| University of Babylon | Subject: Methods of Construction and Estimation |
College of Engineering	Lecture No.: 16
Department of Civil Engineering	Lesson topic: Quantity and Measurement Tables
Class: IV Stage Civil Eng. 2025-2026	Lecturer: Dr. Hassanean S.H.J. Alsharifi

Quantity and Measurement Tables

The method used to accomplish this task in construction engineering projects is detailed estimation. Furthermore, in this type of estimation, the following should be taken into consideration:

- Dimensions such as <u>length, width, height or depth</u> must be extracted from <u>architectural and structural drawings</u> of construction projects such as plans, sections and elevations.

- Wall <u>junction, corners,</u> and wall <u>meeting points</u> require special consideration in the calculation.

For example, *in symmetrical building elements such as foundations, which is the usual case; excavation of earthworks for foundations, casting of concrete foundation, brickwork under and over the DPC layer, brickwork in the superstructure, all these elements can be basically estimated by either of the two methods listed below:*

1. *Center Line Method*
2. *Engineering Shape Method (ESM)*
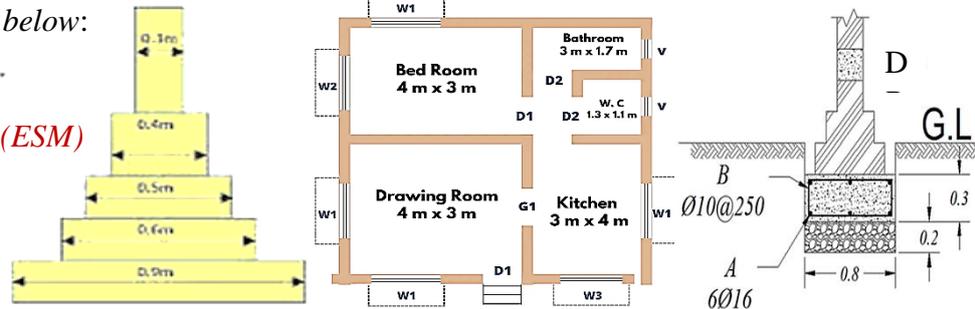
(1) Center Line Method (CLM):

It is a way to estimate building quantities by calculating the total length of all walls from center to center. This total length is then multiplied by the width and/or depth of the element (such as concrete or brick) to find the total quantity of each element (see Figure 16.1 & 16.2). In this method, the following points must be highlighted and taken into consideration:

- This type is considered the standard, easy, and quick method for performing calculations related to quantity and measurement tables, but it requires careful attention and consideration at junctions, intersections and points where meeting of partition or intersecting walls.

- The total length of the center lines of the walls, both long and short, should be calculated.

- The total length of the center lines of walls of the same type, and with the same type of foundations, then calculate the quantities by multiplying the total length of the center by the corresponding width and height.

- The length will be maintained as is for excavation and concrete casting for all foundations, and for the superstructure (with slight variation when there are intersecting walls or a number of junctions).

- A building that contains different types of walls must have each set of walls dealt with separately.
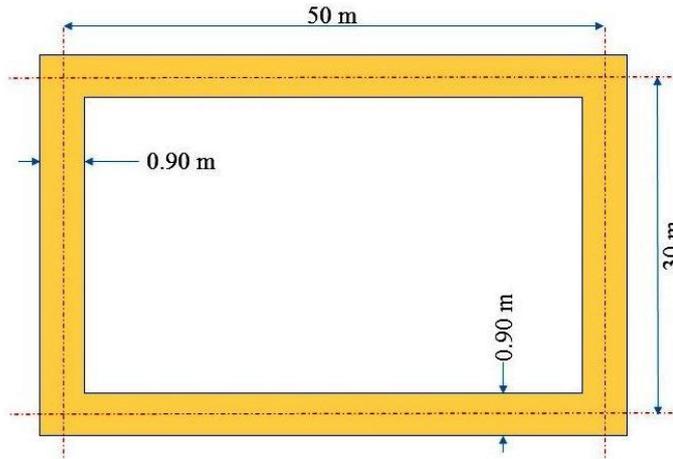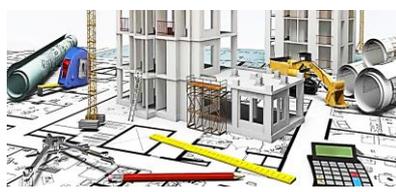
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Figure 16.1: The top view of room footing.

