ESTIMATION & COST EVALUTION-I

SPINTRONIC TECHNOLOGY & ADVANCE RESEARCH (STAR)

DEPARTMENT OF CIVIL ENGINEERING

3RD SEMESTER

DIPLOMA

LECTURE NOTES ON

ESTIMATION & COST EVALUTION-I

BY

SANGITA NAYAK

CHAPTER - 1

INTRODUCTION

Estimate :-

An estimate is the probable cost of work and usually preparced before the construction is taken up.

Data required for Estimate :-

The following 3 types of data are required for estimate.

1. Drawing (plan, elevation, section)
2. Specification (it includes nature, quality, and type of work, material etc)
3. Rate (The reate per unit various items of work, labour etc.)

Types of Estimate :-

The different types of estimates are:

1. Prelimnary estimate / Aproximate estimate
2. Plinth area estimate
3. Cube reate estimate
4. Approximate quantity menthod estimate
5. Detailed estimate.
6. Revised estimate
7. Supplimentary ~~and revised estimate~~.
8. Supplimentary and revised estimate
9. Annual or Repair / Maintenance estimate.

1. Prelimnarcy estimate / Aprcoximate estimate.

- It is reqdireed for prelimnarcy studies of varicus item of work or project to decide the financial position and policy for administrative section by the competent authority.

- In case of commercial projects such as erricgation project or similarc projects which earn revenue income, then it may be seen wheatherc investment is justified or not.

2. Plinth arcea estimate :-

- This is preparced on the basis of plinth arcea of building. The rate being deduced from the cost of similarc building having similarc specification, height and construction in the locality.

- Plinth arcea ~~and~~ estimate is calculated by taking by finding the plinth arcea of the building and multiplying by the plinth arcea rate.

- The plinth arcea should be calculated for the covered arcea by taking external dimensions of the building at the floor level. courtyards and other open arcecs should not be included in the plinth arcea estimate.

3. Cube rate Estimate :-

- Cube reate estimate is a preliminarcy estimate or an approximate estimate and is prepared on the basis of cubical content of a similarc building having similarc specification and construction in the locality.

- This is calculated by finding the cubical content of the building and multiplying it with the cube rate. The length and breath should be taken as the external dimension of the building at the floor level and the height should be taken from the floor level of one storey to the top of next heigher floor.

- The foundation, plinth and the prepare above roof are not taken into consideration in finding the cubical content.

4. Approximate quantity method estimate:

- In this method approximated total length of wall is found in running meter and this total length multiplied by the rate per running meter wall gives fairly accurate cost.

- For this method the structure is devided two parts.
  1. Foundation encluding plinth.
  2. super structure.

- The reunning meter cost for foundation and superstructure should be calculated first and these reunning meter should be multiplied by the total length of wall.

- Similarly for superstructure the prices or rate per running meter is determined from the approximate quantities of bricks, wood works, roof, floor, finishing etc.

5. Detailed estimate :-

- Detailed estimate is an accurcate estimate and consicts of worcking out the quantities of each item of worcks and worcking the cost.
- The dimensions such as length, breath and height of each item arce calculated and abstreating and billing arce done.
- The detailed estimate is preparced in two steages.

① Details OF measurcment and calculation of quantities.

- The details of measurment of each item of work arce taken out correctly from the quantites under each items was computed ena tabulare form.

② Abstract of Estimate cost.

- The total ~~of~~ cost of a item es calculated from the analysis of reates ~~of~~ orc shedule of reate chart.

6. Revised Estimate :-

Revised estimate is the detailed estimate and it reequired to be preparced under any one of the following circumstances.

*. when the orciginal sanction estimate es executed orc likely to execeted by more than 5%.

* when the expenditure on a work exceeded or likely to exceed the amount of administrative sanction by more than 10%.

* when their are material evacaution from the orignal material even through the cost may be meet the original sanction amount.

7. Supplementarey Estimate :-

* Supplementarey is the detailed estimate and it prepared when additional work are required to supplement the oreiginal work or when further development is required during the progress of work.

* The abstract should show the amount of original estimat and the amount including the supplementarey amount for which sanction is required.

8. supplementarey and Revised Estimate:-

If at any time either before or during the execution of original works it is found that orignal estimate is excess in then the divicional officers may saction a revised estimate of reduced amount

* while giving such sanction the accountant general and othere heighere authority arce in fream,

* It is preeparced when the work is parctically abandon and the estimated cost of reemaining work is less than is less than 95% of oreiginal work.

Annual Repair or Maintenance Estimate:-

* Annual reepaire ore maintenance estimate is a detailed estimate and its preeparced to maintain the structure in preeparced ordere and save condition.

* Fore building this encludes white washing, colour washing, painting, minore reepairs etc.

* Furethere there may be speeical estimate such as moonsoon damage reepaire estimate etc.

Estimate OF Building:

A building is estimated by two stages.

1. Meesurement of quantity
2. Calculation of cost.

1. Measurement of Quantity:

- The whole work is devided into different items of work such as earth work, concreet breick work etc.

- The items are classified and groups under different sub heads.
- Details of measurment of each item of work are taken out and quantities under each item are computed in a prescript form known as details of measurment form.

Details of Measurment :

Item no	Particulars of item	No	Length (L)	Breath (B)	Height (H) in metre	Quantity in m^3 (Q)	Explanary Note.

2. Calculation of cost :-

- The cost under each item of work is calculated from the quantities already computed at workable reate and the total cost is work down in a prescript from known as abstract of estimate form.
- A percentage of 3 to 5 % is added for contingency to allow petty expenditerey and unforeowning expenditere.
- The ground total

Abstreact OF Estimate Form.:

Item no	Particulars of item	Quantity	unit	Rate	Amount

Type off Areea :-

There are 3 types of areea in a building

1. Plinth areea
2. Floore areea
3. carepet areea

Plinth areea :- It is the built up coverced areea of a building measured at floore of any storey.

- It is calculated by taking external diamensions of building at the floore level excluding plinth.

- The following shall be encluded in plinth areea.
  1. All floore areea of walls at the floore level.
  2. Interenal sharfts for sanitarey installation whose areea don't exceed 2 m^2.
  3. The areea of bare Sati and areea of munty roof
  4. Areea of pureches other than centely cource.

— The following shall not be included in plinth Area:

① Area of loft

② Internal shaft for sanitary installation whose exceed ~~1000~~ 2m2.

③ on covered balconys.

Floor Area: It is the area of building that is the area of floor in between walls and consists up floor of all room, varandah, passage, staircase room, interance, bathroom, ketecheh, storeu room etc.

*. In short floor area = Plinth area - Area of walls

* The floor of each storey is and different types of floors are measured and taken separately

* The floor area of basements, baresaties, munties and purches etc. should be measured separatly.

Carpet Area: Carepet area of a building is the useful area to livable area.

* This the total floor area - Area varandah, corredoor, passage, staircase and entrance hall.

*. For officeal building carpet is the rentable areea or useful areea. For reeidensical building carpet areea is the livable areea and should be used for living purepose.

*. The carepet areea of an office building is up to 15%. of the plinth areea and for recidensical building it is 50 to 65 % of the plinth areea.

Units of Measurement for various items of work :-

The units of different works depends upon theire size, nature and sape. In generally the units of different items of work are based on the following preinciple.

(1) Mass, voluminous and thick work shall be taken in qubic unit or volum.

(2) Shallow, thin and surface work shall be taken in squarce unite per in areea.

(3) Piece work job work shall be teken in number.

(4) Long and thin work shall be taken in meter per running unit.

SI NO	Particulars OF Items	Units
1	Eearth work excavation	M3
2.	Rock excavation	M3
3.	Eeath work in filling	M3
4.	Sand filling	M3
5.	Surface dressing	Sqm
6.	Cutting of trees	nos
7.	Quarrying of stone or boulder	M3
8.	Lime concrete in roof terracing thickness specified	Sqm
9.	Lime concrete in foundation	M3
10.	cement concrete	M3
11.	Reinforced cement concreete	M3
12.	Jail work	Sqm
13.	Damp proof course	Sqm
14.	Brick work in foundation in plinth and superstructure	M3
15.	sun dried brick work	Cu.m
16.	Honey comb brick work	Sqm
17.	Half - brick work	Sqm
18.	Thin partition wall	Sqm

19.	—	Reinforced brick work	Cum
20.		string course, weather course, coping (projection specified)	meter
21.		Brick edging	Meter
22.		—stone masonry, rubble masonry	Cum
23.		stone work in wall facing	Sqm
24.		wood work in door and window framing	Cum
25.		Door and window shutters	Sqm
26.		Timbering of trenches	Sqm
27.		wood work in partition	Sqm
28.		steel reinforcement bard etc in R.C.C. R.B, work	Quintal
29.		Bending and binding of steel reinforcement	Quintal
30.		Barbed wire fencing	Meter
31.		Iron railing	Meter
32.		Iron hold fast	Quintal
33.		steel door and windows	Sqm
34.		Asbestos cement sheet	Sqm
35.		R.C.C / R.B roof slab	

36.	Centereing and shuttering form work	3qm
37.	Plastering	sqm
38.	Pointing	sqm
39.	white washing	sqm
40.	Distempering	sqm
41.	Painting, distempering	sqm
42.	Polishing of wood work	sqm
43.	Cement concrete floor	sqm
44.	Bituminous road sufacing	sqm
45.	Dismantling of brick masonry	cum
46.	Supply of cement	Bag.

Quantity Estimate of Building

2.1 Estimate Methods :-

There are 2 types of estimate methods.

1. Long wall - short wall method.
2. Center line method.

Long Wall short Wall Method :-

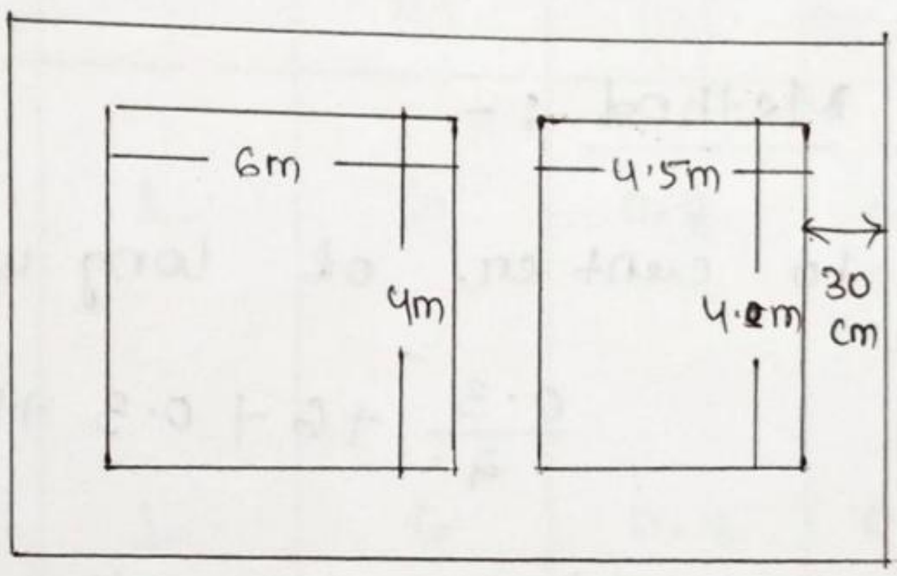
- In this method the centers to center length of long wall and short wall is calculated separately
- The long wall is always calculated from out to out.
- The short wall is always calculated from in to in.
- Length of long wall = centers to center length + $\left(2 \times \frac{\text{width of item}}{2}\right)$
- Length of short wall = Centers to center length - $\left(2 \times \frac{\text{width of item}}{2}\right)$

CENTER LINE METHOD :-

- In this method the centers to centers length of long wall and short wall is calculated separately.
- This method is used to calculated the quantities rapidly.
- + special deduction is applied at junction in this method.
- The point at which more than 2 walls meet is called as a joint.

At joints Total length of walls = sum of centre to centre length of all walls − (no of joints × $\frac{\text{width of item}}{2}$)

1. calculate the length of long wall, short wall centere to centere length of all walls of the figure given below?



30cm = 0.3m

* long wall short wall Method

there no of long wall = 2

no of short wall = 3

centere to centere of long wall = $\frac{0.3}{2} + 6 + 0.3 + 4.5 + \frac{0.3}{2}$

= 11.1

centere to centere of short wall =

$\frac{0.3}{2} + 4 + \frac{0.3}{2}$

= 4.3

length of long wall = center to center length + $\frac{2 \times \text{width of item}}{2}$

→ $11.1 + 2 \times \frac{0.3}{2}$

→ 11.4.m

Length of short wall = center to center length − $2 \times \frac{\text{width of item}}{2}$

⇒ $4.3 - 2 \times \frac{0.3}{2}$

⇒ 4m

<u>center line Method</u> :-

Center to center of long wall =

$\frac{0.3}{2} + 6 + 0.3 + 4.5 + \frac{0.3}{2} = 11.1$

Center to center of short wall = $\frac{0.3}{2} + 4 + \frac{0.3}{2}$

= 4.3

Here no of function or joints = 2

total length of center line =

Sum of center to center length of all walls −

no of joint × $\frac{\text{width of item}}{2}$

→ $2(11.1) + 3(4.3) - 2 \times \frac{0.3}{2}$

⇒ 34.8

Ex-1

ESTIMATING OF WALL

Plan and Section

Fig. 2-1

WALL WITH STANDARD MODULAR BRICKS.

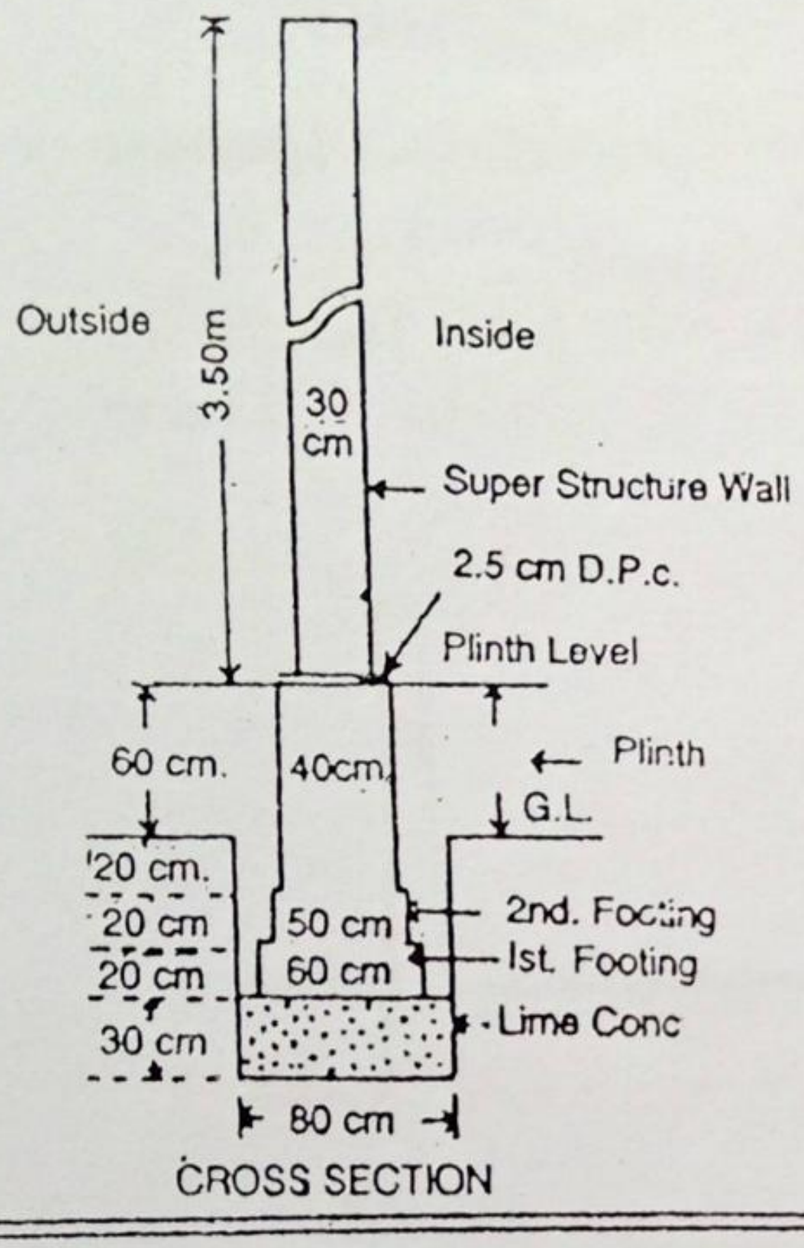
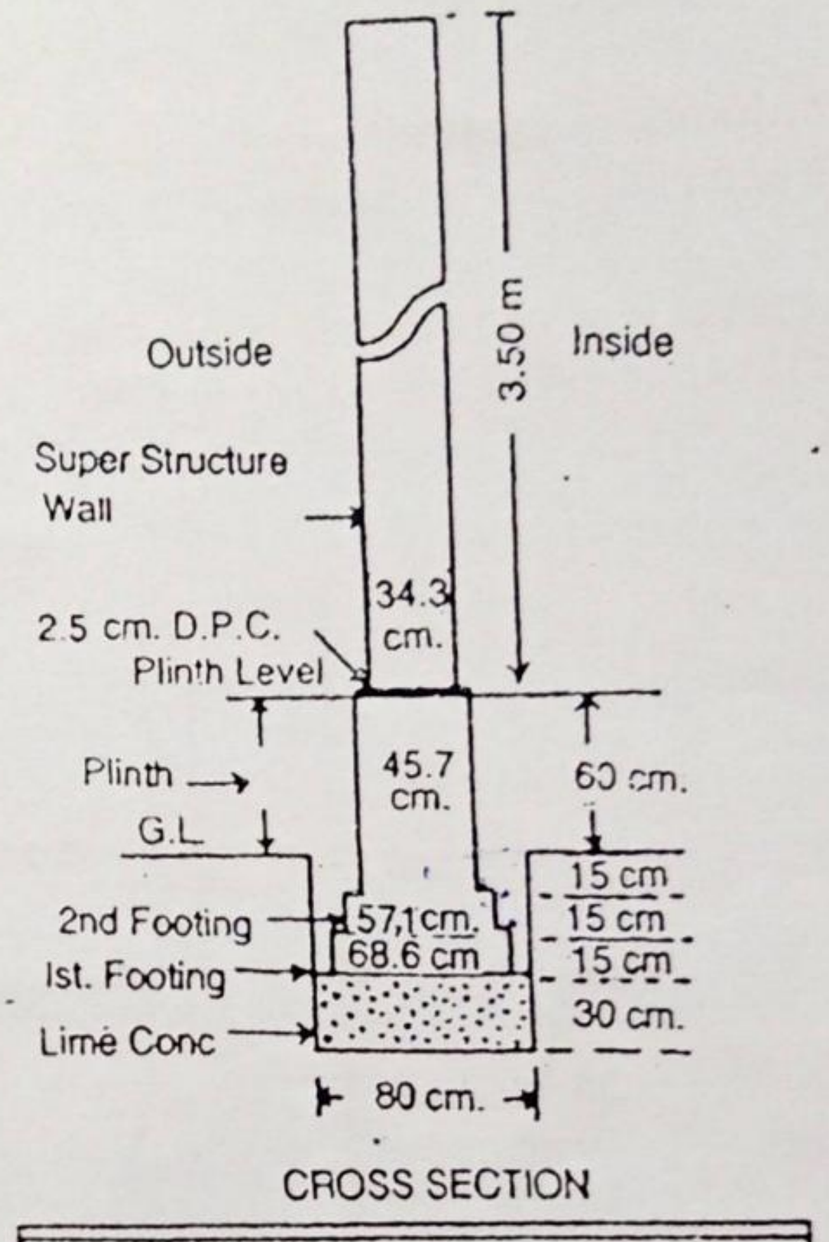


Fig. 2-2

WALL WITH TRADITIONAL BRICKS.



