Dr.AMBEDKAR INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

MANUAL FOR DESIGN OF RCC STRUCTURAL ELEMENTS IPCC22CVU503

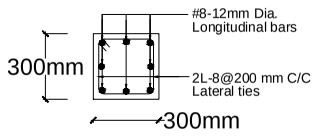
Prepared by Dr.Ashwini L K, Assistant Professor , Department of Civil Engineering

1. Prepare a working drawing for an isolated column footing (RCC) for a column size 300mm x 300mm reinforced with #8 of 12mm HYSD- steel as main bars together with 2 legged 8ϕ stirrups at 200c/c. Details of footing: Size of footing is 1.6m x 1.6m and the thickness of the footing at the face of the column is 450mm which reduces to 300mm at the edge of footing. The mat comprises of 10ϕ TOR- steel at 100 c/c both ways. The footing is provided with PCC bed in 1:3:6 of thickness 75mm.Depth of foundation is1.5m from natural ground level. Solution: Refer Fig. 2.3
2. Prepare a working drawing for an isolated rectangular RCC column and footing has the following details: Column size: (400 x 600) mm. Size of footing: 2m x 3m of uniform thickness 450mm. Depth of foundation below GL = 1.5m Height of column to be shown above GL = 1.0m Thickness of PCC bed in 1:3:6 = 75mm Details of reinforcement: Column: #8 - 16ϕ as main bars with 2L - 8ϕ @ 150 c/c lateral ties Footing: Longer direction steel - 12ϕ @ 130 c/c Shorter direction steel - 12ϕ @ 220 c/c. Solution: Refer Fig. 2.4
3. Draw plan, sectional elevation and cross section of a slab type combined footing with the given details: Size of columns = (400 x 400)mm Size of footing =2m x 4m Depth of footing = 600mm Centre to centre distance between the columns = 2m Thickness of PCC bed in 1:3:6 = 100mm Column reinforcement details – longitudinal steel of #8 - 20ϕ with lateral ties of 2L - 8ϕ @ 200 c/c Footing reinforcement details – bottom reinforcement of 12ϕ @ 100 c/c both ways and top reinforcement of 12ϕ @ 150 c/c both ways Solution: Refer Fig. 2.5
4. Draw plan and sectional elevation of RCC dog legged staircase for an office building which measures 3m x 5.5m. The vertical distance between the floor is 3.3m (including landing). Thickness of the floor slab is 150mm. Provide steps with tread of 300mm and rise of 150mm. Thickness of waist slab and landing slab is 150mm. Width of stair is 1.5m. Reinforcement details: main steel: 10ϕ @125 c/c spacing and distribution: 8ϕ @ 250 c/c spacing. Solution: Refer Fig. 2.10
5. Draw plan and sectional elevation of an open newel stair with a rectangular well for an office building with the following data: Inside dimensions of staircase = 4.5m x 5.4m. Height between the floors is 3.6m. Thickness of the floor slab and landing slab is 150mm. Width of landing=1.5m. Width of stair = 1.5m. Tread=300mm, riser=150mm. Waist slab thickness = 150mm. Reinforcement details: Main steel:12ϕ @150 c/c spacing and Distribution: 8ϕ @ 250 c/c spacing. Solution: Refer Fig. 2.11
6. Draw the longitudinal section and cross section of a rectangular RCC beam simply supported with the following data: Clear span = 4.8m Bearing at the supports = 300mm Width of beam = 300mm Overall depth of beam = 500mm Main reinforcement consists of

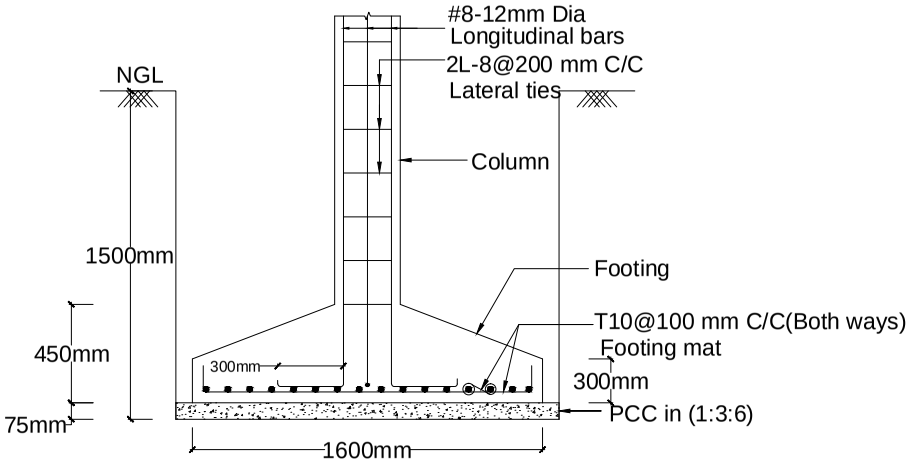
#5 - 20ϕ bars in two layers. Provide #2 - 12ϕ as anchor bars. Stirrups: 2L 8ϕ @ 180 c/c near the supports up to 1.20m and @ 220 c/c in the remaining portion. Solution: Refer Fig. 2.14

7. Draw a detailed longitudinal section, a cross section near the supports and a section at the middle of the span of a simply supported doubly reinforced beam for the following data: Clear span = 5.4m Bearing over the supports = 300mm Size = 300 x 800 mm Main reinforcement tensile: #7 - 25ϕ. 4 straight and 3 bent up @ 1400mm from support. Compression reinforcement: #4 – 25ϕ. Spacer bars=25 ϕ Side face reinforcement=#2-12ϕ Shear reinforcement: 2L - 12ϕ @ 150 c/c for a distance of 1.5m from the support and 2L - 12ϕ @ 300 c/c for remaining middle portion. Solution: Refer Fig. 2.15
8. Draw longitudinal section and cross section of a cantilever beam from the following data: Clear projection from the face of RCC column = 2500mm Size of column = 300mm x 300mm Size of beam at fixed end = 300mm x 300mm Size of beam at free end = 300mm x 150mm Reinforcement main bars: #5 - 20ϕ with 2 bars curtailed at 1500mm from the support and show the curtailment plan. Compression bars: #3 - 16ϕ Stirrups: 2L - 6ϕ @ 200 c/c up to 1000mm from support and @ 300 c/c in remaining length. Solution: Refer Fig. 2.16
9. Draw cross section and plan of one way roof slab showing the details of reinforcement for the following data: Clear span = 4m Length of slab = 10m Thickness of slab = 130mm Bearing wall = 200mm Main reinforcement: 12ϕ @ 250 c/c with alternate bars bent up. Distribution reinforcement: 8ϕ @ 200 c/c. Solution: Refer Fig. 2.17
10. One way continuous slab has been provided for a hall of clear dimensions 8mx14.25m.The slab is supported on RCC beams. The following details are given. C/C distance of supporting beams=3.5m. Column dimensions on which beam rest=250mmx500mm. C/s of beams=250mmx600mm. Slab thickness=150mm. Beam depth is inclusive of slab depth. Main positive reinforcement at the end and interior panels=10ϕ @120 c/c Main negative reinforcement at all supports= 10ϕ @120 c/c. Distribution steel =8ϕ @ 250 c/c. Draw cross section and plan showing the details of reinforcement (Bottom & top). Solution: Refer Fig. 2.18
11. A simply supported two way slab is supported on all sides by using 230mm thick wall. The dimension of two-way slab is 3m x 4m (Clear). Following are the reinforcement details: Along shorter span: 10ϕ @125 c/c. Along longer span: 10ϕ @150 c/c. Negative steel for shorter span: 10ϕ @250 c/c. Negative steel for longer span: 10ϕ @300 c/c. Alternative bars are cranked. Corner mats are 8ϕ @150 c/c along shorter span and 8ϕ @200 c/c along long span. Thickness of slab is 150mm. Draw plan showing reinforcement and cross section along longer & shorter span. Solution: Refer Fig. 2.19

