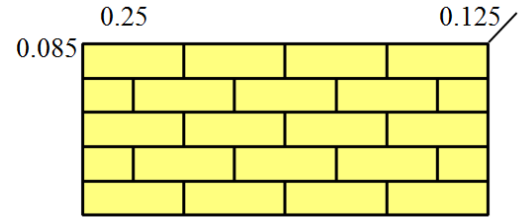L3

Building partition with bricks: بناء القواطع بالطابوق

  a-   Thickness of wall = 12.5 cm

The dimensions of appeared side of brick = 0.085 X 0.25 cm

Number of bricks / m^2 = 1/(0.085*0.25) ≈ 47 brick

  b-   Thickness of wall = 8.5 cm
  The dimensions of appeared side of brick = 0.125 X 0.25 cm

  Number of bricks / m^2 = 1/(0.125*0.25) = 32 brick

Building ceilings with bricks   **بناء السقوف بالطابوق (العقادة)**

The dimensions of appeared side of brick = 0.085 X 0.25 cm

Number of bricks / m^2 = 1/(0.085*0.25) ≈ 47 brick

2- **Volume of mortar in 1m^3 of building with bricks**

حجم المونة في 1 متر مكعب من البناء بالطابوق

Volume of brick before building = 0.24*0.075*0.115= 0.00207 m3

Volume of bricks without mortar in 1 m^3 of building = 378 *0.00207= 0.78246 m3

Volume of mortar = 1 – 0.78246 ≈ 0.22 m^3

From above information: 1 m^3 of building with bricks contains 0.78 m^3 of bricks and 0.22 m^3 of mortar.

What are the quantities of cement and sand in 0.22 m^3?

For x (cement): y (sand) mixing ratio

The mixing losses 1/4 of its volume so the formula will be:

$V = 0.75 (x + y)$

V= volume of mixing

For example: if the mixing ratio is $1:3 \rightarrow y = 3 x$

$V= 0.75* (x+ y) = 0.75 * (x + 3 x) = 0.75 * (4 x) = 3 x$

If v= 0.22 then x= 0.22/3 = 0.0733 m^3 y= 0.22 m^3

The density of cement is about 1400 kg/ m^3 so the weight of cement can be determined:

W = 1400 * 0.0733 = 102.62 kg   (usually the standard bag of cement contains 50 kg) $\rightarrow$ number of bags needed is 102.62/50 = 2.05 $\approx$ 2 bag

For 1 m^3 building with bricks we need two bags of cement and 0.22 m^3 of sand.

- لكل متر مكعب من البناء بالطابوق نحتاج 2 كيس من السمنت و 0.22 متر مكعب من الرمل

3- Estimate of plastering with cement and sand mixing:

تخمين اللبخ بخليط السمنت و الرمل

Plastering thickness is usually (1- 2) cm , mixing ratio 1:3

For 1 m^2 plastering (2 cm in thickness), Volume = 1* 1* 0.02 = 0.02 m^2

$V= 0.75(x+y) \rightarrow 0.02= 0.75 (1x+3x)$ x= 0.02/3 = 0.0067

Weight of cement = 0.0067 * 1400 = 9.38 kg

Sand volume = 3 * 0.0067 = 0.02 m^3

4- Estimate of cement, sand, and gravel quantities in concrete works:

تخمين كميات السمنت، الرمل ،الحصى في اعمال الخرسانة

Concrete contains (cement, sand, gravel, and water)

Mixing of elements loses 1/3 of its volume

$V = 0.67 (x + y + z)$

V= volume of mixing

x, y, z = quantity of cement, sand, and gravel respectively.

Common mixing ratios:

1:1.5:3   1:2:4   1:3:6   1:4:8

For 1 m^3 and mixing ratio (1:2:4):

$V = 0.67 * (x + y + z) \rightarrow 1 = 0.67 * (x + 2x + 4x)$

$1 = 0.67 * (7x) = 4.69 x \rightarrow x = 1/ 4.69 = 0.213 \text{ m}^3$

Weight of cement = $0.0213 * 1400 \approx 300$ kg

Number of cement bags = 300/ 50 = 6 bags

Volume of sand = $0.213 * 2 = 0.42 \text{ m}^3$

Volume of gravel = $0.213 * 4 = 0.85 \text{ m}^3$

For 1 m^3 of concrete the quantities of mixing elements are as following:

Cement = 300 kg = 6 bags   sand = 0.42 m^3 gravel = 0.85 m^3

لكل 1 متر مكعب من الخرسانة ، كميات المكونات للخلطة تكون كالتالي:

سمنت = 300 كغم = 6 اكياس   رمل = 0.42 متر مكعب   حصى= 0.85 متر مكعب

5- **Estimate of tiles : تخمين البلاطات**

a- Floor tiles

     Dimensions of mosaic tiles in general are (20X20) cm , (30X30)cm, or (40X40) cm, thickness of tiles (2-3) cm, space between two tiles is (2 – 4) mm

