Lecture note on

Estimation & Cost Evaluation-1

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CH-1

Estimating :-

Before the undertaking the construction of a project it is necessary to know its probable cost which is worked out by estimating.

→ An estimate is never the actual cost of the work.

There are different types of estimates,

1) Detailed estimate
2) Priliminary / approximate / rough estimate.
3) Quantity estimate / quantity survey.
4) Revised estimate.
5) Suplimentary estimate.
6) Complete estimate.
7) Annual maintainance or repair estimate.
8) Revised estimate & suplimentary estimates due to reduction of cost.

Detailed estimate :-

This includes the detailed particulars for the quantities, rates, & cost of all the items involved for satisfactory completion of a project.

Preliminary / Approximate / Rough estimate :-

This is an approximate estimate to find out an approximate cost in a short time. (ex:- Cubic meter method / square meter method)

Quantity estimate or quantity survey :-

This is a complete estimate or list of quantities for all items of work required to complete the Concerned projec

4) Revised estimate :-

A revised estimate is a detailed estimate for the revised quantities & rates of items of works originally provided in the estimate without material deviations of a structural nature from the design originally approved for a project.

5) Suplimentary estimate :-

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

6) Complete estimate :-

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

7) Annual maintaance or repair estimate :-

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

8) Revised & suplimentary estimate due to reduction of cost :-

In cases where a substantial section of a project costing not less than 5% of the total sactioned cost of the project is abandoned or where material deviations from the original are expected.

Plinth area :-

The plinth area can be calculated by taking the external dimension of the building.

Floor area :-

The floor area is the plinth area less the area of the walls. In the calculation of wall area the thickness of the wall shall be inclusive of finishing if the height of such finish is more than 1mt. from floor finish.

1.3 Accuracy of measurement for different types of work :-

The accuracy to be observed in preparing an estimate depends on the rate of the item & the unit of ~~payment~~ payment.

→ The higher rates the greater should be the accuracy with which the quantities are calculated.

→ Where rates are high & paid per unit, dimensions should be absolutely correct, taking dimensions to the nearest 1cm to 0.5cm (½ inch to ¼ inch) may be allowed for pratical purposes, the quantities in such cases should be worked out to atleast 2 places of decimal. But, where rates are low & paid for percentage to percentage unit such extreame accuracy is not required.

→ In the case of wall, where masonry is paid per cubic meter a few cm. added to or substacted from the length or height would but little affect the total content. But, width the thickness of the wall where every half cm. or quater cm affects the results considerable should be taken out with great accuracy. The quantity is may be computed to nears

two places of decimal.

→ In general, dimensions should be measure to the nearest 1cm, 0·1m area should be worked out to the nearest 0.01 m2 & cubic contents should be patisions etc. & sectional dimessions of coloumns, pillars beams etc. should be taken to the nearest ½ cm

1·2 Units & modes of measurements :-

SL·NO	Particle or items	Units
01.	Earthworks Earthwork in excavation in ordinary in soil, earthwork in mixed soil, with Kanker, Bajeri etc Earth work in Hard soil.	cubic meter
02.	Rock excavation	Cubic meter
03.	Earth filling in excavation in foundation	cubic meter
04.	Earth filling in foundation trenchens	Cubic meter
05.	Earth filling in plinth	Cubic meter
06.	Earth work in banking, cutting, in road & irrigation Channel	cubic meter
07.	surface dressing & levelling	Square meter
08.	cutting of trees	Number
09.	Pudding, Pubble, clay coat -	cumic meter
10.	Sand filling	Cumic meter

11.	Quarrying of stone or boulder	Cubic meter
12.	Blasting of rock (for earthwork, normal lead is 30 cm normal lift is 1.5 m	Cubic meter

Concrete -

Sl no	Particulars of items	Units
01.	Lime concrete in foundation	m^3
02.	Lime concrete in roof terracing, thickness specified	m^2
03.	Cement concrete	m^3
04.	R.C.C	m^3
05.	C.C / R.C.C chajja, sunset.	m^3
06.	Precast C.C / R.C.C	m^3
07.	Jali work / Jaffri work / C.C or tracery pannels (thickness specified)	m^2
or.	Cement concrete bed	m^3
09.	D.P.C. (damp proof course) Cement concrete, rich cement mortar, asphalt etc. (thickness specified)	m^2

Brick work :-

Sl no	Particulars of items	Units
01.	Brickwork in foundation & plinth in superstructure, in arches etc in cement, lime or mud mortar	m^3
02.	Half brick with or without reinforcement	m^2
03.	Thin partition wall	m^2
04.	Reinforced brick work	m^3

plastering, pointing & finishing -

sl. no	Particulars of items	Units
01.	Plastering - cement mortar, lime mortar, mud etc.	m^2
02.	Pointing - struck, flush, weather etc.	m^2
03.	White washing, colour washing cement washing. (no. of codes specify)	m^2
04.	Distempering (no. of codes specify)	m^2

Main items of work :-

1) Earthwork :-

Earthwork in excavation & earthwork in filling

usually taken out separately under different items, & quantities are calculated in m^3.

2) Earthwork in plinth filling :-

Earthwork in plinth filling is calculated by taking the internal dimension in between plinth wall (length, breath).

3) Concrete in foundation :-

The concrete is taken out in m^3 (length × breath × thickness) The length × breadth of foundation concrete are usually the same as for excavation, only the depth or thickness defers.

4) soling :-

When the soil is soft or bathheel, one layer of dry brick or stone soling is applied below the foundation concrete. The soling layer is computed in m^2 (length × breadth) specifying the thickness.

5) D.P.C :-

D.P.C usually of 2.5 cm. or 25 mm. Thick rich cement concrete. 1 : 1/2 : 3 or 2 cm. 3/4 inch thick rich cement mortar.

→ Usually D.P.C is not provided at the sills of the doors & verandah openings, for which deductions are made.

6) masonry :-

masonry is computed in m^3 (length × breadth × height) foundation & plinth masonry is taken under 1 item & masonry in superstructure is taken under a separate item.

∴ End ;-

CH-2 Quantity Estimate

Methods of estimation :-

=> The dimensions of building length, breadth & height or depth are to be taken out from the drawing plan, elevation & section.

=> Junction of wall at the corners and at meeting points of wall require special attention.

=> In detailed estimation, earth work in excavation of foundation concrete, brick work in foundation, plinth & brick work in super structure may be estimated.

=> The quantities required for different items of work are determined

* By long & short wall method
* By center line Method

=> The center line method is the most commonly adopted.

Long & short wall method :-

=> Separate wall method also called individual 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.

=> lengths of long walls are measured or found by "out-to-out" dimensions and those of short wall as "in-to-in" dimensions.

=> Different quantities are calculated by multiplying the length by the breath & the heigth of the wall.

=> The same rule applies to the excavation in foundation, to concrete bed in foundation, D, P, C, masonry in foundation and super structure etc.

=> Long wall length out-to-out = ~~center to center length + half breadth~~

= center to center length + half breadth on one side + half breadth on other side.

= Center to Center length + one breadth

Center line Method :-

=> In this method, total length of center lines of long wall & short wall, has to be find out.

=> The total length of center lines of wall of same type having same type of foundations & footing and their find the quantities by multiplying the total center line length by respective breadth and the height.

=> This method is quicker but requires special attention and considerations at the junction, meeting point of partition or cross wall.

=> For rectangular, circular polygonal building having no inter of cross wall, this method is quite simple.

=> For building having cross of partition walls, for every junction half breath of the respective item or footing is to be deducted from the total center length

=> Thus in the case of a building with one ~~front~~ partition wall or cross wall having two junction, deduct on breadth of the respective item of work for the total center length.