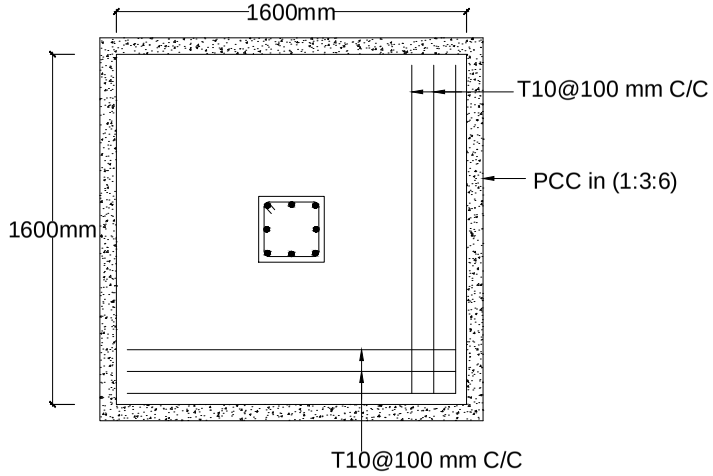
SQUARE ISOLATED COLUMN FOOTING(Fig:2.3)



C/S OF SQUARE COLUMN

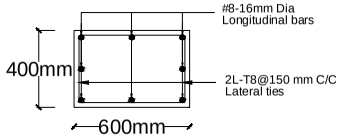


L/S OF SQUARE ISOLATED COLUMN FOOTING

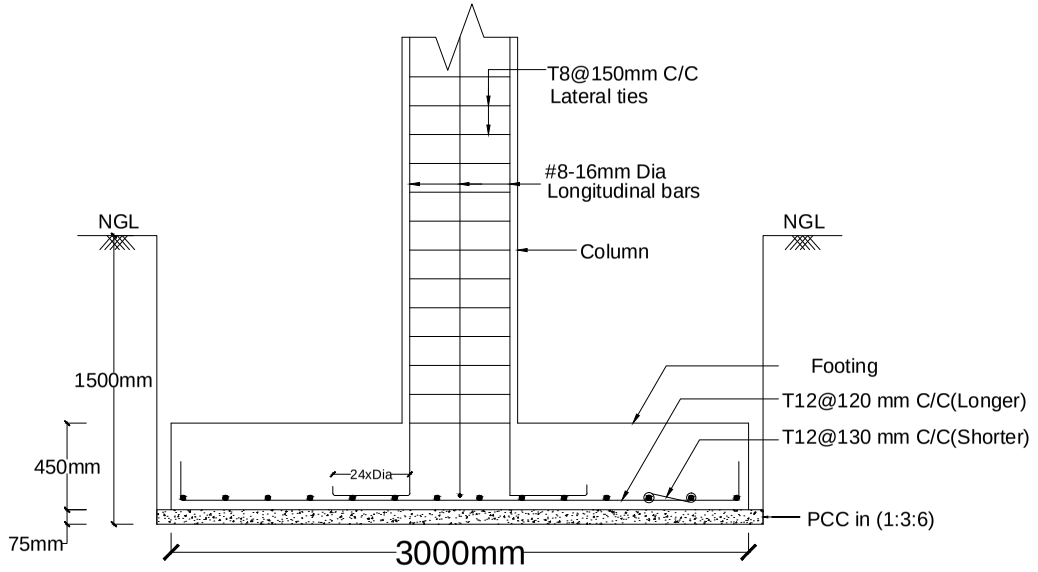


C/S OF SQUARE ISOLATED COLUMN FOOTING

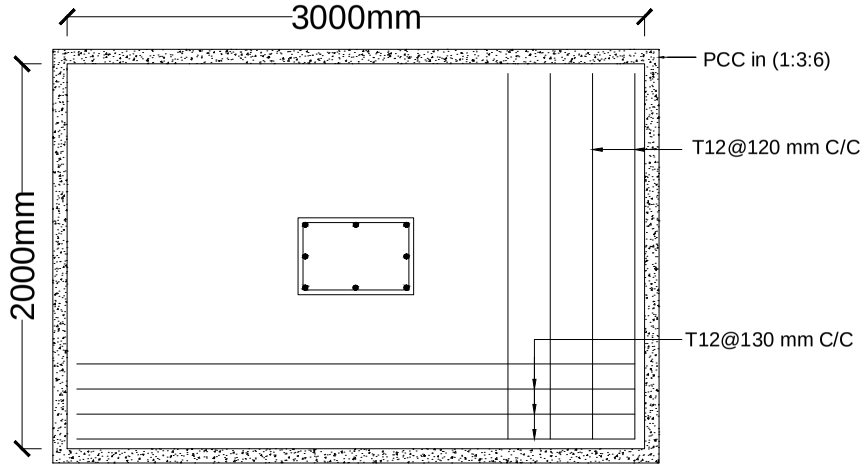
RECTANGULAR ISOLATED COLUMN FOOTING(Fig:2.4)



