

What is Estimate?

Ans. The process of calculating the quantities and of various items such as foundation, wall, roof, door etc. required in connection with the work is known as estimate.

Purpose of Estimating:-

- * To ascertain the necessary amount of money required by the owner to complete the proposed work.

- * To ascertain quantities of material required in order to programme their timely procurement to procure controlled material.

- * To calculate the number of different categories of works that are to be employed to complete the work within the scheduled time of completion.

- * To assess the requirement of tools, plants and equipment required to complete the work according to the programme.

- * To fix up the completion period from the volume of work involved in the estimate.

- * To draw up a construction schedule and programme and also to arrange the funds required according to the programme.

- * To justify the investment from benefit cost ratio.

- * To invite tenders and prepare bills for payment.

Different Types of Estimate :-

1. A detailed Estimate
2. A preliminary and rough Estimate
3. A Quantity Estimate or Quantity survey
4. A Revised Estimate
5. A supplementary Estimate
6. Revised Estimate and supplementary Estimate due to reduction of cost.
7. A complete estimate
8. Annual maintenance or Repair Estimate

A detailed Estimate :-

Quantities of all items of work are calculated from their respective dimensions on the drawing on a measurement sheet. Multiplying these quantities by their respective rates in a separate sheet the cost of all items of work are worked out individually and then summarised, i.e. abstracted. All other expenses required for satisfactory completion of the project are added to the above cost to frame the total or a detailed estimate.

A detailed estimate is accompanied by :-

- * Report
- * Specification
- * Detailed drawings showing plans, etc.
- * Design data and calculation
- * Basis of rates adopted in the estimate

A preliminary and Rough Estimate :-

This is an approximate estimate to find out an approximate cost in a short time and hence enables the

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authority concerned to consider the financial aspect of the scheme, for according sanction to the same, such an estimate is framed a free knowing the rate of similar works and from practical knowledge in various ways for various types of work such as

- * plinth area or square meter method.
- * cubic rate or cubic meter method.
- * service unit or unit rate method.
- * Approximate quantities with bill method
- * cost from material and labour.

A Quantity Estimate or Quantity survey:-

This is a complete estimate on list of quantities for all items of work required to complete the concerned project. The quantity of each individual item of work is worked out from respective dimensions on the drawing of the structure. To find the cost of an item its quantity is multiplied by the rate per unit for that item.

A Revised Estimate:-

A Revised Estimate is a detailed estimate for the revised quantities and rate of items of works originally provided in the estimate with out material deviations of a structural nature from the design originally approved for a project.

* When a sanctioned estimate is likely to exceed by more than 5% either the rates being found except important structural alterations

A supplementary Estimate:-

While a work is in progress, some changes or additional works due to material deviation of structural nature from the design originally approved may be thought necessary for a development of a project.

A complete Estimate:-

This is an estimated cost of all items which are related to the work in addition to the main contract or to the "detailed estimate".

One may think that on the estimate of a structure included only the cost of land and the cost of the main contracts or labour materials and supervision in addition, there many other cost items to be included.

Annual Maintenance or Repair Estimate:-

After completion of a work it is necessary to maintain the same for its proper function and for the same, an estimate is prepared for the items which require renewal replacement, repairs etc in the form of a detailed estimate.

How to Prepare a detailed Estimate:-

The unit - quantity method is followed to prepare a detailed estimate. In this method the rate per unit work of one item including profit are considered first and the total cost for the item is found by multiplying the cost per unit of the rate by the number of units:-

A detailed estimate is divided into two parts :-

- (1) Details of measurement and calculation quantity.
- (2) Abstract of estimate cost.

Details of measurement and calculation quantity
 Details of measurement and calculation quantity is the first part. Respective measurement for dimensions of all individual items involved in the whole are taken off from the drawing of the work and entered in the respective columns of standard measurement form.

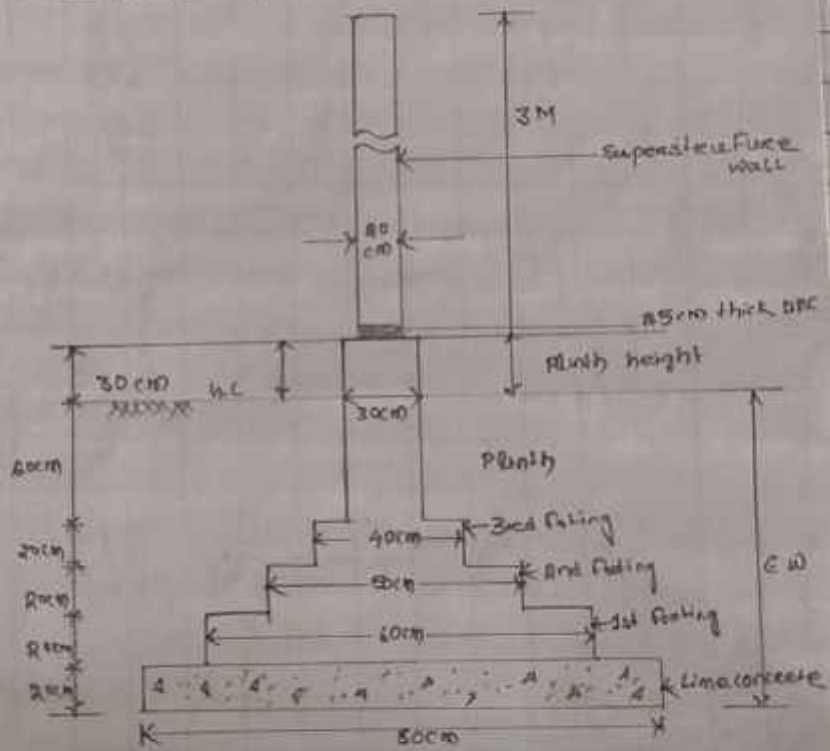
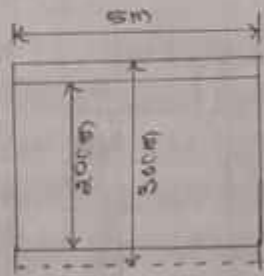
Item No.	Description of item	No.	Length	Breadth	Height	Quantity	Exp

Abstract of estimate cost :-

Abstract of estimated cost is the second part in the preparation of a detailed estimate. The cost of each and every individual item of work is calculated by multiplying the quantity completed in the measurement from with the specified rate in a tabular form known as 'Abstract form'.

Sl. No	Description of item	unit of measurement	unit of rate
	through existing brick work		
11.	Line of cement concrete in Foundation	cum	Per cum
12.	Rain Forced cement concrete	cum	Per cum
13.	Brick work	Sqm	Per cum Per Aintal
14.	Rain For cement	Quintal	Per Sqm
15.	Damp proof course (DPC)	Sqm	Per Sqm
16.	Expansion joint in concrete	run	Per run
17.	Terraced roofing Partition	Sqm	Per run
18.	Lime terracing on roof	Sqm	Per Sqm
19.	Madras terrace roofing	Sqm	Per Sqm
20.	Ridges hips and valley	run	Per run
21.	Ceiling and linings	Sqm	Per Sqm
22.	Artificial stone to floors	Sqm	Per Sqm
23.	Wood work indoor and window Frames	Cum	Per cum
24.	Door and window shutters of different types	Sqm	Per Sqm
25.	steel work in truss	Quintal	Per Quintal
26.	Bolts including nuts and washers	Kg	Per Kg
27.	steel roofing shutters grills	Sqm	Per Sqm
28.	plastering to ceiling	Sqm	Per Sqm
29.	white washing above washing Distemping	Sqm	Per Sqm

CROSS SECTION



Explaining in detail
 clearly
 in height
 (m)
 Boundary

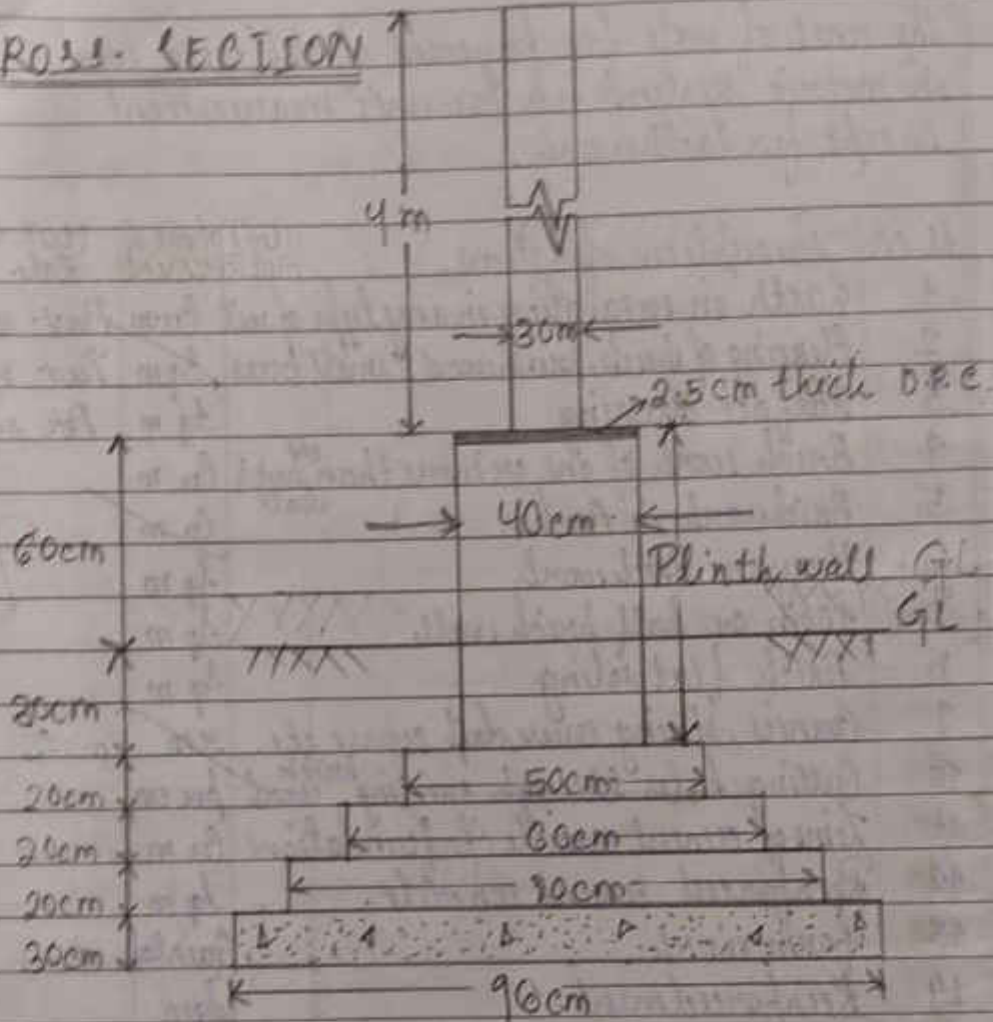
The figure show the plan and cross-section for a work 5m, length Prepare a quantity estimate for the following item.

1. Earth work in excavation in Foundation.
2. lime concrete in Foundation.
3. 1st class brick work (1:4) in Foundation and plinth
4. 2.5 cm thick D.P.C
5. 1st class brick work in superstructure wall (1:6). Detail in

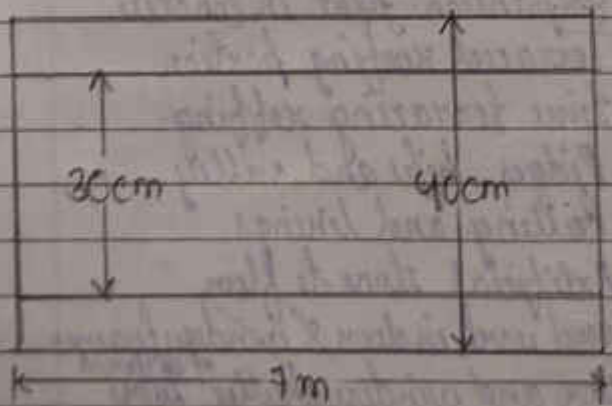
Detail measurement and calculation quantity-

No. as given	Description	No	Length (m)	Breadth (m)	Height (m)	Quantity	Explains rate
1.	Earth work in excavation in Foundation.	1	5.00	0.80	1.40	5.600 m ³	$H = 0.20 + 0.20$ $+ 0.20 + 0.20 + 0.20$ $0.60 = 1.40$
2.	lime concrete in foundation.	1	5.00	0.80	0.20	0.800 m ³	
3.	1st class brick work (1:4) in foundation and plinth.	1	5.00	0.60	0.20	0.60 m ³	$H = 0.60 + 0.30$ $= 0.90$
	(1) 1st footing	1	5.00	0.50	0.20	0.50 m ³	
	(2) 2nd footing	1	5.00	0.40	0.20	0.40 m ³	
	(3) 3rd footing	1	5.00	0.30	0.20	1.035 m ³	
	(4) plinth	1	5.00	0.30	0.20	2.85 m ³	
	4. 2.5 cm thick D.P.C	1	5.00	0.20	-	1.00 m ²	
	5. 1st class brick work	1	5.00	0.20	3.00	3 m ³	

CROSS-SECTION



PLAN



- (1) Earth work in excavation in Foundation.
- (2) Lime concrete (1:2:4) in Foundation.
- (3) 1st class brick work (1:4) in Foundation and plinth.
- (4) 1st class brick work (1:6) in superstructure wall.
- (5) 25mm thick D.P.C (1:2:4) with water proofing compound.