With Standard Bricks, Fig. 2-1 —

DETAILS OF MEASUREMENT AND CALCULATION OF QUANTITIES (Ex. 2)

Item No.	Description of items of work	No.	Dimensions			Quantities or Contents	Total quantities
			Length	Breadth	Ht. or Depth		
1.	Earthwork in excavation in foundation ...	1	6.00 m	.80 m	90 m	4.32	4.32 cu m
2.	Lime concrete in foundation ..,	1	6.00 m	.80 m	.30 m	1.44	1.44 cu m
3.	1st class brickwork in lime mortar in foundation and plinth —						
	1st footing ...	1	6.00 m	.60 m	.20 m	.72	
	2nd footing ...	1	6.00 m	.50 m	.20 m	.60	
	Plinth wall up to G.L. ...	1	6.00 m	.40 m	.20 m	.48	3.24 cu m
	Plinth wall above G.L. ...	1	6.00 m	.40 m	.60 m	1.44	

(Contd.)

2. calculate the quantity of following items of the walls given in figure 1 and 2.

i) Eearth work estavation

ii) Cement concreet in foundation or lime concreet foundation.

iii) Brick work in foundation in super structure.

Figure - 2.1.

Item NO	Particulars of Item	NO	Length (L)	Breath (B)	Height (H) in meter	Quantity in m^3 (Q) L x b x h x NO	Explanatory Note.
1.	Eearth work and Estavation	1	6	0.8	0.9	4.32 m^3	H = 0.3 + 0.2 + 0.2 + 0.2
2.	Lime concreet on foundation	1	6	0.8	0.3	1.44 m^3	
3.	Brick ~~and~~ work and Foundation in super structure						
	a. 1st footing	1	6	0.6	0.2	0.72	
	b. 2nd footing	1	6	0.5	0.2	0.6	
	c. 3rd footing	1	6	0.4	0.8	1.92	
4.	Brick work in super structure.	1	6	0.3	3.5	6.3	

Figurce - 2.2

Item NO	Parcticeulars of Item	NO	Length (L)	Breeath (b)	theight (h) in (m)	Quantity in m^3 (Q)	Explanatorey Note.
1.	Earth work and Estavation	1	6	0.8	0.75	3.6 m^3	H = 0.15 + 0.15 + 0.15 + 0.3 = 0.75
2.	Lime concreet of foundation	1	6	0.8	0.3	1.44 m^3	
3.	Breick work and foundation in superc structure.						
a.	1st Footing	1	6	0.686	0.15	0.6174	
b.	2nd Footing	1	6	0.571	0.15	0.5139	
c.	3rd Footing	1	6	0.457	0.75	2.0565	
d.	4th Footing	1	6	0.343	3.5	7.203	

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 + ½ × .30 + ½ × .30 = 5.30 m. The length of short wall centre to centre = 4.00 + ½ × .30 + ½ × .30 = 4.30 m.

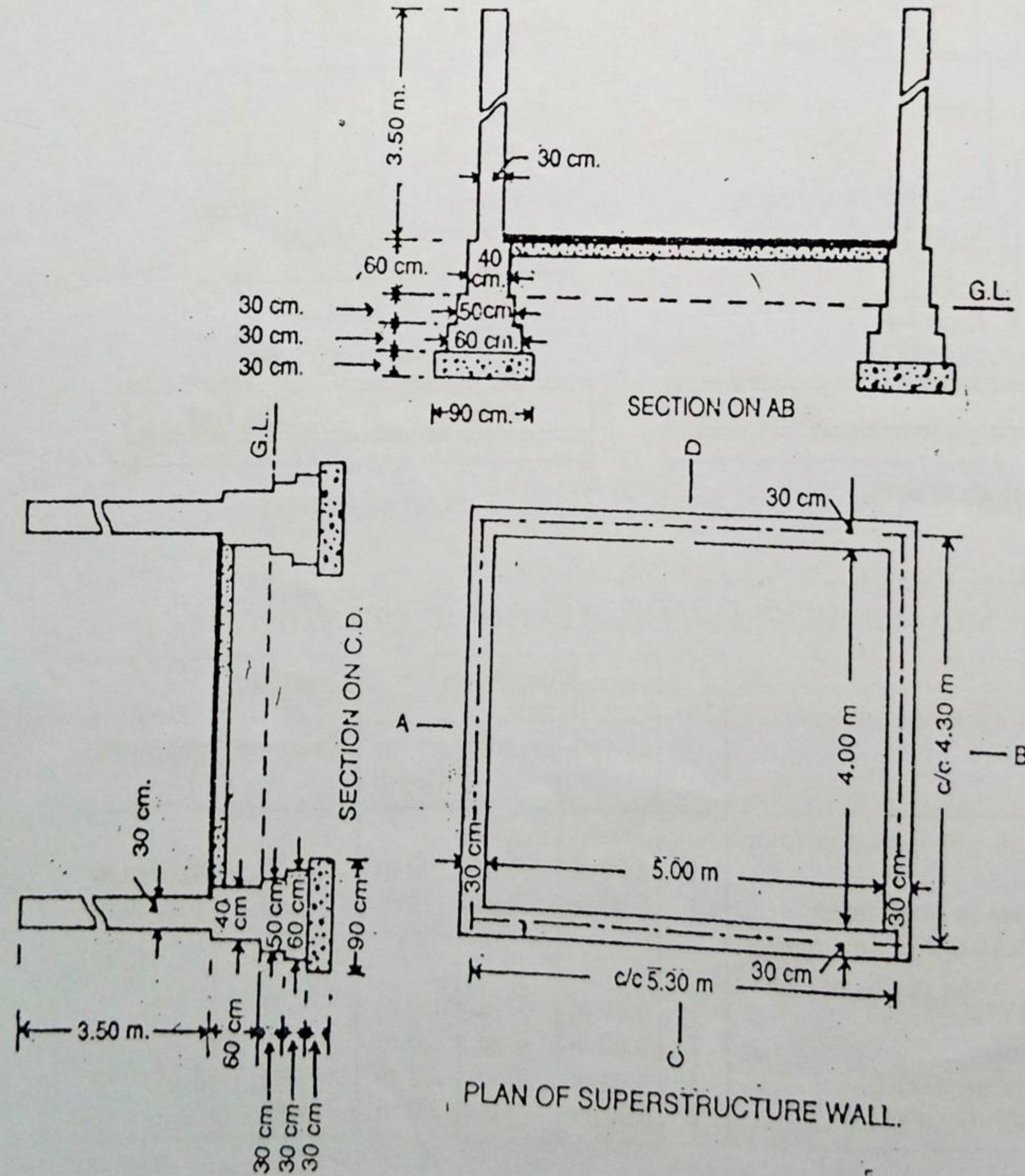


Fig. 2-3

10.11.21

Ex-2(a)

calculate the quantity of following items from the given drawing.

1. Eeath work in Estavation.
2. Cement concreet, orc lime concreet in foundation.
3. Breick work foundation in plinth
4. Breick worek in supere structure.

Ans

Centere to centere length of long wall ⇒

$$\frac{0.3}{2} + 5 + \frac{0.3}{2} = 5.3$$

Centere to center length of short wall ⇒

$$\frac{0.3}{2} + 4 + \frac{0.3}{2} = 4.3$$

No of long wall = 2

No of short wall = 2

Item No	Particulars of item	No	Length (l)	Breadth (b)	Height (h) in (m)	Quantity in m3 (q)	Explanatory.
1.	Earth work estavation						
	a. Long wall	2	6.2	0.9	0.9	10.04	$L_L = 5.3 + \frac{0.9}{2} + \frac{0.9}{2} = 6.2$
	b. short wall	2	3.4	0.9	0.9	+ 5.50	$L_S = 4.3 - \frac{0.9}{2} - \frac{0.9}{2} = 3.4$
						15.54	
2.	Lime concret cement in Foundation						
	a. Long wall	2	6.2	0.9	0.3	3.34	$L_i = 5.3 + \frac{0.9}{2} + \frac{0.9}{2} = 6.2$
	b. Short wall	2	3.4	0.9	0.3	+ 1.83	$L_S = 4.3 - \frac{0.9}{2} - \frac{0.9}{2} = 3.4$
						5.17	
3.	Brick work Foundation and plinth.						
	① First Footing						
	ⓐ long wall	2	5.9	0.6	0.3	2.12	$L = 5.3 + \frac{0.6}{2} + \frac{0.6}{2} = 5.9$
	ⓑ Short wall	2	3.7	0.6	0.3	+ 1.33	$L_S = 4.3 - \frac{0.6}{2} - \frac{0.6}{2} = 3.7$
						3.45	

	② Second footing						
	ⓐ Long wall	2	5.8	0.5	0.3	1.74	$L = 5.3 + \frac{0.5}{2} + \frac{0.5}{2} = 5.8$
	ⓑ Short wall	2	3.8	0.5	0.3	1.14	$L_s = 4.3 - \frac{0.5}{2} - \frac{0.5}{2} = 3.8$
						+ 2.88	
	③ Third footing						
	ⓐ Long wall	2	5.7	0.4	0.6	2.73	$L = 5.3 + \frac{0.4}{2} + \frac{0.4}{2} = 5.7$
	ⓑ Short wall	2	3.9	0.4	0.6	1.87	$L_s = 4.3 - \frac{0.4}{2} - \frac{0.4}{2} = 3.9$
						+ 4.6	
4.	Brick work in						
	Super structure						
	① Long wall	2	5.6	0.3	3.5	11.76	$L = 5.3 + \frac{0.3}{2} + \frac{0.3}{2} = 5.6$
	② Short wall	2	4	0.3	3.5	8.4	$L_s = 4.3 - \frac{0.3}{2} - \frac{0.3}{2} = 4$
						+ 20.16	

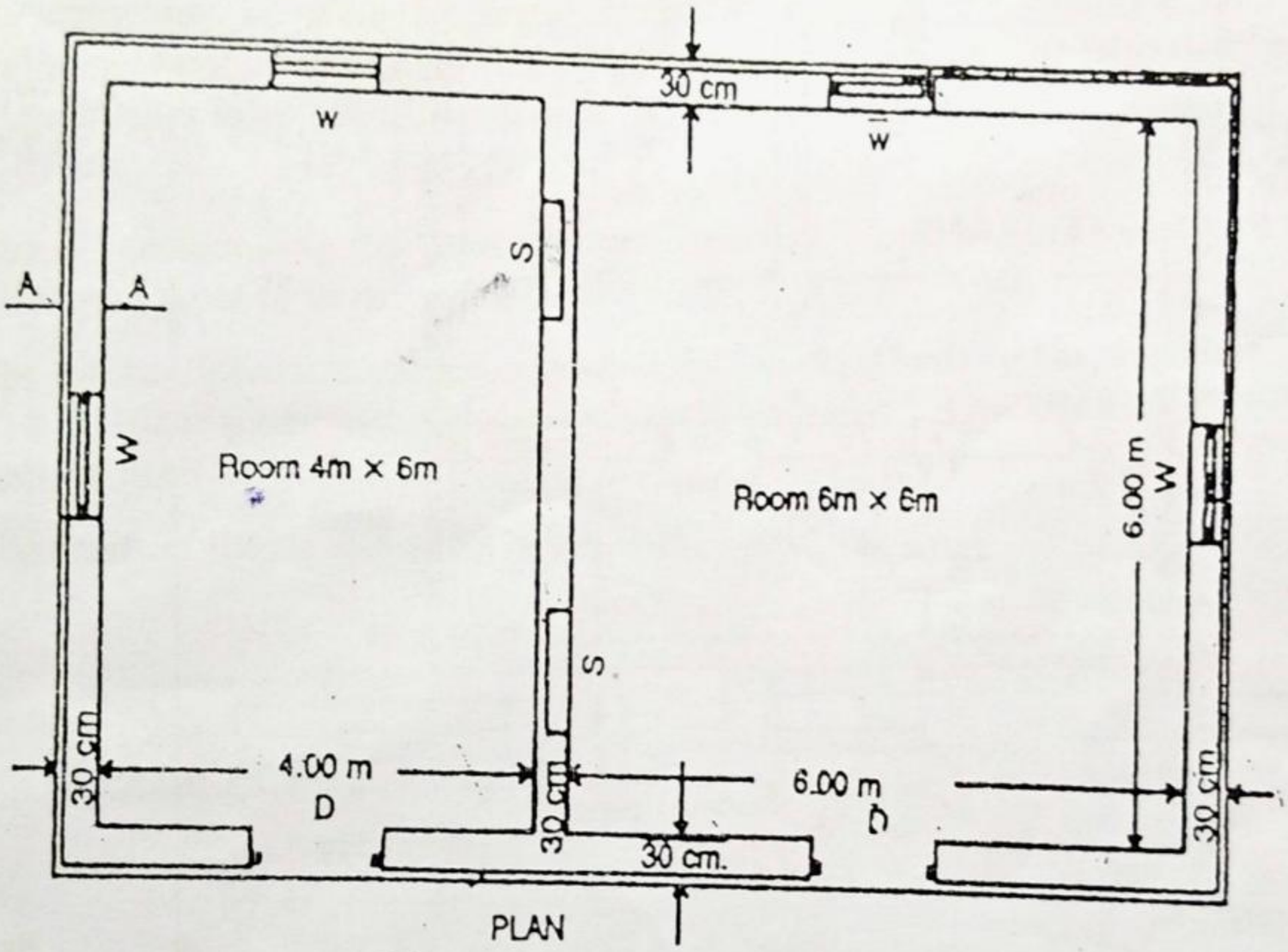
CENTERLINE METHOD :- Ex-(3a)

Item No	Particulars of Item	No	Length (l)	Breath (b)	Height (h)	Quantity in m^3	Explanatory
1	Earth work Excavation	1	19.2	0.9	0.9	15.552 m^3	L = 5.3 x 2 + 4.3 x 2 = 19.2
2.	Lime concrete in foundation	1	19.2	0.9	0.3	5.184 m^3	L = 5.3 x 2 + 4.3 x 2 = 19.2
3.	Brick work in foundation						
	(a) 1st Footing	1	19.2	0.6	0.3	3.456	L = 5.3 x 2 + 4.3 x 2 = 19.2
	(b) 2nd footing	1	19.2	0.5	0.3	2.88	
	(c) 3rd footing	1	19.2	0.4	0.6	4.608	
						10.944 m^3	
4.	Brick work in Super structure	1	19.2	0.3	3.5	20.16	L = 5.3 x 2 + 4.3 x 2 = 19.2

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



CROSS SECTION OF WALL ON AA

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

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

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.*

Ex - 4 (a)

calculate the quantity of following items of work from the given drawing.

(1) Eeareth work in Estavation
(2) Lime concret in foundation
(3) Breick work in foundation in plinth
(4) Damp proof course work
(5) Brick work in super structure

Ans

Here no of long wall = 2
no of short wall = 3

centere to centere length of long wall =

$$\frac{0.3}{2} + 4 + 0.3 + 6 + \frac{0.3}{2} = 10.6$$

centere to centere short wall =

$$\frac{0.3}{2} + 6 + \frac{0.3}{2} = 6.3$$

Item no	Particulars OF Item	NO	Length (l)	Breath (b)	Height (h)	Quantity	Explanatory Note in(M)
1.	Earth work in estavation.						H = 0.3+ 0.2+0.1+0.1+0.1 +0.2 = 1
	a. long wall	2	11.7	1.1	1	24.74	LL = $10.6 + 2 \times \frac{1.1}{2} = 11.7$
	b. short wall	3	5.2	1.1	1	17.16	LS = $6.3 - 2 \times \frac{1.1}{2} = 5.2$
						+ 41.9	
2.	Lime concrete in Foundation						
	a. long wall	2	11.7	1.1	0.3	7.722	L = $10.6 + 2 \times \frac{1.1}{2} = 11.7$
	b. short wall	3	5.2	1.1	0.3	5.148	LS = $6.3 - 2 \times \frac{1.1}{2} = 5.2$
						+ 12.87	
3.	Brick work foundation in plinth						
	a. first Footing						
	(i) Long wall	2	11.4	0.8	0.2	3.648	LL = $10.6 + 2 \times \frac{0.8}{2} = 11.4$
	(ii) short wall	3	5.5	0.8	0.2	2.64	LS = $6.3 - 2 \times \frac{0.8}{2} = 5.5$
						+ 6.288	
	b. second footing						
	(i) Long wall	2	11.3	0.7	0.1	1.582	LL = $10.6 + 2 \times \frac{0.7}{2} = 11.3$
	(ii) short wall	3	5.6	0.7	0.1	1.176	LS = $6.3 - 2 \times \frac{0.7}{2} = 5.6$
						+ 2.758	

						2.758	
c. 3rd Footing							
(i) long wall	2	11.2	0.6	0.1	1.344	$L_L = 10.6 + 2 \times \frac{0.6}{2} = 11.2$	
(ii) Short wall	3	5.7	0.6	0.1	1.026	$L_S = 6.3 - 2 \times \frac{0.6}{2} = 5.7$	
					2.37		
d. 4th Footing							
(i) long wall	2	11.1	0.5	0.1	1.11	$L_L = 10.6 + 2 \times \frac{0.5}{2} = 11.1$	
(ii) Short wall	3	5.8	0.5	0.1	0.87	$L_S = 6.3 - 2 \times \frac{0.5}{2} = 5.8$	
					1.98		
e. 5th footing							
(i) long wall	2	11	0.4	0.8	7.04	$L_L = 10.6 + 2 \times \frac{0.4}{2} = 11$	
(ii) short wall	3	5.9	0.4	0.8	5.664	$L_S = 6.3 - 2 \times \frac{0.4}{2} = 5.9$	
					12.704		
4. 2 cm D.P.C work							
(a) long wall	2	11	0.4		8.8	$L_L = 10.6 + 2 \times \frac{0.4}{2} = 11$	
(b) short wall	3	5.9	0.4		7.08	$L_S = 6.3 - 2 \times \frac{0.4}{2} = 5.9$	
					15.88		
(c) Deduction for door	2	1.2	0.4		0.96		
					14.92		

