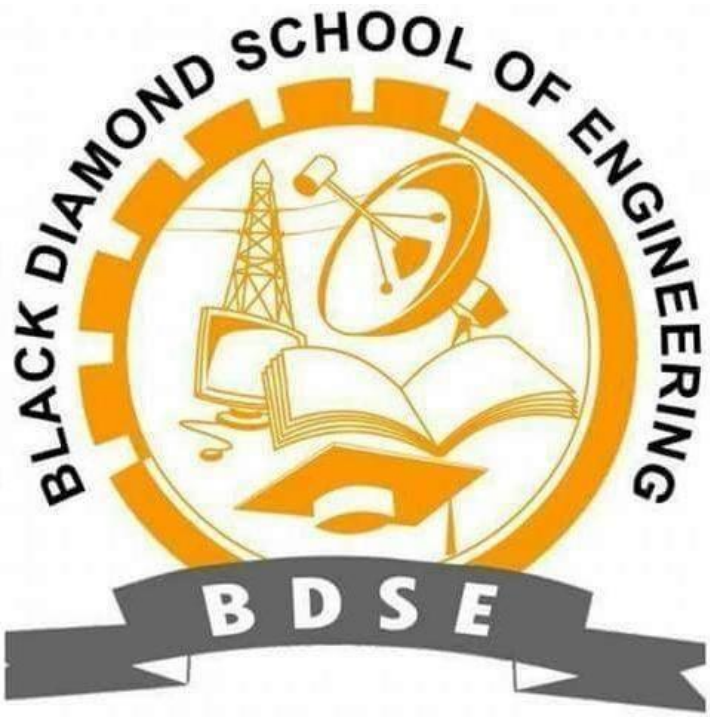
BLACK DIAMOND SCHOOL OF ENGINEERING, JHARSUGUDA

STUDY MATERIAL



ON

ESTIMATION & COST EVALUATION-I (TH-4)

THIRD SEMESTER CIVIL ENGINEERING

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Estimating :-

An estimate is a computation or calculation of the quantities required and expenditure likely to be used in the construction of a work.

OR

Estimating is a rough calculation of the value, number quantity etc which we required for a construction work.

Actual cost :-

The actual cost of a work is known at the completion of the work.

Detailed Estimate :-

preparation of detailed estimate consists of working out the quantities of different items of work and then working out the cost.

OR

In case of detailed estimate we schedule all posibly items with cost. It is an accurate estimate and prepared in two stages :-

i) Details of measurement and calculation of quantities.

ii) Abstract of estimated cost.

Details of Measurement and calculation of quantities

(i) Earthwork excavation in foundation [Digging hole in the area]

(ii) Bulk work

(iii) concrete

The whole work is divided into different items of work as earth work, bulkwork, concreate, etc.

ABSTRACT OF ESTIMATED COST :-

The cost under item of work is calculated from the quantity, already computed at workable rate and the total cost is work out in a prescribed form.

Item NO	Description or particulars	quantity	unit	Rate	Amount

Detail measurement

Sl NO	particulars of item	NO	Length	Breadth	height	quantity

∴ contigencies — used 3% to 5-% in overall cost.

The UNITS OF MEASUREMENTS AND PAYMENTS FOR VARIOUS ITEMS OF WORKS AND MATERIALS

Sl NO	Particulars of Items	units of measurement in MKS	unit of payment in MKS	unit of payment in FPS
	Earth work			
1.	Earthwork in excavation in ordinary soil, earth-work in mixed soil with kankar, bajri etc. earthwork in hard soil.	cu m	per % cum	% cu ft
2.	Rock excavation	cu m	per % cum	% cu ft
3.	Earthfilling in excavation in foundation	cu m	per % cum	% cu ft
4.	Earthfilling in foundation trenches	cu m	per % cum	% cu ft
5.	Earthfilling in plinth	cum	per % cum	% cu ft
6.	Earthwork in banking, cutting in road and irrigation channel	cum	per % cum	% cu ft
7.	Surface dressing and levelling, cleaning etc	sq m	per sq m	% sq ft