Item No.	Description of Item	No	Length	Breadth	Height	Quantity	Explaining Note
1	earth work in excavation in foundation	1	7.00	0.90	1.2	7.56 m ³	$\frac{0.30 \times 0.90 \times 1.2}{0.20 \times 0.90 \times 0.20} = 1.2$
2	(lime concrete (1:2:4) in foundation.	1	7.00	0.90	0.20	1.26 cum	
3	1st class brick work (1:4) in Foundation and Plinth	i- 1st Footing	7.00	0.90	0.20	1.26 m ³	$H = 0.60 \times 2.5 = 1.50$
		ii- 2nd Footing	7.00	0.60	0.20	0.84 m ³	
		iii- 2nd Footing in plinth	7.00	0.50	0.20	0.70 m ³	
		iv- plinth	7.00	0.40	0.20	0.56 m ³	
4	1st class brick work (1:6) in superstructure wall.	1	7.00	0.30	total 4.00	5.18 cum 8.4 cum	
5	25mm thick D.P.C with water proofing compound	1	7.00	0.40	-	2.80 m	

Different method of estimating in building work:-

* long wall & short wall method or out to out and In to In method.

* centre line method.

* Crossing method.

Long wall and short wall method:-

* In this method the long wall in a building are consider as long wall and measure from out to out and shorter or partition wall into-in For a particular layer of work.

* this length of long wall and short wall are multiplied separately by the breadth and height of the corresponding layer and are added to get the quantity.

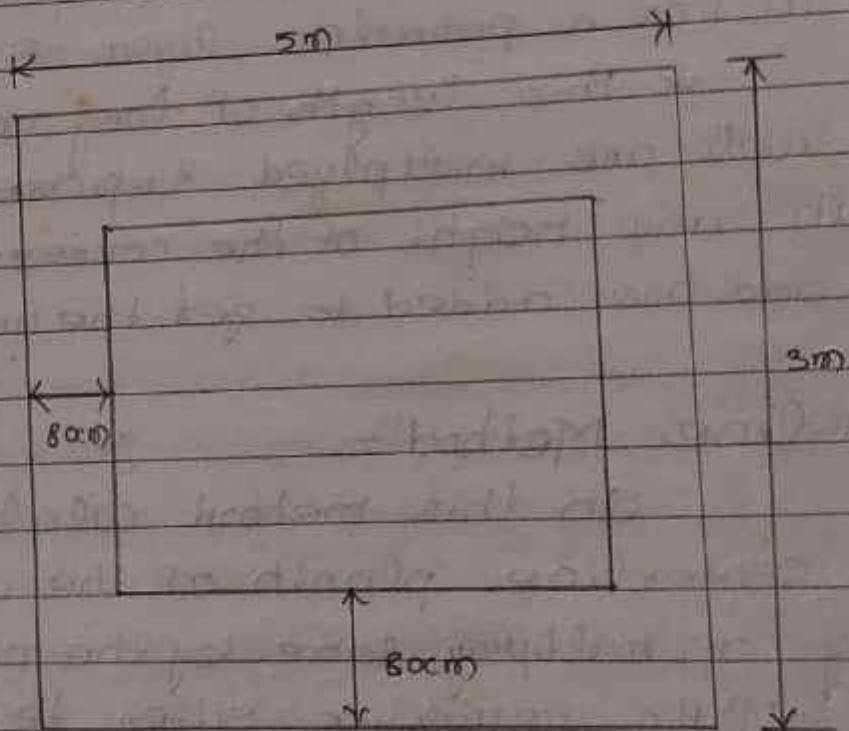
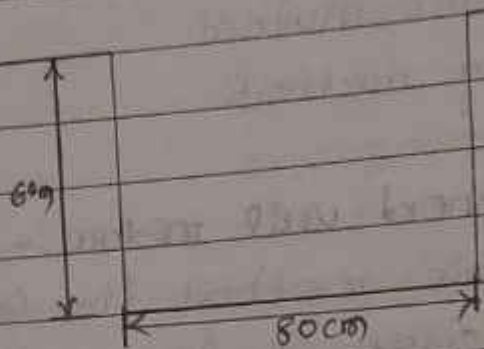
Centerline Method:-

In this method calculate the total centerline length of the wall in a building and multiply same by the plinth height of the respective either to get the total quantity at the time.

Crossing method:-

In this method calculate the overall perimeter of the building and subtract this 4 times the thickness of the wall to obtain the centerline length.

* Internal wall are grouped separately two three section and major in between the internal face of the main wall at the level.



Principally this method is same as the centerline method but differ in the process on calculation to find the centerline length.

Problem:-

The figure show plane and ob of a trange which is 80cm wide 60cm deep it is required to calculate the volume of hand work for the trench. long wall and short wall method centerline method.

long wall and short wall method-

$$\text{long wall} = (L) = 5 \text{ m}$$

$$(B) = 0.80 \text{ m}$$

$$(H) = 0.60 \text{ m}$$

$$\begin{aligned} \text{Quantity} &= 2 \times L \times B \times H \\ &= 2 \times 5 \times 0.80 \times 0.60 \\ &= 4.80 \end{aligned}$$

$$\text{short wall: } (L) = 3 - 2 \times 0.80 = 1.40 \text{ m}$$

$$(B) = 0.80 \text{ m}$$

$$(H) = 0.60 \text{ m}$$

$$\begin{aligned} \text{Quantity} &= 2 \times L \times B \times H \\ &= 2 \times 1.40 \times 0.80 \times 0.60 \\ &= 1.35 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{Total Quantity} &= \text{long wall} + \text{short wall} \\ &= 4.80 + 1.35 \\ &= 6.15 \text{ m} \end{aligned}$$

Centre line length:-

centre to centre long wall

$$5 - 2 \times \frac{0.80}{2} = 4.20 \text{ m}$$

centre to centre short wall

$$3 - 2 \times \frac{0.80}{2} = 2.20 \text{ m}$$

total length = 2 (long wall + short wall)

$$L = 2 (4.20 + 2.20)$$

$$= 12.80 \text{ m}$$

$$B = 80 \text{ cm} = 0.80 \text{ m}$$

$$H = 60 \text{ cm} = 0.60 \text{ m}$$

$$\begin{aligned} \text{Volume of earth work} &= 1 \times 12.80 \times 0.80 \times 0.60 \\ &= 6.15 \text{ cum} \end{aligned}$$

Work charged Establishment -

The work charged establishment will include such temporary establishment as are employed for education or the immediately technical supervision on departmental stores and machinery connection with a specific work he may be technical person or an under staff of the technical person to exit him at work side for such work charge establishment and amount of 2% to 5% according to practice PWD may be proved.

Contingency:-

The term Contingency indicate the in - mis - character which can not to be personable during the Preparation of the estimate 3% according to the practice of (P.W.D) and 5% according to the P.W.D

Approximate method of estimate for building:-

- i. plinth area or square meter method.
- ii. cubic rate or cubic meter method.
- iii. Approximate quantity with bill method.
- iv. Bay method.
- v. service unit or unit rate method.
- vi. Price comparison method.
- vii. Cost from material and labour.

Plinth area or square meter method:-

To prepare an estimate by this method the plinth area of the building shall be determine first plinth area may also have to worked out floor area or carpet area or covered area of a building to the term or desision below one by one similar the circulation area shall be known in order to calculate the plinth area of a building.

Plinth area:-

The plinth area is the building is cover area measure at the floor level of the basement or of any storey of a building plinth area can be calculate by taken the external dimension of building excluding the plinth offset.

Floor level:-

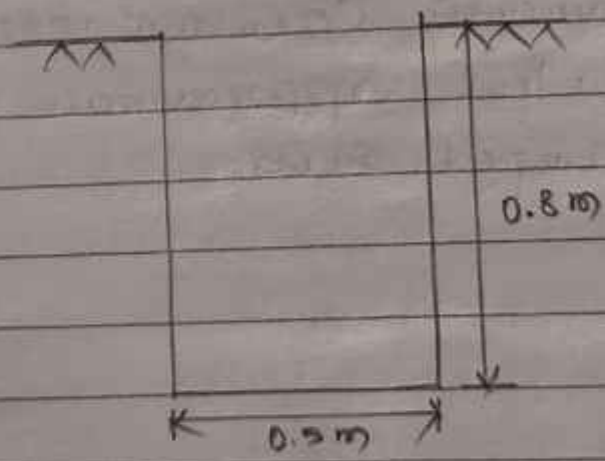
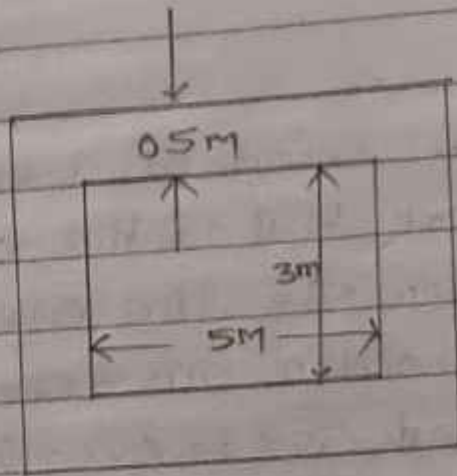
It is defined as the clear cover area that is plinth area excluding ~~the~~ area of wall 10% - 15%. All the doors not included in the floor area. The floor area of every storage 1st and 2nd building save in nature separately.

Carpet area:-

This is an area of a building which is useful work that is the area of drawing room bedroom etc. The area of kitchen, staircase and verandha and entrance hall, bathroom are included 50% to 60% plinth area.

Circulation Area:-

Area used for movement that is verandha staircase. Consider verandha is term 1 circulation. This approximate to the plinth area and carpet area.



LONG WALL & SHORT WALL METHOD:-

$$\text{Long wall} \rightarrow L = 5 + (2 \times 0.5) = 6 \text{ m}$$

$$B = 0.5 \text{ m}$$

$$H = 0.8 \text{ m}$$

Earth work in excavation

$$\begin{aligned} \text{Quantity} &= 2 \times L \times B \times H \\ &= 2 \times 6 \times 0.5 \times 0.8 \\ &= 4.8 \text{ m}^3 \end{aligned}$$

$$\text{Short wall} = L = 3 \text{ m}$$

$$B = 0.5 \text{ m}$$

$$H = 0.8 \text{ m}$$

Earth work in excavation

$$\begin{aligned} \text{Quantity} &= 2 \times L \times B \times H \\ &= 2 \times 3 \times 0.5 \times 0.8 \\ &= 2.4 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{Total quantity} &= \text{Long wall} + \text{Short wall} \\ &= 4.8 \text{ m}^3 + 2.4 \text{ m}^3 \\ &= 7.2 \text{ m}^3 \end{aligned}$$

CENTRE LINE METHOD:-

$$\text{Centre to centre long wall} \rightarrow 5 + (2 \times \frac{0.5}{2}) = 5.5 \text{ m}$$

$$\text{Centre to centre short wall} \rightarrow 3 + (2 \times \frac{0.5}{2}) = 3.5 \text{ m}$$

$$\begin{aligned} \text{Total quantity} &\rightarrow 2 \times (\text{Centre to centre long wall} + \\ &\quad \text{Centre to centre short wall}) \\ &= 2 \times (5.5 + 3.5) \\ &= 18 \text{ m} \\ \therefore L &= 18 \text{ m} \end{aligned}$$

$$\begin{aligned}
 \text{Earth work in excavation} &= L \times B \times H \\
 &= 1 \times 18 \times 0.5 \times 0.8 \\
 &= 7.2 \text{ m}^3
 \end{aligned}$$

Q. Prepare a complete detail estimate of the cost of construction of moga line show in figure one the basis of present market rate from the total amount amount at on detail estimate find out plinth area rate of the building.