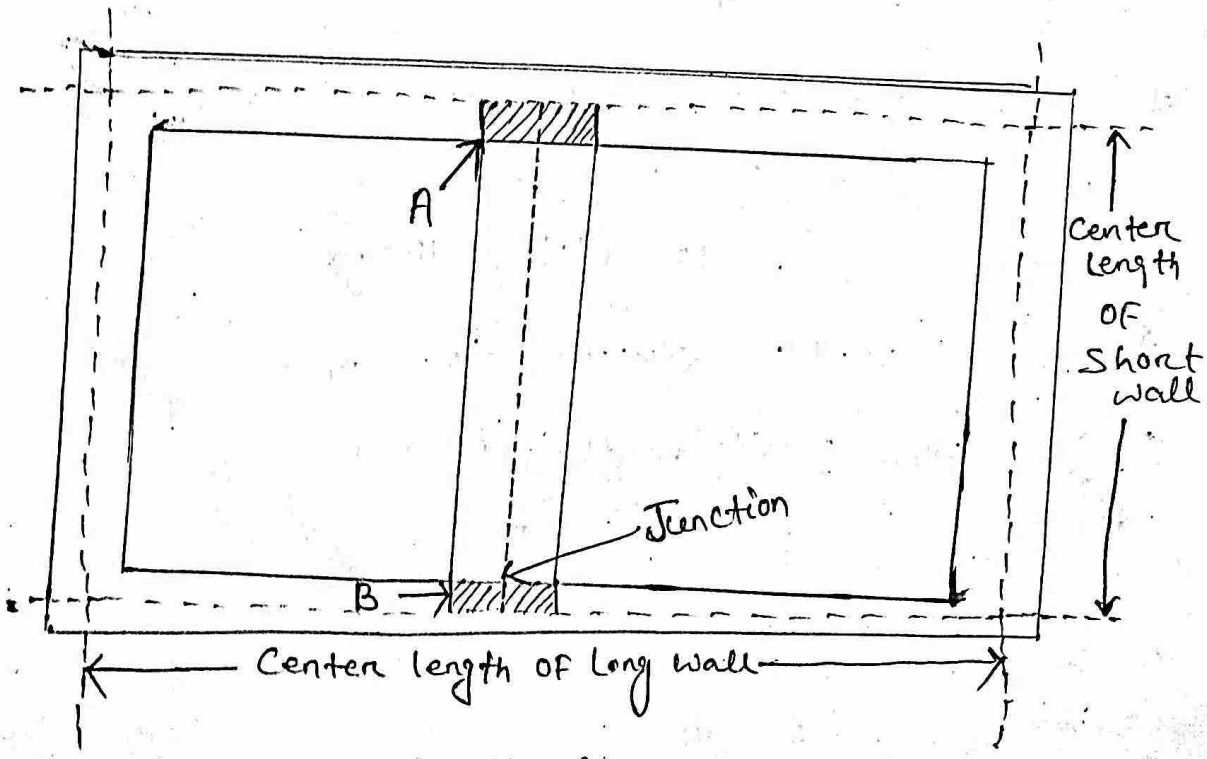


Fig :- Center line Method

4-12. The main differences between centre line method and Long and Short wall method of estimating.

By the centre line method estimate for earthwork, concretework or brickwork for all walls of a whole building having the same section is estimated at a time. But for partition walls or walls of other sections of the building attention is required to locate the junctions with the main wall in order to subtract half the width of the work of the main wall for each junction at the same level.

By Long and Short wall method each wall of a building is estimated separately. The long walls are considered out-to-out and the short walls in-to-in. For in-to-in consideration attention is required to see the level with which the short wall joins with the long wall in order to deduct half the width of the work from each joint at the same level.

Thus, by centre line method estimate of a building can be prepared quickly eliminating lengthy mathematical calculations. But the centre line of a building can not be physically measured at site, where as the long and short walls i.e. out-to-out and in-to-in measurements of rooms of a building can be physically measured. So, centre line method is preferred to prepare estimates and Long and Short wall method is preferred for entering measurements in the Measurement Book (M.B.).

(C) Partition or Verandah Wall having Cross Section Different from that of Main Wall and when the same footing joins along with Several Footings of the Main Wall.

Fig. 4-20 shows the plan and sections of walls for a single roomed building with Verandah. Estimate the quantities of the following items:– (1) Earthwork in excavation in foundation. (2) Lime concrete in foundation. (3) First class brickwork in cement mortar (1:4) in foundation and plinth. (4) First class brickwork in cement mortar (1:6) in superstructure. Neglect step.

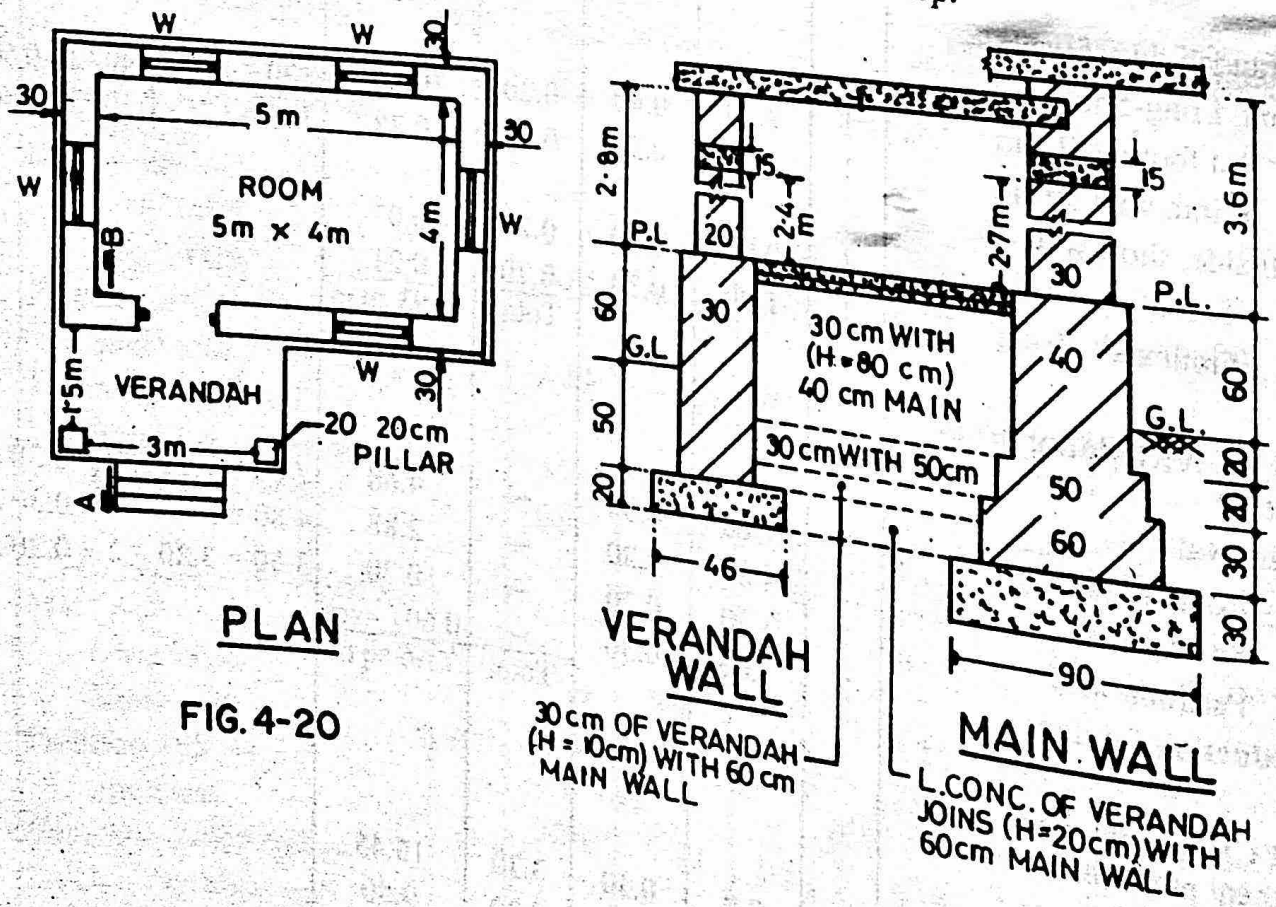


FIG. 4-20

Long and Short wall method :- Centre to centre lengths for Room:- Long walls = $5 + 2 \times \frac{0.30}{2} = 5.30$m, Short walls $4 + 2 \times \frac{0.30}{2} = 4.30$m

Verandah :- Front, Long wall $= 3 + 2 \times \frac{0.20}{2} = 3.20$m. Sides, Short walls $= 1.5 + \frac{0.20}{2} + \frac{0.30}{2} = 1.75$m