C/S OF RECTANGULAR COLUMN

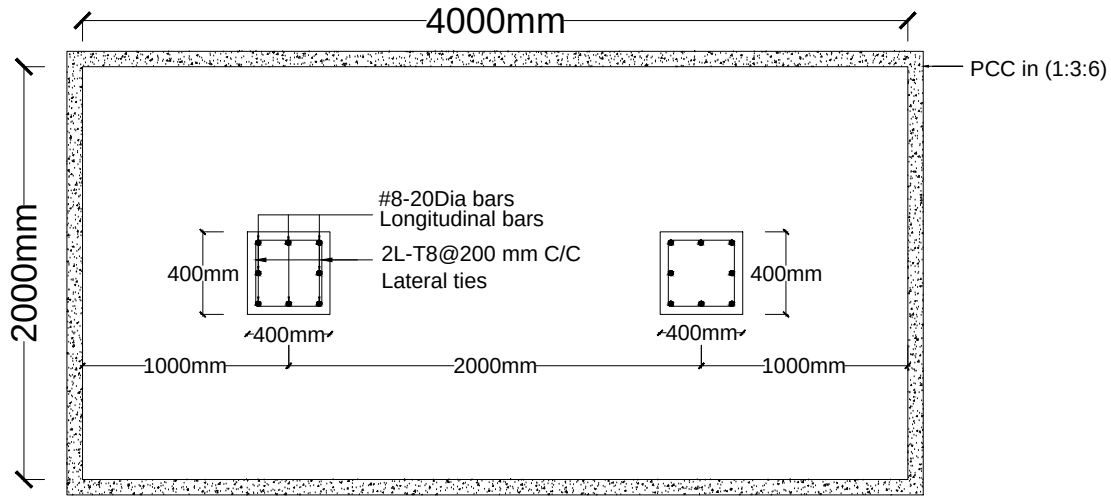


L/S OF RECTANGULAR ISOLATED COLUMN FOOTING

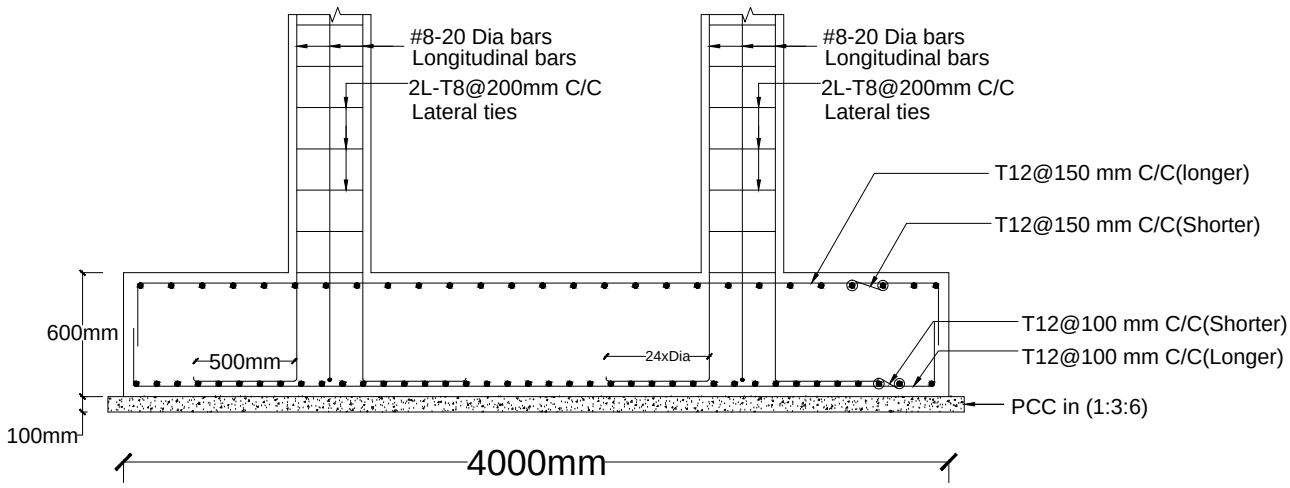


C/S OF RECTANGULAR ISOLATED COLUMN FOOTING

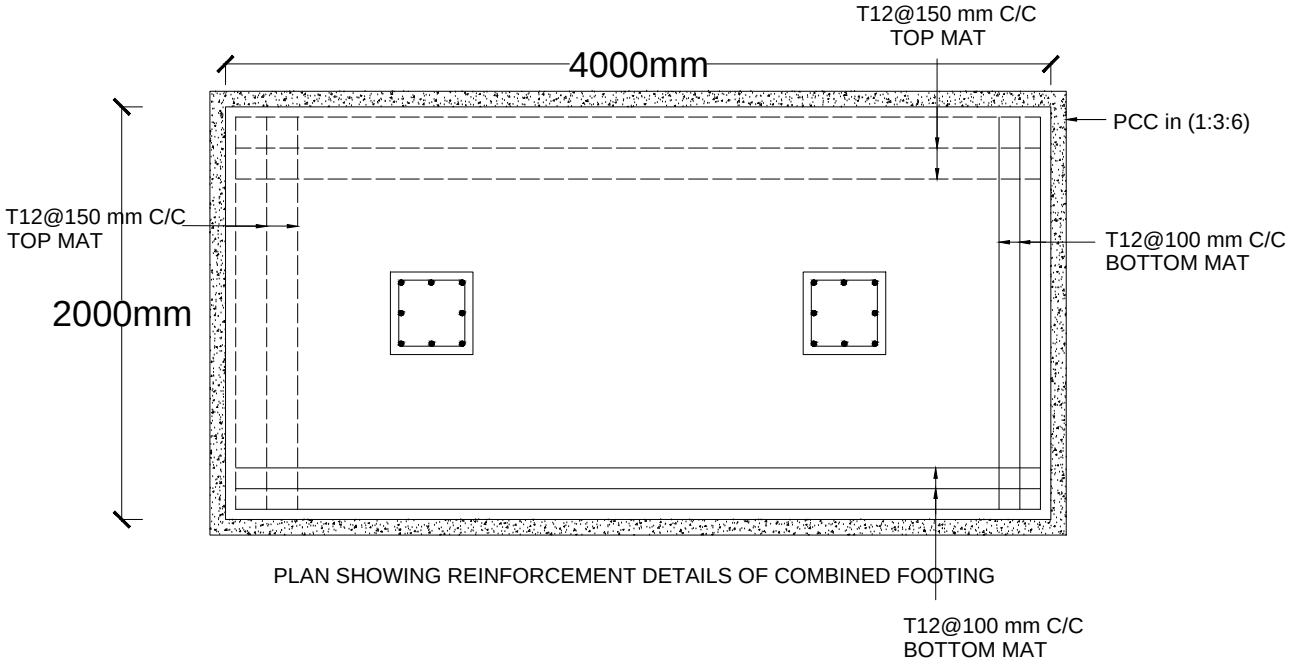
SLAB TYPE COMBINED FOOTING(Fig:2.5)