General specification:-

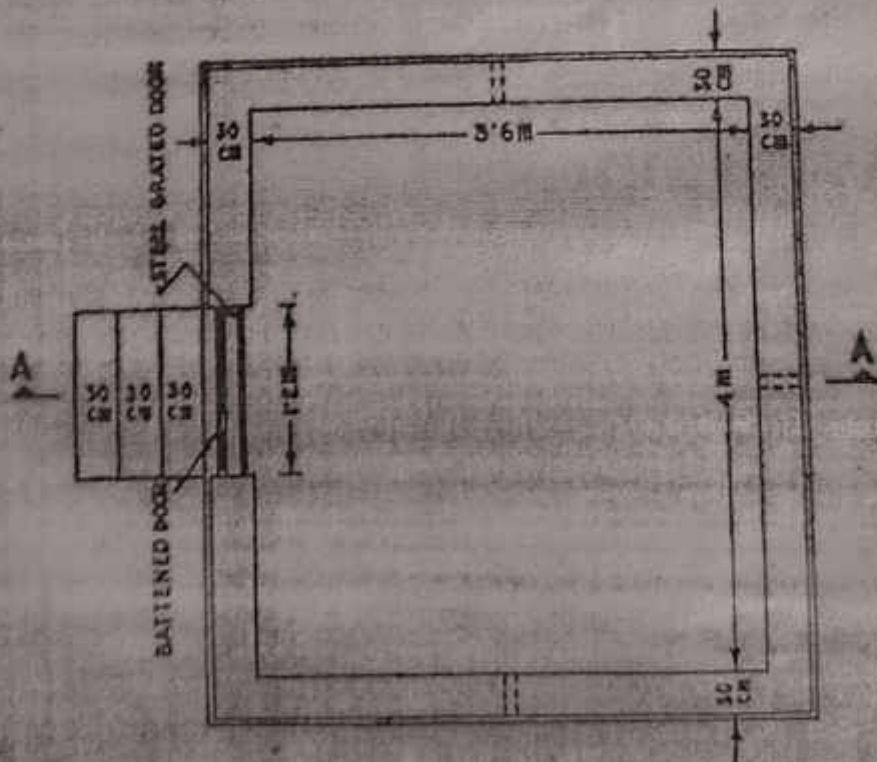
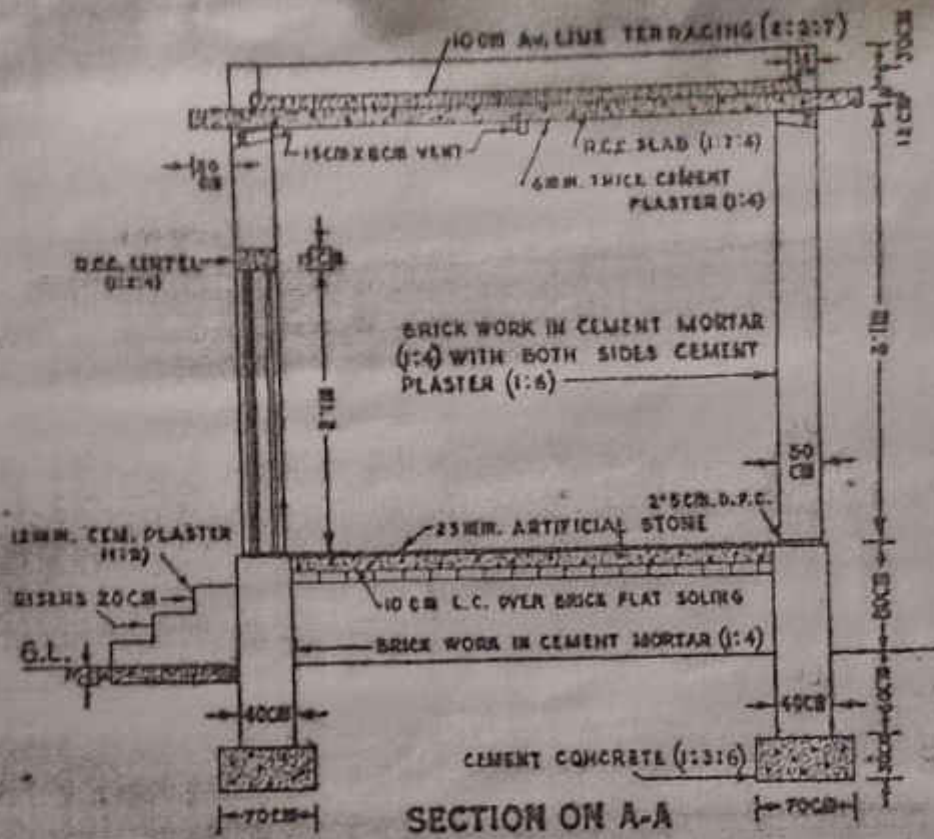
1. Earthwork in excavation in Foundation
2. Cement concrete 1:3:6 in Foundation
3. Brick work in cement mortar 1:4 in Foundation and blinth.
4. 2.5 cm thick D.P.C 1:2:4
5. Brick work in superstructure wall.

$$\text{Centre to centre long wall} \rightarrow 4 + \frac{0.3}{2} + \frac{0.3}{2} = 4.3 \text{ m}$$

$$\text{centre to centre short wall} \rightarrow 3.6 \times \frac{0.3}{2} + \frac{0.3}{2} = 3.9 \text{ m}$$

$$\begin{aligned}
 \text{Sum of centre line length} &\rightarrow 2 \times (\text{centre to centre} \\
 &\quad \text{long wall} + \text{centre to centre} \\
 &\quad \text{short wall}) \\
 &\rightarrow 2 \times (4.3 + 3.9) \\
 &\rightarrow 16.4 \text{ m}
 \end{aligned}$$

ESTIMATE OF BUILDINGS



PLAN
(SCALE = 1:66 1/2)

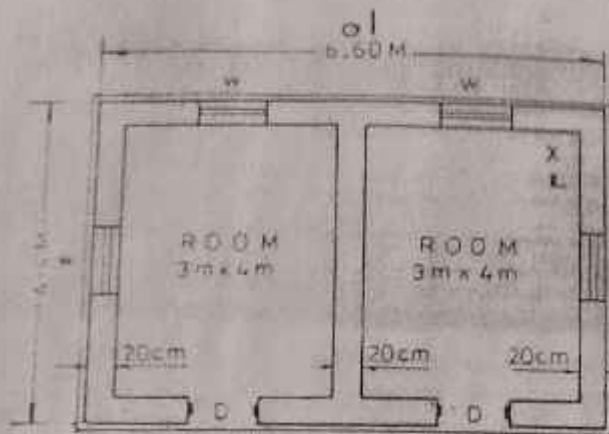
FIG. 5-1

Item NO	Description of Items	No. length	Breadth	Height	Quantity	Explanatory Notes.
1.	Foundation work in excavation in Foundation	1 16.4m	0.7m	0.9m	10.38 m ³	H = 0.6 + 0.3 = 0.9m
2.	Cement concrete 1:3:6 in Foundation	1 16.4m	0.7m	0.3m	3.44 m ³	
3.	Brick work in cement mortar 1:4 in foundation & plinth.	1 16.4m	0.4m	2.4m	8.96 m ³	H = 0.6 + 0.8 = 1.4m
4.	2.5cm thick DPC (1:2:4)	1 16.4m	0.3m	—	4.92 m ²	
5.	Brick work in superstructure wall	1 16.4m	0.3m	3.1m	15.25 m ³	

ESTIMATING, COSTING, SPECIFICATION AND VALUATION

4-11. Partition wall — (A) Partition wall having the same section as that of main wall —

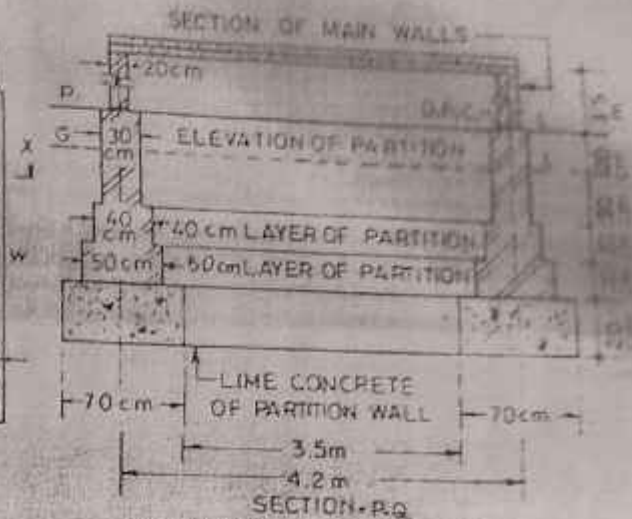
Two roomed building Fig. 4-16 shows the plan and cross section of wall of a building. Estimate the quantities for the following items (1) Earthwork in excavation in foundation, (2) Lime concrete in foundation, brickwork in cement mortar in superstructure.



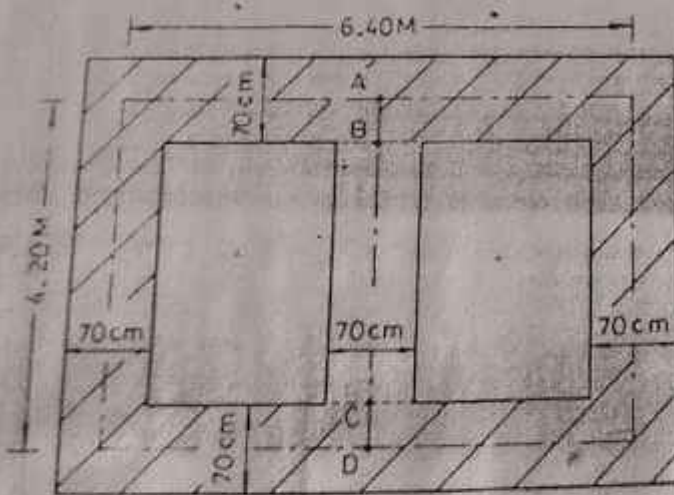
PLAN

D = 1.2 x 2.1 m
W = 1.0 x 1.2 m

FIG. 4-16

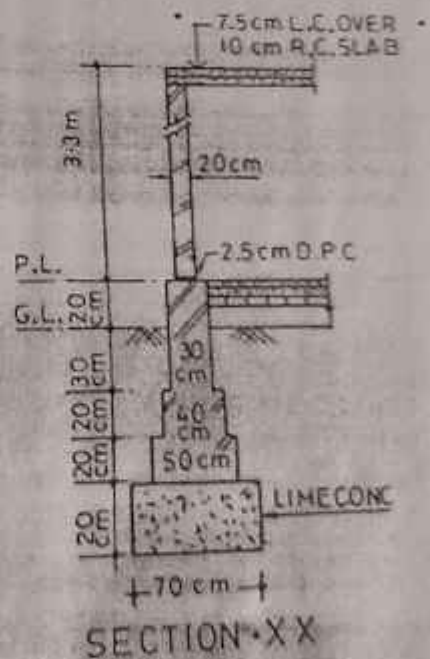


SECTION - P.Q
After removal of eorn (ENLARGED)
FIG. 4-16(B)



PLAN FOR FOUNDATION TRENCH

FIG. 4-17



SECTION - X X

Centre line method : The total length of centre line = Length of centre line for the main outer wall + length of centre line for the partition wall.

$$= 2 (6.60 - 2 \times 0.20 / 2 + 4.40 - 2 \times 0.20 / 2) + 4.40 - 2 \times 0.20 / 2 = 2 (6.40 + 4.20) + 4.20 = 25.4 \text{ m}$$

LONG WALL & SHORT WALL

$$\text{Center to center long wall} = 6.40 \text{ m} \rightarrow \boxed{2 \text{ NO}}$$

$$\text{Center to center short wall} = 4.20 \text{ m} \rightarrow \boxed{3 \text{ NO}}$$

$$6.60 + (2 \times \frac{0.20}{2}) = 6.40 \text{ m}$$

$$4.4 + (2 \times \frac{0.20}{2}) = 4.20 \text{ m}$$

Item No	Description of Items	No	Length	Breadth	Height	Quantity	Explanatory
	Earthwork in excavation in foundation						
①	* Long Wall	2	7.1 m	0.70 m	0.90 m	8.94 m ³	$L = 6.4 + (\frac{0.7}{2} \times 2) = 7.1 \text{ m}$
	* Short wall	3	3.5 m	0.70 m	0.90 m	6.615 m ³	$L = 0.20 + 0.20 + 0.20 + 0.90 = 0.90$
					Total	15.561 m ³	$L = 4.2 - (2 \times \frac{0.7}{2}) = 3.5 \text{ m}$

Lime concrete in foundation

②	* Long wall	2	7.1 m	0.7 m	0.20 m	1.98 m ³
	* Short wall	3	3.5 m	0.7 m	0.20 m	1.47 m ³
					Total	3.45 m ³

③

1st class brick work in foundation & plinths

1st Foundation

- Long wall
- Short wall

$$L = 6.40 + (2 \times \frac{0.50}{2}) = 6.90 \text{ m}$$

$$L = 4.20 - (2 \times \frac{0.50}{2}) = 3.7 \text{ m}$$

$$1.38 \text{ m}^3$$

$$1.11 \text{ m}^3$$

$$0.20 \text{ m}$$

$$0.20 \text{ m}$$

$$0.50 \text{ m}$$

$$0.50 \text{ m}$$

$$2 \quad 6.90 \text{ m}$$

$$3 \quad 3.7 \text{ m}$$

2nd Footing

- Long wall
- Short wall

$$L = 6.40 + (2 \times \frac{0.40}{2}) = 6.80 \text{ m}$$

$$L = 4.20 - (2 \times \frac{0.40}{2}) = 3.8 \text{ m}$$

$$1.088 \text{ m}^3$$

$$0.912 \text{ m}^3$$

$$0.20 \text{ m}$$

$$0.20 \text{ m}$$

$$0.40 \text{ m}$$

$$0.40 \text{ m}$$

$$2 \quad 6.80 \text{ m}$$

$$3 \quad 3.8 \text{ m}$$

3rd Footing or Plinth

- Long wall
- Short wall

$$L = 6.40 + (2 \times \frac{0.30}{2}) = 6.70 \text{ m}$$

$$H = 0.20 + 0.30 = 0.50 \text{ m}$$

$$L = 4.20 - 2 (\frac{0.3}{2}) = 3.9 \text{ m}$$

$$2.01 \text{ m}^3$$

$$1.75 \text{ m}^3$$

$$0.50 \text{ m}$$

$$0.50 \text{ m}$$

$$0.30 \text{ m}$$

$$0.30 \text{ m}$$

$$2 \quad 6.70 \text{ m}$$

$$3 \quad 3.90 \text{ m}$$

Total = 8.250 m³

④	2.5cm orthick D.P.C	2	6.60m	0.20m	2.64 m ²	$L = 6.40 + (2 \times \frac{0.20}{2})$ $= 6.60m$ $L = 4.20 - (2 \times \frac{0.20}{2})$ $= 4m$
	→ long wall	3	4m	0.20m	2.4 m ²	
	→ short wall				Total = 5.04 m ²	
	Deduction					
	Door sill level	2	1.2m	0.80m	0.48 m ²	
					Total	4.56 m ²

⑤	Brick work in super-structure					$L = 6.4 + (2 \times \frac{0.20}{2})$ $= 6.60m$ $L = 4.20 - (2 \times \frac{0.20}{2})$ $= 4m$
	→ long wall	2	6.60	0.20m	8.712 m ²	
	→ short wall	3	4m	0.20m	7.92 m ²	
					Total	16.632 m ²