The center line (C.L.) length for the shape = (L₁ + L₂) * 2

$$The\ center\ line\ (C.L.)\ length\ for\ the\ shape = (L_1 + L_2) * 2$$

Where:

L₁: the length (in long direction) of excavation for room footing subtracted from it half width of the two edges for perpendicular ribs.

L₂: the length (in short direction) of excavation for room footing subtracted from it half width of the two edges for perpendicular ribs.
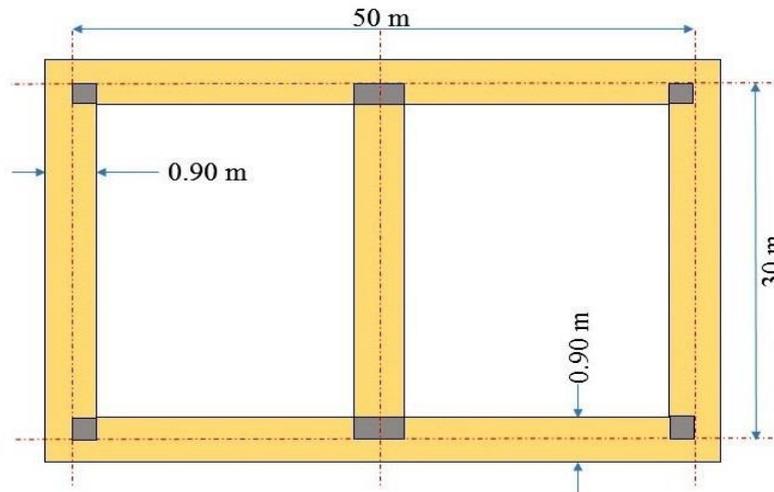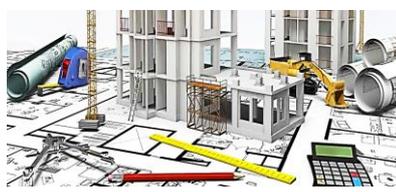

Figure 16.1: The top view of double room footing.

$$Length\ of\ C.L. = \begin{bmatrix} C.L.\ of \\ closed\ shape \end{bmatrix} - \left[\left(\frac{width\ of\ intersection\ (or\ racking)}{2} \right) * no.\ of\ intersection \right]$$

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(2) Engineering Shape Method (ESM):

This method is also called "Separate or Individual Wall Method": In this way the shape is divided into a set of horizontal and vertical walls, the foundation width is added to the walls of horizontal or vertical walls, and vice versa (see Figure 16.3).
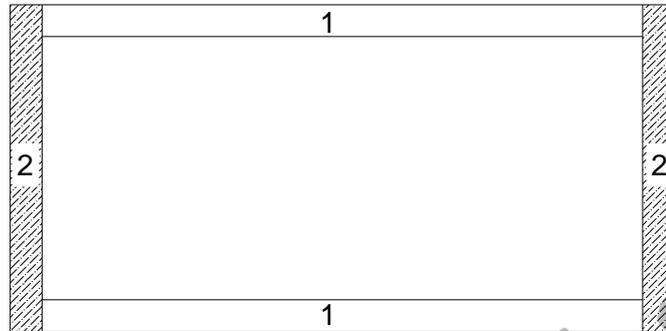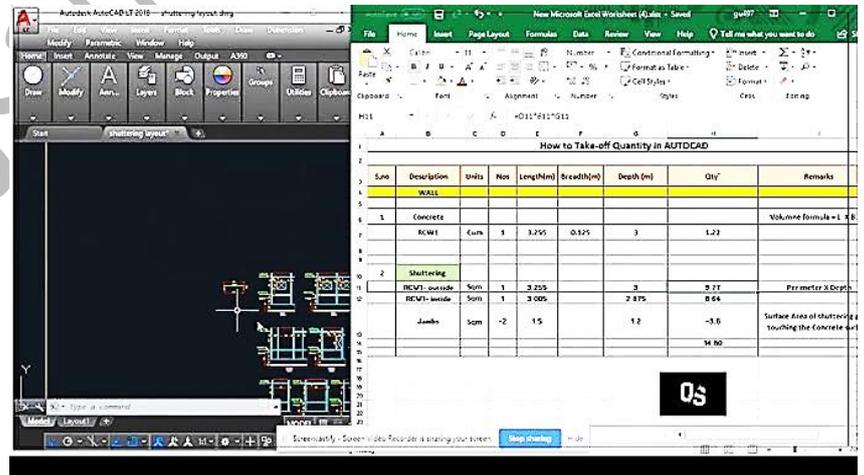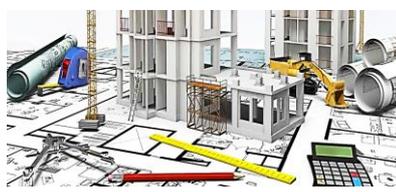