PLAN OF COMBINED FOOTING

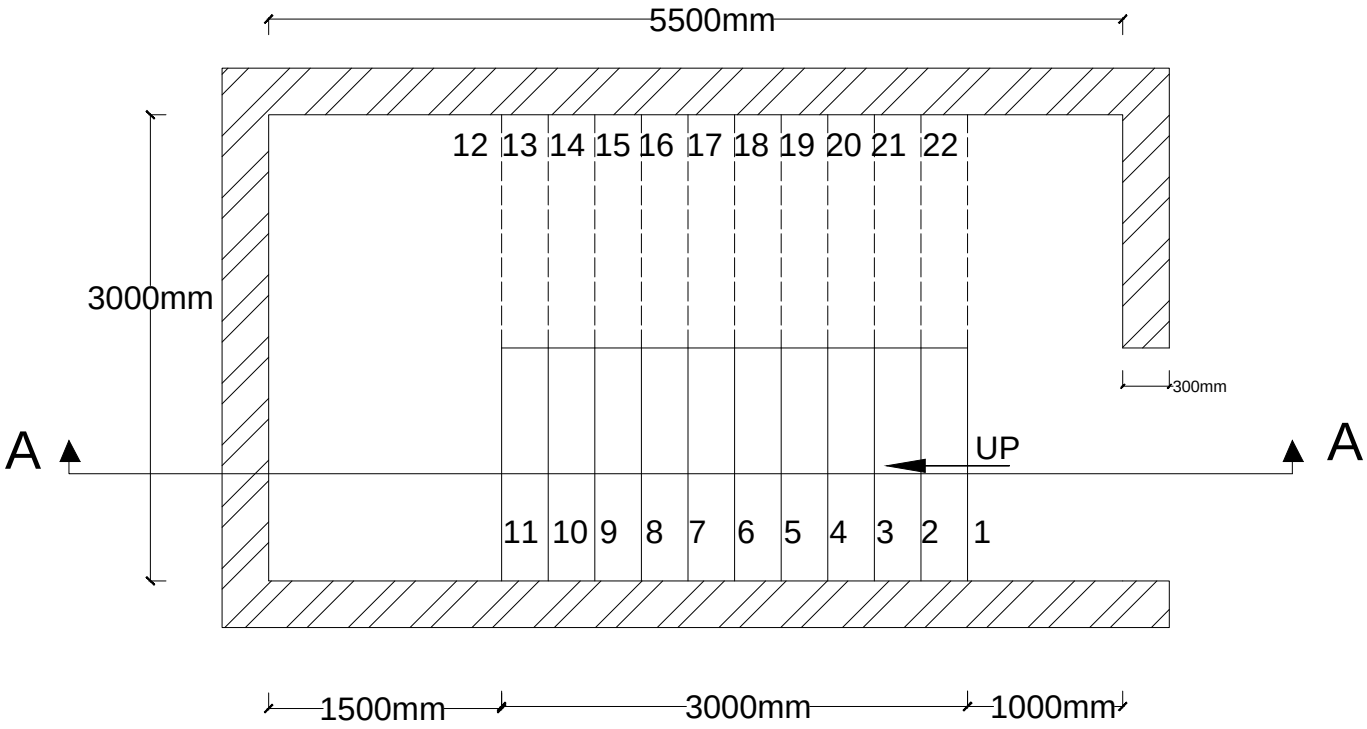


L/S OF COMBINED FOOTING

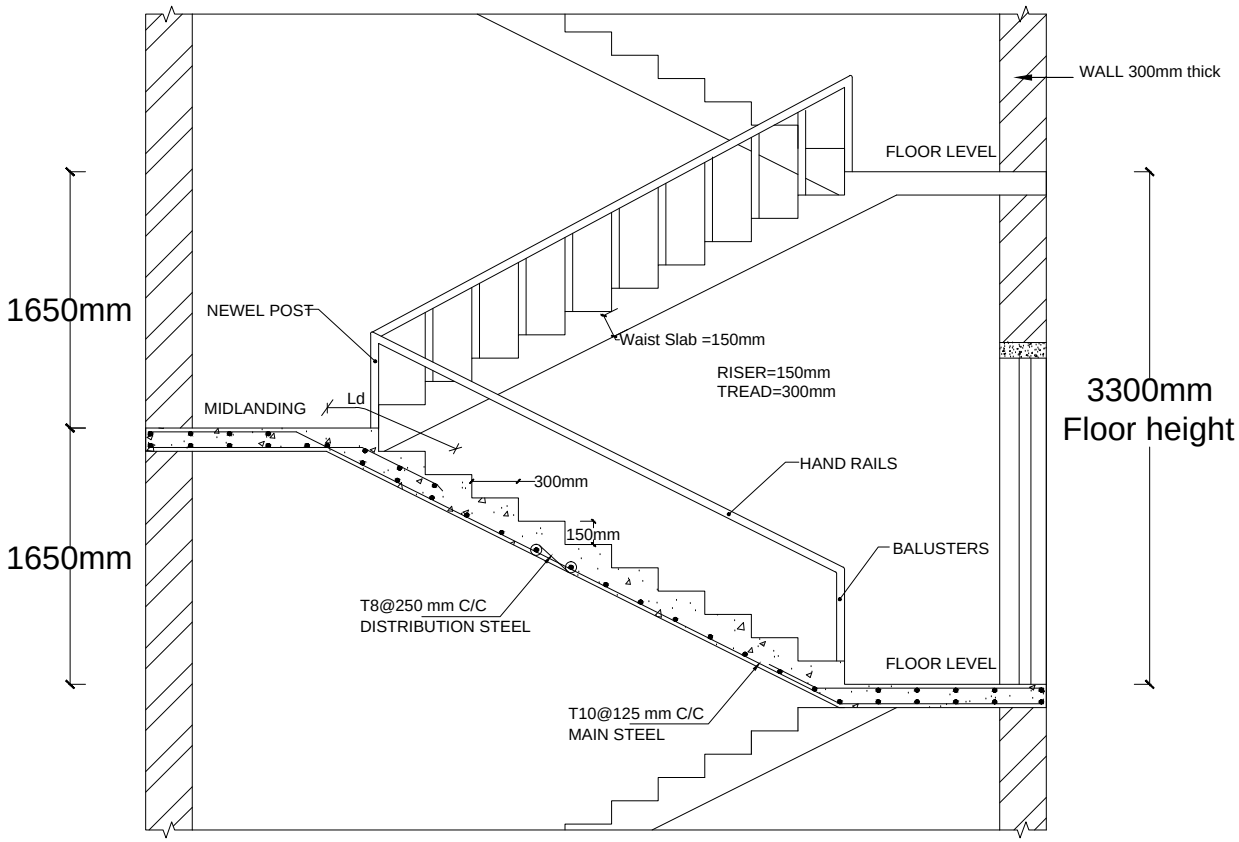


PLAN SHOWING REINFORCEMENT DETAILS OF COMBINED FOOTING

DOGLEGGED STAIR CASE (Fig:2.10)