Item no.	Description of item	No.	Dimensions in metre			Quantity	Explanatory notes.
			Length	Breadth	Height		
1.	**Earthwork in excavation**						
	Room – Long walls ...	2	6.20	0.90	1.00	11.16	6.20 = 5.30 + 0.90
	Short Walls ...	2	3.40	0.90	1.00	6.12	3.40 = 4.30 – 0.90
	Verandah–Front,Long wall	1	3.66	0.46	0.70	1.18	3.66 = 3.20 + 0.46
	Sides, Short walls ...	2	1.07	0.46	0.70	0.69	$1.07 = 1.75 - \frac{0.90}{2} - \frac{0.46}{2}$
					Total =	19.15 cu m	
2.	**Lime concrete in foundation**						
	Room– Long walls ...	2	6.20	0.90	0.30	3.35	
	Short walls ...	2	3.40	0.90	0.30	1.83	
	Verandah–Front,Long wall	1	3.66	0.46	0.20	0.34	
	Sides, Short walls ...	2	1.22	0.46	0.20	0.22	$1.22 = 1.75 - \frac{0.60}{2} - \frac{0.46}{2}$
					Total =	5.74 cu m	
3.	**First class brickwork (1:4) in foundation and plinth**						Lime concrete joins with 60cm brick layer room
	Room– Long walls						
	60cm layer ...	2	5.90	0.60	0.30	2.12	5.90 = 5.30 + 0.60
	50cm layer ...	2	5.80	0.50	0.20	1.16	5.80 = 5.30 + 0.50
	40cm layer ...	2	5.70	0.40	0.80	3.65	
	Short walls 60cm layer	2	3.70	0.60	0.30	1.33	3.70 = 4.30 – 0.60
	50cm layer ...	2	3.80	0.50	0.20	0.76	
	40cm layer ...	2	3.90	0.40	0.80	2.50	
	Verandah– Long wall						
	30cm layer ...	1	3.50	0.30	1.10	1.16	3.50 = 3.20 + 0.30
	Short walls						
	30cm layer						
	(i) that with 60cm layer	2	1.30	0.30	0.10	0.08	$1.30 = 1.75 - \frac{0.60}{2} - \frac{0.30}{2}$
	(ii) " " 50cm "	2	1.35	0.30	0.20	0.16	
	(iii) " " 40cm "	2	1.40	0.30	0.80	0.67	$1.35 = 1.75 - \frac{0.50}{2} - \frac{0.30}{2}$
					Total =	13.59 cu m	
4.	**First class brickwork(1:6) in superstructure**						
	Room –						
	Long walls ...	2	5.60	0.30	3.60	12.10	5.60 = 5.30 + 0.30
	Short walls ...	2	4.00	0.30	3.60	8.64	4.00 = 4.30 – 0.30
	Verandah– Long wall (consider solid first)	1	3.40	0.20	2.80	1.90	3.40 = 3.20 + 0.20
	Short walls ...	2	1.50	0.20	2.80	1.68	$1.50 = 1.75 - \frac{0.20}{2} - \frac{0.30}{2}$
	Deductions for openings, Lintel and verandah openings	Same as C.L		method		= 6.86(-ve)	
					Total =	17.46 cu m	

Centre line method :-

(a) Length of centre line for mainwalls = $2\{(5.0 + 2 \times \frac{0.30}{2}) + (4.0 + 2 \times \frac{0.30}{2})\}$ = 19.20m

(b) Length of centre line for verandah walls, sides = $2(1.5 + \frac{0.30}{2} + \frac{0.20}{2})$ = 3.50m

Front = $3 + 2 \times \frac{0.20}{2}$ = 3.20m

Total = 6.70m

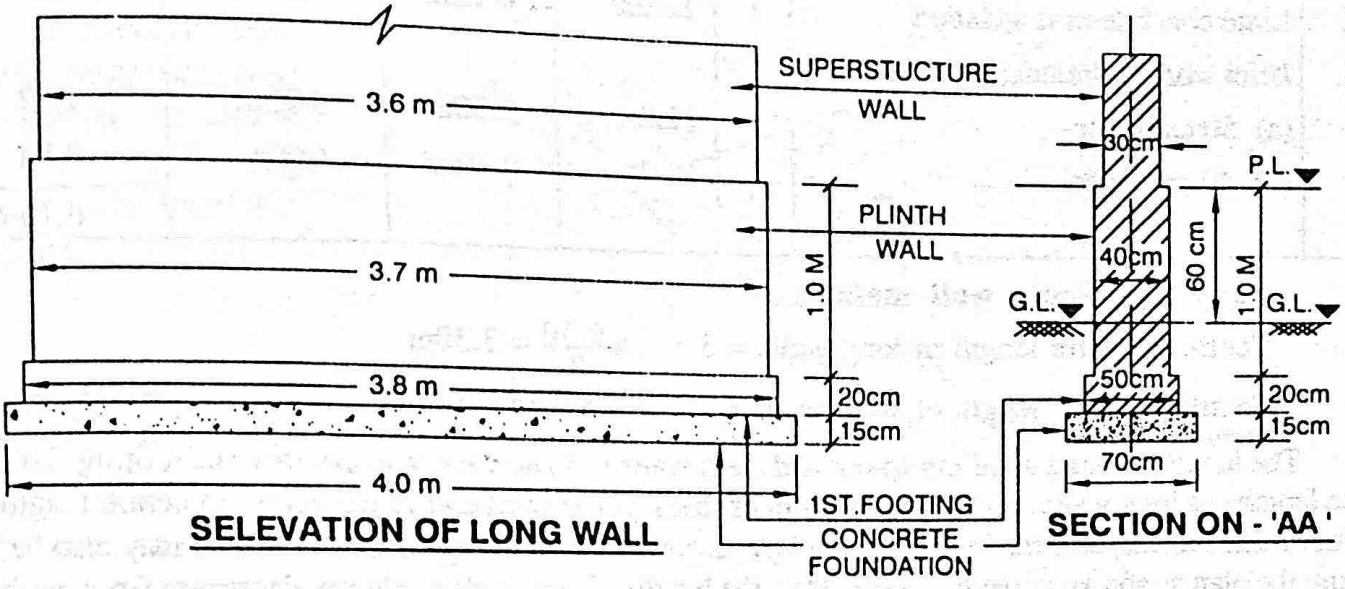
Number of joints = 2 nos.

Note that a joint occurs at a place where three walls join.

