Isolated footing:

Squared Isolated footing .

تستخدم في حالة:

1. عمود مربع.
2. عمود دائري.
3. يمكن مع الأعمدة المستطيلة لكنة غير مفضل.

Hunched Squared Isolated footing .

Rectangular Isolated footing .

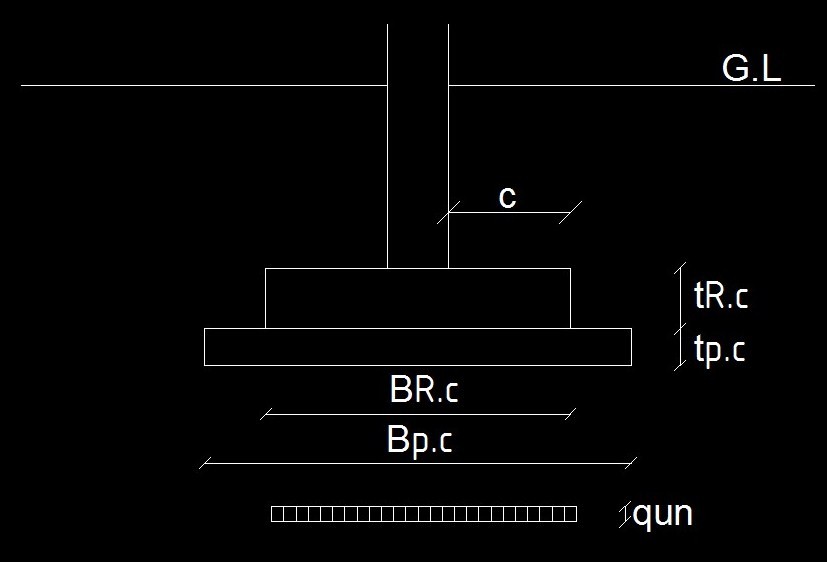
تستخدم في حالة:

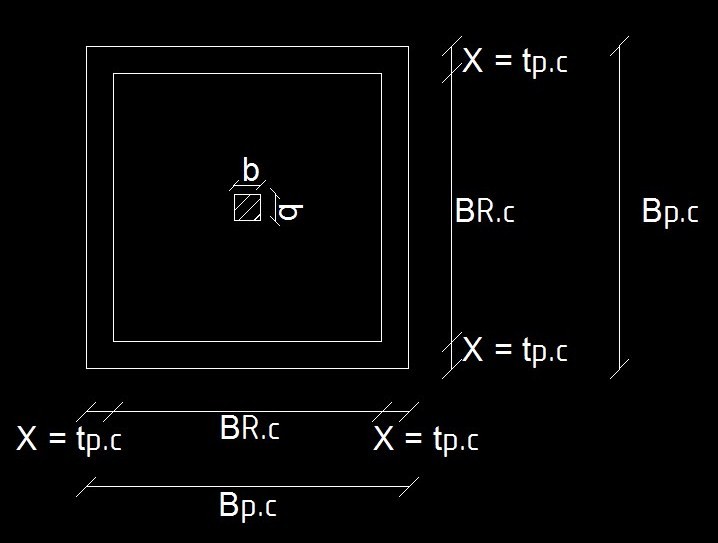
1. الأعمدة المستطيلة.
2. يمكن مع الأعمدة المربعة لكنة غير مفضل.

Circular Isolated footing .

تستخدم فقط مع الأعمدة الدائرية.

Design Isolated Squared footing:





Procedure of Design:

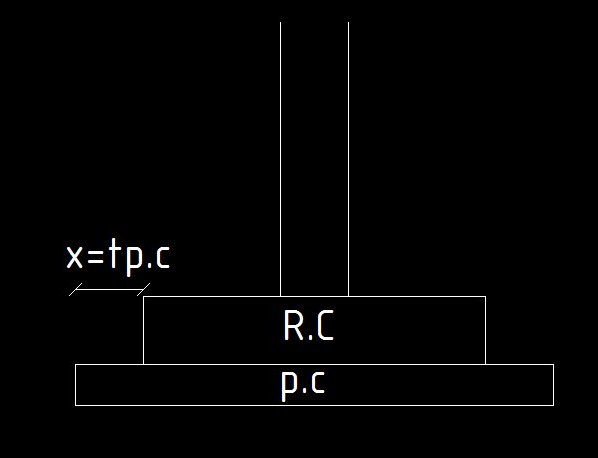
Plain concrete:

|  |  |
| --- | --- |
| 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=BR.c2 | Ap.c = Pt / qall=Bp.c2 |
| BR.c = | Bp.c = |
| Bp.c =BR.c + 2tp.c  to the nearest 5cm | BR.c = Bp.c - 2tp.c  to the nearest 5cm |

