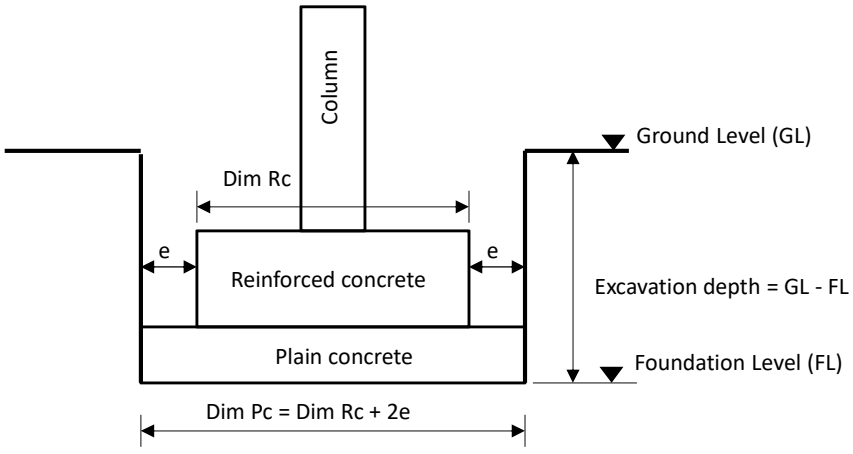
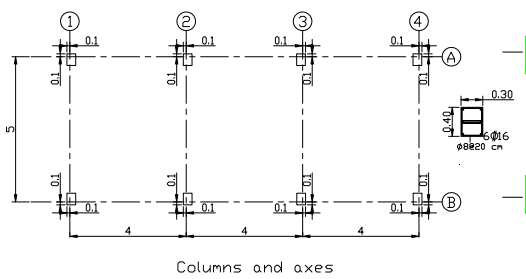
الأكاديمية العربية للعلوم والتكنولوجيا والنقل البحري
Arab Academy for Science, Technology & Maritime Transport