Number of tiles (20X20 cm and space 2 mm)

in 1 m^2 = 1/(0.202*0.202) = 24.5 tile
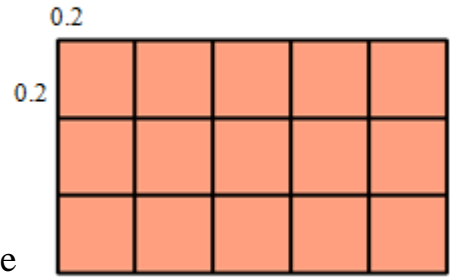
b- skirting tiles

For skirting tiles with 20 cm length and 3mm space

البلاط المستخدم للارزارة

Number of tiles for 1 m = 1/ (0.203) = 4.9 piece

For roof tiles the common dimensions are (50 X 50 X 4) cm or (80 X 80 X 4) cm.

Space between tiles = 2 mm

Number of tiles in 1 m^2 = 1/(0.802*0.802) = 1.55 piece

Note: For any other tiles (like ceramic tiles) with different dimensions, the method of determining the number of pieces in 1 m2 is similar to what mentioned above.

Number of tiles in 1 m^2 = 1/ (x + s * y + s)

x, y : dimensions of tile

S: space between two tiles

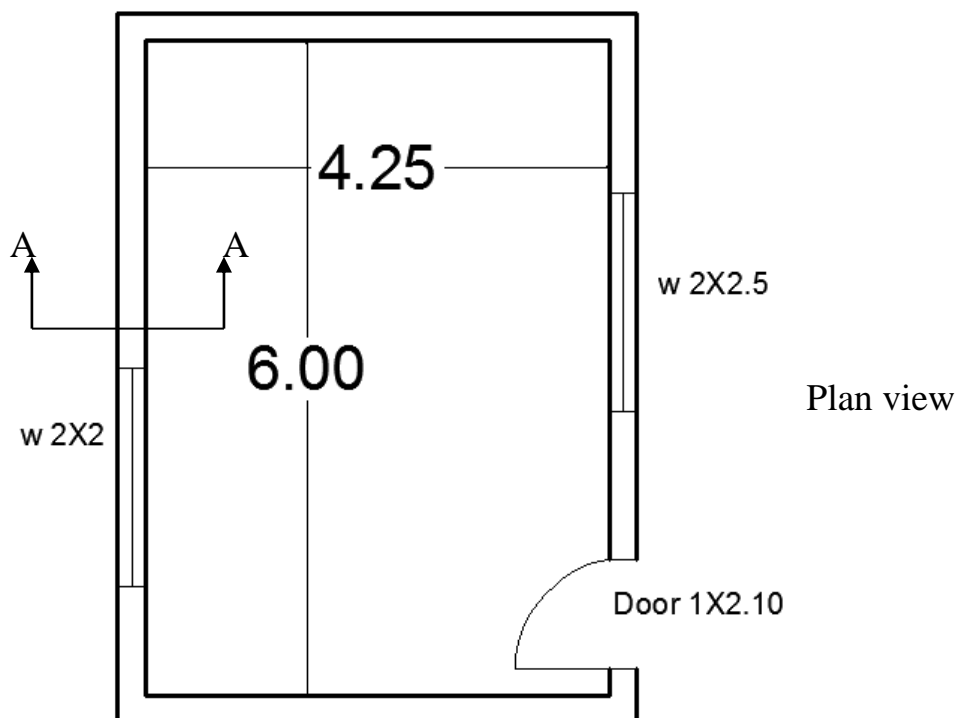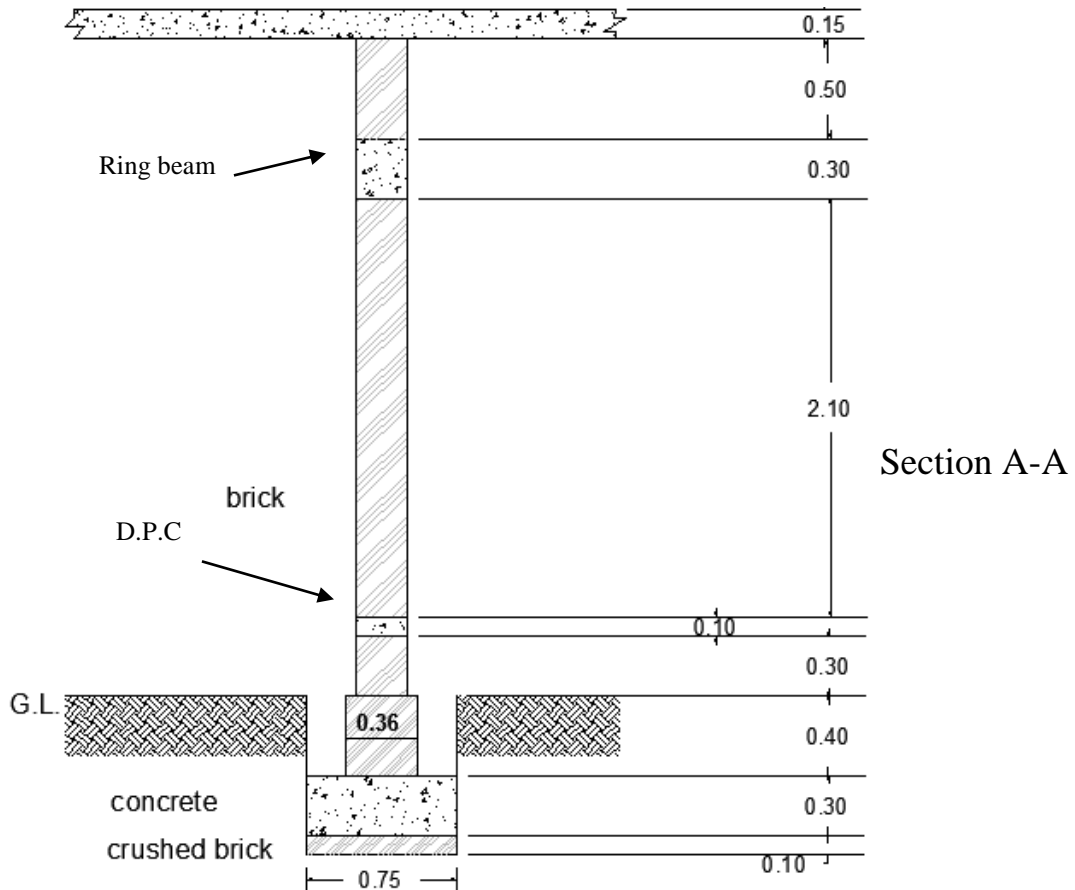6- **Estimate of concrete brick (block) : تخمين البلوك**