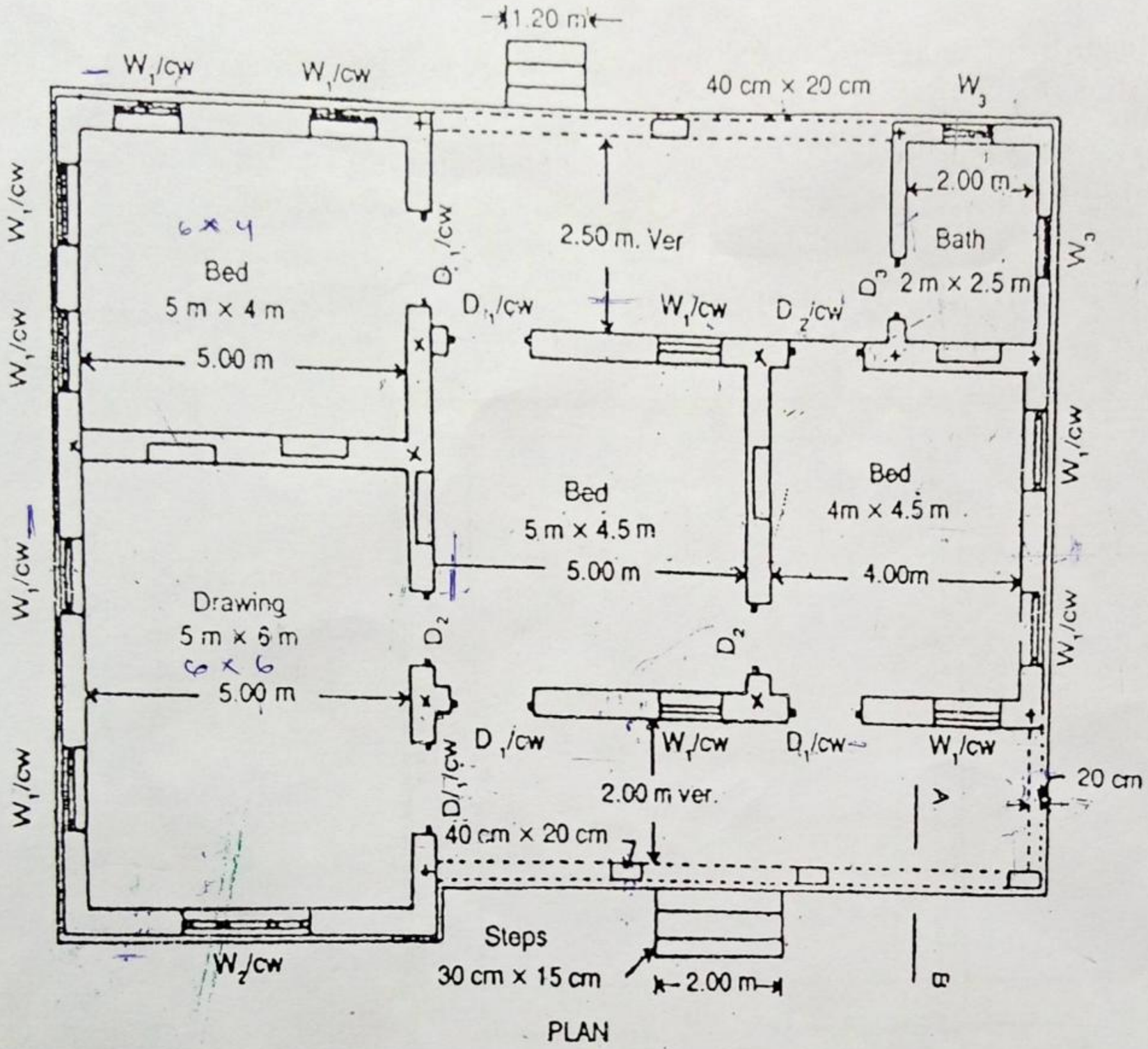
5.	Brick work in super structure.							
	(a) long wall	2	10.9	0.3	4.2	27.468	$L_L = 10.6 + 2 \times \frac{0.3}{2} = 10.9$	
	(b) short wall	3	6	0.3	4.2	22.68	$L_S = 6.3 - 2 \times \frac{0.3}{2} = 6$	
						+		
						50.148		
	(c) Deduction for							
	(i) Door	2	1.5	0.3	2.1	0.135	$L = 1.2 + 2 \times 0.15$	
	(ii) window	4	1.3	0.3	1.5	0.234	$L = 1 + 2 \times 0.15$	
	(iii) shelves	2	1.3	0.2	1.5	0.117	$L = 1 + 2 \times 0.15$	
						+		
						0.486		
						50.148		
						- 4.398		
						45.75		

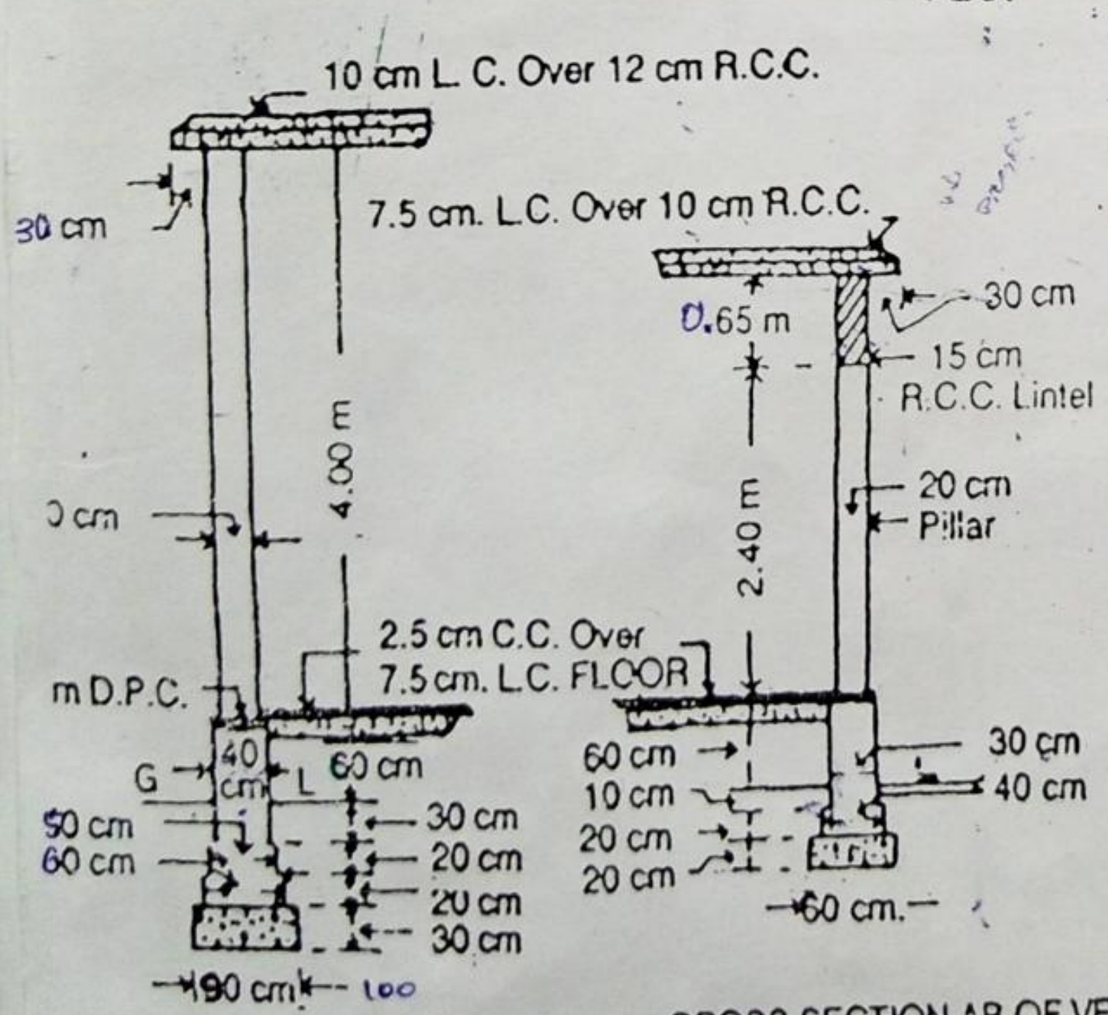
CENTER LINE METHOD

Item No	Particulars of item	No	length	breadth	height	Quantity	Explanatory Note
1.	Earth work in estavation.	1	39	1.1	1	42.9	$(2\times 10.6)+(3\times 6.3)-(2\times\frac{1.1}{2})$ $= 39$
2.	Lime concreete in foundation	1	39	1.1	0.3	12.87	$(2\times 10.6)+(3\times 6.3)-(2\times\frac{1.1}{2})$ $= 39$
3.	Breick work in foundation						
	① first footing	1	39.3	0.8	0.2	6.288	$(2\times10.6)+(3\times6.3)-(2\times\frac{0.8}{2})=$ $= 39.3$
	② 2nd footing	1	39.4	0.7	0.1	2.758	$(2\times10.6)+(3\times6.3)-(2\times\frac{0.7}{2})=39.4$
	③ 3rd footing	1	39.5	0.6	0.1	2.37	$(2\times10.6)+(3\times6.3)-(2\times\frac{0.6}{2})=39.5$
	④ 4th footing	1	39.6	0.5	0.1	1.98	$(2\times10.6)+(3\times6.3)-(2\times\frac{0.5}{2})=39.6$
	⑤ 5th footing	1	39.7	0.4	0.8	12.704	$(2\times10.6)+(3\times6.3)-(2\times\frac{0.4}{2})=39.7$
						26.1	
4.	2 cm D.P.C work	1	39.7	0.4		15.88	
	@ Deduction for Door	2	1.2	0.4		-0.96	
						14.92	

5.	Brick work in super structure	1	39.8	0.3	4.2	50.148	$(2\times10.6)+(3\times6.3)-(2\times\frac{0.3}{2})=39.8$
	(a) Deduction for						
	(i) Door	2	1.2	0.3	2.1	1.512	
	(ii) window	4	1	0.3	1.5	1.8	
	(iii) shelves	2	1	0.2	1.5	0.6	
						3.912	
	(b) Deduction for lintel over						
	(i) Door	2	1.5	0.3	0.15	0.135	
	(ii) window	4	1.3	0.3	0.15	0.234	
	(iii) shelves	2	1.3	0.3	0.15	0.117	
						0.486	
						45.75	

RESIDENTIAL BUILDING





CROSS SECTION OF MAIN WALLS

CROSS SECTION AB OF VER.WALL

Doors:-

D_1 – 120 cm × 210 cm (1.20 m × 2.10 m)

D_2 – 100 cm × 200 cm (1.00 m × 2.00 m)

D_3 – 75 cm × 180 cm (.75 m × 1.80 m).

Windows:-

W_1 – 100 cm × 150 cm (1.00 m × 1.50 m)

W_2 – 200 cm × 150 cm (2.00 m × 1.50 m)

W_3 – 75 cm × 120 cm (.75 m × 1.20 m)

C.W. – 75 cm × 60 cm (.75 m × .60 m).

Shelves:-

S – 100 cm × 150 cm (1.00 m × 1.50 m)

Lintel Over Doors, Windows Etc.

15 cm R.B.

All walls of Drawing Rooms and Bed Rooms have same section

Bath Room walls have similar section.

Note—No beam has been shown in the plan.

Fig. 2-7

Drawing :- 4

Calculation of center to center leagth.

(a) Left side Bed and drawing combined center to center length of long wall =>

$$\Rightarrow \frac{0.3}{2} + 4 + 0.3 + 6 + \frac{0.3}{2} = 10.6$$

center to center length of short wall

$$\Rightarrow \frac{0.3}{2} + 5 + \frac{0.3}{2} = 5.3$$

No of long wall = 2

No of short wall = 3

(b) Right side double bedroom comined.

centere to center length of long wall

$$\Rightarrow \frac{0.3}{2} + 5 + 0.3 + 4 + \frac{0.3}{2} = 9.6$$

Centere to center length of short wall

$$\Rightarrow \frac{0.3}{2} + 4.5 + \frac{0.3}{2} = 4.8$$

No of long wall = 2

No of short wall = 2

(c) Front varcandah

center to centere length of long wall

$$\Rightarrow \frac{0.3}{2} + 5 + 0.3 + 4 + 01 + \frac{0.2}{2} = 9.65$$

center to center length of short wall

$$\Rightarrow \frac{0.3}{2} + 2 + \frac{0.2}{2} = 2.25$$

No of long wall 1

No of short wall 1

(d) Back varandah including bathroom.

center to center length of long wall

$= \frac{0.3}{2} + 5 + 0.3 + 4 + 0.1 + \frac{0.2}{2} = 9.65$

centere to centere length of short wall

$= \frac{0.2}{2} + 2.50 + \frac{0.3}{2} = 2.75$

No of long wall - 1

No of short wall = 2

(e) Bathroom

center to centere length of long wall

$\Rightarrow \frac{0.3}{2} + 2.5 + \frac{0.2}{2} = 2.9$

center to center length of short wall

$\Rightarrow \frac{0.2}{2} + 2 + \frac{0.2}{2} = 2.2$

No long wall = 2

No of short wall = 1

Item NO	Particulars of Item	NO	Length (l)	breadth (b)	Height (h)	Quantity	Explanatory Note
1.	Earth work in Excavation						
							H = 0.3+0.2+0.2+0.3 = 1
	(a) Left side bed and drawing ~~room~~ combined						
	① Long wall	2	11.5	0.9	1	20.7	LL = $10.6 + 2 \times \frac{0.9}{2} = 11.5$
	② short wall	3	4.4	0.9	1	11.88	Ls = $5.3 - 2 \times \frac{0.9}{2} = 4.4$
	(b) Right side double bedroom combined						
	① Long wall	2	9.6	0.9	1	17.28	$L_L = 9.6 + \frac{0.9}{2} = \frac{0.9}{2} = 9.6$
	② short wall	2	3.9	0.9	1	7.02	$L_S = 4.8 - \frac{0.9}{2} - \frac{0.9}{2} = 3.9$
	(c) front varandah						H = 0.2 +0.2 +0.1 = 0.5
	① Long wall	1	9.5	0.6	0.5		$L = 9.65 - \frac{0.9}{2} + \frac{0.6}{2} = 9.5$
	② short wall	1	1.5	0.6	0.5		$L_S = 2.25 - \frac{0.6}{2} - \frac{0.9}{2} = 1.5$

	ⓓ Back varandah						
	ⓘ Long wall	1	9.5	0.6	0.5	2.85	$L_L = 9.65 - \frac{0.9}{2} + \frac{0.6}{2} = 9.5$
	ⓘⓘ Short wall	2	2	0.6	0.5	1.2	$L_S = 2.75 - \frac{0.9}{2} - \frac{0.6}{2} = 2$
	ⓔ step						
	① Front step	1	2.2	1	0.1	0.22	$L = 2 + 2 \times 0.1 = 2.2$
	② Back step	1	1.4	1	0.1	0.14	$b = 0.3 + 0.3 + 0.3 + 0.1 = 1$
2.	Lime concrete in foundation.						
	ⓐ Left side bed and drawing comined						
	ⓘ Long wall	2	11.5	0.9	0.3	6.21	$L = 10.6 + \frac{0.9}{2} + \frac{0.9}{2} = 11.5$
	ⓘⓘ Short wall	3	4.4	0.9	0.3	3.564	$L_S = 5.3 - \frac{0.9}{2} - \frac{0.9}{2} = 4.4$
	ⓑ Right side double bedroom comined						
	① Long wall	2	9.6	0.9	0.3	5.184	$L_L = 9.6 - \frac{0.9}{2} + \frac{0.9}{2} = 9.6$
	② short wall	2	3.9	0.9	0.3	2.106	$L_S = 4.8 - \frac{0.9}{2} - \frac{0.9}{2} = 3.9$

ⓒ Front varandah						
① Long wall	1	9.7	0.6	0.2	1.164	$L = 9.65 - \frac{0.5}{2} + \frac{0.6}{2} = 9.7$
② short wall	1	1.7	0.6	0.2	0.204	$L = 2.25 - \frac{0.5}{2} - \frac{0.6}{2} = 1.7$
ⓓ Back varandah including bath-room						
① Long wall	1	9.7	0.6	0.2	1.164	$L = 9.65 - \frac{0.5}{2} + \frac{0.6}{2} = 9.7$
② short wall	2	2.2	0.6	0.2	0.204	$L = 2.75 - \frac{0.5}{2} - \frac{0.6}{2} = 1.7$
ⓔ steps						
① Front steps	1	2.2	1	0.1	0.22	
ii) Back steps	1	1.4	1	0.1	1.14	
③ Brick work in foundation and plinth.						
ⓐ Left side bed and drawing combined						
① First footing						
- long wall	2	11.2	0.6	0.2	1.344	$L = 10.6 + 2 \times \frac{0.6}{2} = 11.2$
- short wall	3	4.7	0.6	0.2	1.692	$L = 5.3 - 2 \times \frac{0.6}{2} = 4.7$

(ii) second footing						
- long wall	2	4.1	0.5	0.2	2.22	$L_L = 10.6 + 2 \times \frac{0.5}{2} = 11.1$
- short wall	3	4.8	0.5	0.2	1.44	$L_S = 5.3 - 2 \times \frac{0.5}{2} = 4.8$
(iii) 3rd footing						
- long wall	2	11	0.4	0.9	7.92	$L_L = 10.6 + 2 \times \frac{0.4}{2} = 11$
- short wall	3	4.9	0.4	0.9	5.292	$L_S = 5.3 - 2 \times \frac{0.4}{2} = 4.9$
~~(iv) 4th footing~~						
~~- long wall~~						
~~- short wall~~						
(b) Right side double bedroom combined						
(i) First Footing						
- long wall	2	9.6	0.6	0.2	2.304	$L_L = 9.6 + \frac{0.6}{2} - \frac{0.6}{2} = 9.6$
- short wall	2	4.2	0.6	0.2	1.008	$L_S = 4.8 - \frac{0.6}{2} - \frac{0.6}{2} = 4.2$
(ii) Second Footing						
- long wall	2	9.6	0.5	0.2	1.92	$L_L = 9.6 + \frac{0.5}{2} - \frac{0.5}{2} = 9.6$
- short wall	2	4.3	0.5	0.2	0.82	$L_S = 4.8 - \frac{0.5}{2} - \frac{0.5}{2} = 4.3$
(iii) 3rd Footing						
- long wall	2	9.6	0.4	0.9	6.912	$L_L = 9.6 + \frac{0.4}{2} - \frac{0.4}{2} = 9.6$
- short wall	2	4.4	0.4	0.9	3.168	$L_S = 4.8 - \frac{0.4}{2} - \frac{0.4}{2} = 4.4$

(c) Front varandah						
(i) First Footing						
+ Long wall	1	9.65	0.4	0.2	0.772	$L = 9.65 - \frac{0.4}{2} + \frac{0.4}{2} = 9.65$
short wall	1	1.85	0.4	0.2	0.148	$Ls = 2.25 - \frac{0.4}{2} - \frac{0.4}{2} = 1.85$
(ii) 2nd footing						
- long wall	1	9.6	0.3	0.7	2.016	$L = 9.65 - \frac{0.4}{2} + \frac{0.3}{2} = 9.6$
- short wall	1	1.9	0.3	0.7	0.399	$Ls = 2.25 - \frac{0.4}{2} - \frac{0.3}{2} = 1.9$
(d) Back varandah including bathroom						
(i) First footing						
Long wall	1	9.65	0.4	0.2	0.772	$L = 9.65 - \frac{0.4}{2} + \frac{0.4}{2} = 9.65$
Short wall	2	2.35	0.4	0.2	0.376	$Ls = 2.75 - \frac{0.4}{2} - \frac{0.4}{2} = 2.35$
(2) Second footing						
long wall	1	9.6	0.3	0.7	2.016	$L = 9.65 - \frac{0.4}{2} + \frac{0.3}{2} = 9.6$
short wall	2	2.4	0.3	0.7	1.008	$Ls = 2.75 - \frac{0.4}{2} - \frac{0.3}{2} = 2.4$
(e) Steps						
(a) - Front step						
- First step	1	2	0.9	0.15	0.27	
- 2nd step	1	2	0.6	0.15	0.18	
- 3rd step	1	2	0.3	0.15	0.09	