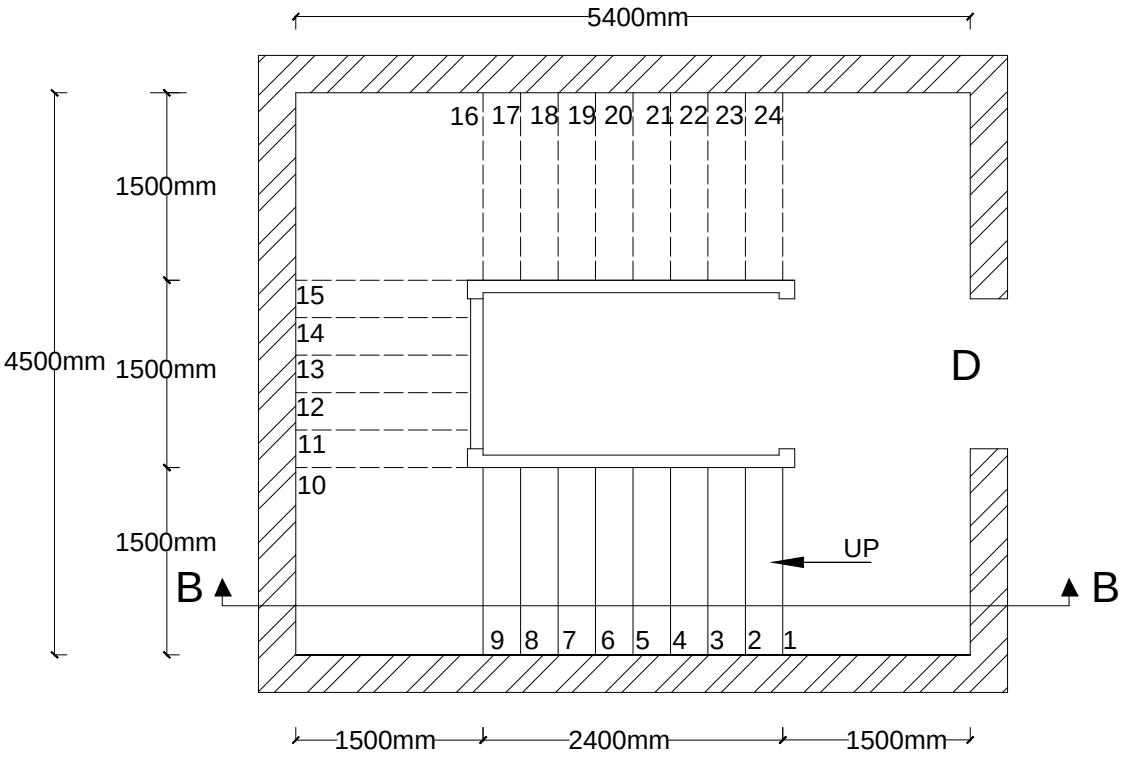
PLAN OF DOGLEGGED STAIRCASE



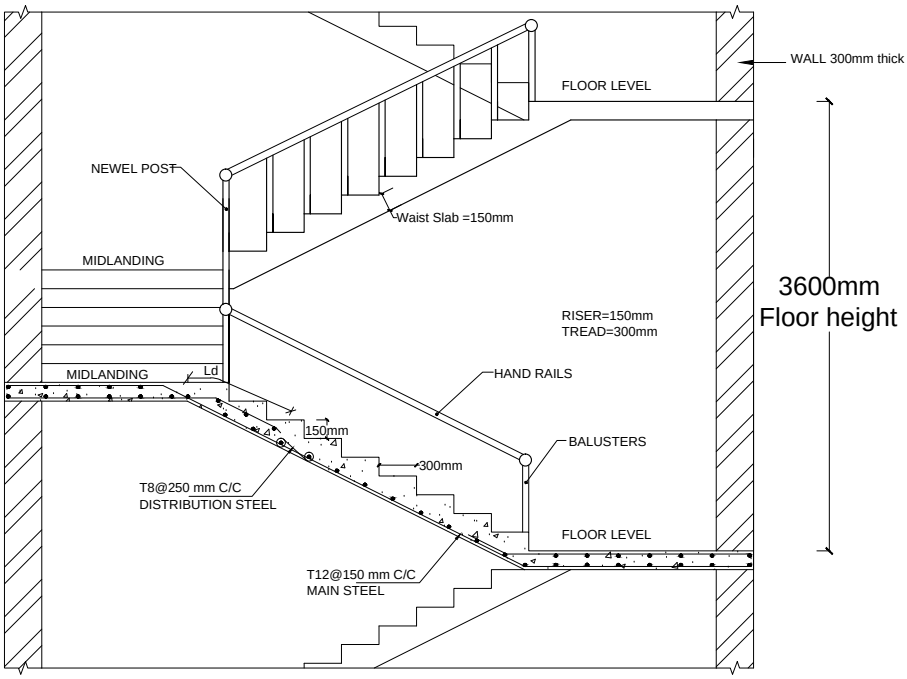
SECTION A-A

SECTIONAL ELEVATION OF

OPEN NEWEL STAIR CASE (Fig:2.11)