Quantity Surveying of Foundation Items

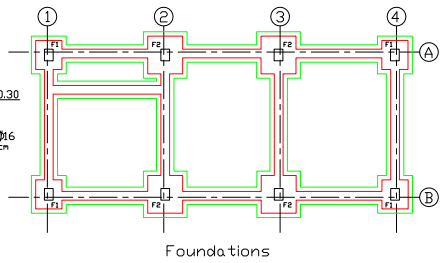
Dr. Karim Helmi

Footings





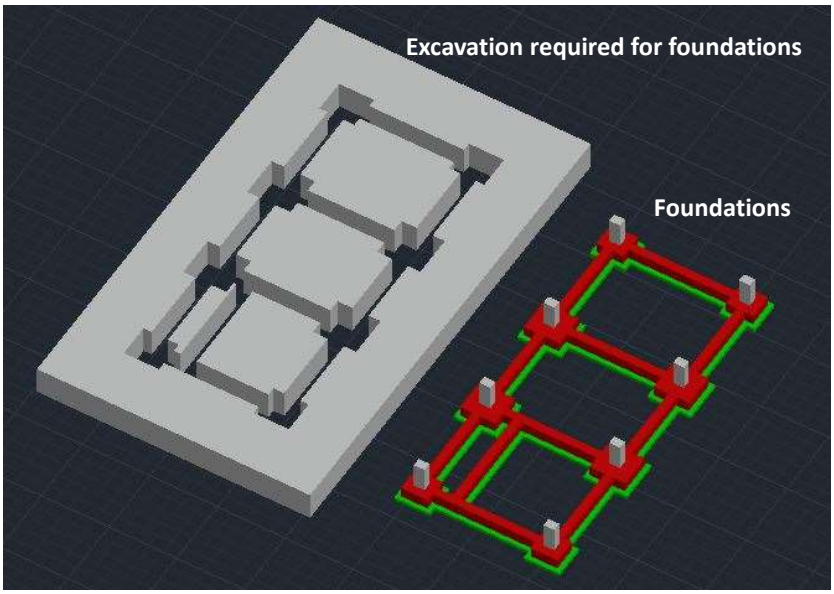
Columns and axes

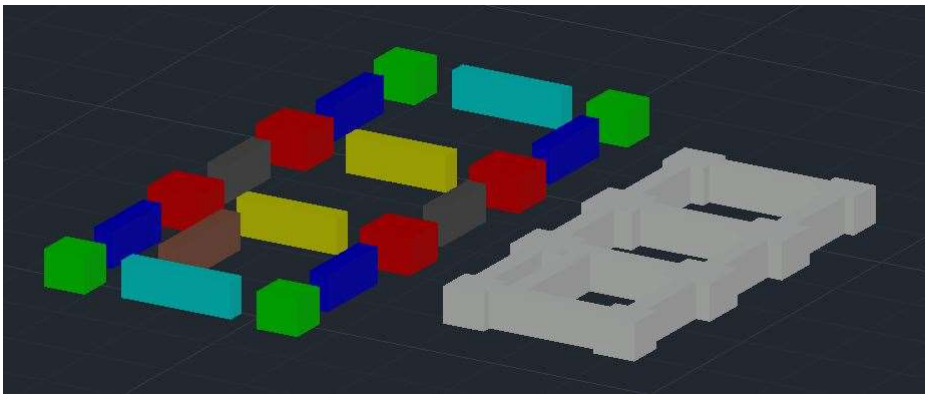


Foundations

Footing	Dimensions			Reinforcement	
	L	W	H	Long direction	Short Direction
F1	1.00	0.90	0.40	5 Φ 12	6 Φ 12
F2	1.30	1.20	0.40	7 Φ 12	8 Φ 12

Foundation level -1.10 m
Plain concrete for foundations extends 15 cm from all ends of footings and ties and have a thickness of 15 cm
All ties are 30 x 40 cm have a top and bottom reinforcement 3 16 and stirrups ϕ 8 @20 cm

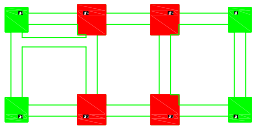




To simplify calculations the are is divided into regular shapes related to a unit like a footing or a tie
The volume of the excavation is calculated by multiplying the area of the plain concrete by the excavation depth

Plain Concrete footing Dimensions

Footing	Dimensions			Reinforcement	
	L	W	H	Long direction	Short Direction
F1	1.00	0.90	0.40	5 ⌀ 12	6 ⌀ 12
F2	1.30	1.20	0.40	7 ⌀ 12	8 ⌀ 12



All ties are 30 x 40 cm have a top and bottom reinforcement 3 ⌀16 and stirrups ϕ 8 @20 cm
Foundation level -1.10 m
Plain concrete for foundations extends 15 cm from all ends of footings and ties and have a thickness of 15 cm

P.C. $F1\ Length$ = 1.00 + 2 × 0.15 =1.30 m

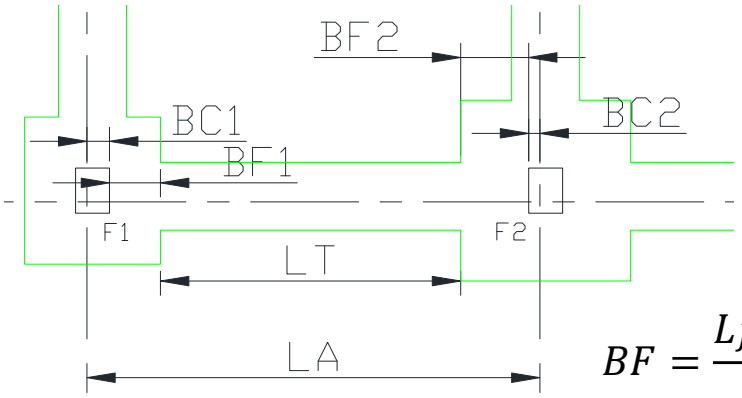
P.C. $F1\ Width$ = 0.90 + 2 × 0.15 =1.20 m

P.C. $F2\ Length$ = 1.30 + 2 × 0.15 =1.60 m

P.C. $F2\ Width$ = 1.20 + 2 × 0.15 =1.50 m

Item	Description	Unit	No.	L	W	H	Add	Deduct	Total
Excavation	Footings F1	m^3	4	1.30	1.20	1.10	6.864		
	Footings F2		4	1.60	1.50	1.10	10.560		