Deduction

→ Door

→ Window

→ Lintel over door

→ Lintel over window

2	1.2m	0.20m	2.4m	(-) 1.008 m ³
4	1m	0.20m	4.2m	(-) 0.96 m ³
2	1.5m	0.20m	0.15m	(-) 0.09 m ³
4	1.3m	0.20m	0.15m	(-) 0.156 m ³

$$L = 1.2 + (2 \times 0.15) = 1.5m$$

$$L = 1 + (2 \times 0.15) = 1.3m$$

Grand Total =

14.418 m³

Centre line Method:-

centre to centre long wall = $3 + 3 + 0.20 + (2 \times \frac{0.20}{2}) = 6.40 \text{ m}$

centre to centre short wall = $4 + (2 \times \frac{0.20}{2}) = 4.20 \text{ m}$

centre to centre partition wall = $4 + (2 \times \frac{0.20}{2}) = 4.20 \text{ m}$

Total centreline length = $[2 \times (6.40 + 4.20)] + 4.20 = 25.40 \text{ m}$

$$L = 25.40 - (2 \times \frac{0.20}{2})$$

$$H = 0.20 + 0.20 + 0.20 + 0.20 + 0.20 = 0.90 \text{ m}$$

① Earthwork in excavation in foundation

$$15.56 \text{ m}^3$$

$$0.20 \text{ m}$$

$$0.70 \text{ m}$$

$$1 \quad 24.70 \text{ m}$$

② Lime concrete in foundation

$$3.415 \text{ m}^3$$

$$0.20 \text{ m}$$

$$0.70 \text{ m}$$

$$1 \quad 24.30 \text{ m}$$

(3) 1st class brick wall
in Foundation & plinth

→ 1st Footing

→ 2nd Footing

→ plinth

$$L = 25.40 - (2 \times \frac{0.50}{2}) = 24.9$$

$$L = 25.40 - (2 \times \frac{0.40}{2}) = 25$$

$$L = 25.40 - (2 \times \frac{0.30}{2}) = 25.40$$

$$H = 0.80 + 0.30 = 1.10$$

1	24.90m	0.50m	0.20m	2.490m ³	$L = 25.40 - (2 \times \frac{0.50}{2}) = 24.9$
1	25.00m	0.40m	0.20m	2m ³	$L = 25.40 - (2 \times \frac{0.40}{2}) = 25$
1	25.40m	0.30m	0.50m	3.165m ³	$L = 25.40 - (2 \times \frac{0.30}{2}) = 25.40$
Total				8.255m ³	$H = 0.80 + 0.30 = 1.10$

(4) 2.5 cm of thick D.P.C. ↓ 25.20m 0.80m

Deduction
Door sill

$$L = 25.40 - (2 \times \frac{0.20}{2}) = 25.20$$

—				5.04m ³	$L = 25.40 - (2 \times \frac{0.20}{2}) = 25.20$
—				0.46m ³	
Total =				4.58m ³	

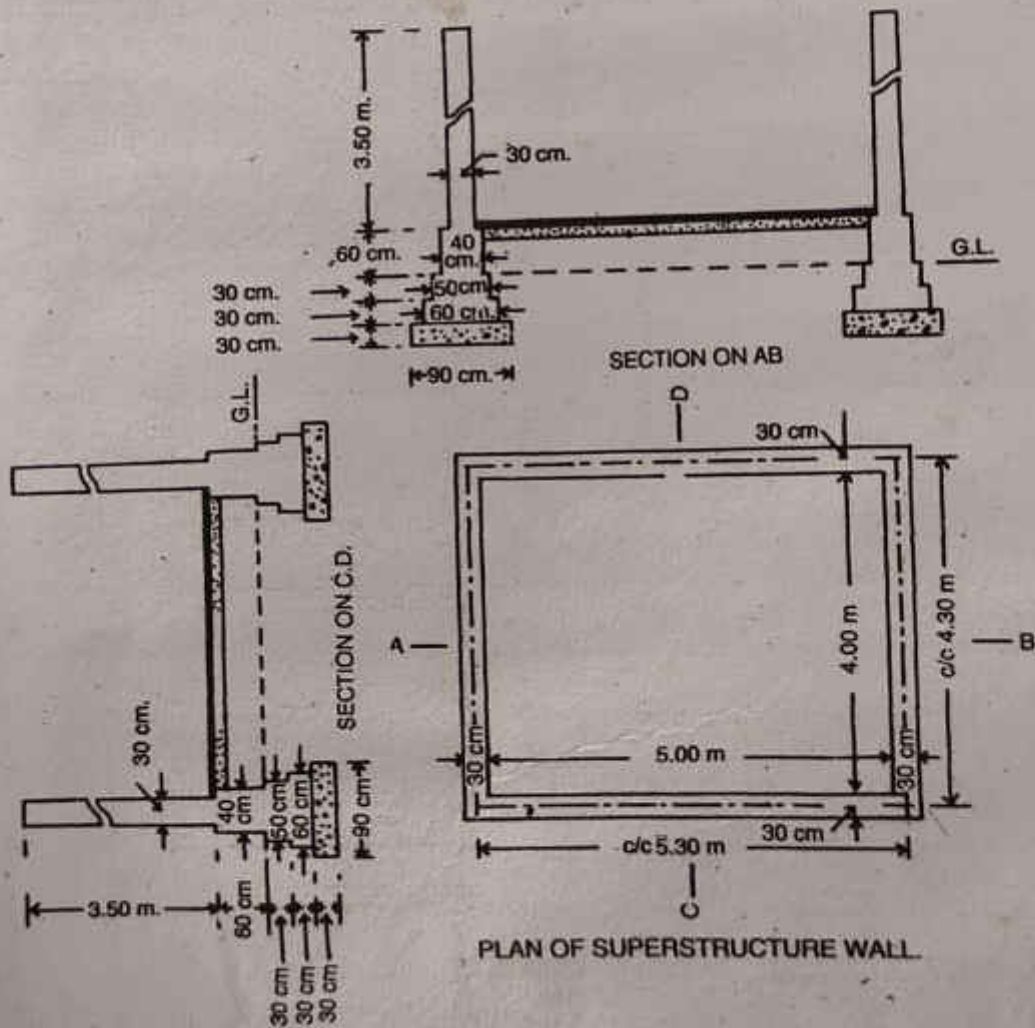
⑤ 1st class brick wall in Superstructure.	1	25.2m	0.20m	3.3m	16.62m ³	$L = 25.2 \times 0.20$ $= 25.2 \text{ m}$
<u>Deduction</u>						
→ Door	2	1.20m	0.20m	2.10m	(-) 1008m ³	
→ Window	4	1m	0.20m	1.20m	(-) 0.96m ³	
→ Lintel over door	2	1.50m	0.20m	0.15m	(-) 0.09m ³	$L = 2 \times 20 + (2 \times 0.15) = 1.5 \text{ m}$
→ Lintel over window	4	1.30m	0.20m	0.15m	(-) 0.16m ³	$L = 2 \times 1.3 + (2 \times 0.15) = 1.3 \text{ m}$
				Total =	14.418m ³	

The following examples (Exs. 3a, 4a, and 5a) illustrate this method :—

Example 3(a). — Fig. 2-3, the plan represents the plan of superstructure wall of a single room building of 5 m × 4 m, and Sections represent the cross-sections of the walls with foundation. Estimate the quantities of —

- (1) Earthwork in excavation in foundation,
- (2) Concrete in foundation,
- (3) Brickwork in foundation and plinth and
- (4) Brickwork in superstructure.

The length of long wall centre to centre = $5.00 + \frac{1}{2} \times .30 + \frac{1}{2} \times .30 = 5.30$ m. The length of short wall centre to centre = $4.00 + \frac{1}{2} \times .30 + \frac{1}{2} \times .30 = 4.30$ m.



LONG WALL & SHORT WALL

Centre to centre long wall = $5 + \left(\frac{0.30}{2} \times 2\right) = 5.30m$

Centre to centre short wall = $4 + \left(2 \times \frac{0.30}{2}\right) = 4.30m$

② Earth in excavation

→ long wall

→ short wall

$L = 15.30 + \left(2 \times \frac{0.90}{2}\right) = 6.30m$

$L = 4.30 + \left(2 \times \frac{0.90}{2}\right) = 5.90m$

2	6.30m	0.90m	0.90m	40.04 m ³
2	3.40m	0.90m	0.90m	5.508 m ³
Total				15.552 m ³

③ Concrete in foundation.

→ long wall

→ short wall

2	6.30m	0.90m	0.30m	3.348 m ³
2	3.40m	0.90m	0.30m	1.836 m ³
Total =				5.184 m ³

③ Brickwork in foundation and plinth.

1st footing

→ Long wall

→ Short wall

$$2 \times 5.9 \text{ m} \times 0.60 \text{ m} \times 0.30 \text{ m} = 2.148 \text{ m}^3$$

$$2 \times 3.7 \text{ m} \times 0.60 \text{ m} \times 0.30 \text{ m} = 1.332 \text{ m}^3$$

2nd footing

→ Long wall

→ Short wall

$$2 \times 5.6 \text{ m} \times 0.50 \text{ m} \times 0.30 \text{ m} = 1.71 \text{ m}^3$$

$$2 \times 3.6 \text{ m} \times 0.50 \text{ m} \times 0.30 \text{ m} = 1.14 \text{ m}^3$$

Plinth

→ Long wall

→ Short wall

$$2 \times 5.9 \text{ m} \times 0.40 \text{ m} \times 0.60 \text{ m} = 2.73 \text{ m}^3$$

$$2 \times 3.9 \text{ m} \times 0.40 \text{ m} \times 0.60 \text{ m} = 2.81 \text{ m}^3$$

$$11.986 \text{ m}^3$$

④ Brick work in Super structure

- long wall
- short wall

2	5.6m	0.30m	3.50m	11.76 m ³	$L = 5.30 + (2 \times \frac{0.30}{2}) = 5.6m$
2	4m	0.30m	2.50m	8.40 m ³	$L = 4.30 - (2 \times \frac{0.30}{2}) = 4m$
Total = 20.16 m ³					

Example 4(a). — Estimate the quantities of the following items of a two roomed building from the given plan and section (Fig. 2-6) :—

- (1) Earthwork in excavation in foundation,
- (2) Lime concrete in foundation,
- (3) 1st class brickwork in cement mortar 1 : 6 in foundation and plinth,
- (4) 2.5 cm c.c. damp proof course, and
- (5) 1st class brickwork in lime mortar in superstructure.

TWO ROOMED BUILDING

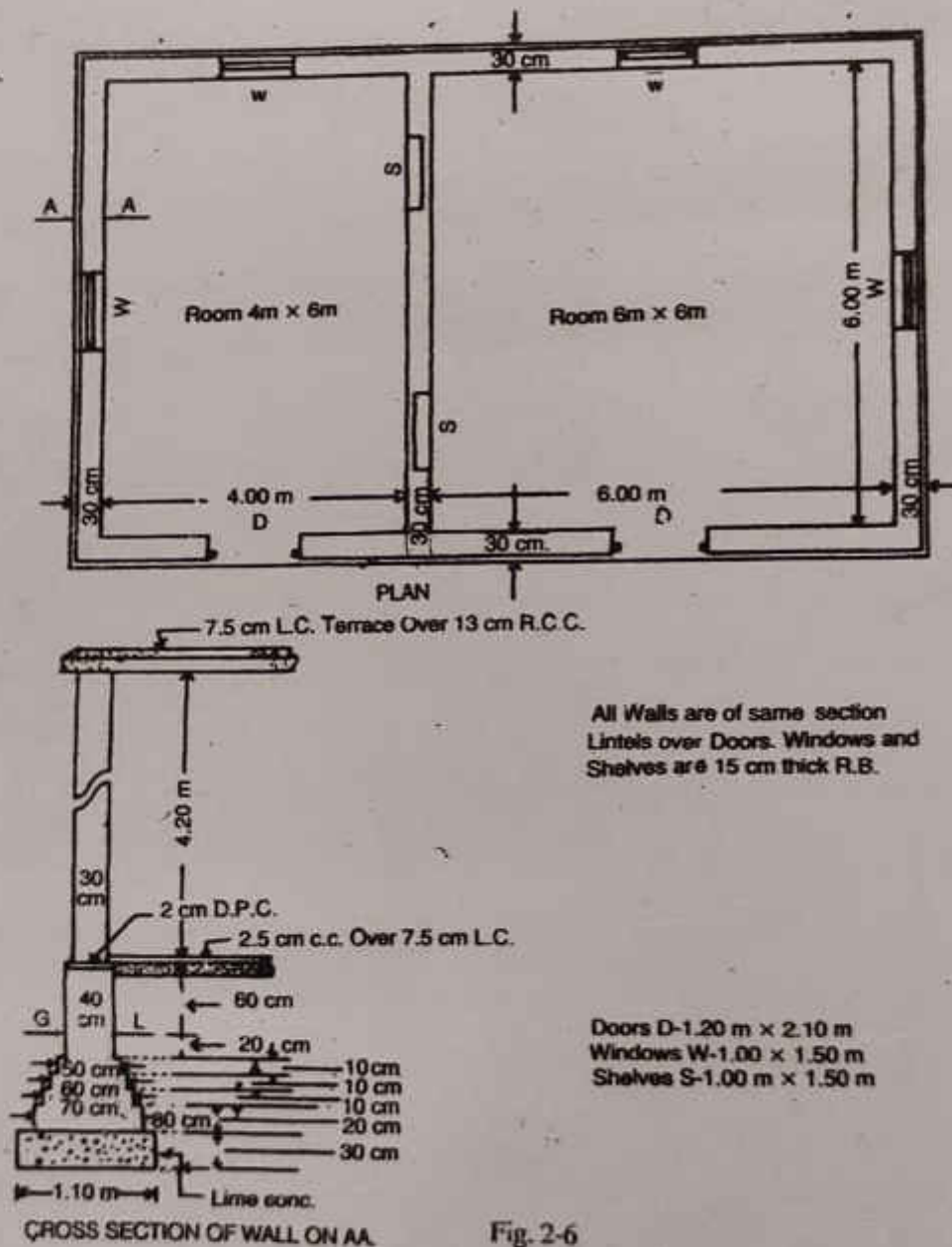


Fig. 2-6

Note : — No beam has been shown in the plan as the object of this example is to explain the method of estimating the walls only.