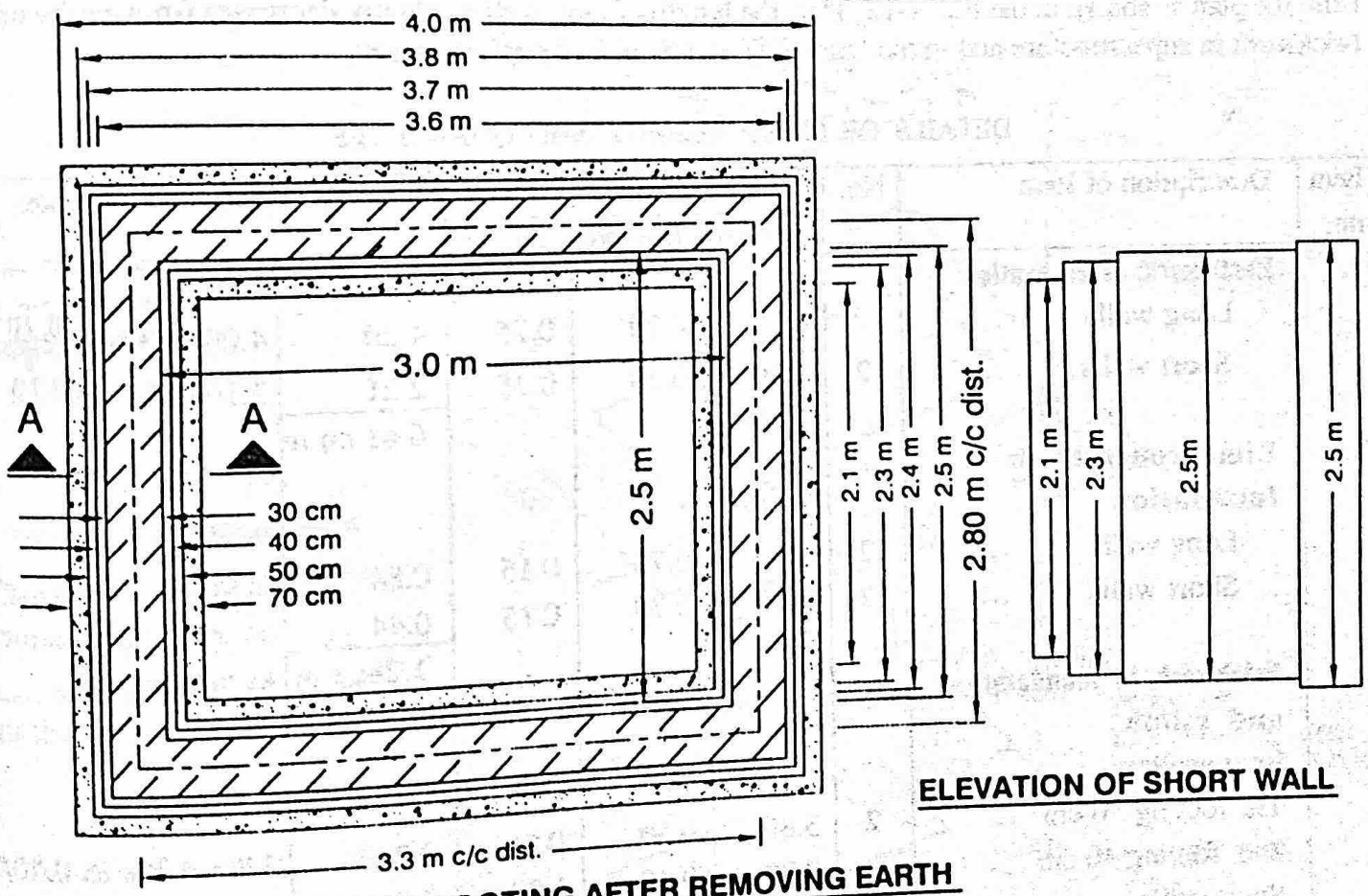
DETAILS OF MEASUREMENT AND QUANTITIES

Item no.	Description of item	No.	Dimensions in metre			Quantity	Explanatory notes.
			Length	Breadth	Height		
1.	**Earthwork in excavation**						Length of verandah is reduced by half of trench width $5.80 = 6.70 - 2 \times \frac{0.90}{2}$
	(a) Main walls ...	1	19.20	0.90	1.00	17.28	
	(b) Verandah wall ...	1	5.80	0.46	0.70	1.87	
					Total =	19.15 cu m	
2.	**Lime concrete in foundation**						
	(a) Main walls ...	1	19.20	0.90	0.30	5.18	
	(b) Verandah ...	1	6.10	0.46	0.20	0.56	
					Total =	5.74 cu m	
3.	**First class brickwork in foundation and plinth(1:4)**						Lime concrete joins with 60cm brick layer of main wall $6.10 = 6.70 - 2 \times \frac{0.60}{2}$
	(a)Main walls						
	60cm layer ...	1	19.20	0.60	0.30	3.46	
	50cm layer ...	1	19.20	0.50	0.20	1.92	
	40cm layer ...	1	19.20	0.40	0.80	6.14	
	(b)Verandah wall, portion joins with						
	(i) 60cm layer of main wall	1	6.10	0.30	0.10	0.18	$6.10 = 6.70 - 2 \times \frac{0.60}{2}$
	(ii) 50cm " " " "	1	6.20	0.30	0.20	0.37	$6.20 = 6.70 - 2 \times \frac{0.50}{2}$
	(iii)40cm " " " "	1	6.30	0.30	0.80	1.51	$6.30 = 6.70 - 2 \times \frac{0.40}{2}$
					Total =	13.58 cu m	
4.	**First class brickwork in superstructure walls**						$6.40 = 6.70 - 2 \times \frac{0.30}{2}$
	(a) Main walls ...	1	19.20	0.30	3.60	20.74	
	(b) Verandah walls ...	1	6.40	0.20	2.80	3.58	
	Deductions for-						
	Door openings, D ...	1	1.10	0.30	2.10	0.69(-ve)	
	Window openings,W...	5	1.00	0.30	1.50	2.25 "	
	Verandah openings, sides	2	1.50	0.20	2.40	1.44 "	
	" " front	1	3.00	0.20	2.40	1.44 "	
	Lintel at main wall ...	1	19.20	0.30	0.15	0.86 "	No deduction for ends of verandah lintel
	-do- Verandah ...	1	6.40	0.20	0.15	0.18 "	
					Total =	17.46 cu m	

Example - 2. Single Room building :- **Fig.4-11** represents the plan and section of the foundation wall (after removal of earth) of a building internally measuring 3m x 2.5.Estimate the quantities of (1) Earthwork in excavation in foundation, (2) Lime concrete in foundation, (3) Brickwork in foundation and plinth.



SELEVATION OF LONG WALL **SECTION ON - 'AA '**



PLAN OF FOUNDATION & FOOTING AFTER REMOVING EARTH **ELEVATION OF SHORT WALL**

PLAN AFTER REMOVING EARTH FIG.- 4 -11

Centre line method :- To estimate the quantities,calculate first the total length of centre line which remains constant for verying widths of works,and multiply this constant length of the cenyre line with the respective breadth and height. Thus quantitites of all items may be calculated easily.

Total length of centre line=$2[(3m + 2 \times \frac{30cm}{2}) + (2.5m + 2 \times \frac{30cm}{2})] = 12.2m$

Item no.	Description of Item	No.	Length	Breadth	Height	Quantity
1.	Earthwork in excavation ...	1	12.2m	0.70m	0.75m	6.41cu m
2.	Lime concrete in foundation ...	1	12.2m	0.70m	0.15m	1.28 cu m
3.	Brickwork in foundation & plinth					
	(a) 50 cm layer ...	1	12.2m	0.50m	0.20m	1.22
	(b) 40 cm layer ...	1	12.2m	0.40m	1.00m	4.88
						6.10 cu m

Long and Short wall method :–

Centre to centre length of long walls = $3 + 2 \times \frac{0.30}{2} = 3.30$m

Centre to centre length of short walls = $2.5 + 2 \times \frac{0.30}{2} = 2.80$m

The lengths of long walls out-to-out and short walls in-to-in vary in every layer of footing. To calculate the lengths of long walls add half the breadth of that layer at each end to the centre to centre length and for short walls subtract half the breadth of the layer from each end. Lengths thus obtained may also be verified from the plan as shown in the Fig. 4-12. Thus the length of long wall gradually decreases from earthwork to brickwork in superstructure and in the case of a short wall, its length increases.

DETAILS OF MEASUREMENT AND QUANTITIES

Item no.	Description of Item	No.	Dimensions in metre			Quantity	Explanatory notes
			Length	Breadth	Height		
1.	**Earthwork in excavation**						
	Long walls ...	2	4.00	0.70	0.75	4.20	$4.00=3.30+2x\frac{0.70}{2}$
	Short walls ...	2	2.10	0.70	0.75	2.21	$2.10=2.80-2x\frac{0.70}{2}$
						6.41 cu m	
2.	**Lime concrete in foundation**						Width of concrete
	Long walls ...	2	4.00	0.70	0.15	0.84	is same as earthwork
	Short walls ...	2	2.10	0.70	0.15	0.44	so lengths are same
						1.28cu m	as excavation.
3.	**Brickwork in foundation and plinth**						
	Long walls						
	1st. footing 50 cm ...	2	3.80	0.50	0.20	0.76	$3.80=3.30+2x\ 0.50/2$
	2nd. footing 40 cm ...	2	3.70	0.40	1.00	2.96	$3.70=3.30+2x\ 0.40/2$
	Short walls						
	1st. footing 50 cm ...	2	2.30	0.50	0.20	0.46	$2.30=2.80-2x\ 0.50/2$
	2nd. footing 40 cm ...	2	2.40	0.40	1.00	1.92	$2.40=2.80-2x\ 0.40/2$
						6.10 cu m	

Building 1A. The plan and sections of an one roomed building is shown in Fig. 5-1A. Prepare quantity estimate for the following items of work.

(1) Earthwork in excavation in foundation, (2) Earthwork in plinth filling, (3) Lime concrete in foundation, (4) First class brickwork in cement mortar (1:6) for foundation and plinth, (5) 2.5 cm thick damp proof course, and (6) First class brickwork in superstructure.

