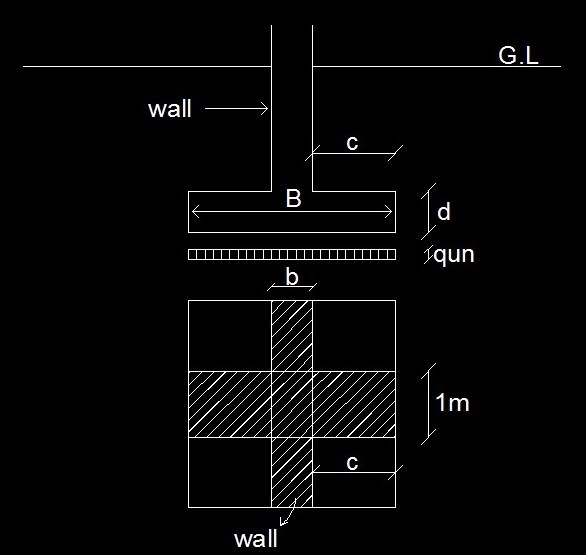
القاعدة الشريطية: Strip Footing:



الأبعاد ب working load

السمك و الحديد ب Ultimate load

للتحويل من ال working to Ultimate \* 1.5

Procedure of Design:

الخرسانة العادية: Plain Concrete:

|  |  |
| --- | --- |
| If tp.c 20 cm | If tp.c > 20 cm |
| فرشه نظافة فقط Neglect in design | Consider p.c in design |
| Pt = Pw \*1.1 | Pt = Pw \*1.1 |
| AR.c = Pt / qall =1\* BR.c | Ap.c = Pt / qall =1\* Bp.c |
| BR.c = to the nearest 5cm | BR.c = Bp.c - 2tp.c  to the nearest 5cm |

tp.c  is assumed 10 → 40 cm

فرشه نظافة و لا تؤخذ في حسابات التصميم

tp.c  = 10 → 20 cm

تعتبر قاعدة عادية و تؤخذ في حسابات التصميم

tp.c  = 20 → 40 cm

Minimum dimensions of R.C. Footing:

BR.c. = 80 cm

tR.C. = 40 cm

dR.C = 33 cm

If tp.c  not given take tp.c = 20 cm

qult = 1.5\*pw / BR.c \*1

Mult = qult \* c2 / 2

C = BR.c - bw / 2

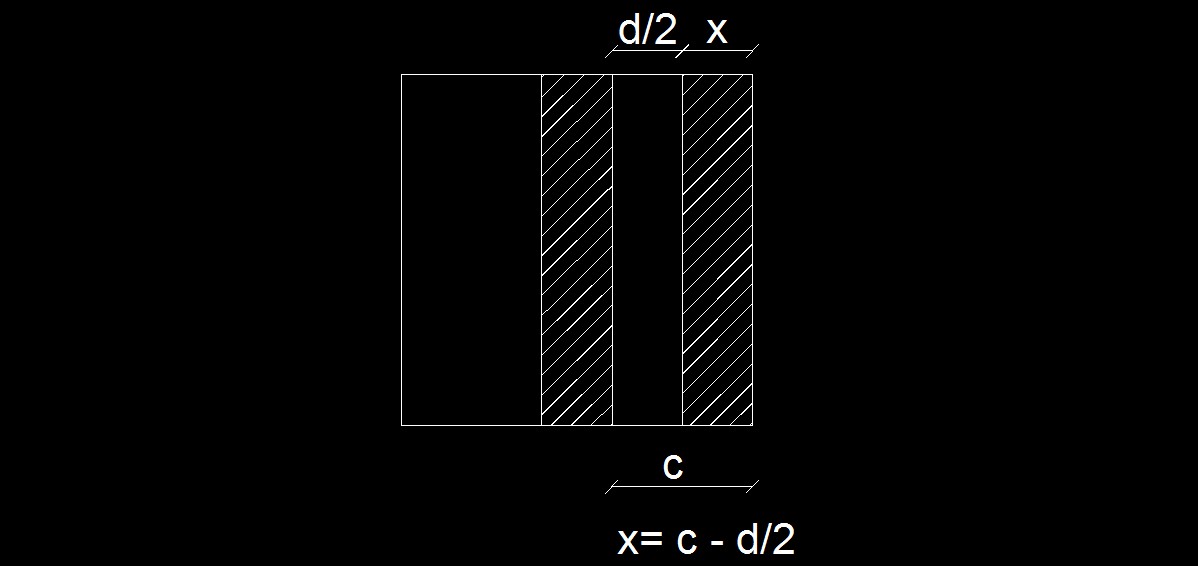
d = c1  to the nearest 5cm

If Fcu not given take Fcu = 250 kg / cm2

C1 = 5 , B = 100 cm

|  |  |  |
| --- | --- | --- |
| الخرسانة العادية | Plain concrete | p.c |
| الخرسانة المسلحة | Reinforced concrete | R.c |
| حمل الحائط | wall load | Pw |
| سمك الخرسانة العادية | Thickness of Plain concrete | tp.c |
| مساحة الخرسانة العادية | Area of Plain concrete | Ap.c |
| مساحة الخرسانة المسلحة | Area of Reinforced concrete | AR.c |
| عرض الخرسانة العادية | Plain concrete thickness | Bp.c |
| عرض الخرسانة المسلحة | Reinforced concrete thickness | BR.c |
| عرض الحائط | Wall thickness | bw |
| اجهادات ال shear | Actual shear stress | qsh |
| مقاومة الخرسانة لل shear | Allowable shear stress | qcu |
| طول السيخ | Available length | La |
| قطر السيخ | Diameter of bars |  |

Check shear:



القطاع الحرج علي مسافة d/2 من وش الحائط.

Critical section

Qsh = qult ( c - d/2 )

qsh = Qsh / B\*d

qcu = 0.4

if qsh < qcu  ok safe

if qsh > qcu  not safe increase depth

d = Qsh / qcu \*b

t = d + cover to the nearest 5cm

cover = (5 to 10 cm)

Reinforcement of the footing:

Min 5 y 12 / m

Max 10 y ?? / m

As = Mult / J\*d\*fy  - - - - - - - - -(1)

- - - - - - - - -(2) As min = 5 y 12 / m

As min = ( 0.15 / 100 ) \* B \* d - - - - - - - - -(3)

نأخذ القيمة الأكبر في القيم 1,2,3

If As As min → ok

If As < As min  → take As = As min

Check Bond:

Ld = α \* β \* µ \* (fy / ) \* ( /4 qub )

حيث أن:

سيخ أملس α = 1 → plan bars

سيخ مشرشر α = 0.75 → H.G.S

β = 1

µ= 1

Fy = 3600 kg / cm2

qub = 0.87

Ld La

Example: 1

Given : fcu = 200 kg/cm2 , Pw= 180 kN / m2 ,

bw = 0.5 m , fy =3600 kg/cm2 , tp,c = 20 cm , B/C (qall = 100 kN / m2

Req : Design of strip footing that carry the given line load.

Solution

100 kN / m2  = 10 t / m2 = 1 kg / cm2

tp.c  20 cm

Neglect in design

AR.c = 1.1\*Pw / qall = 1.1 \* 180 / 100 = 1.98 m2

= 1\* BR.c = 1\* 1.98 = 1.98 2 m2

End of working load

qult =1.5\*pw/BR.c\*1=(1.5 \* 18)/(2\*1)=13.5 t /m2

C = BR.c - bw / 2= (2-0.5)/ 2 = 0.75 m

Mult = qult \* c2 / 2= (13.5\*(0.75)2)/2 = 3.8 t.m

d =c1  = 5 = 21.8 cm 25cm

t = d + cover =25+10 = 35 cm

Check shear:

Qsh = qult (c - d/2)=13.5\*(0.75-(0.25/2))=8.4ton

qsh = Qsh / B\*d= = 3.3 kg / cm2

qcu = 0.4 = 0.4  **=**5.66kg / cm2

qsh < qcu  ok safe

3.3< 5.66 safe

Reinforcement:

As1 =Mult / J\*d\*fy = = 5.11 cm2 / m'

As min2 = 5 y 12 /m = 5.65 cm2 / m'

As min3 =\*B\*d=\*100\*25=3.75cm2/ m'

take As =5.65cm2/ m'

use 5 y 12 /m

Check Bond:

Ld = α \* β \* µ \* (fy / ) \* ( /4 qub )

qub = 0.87 = 0.87 =10 kg/cm2

Ld = 0.75\*1\*1\*(3600 /1.15)\*(1.2/(4\*10))

= 70.4 cm → 0.704 m

Ld La

0.704 2 ok