LONG WALL & SHORT WALL

Center to center long wall = $0.20 + 4 + 0.20 + 6 + 0.20 = 10.6m$

center to center short wall = $\frac{0.20}{2} + 6 + \frac{0.20}{2} = 6.3m$

Sl. No.	Description of Items	No	Length	Breadth	Height	Quantity	Explanatory Notes
1	Earth work in excavat ion.						
	→ long wall	2	11.70m	1.40m	1m	$2 \times 5.74 m^3$	$L = 10.6 + (2 \times \frac{1.10}{2}) = 11.70m$
	→ short wall	3	5.2m	1.10m	1m	$17.16 m^3$	$H = 0.2 + 0.2 + 0.1 + 0.1 + 0.1 + 0.3 = 1m$
					Total =	$48.9 m^3$	
2	Time Consumed in Foundation						
	→ long wall	2	11.70m	1.40m	0.30m	$7.72 m^3$	$L = 10.6 + (2 \times \frac{1.10}{2}) = 11.70m$
	→ short wall	3	5.2m	1.10m	0.30m	$5.14 m^3$	
						$12.87 m^3$	

1st class brick work in
Cement mortar (1:6) in
Foundation and plinth

1st Footing

→ Long wall

→ Short wall

2nd Footing

→ Long wall

→ Short wall

Bred Footing

→ Long wall

→ Short wall

4th Footing

→ Long wall

→ Short wall

2	11.4m	0.80m	0.80m	0.20m	3.00m ³	$L = 10.6 + (2 \times \frac{0.80}{2}) = 11.4m$
3	5.50m	0.80m	0.80m	0.20m	2.64m ³	$L = 6.3 - (2 \times \frac{0.80}{2}) = 5.50m$
2	11.3m	0.70m	0.70m	0.10m	1.588m ³	$L = 10.6 + (2 \times \frac{0.70}{2}) = 11.3m$
3	5.60m	0.70m	0.70m	0.10m	1.176m ³	$L = 6.3 - (2 \times \frac{0.70}{2}) = 5.6m$
2	14.2m	0.60m	0.60m	0.10m	1.344m ³	$L = 10.6 + (2 \times \frac{0.60}{2}) = 11.2m$
3	5.7m	0.60m	0.60m	0.10m	1.086m ³	$L = 6.3 - (2 \times \frac{0.60}{2}) = 5.7m$
2	11.4m	0.50m	0.50m	0.10m	1.11m ³	$L = 10.6 + (2 \times \frac{0.50}{2}) = 11.1m$
3	5.6m	0.50m	0.50m	0.10m	0.87m ³	$L = 6.3 + (2 \times \frac{0.50}{2}) = 5.9m$

Plinth
 → long wall
 → short wall

$$L = 10.6 + (2 \times \frac{0.40}{2}) = 11m$$

$$L = 6.3 - (2 \times \frac{0.40}{2}) = 5.9m$$

$$7.04m^3$$

$$5.66m^3$$

0.80m
 0.80m
 0.40m
 0.40m
 2
 3

④ 2.5cm of thick D.P.C
 → long wall.
 → short wall.

$$L = 10.6 + (2 \times \frac{0.40}{2}) = 11m$$

$$L = 6.3 - (2 \times \frac{0.40}{2}) = 5.9m$$

$$8.8m^2$$

$$7.08m^2$$

$$\text{Total} = 15.88m^2$$

—
 —
 0.40m
 0.40m
 2
 3

Deduction
 Door sill level

$$(-) 0.96m^2$$

$$\text{Total} = 14.92m^2$$

—
 —
 0.40m
 0.40m
 2

⑤ 1st class brick work
 in lime mortar in
 superstructure.
 → long wall
 → short wall

$$L = 10.6 + (2 \times \frac{0.30}{2}) = 10.9m$$

$$L = 6.3 - (2 \times \frac{0.30}{2}) = 6m$$

$$27.46m^3$$

$$28.68m^3$$

$$\text{Total} = 56.14m^3$$

4.20m
 4.20m
 0.30m
 0.30m
 2
 3

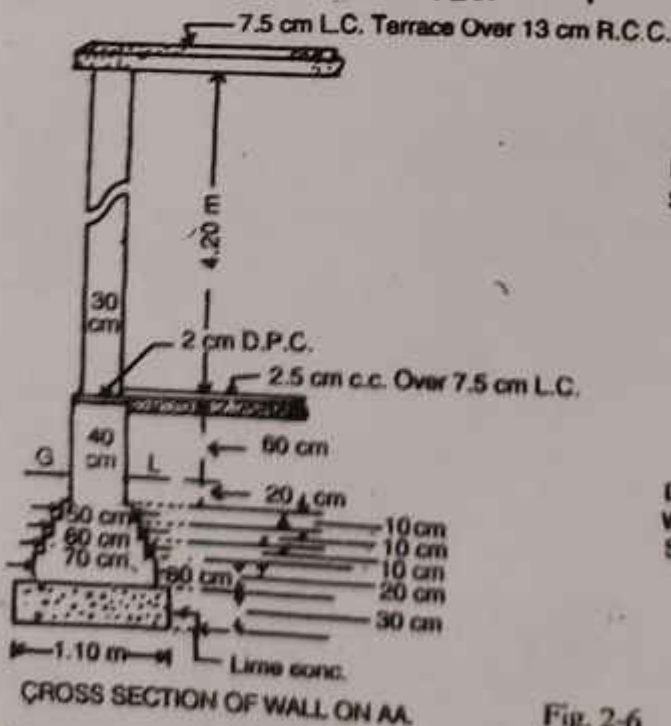
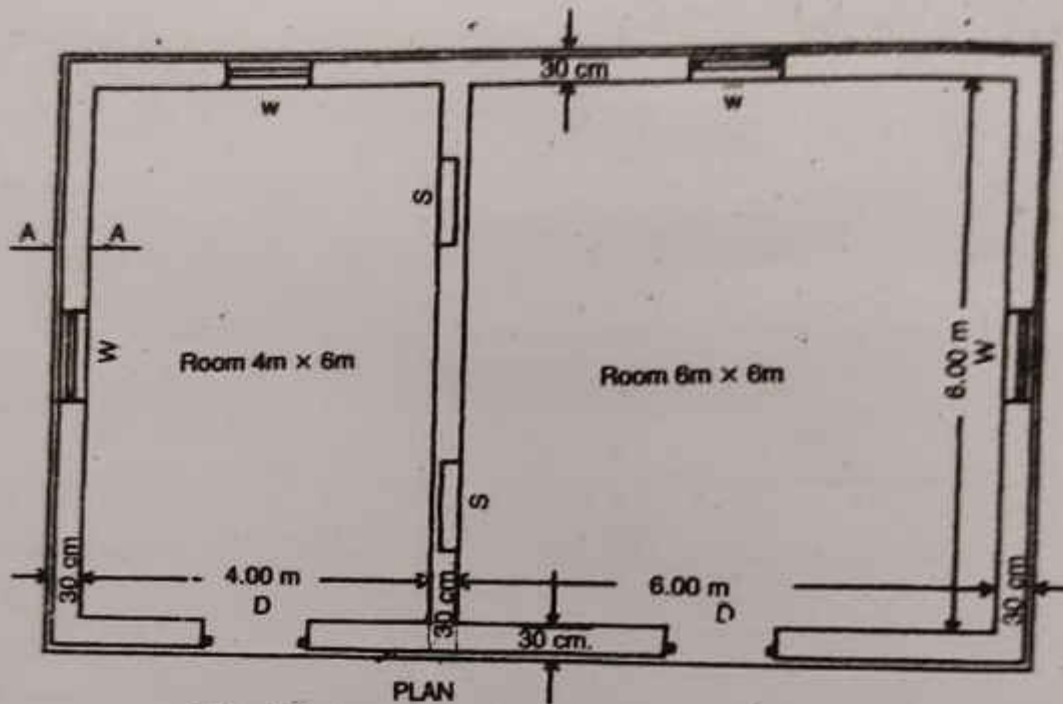
Deduction

→ Door	2	1.20m	0.30m	2.10m	(-) 1.512
→ window	4	1m	0.30m	1.50m	(-) 1.8 m ³
→ shelves	2	1m	1m	0.15m	1.50m
→ lintal over window	2	1.50m	0.30m	0.15m	(-) 0.135m ³ $L = 1.20 + (2 \times 0.15) = 1.5m$
→ lintal over window	4	1.30m	0.30m	0.15m	(-) 0.195m ³ $L = 1 + (2 \times 0.15) = 1.30m$
→ lintal over shelves	2	1.50m	0.15m	0.15m	(-) 0.585m ³ $L = 1 + (2 \times 0.15) = 1.30m$
Total =					46.26 m ³

Example 4(a). — Estimate the quantities of the following items of a two roomed building from the given plan and section (Fig. 2-6) :—

- (1) Earthwork in excavation in foundation,
- (2) Lime concrete in foundation,
- (3) 1st class brickwork in cement mortar 1 : 6 in foundation and plinth,
- (4) 2.5 cm c.c. damp proof course, and
- (5) 1st class brickwork in lime mortar in superstructure.

TWO ROOMED BUILDING



All Walls are of same section
Lintels over Doors, Windows and
Shelves are 15 cm thick R.B.

Doors D-1.20 m x 2.10 m
Windows W-1.00 x 1.50 m
Shelves S-1.00 m x 1.50 m

CROSS SECTION OF WALL ON AA.

Fig. 2-6

Note : — No beam has been shown in the plan as the object of this example is to explain the method of estimating the walls only.

Centerline Method:-

Center to center long wall = $\frac{0.30}{2} + 1 + 0.30 + 6 + \frac{0.30}{2} = 10.6m$

Center to center short wall = $\frac{0.30}{2} + 6 + \frac{0.30}{2} = 6.3m$

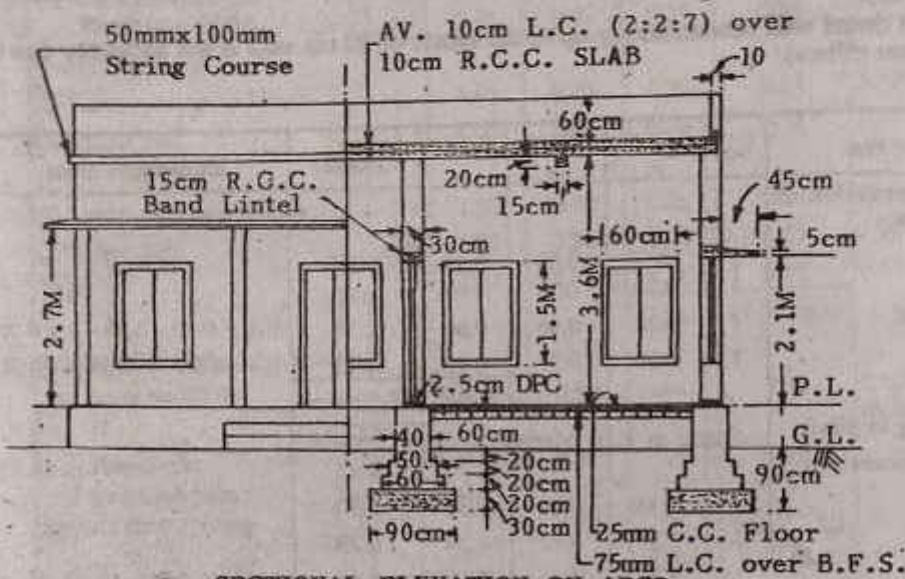
Center to center partition wall = $\frac{0.30}{2} + 6 + \frac{0.30}{2} = 6.3m$

Total centre line length = $[2 \times \text{C.C long wall} + \text{C.C short wall}] + \text{C.C partition wall}$

$$= [2 \times (10.6 + 6.3)] + 6.3 = 60.1m$$

Sl. No	Descriptions of items	No	length	Breadth	Height	Quantity	Explanatory Notes
1	Earth in excavation	1	39m	1.10m	1m	$42.9m^3$	$L = 40.1 - (2 \times \frac{1.10}{2}) = 39m$
2	lime concrete in foundation	1	39m	1.10m	0.20m	$12.87m^3$	$L = 40.1 - (2 \times \frac{1.10}{2}) = 39m$
3	1st class brick work in foundation and plinth						
	→ 1st Footing	1	37.30m	0.80m	0.20m 0.20m	$6.28m^3$	$L = 40.1 - (2 \times \frac{0.80}{2}) = 37.3m$
	→ 2nd Footing	1	37.40m	0.70m	0.10m	$2.458m^3$	$L = 40.1 - (2 \times \frac{0.70}{2}) = 39.4m$
	→ 3rd Footing	1	37.50m	0.60m	0.10m	$2.37m^3$	$L = 40.1 - (2 \times \frac{0.60}{2}) = 39.5m$
	→ 4th Footing	1	37.60m	0.50m	0.10m	$1.98m^3$	$L = 40.1 - (2 \times \frac{0.50}{2}) = 37.6m$