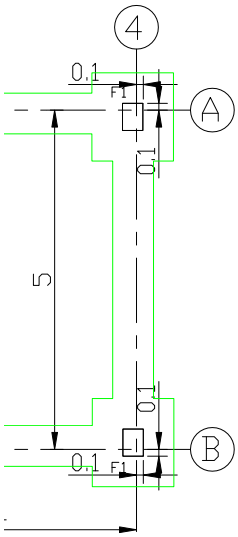
Tie Dimensions

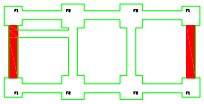


$$BF = \frac{Lf - lc}{2}$$

LT= LA – BC1 – BF1 – BC2 – BF2

Ties on axes 1 and 4





LA = 5.00 m

BC1 = 0.40 – 0.10 = 0.30 m

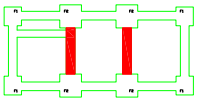
$Bf1 = \frac{1.30-0.40}{2} = 0.45$ m

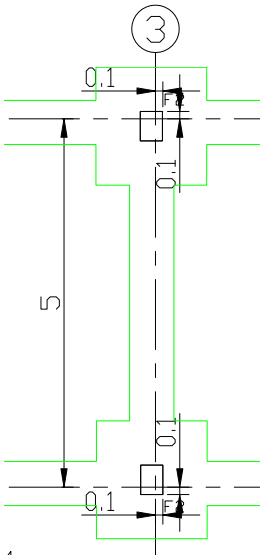
BC2 = 0.40 -0.10 =0.30 m

$Bf2 = \frac{1.30-0.40}{2} = 0.45$ m

LT= 5 – 0.3 - 0.45 - 0.3 - 0.45 = 3.50 m

Ties on axes 2 and 3





LA = 5.00 m

BC1 = 0.40 – 0.10 = 0.30 m

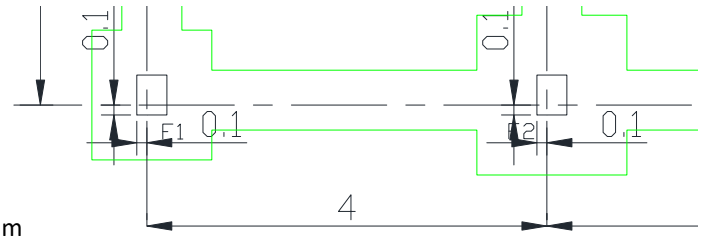
$$Bf1 = \frac{1.60 - .40}{2} = 0.60 \text{ m}$$

BC2 = 0.40 -0.10 =0.30 m

$$Bf2 = \frac{1.60 - 0.40}{2} = 0.60 \text{ m}$$

LT= 5 – 0.3 - 0.60 - 0.3 - 0.60 = 3.20 m

Ties on axes A and B Between Axes 1 & 2 and 3 & 4



LA = 4.00 m

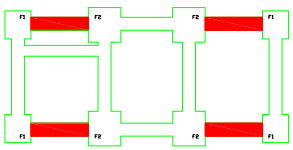
BC1 = 0.30 -0.10 =0.20 m

$$Bf1 = \frac{1.20 - 0.30}{2} = 0.45 \text{ m}$$

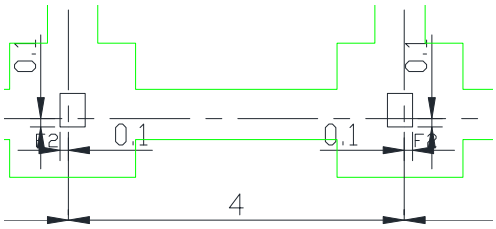
BC2 = 0.10 m

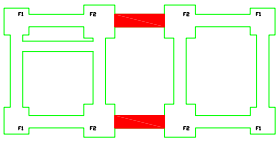
$$Bf2 = \frac{1.50 - 0.30}{2} = 0.60 \text{ m}$$

LT= 4 – 0.2 - 0.45 - 0.1 - 0.60 = 2.65 m



Ties on axes A and B Between Axes 2 and 3





LA = 4.00 m

BC1 = 0.30 -0.10 =0.20 m

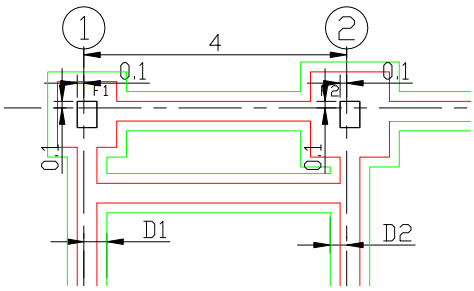
$$Bf1 = \frac{1.50 - 0.30}{2} = 0.60 \text{ m}$$