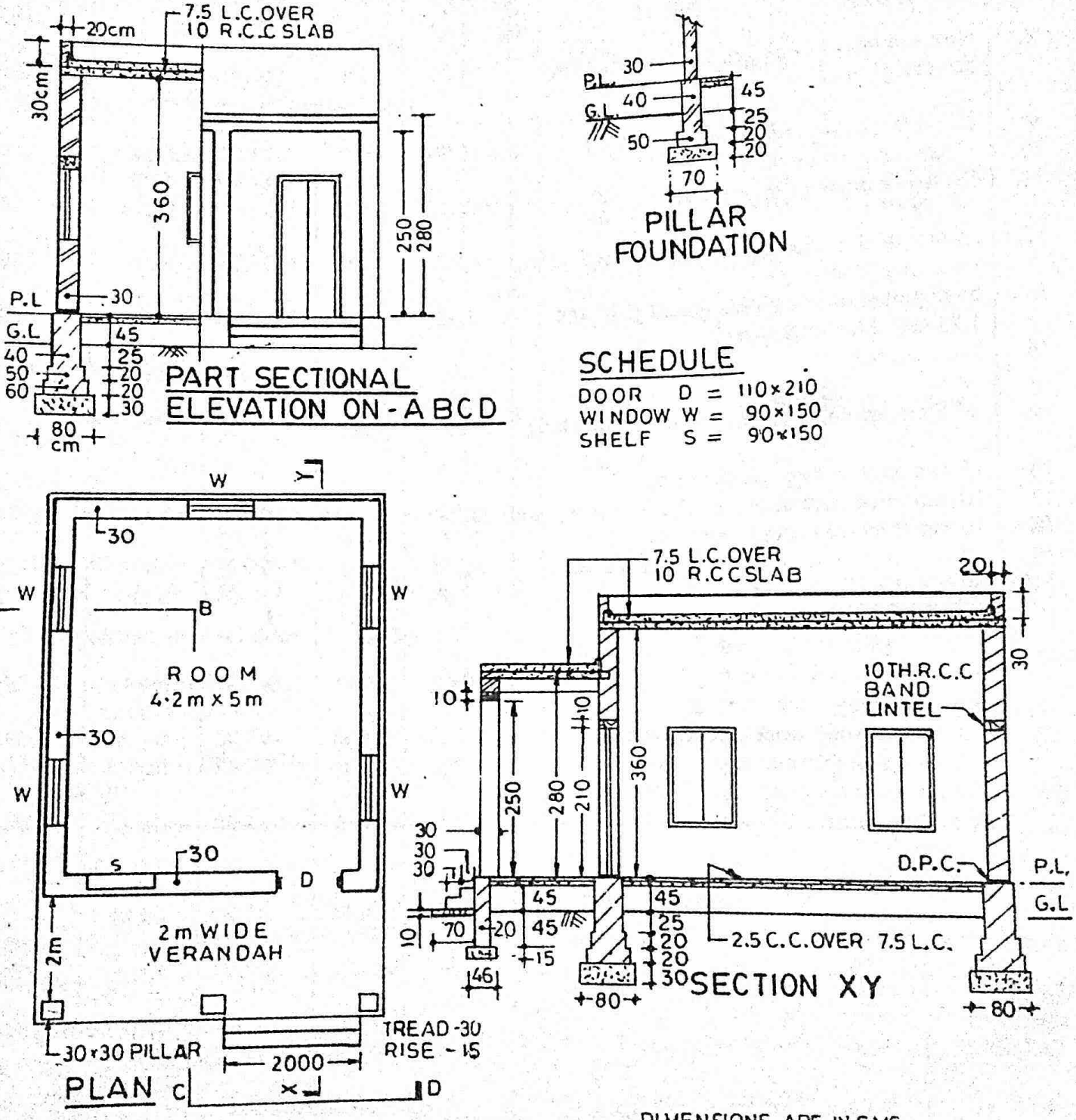


FIG. 5-1A

Long-Short wall method. – Centre to centre length for —
Room — Long wall = 5.00 + 0.30 = 5.30 m
Short wall = 4.20 + 0.30 = 4.50 m
Verandah front = 4.20 + 0.30 = 4.50 m (constant due to presence of pillars)
Verandah, sides Short walls = 2.00 + 0.30 = 2.30 m.
(Note : The accountability up to the centre of 20 cm plinth dwarf wall is not required due to presence of isolated corner pillars having higher section than that of the dwarf wall.)

DETAILS OF MEASUREMENT AND CALCULATION OF QUANTITIES

Item No.	Description of item	No.	Length m	Breadth m	Height m	Quantity	Explanatory notes
1.	**Earthwork in excavation in foundation** – Room —						
	Long walls ...	2	6.10	0.80	0.95	9.27	6.10 = 5.30 + 0.80
	Short walls ...	2	3.70	0.80	0.95	5.62	3.70 = 4.50 – 0.80
	Verandah pillars ...	3	0.70	0.70	0.65	0.96	
	Plinth dwarf wall —						
	Front ...	1	3.10	0.46	0.60	0.86	3.10 = 4.50 – 2 × 0.70
	Sides, Short ...	2	1.55	0.46	0.60	0.86	(for corner pillars) – 0.70 (middle)
	Step ...	1	2.20	0.57	0.10	0.13	1.55 = 2.30 – 0.80 / 2 – 0.70 / 2
					Total	17.70 cu m	
2.	**Earthwork in filling in plinth**						
	Room ...	1	4.90	4.10	0.375	7.53	
	Verandah ...	1	4.50	2.10	0.375	3.54	
	Deduct pillar projections						
	Central ...	1	0.40	0.20	0.375	0.03 (– ve)	
	Sides ...	2	0.20	0.20	0.375	0.03 (– ve)	
					Total	11.04 cu m	
3.	**Lime concrete in foundation**						
	Room —						
	Long walls ...	2	6.10	0.80	0.30	2.93	
	Short walls ...	2	3.70	0.80	0.30	1.78	
	Verandah pillars	3	0.70	0.70	0.20	0.29	
	Plinth dwarf walls —						
	Front ...	1	3.10	0.46	0.15	0.21	3.10 = 4.50 – 2 × 0.70 / 2 – 0.70. L.C. joins L.C. of ver.
	Sides, Short ...	2	1.65	0.46	0.15	0.23	pillars 1.65 = 2.30 – 0.60 / 2
	Step ...	1	2.20	0.70	0.10	0.15	– 0.70 / 2 L.C. joins with
					Total	5.59 cu m	0.60 L.C. of main and 0.70 L.C. of ver. pillar
4.	**First class brickwork in foundation and plinth in cement** mortar (1:6)						
	Room —						
	Long walls —						
	1st footing 60 cm ...	2	5.90	0.60	0.20	1.41	5.90 = 5.30 + 0.60
	2nd footing 50 cm ...	2	5.80	0.50	0.20	1.16	5.80 = 5.30 + 0.50
	Plinth wall 40 cm ...	2	5.70	0.40	0.70	3.19	5.70 = 5.30 + 0.40
	Short walls —						
	1st footing 60 cm ...	2	3.90	0.60	0.20	0.94	3.90 = 4.50 – 0.60
	2nd footing 50 cm ...	2	4.00	0.50	0.20	0.80	4.00 = 4.50 – 0.50
	Plinth wall 40 cm ...	2	4.10	0.40	0.70	2.30	4.10 = 4.50 – 0.40
	C.O. ...		...	...	Total	9.80	

Item No.	Description of item	No.	Length m	Breadth m	Height m	Quantity	Explanatory notes
	B.F. ...		...	...	...	9.80	
	Verandah pillars						
	1st footing 50 cm ...	3	0.50	0.50	0.20	0.15	
	Plinth wall 40 cm ...	3	0.40	0.40	0.70	0.34	
	Dwarf wall front —						
	(i) Lower part up to 30 cm	1	3.50	0.20	0.20	0.14	3.50 = 4.50 – 2 × 0.50 / 2 – 0.50
	(ii) Upper part ...	1	3.70	0.20	0.70	0.52	3.70 = 4.50 – 2 × 0.40
	Dwarf wall sides –						
	(i) Lower part up to 20 cm ...	2	1.80	0.20	0.20	0.14	1.80 = 2.30 – 2 × 0.50 / 2
	(ii) Upper part ...	2	1.96	0.20	0.70	0.53	1.90 = 2.30 – 2 × 0.40 / 2
	Steps	1	2.00	0.45 (av)	0.30	0.27	0.45 = 1 / 2 (0.30 + 0.60)
					Total	11.89 cu m	
5.	**2.5 cm thick damp proof course**						
	Long walls ...	2	5.60	0.30	—	3.36	5.60 = 5.30 + 0.30 D.P.C. under superstructure walls
	Short walls ...	2	4.20	0.30	—	2.52	
	Verandah pillars ...	3	0.30	0.30	—	0.27	
	Deduct door opening ...	1	1.10	0.30	—	0.33 (– ve)	
					Total	5.82 sq m	
6.	**1st class brickwork in superstructure** in cement mortar (1:6)						
	Long walls ...	2	5.60	0.30	3.60	12.10	
	Short walls ...	2	4.20	0.30	3.60	9.07	
	Verandah pillars ...	3	0.30	0.30	2.50	0.68	
	Above ver. lintel —						
	Front long wall ...	1	4.80	0.30	0.20	0.29	
	Sides short walls ...	2	2.00	0.30	0.20	0.24	
	Parapet —						
	Long walls ...	2	5.60	0.20	0.30	0.67	
	Short walls ...	2	4.40	0.20	0.30	0.53	
	Deduct						
	Door opening ...	1	1.10	0.30	2.10	0.69 (– ve)	
	Window openings ...	5	0.90	0.30	1.50	2.03 (– ve)	
	Shelve ...	1	0.90	0.20	1.50	0.27 (– ve)	
	Band lintel in main walls —						
	Long walls ...	2	5.60	0.30	0.10	0.34 (– ve)	
	Short walls ...	2	4.20	0.30	0.10	0.25 (– ve)	
					Total	20.00 cu m	

