Design Of R.C. Footing Supporting a Steel Column

Specifications :

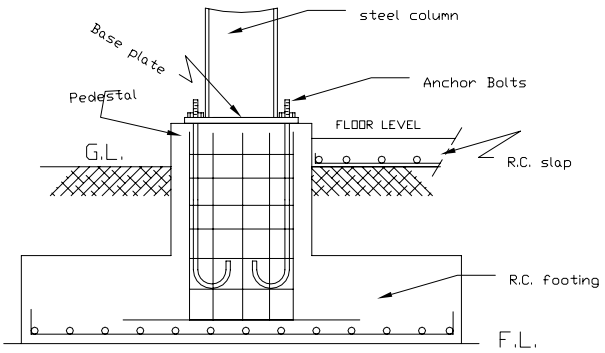
Pedestal dimensions = base plate dimensions + (5cm to 10 cm)

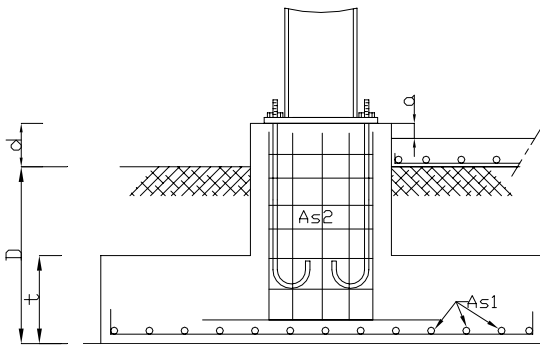
Pedestal reinforcement (As_2) = (0.8% - 1%)Ac as short column

Footing thickness (t) = not less than the smallest dimension of pedestal
Not less than 30 cm

Foundation level (D) = not less than 1.00 m

Foundation reinforcement (As_1) = 0.2%Ac
Not less than 6T13/m





The following is an illustration of the design procedure of R.C. foundation to support a steel column with axial force 75 ton , reverse bending moment 20T.m and reverse shear force 10 ton .
The base plate thickness is 30 mm , length 700 mm and width 600 mm , with 6 anchor bolts 28 mm diameter spacing 500 mm . foundation level is 1.00 m and soil bearing capacity is 2.5kg/cm^2

R.C. footing

Let L=1.2B
Then $A=1.2B^2$ & $Z=0.24B^3$

PT = A(soil+ concrete bearing x havg) = (2x1.25)=2.5A

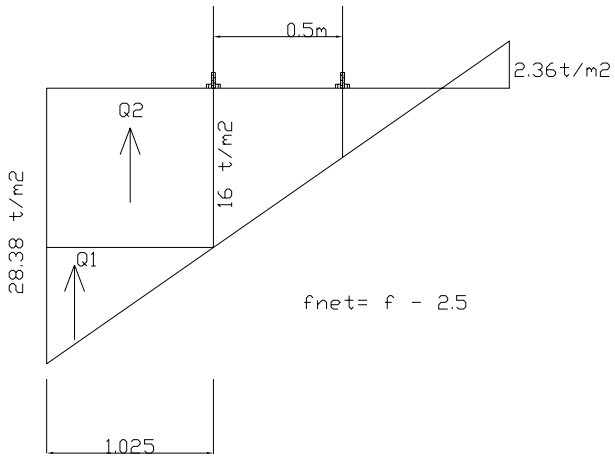
M = 20 T.m + shear x d = 20+10x1.5 = 35 t.m

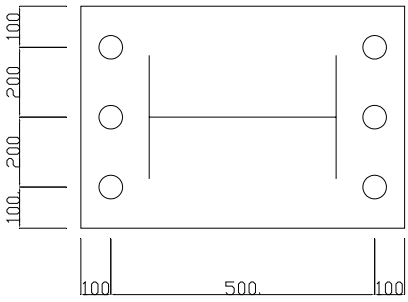
f1 = P/A + M/Z
f2 = P/A – M/Z

but no negative stress is allowed in soil
then $0 = (75+2.5A)/1.2B^2 - 35/0.24B^3$

then L=2.55m & B = 2.1m
which gives f1 = 30.88 t/m^2 & f2 = 0.14t/m^2

Q1 = 12.38*2.1*1.025/2 = 13.32 ton
Q2 = 16*1.025*2.1 = 34.44 ton
Qb = Q1+Q2 = 47.67





M = 13.32*0.68 + 34.44*0.513 = 26.73 t.m

d = 0.315(2673000/40+20)$^{1/2}$ = 66.5 cm
t = 70 cm

As_1 = 2673000/0.87*1400*67 = 32.74 (17 T 16)
0.2% Ac = 255*70*0.2/100 = 35.7 (18T16) use this

<u>Pedestal</u>

Take pedestal cross section = 70*80 (base plate + 10 cm)

As_2 = 0.8% Ac = 44.8 cm2 (16T19)

Use stirrups 10mm@20cm