8.	Cutting of trees (girth specified)	no	per no	per no
9.	puddling, puddle clay core	cum	per % cum	% cu ft
10.	Sand filling	cum	per cu m	% cu ft
11.	Quarrying of stone or boulder.	cum	per cu m	% cu ft
12.	Blasting of rock (Blasted stone stacked and then measured)	cum	per cu m	% cu ft
	NOTE :- (for earthwork, normal lead is 30 m and normal lift is 1.5 m)			
	CONCRETE :-			
1.	Lime concrete (L.C) in foundation.	cu m	per cu m	% cu ft
2.	Lime concrete (L.C) in roof terracing thickness specified.	sq m	per sq m	% sq ft
3.	Cement concrete (C.C)	cum	per cu m	per cu ft
4.	Reinforced cement concrete (R.C.C)	cu m	per cu m	per cu ft
5.	C.C or R.C.C. chujja, sun shade	cum	per cu m	per cu ft
6.	precast C.C or R.C.C	cum	per cu m	per cu ft
7.	Jali work or Jaffri work or C.C. tracery panels (thickness specified)	Sq m	per sq m	per sq ft
8.	Cement concrete bed	cu m	per cu m	per cu ft

Types of estimate :

1) Rough cost estimate
2) unit cost estimate
3) plinth area estimate
4) cubical content estimate
5) Detailed estimate

Accuracy will increase from top to bottom

Detailed estimate

- Supplimentary estimate
- Revised estimate → Estimated cost - 5%
  → Material cost - 10%
  → Deviation in material

Rough cost estimate :
The rough calculation which is not accurate.

unit cost estimate :
The rough calculation of each and one thing.

plinth area estimate :
The calculation of plinth area part.

cubical content estimate :
plint area X Height = cubical content estimate.

Detailed estimate :
It is the most accurate calculation for a building construction.

1) supplimentary estimate (addition of things)
2) Revised estimate (Addition of extra expenditure)

Plinth area :- plinth area is the covered build up area measure from the floor level of base-ment

Total no of bricks = vol of wall / vol of brick

→ frog help in bonding

1 : 1½ : 3 - Aggr
cement sand

Modular Brick (BIS)

* Actual size — 19cm x 9cm x 9 cm
* Nominal size - 20 cm x 10 cm x 10 cm
* Traditional

Actual - 22.9 x 11.2 cm x 7cm

Nominal - 22.9 x 11.4 cm x 7.6 cm

Q Estimate the quantities of brick work and plastering required in a wall 4m long, 3m height and 30 cm thick. calculate also the cost of the rate of brick work is 320 rupees per cubic meter and of plastering is 8.5 rupees per square meter.

ans Quantities of brick work -

30 cm = 0.3 m

$$L \times B \times H$$
$$= 4 \times 3 \times 0.3$$
$$= 3.6 \text{ cum}$$

Quantity of plastering = $2 \times l \times h$
$= 2 \times 4 \times 3$
$= 24$ Sq mt