	ⓑ back step						
	first step	1	1.2	0.9	0.15	0.162	
	2nd step	1	1.2	0.6	0.15	0.108	
	3rd step	1	1.2	0.3	0.15	0.054	
4.	2.5 cm D.P.C work.						
	ⓐ left side bed and drawing combined						
	(i) Long wall	2	11	0.4	8.8	$L = 10.6 + \frac{0.4}{2} + \frac{0.4}{2} = 11$	
	(ii) short wall	3	4.9	0.4	5.88	$L = 5.3 - \frac{0.4}{2} - \frac{0.4}{2} = 4.9$	
	ⓑ Right side bed room combined						
	(i) Long wall	2	9.6	0.4	7.68	$L = 9.6 + \frac{0.4}{2} - \frac{0.4}{2} = 9.6$	
	(ii) short wall	2	4.4	0.4	3.52	$L = 4.8 - \frac{0.4}{2} - \frac{0.4}{2} = 4.4$	
	ⓒ Bath room						
	(i) Long wall	2	2.7	0.3	1.62	$L = 2.75 - \frac{0.4}{2} + \frac{0.3}{2} = 2.7$	
	(ii) short wall	1	1.9	0.3	0.57	$L = 2.2 - \frac{0.3}{2} - \frac{0.3}{2} = 1.9$	

④	Pillars		0.4	0.2		7.68	
⑤	Deduction for Doors						
	(i) D_1	5	1.2	0.4		2.4	
	(ii) D_2	3	1	0.4		1.2	
	(iii) D_3	1	0.75	0.3		0.225	
5.	Brick work in Super structure.						
ⓐ	Left side bed drawing combined						
	① Long wall	2	10.9	0.3	4	26.16	$L_4 = 10.6 + \frac{0.3}{2} + \frac{0.3}{2} = 10.9$
	② short wall	3	5	0.3	4	18	$L_5 = 5.3 - \frac{0.3}{2} - \frac{0.3}{2} = 5$
⑤	Right side bed room combined						
	① Long wall	2	9.6	0.3	4	23.04	$L = 9.6 + \frac{0.3}{2} - \frac{0.3}{2} = 9.6$
	② short wall	2	4.5	0.3	4	10.8	$L_5 = 4.8 - \frac{0.3}{2} - \frac{0.3}{2} = 4.5$

ⓒ Front varandah (varandah wall above lintel)						$H = 0.65 - 0.15 = 0.5$
① Long wall	1	9.6	0.2	0.5	0.96	$L = 9.65 - \frac{0.3}{2} + \frac{0.2}{2} = 9.6$
② short wall	1	2	0.2	0.5	0.2	$Ls = 2.25 - \frac{0.3}{2} - \frac{0.2}{2} = 2$
ⓓ Back varandah (varandah wall above lintel)						
① Long wall	1	7.2	0.2	0.5	0.72	$L = 9.65 - \frac{0.3}{2} - \frac{0.2}{2} - 2 - 0.2 = 7.2$
ⓔ Bath room						
① Long wall	2	2.7	0.2	3.05	3.294	$H = 2.4 + 0.65 = 3.05$
② short wall	1	2	0.2	3.05	1.22	$L = 2.75 - \frac{0.3}{2} + \frac{0.2}{2} = 2.7$
ⓕ Pillars	4	0.4	0.2	2.4	0.768	$Ls = 2.2 - \frac{0.2}{2} - \frac{0.2}{2} = 2$
ⓖ Deduction for						
① Door, window and CW						
① Door						
- D_1	5	1.2	0.3	2.1	3.78	
- D_2	3	1	0.3	2	1.8	
- D_3	1	0.75	0.2	1.8	0.27	

② window						
w_1	11	1	0.3	1.5	4.95	
w_2	1	2	0.3	1.5	0.9	
w_3	2	0.75	0.2	1.2	0.36	
③ CW	18	0.75	0.3	0.60	2.43	
④ Shelves	5	1	0.2	1.5	1.5	
⑤ Deduction for lintel over Door, window, CW, shelves.						
① Door						
D_1	5	1.5	0.3	0.15	0.3375	$L = 1.2 + 2 \times 0.15 = 1.5$
D_2	3	1.3	0.3	0.15	0.1755	$L = 1 + 2 \times 0.15 = 1.3$
D_3	1	1.05	0.2	0.15	0.0315	$L = 0.75 + 2 \times 0.15 = 1.05$
② window						
w_1	11	1.3	0.3	0.15	0.6435	$L = 1 + 2 \times 0.15 = 1.3$
w_2	1	2.3	0.3	0.15	0.1035	$L = 2 + 2 \times 0.15 = 2.3$
w_3	2	1.05	0.2	0.15	0.065	$L = 0.75 + 2 \times 0.15 = 1.05$
③ CW	18	1.05	0.3	0.15	0.3505	$L = 0.75 + 2 \times 0.15 = 1.05$
④ shelves	5	1.3	0.2	0.15	0.195	$L = 1 + 2 \times 0.15 = 1.3$

5.	**Plastering**					
	out side					
	ⓐ Plinth height, Plinth projection and 10cm below ground level	1	52.6	0.75		H = 0.5 + 0.6 + 0.1 = 0.75 L = 2x(11 + 15.3) = 52.6
	ⓑ out side of left side bed and drawing combined	1	33	4		L = 2 x [(0.3+5+0.3) + (0.3+6+0.3+4+0.3)] = 33
	ⓒ out side of right side double bed room combined	1	24.3			L = (5+0.3+4+0.3) + (5+4+0.3+0.3) + (4.5+0.3+0.3) = 24.3
	ⓓ out side of bathroom.	1	7.8	3.05		L = (2+0.2+0.2)+2x(2.5+0.2) = 7.8
	ⓔ Pillar	4	1.2	2.4		L = 2x 0.4+0.2 =
	ⓕ out side of Front varandah	1	11.8	0.65		L = 9.65 - 0.3/2 + 0.2/2 + 2 + 0.2 =
	ⓖ out side of back varandah	1	7.2			

In side						
(h) In side of left side bed room	1	18		4		L = 5+4+5+4 = 18
(i) In side of drawing room.	1	22		4		L = 5+6+5+6 = 22
(j) In side of right side bedroom 1	1	14.5		4		L = 5+4.5+5 = 14.5
(k) In side of right side bedroo 2	1	17		4		L = 4+4.5+4+4.5 = 17
(l) Inside of bath room.	1	7		3.05		l = 2+2.5+2.5 = 7 H = 2.40+0.65 = 3.05
(m) In side of front varandah	1	11.4		0.65		L = 9.65 - 0.3/2 - 0.2/2 + 2
(n) In side of back varandah.	1	7.2				
(o) (i) Step						
(iii) Front step						
- 1st step	1	2.3	0.3			l = 0.15+2+0.15 = 2.3
- 2nd step	1	2.6	0.3			L = 0.3+2+0.3 = 2.6
- 3rd step	1	2.9	0.3			L = 0.45+2+0.45 = 2.9
(ii) Back step						

(ii) Back step							
1st step	1	1.2	0.3				$l = 0.15 + 1.2 + 0.15 = 1.2$
2nd step	1	1.8	0.3				$l = 0.3 + 1.2 + 0.3 = 1.8$
3rd step	1	2.1	0.3				$l = 0.45 + 1.2 + 0.45 = 2.1$
P. Deduction for							
• Door							
→ D_1	5 x 1	1.2		2.1			
D_2	3 x 1	1		2			
D_3	1 x 1	0.75		1.8			
window							
w_1	11 x 1	1		1.5			
w_2	1 x 1	2		1.5			
w_3	2 x 1	0.75		1.2			
CW	18 x 0	1		1.5			
7. R.B work							
(a) 15 cm R.B lintel over door							
(i) D_1	5	1.5	0.3	0.15	0.3375		$l = 1.2 + 2 \times 0.15 = 1.5$
(ii) D_2	3	1.3	0.3	0.15	0.1755		$l = 1 + 2 \times 0.15 = 1.3$
(iii) D_3	1	1.05	0.2	0.15	0.0315		$l = 0.75 + 2 \times 0.15 = 1.05$

(iv) w_1 (v) w_2 (vi) w_3 (vii) CW (viii) shelves						
R.C.C work (a) Roof of left side bed and drawing combined	1	11.5	6.2	0.12		$l = 0.3+0.3+6+0.3+4+0.3+0.3 = 11.5$ $b = 0.3+0.3+5+0.3+0.3 = 6.2$
(b) Roof of Right side double bed room combined	1	9.6	5.7	0.12		$l = [illegible]+0.3+5+0.3+4+0.3-0.3 = 9.6$ $b = 0.3+4.5+0.3+0.3+0.3 = 5.7$
(c) Roof of Front varandah	1	10	2.6	0.1		$l = 5+4+0.3+0.3+0.3+0.1 = 10$ $b = 2+0.3+0.2+0.1 = 2.6$
(d) Roof of back varandah including bath room	1	10	3.1	0.1		~~Loose~~ $l = 5+4+0.3+0.3+0.3+0.1 = 10$ $b = 0.3+0.2+2.5+0.1 = 3.1$

Brick work

(e) 15 cm R.C.C lintel in Front varandah						
(i) Long wall	1		9.6	0.2	0.15	
(ii) short wall	1		2	0.2	0.15	
(f) 15 cm R.C.C. lintel in back varandah						
(i) Long wall	1		7.2	0.2	0.15	

Rules for plastering and pointing

- No deduction are made for ends of beam, post, rafter etc.
- For small opening upto $0.5\ m^2$ no deduction is made and at the same time no additions are made for soffits, jambs and sill etc.
- For opening exceeding $0.5\ m^2$ but not exceeding $3\ m^2$ deduction is made for one face only. and the other face is allow for jambs, soffits and sill.
- For opening above $3\ m^2$ deduction is made for both faces and the jambs, soffits and sills are taken en to account and added. seperately.

SINGLE ROOM BUILDING WITH FRONT VERANDAH

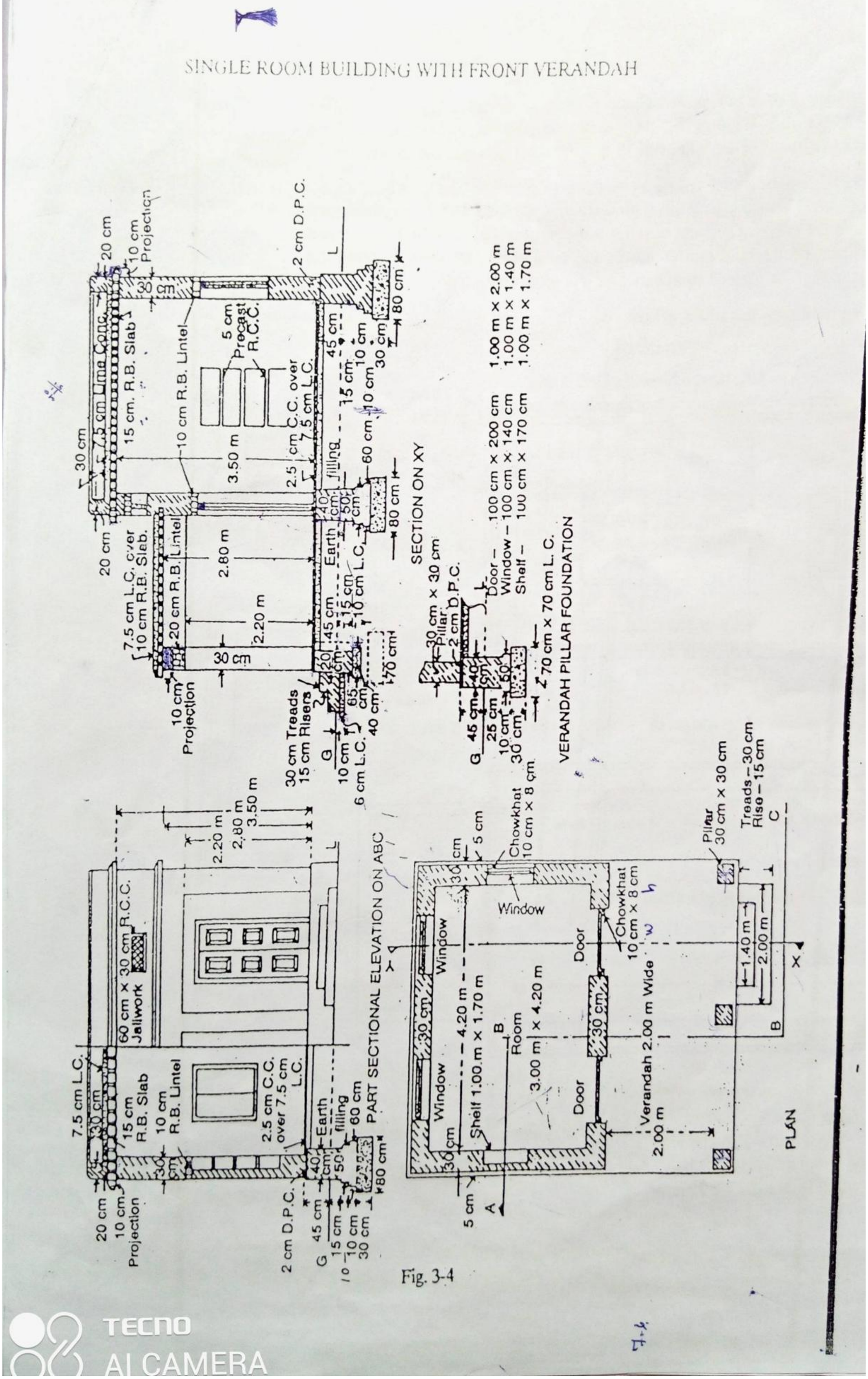


Fig. 3-4

(A) Room :-

(1) Calculation of the center to center length of

long wall $= \frac{0.3}{2} + 4.2 + \frac{0.3}{2} = 4.5$

(2) calculation of the center to center of short

wall $= \frac{0.3}{2} + 3 + \frac{0.3}{2} = 3.3$

B. Varandah :-

(1) center to center length of long wall (center to center of pillar) $= \frac{0.3}{2} + 4.2 + \frac{0.3}{2} = 4.5$

(2) center to center length of short wall (center of main wall ~~center~~ to the center of pillar) $= \frac{0.3}{2} + 2 + \frac{0.3}{2}$

$= 2.3$

SI No	Particulars of Item	No	Length	breadth	Height	Quantity	Explanatory Notes.
1	Earth work in Excavation						
	(a) Room						H = 0.3+0.1+0.1+0.15 = 0.65
	(i) Long wall	2	5.3	0.8	0.65		L = $\frac{0.8}{2}$ + 4.5 + $\frac{0.8}{2}$ = 5.3
	(ii) short wall	2	2.2	0.8	0.65		Ls = 3.3 - $\frac{0.8}{2}$ - $\frac{0.8}{2}$ = 2.2
	(b) Pillar	3	0.7	0.7	0.65		
	(c) Varandah						H = 0.25 + 0.1 + 0.3 = 0.65
	(i) Long wall	1	5.2	0.7	0.65		L = $\frac{0.7}{2}$ + 4.5 + $\frac{0.7}{2}$ = 5.2
	(ii) short wall	2	1.6	0.7	0.65		Ls = 2.3 - $\frac{0.7}{2}$ - $\frac{0.7}{2}$ = 1.6
	(c) varandah						H = 0.1 + 0.15 = 0.25
	(i) Long wall	1	3.1	0.4	0.25		L = 4.5 - $\frac{0.7}{2}$ - $\frac{0.7}{2}$ - 0.7 = 3.1
	(ii) short wall	2	1.55	0.4	0.25		Ls = 2.3 - $\frac{0.8}{2}$ - $\frac{0.7}{2}$ = 1.55
	(d) step	1	2.1	0.65	0.1		L = 2 + (2 × 0.05) = 2.1
							b = 0.3 + 0.3 + 0.05 = 0.65

2.	Lime concrete in Foundation					
	ⓐ Room					$L_1 = \frac{0.8}{2} + 4.5 + \frac{0.8}{2} = 5.3$
	ⓘ long wall	2	5.3	0.8	0.3	$L_2 = 3.3 - \frac{0.8}{2} - \frac{0.8}{2} = 2.5$
	ⓘⓘ short wall	2	2.5	0.8	0.3	
	ⓑ Pillar	3	0.7	0.7	0.3	
	ⓒ Varandah					
	ⓘ long wall	1	4.1	0.4	0.1	$L = 4.5 - \frac{0.4}{2} - 0.4 - \frac{0.4}{2} = 4.1$
	ⓘⓘ short wall	2	1.85	0.4	0.1	$L_2 = 2.3 - \frac{0.4}{2} - \frac{0.5}{2} = 1.85$
	ⓓ step	1	2.1	0.65	0.06	
3.	Brick work and plinth					
	ⓐ Room					
	ⓘ First footing					
	ⓘⓘ long wall	2	5.1	0.6	0.1	$L = 4.572 \times \frac{0.6}{2} = 5.1$
	= short wall	2	2.7	0.6	0.1	$L_2 = 3.3 - 2 \times \frac{0.6}{2} = 2.7$

(ii) 2nd Footing			0.5	0.1		$L = 4.5 + 2 \times \frac{0.5}{2} = 5$
+ long. wall	2	5	0.5	0.1		
short wall	2	2.8				$b = 3.3 - 2 \times \frac{0.5}{2} = 2.8$
(iii) 3rd Footing						
- long wall	2	4.9	0.4	0.5		$L = 4.5 + 2 \times \frac{0.4}{2} = 4.9$
- short wall	2	2.9	0.4	0.5		$b = 3.3 - 2 \times \frac{0.4}{2}$ 2.9
(b) Pellar						
(i) First footing	3	0.5	0.5	0.1		
(ii) 2nd Footing	3	0.5	0.4	0.7		$H = 0.45 + 0.25 = 0.7$
(c) Verandah wall						
i) Long wall	1	3.7	0.2	0.6		$H = 0.45 + 0.15 = 0.6$
(ii) short wall	2	1.9	0.2	0.6		$L = 4.5 - \frac{0.4}{2} - \frac{0.4}{2} - 0.4$
						$= 3.7$
						$b = 2.3 - \frac{0.4}{2} - \frac{0.4}{2}$
						$= 1.9$
(d) Steps						
1st step	1	0.2	0.6	0.19		$H = 0.15 + 0.4 = 0.19$
2nd step	1	0.14	0.3	0.15		