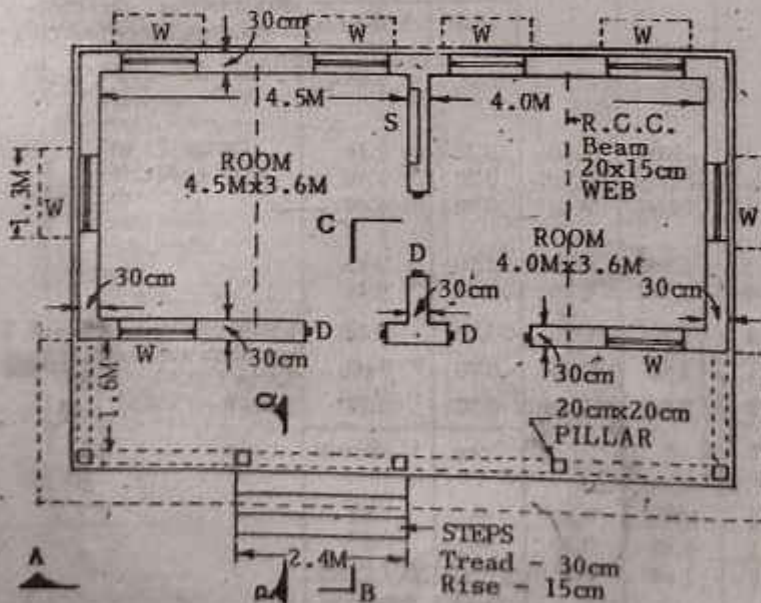
④	Plinth	1	39.70m	0.40m	0.80m	12.704m ³	$L = 40.1 - (2 \times \frac{0.40}{2}) = 39.7m$
					Total	12.704m ³	
⑤	2.5 cm of thick D.P.C	1	39.70m	0.40m	—	15.081m ³	$L = 40.1 - (2 - \frac{0.40}{2}) = 39.7m$
	<u>Deduction</u>						
	Door sill level	2	1.80m	0.40m	—	1.096m ³	
					Total =	14.987m ³	
⑥	1st class brick work in lime concrete in super structure	1	37.80m	0.30m	4.20m	50.148m ³	$L = 40.1 - (2 \times \frac{0.30}{2}) = 39.9m$
	<u>Deduction</u>						
	→ Door	2	1.20m	0.30m	2.50m	(-) 1.584m ³	
	→ window	4	1.20m	0.30m	1.50m	(-) 1.08m ³	
	→ shelf	2	1m	0.15m	1.50m	(-) 0.45m ³	
	→ Lintel over window	4	1.30m	0.30m	0.15m	(-) 0.234m ³	$L = 1.20 + (2 \times \frac{0.30}{2}) = 1.5m$
	→ Lintel over Door	2	1.50m	0.30m	0.15m	(-) 0.13m ³	$L = 1 + (2 \times \frac{0.30}{2}) = 1.30m$
	→ Lintel over shelves	1	1.30m	0.15m	0.15m	(-) 0.058m ³	$L = 1 + (2 \times \frac{0.30}{2}) = 1.30m$
					Total =	45.74m ³	



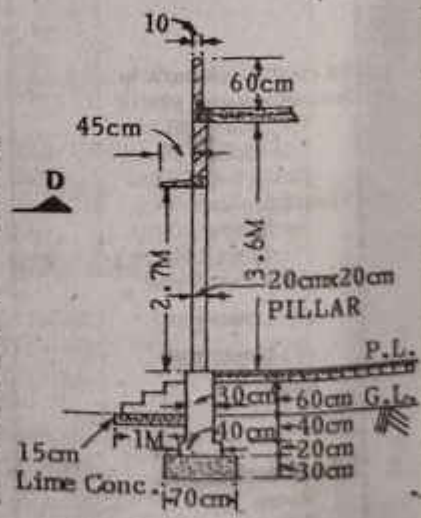
Schedule

- DOOR :
D = 1.2M x 2.1M
FRAME = 10cm x 8.0cm
- WINDOW :
W = 1.1M x 1.5M
FRAME = 10cm x 8.0cm
- SHELF
S = 1.1M x 1.5M
20cm Deep

SECTIONAL ELEVATION ON ABCD



PLAN



SECTION ON PQ

LONG WALL & SHORT WALL

Room

Front and backside of room.

$$\begin{aligned} * \text{ Centre to Centre long wall} &\rightarrow \frac{0.30}{2} + 0.30 + 4.5 + 4 \\ &\quad + \frac{0.30}{2} = 9.1 \text{ m} \end{aligned}$$

Partition wall and side wall.

$$\begin{aligned} * \text{ Centre to Centre short wall} &\rightarrow \frac{0.30}{2} + \frac{0.30}{2} + 3.6 \\ &= 3.9 \text{ m} \end{aligned}$$

Verandah

One side verandah long wall.

* Centre to Centre long wall \Rightarrow

$$\begin{aligned} &\Rightarrow \frac{0.20}{2} + 0.10 + 4.5 + 0.30 + 4 + \frac{0.20}{2} \\ &= 9.2 \text{ m} \end{aligned}$$

Two sides short wall of verandah.

* Centre to Centre short wall \Rightarrow

$$\begin{aligned} &= \frac{0.30}{2} + \frac{0.20}{2} + 1.6 \\ &= 1.85 \text{ m} \end{aligned}$$

Sl. No	Description of items	Length	Breadth	Height	Quantity	Explanatory Notes
①	Earth work in excavation in foundation <u>Koorn</u>					
	→ Long wall	2	10m	0.90m	16.2m ³	$L = 9.1 + (2 \times \frac{0.90}{2}) = 10m$
	→ Short wall	2	3m	0.90m	7.29m ³	$H = 0.3 + 0.2 + 0.2 + 0.2 = 0.9m$ $L = 3.9 - (\frac{0.90}{2} \times 2) = 3m$
	<u>VEKANATH</u>					
	→ Long wall	1	0.90m	0.90m	0.23m ³	$L = 0.2 + (2 \times \frac{0.10}{2}) = 0.90m$
	→ Short wall	2	1.05m	0.90m	1.32m ³	
					Total = 31.04 m ³	
②	lime concrete in foundation. <u>Koorn</u>					
	→ Long wall	2	10m	0.30m	5.4m ³	$L = 9.1 + (2 \times \frac{0.30}{2}) = 10m$
	→ Short wall	2	3m	0.30m	2.43m ³	$L = 3.9 - (2 \times \frac{0.30}{2}) = 3m$

VERANDAH

→ LONG WALL	1	9.90m	0.70m	0.20m	2.07m ²	$L = 9.2 + (2 \times \frac{0.70}{2}) = 9.90m$
→ SHORT WALL	2	1.05m	0.70m	0.20m	0.49m ²	$L = 1.85 - ((\frac{0.90}{2}) - (\frac{0.70}{2})) = 1.05m$
				Total =	10.241m ²	

(5) Set class brick work in foundation and plinth.

ROOM

Jet Footing

→ long wall	2	9.70m	0.60m	0.20m	2.32m ²	$L = 9.1 + (2 \times \frac{0.60}{2}) = 9.70m$
→ short wall	2	3.3m	0.6m	0.20m	1.18m ²	$L = 3.9 - (2 \times \frac{0.60}{2}) = 3.3m$

End Footing

→ long wall	2	9.60m	0.50m	0.20m	1.98m ²	$L = 9.1 + (2 \times \frac{0.50}{2}) = 9.60m$
→ short wall	2	3.4m	0.50m	0.20m	1.02m ²	$L = 3.9 - (2 \times \frac{0.50}{2}) = 3.9m$

Plinth

→ Long wall

→ Short wall

Verandah

Set Footing

→ Long wall

→ Short wall lower.

Plinth

→ Long wall

→ Short wall lower

→ Short wall upper.

2	9.5m	0.4m	0.60m	6.00m ²	L = 9.1 + (2 × $\frac{0.40}{2}$) = 9.5m H = 0.20 + 0.60 = 0.80m
2	3.5m	0.4m	0.60m	2.36m ²	L = 3.1 - (2 × $\frac{0.40}{2}$) = 3.5m
1	9.6m	0.4m	0.2m	0.76m ²	L = 9.2 + ($\frac{0.4}{2} \times 2$) = 9.6m
2	1.25m	0.4m	0.2m	0.216m ²	L = 1.85 - ($\frac{0.6}{2} - \frac{0.4}{2}$) = 1.35m
1	9.5m	0.30m	1m	2.85m ²	L = 9.2 + ($\frac{0.30}{2} \times 2$) = 9.5m
2	1.45m	0.30m	1m	0.87m ²	H = 0.4 + 0.6 = 1m
2	1.5m	0.30m	1m	0.9m ²	L = 1.85 - $\frac{0.5}{2}$ - $\frac{0.30}{2}$ = 1.5m L = 1.85 - $\frac{0.4}{2}$ - $\frac{0.30}{2}$ = 1.5m
Total				21.47m ²	

4) 2.5cm thick D.P.C

Koorn

→ long wall

→ short wall

PILLAR

Deduction

Door sill

5) Koorn

→ long wall

→ short wall

Verandah

→ long wall

→ short wall

PILLAR

$$L = 9.14 + \left(2 \times \frac{0.30}{2} \right) = 9.4m$$

$$L = 3.6 - \left(2 \times \frac{0.30}{2} \right) = 3.6m$$

5.64 m ²	—	0.30m	2	9.4m
3.24 m ²	—	0.30m	3	3.6m
0.20 m ²	—	0.2m	5	0.2m
9.08 m ²	Total			
1.09 m ²	—	0.3m	3	1.2m
1.8 m ²	Total			

$$L = 9.14 + \left(2 \times \frac{0.30}{2} \right) = 9.4m$$

$$L = 3.6 - \left(2 \times \frac{0.30}{2} \right) = 3.6m$$

20.20 m ²	3.6m	0.30m	2	9.4m
11.06 m ²	3.6m	0.30m	3	3.6m
1.69 m ²	0.9m	0.2m	1	9.4m
0.53 m ²	0.9m	0.2m	2	1.65m
0.54 m ²	2.7m	0.2m	5	0.2m
24.76 m ²	Total			

$$L = 9.2 + \left(2 \times \frac{0.30}{2} \right) = 9.4m$$

$$H = 3.6 - 2.7 = 0.9m$$

$$L = 1.85 - \left(\frac{0.30}{2} - \frac{0.30}{2} \right) = 1.6m$$

Deduction

Door
window

S

Lintel over door

Lintel over window

3
8
1
3
8

1.2m
1.8m
1.4m
1.5m
1.4m

0.2m
0.3m
0.2m
0.3m
0.3m

2.1m
1.5m
4.5m
0.15m
0.15m

(-) 2.26 m²
(-) 2.96 m²
(-) 0.33 m²
(-) 0.22 m²
(-) 0.54 m²

$$L = 1.2 + (2 \times 0.15) = 1.5m$$
$$L = 1.1 + (2 \times 0.5) = 2.1m$$

Total = 27.50 m²

CENTER LINE METHOD:- Room

Centre to Centre long wall =

$$\frac{0.30}{2} + \frac{0.30}{2} + 4 + \frac{0.30}{2} = 9.1\text{m}$$

Centre to Centre short wall =

$$\frac{0.30}{2} + \frac{0.30}{2} + 3.6 = 3.9\text{m}$$

Centre to Centre partition wall:-

$$\frac{0.30}{2} + \frac{0.30}{2} + 3.6 = 3.9\text{m}$$

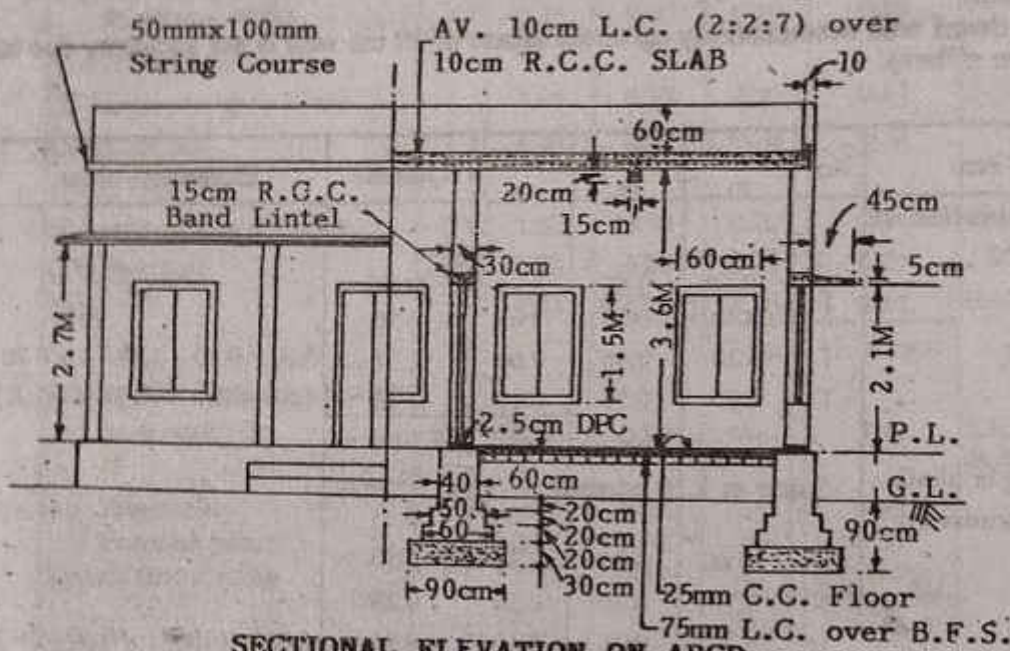
$$\begin{aligned} \text{Total centreline length} &= [2 (\text{C.C long wall} + \text{C.C short wall})] + \text{C.C partition wall} \\ &= [2 \times (9.1 + 3.9)] + 3.9\text{m} \\ &= 29.9\text{m} \end{aligned}$$

VERANDAH-

$$\begin{aligned} \text{Centre to Centre long wall} &= \frac{0.30}{2} + 0.10 + 4.5 + 0.30 + \\ &4 + 0.10 + \frac{0.30}{2} = 9.2\text{m} \end{aligned}$$

$$\begin{aligned} \text{Centre to Centre short wall} &= \frac{0.30}{2} + \frac{0.30}{2} + 1.6 \\ &= 1.85\text{m} \end{aligned}$$