Centre line method. –

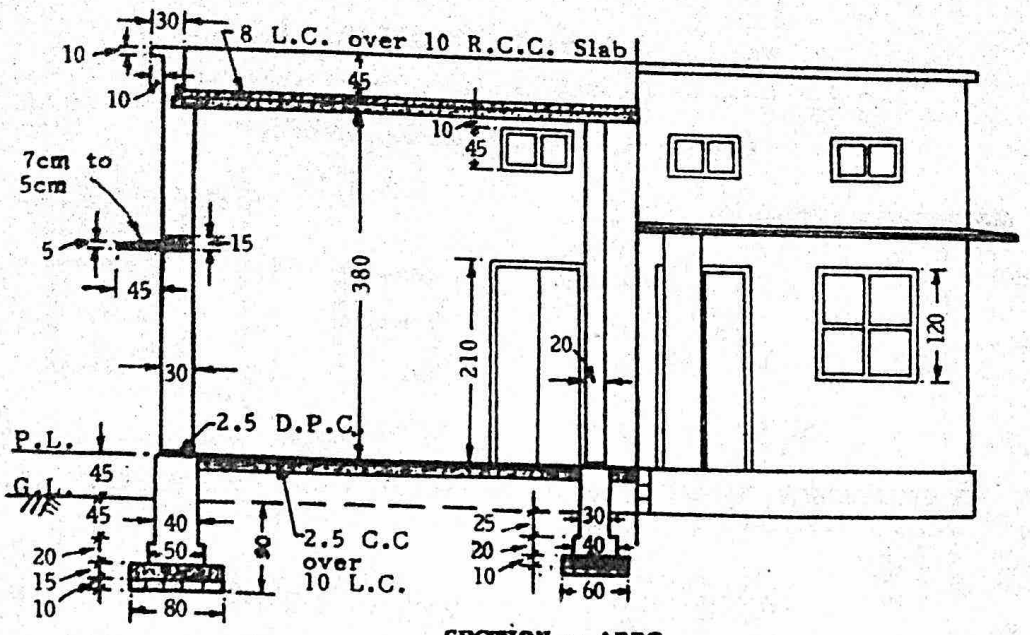
Total length of centre line for room = 2[(5 + 0.30) + (4.2 + 0.30)] = 19.60 m

Total length of centre line for verandah dwarf wall = 4.5 + 2 × 2.30 = 9.10 m

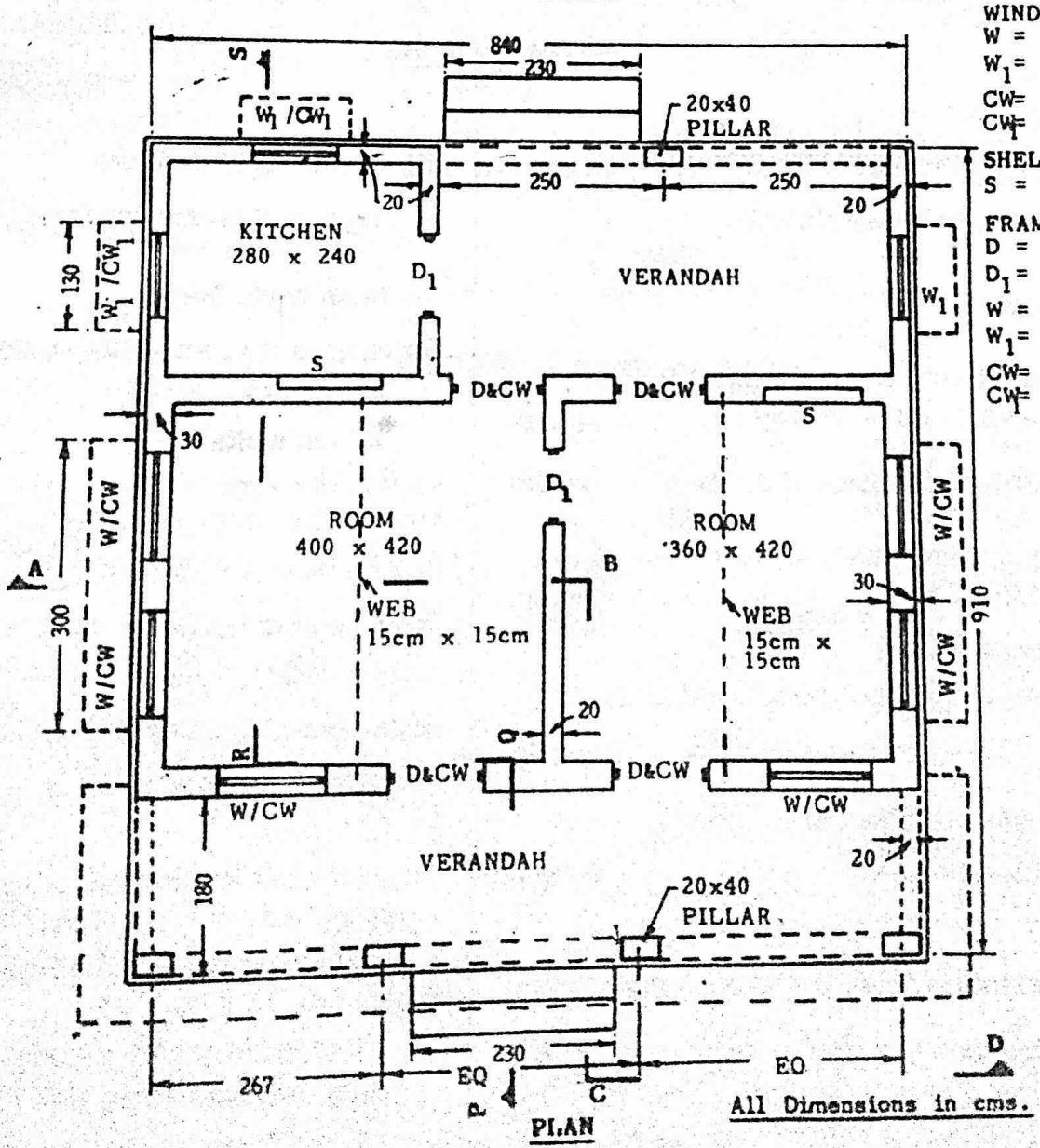
Total length of centre line for parapet wall = 2(5.60 + 4.80) – 4 × 0.20 = 20 m (i.e. outside perimeter – 4 times the thickness of wall).

(Note : For verandah dwarf wall accountability up to the centre of 20 cm wall is not necessary due to presence of isolated corner pillars).

Item No.	Description of item	No.	Length m	Breadth m	Height m	Quantity	Explanatory notes
1.	**Earthwork in excavation in foundation trenches**						
	Room ...	1	19.60	0.80	0.95	14.90	
	Pillars ...	3	0.70	0.70	0.65	0.96	
	Verandah dwarf wall ...	1	6.20	0.46	0.60	1.71	6.20 = 9.10 – 080 – 3 × 0.70
	Step ...	1	2.20	0.57	0.10	0.13	0.57 = 0.70 – 1/2 (0.46 – 0.20)
					Total	17.70 cu m	
2.	**Earthwork in filling in plinth**	Same as L.S. Method				11.04 cu m	
3.	**Lime concrete in foundation**						
	Room ...	1	19.60	0.80	0.30	4.70	
	Pillars ...	3	0.70	0.70	0.20	0.29	
	Verandah dwarf wall ...	1	6.40	0.46	0.15	0.44	6.40 = 9.10 – 2 × 0.60 / 2 – 3 × 0.70 Ver. L.C. joins with 60 cm wall at 2 junctions – 3 nos. conc. for pillars
	Step ...	1	2.20	0.70	0.10	0.15	
					Total	5.58 cu m	
4.	**1st class brickwork in foundation and plinth**						
	1st footing 60 cm ...	1	19.60	0.60	0.20	2.35	
	2nd footing 50 cm ...	1	19.60	0.50	0.20	1.96	
	Plinth wall 40 cm ...	1	19.60	0.40	0.70	5.49	
	Verandah pillars —						
	1st footing 50 cm ...	3	0.50	0.50	0.20	0.15	
	Plinth wall 40 cm ...	3	0.40	0.40	0.70	0.34	
	Verandah dwarf wall						
	(i) Lower part 50 long ...	1	7.10	0.20	0.20	0.28	Lower part coincides with 2 nos 50 cm wall and 3 pillars at 50 cm 7.10 = 9.10 – 2 × 0.50 / 2 – 3 × 0.50
	(ii) Upper part 40 long ...	1	7.50	0.20	0.70	1.05	
	Step ...	1	2.00	0.45 (av.)	0.30	0.27	
					Total	11.89 cu m	
5.	**2.5 cm thick D.P.C.**						
	Room ...	1	19.60	0.30	—	5.88	
	Pillars ...	3	0.30	0.30	—	0.27	
	Deduct door opening ...	1	1.10	0.30	—	0.33 (– ve)	
					Total	5.82 sq m	
6.	**1st class brickwork in superstructure**						
	Room ...	1	19.60	0.30	3.60	21.17	
	Pillars ...	3	0.30	0.30	2.50	0.68	
	Above pillars ...	1	8.80	0.30	0.20	0.53	8.80 = 9.10 – 0.30
	Parapet ...	1	20.00	0.20	0.30	1.20	
	Deduction for openings	Same as L.S. Method				3.58 (– ve)	
					Total	20.00 cu m	



SECTION - ABDC



PLAN

All Dimensions in cms.