4.	2cm D.P.C work						
	a. Room						$L_L = 4.5 + 2 \times \frac{0.4}{2} = 4.9$
	i - long wall	2	4.9	0.4			
	ii - short wall	2	2.9	0.4			$L_S = 3.3 - 2 \times \frac{0.4}{2} = 2.9$
	b. Pillar	3	0.4	0.4			
	c. Deduction for Door	2	0.1	0.4			
5.	Brick work in Super Structure						
	a. Room						
	i long wall	2	4.8	0.3	3.5		$L = 4.5 + 2 \times \frac{0.3}{2} = 4.8$
	ii short wall	2	3	0.3	3.5		$L_S = 3.3 - 2 \times \frac{0.3}{2} = 3$
	b. Pillar	3	0.3	0.3	2.2		
	c. Verandah wall above lintel						$H = 0.6 - 0.2 = 0.4$
	i. long wall	1	4.8	0.3	0.4		$L = 4.5 + 2 \times \frac{0.3}{2} = 4.8$
	ii. short wall	2	2	0.3	0.4		$L_S = 3.3 - 2 \times \frac{0.3}{2} = 3$

Parapate above roof						$H = \frac{30+7.5}{100}$
i- Long wall	2	4.8	0.2	0.37		$L = 4.5 + 2\times\frac{0.3}{2} = 4.8$
ii- short wall	2	2.4	0.2	0.37		$L_s = 2.3 + 2\times\frac{0.1}{2} = 2.4$
⑤ Deduction for						
i- Door	2	1	0.3	2		
ii- window	3	1	0.3	1.4		
iii- shelve	1	1	0.2	1.7		
iv- Jali work	1	0.6	0.3	0.3		
⑦ Deduction for						
Lintel over						
i- Door	2	1.2	0.3	0.2		
ii- window	3	1.2	0.3	0.2		
iii- shelve	1	1.2	0.3	0.2		
iv- Jali work	2	0.8	0.3	0.3		
⑥ ⓐ Plastering and Pointing wall out side						
ⓐ Plinth height and Plinth Projection 10 cm below ground level	1	21.8		0.6		$H = 0.05 + 0.45 + 0.1 = 0.6$ $L = 2\times4.9 + 2\times6 = 21.8$

below ground level

⑤ out side of room	1	16.8		3.5	L = 2 x (4.8 + 3.6) = 16.8	
⑥ Pillar	~~3~~	1.2		2.2	L = 0.3 x 4 = 1.2	
⑦ out side of verandah wall above pillar	1	9.4		0.6	H = 2.8 - 2.2 = 0.6 L = 4.8 + 2.8 2.3 = 9.4	
⑧ out side of parapate.	1	16.8		0.375	L = 2 (4.8 + 3.6) = 16.8 H = 30 + $\frac{7.5}{100}$ = 0.375	
⑨ Steps					L = 2 + 0.15 + 0.15 = 2.3	
1- First step	1	2.3	0.3			
2- Second step	1	2.6	0.3		L = 1.4 + 4 x 0.15 + 2 x 0.3 = 2.6	
Inside						
⑩ inside of room	1	14.4		3.5	L = 4.2 + 4.2 + 3 + 3 = 14.4	
4.4 3.2 ⑪ verandah wall above pillar	1	8.2		0.6	L = 4.2 + 2 x 2 = 8.2 H = 2.8 - 2.2 = 0.6	
⑫ parcerpate	1	15.2		0.3	L = 2 x 4.4 + 2 x 3.2 = 15.2	

	Deduction for						
	i- Door	2	1		2		
	ii- window	3	1		1.4		
	iii- Jali work	2	0.6		0.3		No deduction shall be made.
7.	wood working frame						
	a. Door	2	5.08	0.1	0.08	0.081	L = 1+ ~~0.08~~(2x2)+ (0.04x2) = 5.08
	b. window	3	4.8	0.1	0.08	0.1152	L = 2x1 + 2x1.4 = 4.8
8.	wood working shutter						
	(a) Door	2	0.87		1.935		L = (100 - 2x8 + 2x1.5)/100 {Repate=1.5} = 0.87
	(b) window	3	0.87				H = (200 - 8 + 1.5)/100 = 1.935
							L = (100 - (2x8) + (2x1.5))/100 = 0.87

	~~Line concrete~~						$H = 100 - (2\times8) - (2\times1.5)$
9.	Lime concrete terasing						
	a. 7.5 L.C terasing over room	1	4.4	3.2			$L = 4.2 + (2\times0.1) = 4.4$ $b = 3 + (2\times0.1) = 3.2$
	b. 7.5 cm L.C terasing	1	5	2.4			$L = 4.8 + (2\times0.1) = 5$ $b = 2 + 0.3 + 0.1 = 2.4$
10.	R.B work						
	a. 10 cm R.B lintel over						
	i- Door	2	1.2	0.3	0.2		
	ii- window	3	1.2	0.3	0.2		
	iii- Shelves	1	1.2	0.3	0.2		
	iv- Jali work	2	0.8	0.3	0.3		
	b. 20 cm RB Lintel over pillar in verandah						
	i- long wall	1	4.8	0.3	0.2		$L = 0.3 + 4.2 + 0.3 = 4.8$
	ii- short wall	2	2	0.3	0.2		

c.	15 cm R.B Slab over. Roof	1	5	3.8	0.15		L = 0.3+4.2+0.3+0.1 +0.1 = 5 b = 0.3+3+0.3+0.1+0 = 3.8
d.	10 cm R.B Slab over. Verandah	1	5	2.5	0.1		L = 0.3+4.2+0.3+0.1 +0.1 = 5 b = 0.1+2+0.3+0.1 = 2.5
11.	R.C.C work						
a.	5cm precast R.C.C slab on shelve	3	1.1	0.2	0.05		l = 1+(2×0.05)

TWO-ROOM BUILDING WITH FRONT VERANDAH

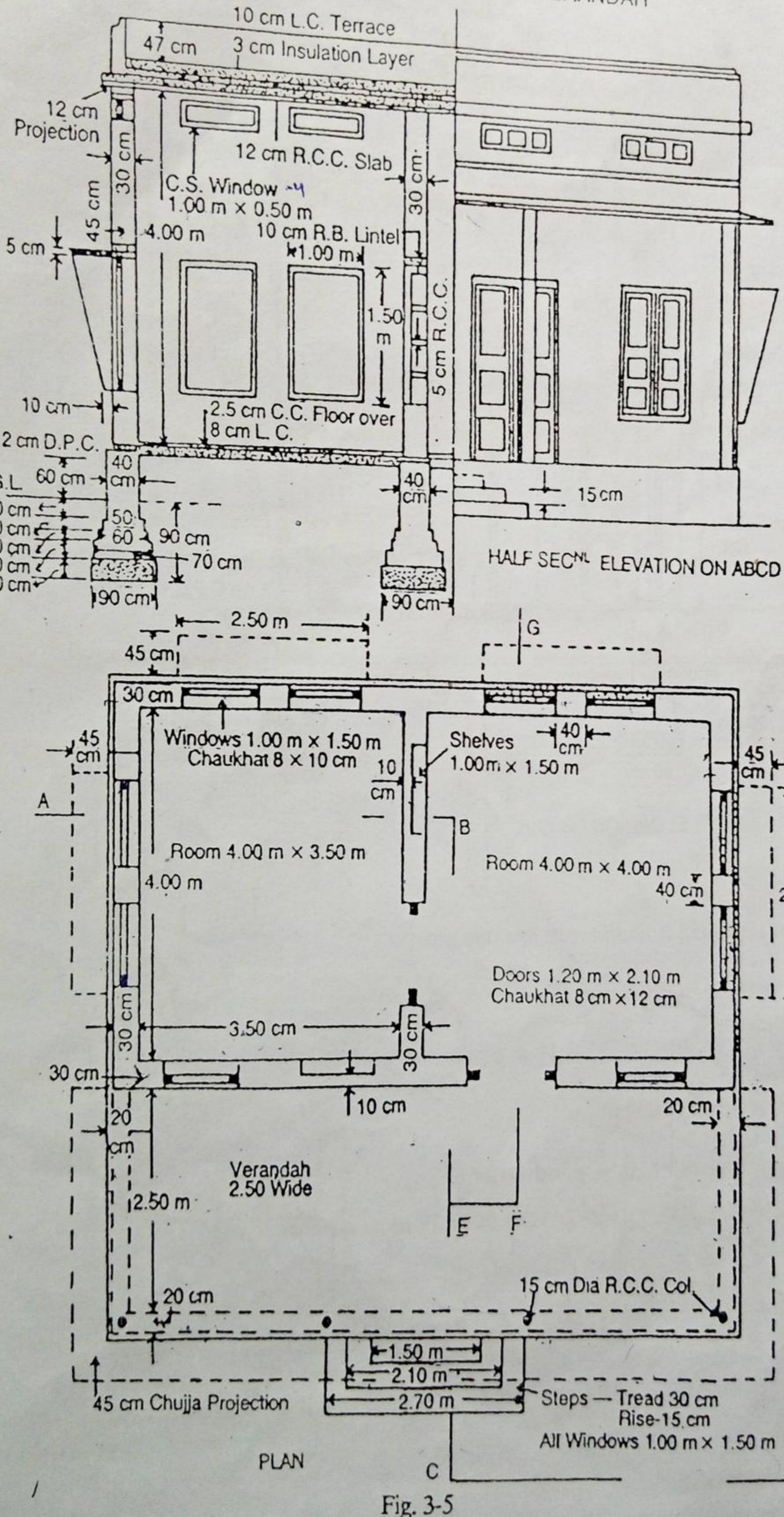


Fig. 3-5

Room

center to center length of long wall

$$= \frac{0.3}{2} + 3.5 + 0.3 + 4 + \frac{0.3}{2} = 8.1$$

center to center length of short wall

$$= \frac{0.3}{2} + 4 + \frac{0.3}{2} = 4.3$$

Front Verandah

center to center length of long wall

$$= \frac{0.2}{2} + 0.1 + 3.5 + 0.3 + 4 + 0.1 + \frac{0.2}{2} = 8.2$$

Center to center Length of short wall

$$= \frac{0.3}{2} + 2.5 + \frac{0.2}{2} = 2.75$$

Item no	Particulars of Item	NO	Length	breadth	height	Quantity	Explanatory note.
1.	Earth work on excavation						H = 0.3 + 0.2 + 0.1 + 0.1 + 0.2
	a. Room						
	- long wall	2	9	0.9	0.9		L = 8.1 + 2 × 0.9/2 = 9
	- short wall	3	3.4	0.9	0.9		L = 4.3 − 2 × 0.9/2 = 3.4
	b. verandah						
	- long wall	1	8.9	0.7	0.9		H = 0.3 + 0.2 + 0.1 + 0.3 = 0.9
	- short wall	2	1.95	0.7	0.9		L = 8.2 + 2 × 0.7/2 = 8.9
	c. step	1	2.9	1	0.15		L = 2.75 − 0.9/2 − 0.7/2 = 1.95
							L = 2.7 + 2 × 0.1
2.	Lime concrete in foundation						
	a. Room						
	- long wall	2	9	0.9	0.3		
	- short wall	3	3.4	0.9	0.3		
	b Verandah						LL
	- long wall	1	8.9	0.7	0.3		
	- Short wall	2	1.95	0.7	0.3		

c. step	1	2.9	1	0.15		
3 Brick work in foundation and plinth						
a. Room						
i First footing						
- long wall	2	8.8	0.7	0.2		$L_L = 8.1 + 2\times\frac{0.7}{2} = 8.8$
- short wall	3	3.6	0.7	0.2		$L_S = 4.3 - 2\times\frac{0.7}{2} = 3.6$
ii - 2nd footing						
- long wall	2	8.7	0.6	0.1		$L = 8.1 + 2\times\frac{0.6}{2} = 8.7$
- short wall	3	3.7	0.6	0.1		$L_S = 4.3 - 2\times\frac{0.6}{2} = 3.7$
iii 3rd footing						
- long wall	2	8.6	0.5	0.1		$L = 8.1 + 2\times\frac{0.5}{2} = 8.6$
- short wall	3	3.8	0.5	0.1		$L_S = 4.3 - 2\times\frac{0.5}{2} = 3.8$
iv - 4th footing						
- long wall	2	8.5	0.4	0.8		$L = 8.1 + 2\times\frac{0.4}{2} = 8.5$
- short wall	3	3.9	0.4	0.8		$L_S = 4.3 - 2\times\frac{0.4}{2} = 3.9$

b. Verandah					
a First footing					$L_L = 8.2 + 2 \times \frac{0.5}{2} = 8.7$
- long wall	1		0.5	0.2	
- short wall	2		0.5	0.2	$L_S = 2.75 - \frac{0.5}{2} - \frac{0.7}{2} = 2.15$
b. 2nd footing					
- long wall	1		0.4	0.1	$L = 8.2 + 2 \times \frac{0.4}{2} =$
- short wall	2		0.4	0.1	$L_S = 2.75 - \frac{0.4}{2} - \frac{0.6}{2} =$
c. 3rd footing					
i - long wall	1/2		0.3	0.9	$L = 8.2 + 2 \times \frac{0.3}{2} =$
ii - short wall			0.3	0.9	
= 10 cm height of 3rd footing from bottom	2		0.3	0.1	$L_S = 2.75 - \frac{0.3}{2} - \frac{0.5}{2}$
= 80 cm height above 10 cm height	2		0.3	0.8	$L_S = 2.75 - \frac{0.3}{2} - \frac{0.4}{2}$
c. Step					
- 1st step	1	2.7	0.9	0.15	
- 2nd step	1	2.1	0.6	0.15	
- 3rd step	1	1.5	0.3	0.15	

4.	2 cm D.P.C work						
	a. Room						
	- long wall	2	8.5	0.4			$L_L = 8.1 + 2 \times \frac{0.4}{2} = 8.5$
	- short wall	3	3.9	0.4			$L_S = 4.3 - 2 \times \frac{0.4}{2} = 3.9$
	Deduction for Door	2	1.2	0.4			
5.	Brick work in Superstructure						
	a Room						
	- long wall	2	8.4	0.3	4		$L = 8.1 + 2 \times \frac{0.3}{2} = 8.4$
	- short wall	3	4	0.3	4		$L_S = 4.3 - 2 \times \frac{0.3}{2} = 4$
	b verandah wall above lintel.						
	- long wall	1	8.4	0.2	0.3		$L = 8.1 + 2 \times \frac{0.2}{2} = 8.4$
	- short wall	2	2.5	0.2	0.3		$L_S = 4.3 - 2 \times \frac{0.2}{2} = 2.5$

Parapate over room						
- long wall	2	8.4	0.2	0.6		H = 0.47 + 0.1 + 0.3 = 0.6
- short wall	2	4.2	0.2	0.6		L = 0.3 + 3.5 + 0.3 + 4 + 0.3 = 8.4
Parapate over varandah						
- long wall	1	8.4	0.2	0.4		
- short wall	2	2.5	0.2	0.4		
Deduction						
- DOOR	2	1.2	0.3	2.1		
- window	10	1	0.3	1.5		
- C.S window	11	1	0.3	0.5		
- shelves	2	1	0.2	1.5		
Deduction for lintel over.						
- DOOR	2	1.4	0.3	0.1		D = 1.2 + 0.1 + 0.1 = 1.4
- window	10	1.2	0.3	0.1		w = 1 + 0.1 + 0.1 = 1.2
- shelves	2	1.2	0.3	0.1		S = 1 + 2 × 0.1 = 1.2
- C.S window.	11	1.2	0.3	0.1		C.S = 1 + 2 × 0.1 = 0.2

4.	Plastering work out side					
	a. Plinth, heigh, plinth projection, including 10cm below ground leble.	1	31.8		0.75	L = 2x8.5 + 2x7.4 = 31.8 H = 0.05 + 0.6 + 0.1 = 0.75
	b. out side of double room combined.	1	26		4	- only wall L = 2x(8.4 + 4.6)
	c. out side of varandah wall	1	13.8		0.6	L = 8.4 + 2x2.7 = 13.8 H = 3 - 2.4 = 0.6
	d. outer side of parcapate					
	① Over room	1	26		0.6	L = (2x8.4) + (2x4.6)
	② Owere varandah	1	13.8		0.4	L = 2x(2.5 + 0.2) + 8.4

e. Steps						
- 1st step	1	3	0.3	~~0.15~~		L = 2.7 + (2 × 0.15) = 3
- 2nd step	1	3.3	0.3	~~0.15~~		L = 2.7 + (4 × 0.15) = 3.3
- 3rd step	1	3.6	0.3	~~0.15~~		L = 2.7 + (6 × 0.15) = 3.6
Inside						
f. Inside of left side room 1	1	15		4		L = 2 x (3.5 + 4) = 15
g. Right side room.	1	16		4		L = 2x (4 + 4) = 16
h. Inside of varandah wall	1	13		0.6		L = 8 + (2 x 2.5) = 13 H = 3 - 2.4 = 0.6
i. Inside of parapet.						
i- over room	1	24.4		0.47		L = (2 x 8) + (2 x 4.2) = 24.4
ii- over varandah	1	13		0.27		L = 8 + (2 x 2.5)
j. Plastering of Chajja (window)						
(i) Top chajja	4x2	2.5	0.45			

	(Top, bottom)						
(ii)	Bottom chajja (Top, bottom)	4×2	2.5	0.1			
(iii)	Side chajja (~~Top~~ inner, outer, ~~bottom~~)	4×4		0.275	1.5		$b = \frac{0.45+0.1}{2} =$
K.	Chajja (Verandah)						
	i- Front chajja (Top and bottom)	1×2	9.3	0.45			$L = 8.4+(2\times 0.45)$
	ii- Side chajja	2×2	2.7	0.45			
L.	Deduction For						
	i- Door	2×1	1.2		2.1		Deduction is made for 1 face only.
	ii- window	10×1	1		1.5		"
	iii- C.S window	11×0	1		0.5		no deduction is made.
M.	Wood working						
	1- Door	2	5.4	0.12	0.8		$L = 1.2+2.1+2.1+0.04+0.04$
	2- window	10	5	0.1	0.8		$L = 2\times1+2\times1.5$

wood working shutter					
- DOOR	2	1.07	2.035		$L = 1.2 - 2(0.08) + 2\left(\frac{1.5}{100}\right)$ $= 1.07$
+ window	10	0.87	1.37		$H = 2.1 - \left(0.08 + \frac{1.5}{100}\right)$ $= 2.035$
					$L = 1 - 2(0.08) + 2\left(\frac{1.5}{100}\right)$ $= 0.87$
					$H = 1.5 - 2 \times 0.08 + 2 \times \left(\frac{1.5}{100}\right)$ $= 1.37$

Superstructure. — Wall shall be of first class brickwork in lime mortar. Roof shall be of lime concrete terracing over R.C.C slab. Window chowkhat shall be of sal wood, and shutters shall be 4 cm thick battenes of shisham wood. Gate will be of 20 B.W.G. sheet iron in angle iron frame.

Finishing. — Floor of garage room shall be 2.5 cm c.c. over 7.5 cm L.C. and floor of approach ramp shall be of 4 cm c.c. over 7.5 cm L.C. Walls shall be 12 mm plastered with 1 : 6 cement local sand mortar. Ceiling and the exposed surfaces of outer projections of slab shall be 6 mm cement plastered with 1 : 3 cement coarse sand mortar. Inside and outside shall be white washed three coats. Windows and gate shall be painted two coats over one coat of priming.