في حالة العمود المربع:

Check stresses on plain concrete:

عند أخذ القاعدة العادية في الحسابات:



qult = 1.5\*pw / Bp.c2

Mult = (qult \*(X2)) /2

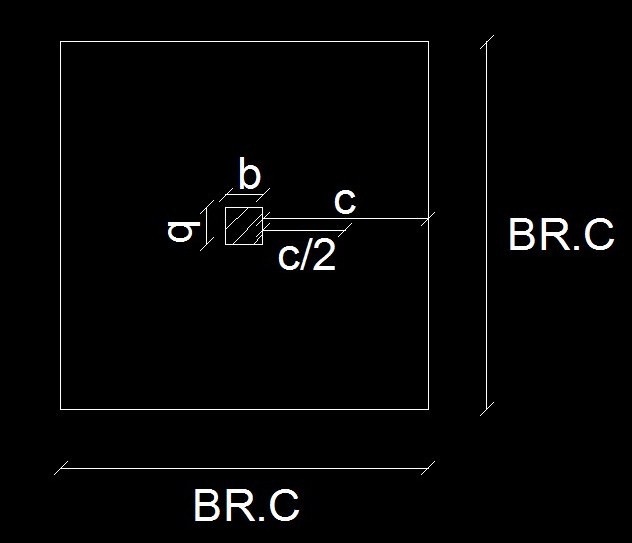
Ft = 6\* Mult / 100\*(tp.c)2

Ftcu = (0.75\*(fcu)2/3)/1.5

If Ft < Ftcu  ok safe

نقلل بروز الخرسانة العادية (X) If Ft > Ftcu  not safe

qult = 1.5\*pw / BR.c2



Mult = qult \*( BR.c\*c)\*(c/ 2)

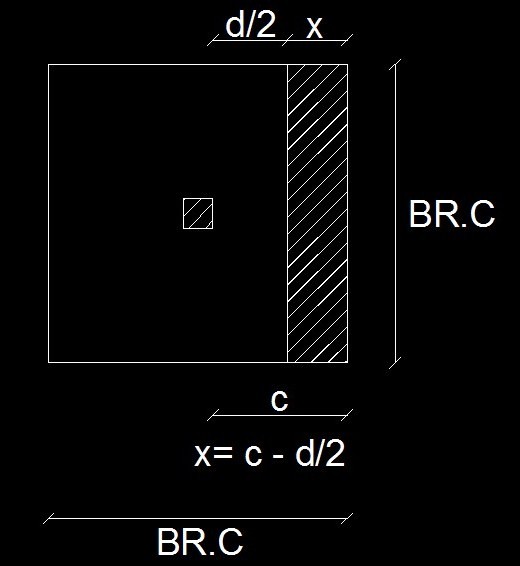
C = (BR.c - b/ 2)

d = c1  to the nearest 5cm

t = d + cover to the nearest 5cm

cover = (5 to 10 cm)

Check shear:



القطاع الحرج علي مسافة d/2 من وش العمود.

Critical section

Qsh = qult (BR.c\*( c - d/2) )

qsh = Qsh /( BR.c\*d)

qcu = 0.4

if qsh < qcu  ok safe

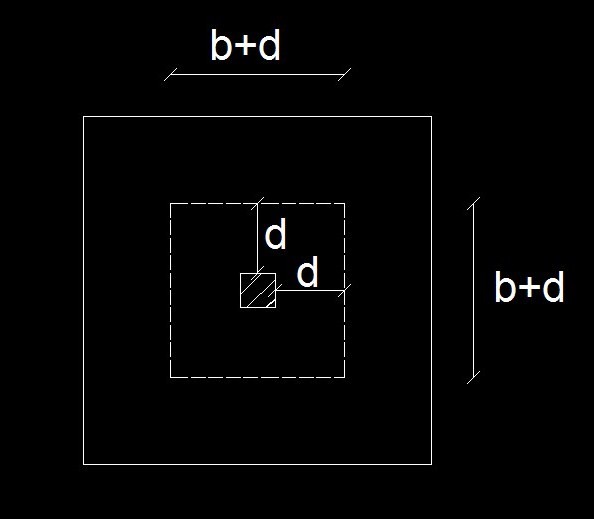
if qsh > qcu  not safe increase depth

d = Qsh / (qcu \* BR.c)

t = d + cover

cover = (5 to10 cm)