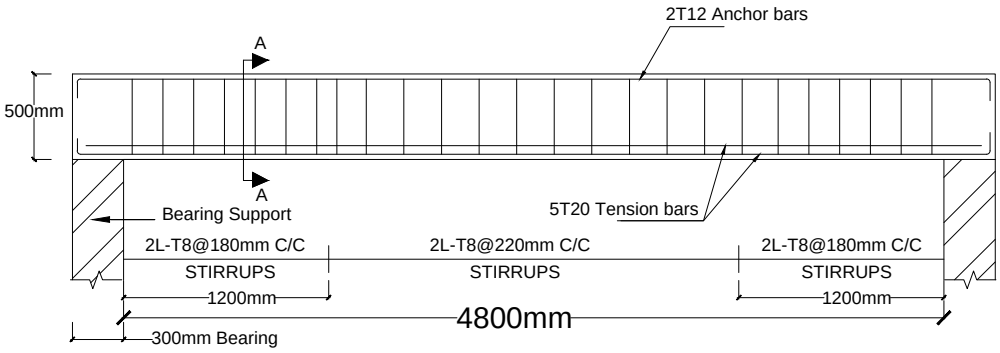


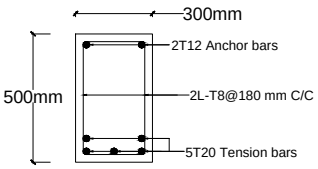
PLAN OF OPEN NEWELL STAIRCASE



SECTION B-B
SECTIONAL ELEVATION OF OPEN NEWELL STAIRCASE

SIMPLY SUPPORTED SINGLY REINFORCED BEAM (Fig:2.14)

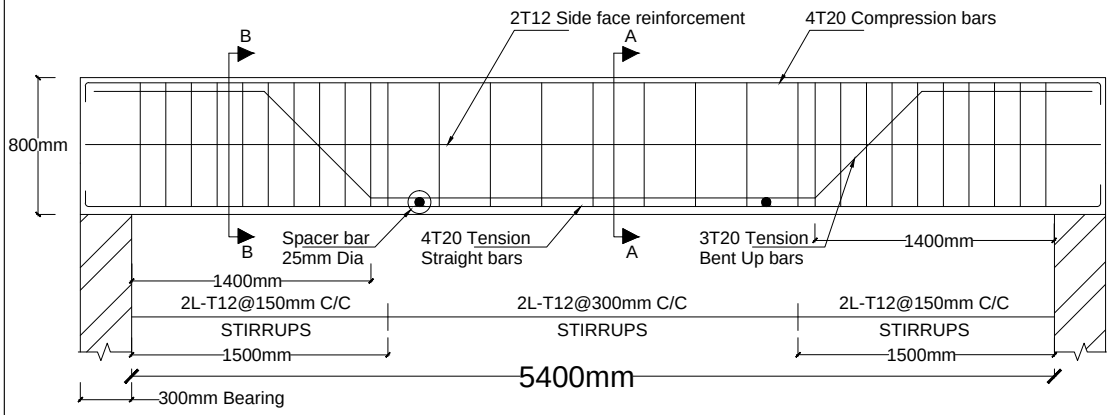


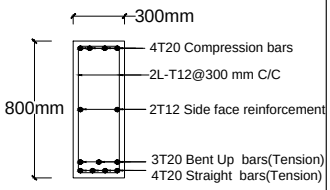


C/s at Section A-A

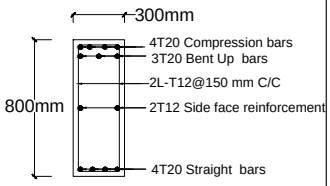
L/S OF SIMPLY SUPPORTED SINGLY REINFORCED BEAM

SIMPLY SUPPORTED DOUBLY REINFORCED BEAM (Fig:2.15)





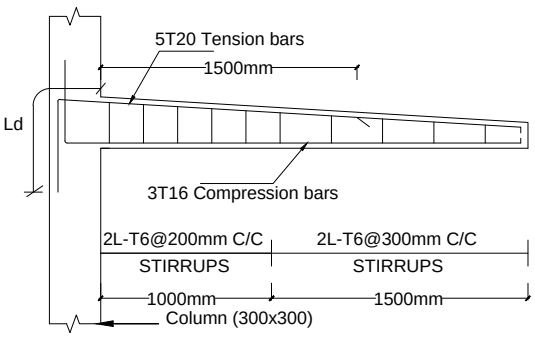
C/S at Section A-A



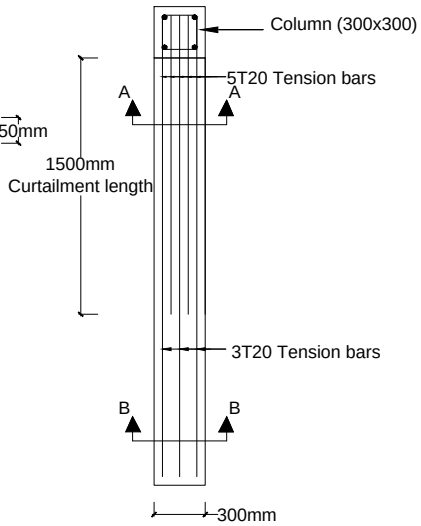
C/s at Section B-B

L/S OF SIMPLY SUPPORTED DOUBLY REINFORCED BEAM

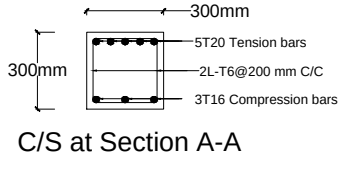
CANTILEVER BEAM (Fig:2.16)