Calculate also the plinth area rate of the garage.

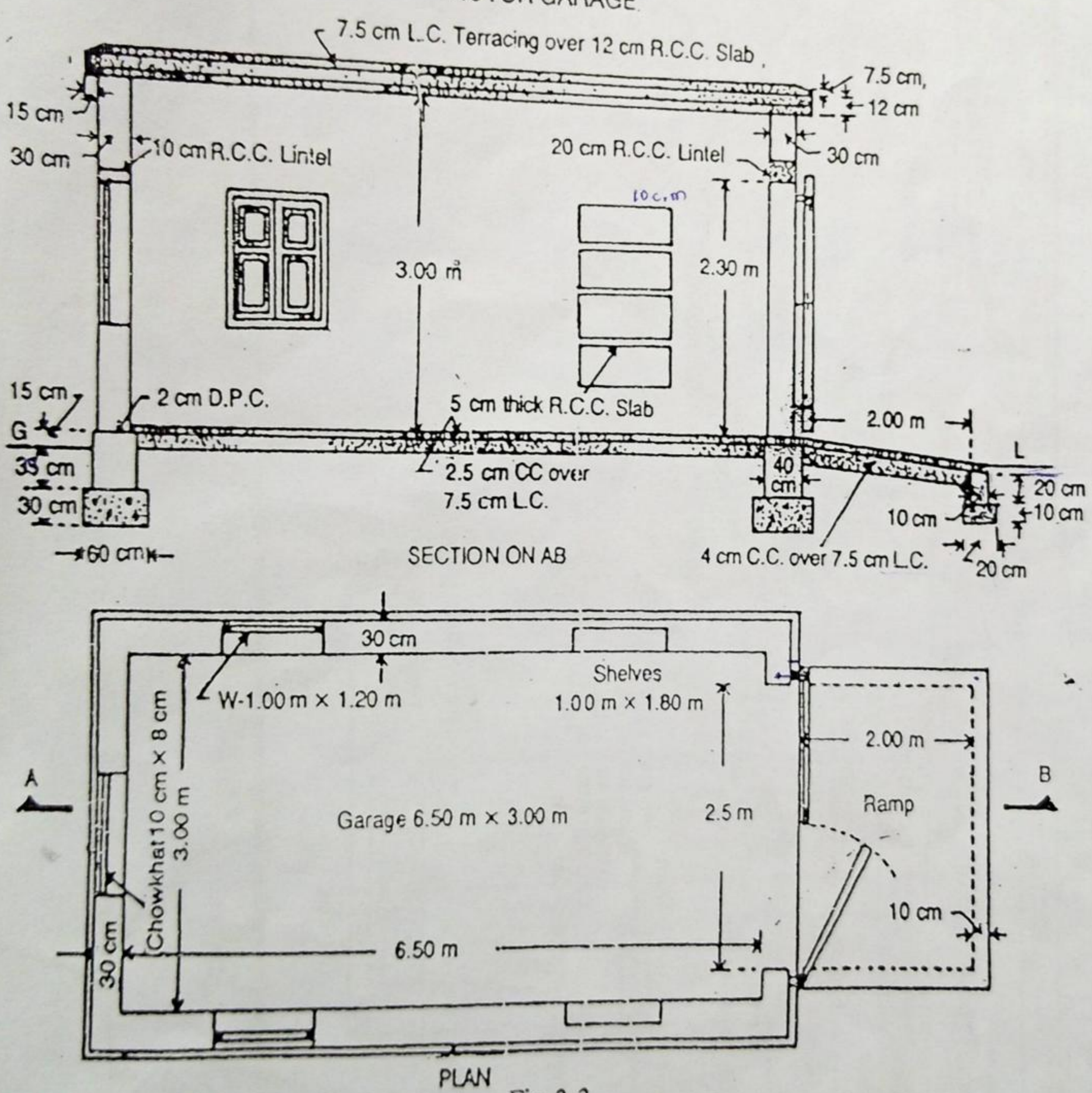


Fig. 3-3

Motor Garage -- Long wall c. to c. length = 6.50 + 0.30 = 6.80 m, and short wall c. to c. length = 3.00 + 0.30 = 3.30 m.

Approach Ramp — Front wall c. to c. length = 2.50 + 0.10 = 2.60 m, and side walls c. to c. length = 2.00 + .20 + .05 = 2.25 m.

03.01.22

TECHNO AI CAMERA

calculation of center to center length :-

a - Garage

center to center length of longwall =

$$\frac{0.3}{2} + 6.5 + \frac{0.3}{2} = 6.8$$

center to center length of short wall =

$$\frac{0.3}{2} + 3 + \frac{0.3}{2} = 3.3$$

b. Ramp

Center to center length of long wall =

$$\frac{0.1}{2} + 2.5 + \frac{0.1}{2} = 2.6$$

center to center length of short wall =

(Plinth Projection)

$$\frac{0.3}{2} + 0.05 + 2 + \frac{0.1}{2} = 2.25$$

Item No	Particulars of Item	NO	Length	Breadth	Height	Quantity	Explanatory Note.
1.	Earth work in excavation						H = 0.3 + 0.35 = 0.65
	a. Garage						L = $\frac{0.6}{2}$ + 6.8 + $\frac{0.6}{2}$ = 7.4
	i - long wall	2	7.4	0.6	0.65		
	ii - short wall	2	2.7	0.6	0.65		L = $\frac{0.6}{2}$ - 3.3 - $\frac{0.6}{2}$ = 2.7
	b. Ramp						H = 0.1 + 0.2 + 0.04 = 0.34
	i - long wall	1	2.8	0.2	0.34		L = 2.6 + 2 × $\frac{0.2}{2}$
	ii - short wall	2	1.85	0.2	0.34		= 2.8
							L = 2.25 - $\frac{0.6}{2}$ - $\frac{0.2}{2}$
							= 1.85
2.	Cement concrete in foundation						
	a. Garage						
	i - long wall	2	7.4	0.6	0.3		L = 6.8 + 2 × $\frac{0.6}{2}$ = 7.4
	ii - short wall	2	2.4	0.6	0.3		L = 3.3 - 2 × $\frac{0.6}{2}$ = 2.7
	b Ramp						
	i - long wall	1	2.8	0.2	0.1		L = 2.6 + 2 × $\frac{0.2}{2}$ = 2.8
	ii - short wall	2	1.95	0.2	0.1		L = 2.25 - $\frac{0.6}{2}$ - $\frac{0.2}{2}$
							= 1.95

3.	Brick work in foundation in plinth						$H = 0.35 + 0.45 = 0.5$
	a. Garage						
	- long wall	2	7.2	0.4	0.5		$L = 6.8 + 2 \times \frac{0.4}{2} = 7.2$
	- short wall	2	2.9	0.4	0.5		$L = 3.3 - 2 \times \frac{0.4}{2} = 2.9$
	b. Ramp						
	- long wall	1	2.7	0.1	0.2		$L = 2.6 + 2 \times \frac{0.1}{2} = 2.7$
	- short wall	2	2	0.1	0.2		$L = 2.25 - \frac{0.4}{2} - \frac{0.1}{2} = 2$
4.	2cm D.P.C						
	a. Garage						
	- long wall	2	7.2	0.4			$L = \frac{0.4}{2} \times 2 + 6.8 = 7.2$
	- short wall	2	2.9	0.4			$L = 3.3 - 2 \times \frac{0.4}{2} = 2.9$
	b. Deduction for gate	1	2.5	0.4			

5. Brick work in super structure

a. Garage

i. long wall	2	7.1	0.3	~~0.3~~ 3	$L_1 = 6.8 + 2 \times \frac{0.3}{2} = 7.1$
ii - short wall	2	3	0.3	3	$L_3 = 3.3 - 2 \times \frac{0.3}{2} = 3$

b. Deduction for

i - Gate	1	2.5	0.3	2.3	
ii - window	3	1	0.3	1.2	
iii - shelve	2	1	0.2	1.8	

C. Deduction for lintel over

i- Gate	1	2.9	0.3	0.2	$L = 2.5 + 0.2 + 0.2 = 2.9$
ii - window	3	1.2	0.3	0.1	$L = 1 + 0.1 + 0.1 = 1.2$
iii - shelves	2	1.2	0.3	0.1	

6. **Plastering**

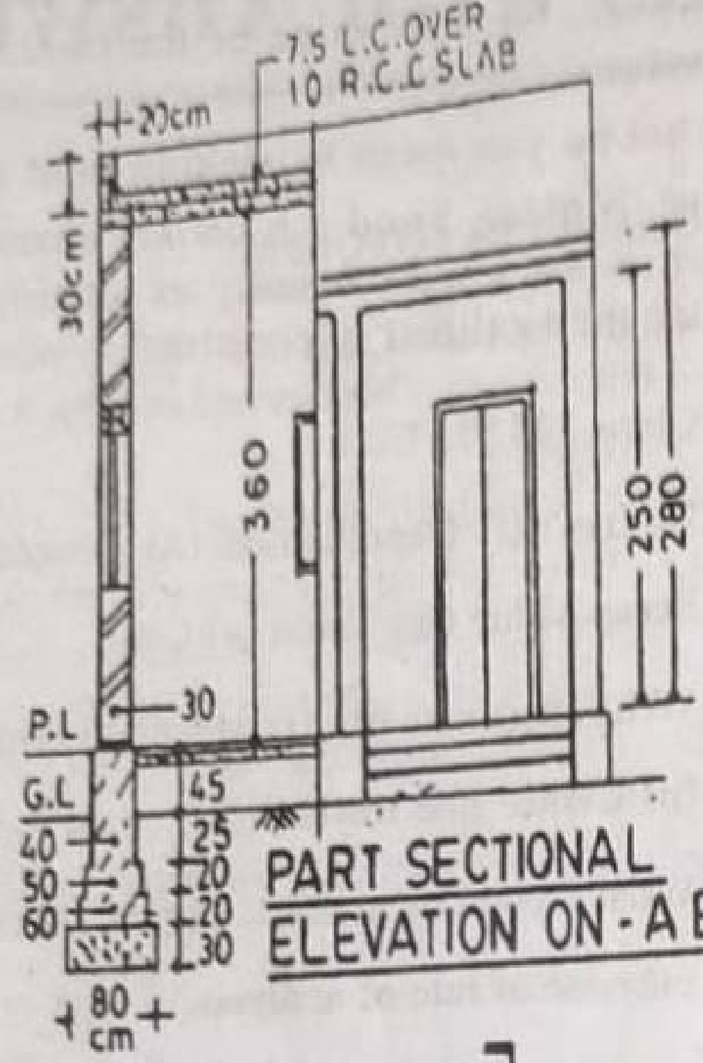
Out side

① Plinth height including plinth projection and

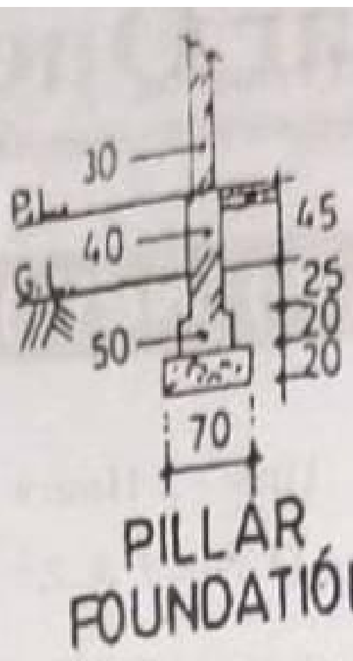
$H_D = 0.15 + 0.05 + 0.1 = 0.3$

10 cm below ground level	1	19.1		0.3		L = 2(3.7+7.2) = 21.8 21.8 − 2.7 = 19.1
(ii) Out side of garage	1	21.4		3		L = 2(7.1+3.6) = 21.4
Inside						
i Inside of garage	1	19		3		L = 2×(6.5+3) = 19
(iii) Deduction for						
- gate	1×2	2.5		2.3		Deduction is made for 2 faces only
- window	3×1	1		1.2		Deduction is made for 1 face only.
7. R.C.C work						
a. 12 cm R.C.C slab over garage	1	7.4	3.9	0.12		L = 6.5+0.3+0.3+0.15+0.15 b = 3+0.3+0.3+0.15+0.15
b. 10 cm R.C.C lintel over						
a- window	3	1.2	0.3	0.1		L = 1+0.1+0.1
b. shelve	2	1.2	0.3	0.1		
c. 20 cm R.C.C lintel over gate	1	2.9	0.3	0.2		L = 2.5+0.2+0.2

D.	5cm R.C.C ~~lintel~~ slab in shelve	2x 3	1	0.2	0.05		L = 1+0.05+0.05
8.	wood working in frame - window	3	4.4	0.1	0.08		L = 2x(1+1.2)
9.	wood working in shutter. - window	3	0.87				L = 1 - 2(0.08)+2(0.015) b = 1.2 -(2x0.08)+(2x0.015)



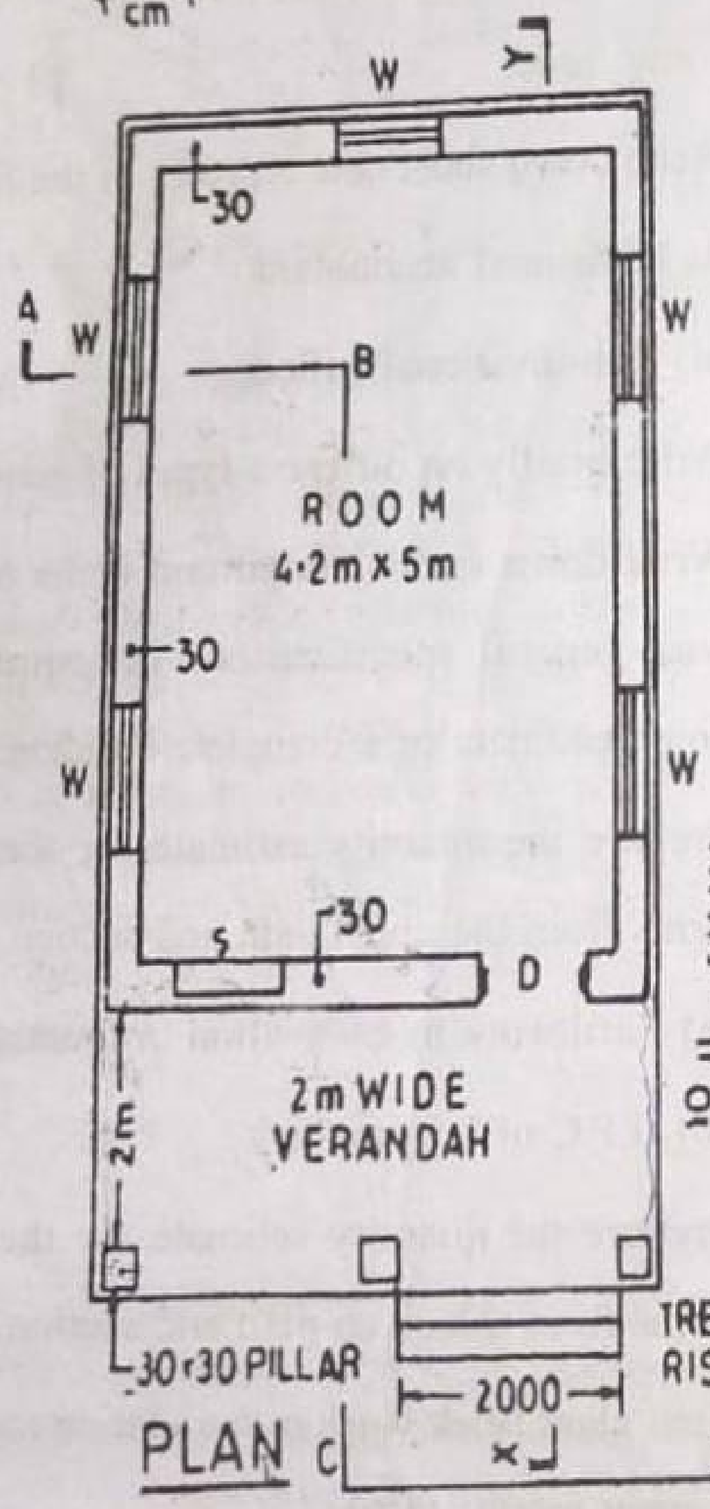
PART SECTIONAL
ELEVATION ON - ABCD

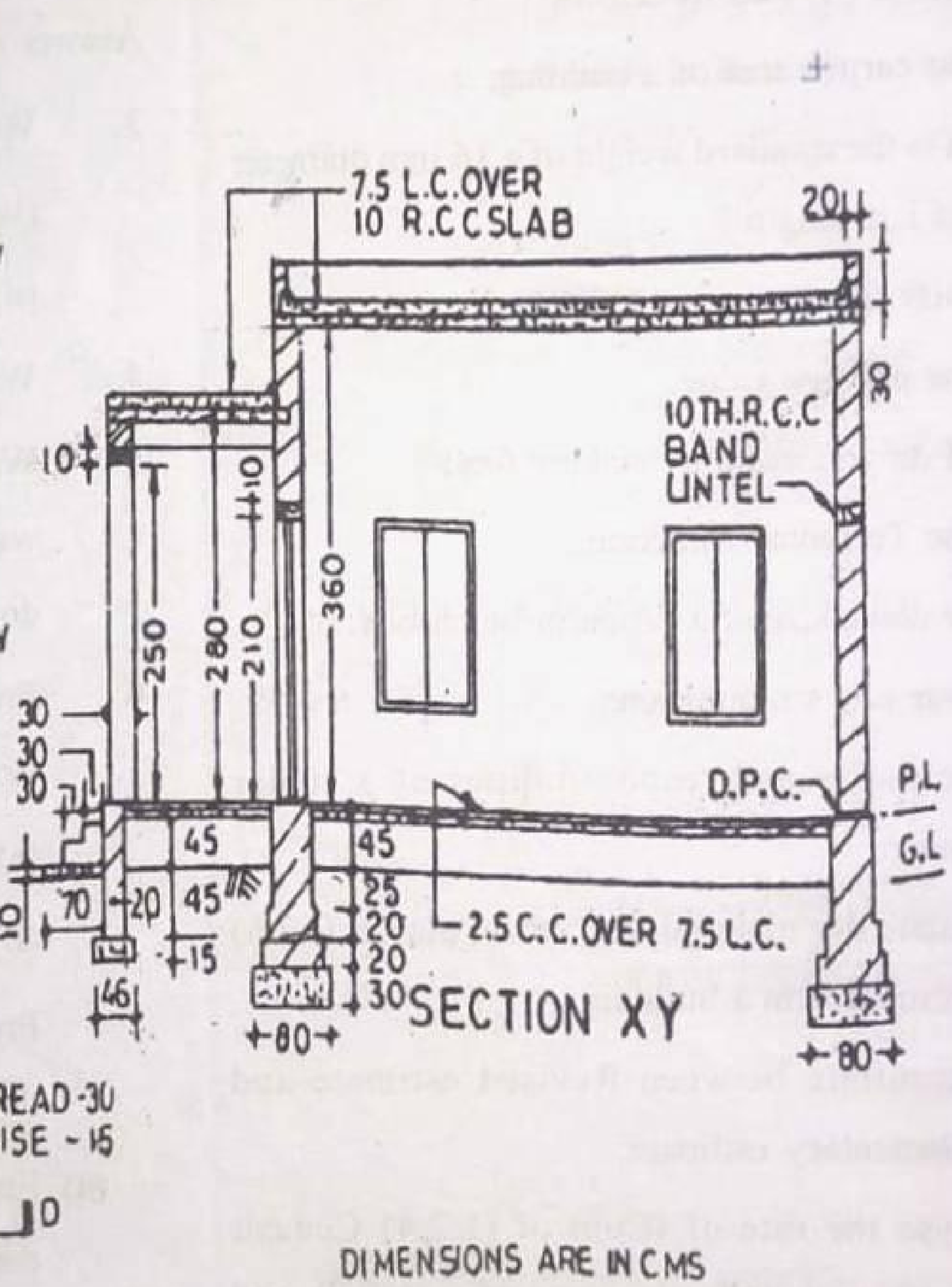


PILLAR
FOUNDATION

SCHEDULE

DOOR D = 110×210
WINDOW W = 90×190
SHELF S = 90×150





SECTION XY

DIMENSIONS ARE IN CMS

Previous Year Q. 2019

Calculation of center to center length

a Room

Center to center length of long wall

$$= \frac{0.3}{2} + 5 + \frac{0.3}{2} = 5.3$$

Center to center length of short wall

$$= \frac{0.3}{2} + 4.2 + \frac{0.3}{2} = 4.5$$

b. Verandah (Pillar)