Check punching:



Qp = pu - qult (b+d)2

qp = Qp / (4(b+d)d)

qpcu =

If qpcu > qp  ok safe

If qpcu < qp  un safe → increase depth

Reinforcement of the footing:

Min 5 y 12 / m

Max 10 y ?? / m

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

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

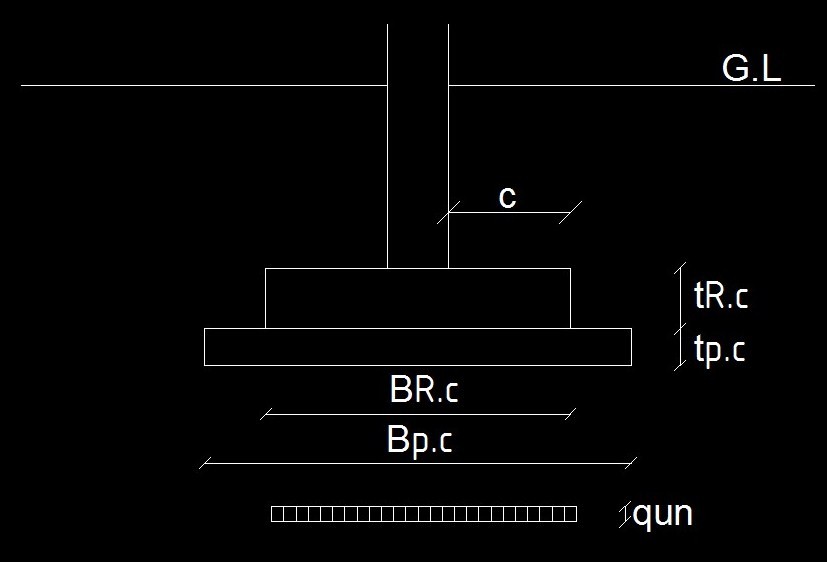
As min = ( 0.15 / 100 ) \* B \* d - - - - - - - - -(3)

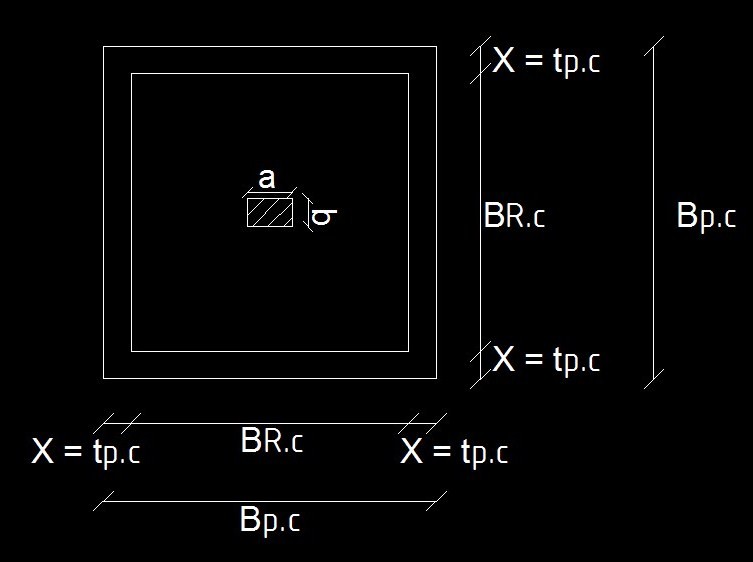
نأخذ القيمة الأكبر في القيم 1,2,3

If As As min → ok

If As < As min  → take As = As min

Design Isolated Squared footing:





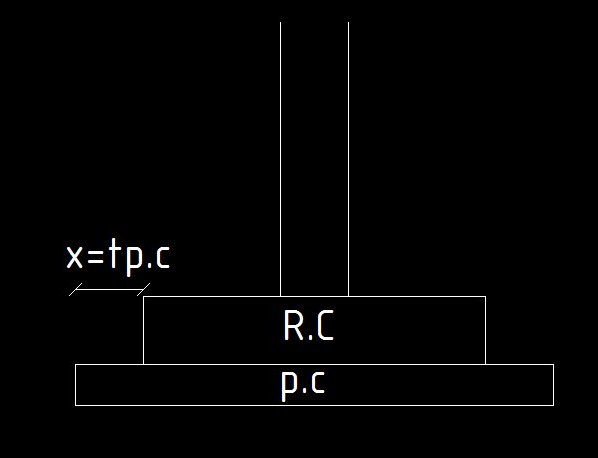
Procedure of Design:

|  |  |
| --- | --- |
| 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=BR.c2 | Ap.c = Pt / qall=Bp.c2 |
| BR.c = | Bp.c = |
| Bp.c =BR.c + 2tp.c  to the nearest 5cm | BR.c = Bp.c - 2tp.c  to the nearest 5cm |