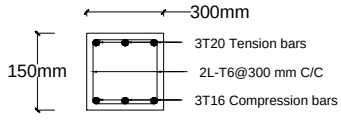
L/S OF CANTILIVER BEAM



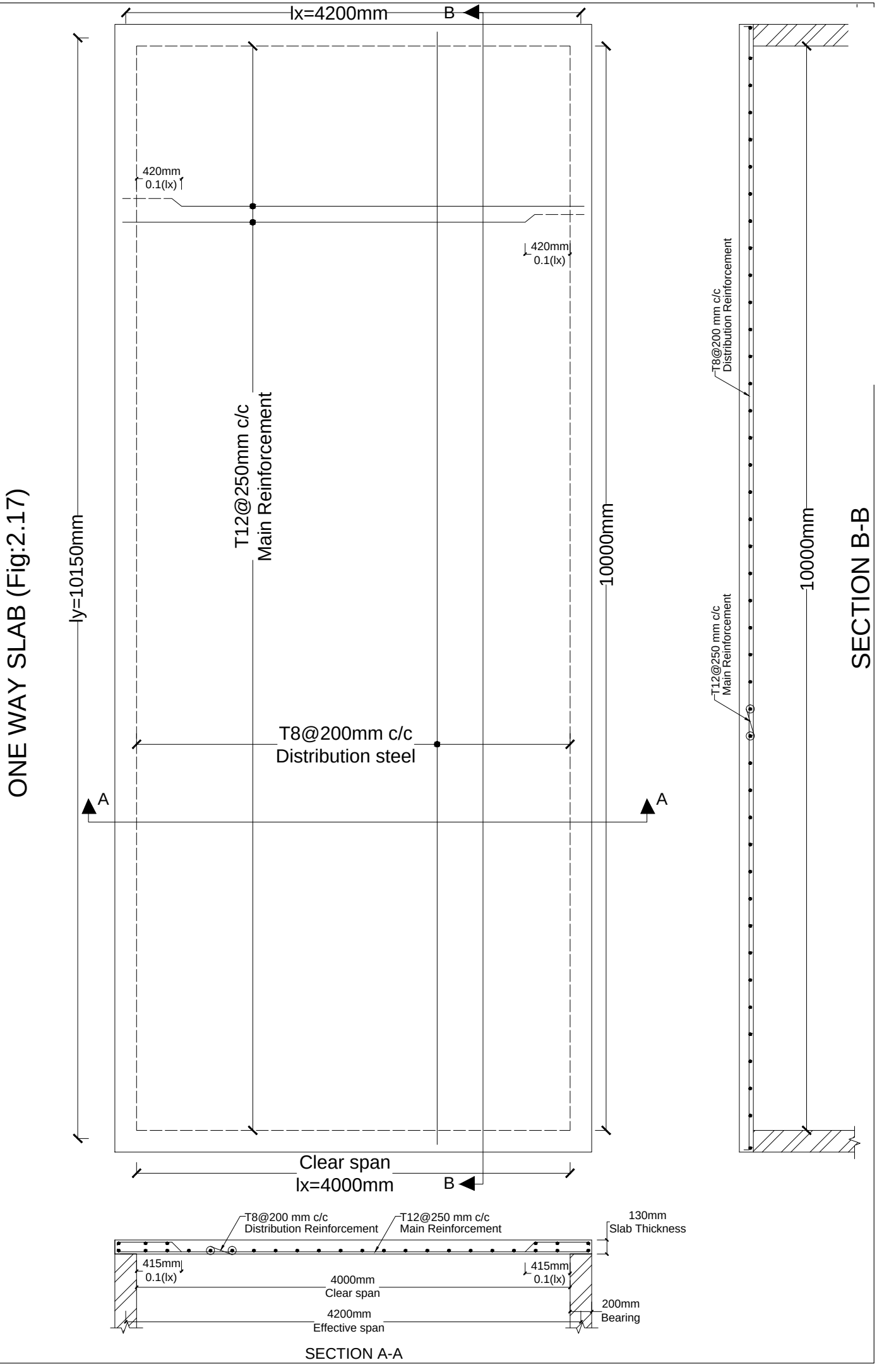
PLAN SHOWING CURTAILMENT DETAILS



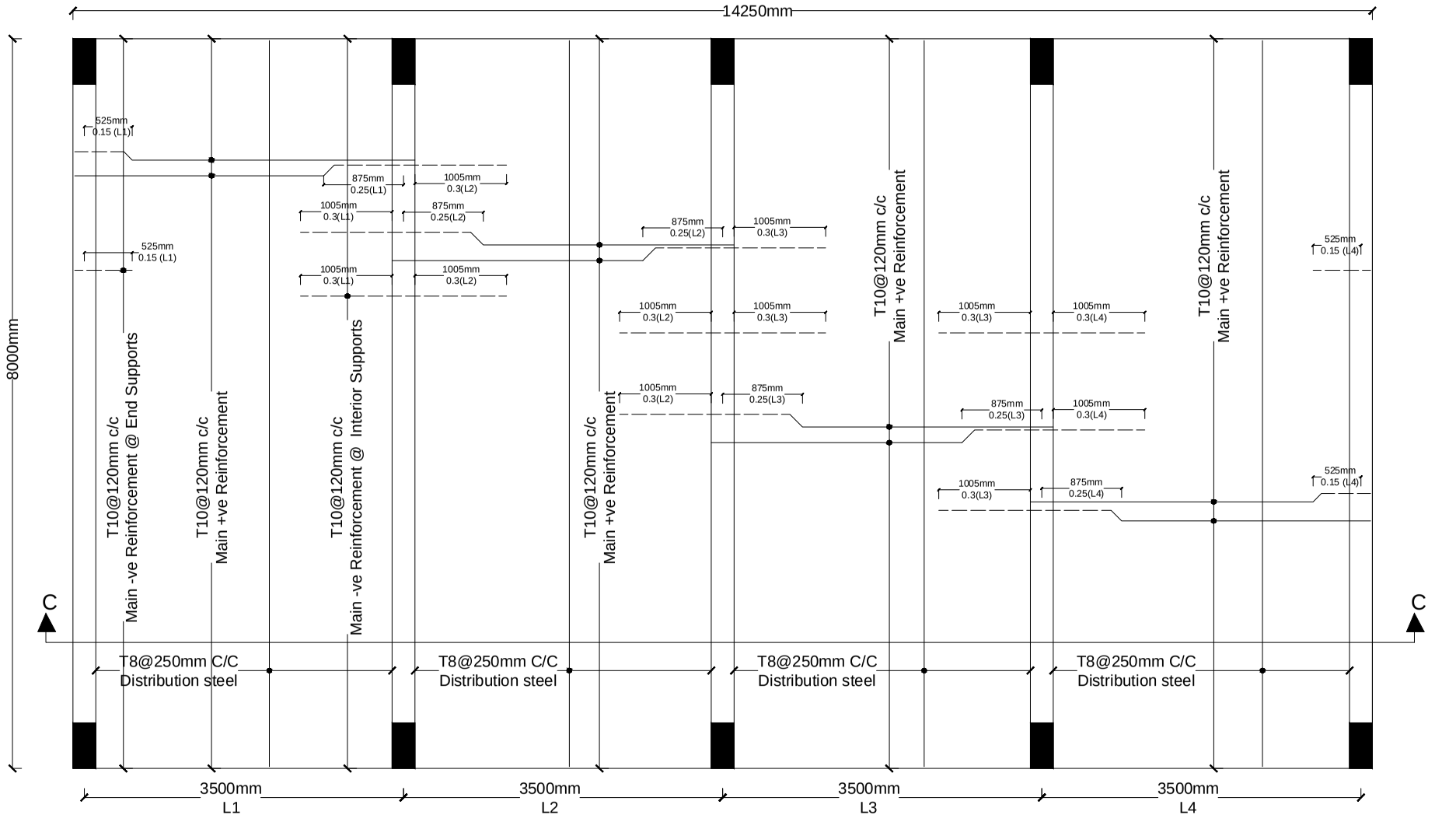
C/S at Section A-A

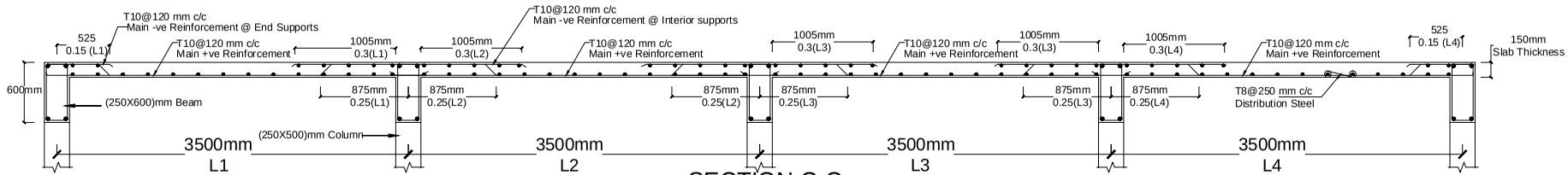


C/s at Section B-B


ONE WAY SLAB (Fig:2.17)
lx=4200mm
B
ly=10150mm
420mm
0.1(lx)
420mm
0.1(lx)
T12@250mm c/c
Main Reinforcement
10000mm
T8@200mm c/c
Distribution steel
A
A
Clear span
lx=4000mm
B
T8@200 mm c/c