Schedule

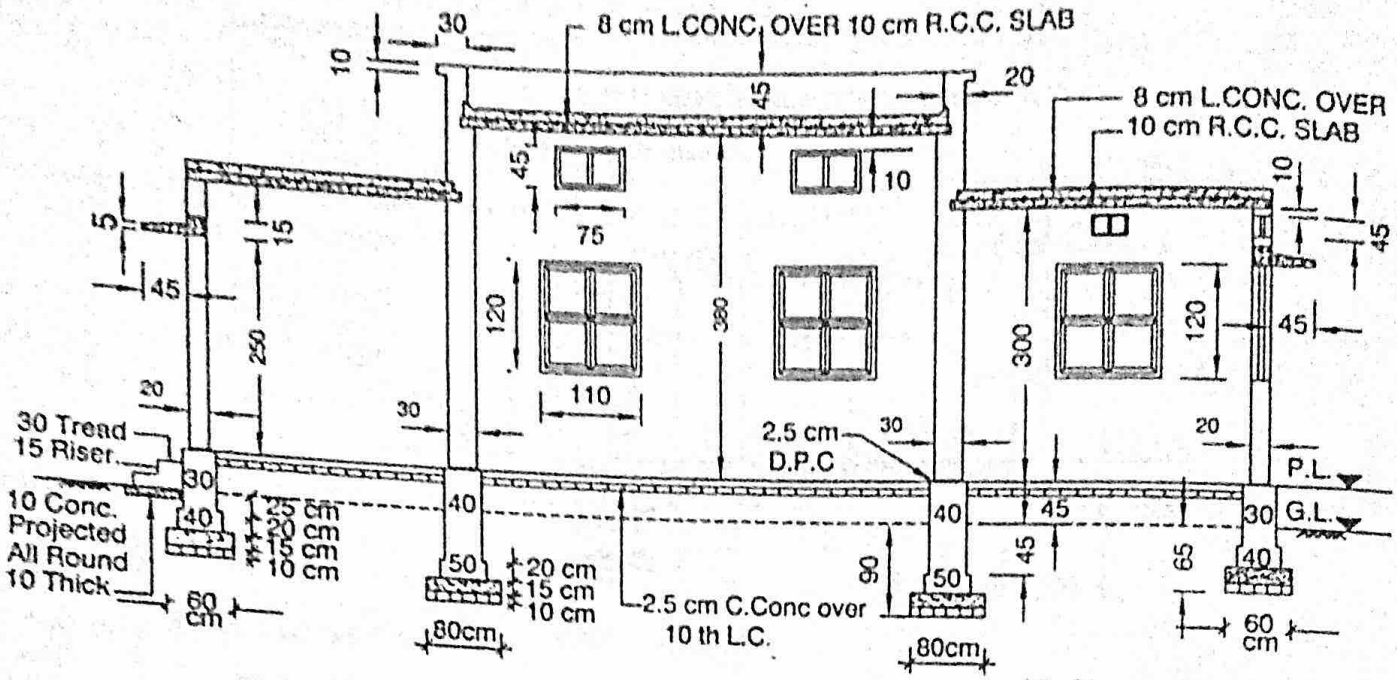
DOORS :
D = 100x210
D_1 = 90x210

WINDOWS :
W = 110x120
W_1 = 90x120
CW = 75x45
CW_1 = 60x45

SHELF :
S = 110x140

FRAME :
D = 8x10
D_1 = 8x10
W = 8x10
W_1 = 8x10
CW = 6x5
CW_1 = 6x5

FIG. 5-3



SECTION - PORS

Fig. 5-3

(A) Long and Short wall method -

Centre to centre distance -

Rooms -

Back and front,Long walls (2nos.)
$=4+3.6+0.20+2x\frac{0.30}{2}$ =8.1m

Sides,Short walls(2nos.)$4.2+2x\frac{0.30}{2}$ =4.5m

Partition (having different sec.)
=4.2+0.30 =4.5m

Verandahs -

Entire back and front, Long walls (2nos.)
$=(2.8+0.20+2x2.5)2x\frac{0.20}{2}$ =8.2m

Front verandah,Short walls (2nos.)
$=1.8-\frac{0.20}{2}+\frac{0.20}{2}$ =1.85m

Back verandah sides and kitchen front,Short walls (3nos.)$=2.4+\frac{0.30}{2}+\frac{0.20}{2}$ =2.65m

(B) Centre Line method.-

Length of centre line for -

Main walls 30cm

Outer walls of room =2[(4+0.20+3.6+0.30)+(4.2++0.30)] =25.20m

20 cm walls

Partion of rooms =4.2+0.30 =4.50m

Front and back of building-
$2[(2.8+0.20+2x2.5)+2x\frac{0.20}{2}]$ =16.40m

Front verandah sides -
$=2(1.8-\frac{0.20}{2}+\frac{0.20}{2})$ =3.70m

Brick verandah sides and walls and Kitchen from$=3(2.4+\frac{0.30}{2}+\frac{0.20}{2})$ =7.95m

Total=32.55m

Note that the number of joints=7nos.with main wall and 1No.with 20cm wall

Excluding partition wall total length of centre line =32.55-4.50 =28.05m

Number of joints =5nos.with main wall and 1no.with 20cm wall.

Details of Measurement and Quantities (Building - 3)

Sl. No.	Description of item	No.	L. m	B. m	H. m	Qty.	Explanatory Notes
1.	**Earthwork in excavation**						
	(a) For foundation trenches						
	Long-Short wall method–						
	Rooms–						
	Long walls ...	2	8.90	0.80	0.90		8.90 = 8.1 + 0.80
	Short walls ...	2	3.70	0.80	0.90		3.70 = 4.50–0.80
		T.L.	25.20	0.80	0.90	18.14	
	Partition, Short wall ...	1	3.70	0.80	0.65		3.70 = 4.50–0.80
	Verandahs–						
	Long walls ...	2	8.80	0.60	0.65		8.80 = 8.2 + 0.60
	Front Short walls ...	2	1.15	0.60	0.65		1.15 = 1.85–0.60/2–0.80/2
	Back Short walls ...	3	1.95	0.60	0.65		1.95 = 2.65–0.60/2–0.80/2
		T.L.	29.45	0.60	0.65	11.49	
				Total	(a)	29.63	
	Centre line method–						
	Outer walls of rooms ...	1	25.2	0.80	0.90	18.14	
	20 cm walls ...	1	29.45	0.60	0.65	11.49	29.45 = 32.55-7x
				Total	(a)	29.63	0.80/2-0.60/2
	(b) Steps, front and back ...	2	2.50	0.55	0.10	0.28	0.55 = 2x0.30 + 0.10
			Total	(a)	+ (b)	29.91 cu m	+ 0.30/2-0.30
2.	**Earthwork in filling**						
	*(a) For foundation trenches	$=\frac{1}{5}$	th of exc avation		(apx.)	= 5.97	
	(b) Plinth filling –						
	Room bigger ...	1	4.10	3.90	0.35	5.60	4.1 = 4.2-2x0.05
	Room smaller ...	1	3.50	4.10	0.35	5.02	(offsets)
	Verandah front ...	1	8.00	1.50	0.35	4.20	0.35 = 0.45-0.10 (L.C.)
	Verandah back ...	1	4.90	2.30	0.35	3.94	
	Kitchen ...	1	2.70	2.30	0.35	2.17	
				Total	=	26.90	cu m
3.	***Brick flat soling***						Concrete of 20 cm wall joins with 50 cm brick layer of main wall.
	For foundation trenches						
	Long-Short wall method or						
	Centre line method–						
	Rooms– ...	1	25.20	0.80	–	20.16	30.50 = 32.55- $7x\frac{0.50}{2} - \frac{0.60}{2}$
	Verandah ...	1	30.50	0.60	–	18.30	
				Total	=	38.46	sq m
4.	**Cement concrete 1:3:6 in foundation–**						
	(a) Walls–						
	Long-Short wall method –						
	Rooms –						
	Long Walls ...	2	8.90	0.80	0.15		The concrete of partition wall joins with 50 cm brickwork.
	Short walls ...	2	3.70	0.80	0.15		
	C.O.	T.L.	25.20	0.80	0.15	3.02	

* Accurately the volume is earthwork in excavation less volume of structure up to G. L.