cost of brick work = 320×3.6
= Rs 115-2 /-

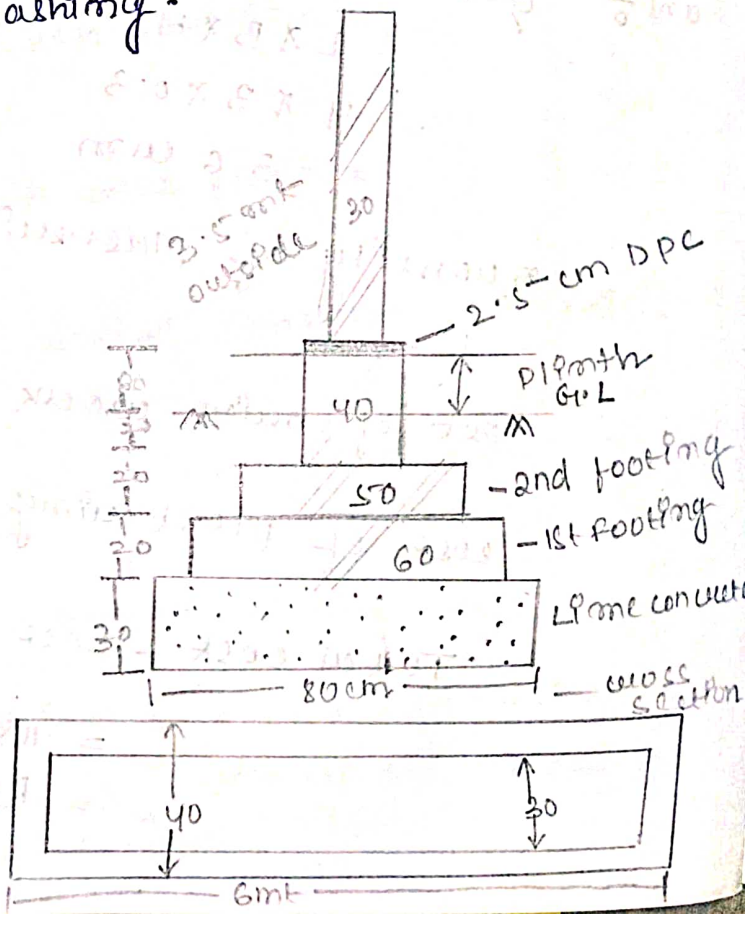
cost of plastering = 8.5×24
= Rs 204 /-

Total cost = cost of brick work + cost of plastering
= 1152 + 204
= Rs 1356 /-

Prepare a detail estimate of part of a wall of a building from the given plan and section and general specification.

General specification :-

1) Foundation concrete shall be of lime concrete.
2) Foundation and plinth shall be of 1st class brick work of lime motar.
3) D.P.C 2.5 cm, 1 : 1½ : 3 with water proofing compound.
4) Super structure first class brick work in lime motar.
5) wall finishing inside wall - 12mm cement plaster 1 : 6 and white wash 3 coat outside wall - 12mm cement plaster 1 : 6. including 10 cm below ground level and finished 2 coat of colour wash over 1 coat of white washing.



Sl No	Particulars of Item	NO	Length (L) in mt	Breadth (B) in mt	height (H) in mt	quantity	total quantity (mt)
1.	Earthwork in Excavation in Foundation	1	6	.80	.90	4.32 cum	4.32 cum
2.	Lime concrete in Foundation	1	6	.80	.30	1.44 cum	1.44 cum
3.	1st class bubk work of lime motor in Foundation and plinth.						
	1st footing	1	6	0.60	0.20	0.72 cum	
	and footing	1	6	0.50	0.20	0.6 cum	
	plinth upto G.L	1	6	0.40	0.20	0.48 cum	
	plinth above G.L	1	6	0.40	0.60	1.44 cum	
						3.24 cum	3.24 cum
4.	2.5 cm DPC	1	6	0.40	—	2.4 sqm	2.4 sqm
5.	1st class bubk work in Lime motor in Super structure	1	6	0.30	3.5	6.3 cum	6.3 cum
6.	cement plastering 1:6 of 12 mm thick outside	1	6	—	4.2	25.2 sqm	
	inside	1	6	—	3.5	21 sqm	
						46.2 sqm	46.2 sqm
7.	white wash 3 coats (inside)	1	6	—	3.5	21 sqm	21 sqm
8.	colour wash 2 coat (outside) above G.L	1	6	—	4.1	24.6 sqm	24.6 sqm

* Details estimate

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

Example 3(a). — In 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.