center to center length of long wall (Pillars)

$$= \frac{0.3}{2} + 4.2 + \frac{0.3}{2} = 4.5$$

center to center length of short wall (Pillar to wall)

$$= \frac{0.3}{2} + 2 + \frac{0.3}{2} = 2.3$$

Item No	Particulars of Item	No	length	breadth	height	Quantity	Explanatory Note
1.	Earth work in excavation						
	a. Room						H = 0.3+0.2+0.2+0.25=0.95
	- long wall	2	6.1	0.8	0.95		L= 5.3+ 0.8/2 + 0.8/2 = 6.1
	-short wall	2	3.1	0.8	0.95		L= 4.5 - 2x 0.8/2 = 3.7
	b. Pillar	3	0.7	0.7	0.65		H= 0.4+0.25 = 0.65
	c. Verandah						
	- long wall	1	3.1	0.4	0.6		H = 0.45+0.15= 0.6
	- short wall	2	1.55	0.4	0.6		L= 4.5 - 0.7/2 - 0.7 - 0.7/2 = 3.1
	d. step	1	2.2	0.7	0.1		Ls = 2.3 - 0.8/2 - 0.7/2 = 1.55
							l = 2+0.1+0.1
							b= 0.3+0.3+0.1
2.	Lime concrete in foundation						
	a. Room						
	- long wall	2	6.1	0.8	0.3		L= 5.3+2x 0.8/2 = 6.1
	- short wall	2	3.7	0.8	0.3		Ls = 4.5 - 2x 0.8/2 = 3.7

	b. Pillar	3	0.7	0.7	0.2		
	c. vereandah						
	- long wall	1		0.4	0.15		$L_L = 4.5 - 2\times\frac{0.7}{2} - 0.7 = 3.1$
	- short wall	2		0.4	0.15		$L_S = 2.3 - \frac{0.7}{2} - \frac{0.6}{2} = 1.65$
	d. step	1	2.2	0.7	0.1		
3	Brick work in foeendatin and plinth						
	a - Room						
	i - first footing						
	- long wall	2	5.9	0.6	0.2		$L_L = 5.3 + 2\times\frac{0.6}{2} = 5.9$
	- short wall	2	3.9	0.6	0.2		$L_S = 4.5 - 2\times\frac{0.6}{2} = 3.9$
	ii 2nd footing						
	- long wall	2	5.8	0.5	0.2		$L_L = 5.3 + 2\times\frac{0.5}{2} =$
	- short wall	2		0.5	0.2		$L_S = 4.5 - 2\times\frac{0.5}{2} =$
	iii - 3rd footing						$H = 0.25 + 0.45 = 0.7$
	- long wall	2		0.4	0.7		$L_L = 5.3 + 2\times\frac{0.4}{2} =$
	- short wall	2		0.4	0.7		$L_S = 4.5 - 2\times\frac{0.4}{2} =$

5. Pillar					$H = 0.45 + 0.25 = 0.7$
- first footing	3	0.5	0.5	0.7	
- 2nd footing	3	0.4	0.4	0.7	$H = 0.45 + 0.45 = 0.9$
c verandah	1		0.2	0.9	
1- 1st 20cm height from bottom					
- long wall	1	3.5	0.2	0.2	$L = 4.5 - \frac{0.5}{2} \times 2 - 0.5 = 3.5$
- short wall	2	1.8	0.2	0.2	$L = 2.3 - \frac{0.5}{2} - \frac{0.5}{2} = 1.8$
ii 2nd 70 cm height bellow plinth level					
- long wall	1	3.7	0.2	0.7	$L = 4.5 - \frac{0.4}{2} \times 2 - 0.4 = 3.7$
- short wall	2	1.9	0.2	0.7	$L = 2.3 - \frac{0.4}{2} - \frac{0.4}{2} = 1.9$
d. step					
- First step	1	2	0.6	0.15	
- 2nd step	1	2	0.3	0.15	

	e. D.P.C work						
	a. Room						
	- long wall	2	5.7	0.4			$L = 5.3 + 2 \times \frac{0.4}{2} = 5.7$
	- Short wall	2	4.1	0.4			$L = 4.5 - 2 \times \frac{0.4}{2} = 4.1$
	b. Pillar	3	0.4	0.4			
	c. Deduction for door.	1	1.1	0.4			
4.	Brick work in Super structure						
	a Room						
	- long wall	2	5.6	0.3	3.6		$L = 5.3 + 2 \times \frac{0.3}{2} = 5.6$
	- short wall	2	4.2	0.3	3.6		$L = 4.5 - 2 \times \frac{0.3}{2} = 4.2$
	b. Pillar	3	0.3	0.3	2.5		
	C. Verandah wall above lintel.						$H = 2.8 - 2.5 - 0.1 = 0.2$
	- long wall	1	4.8	0.3	0.2		$L = 4.5 + 2 \times \frac{0.3}{2} = 4.8$
	- short wall	2	2	0.3	0.2		$L = 2.3 - 2 \times \frac{0.3}{2} = 2$

4- Parapet around the room						
- long wall	2	5.6	0.2	0.3		$L_l = 5 + 0.3 + 0.3 = 5.6$
- short wall	2	4.4	0.2	0.3		$L_s = 4.2 + 2 \times 0.1 = 4.4$

Imporetant Note :-

- The drey volume of 1m3 of cement concreete = 1.5 m3

- Brick worek -(both superi. structuree and sub structuree)

Standard size of 1 breick = 190 cm x 9 cm x 9 cm

Nominal size of 1 breick = 20 cm x 10cm x 10 cm

In breick worek volume of mortaer = Total volume of breick work - volume(~~quantity~~ of breicks

No of breicks present in 1 m3 of breick work =

= 500

- wet volume of mortaer is increasing 15% for freog filling, breick bonding coarse, westage etc.

Drey volume of mortaer = wet volume + 1/3 of wet volume

3. Plastereing :- volume of plastereing = Areea of plastereing x thickness of plastereing

- wet volume of mortaer is increase 20%. for westage and joint filling etc.
- Drey volume of mortaer = wet volume + 1/3rd of wet volume

4. D.P.C -: a. Moretaer D.P.C = cement + sand + ~~Dam~~ damp proofing materical

- wet volume of D.P.C = Area of D.P.C x thickness of D.P.C

- Dry volume of D.P.C = wet volume + 1/3rd of wet volume.

- D.P.C material (sealing material) = 2% or 1% of weight of cement (given in question)

5. Concreete D.P.C :- wet volume of D.P.C = Area of D.P.C x thickness of D.P.C

- Dry volume of D.P.C = 1.54x wet of volume.

1 bag of cement = 50kg = $0.034 m^3$

1 m3 of cement = $\frac{1440}{50}$ kg = 29 bag

6. volume of rein forcement for horizontal streeteere like beam, slab, chajja = 2% of total volume of streeteere

7. volume of reinforcement for vertical streeteere like column = 1% of total volume of streeteere.

1. Calculate the quantity of drey matericel required for 5m3 of cement concrete (1:2:4).

4. Data given

volume of ~~drey~~ wet concrete = $5m^3$

Preperetion of concrete = 1:2:4

we knew drey volume of 1m3 of concrete

= 1.54 m3

So drey volume of concrete = 5 x 1.54 = 7.7 m3

Let volume of cement = x

" " sand = 2x

" " aggregate = 4x

$\Rightarrow x + 2x + 4x = 7.7$

$\Rightarrow 7x = 7.7$

$\Rightarrow x = \frac{7.7}{7} = 1.1\ m^3$

So volume of cement = x = $1.1\ m^3 = 1.1 \times 1440\ kg$

~~sand = 2x = 2 x 1.1~~ = 1584kg

$= \frac{1584}{50}$ bag

= 32 bag

sand = 2x = 2 x 1.1 = 2.2 m3

aggregeate = 4x = 4 x 1.1 = 4.4 m3

:. Calculate the quantity of dry material required for 6m3 of brick work (1:2) (c.s)

Data given

Quantity of brick work = 6m3

Proportion of mortar = 1:2

we know No of bricks present in 1m3 of brick work = 500

so here total no of bricks = 6 × 500 = 3000 No

volume of 1 brick = 0.19 × 0.09 × 0.09

= 1.539 × 10^-3 m3

Total volume of bricks = 3000 × 1.539 × 10^-3

= 4.617 m3

wet volume of mortar = 6 - 4.617 = 1.383 m3

Increasing 15% for fraog filling, wastage and brick bonding coarse, wet volume of mortar = $1.383 + \frac{15}{100} \times 1.383$

= 1.59045

Dry volume of mortar = $1.59045 + \frac{1}{3} \times 1.59045$

= 2.1206

Let volume of cement = x

sand = 2x

$\Rightarrow x + 2x = 2.1206$

$\Rightarrow 3x = 2.1206$

$\Rightarrow x = \frac{2.1206}{3} = 0.706$

so volume of cement = x 0.706

sand = $2x$ = 2×0.706

= 1.4137 m^3

Cement = x = 0.706×1440 kg

= $\frac{1016.64}{50}$ bag

= 21 bag

③ calculate the quantity of dry materials required for 200m^2 of 12mm thick cement plastered. (1:4)

Soln

Data given

Area of plastering = 200m^2

Thickness of plastering = 12mm = 0.12m

Proportion of mortare = 1:4

volume of plastering = Area of plastering × thickness of plastering

= 200 × 0.12

= 2.4 m^3

Increase 20% for wastage and joint filling

= $2.4 + \frac{20}{100} \times 2.4$

= 2.88 m^3

Dry volume mortare = $2.88 + \frac{1}{3} \times 2.88$

= 3.84 m^3

Let the volume of cement = x

sand = $4x$

$\rightarrow \quad x + 4x = 3.84$

$\rightarrow \quad 5x = 3.84$

$\Rightarrow \quad x = \frac{3.84}{5} = 0.768\ m^3$

volume of cement $x = 0.768\ m^3$

$= 0.768 \times 1440$ kg

$= \frac{1105.92}{50}$ bags

$= 23$ bags

volume of Sand $4x = 4 \times 0.768 = 3.072\ m^3$

(4) Calculate the quantity of dry material required for $150m^2$ of 2 cm D.P.C (1:3)

Sol^n

Data given

Area of D.P.C $= 150m^2$

thickness of D.P.C $= 2m = 0.02mm$

volume of D.P.C $= 150 \times 0.02$

$= 3\ m^3$

Dry volume mortar $= 3 + \frac{1}{3} \times 3$

$= 4\ m^3$

Let the volume of cement $= x$

Sand $= 3x$

$\Rightarrow \quad x + 3x = 4\ m^3$

$\Rightarrow \quad 4x = 4$

$\Rightarrow \quad x = 1\ m^3$

volume of cement $x = 1$

$= 1 \times 1440$ kg

$= \frac{1440}{50}$ bag

$= 29$ bag

volume of sand $= 3x = 3 \times 1 = 3\ m^3$

— Quantity of sealing material @ at the rate 1% of

weight of cement $= \frac{1}{100} \times 1440 = 14.4$ kg

(5) Calculate the quantity of ~~500m²~~ dry materials for $500m^2$ 2.5 cm D.P.C (1:3:6)

A. Given data

Area of D.P.C $= 500\ m^2$

thickness of D.P.C $= 2.5$ cm $= 0.025$ mm

Volume of D.P.C $= 12.5\ m3$

Dry volume of ~~co~~ ~~mortare~~ concrete $= 12.5 \times 1.54$

$= 19.25\ m^3$

let the volume of cement $= x$

sand $= 3x$

aggregate $= 6x$

$\Rightarrow \quad x + 3x + 6x = 19.25$

$\Rightarrow \quad 10x = 19.25$

$\Rightarrow \quad x = \frac{19.25}{10} = 1.925$

volume of cement $x = 1.925$

$= 1.925 \times 1440$ kg

$= \frac{2772}{50}$ bag

$= 56$ bag

sand $3x = 3 \times 1.925 = 5.775\ m^3$

aggreegate $6x = 6 \times 1.925 = 11.55\ m^3$

Quantity of sealing material at the rate 1% of weight of cement $= \frac{1.925}{100} \times 1440$

$= 27.72$ kg.

6. Calculate the quantity of drey materials required for $5\ m^3$ of R.C.C slab (1:2:4)

Data given

~~Area of~~ volume of R.C.C $= 5\ m^3$

Drey volume of concrete $= 5 \times 1.54$

$= 7.7\ m^3$

let volume of cement $= x$

sand $= 2x$

aggregate $= 4x$

$\Rightarrow x + 2x + 4x = 7.7$

$\Rightarrow 7x = 7.7$

$\Rightarrow x = 1.1$

volume of cement $= 1.1$

$= 1.1 \times 1440$ kg

$= 1584$

$= \frac{1584}{50}$ bag $= 32$ bag

sand $= 2x = 2 \times 1.1 = 2.2\ m^3$

aggregate $= 4x = 4 \times 1 = 1 = 4.4\ m^3$

Quantity of reinforcement at the reate @2% o

total volume $= \frac{2}{100} \times 5 = 0.1\ m^3$

we know density of steel $= 7850\ kg/m^3$

so total wt. of reinforcement $= 0.1\ m^3 \times$

$7850 = 785$

$= 7.85$

ANALYSIS OF RATES, RATES OF MATERIALS AND LABOUR CURRENT INLUCKNOW DURING 2016

Particulars	Rate at Site
Materials :-	
① Brick II class	Rs-8000/- %oo Nos
② Brick II class	Rs-7000/- %oo Nos
③ Brick Ballast (morca) 40mm gauge	Rs-1000/- Per cu.m
④ Brick ballast 25mm	Rs:-1100/- Per cu.m
⑤ stone ballast 40mm	Rs-2400/- Per cu.m
⑥ stone ballast 20mm	Rs-2400/- Per cu.m
⑦ stone ballast 12 mm	Rs-1900/- Per cu.m
⑧ stone ballast 8 mm	Rs-1500/- Per cu.m
⑨ cement	Rs-330/- Per bag
⑩ steel	Rs-4200/- Per q
⑪ white orc stone lime (unslaked)	Rs-1000/- Per q cu.m
⑫ white orc stone lime (slaked)	Rs-1000/- Per cu.m
⑬ surkhi	Rs-800/- Per cu.m
⑭ sand fine (local)	Rs-1500/- Per cu.m
⑮ sand coarse (maircang)	Rs-1800/- Per cu.m
⑯ Teak wook	Rs-50000/- Per cu.m
⑰ Shisham wood	Rs-35000/- Per cu.m
⑱ [illegible]	Rs-50000/- Per cu.m

Particulars	Rates
LABOUR	
① Head mason (mistry)	RS. 425/- Per day
② Mason	Rs. 400/- Per day
③ Maz door (Belder)	Rs. 250/- Per day
④ Bay or woman coolie	Rs. 230/- per day
⑤ Bishti	Rs. 230/- Per day
⑥ Carpenter	Rs. 400/- Per day
⑦ Blacksmith	Rs. 375/- Per day
⑧ Painter	Rs. 375/- Per day

NO OF LABOUR

1. Lime concrete in foundation with 40mm gauge brick ballast unit 1 cu.m. (Quantity - $10m^3$)

Labourr :-

Mistri (Head mason)	–	1/2 Nos
Mason	–	1 Nos
Maz door (Belder)	–	12 Nos
Bay or woman coolie	–	12 Nos
Bhisti (waterr-man)	–	2 Nos
Sundries T. and P. etc (misc petty thwings)	–	Lump sum.

2. Cement concrete 1:2:4 - unit 1 cu m. Take 10 cu.m

Labour :- (quantity - 10m3)

Mestri (Head mason) — 1/3 no

Mason — 2 nos

Mazdoor (Beldar) — 12 nos

Bay or women coolie — 20 nos

Bhishti (including curings) - 6 nos

Forems etc. (according to requirement) - Lump-sum.

sundries T. and P. etc. — Lump sum.

3. I class Brick work in foundation and plinth with 20 x 10 x 10 cm (nominal size) Bricks with cement sand mortar 1:6 - unit 1 cu.m Take - 10 cu.m.

Labour :- (Quantity = 10m3)

Mistri (Head mason) — 1/2 no

Mason — 7 nos

Mazdoor (Beldar) - 7nos

Bay or women coolie - 7 nos

Bhishti (waterc man) - 2nos

Sundries .T. and p etc

misc petty things — Lump sum.

4. I class Brick work en superc structure with 20x10x10 Brick with 1:6 cement sand moretare - unit 1 cu.m

Take - 10 cu.m.

Labour :- Quantity ($10 m^3$)

Mistrei (Head mason) - 1/2 no

Mason - 10 nos

Mazdoore (Belder) - 7 nos

Boy are woman coolie - 10 nos

Bhishti - 2 nos

Scaffolding - lump sum

Sundries T. and P etc - Lump sum

5. 12mm Plastering 1:6 - unit 1 sqm. Take 100 sqm.

Labour :-

Mistri (Head mason) - 1/3 no

Mason - 10 nos

Mazdoor (Belder) including

Making of joints - 15 nos

Bhishti including (curing) - 3/4 nos

Scaffolding sundries T. and P. etc - Lumpsum

(7). Calculate the quantity of dry materials required for 200m² of 7.5cm lime terracing (1:1.5:3)
(c.s.a)

Soln

Data given

Area of lime terracing = 200m²

thickness of " = 7.5cm = 0.075

Volume of lime concrete = 200 × 7.5 = 1500 m³
= 15 m³

Dry volume of lime concret
= 15 × 1.54
= 23.1 m³

Let the volume of ~~cement~~ lime = x

Sand = 1.5x

aggregate = 3x

$= x + 1.5x + 3x = 23.1$

$= 5.5x = 23.1$

$= x = \frac{23.1}{5.5} = 4.2\ m^3$

sand $= 1.5x = 1.5 \times 4.2 = 6.3\ m^3$

aggregate $= 3x = 3 \times 4.2 = 4.5\ m^3$

Rate Analysis

The calculation of cost both material and labour is known as reate analysis. ~~steeedule~~

- It is done according to odicha P.W.D schedule of reate.
- The total cost is calculated by multiplying the quantity with unit reate

Purpose of Rate Analysis :-

- To determine the current reate per unit of an item at the locality.
- To determine the variability of rates offered by the contractor.
- To fix up the labour contract reate.
- To know the cost of structure and the amount to be sanctioned.
- To calculate the strength of labour and material required for the project.