Figure 16.3: The top view of room footing.

$$Area\ of\ the\ Shape\ = \sum Area\ of\ Shapes\ no.1 +\ Area\ of\ Shapes\ no.2$$

(3) Use the AUTO CAD program: *It simplifies the estimation process primarily by enabling the accurate extraction of quantities from precise digital drawings.*

By using the program mentioned …………………

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Case Study No. 16-1: From the plan and section details shown in Figure below, prepare the quantity table for the following items:

i. Earth excavation.
ii. Blinding by sub-base.
iii. Cast of reinforcement concrete for foundation.
iv. Building by bricks and cement mortar.
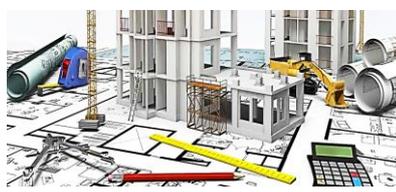v. Casting damp proof concrete (D.P.C).
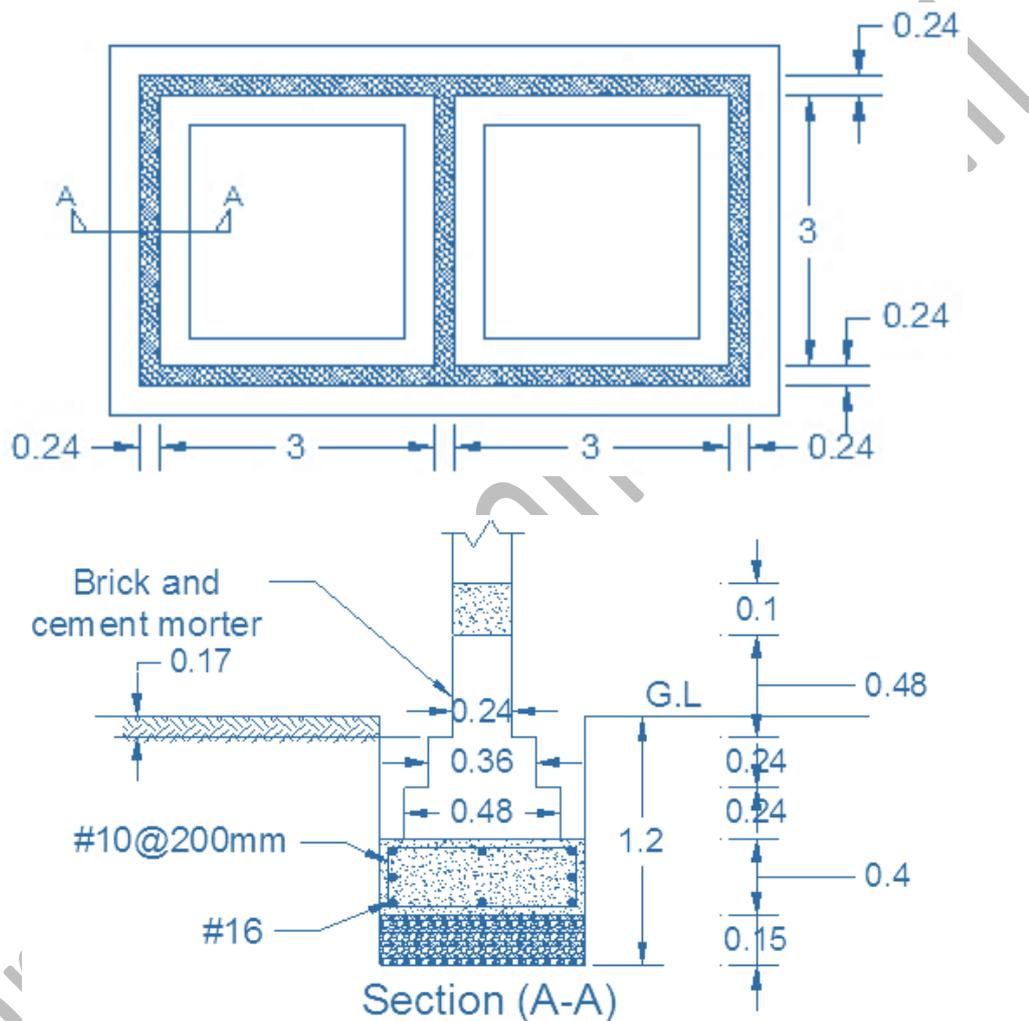
Section (A-A)