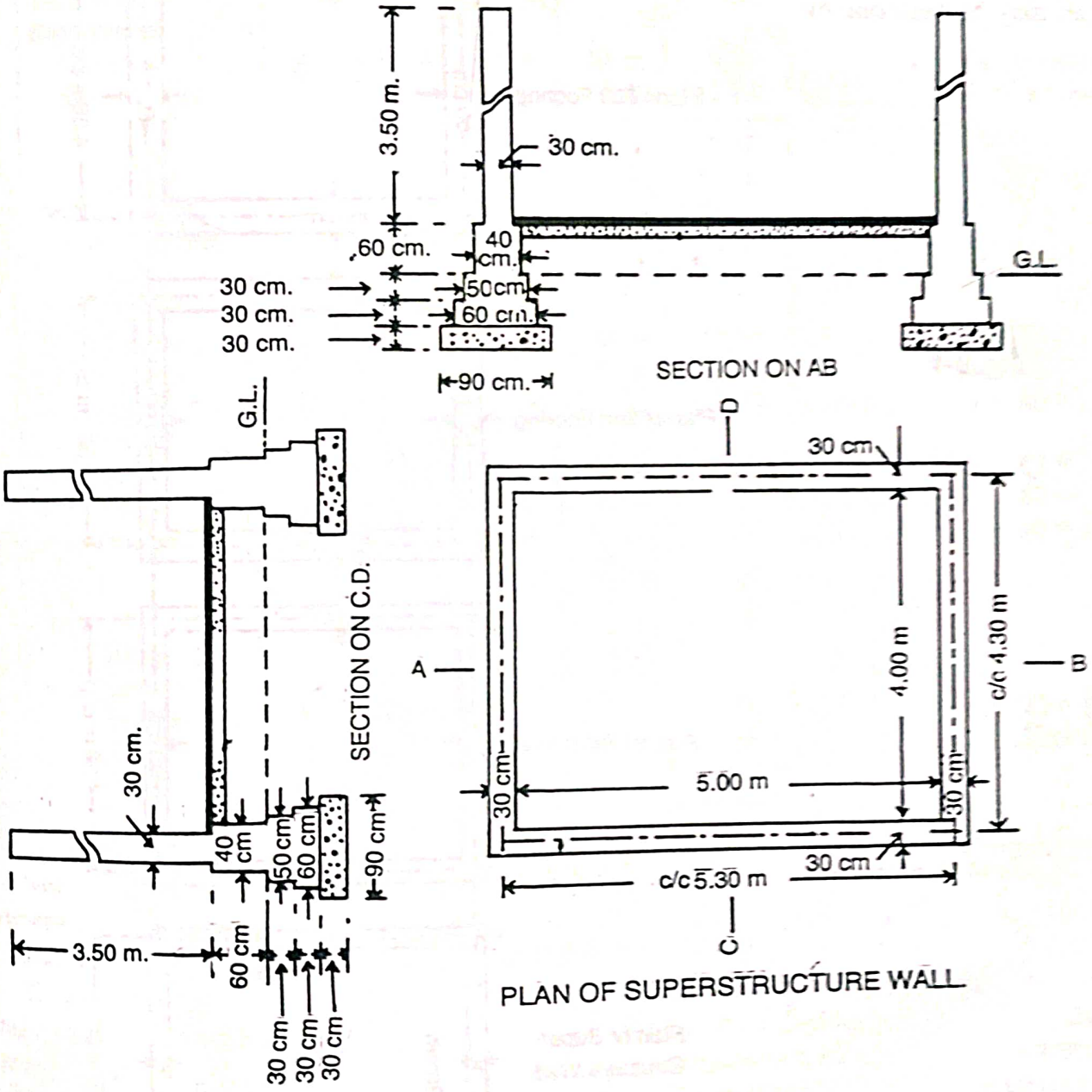


Fig. 2-3

Methods of estimating:

Long wall and short wall:-

Length of Long wall center to center (C/C)