في حالة العمود المستطيل:

Check stresses on plain concrete:

عند أخذ القاعدة العادية في الحسابات:



qult = 1.5\*pw / Bp.c2

Mult = (qult \*(X2)) /2

Ft = 6\* Mult / 100\*(tp.c)2

Ftcu = (0.75\*(fcu)2/3)/1.5

If Ft < Ftcu  ok safe

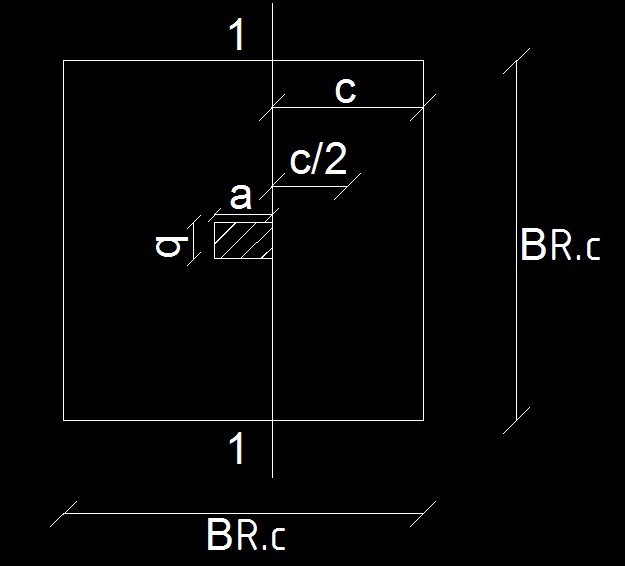
نقلل بروز الخرسانة العادية (X) If Ft > Ftcu  not safe

qult = 1.5\*pw / BR.c2

نأخذ القطاعات الحرجة للعزوم علي وش العمود من الجهتين

Critical section of bending at R.C Footing .

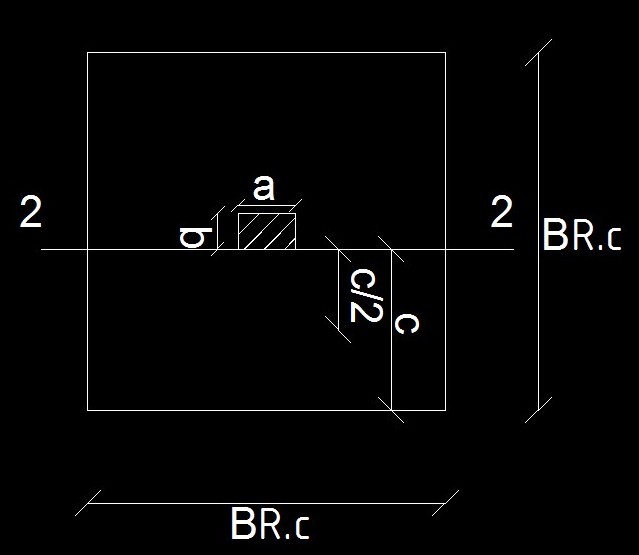
Direction 1:



C1 = (BR.c - a/ 2)

Mult 1 = qult \*( BR.c\*c1)\*(c1/ 2)

Direction 2:



C2 = (BR.c - b/ 2)

Mult 2 = qult \*( BR.c\*c2)\*(c2/ 2)