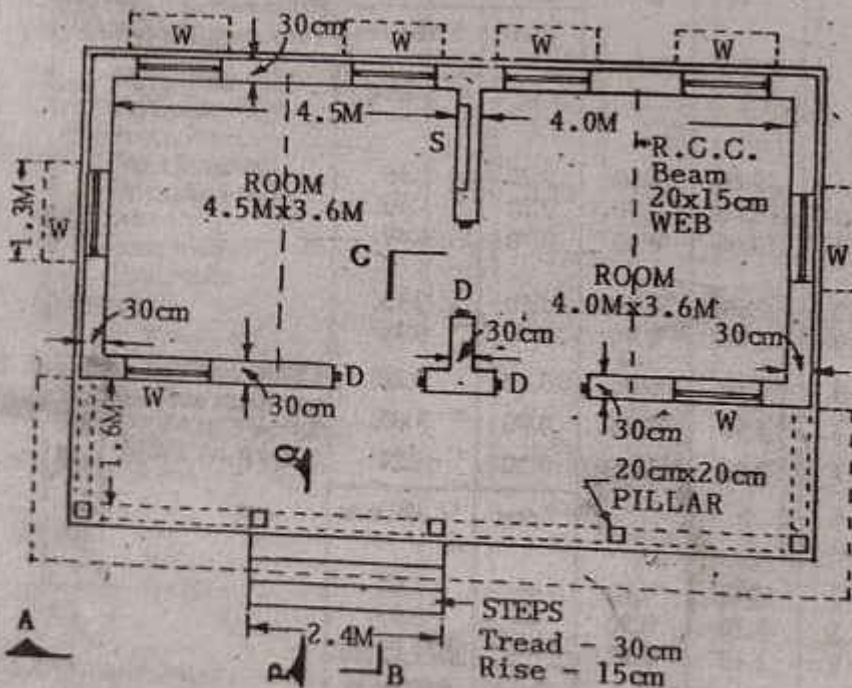
$$\begin{aligned} \text{Total Centre line length} &= \text{C.C long wall} + (2 \times \text{C.C short wall}) \\ &= 9.2 + (2 \times 1.85) = 12.9\text{m} \end{aligned}$$



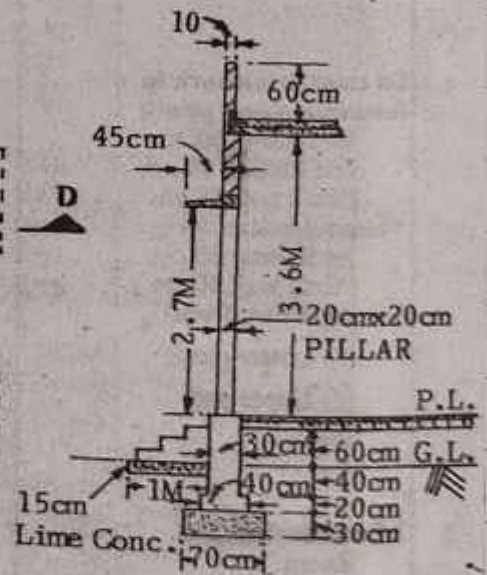
SECTIONAL ELEVATION ON ABCD

Schedule

- DOOR :
 D = 1.2M x 2.1M
 FRAME = 10cm x 8.0cm
- WINDOW :
 W = 1.1M x 1.5M
 FRAME = 10cm x 8.0cm
- SHELF
 S = 1.1M x 1.5M
 20cm Deep



PLAN



SECTION ON PQ

No	Description of items	Length	Breadth	Height	Quantity	Explanatory Notes
①	Earthwork in excavation Room	1 29m	0.9m	0.9m	23.4m ³	$L = 29.9 - (2 \times \frac{0.9}{2}) = 27.9$ $H = 0.3 + 0.2 + 0.2 + 0.2 = 0.9$
1	<u>VEKANDAH</u>	1 12m	0.7m	0.9m	7.56m ³	$L = 12.9 - \frac{0.7}{2} = 12$ $H = 0.3 + 0.2 + 0.4 = 0.9$
②	Cone concrete in foundation Room	1 29m	0.9m	0.3m	7.86m ³	$L = 29.9 - (2 \times \frac{0.9}{2}) = 27.9$
1	<u>VEKANDAH</u>	1 12m	0.7m	0.3m	2.52m ³	$L = 12.9 - (\frac{0.7}{2} - \frac{0.7}{2}) = 12.1$
③	1st class brickwork in foundation and plinth Room	1 29.3m	0.6m	0.2m	3.516m ³	$L = 29.9 - (2 \times \frac{0.6}{2}) = 28.7$
→	1st footing	1 29.4m	0.5m	0.2m	2.94m ³	$L = 29.9 - (2 \times \frac{0.5}{2}) = 29.4$
→	2nd footing	1 29.9m	0.4m	0.8m	9.44m ³	$L = 29.9 - (2 \times \frac{0.4}{2}) = 29.5$
→	plinth					

VERANDA

→ 1st Footing	1	12.4m	0.4m	0.2m	0.984 m ²	$L = 12.9 - \left(\frac{0.60}{2} \times 2\right) = 12.3m$
→ 2nd Footing tower	1	12.4m	0.30m	0.40m	1.49 m ²	$L = 12.9 - \left(2 \times \frac{0.50}{2}\right) = 12.4m$
→ 2nd Footing upper	1	12.5m	0.80m	0.60m	2.25 m ²	$L = 12.9 - \left(2 \times \frac{0.40}{2}\right) = 12.3m$
				Total	20.71 m ²	

④ 2.5 cm of thick D.P.C

Room

$$L = 29.9 - \left(2 \times \frac{0.30}{2}\right) = 29.60m$$

1	29.6m	0.80m	—	8.83 m ²
5	0.20m	0.20m	—	0.80 m ²

PILLAR

Total 9.63 m²

Deduction

Door sill level 3 1.20m 0.20m (C) 1.08 m²

Total 8 m²

5

1st class brick work in superstructure wall

Room

VERANDAN

PILLAR

Deduction

(i) Door

(ii) window

(iii) skelt

(iv) lintel over door

(v) Lintel over window

1	29.6m	0.30m	3.60m	31.96m ³	$L = 29.9 - \left(\frac{0.30}{2} \times 2\right) = 29.6m$
1	12.6m	0.30m	0.90m	2.268m ³	$L = 12.9 - \left(\frac{0.30}{2} \times 2\right) = 12.6m$
5	0.20m	0.80m	2.70m	0.54m ³	$H = 3.6 - 2.7 = 0.90m$
Total =				34.76m ³	

Total = 34.76m³

(-) 2.26m³

(-) 3.96m³

(-) 0.33m³

(-) 1.2 + (2 x 0.15) = 1.5m

(-) 1.1 x (2 x 0.15) = 1.4m

Total = 27.503m³

Q1. What are the unit dimension following material and work?

Ans: Glass panes - length and breadth in cm or m
thickness in mm.

(i) stone blocks - All dimension are in cm.

(ii) Reinforcement - Quintal

(iii) Form work - m²

Q2. How the laborers are classified as per schedule of rate of Govt. of Andhra?

Ans -

- (i) Head mason / most skilled.
- (ii) Mason / semi skilled
- (iii) Mazdoor / Non skilled
- (iv) Boy or women worker.
- (v) Bhishti
- (vi) Carpenter
- (vii) Blacksmith
- (viii) Painter.

Q3. What is the size of the normal brick and traditional brick?

Ans. Normal Brick = 20 cm x 10 cm x 10 cm in cm
Traditional Brick = 19 cm x 9 cm x 9 cm

Q4. What is the standard weight of 12 mm diameter of HYSD bar of 1m.

Ans. The standard weight of 12 mm diameter HYSD bar of 1m is 0.89 kg.

Q.5 Name different government and public sector organisation employing civil Diploma holder in Odisha state.

Govt. Organisation

→ OP.S.C, SSC

→ Housing Board Organisation

→ P.W.D, Irrigation department, NHPC & B department R&S.

Public sector

→ Indian oil

→ JINDAL, TATA, BHEL, OPTCL, NALCO, SAIL, HAL,

Q.6. What is the volume of bag and cement in the market?

Ans- 1 Bag of Cement = 50 kg

1 Bag = 0.0347 m³

1 m³ = 35.3147 cft

Calculating quantity of dry Material:

In concrete

<u>Ratio</u>	<u>Mix</u>	<u>Cement</u>	<u>sand</u>	<u>Aggregate</u>
M10	1:3:6	1	3	6
M15	1:2:4	1	2	4
M20	1:1 $\frac{1}{2}$:3	1	1.5	3
M25	1:1:2	1	1	2

Wet volume of cement = 1 m³ Consider Dry
volume of concrete = 54% increase by wet volume.
wet volume = 100% + 54%
= 154%

$$\frac{154}{100} = 1.54$$

$$\boxed{1 \text{ m}^3 = 1.54}$$

Dry volume = 1.54 of wet volume

Density:-

$$\text{Cement} = 1440 \text{ kg/m}^3$$

$$\text{Sand} = 1450 - 1600 \text{ kg/m}^3$$

$$\text{Aggregate} = 1450 - 1550 \text{ kg/m}^3$$

$$\text{M15} = 1:2:4$$

consider volume = 1 cum (m³)

$$\text{M15} = 1:2:4$$

$$\text{Total Mix} = 1+2+4 = 7$$

$$\text{Dry volume} = 1.54 \times 1 = 1.54 \text{ cum}$$

Cement :-

$$1 \text{ m}^3 = \frac{1.54 \times 1}{7} = 0.22 \text{ m}^3$$

$$\text{kg} = \frac{1.54 \times 1}{7} \times 1440 = 316.8 \text{ kg}$$

$$1 \text{ bag} = 50 \text{ kg}$$

$$\text{No. of bag} = \frac{316.8}{50} = 6.336 \text{ bag}$$

Sand :-

$$1 \text{ m}^3 = \frac{1.54 \times 2}{7} = 0.44 \text{ m}^3$$

$$\text{kg} = \frac{1.54 \times 2}{7} \times 1500 = 660 \text{ kg}$$

Aggregate :-

$$1 \text{ m}^3 = \frac{1.54 \times 4}{7} = 0.88 \text{ m}^3$$

$$\text{kg} = \frac{1.54 \times 4}{7} \times 1500 = 1320 \text{ kg}$$

$$M_{10} = 1:3:6$$

consider volume = 1 m^3

$$\text{Total mix} = 1+3+6 = 10$$

$$\text{Dry volume} = 1.54 \times 1 = 1.54 \text{ m}^3$$

Cement :- $\text{kg} =$

$$1 \text{ m}^3 = \frac{1.54 \times 1}{10} = 0.154 \text{ m}^3$$

$$\text{kg} = \frac{1.54 \times 1}{10} \times 1440 = 221.76 \text{ kg}$$

$$1 \text{ bag} = 50 \text{ kg}$$

$$\text{No. of bag} = \frac{221.76}{50} = 4.4352 \text{ bag}$$

Sand :-

$$1\text{m}^3 = \frac{1.54 \times 3}{10} = 0.462\text{m}^3$$

$$\text{kg} = \frac{1.54 \times 3}{10} \times 1500 = 693\text{kg}$$

Aggregate :-

$$1\text{m}^3 = \frac{1.54 \times 6}{10} = 0.924\text{m}^3$$

$$\text{kg} = \frac{1.54 \times 6}{10} \times 1500 = 1386\text{kg}$$

Calculate the number of brick required in 1m³ Brick work :-

Ratio = 1:6

Thickness mortar = 10mm = 0.01m

Volume = 1m³

Standard size of Brick = 190mm x 90mm x 90mm

$$= 0.19\text{m} \times 0.09\text{m} \times 0.09\text{m}$$

Volume of 1 brick with mortar =

$$(0.19 + 0.01) \times (0.09 + 0.01) \times (0.09 + 0.01)$$

$$= 0.002\text{m}^3$$

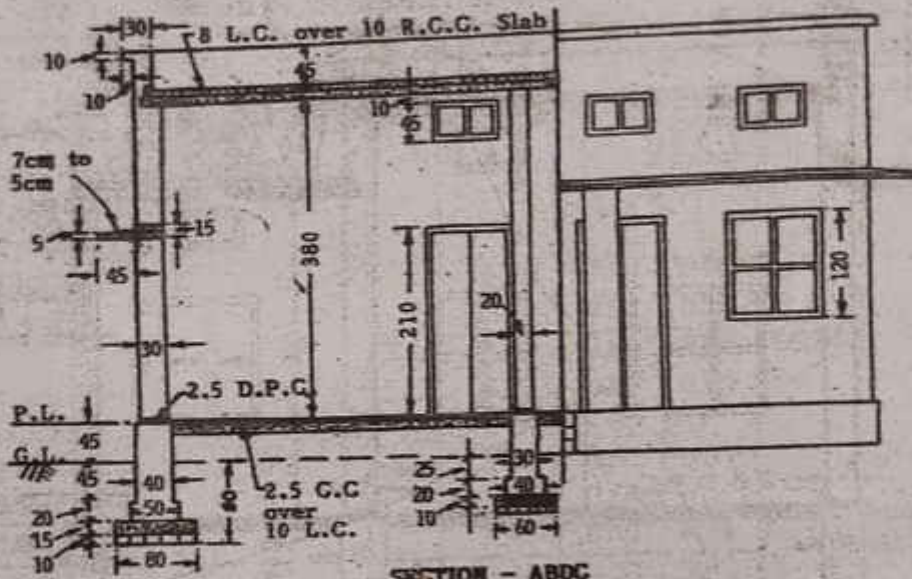
No of brick =

$$= \frac{\text{Volume of Brick}}{\text{Volume of 1 brick with mortar}}$$

$$= \frac{1}{0.002} = 500 \text{ Nos.}$$

$$\text{NO OF BRICK} = \frac{1}{0.002}$$

Only for 10mm thick mortar.