Dimensions of block are (20 X 20 X 40) cm or (10 X 20 X 40) cm

Number of blocks (20 X 20 X 40) in 1 m^2 = 1/ (0.21*0.21*0.41) = 55.3 block

Example: for the drawings below estimate the following:

1- Earth work quantity
2- Quantity of foundation concrete
3- Quantity of bricks in foundation
4- Quantity of D.P.C.   مانع الرطوبة

5- Quantity of bricks in walls
6- Quantity of concrete in ring beam   الرباط
7- Quantity of concrete in ceiling
8- Overall cement bags and sand needed for activities (2-8) (assume same cement type used and same mixing ratio for concrete 1:2:4)
9- Overall quantity of gravel for activities (2, 4, 6, and 7)

Section A-A

| 0.15 |
| 0.50 |
| 0.30 |
| 2.10 |

Ring beam

brick
D.P.C

0.10

0.30

G.L.

0.36

0.40

concrete

0.30

crushed brick

0.10

0.75

4.25

A   A

w 2X2.5

6.00

Plan view

w 2X2

Door 1X2.10

By using center line method:

Center line length = 2* (4.25+0.25) + 2 * (6 + 0.25) = 21.5 m

1. Earth work volume = 0.75 * 0.8 * 21.5 = 12.9 m^3
2. Foundation concrete volume = 0.75 * 0.3 * 21.5 = 4.84 m^3
3. Volume of bricks work in foundation = (0.36* 0.4 + 0.25 * 0.3) * 21.5 = 4.7 m^3
   Quantity of bricks = 400 * 4.7 = 1880 brick
4. Volume of concrete in D.P.C. = 0.1 * 0.25 * 21.5 = 0.54 m^3
5. Volume of bricks in walls= 0.25 * 2.1 * 21.5 – (2 *2.5 * 0.25) – (2*2* 0.25) – (1 * 2.1*0.25) + (0.5*0.25*21.5) = 11.2 m^3
   Quantity of bricks = 400 * 11.2 = 4480 brick
6. Volume of concrete in ring beam = 0.3 * 0.25 * 21.5 = 1.61 m^3
7. Quantity of concrete in ceiling (no sunshade) = 6.5 * 4.75 * 0.15= 4.63 m^3
8. Overall cement bag needed:

   Cement bags:

   a. Total concrete volume = 4.84 + 0.54+ 1.61 + 4.63 = 11.62 m^3
      For 1 m^3 (1:2:4 mixing ratio) we need 6 bags
      Total bags needed = 6* 11.62 = 69.72 bag

   b. Total volume of bricks work = 4.7 + 11.2 = 15.9 m^3
      For 1 m^3 bricks work we need 2 cement bags
      Number of cement bags = 2*15.9 = 31.8 bag

Overall cement bag = 31.8 + 69.72 ≈ 102 bag ≈ 5 tons

   Sand: H.W.

9. Gravel volume H.W.

Complete table:

No.	Item	Quantity	Unit
1	Excavation	12.9	m^3
2	bricks	6360	Number
3	Cement	5	Tons
4	Sand	?	m^3
5	Gravel	?	m^3