يتم التصميم علي العزم الكبر من Mult 1 , Mult 2

d = c1  to the nearest 5cm

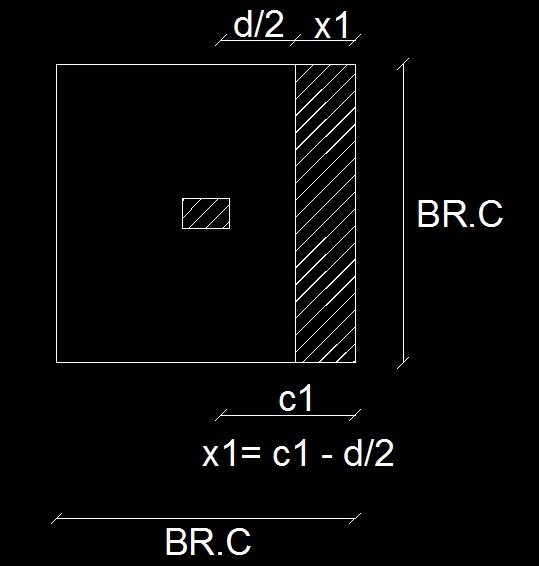
t = d + cover to the nearest 5cm

cover = (5 to 10 cm)

Check shear:

القطاع الحرج علي مسافة d/2 من وش العمود.

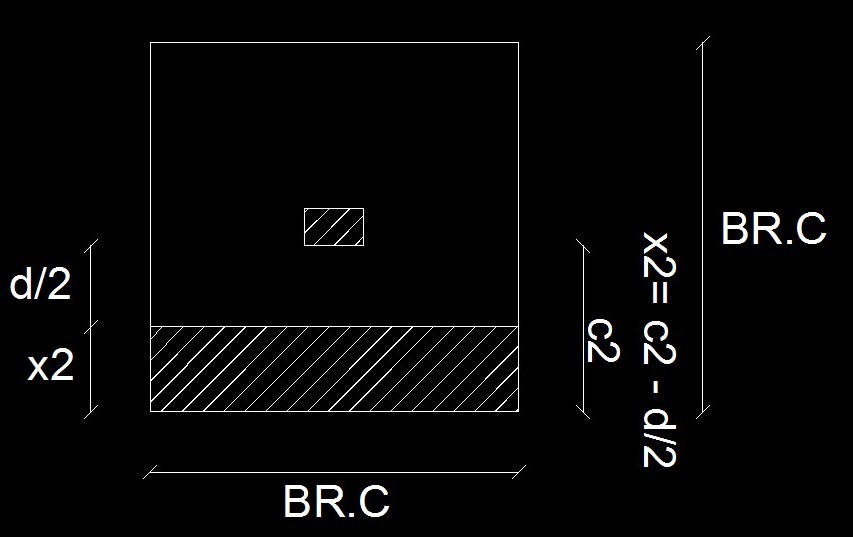
Critical section



Qsh1 = qult (BR.c\*( c1 - d/2) )

qsh1 = Qsh1 /( BR.c\*d)

qcu = 0.4



Qsh2 = qult (BR.c\*( c2 - d/2) )

qsh2 = Qsh2 /( BR.c\*d)

qcu = 0.4

Take the bigger of Qsh1 , Qsh2 and qsh1 , qsh2

if qsh < qcu  ok safe

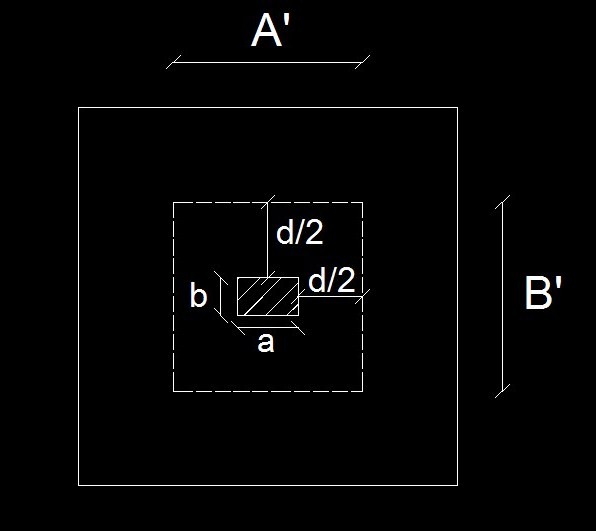
if qsh > qcu  not safe increase depth

d = Qsh / (qcu \* BR.c)

t = d + cover

cover = (5 to 10 cm)

Check punching:



Qp = pu - qult (A'+B')

A' = a + d , B' = b + d

عرض العمود b → , طول العمود a →

qp = Qp / (2(A'+B')d)

qpcu = (0.5 + )

If qpcu > qp  ok safe

If qpcu < qp  un safe → increase depth

Reinforcement of the footing:

Min 5 y 12 / m

Max 10 y ?? / m

As = Mult / J\*d\*fy / BR.c  - - - - - - - - -(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