Distribution Reinforcement
T12@250 mm c/c
Main Reinforcement
130mm
Slab Thickness
415mm
0.1(lx)
415mm
0.1(lx)
4000mm
Clear span
4200mm
Effective span
200mm
Bearing
SECTION A-A
T8@200 mm c/c
Distribution Reinforcement
T12@250 mm c/c
Main Reinforcement
10000mm
SECTION B-B

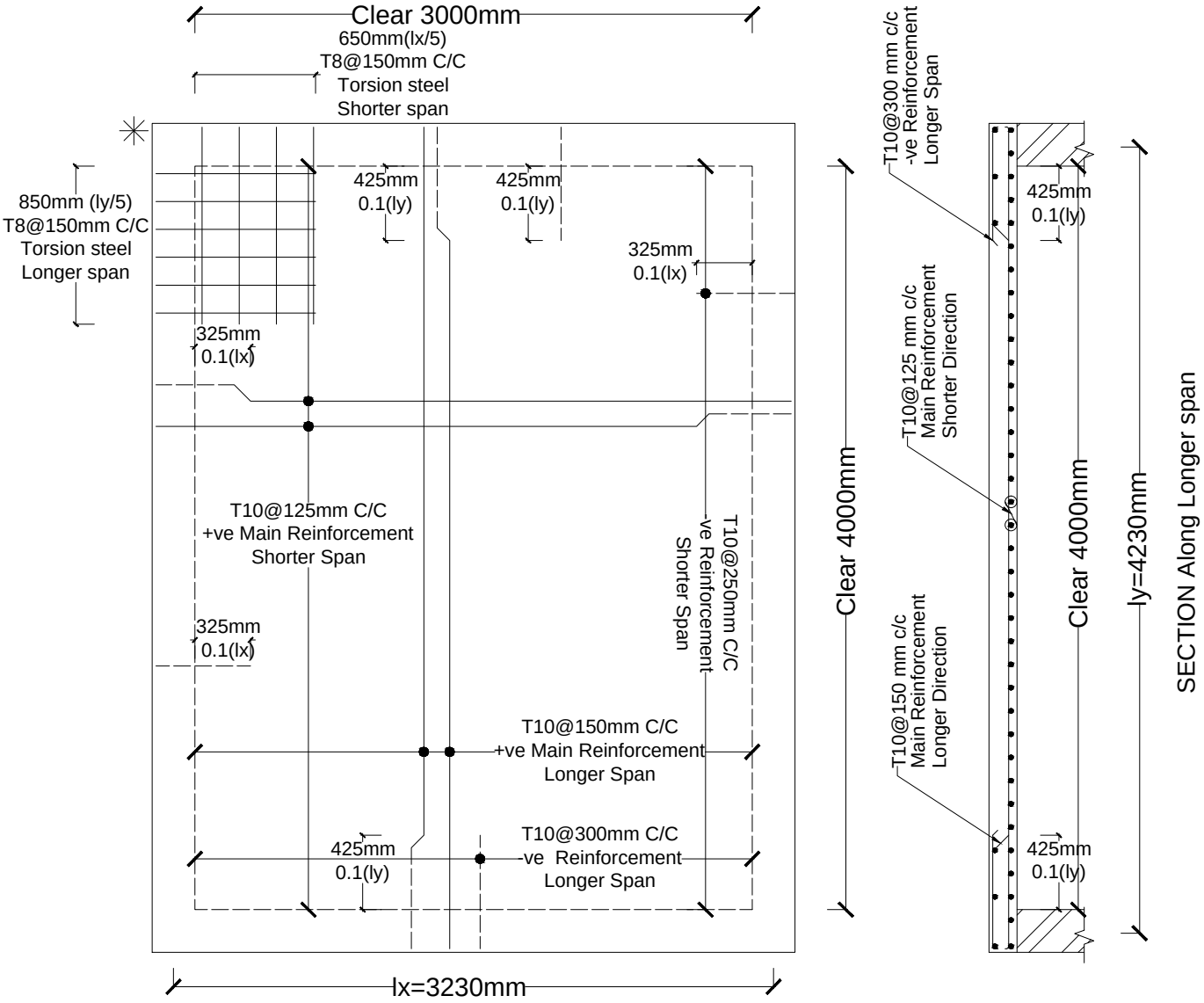
ONE WAY CONTINUOUS SLAB (Fig:2.18)

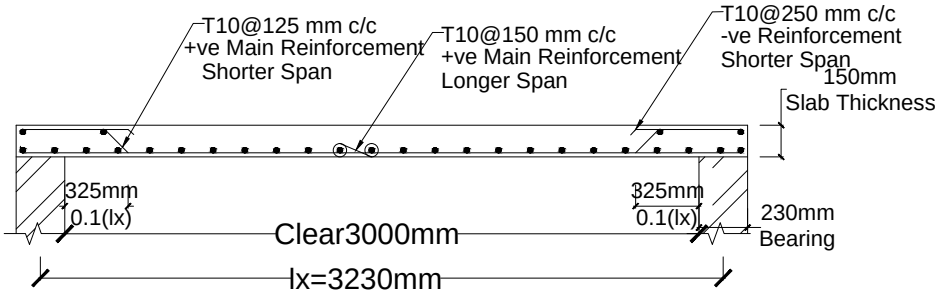




SECTION C-C

SIMPLY SUPPORTED TWO WAY SLAB (Fig:2.19)





SECTION Along Shorter span