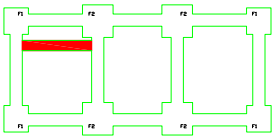
LT= 4 – 0.2 - 0.60 - 0.2 - 0.60 = 2.40 m

BC2 = 0.30 -0.10 =0.20 m

$$Bf2 = \frac{1.50 - 0.30}{2} = 0.60 \text{ m}$$

Tie Between axes A and B and Between Axes 2 and 3





LA = 4.00 m

LT= 4 – 0.35 – 0.25 = 3.40 m

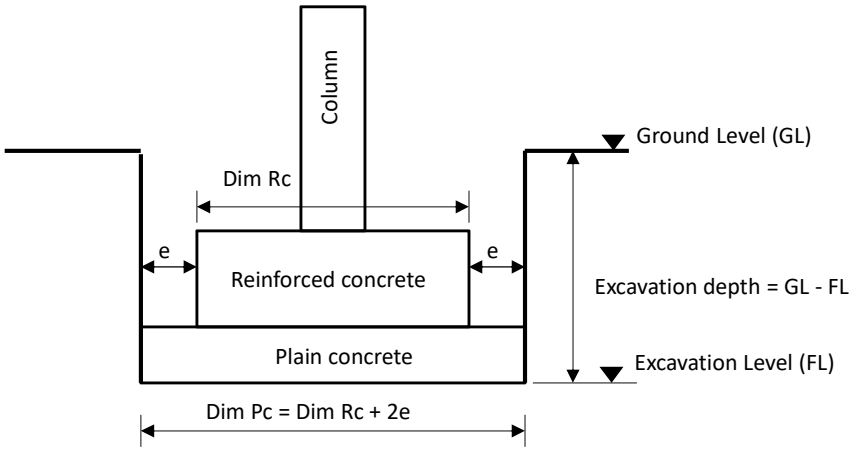
D1 = 0.30 - 0.10 + 0.15 = 0.35 m

D2 = 0.10 + 0.15 = 0.25 m

Item	Description	Unit	No.	L	W	H	Add	Deduct	Total
Excavation	Footings F1	m^3	4	1.30	1.20	1.10	6.864		
	Footings F2		4	1.60	1.50	1.10	10.560		
	Ties axes 1 and 4		2	3.50	0.60	1.10	4.620		
	Ties axis 2 and 3		2	3.20	0.60	1.10	4.224		
	Ties axes A and B between axes 1&2 and 3&4		4	2.65	0.60	1.10	6.996		
	Ties axes A and B between axes 2 & 3		2	2.40	0.60	1.10	3.168		
	Tie between axes A and B & between axes 1 & 2		1	3.40	0.60	1.10	2.244		
									38.676

PC tie width = RC tie width + 2e = 0.30 + 2 × 0.15 = 0.60 m

Plain Concrete



Plain Concrete

The excavation area is the same as the plain concrete are so the same dimensions are used for length and width

Item	Description	Unit	No.	L	W	H	Add	Deduct	Total
Excavation	Footings F1	m³	4	1.30	1.20	1.10	6.864		
	Footings F2		4	1.60	1.50	1.10	10.560		
	Ties axes 1 and 4		2	3.50	0.60	1.10	4.620		
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	Tie between axes A and B & between axes 1 & 2		1	3.40	0.60	1.10	2.244		
									38.676