27.12.21

(1) Calculate the cost of construction of $15m^3$ of cement concrete in foundation (1:2:4) :

A. Data given

Quantity of cement concrete = $15m^3$

Properetion = 1:2:4

Calculation of drey material ($10m^3$)

Drey volume $10m^3$ of concrete = $1.54 \times 10 = 15.4 m^3$

Let the volume of cement = x

sand = $2x$

aggregeate = $4x$

$\Rightarrow \quad x + 2x + 4x = 15.4$

$\Rightarrow \quad 7x = 15.4$

$\Rightarrow \quad x = \frac{15.4}{7} = 2.2$

cement = x = 2.2

sand = $2x$ = $2 \times 2.2 = 4.4$

aggregate = $4x$ = $4 \times 2.2 = 8.8$

cement = 2.2×1440

= $\frac{3168}{50}$ bag

= 64 bag

Item No	Types of material or Labour	Quantity	Rate	unit	Cost
1	Material				
	Cement	64	330	bag	21120
	Sand	4.4	1500	m^3	6600
	Aggregate	8.8	2400	m^3	21120
2.	Labour				
	Head Mason	$\frac{1}{3}$	425	No	141.66
	Mason	2	400	No	800
	Mazdoor	12	250	No	3000
	Boy or women collies	20	230	No	4600
	Bhesti	6	230	No	1380
	Sundries T & P etc	—	—	—	200
	Forme etc.				150
				Total	59111.67
	adding 1½ % of water charge			Total 65909.506	$59111.67 \times \frac{1.5}{100}$ = 886.67
	adding 10 % as contracter profit				$5914.67 \times \frac{10}{100}$ = 5911.16

cost for $10 m^3$ of cement concrete = ₹5909.50

cost for $1 m^3$ of cement concrete = $\frac{₹5909.50}{10}$

= 590.95

cost FO $15 m^3$ of cement concrete = 590.95 × 15

= 8864.25 Rs

2. Calculate the cost of construction of $200 m^2$ of 12mm cement plaster (1:6)

A

Data given

Quantity of cement plaster = $200 m^2$

Preperation = 1:6

Calculation of drey material = $100 m^2$

• volume of concrete = 1.200 × 0.012

= 1.2m3

Increase 20% = 1.2 + $\frac{20}{100}$ × 1.2 = 1.44 m3

Drey volume mortare = 1.44 + $\frac{1}{3}$ × 1.44

= 1.92 m^3

Let the volume of = x

Sand = 6x

⇒ x + 6x = 1.92

⇒ 7x = 1.92

⇒ x = $\frac{1.92}{7}$ = 0.27

Cement $x = 0.27$

$= 0.27 \times 1440$

$= \frac{388.8}{50}$ bag

$= 8$ bag

Sand $= 6x = 6 \times 0.27 = 1.62\ m^3$

Item NO	Types of material or labour	Quantity	Rate	unit	cost
1.	Material				
	Cement	8	330	bag	2640
	Sand	1.62	1500	m^3	2430
2.	Labour				
	Head mason	1/3	425	Nos	141.66
	Mason	10	400	Nos	4000
	Mazdoor	15	280	No	3750
	~~Joints~~				
	Bhishti including	3/4	230	No	172.5
	scaffolding				200
	sundries				
	T and P etc			Total	13334.16
Adding 1½% as water charge					$13334.16 \times \frac{1.5}{100}$
					$= 200.0124$
Adding 10%					$13334.16 \times \frac{10}{100}$
					~~$= 20.00024$~~
					$= 1333.41$
				Total	~~13554.17~~
					14867.58

cost for 100m³ of cement concrete = 14867.58

cost for 1 m³ of " " = $\frac{14867.58}{100}$

= 148.67

cost for 200m³ of " " = [illegible]

= 148.67 × 200

= 29735.16 /—

29.12.21

1. Calculate the cost of construction of 12m3 of brickwork (1:4) in super structure.

A

Data given

Quantity = 12 m³

Proportion = 1 : 4

Calculation for Dry material (10m³)

~~volume of the cement =~~

we know the no of bricks present in 1m³

= 500

So here no of bricks = 10 × 500 = 5000 Nos

volume of 1 brick = 0.19 × 0.09 × 0.09

= 1.539×10^{-3} m3

Total volume of brick = $5000 \times 1.539 \times 10^{-3}$

= 7.695 m³

wet volume of mortar = 10 - 7.695 = 2.305 m^3

Increase 15% = $2.305 + \frac{15}{100} \times 2.305$

= 2.65075

Dry volume of mortal = $2.\frac{650}{305} + \frac{1}{3} \times 2.\frac{650}{305}$

= 3.53

Let the volume of cement = x

sand = 4x

$\Rightarrow x + 4x = 3.53$

$\Rightarrow 5x = 3.53$

$\Rightarrow x = \frac{3.53}{5} = 0.706$

$= 0.706 \times 1440$

$= \frac{1017.6}{50}$ bag

= 21 bag.

Sand 4x = $4 \times 0.706 = 2.824\ m^3$

= 27145.92

1.	Material				
	cement	21	330		6930
	sand	2.824	1500		4236
	brick	5000	8		40000
2.	Mistri	1/2	425		212.5
	Mason	10	400		4000
	Mazdoor	7	250		1750
	Boy or women	10	230		2300
	Bhishti	2	230		460
	Scaffolding				200
	sundries				200
					60288.5

Adding $1\frac{1}{2}$ as water = $60288.5 \times \frac{1.5}{100} = 904.32$

Adding 10% as contractor profit = $60288.5 \times \frac{10}{100}$ =

= 6028.85

cost for 10 m^3 of cement concrete = 67221.67

" " 1 m^3 " " " = $\frac{67221.67}{10}$

= 6722.167

" " 12 m3 " " " = 6722.167 x 12

= 80666.

② Calculate the cost of construction of 8 m^3 of R.C.C beam (1:2:4)

A Give data

Quantity = 8 m^3

Proportion = (1:2:4)

Dry volume of concret = 10 x 1.54

= 15.4 m^3

let the volume of cement = x

sand = 2x

aggregate = 4x

$\Rightarrow$ $x + 2x + 4x =$ 15.4 m3

$\Rightarrow$ $7x =$ 15.4

$\Rightarrow$ $x = \frac{15.4}{7} =$ 2.2

= 2.2 x 1440

= $\frac{3168}{50}$ bag

= 64 bag

Sand $2x = 2 \times 1.76 = 3.52$

aggregate $4x = 4 \times 1.76 = 7.04$

Quantity of reinforcement @ 2% of total

$$\text{volume} = \frac{2}{100} \times 10 = 0.2\ m^3$$

We know density of scabe $= 7850\ kg/m^3$

so total wt. of reinforcement $= 0.2 \times 7850$

$= 1570\ kg$

$= 15.7q$

Item No	Types of material or labour	Quantity	Rate	Unit	cost
1.	Material				
	Cement	64	330	bag	21120
	Sand	4.4	1500	m^3	6600
	Aggregate	8.8	2400	m^3	21120
	Reinforcement	15.7	4200	q	65940
2.	Labour				
	Mistri	1/3	425		141.66
	Masoon	3	400		1200
	Mazdoor	12	250		3000
	Boy or woman Kelly	20	230		4600
	Bhichti	6	230		1380
	Sundries P and T etc	lumpsum	200		200
	Bending Cranking and binding of				

steel bas in position				
Blacksmith	8	375		3000
Mazdoor	8	250		2000
Lumpsum / Sundries	—	200		200
centering and shuttering				
Timber planks	—			1000
carpainter	10	400		4000
Mazdoor	10	250		2500
Nail	—	100		100
Tand P		200		200
			Total	138301.66

Adding $1\frac{1}{2}$ % as water charge = $138301.66 \times \frac{1.5}{100}$

= 2074.52

Adding 10 % as contractors charge = $138301.66 \times \frac{10}{100}$

= 13830.166

Total cost = 138301.66 + 2074.52 + 13830.166

= 154206.346 m³

Cost of $1 m^3$ of cement plaster = 154206.346 m^2

" " $1 m^3$ " " " = $\frac{154206.346}{10}$

= 15420.6346

cost of $8 m^3$ " " " = 15420.6346 × 8

= 123365.0768.

Valuation

Introduction -: Valuation is the process of estimating or determining the faire price or value of a property such building, other engineering structure etc. The value also depends on supply of demand and purpose for which valuation is required.

- The cost means original cost of constructions. But value means present value.

Different values of a structure :-

The different values of a structure of a structure are as follows.

1. Scrap value
2. Salvage value
3. Market value
4. Book value
5. Assessed value.

Purpose of valuation

- Buying or selling property.
- Taxation
- Rent fixation
- Security of Loans
- Compulsory acquisition

Scrap Value :-

scrap value is the value of dismanted material. For a building when the life is over at the end of its utility period, the dismantled material such as steel, bricks timber will fetch a certain amount which is the scarp value of the building.

The scareap value of a building is about 10 percent of its total cost of construction.

- The cost of dismantling and removal of the rubbish material is deducted from the total receipt from the sale of the useable materials to get the scarp value.

Salvage Value :-

- It is the value at the end of the utility period without being dismantled. A machine after the completion of its usual span of life or when it become uneconomical, may be sold, and one may purchase the same for use for some other purpose. The sale value of a machine is its salvage value. It does not include the cost of removal.
- The ~~scrap~~ salvage value of a RCC structure will be negative as the removal and dismantling is costly.

Asset Value :-

- For the purpose of taxation, a property is assessed for its monetary worth. This ascertained price is known as assessed value.
- In general the assessed value tends to be less than the fair or actual market price of the property.
- This is normally done by govt departments.

Asset Value -:

- For the purpose of taxation, a property is assessed for its monetary worth. This ascertained price is known as assessed value.
- In general the assessed value tends to be less than the fair or actual market price of the property.
- This is normally done by govt. department.

Depreciation :-

- Depreciation is the gradual decrease of usefulness of a property. This may be defined as the decrease or loss in the value of a property due to structural deterioration use, life wear and tear, decay and obsolescence.
- Usually a percentage on depreciation per annum is allowed. The general annual decrease in the value of property is known as annual depreciation.
- Usually the percentage rate of depreciation is less at beginning and gradually increase during later year.

Obsolescence :-

- Obsolescence is the cause due to which depreciation occurs.
- Obsolescence may be due to the reason such as progress in arts, changes in fashion, changes in planning ideal new, inventions, improvement in design techniques.

Method of Valuation :-

The different method used for valuation of a structure are :

- Rental method of valuation
- Direct comparision with the capital value
- valuation based on profit
- valuation based on cost
- Development method of valuation
- Depreciation method of valuation.

ADMINISTRATIVE SET UP OF ENGINEERING ORGANISATION

Duties And Liabilities of Owner :-

- To appoint an engineer and give him power to work on his behalf.
- To intimate the engineer required for the project including his desired time of completion.
- To obtain necessary sanction for his construction from competent authority.
- To give possession of the site to the contractor.
- To make payment to the contractor on production of certified bill from the engineer.
- To take over possession of the completed projects timely from the contractor.
- In case of conflict (problem) with the contractor, he will appoint lawer for defending his side.

DUTIES OF CONTRACTOR -:

- To inspect the site and study soil conditions before tendering. He should investigate the availability, accessibility of electric power, water supply etc.
- he should collect the local rates of material, labour and accordingly prepare the analysis of rates of all the items.
- It is duty and liability of the contractor to follow the labourr act truly.
- The contractor is liable to safeguard his own men and material issued to him.
- The contractor should submit his claims for extra works and submit bills for payment in due time.
- It is the responsibility of contractor to hand over the completed work in sound condition.

Duties of Engineer :-

- To prepare the necessary drawing, specifications and estimate in accordance with the requirement of the owner.
- To check up the soil condition.
- To supervise the work and ensure that the drawing and specifications are faithfully followed.
- To check up the progress of work with passage of time and submit progress report to the owner.
- To check the quality of work, measurment of works done, quantities, rates and pass the bill for payment.
- To notify the owner about the progress of work, if the work progress very slowly.
- To ensure that no damage is being made on any part of the completed work at the time of handing over the same to the owner.

Duties of ~~Executive~~ Engineer :-

- To prepare the necessary drawing, specifications and estimate in accordance with the requirement of the owner.
- To check up the soil ~~owner~~. condition.
- To supervise the work and ensure that the drawing and specifications are faithfully followed.
- To check up the progress of work with passage of time and submit progress report to the owner.
- To check the quality of work, measurement of works done, quantities, rates and pass the bill for payment.
- To notify the owner about the progress of work, if the work progress very slowly.
- To ensure that no damage is being made on any part of the completed work at the time of handling over the same to the owner.

Duties OF Executive Engineer :-

- To organize and supervise the execution of works and to see that they are economically and suitably carried out with specified quality of material.
- To prepare estimate of proposed works through his sub-ordinates and submit the same to the super-intending engineer.
- To invite tenders for works valued under his power.
- To inform the probability of excess of actual over estimated cost of work to his superintending engineer before execution of work.
- To check that the accounts are posted from day to day and that the accountant carries his duty regularly and punctually.
- To prevent ~~any~~ encroachment on govt. lands under his

- To inspect works and checks measurement of at least 10% of works according to the standing rule.

Duties of Assistant Engineer or Sub-divisional Officer:-

- Efficient management and execution of works within his jurisdiction.
- To maintain the initial account records of cash and stores under his charge.
- To ensure all correct account returns and submit it punctually to the divisional officer.
- To check a certain percentage (at least 25%) of measurements recorded in the measurement book.
- To keep a control over the expenditure against the sanctioned estimate and to report monthly progress work.
- to check stores at least twice a year and tools and plants once in a year.
- To modify the tools, plants and labors whenever required.

Duties of sectional officer / sub-assistant Engineer:-

- To supervise the day-to-day progress of works under his control. To check up whether the materials, proportion of mix, details of item, workmanship etc. are provided as per specification.
- To take detailed measurement of works during progress and enter the same in the measurement book and prepare timely bill for payment.
- To maintain accounts of materials, tools and plants issued for the work and to make timely recovery of the same from the bill of contractors.

To draw the attention of his assistant engineer in charge for any irregularities of contract, specifications, shotage of supply of departmental material or any other difficulties.

To maintain accounts of material, tools and plants, labour etc.

Duties of Divisional Accountant:-

To assist divicional officers in the discharge of their responsibilities.

- compile the accounts of the division with the prescribed rules and from the date furnished to him.
- To apply certain preliminarey checks to the internal accounts, voucher etc.
- Advice the divisional officer in all matters relating to account and budget estimates.
- To see the comparative statements correctly and incorporate the totals are checked on individual tenders.

Lead and Lift:-

Normally earth work is estimated for 30 m horizontal distance and 1.5m vertical distance or height. The horizontal distance of 30m is known as lead and the vertical distance of earth work is for 30m lead and 1.5m lift. For greater horizontal distance (30m) and greater vertical distance (1.5m) the rate of earth work is different.

Sundries And Overhead Charges -:

SUNDRIES -: It is the item of work can't be measured but it is required in the work at site. A lumpsum amount is kept as provision to meet sundry expenditure.

OVERHEAD CHARGES -: It includes general office expenses, rent, tax, purchase of stationary, printing of papers, telephone bill, electric bill and postage etc. This is an indirect expence.

Diffrent Govt. And Public Sectors Employing Civil Diploma Holdem -:

- Govt organizations employing civil diploma holders in odisha are - (i) Opsc, Ssc
  (ii) Housing Board Organization
  (iii) PWD, Irrigation department, NHPC & B department, RWSS etc.
- Public sectors oreganizations employing civil diploma holders en odisha are -
  (i) Indian oil
  (ii) JINDAL, TATA, ONGC, OPTCL, NALCO, SAIL, HAL etc.

Explain the terem A.R ESTIMATE -:

Annual repair estimate is a detailed estimate and is prepared to maintain the streucture or work in proper orders and safe condition. For building, thes includes white washing colour washing, painting and minor repaires etc. For road it includes patch reparing, renewals .repaire of bridge and culvert.

UNIT RATE ESTIMATE -:

In this estimate the unit rate of all materials and labors are noted. Then this unit rate is multiplied with quantity of item or labor to calculate cost of all items.

→ List out the Enclosures / Attachments to be submitted with an ESTIMATE -:

- Detailed measurement
- Rate analysis for material and labor
- Labor rate chart
- Proposed drawing including plan

→ Mention the different types of inclined roofs available -:

- Lean to roof
- Gable roof
- Hip roof
- Gambrel roof
- Mansard or curb roof
- Deck roof

→ Specify size of Nominal and Traditional Bricks.

Types of brick	Actual size	Nominal size
Standard brick	19cm x 9cm x 9cm	20cm x 10cm x 10cm
Traditional brick	22.9cm x 11.2cm x 7cm	22.9cm x 11.4 cm x 7.6cm

→ Administrative approval or sanction -:

- Fore any work or project required by a department, an approval or sanction of the competent authority of the department with respect to the cost or work is necessary at the first instance.
- It denotes the formal acceptance by the department concerned of the proposal and after administrative approval is given the engineering department take up the work and prepares details, designs, plans, estimates

and then executes the work.

TECHNICAL SANCTION:

- Technical sanction means the sanction of detailed estimate design calculations, quantities of work by the competent authority of the engineering department
- After the technical sanction of the estimate is given, then only the work is teaken up for construction.
- In case of original work, the counter signature of the local head of the department should be obtained in the plan and estimate, before technical sanction is accorded by the engineering department.
- The power of technical sanction differs from state to state.

HEIRACHY OF ENGINEERING DEPARTMENT

Heirachy of Engineering

P.W.D. (Ex-OPWD)

(Adminstrative head) → Chief Engineer (odisha circle)

- Regional cheif Engg.
- Additional chief Engg.
- Deputy cheif Engg.

(East / west circles) = superintending Engineer (S.E) / surveyor of work

Division = Executive Engineer (EE) / Divisional Enggineer

Sub-division = Assistant Engineer (A.E) / sub-divisional Engineer (S.D.O)

Panchayat / block / section = over seer / sectional officer /
Junior Engg.
↳ work supervisor.

→ write the size of cement batch box.

- 400mm x 300mm x 300mm.

03.01.22

REFERNCES BOOKS:

Sl. NO.	Name of Authors	Titles of Book	Name of Publisher
1.	M.Chakraborty B.N.Dutta Estimating &Costing	Estimating, Costing, specification &Valuation in Civil Engineering	Published by author
2.	B.N.Dutta	Estimating &Costing	UBSPD
3.	A. Panigrahi	Accounts & contracts	Vikas Publication
4.	Govt. of Odisha	Latest Orissa PWD Schedule of Rates & Analysis of rates	Govt. of Odisha