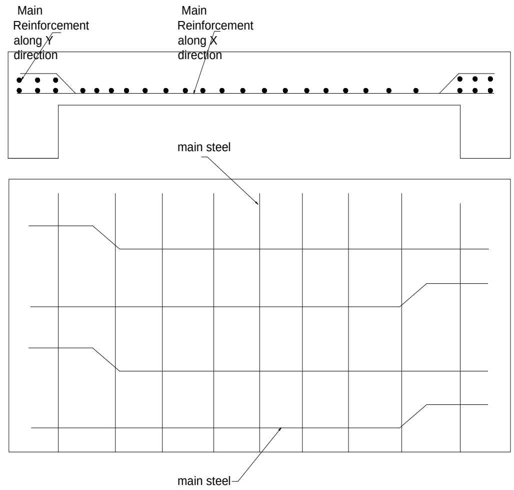


Fig. reinforcement detail of slab

2. Sample Problem

Step 1

if the shorter span lx(<) less then 3.5 m & live load less then 3 kN/m²

Then ,

If the shorter span l_x (>) greater than 3.5m

Live load > 3 kN/m²

d = 3500/20 X 1.4

= 125 mm

D = 125 + 20

= 145 mm

Step 2- calculate effective span

l_{xe} = 4+ 0.2 = 4.2

OR

c/c distance between two support whichever is less

step 3 – loading calculate

self wet = 1 X D(m) X 25 ……….1

= 1 X 0.145 X 25

= 3.625 KN/m

Live load = 0.75 KN/m ……….2

Floor finish = 0.75 KN/m ………..3

w= 5.125 KN/m …..1+2+3

factored load = 1.5 X w

= 1.5 X 5.125

= 7.68 KN/m

Aspect ratio = l_y/l_x = 4/3.5 = 1.14 m

Ly/lx	1.1	1.2
α_x	0.074	0.084
α_y	0.061	0.059

α_x = 0.074 + (0.084-0.074)/(1.2-1.1)X(1.14-1.1)

=0.078

α_y = 0.061 + (0.059-0.061)/(1.2-1.1) X (1.14 – 1.1)

= 0.0602

step 4 – calculate factored moment

$M_{xd} = \alpha_x$ X W_d X l_{xe}^2

=0.078 X 7.68 X 3.5^2

= 7.32 kN/m

$M_{yd} = \alpha_y$ X W_d X l_{xe}^2

= 0.0602 X 7.58 X 3.5^2

= 5.58 kN/m

Where, M_{xd} = factored moment about x-x axis

M_{yd} = factored moment about y_y axis

α_x & α_y = bending moment coefficient for slab (table no . 7.1 page no. 91) from IS 456-2000

step 5- determine required depth

d for bending

M_d = 0.138 FCK bd^2 …………... for Fe 415

0.138 X 20 X 1000 d^2 = 7.62 X 10^6

d^2 = 7.62 x 10^6 / 2760

d = 52.54 mm < 125 mm

hence check ok

step 6 – determine main steel –

C) Area of steel in x- direction

M_{xd} = 0.87 fy A_{st} (d- 0.42X_u)

7.62 X 10^6 =0.87x415xA_{st}(125-0.42x0.05A_{st})

=361.05Ast(125-0.021Ast)

=45131.25A_{st}-7.58A_{st}^2

7.58A_{st}^2-45131.25+7.62x10^6 =0

A_{stx}=173.92 mm²

Where , xu = (0.87 fy A_{st})/ (0.36 Fck b)

= (0.87 X 415 X A_{st}) / (0.36 X 20 X 1000)

= 0.05 A_{st}

Find spacing s_x = 1000 X Aϕ / A_{stx}

=1000X50.26/(173.92)

=288.98mm≅280mm

Where , Aϕ = area of one bar

D) Area of steel in Y –direction

M_{yd} = 0.87 fy A_{sty} (d_y – 0.42X_u)

5.58x10^6=0.87x415xA_{sty}(117-0.42x0.05A_{st})

=361.05A_{sty}(117-0.021A_{st})

=42242.85A_{sty} -7.58A_{st}^2

7.58A_{st}^2-42242.85A_{sty}+5.58x106=0

A_{sty}=135.38mm²

Where d_y = d – ϕ

=125-8

=117 mm

Find spacing s_y = 1000 X Aϕ/ A_{sty}

=1000x50.26/135.38

=371.25mm≅340mm

check for spacing S_x & S_y ≩ 3d or 300 mm

S_x ≩ 3d or 300

280 ≩ 3x125

280 ≩ 375

S_y ≩ 3dy or 300

340 ≩ 3x117

340 ≩ 351

step 7 – check for shear

as shear for in slab is very small no need to check for shear

step 8 – check for deflection

step 9 – summary

5) depth of slab (D)=145mm
6) cover =20mm
7) main steel along X - direction
   8mmϕ@280mmc/c
8) main steel along Y – direction
   8mmϕ@340mmc/c

step 10 – reinforcement details

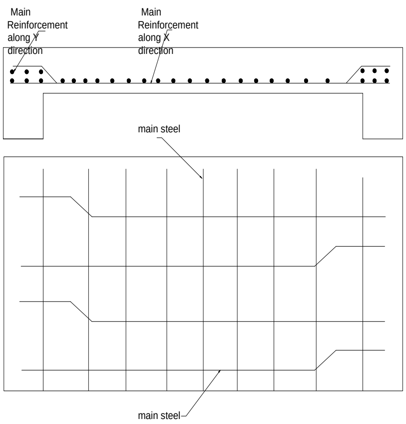


Fig. reinforcement detail of slab

3. CONCLUSIONS

By use of Reinforced cement concrete (R.C.C)we construct the safe and earthquake resisting structure. By considering various aspects such as factor of safety and economy we design the city effectively

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