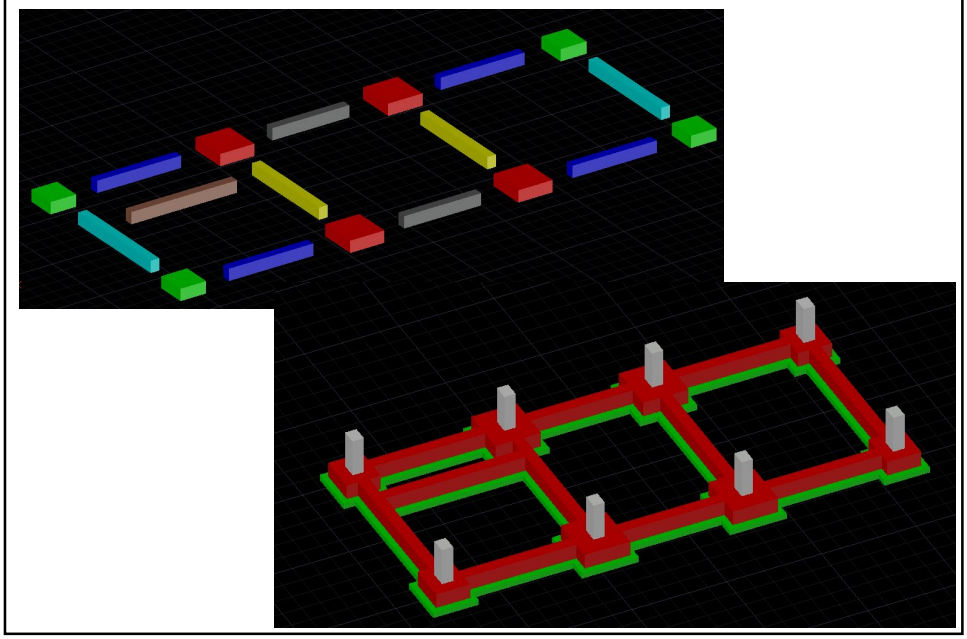
0.15 m

Item	Description	Unit	No.	L	W	H	Add	Deduct	Total
Plain Concrete	Footings F1	m³	4	1.30	1.20	0.15	0.936		
	Footings F2		4	1.60	1.50	0.15	1.440		
	Ties axes 1 and 4		2	3.50	0.60	0.15	0.630		
	Ties axis 2 and 3		2	3.20	0.60	0.15	0.576		
	Ties axes A and B between axes 1&2 and 3&4		4	2.65	0.60	0.15	0.954		
	Ties axes A and B between axes 2 & 3		2	2.40	0.60	0.15	0.432		
	Tie between axes A and B & between axes 1 & 2		1	3.40	0.60	0.15	0.306		
									5.274

Reinforced Concrete Foundation

- The foundation is divided into footings and ties
- The footing dimensions are takes as per design from dimensions or tables in the drawings
- Tie width and height are also taken from design
- Tie length is calculated as shown for calculating plain concrete ties but using reinforced concrete footing dimensions
- Alternatively the length of ties could be calculated by adding double the plain concrete footing extensions to the length of the plain concrete ties

Reinforced Concrete Foundation

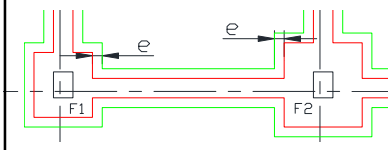


Reinforced Concrete Footings

Footing	Dimensions			Reinforcement	
	L	W	H	Long direction	Short Direction
F1	1.00	0.90	0.40	5 ϕ 12	6 ϕ 12
F2	1.30	1.20	0.40	7 ϕ 12	8 ϕ 12

Item	Description	No.	L	W	H	Add	Deduct	Total
R.C. Foundations	Footings F1	4	1.00	0.90	0.40	1.440		
	Footings F2	4	1.30	1.20	0.40	2.496		

Reinforced Concrete Ties



Item	Description	Unit	No.	L
Plain Concrete	Footings F1	m³	4	1.30
	Footings F2		4	1.60
	Ties axes 1 and 4		2	3.50
	Ties axis 2 and 3		2	3.20
	Ties axes A and B between axes 1&2 and 3&4		4	2.65
	Ties axes A and B between axes 2 & 3		2	2.40
	Tie between axes A and B & between axes 1 & 2		1	3.40

Length of R.C. Tie = Length of P.C. tie + 2 × e
Length of R.C. Tie = 3.5 + 2 × 0.15 = 3.80 m

Item	Description	Unit	No.	L	W	H	Add	Deduct	Total
R.C. Foundations	Footings F1	m³	4	1.00	0.90	0.40	1.440		
	Footings F2		4	1.30	1.20	0.40	2.496		
	Ties axes 1 and 4		2	3.80	0.30	0.40	0.912		
	Ties axis 2 and 3		2	3.50	0.30	0.40	0.840		
	Ties axes A and B between axes 1&2 and 3&4		4	2.95	0.30	0.40	1.416		
	Ties axes A and B between axes 2 & 3		2	2.70	0.30	0.40	0.648		
	Tie between axes A and B & between axes 1 & 2		1	3.70	0.30	0.40	0.444		
									8.196

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