Solution:

$$Length\ of\ C.L.= \begin{bmatrix} C.L.of \\ closed\ shape \end{bmatrix} - \left[\left(\frac{width\ of\ intersection\ (or\ racking)}{2} \right) * no.of\ intersection \right]$$

$$\textbf{C.L at lower excavation} = 2 \times \left((0.12 + 3 + 0.24 + 3 + 0.12) + 3 \times (0.12 + 3 + 0.12) \right) - \left(\frac{0.9}{2} \times 2 \right)$$

$$= 22.68 - 0.9 = 21.78\ m$$

$$\textbf{C.L at 1}^{st}\ \textbf{racking (0.48)} = 22.68 - 2 \times \frac{0.48}{2} = 22.2m$$

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$$C.L \ at \ 2^{nd} \ racking(0.36) = 22.68 - 2 \times \frac{0.36}{2} = 22.32m$$

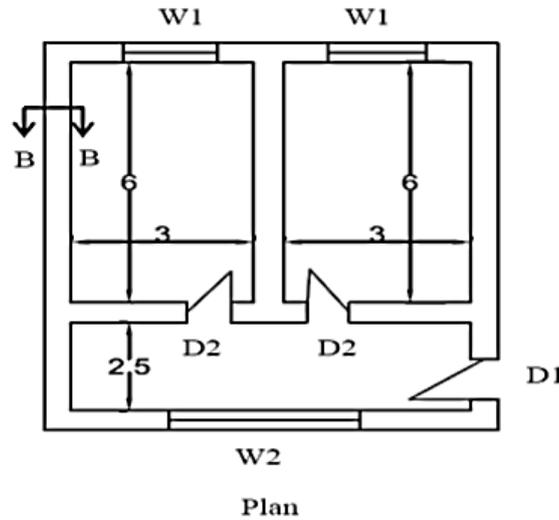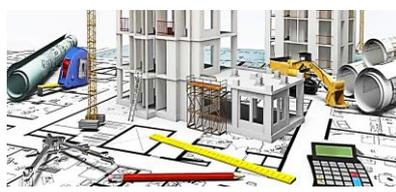$$C.L \ at \ 3^{rd} \ racking(0.24) = 22.68 - 2 \times \frac{0.24}{2} = 22.44m$$

Quantity table:

No.	Item	Unit	No.	Dimension (m)			Quantity	Notes
				length	Width	height		
1	Scraping and leveling	L.S	1	-----	-----	-----	L.S	
2	Planning	L.S	1	-----	-----	-----	L.S	
3	Foundation excavation	m^3	1	21.78	0.9	1.2	23.52	
4	Blinding with sub-base	m^3	1	21.78	0.9	0.15	2.94	
	Or blinding with sub-base thickness 15cm	m^2	1	21.78	0.9	-----	19.6	
5	Casting of concrete for foundation by SRPC	m^3	1	21.78	0.9	0.4	7.84	
6	Building by bricks and cement mortar i. Racking 0.48 ii. Racking 0.36 iii. Racking 0.24	m^3	1	22.2 22.32 22.44	0.48 0.36 0.24	0.24 0.24 0.48	2.55 1.93 2.58	
7	Casting concrete for D.P.C by SPRC	M.L	1	22.44	-----	-----	22.44	

Case Study No. 16-2: For the plan and section shown in the following Figure, prepare the **quantity table** according to the unified standard guide (USG) for the following items:

i. Foundation excavation.
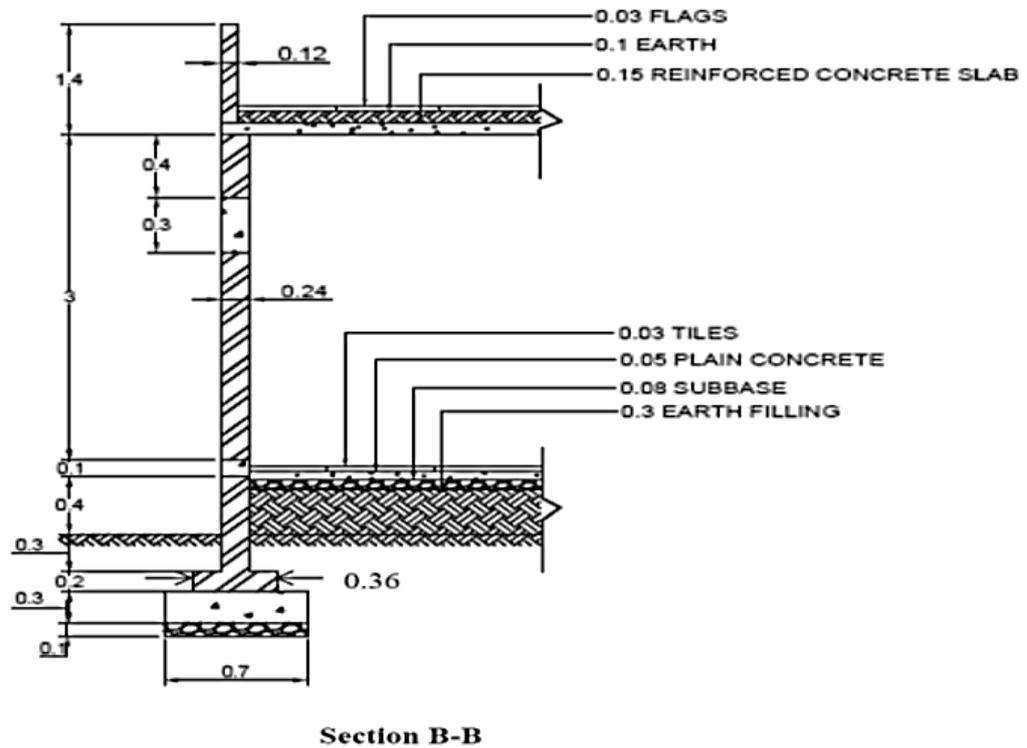ii. Concrete for foundation.
iii. Building by bricks and cement mortar from DPC to roof.
iv. Concrete for roof slabs.
v. Roofing with flags.
vi. Tiling all floors with tiles.

Table of windows and doors

Window	(Dimension) width × height	Door	(Dimension) width × height
W1 PVC	1.5×1.2 m	D1 steel	1.0×2.1
W2 PVC	3.0×1.2 m	D2 PVC	0.8×2.1

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Plan

Section B-B

Solution:

Length of center line = 3*(3 + 0.24 + 3 + 0.24) + 2*(6 + 0.24 + 2.5 + 0.24) + (6 + 0.24) – 4*(W/2)

= 43.64 - (4*w/2)

= 43.64 - (4*0.7/2) = 42.24 m (for excavation).

= 43.64 - (4*0.36/2) = 42.92 m (for first racking of bricks).

= 43.64 - (4*0.24/2) = 43.16 m (for second racking of bricks).

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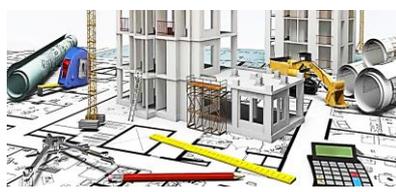
Quantity table:

No.	Item	Unit	No.	Dimensions (m)			Quantity	Notes
				Length	Width	Height		
1	Foundation excavation	m^3	1	42.24	0.7	0.9	26.61	
2	Concrete for foundation	m^3	1	42.24	0.7	0.3	8.87	
3	Building by bricks and cement mortar from DPC to roof	m^3	1	43.16	0.24	2.7	27.96	
	Size of doors							
	D1		1	1	0.24	2.1	-0.504	
	D2		2	0.8	0.24	2.1	-0.806	
	Size of windows							
	W1		2	1.5	0.24	1.2	-0.864	
	W2		1	3	0.24	1.2	-0.864	
	Summation						24.92	
4	Concrete for lintels	m^3	1	43.16	0.24	0.3	3.1	
5	Concrete for roof slab	m^3	1	9.22	6.72	0.15	9.29	length = 8.5+0.24*3=9.22 Width= 6+0.24*3=6.72
6	Roofing with flags	m^2	1	8.98	6.48	-	58.19	length = 8.5+0.24*2=8.98 Width= 6+0.24*2=6.48
7	Tiling	m^2	2	6	3	-	36	
			1	6.24	2.5	-	15.6	
			1	1	0.24		0.24	
			2	0.8	0.24		0.384	
	Summation						52.224	