$= \frac{0.30}{2} + 5 + \frac{0.30}{2} = 5.30$ mt

Length of short wall C/C $= \frac{0.30}{2} + 4 + \frac{0.30}{2} = 4.30$ mt

Sl No	Particulars of Item	NO	Length	Breadth	Height	Quantity	Explanatory note
1.	Earthwork in excavation in foundation.						
	Long wall	2	6.20mt	0.90 m	0.90	10.044cum	L = 5.30 + 0.90 = 6.20 mt
	Short wall	2	3.40 mt	0.90 m	0.90	5.508 cum	L = 4.30 - 0.90 = 3.40 mt
					Total	15.548cum	
2.	Cement concrete in foundation						
	Long wall	2	6.20mt	0.90 m	0.30	3.348cum	L = 5.30 + 0.90 = 6.20 mt
	Short wall	2	3.40 mt	0.90 m	0.30	1.836 cum	L = 4.30 - 0.90 = 3.40 m
						5.184cum	
3.	Brickwork in foundation and plinth.						
	Long wall						
	1st footing	2	5.9mt	0.60 m	0.30	2.124cum	L = 5.30 + 0.60 = 5.9 mt
	2nd footing	2	5.8 mt	0.50m	0.30	1.74cum	L = 5.30 + 0.50 = 5.8 mt
	plinth	2	5.7mt	0.40m	0.60	2.736cum	L = 5.30 + 0.40 = 5.7mt
	Short wall						
	1st footing	2	3.7mt	0.60m	0.30	1.332cum	B = 4.30 - 0.60 = 3.7m
	2nd footing	2	3.8mt	0.50m	0.30	1.14 cum	B = 4.30 - 0.50 = 3.8m
	plinth	2	3.9mt	0.40m	0.60	1.872cum	B = 4.30 - 0.60 = 3.9m
						10.95cum	
4.	Brick work in super structure						
	Long wall	2	5.6mt	0.30	3.50	11.76cum	L = 5.30 + 0.30 = 5.6mt
	Short wall	2	4mt	0.30	3.50	8.4cum	B = 4.30 - 0.30 = 4mt
						20.16cum	

Building Estimate:
The quantities like earth work, foundation concrete, brickwork in plinth and super structure etc., can be workout by any of following three methods

a. Long wall - short wall method
b. Centre line method.

- Long wall-short wall method:In this method, the wall along the length of room is considered to be long wall while the wall perpendicular to long wall is said to be short wall. To get the measurement of materials and works length of long wall or short wall, calculate first the center line lengths of individual walls. Then the length of long wall, (out to out) may be calculated after adding half breadth at each end to its center line length. Thus the length of short wall measured into in and may be found by deducting half breadth from its center line length at each end. The length of long wall usually decreases from earth work to brick work.in super structure while the short wall increases. These lengths are multiplied by breadth and depth to get quantities
- Centre line method:This method is suitable for walls of similar cross sections. Here the total center line length is multiplied by breadth and depth of respective item to get the total quantity at a time. When cross walls or partitions or verandah walls join with main all, the center line length gets reduced by half of breadth for each junction. Such junction or joints are studied carefully while calculating total center line length. The estimates prepared by this method are most accurate and quick.

Estimate the quantities of following items from the given plan and sectional elevation

(a) Earthwork in excavation in foundation
(b) Concrete work in foundation
(c) Brickwork in foundation and plinth
(d) Brickwork in superstructure

Solution:

The centre to centre length of long wall = 5.00 + (0.3/2)+(0.3/2)= 5.30 m

The centre to centre length of short wall = 4.00 +(0.3/2)+(0.3/2) = 4.30 m

Details of measurement and calculation of quantities

Sl no.	Particulars of item	No.	Length	Breadth	Depth	Quantity	Remark
1	Earthwork in excavation in foundation						
	Long wall	2	6.20	0.90	0.90	10.04	L = 5.3 + 0.90 = 6.20 m
	Short wall	2	3.40	0.90	0.90	5.51	L = 4.30 – 0.90 = 3.40 m
					Total	15.55 cum	
2	Concrete work in foundation						
	Long wall	2	6.20	0.90	0.30	3.35	
	Short wall	2	3.40	0.90	0.30	1.83	
					Total	5.18 cum	
3	Brickwork in foundation and plinth						
	Long wall						
	1st footing	2	5.90	0.60	0.30	2.13	L = 5.30 + 0.60 = 5.90
	2nd footing	2	5.80	0.50	0.30	1.74	L = 5.30 + 0.50 = 5.80
	Plinth wall	2	5.70	0.40	0.60	2.74	L = 5.30 + 0.40 = 5.70
	Short wall						
	1st footing	2	3.70	0.60	0.30	1.33	L = 4.30 – 0.60 = 3.70
	2nd footing	2	3.80	0.50	0.30	1.14	L = 4.30 – 0.50 = 3.80
	Plinth wall	2	3.90	0.40	0.60	1.87	L = 4.30 – 0.40 = 3.90 m
					Total	10.95 cum	
4	Brickwork in superstructure						
	Long wall	2	5.60	0.3	3.50	11.76	L = 5.30 + 0.30 = 5.60
	Short wall	2	4.00	0.3	3.5	8.40	L = 4.3 – 0.3 = 4.0
					Total	20.16 cum	