Schedule

DOORS :
 D = 100x210
 D₁ = 90x210

WINDOWS :
 W = 110x120
 W₁ = 90x120
 CW = 75x45
 CW₁ = 60x45

SHELF :
 S = 110x140

FRAME :
 D = 8x10
 D₁ = 8x10
 W = 8x10
 W₁ = 8x10
 CW = 6x5
 CW₁ = 6x5

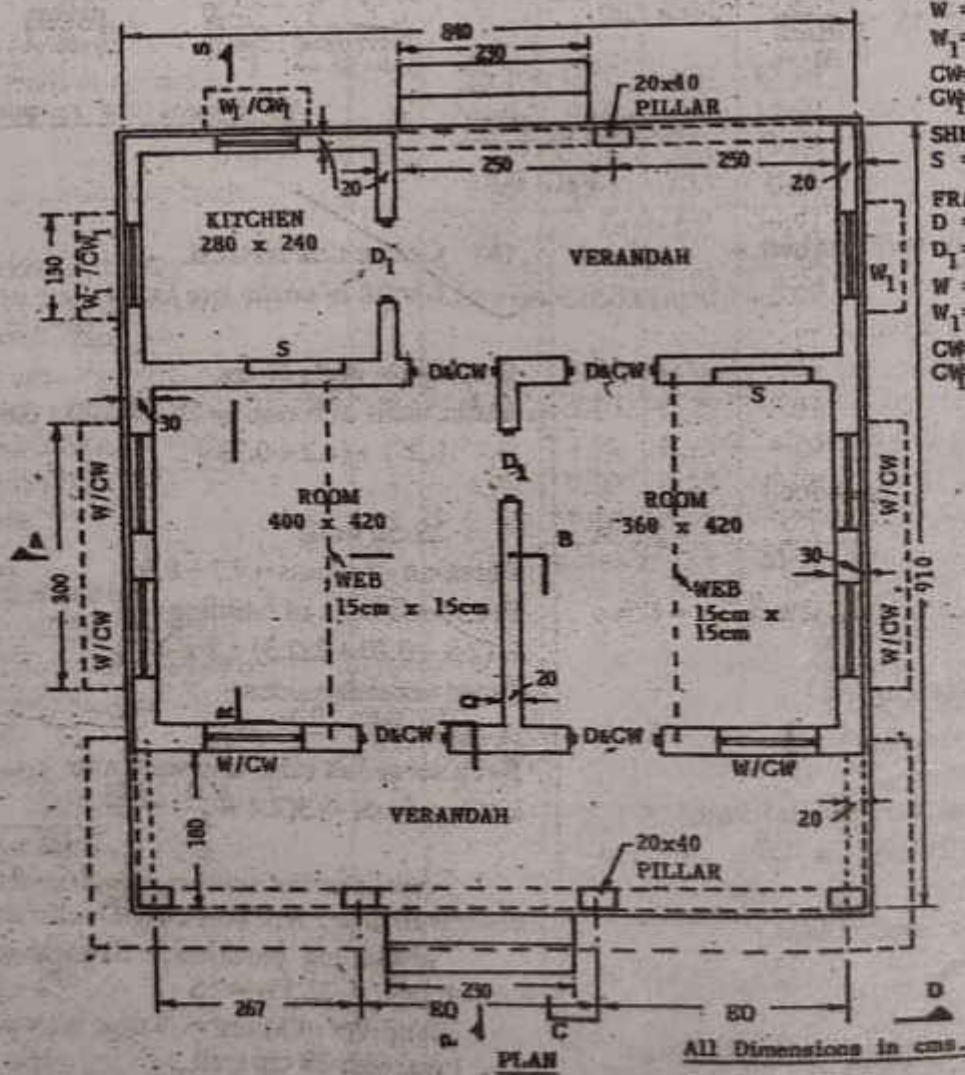


FIG. 5-3

LONG WALL / SHORT WALL METHOD

ROOM

→ Centre to centre long wall

$$\Rightarrow \frac{0.30}{2} + 4.00 + 0.30 + \frac{3.60 + 0.30}{2} = 8.10 \text{ m. (2 nos)}$$

→ Centre to centre short wall

$$\Rightarrow \frac{0.30}{2} + 4.20 + \frac{0.30}{2} = 4.50 \text{ m. (3 nos)}$$

FRONT VERANDHA

→ Centre to centre long wall

$$\Rightarrow \frac{0.20}{2} + 10.70 + 4.00 + 0.20 + \frac{3.60 + 10.70 + 0.20}{2} = 8.20 \text{ m. (1 no)}$$

→ Centre to centre short wall

$$\Rightarrow \frac{0.20}{2} + 1.60 + \frac{0.30}{2} = 1.85 \text{ m (2 nos)}$$

BACK VERANDHA INCLUDING KITCHEN.

→ Centre to centre long wall

$$\Rightarrow \frac{0.20}{2} + 2.80 + 0.20 + \frac{2.50 + 2.50 + 0.20}{2} = 4.20 \text{ m (1 no)}$$

→ Centre to centre short wall

$$\Rightarrow \frac{0.30}{2} + 2.40 + \frac{0.20}{2} = 2.65 \text{ m (3 nos)}$$

Earthwork in excavation in foundations

a) ROOM

→ Long wall

→ Short wall

2 0.90 0.80 0.90

3 0.70 0.80 0.90

b) FRONT VERANDHA

→ Long wall

→ Short wall

1 1.80 0.60 0.55

2 1.15 0.60 0.55

c) BACK VERANDHA

→ Long wall

→ Short wall

1 1.80 0.60 0.55

3 1.95 0.60 0.55

Total =

$$H = 0.1 + 0.15 + 0.20 + 0.45 = 0.90 \text{ m}$$

$$L = 8.1 + \frac{(2 \times 0.80)}{2} = 8.90 \text{ m}$$

$$H = 0.10 + 0.20 + 0.25 = 0.55 \text{ m}$$

$$L = 8.2 + \frac{(2 \times 0.60)}{2} = 8.80 \text{ m}$$

$$L = 1.85 - \frac{0.80}{2} - \frac{0.60}{2} = 1.15 \text{ m}$$

$$L = 8.2 + \frac{(2 \times 0.60)}{2} = 8.80 \text{ m}$$

$$L = 2.05 - \frac{0.80}{2} - \frac{0.60}{2} = 1.95 \text{ m}$$

Time concrete in foundations

ROOM

→ Long wall

→ Short wall

2	8.90	0.80	0.15
3	3.70	0.80	0.15

$$L = 8.9 + (2 \times \frac{0.80}{2}) = 1.90m$$

$$L = 4.5 - (2 \times \frac{0.80}{2}) = 3.70m$$

FRONT VERANDA

→ Long wall

→ Short wall

1	8.80	0.60	0.10
2	4.15	0.60	0.10

$$L = 8.8 + (2 \times \frac{0.60}{2}) = 8.80m$$

$$L = 1.95 - \frac{0.80}{2} + \frac{0.60}{2} = 1.75m$$

BACK VERANDA

→ Long wall

→ Short wall

1	8.80	0.60	0.10
3	1.95	0.60	0.10

$$L = 8.8 + (2 \times \frac{0.60}{2}) = 8.80m$$

$$L = 1.95 - \frac{0.80}{2} - \frac{0.60}{2} = 1.95m$$

TOTAL L =

③ 1st class brickwork in foundation & plinth

ROOM

1st footing

- long wall
- short wall

$$L = 8.1 + \left(\frac{2 \times 0.50}{2} \right) = 8.60 \text{ m}$$

$$L = 4.5 - \left(\frac{2 \times 0.50}{2} \right) = 4 \text{ m}$$

$$4.72 \text{ m}^3$$

$$1.20 \text{ m}^3$$

2	8.60	0.50	0.20
3	4.00	0.50	0.20

VERA PLINTH

- long wall
- short wall

$$L = 8.1 + \left(\frac{2 \times 0.40}{2} \right) = 8.5 \text{ m}$$

$$L = 4.5 - \left(\frac{2 \times 0.40}{2} \right) = 4.10 \text{ m}$$

$$6.42 \text{ m}^3$$

$$4.42 \text{ m}^3$$

2	8.50	0.40	0.90
3	4.10	0.40	0.90

FRONT VERANDHA

1st footing

- long wall
- short wall

$$L = 8.2 + \left(\frac{2 \times 0.40}{2} \right) = 8.60 \text{ m}$$

$$L = 1.85 - \frac{0.50}{2} = 1.40 \text{ m}$$

$$0.69 \text{ m}^3$$

$$0.22 \text{ m}^3$$

1	8.60	0.40	0.20
2	1.40	0.40	0.20

Plinth

→ long wall

→ short wall

$$L = 1.2 + (2 \times \frac{0.30}{2}) = 1.50m$$

$$L = 1.85 - \frac{0.40}{2} - \frac{0.30}{2} = 1.50m$$

0.70

0.30

1 8.50

0.70

0.30

2 1.50

$$1.78m^3$$

$$0.63m^3$$

BACK VERANDHA

4 ft footing

→ long wall

→ short wall

$$L = 1.2 + (2 \times \frac{0.40}{2}) = 1.60m$$

$$L = 2.65 - \frac{0.40}{2} - \frac{0.30}{2} =$$

0.20

0.40

1 2.60

0.20

0.40

3 2.20

$$0.68m^3$$

$$0.52m^3$$

Plinth

→ long wall

→ short wall

$$L = 1.2 + (2 \times \frac{0.30}{2}) = 1.50$$

$$L = 2.65 - \frac{0.40}{2} - \frac{0.30}{2} =$$

0.70

0.30

1 8.50

0.70

0.30

3 2.30

$$1.78m^3$$

$$1.44m^3$$

$$TOTAL = 21.19m^3$$

④ 2.5cm thick DPC

ROOM

→ Long wall

→ Short wall

→ Partition wall

FRONT VERANDHA PILLAR.

BACK VERANDHA PILLAR

BACK VERANDHA KITCHEN

→ Long wall

→ Short wall

DEDUCTION of door size

→ D

→ D₁

5.04m² L = 8.1 + (2 × 0.30) = 8.40m.

2.52m² L = 4.5 - (2 × 0.30) = 4.20m.

0.84m²

L = 8.29/23

L = 2.80 + (2 × 0.20) = 3.00m

L = 2.65 - (2 × 0.20) = 2.45m

2	8.40	0.30	—
2	4.20	0.30	—
1	4.20	0.20	—
4	0.40	0.20	—
1	0.40	0.20	—
2	3.00	0.20	→
3	2.45	0.20	—
4	1.00	0.30	→
2	0.90	0.30	→

(C)
(C)

⑤ 1st class brick work in superstructure

ROOM

- Long wall
- Short wall
- Partition wall

FRONT VERANDHA

- Long wall
- Short wall

PILLAR (Front)

KITCHEN

- Long wall
- Short wall

BACK VERANDHA

- Long wall
- Short wall

2	3.40	0.30	3.80	19.15 m ³	$L = 8.1 + (2 \times \frac{0.30}{2}) = 8.40m$
2	4.20	0.80	3.30	9.57 m ³	$L = 4.5 - (2 \times \frac{0.30}{2}) = 4.20m$
1	4.20	0.20	3.80	3.26 m ³	$L = 4.5 - (2 \times \frac{0.30}{2}) = 4.30m$
1	3.40	0.20m	0.50m	0.34 m ³	$L = 3.2 + (2 \times \frac{0.20}{2}) = 3.40m$
2	1.60m	0.20m	0.50m	0.32 m ³	$H = 3 - 2.5 = 0.5m$
4	0.40m	0.20m	2.50m	0.80 m ³	$L = 1.85 - \frac{0.30}{2} - \frac{0.20}{2} = 1.6m$
1	3.20m	0.20m	3.00m	3.64 m ³	Chc Lw = $2.7 + 2 \times \frac{0.20}{2} = 3.00m$
2	2.40m	0.20m	3.00m	2.88 m ³	$L = 3 + (2 \times \frac{0.20}{2}) = 3.2m$
1	5.40m	0.20m	0.50m	0.54 m ³	Chc Short wall = $\frac{0.30}{2} + 2.40 + \frac{0.20}{2} = 2.65m$
1	2.40m	0.20m	0.50m	0.24 m ³	Chc Lw = $0.10 + 2.5 + 0.10 = 5.2m$
1	0.40m	0.20m	2.50m	0.20 m ³	$L = 5.2 - (2 \times \frac{0.20}{2}) = 5.40m$
			<u>Total</u>	<u>41.57 m³</u>	$K. S = 2.65 - \frac{0.30}{2} - \frac{0.25}{2} = 2.40m$

DEDUCTION:

- Door
- Door-1
- Window
- Window-1
- Shelf
- Lintel over Door
- Lintel over door-1
- Lintel over window
- Lintel over window-1

4 1.50m
2 0.90m
6 1.10m
8 0.90m
2 1.10m
4 1.30m
2 1.20m
6 1.40m
8 1.20m

0.30m
0.20m
0.30m
0.20m
0.20m
0.30m
0.20m
0.30m
0.20m

2.10m
2.10m
1.20m
1.20m
1.40m
0.15m
0.15m
0.15m
0.15m

2.52m³
0.756m³
2.376m³
0.648m³
1.008m³
0.234m³
0.072m³
0.378m³
0.108m³

$L = 1.00 + (2 \times 0.15) = 1.3m$
 $L = 0.90 + (2 \times 0.15) = 1.2m$
 $L = 1.10 + (2 \times 0.15) = 1.40m$
 $L = 0.90 + (2 \times 0.15) = 1.20m$

2.072m³