Example :

Estimate the quantities of following items of a two roomed building from the given plan and section

(a) Earthwork in excavation in foundation
(b) Concrete work in foundation
(c) Brickwork in foundation and plinth
(d) 2.5 cm c.c damp proof course
(e) Brickwork in superstructure

Details of measurement and calculation of quantities:

Sl.no.	Particulars of item	No	Length	Breadth	Depth	Quantity	Remark
1	Earthwork in excavation in foundation						
	Long wall	2	11.70	1.10	1.00	25.74	L = 10.60 + 1.10 = 11.70
	Short wall	3	5.20	1.10	1.00	17.16	L = 6.30 – 1.10 = 5.20
					Total	42.90 cum	
2	Cement concrete work in foundation						
	Long wall	2	11.70	1.10	0.30	7.72	
	Short wall	3	5.20	1.10	0.30	5.15	
					Total	12.87 cum	
3	First class brickwork in foundation and plinth						
	Long wall						
	1st footing	2	11.40	0.80	0.20	3.65	L = 10.60 +0.80 = 11.40 m
	2nd footing	2	11.30	0.70	0.10	1.58	L = 10.60 + 0.70 = 11.30 m
	3rd footing	2	11.20	0.60	0.10	1.34	L = 10.60 + 0.60 = 11.20 m
	4th footing	2	11.10	0.50	0.10	1.11	L = 10.60 + 0.50 = 11.10 m
	Plinth wall above footing	2	11.00	0.40	0.80	7.04	L = 10.60 + 0.40 = 11.00 m
	Short wall						
	1st footing	3	5.50	0.80	0.20	2.64	L = 6.30 – 0.80 = 5.50 m
	2nd footing	3	5.60	0.70	0.10	1.18	L = 6.30 – 0.70 = 5.60 m
	3rd footing	3	5.70	0.60	0.10	1.03	L = 6.30 – 0.60 = 5.70
	4th footing	3	5.80	0.50	0.10	0.87	L = 6.30 – 0.5 = 5.80
	Plinth wall above footing	3	5.90	0.40	0.80	5.66	L = 6.30 – 0.40 = 5.90
					Total	26.10 cum	
4	Damp proof course 2.5 cm thick C.C						

	Long wall	2	11.00	0.40	---	8.80	
	Short wall	3	5.90	0.40	---	7.08	
					Total	15.88	
	Deduct door sills	2	1.20	0.40	---	0.96	
					Net total	14.92 sqm	
5	First class brick work in superstructure						
	Long wall	2	10.90	0.3	4.20	27.47	
	Short wall	3	6.00	0.30	4.20	22.68	
					Total	50.15 cum	
	Deduct						
	Door opening	2	1.20	0.30	2.10	1.51	
	Window openings	4	1.00	0.30	1.50	1.80	
	Shelves	2	1.00	0.20	1.50	0.60	
	Lintels over door	2	1.50	0.30	0.15	0.14	Bearing 15 cm
	Lintel over window	4	1.30	0.30	0.15	0.23	Bearing 15 cm
	Lintel over shelves	2	1.30	0.30	0.15	0.12	Bering 15 cm
					Total of deduction	4.40	
					Net total	45.75 cum	