Sl. No.	Description of item	No.	L. m	B. m	H. m	Qty.	Explanatory Notes
	B.F.					3.02	
	Partition Short wall ...	1	4.00	0.60	0.10		4.00 = 4.5-0.50
	Verandahs-						
	Long walls ...	2	8.80	0.60	0.10		
	Front Short walls ...	2	1.30	0.60	0.10		$1.25 = 1.80 - \frac{0.50}{2} - \frac{0.60}{2}$
	Back Short walls ...	3	2.10	0.60	0.10	1.83	$2.10 = 2.65 - \frac{0.50}{2} - \frac{0.60}{2}$
		T.L.	30.50	0.60	0.10	4.85	
				Total	(a)		
	Centre line method–						
	Outer walls of rooms ...	1	25.20	0.80	0.15	3.02	
	Verandah & 20 cm walls ...	1	30.50	0.60	0.10	1.83	
				Total	(a)	4.85	
	(b) Steps, back and front ...	2	2.50	0.70	0.10	0.35	
			Total	(a)	+ (b)	5.20	cu m
5.	**1st. class brickwork in foundation and plinth**						
	(a) Walls–						
	Long-Short wall method–						
	Rooms–						
	Long walls						
	1st. footing ...	2	8.60	0.50	0.20	1.72	
	~~2nd. footing~~ plinth wall...	2	8.50	0.40	0.90	6.12	
	Short walls –						
	1st. footing ...	2	4.00	0.50	0.20	0.80	4.00 = 4.50–0.50
	~~2nd. footing~~ plinth wall ...	2	4.10	0.40	0.90	2.95	
	Partition Short wall –						
	1st. footing ...	1	4.10	0.40	0.20	0.33	4.10 = 4.50–0.40
	~~2nd. footing~~ plinth wall ...	1	4.10	0.30	0.70	0.86	1st. and 2nd. footing of partition wall meet with 40 cm brick layer of main wall
	Verandahs–						
	Back Long walls–						
	1st. footing ...	2	8.60	0.40	0.20	1.38	
	2nd. footing plinth wall...	2	8.50	0.30	0.70	3.57	
	Front verandah Short walls–						
	1st. footing ...	2	1.45	0.40	0.20	0.23	1.45 = 1.85–2 x 0.40/2
	2nd. footing plinth wall ...	2	1.50	0.30	0.70	0.63	1.50 = 1.85–0.40/2–0.30/2
	Back Short walls–						
	1st. footing ...	3	2.25	0.40	0.20	0.54	2.25 = 2.65–2 x 0.40/2
	2nd. footing plinth wall ...	3	2.30	0.30	0.70	1.45	2.30 = 2.65
				Total	(a)	20.58	$-0.40/2 - \frac{0.30}{2}$
	Centre line method–						40 cm and 30 cm
	Outer walls of rooms-						of verandah meet
	1st. footing 50 cm ...	1	25.20	0.50	0.20	2.52	with 40 cm of main.
	2nd. footing 40 cm ...	1	25.20	0.40	0.90	9.07	30.95 = 32.55
	Verandah & 20 cm walls						–7 x 0.40/2–0.40/2
	1st. footing 40 cm ...	1	30.95	0.40	0.20	2.48	31.00 = 32.55
	2nd. footing 30 cm ...	1	31.00	0.30	0.70	6.51	–7 x 0.40/2–0.30/2
				Total	of (a)	20.58	2.30 is av.
	(b) Steps, front and back ...	2	2.30	0.45	0.30	0.62	cu m
			Total	(a)	+ (b) =	21.20	

Sl. No.	Description of item	No.	L. m	B. m	H. m	Qty.	Explanatory Notes
6.	**2.5 cm thick D.P.C. of cement concrete (1:2:4)**						
	Long-Short wall method						
	Rooms–						
	Long walls ...	2	8.40	0.30	–		8.40 = 8.10 + 0.30
	Short walls ...	2	4.20	0.30	–		
		T.L.	25.20	0.30	–	7.56	
	Partition Short wall ...	1	4.20	0.20	–		
	Verandahs–						
	Long walls ...	2	8.40	0.20	–		
	Front Short walls ...	2	1.60	0.20	–		$1.60 = 1.85 - \frac{0.30}{2} - \frac{0.20}{2}$
	Back Short walls ...	3	2.40	0.20	–		
		T.L.	31.40	0.20		6.28	$2.40 = 2.65 - \frac{0.30}{2} - \frac{0.20}{2}$
		Total before deduction				13.84	
	Centre line method–						
	Main walls ...	1	25.20	0.30	–	7.56	
	Verandah & 20 cm walls ...	1	31.40	0.20	–	6.28	$31.40 = 32.55$
		Total before deduction				13.84	$-7 \times \frac{0.30}{2} - \frac{0.20}{2}$
	Deductions for-						
	Door sills D ...	4	1.00	0.30	–	1.20(-ve)	For front verandah
	Door sills D_1 ...	2	0.90	0.20	–	0.36(-ve)	D.P.C. is for openings
	Back veran. openings ...	2	2.30	0.20	–	0.92(-ve)	also.
		Net total by any method				11.36	sq m
7.	**1st. class brickwork in superstructure** with cement mortar (1:6)						
	(a) Walls –						
	Long-Short wall method						
	Rooms–						
	Long walls ...	2	8.40	0.30	3.80		
	Short walls ...	2	4.20	0.30	3.80		
		T.L.	25.20	0.30	3.80	28.73	
	Partition Short Wall ...	1	4.20	0.20	3.80	3.19	
	Verandahs–						
	Long walls ...	2	8.40	0.20	3.00		
	Front Short walls ...	2	1.60	0.20	3.00		
	Back Short walls ...	3	2.40	0.20	3.00		
		T.L.	27.20	0.20	3.00	16.32	4.20 is the clear distance
				Total of (a)		48.24	$27.20 = 28.05$
							$-5 \times \frac{0.30}{2} - \frac{0.20}{2}$
	Centre line method–						
	Outer walls of rooms ...	1	25.20	0.30	3.80	28.73	
	Partition wall ...	1	4.20	0.20	3.80	3.19	
	Verandahs and kitchen wall only	1	27.20	0.20	3.00	16.32	
	C.O.			Total of (a)		48.24	

Sl. No.	Description of item	No.	L. m	B. m	H. m	Qty.	Explanatory notes
	B.F.					48.24	
	(b) Parapet wall by any method						Height of parapet from the room height.
	Back and front out to out	2	8.40	0.20	0.63	2.12	
	Sides inner to inner	2	4.40	0.20	0.63	1.11	4.40 = 4.2+2x0.10 (offsets)
	Projections —						
	Back and front out to out	2	8.60	0.10	0.10	0.17	
	Sides in to in	2	4.80	0.10	0.10	0.10	Projections may alternatively be measured as string course
			Total	of (a)	+ (b)	51.74	
	Deductions for —						
	(i) Door openings D with lintel	4	1.00	0.30	2.25	2.70(-ve)	2.25 = 2.10 + 0.15 (for lintel)
	" " D_1 " "	2	0.90	0.20	2.25	0.31	
	Window W	4	1.10	0.30	1.35	1.78	
	" W(comb) "	2	2.70	0.30	1.35	2.18	2.70=3.00–2x0.15 i.e. 0.15 less bearing
	" W_1 "	3	0.90	0.20	1.35	1.09	
	Clearstory windows, CW "	10	0.75	0.30	0.55	1.24	Consider shelf depth = 20 cm
	" " CW_1	2	0.60	0.20	0.35	1.13	
	Shelf openings S	2	1.10	0.20	1.55	0.68	
	Front verandah openings, Front	3	2.27	0.20	2.65	3.61	5 Pillers 40cm lengthwise
	Sides	2	1.60	0.20	2.65	1.70	
	Back verandah openings	2	2.30	2.20	2.65	2.44	15cm bearing considered.
	Lintel over pillers	1	2.00	0.20	0.15	0.06	
		Net	total	of (a)	+ (b)	32.32	1.95=1.80+0.15
8.	**R.C.C. Work (1:2:4) excluding reinforcement but including centering and shuttering**					cu m	2.75=2.4+0.20 +0.15
	(a) Roof slab, above rooms	1	8.10	4.50	0.10	3.65	For doors and windows 15cm bearing
	" " Front verandah	1	8.40	1.95	0.10	1.65	
	" " Back verandah	1	8.40	2.75	0.10	2.31	
	(b) Lintel over doors D	4	1.30	0.30	0.15	0.23	For S and CW, CW_1 10cm bearing
	" D_1	2	1.20	0.20	0.15	0.07	
	Windows W rooms front	2	1.40	0.30	0.15	0.13	
	" W sides (comd.)	2	3.00	0.30	0.15	0.27	
	" W_1	3	1.20	0.20	0.15	0.11	1.75=1.80–0.20+ 0.15 (bearing). For back 0.10 bearing
	Over shelf S	2	1.30	0.30	0.15	0.12	
	Clearstorey window CW	10	0.95	0.30	0.10	0.29	
	" " CW_1	2	0.80	0.20	0.10	0.03	
	Front verandah front	1	8.40	0.20	0.15	0.25	
	" " sides	2	1.75	0.20	0.15	0.11	
	Back verandah back	1	5.20	0.20	0.15	0.16	
	(c) Beams (Web only)	2	4.70	0.15	0.15	0.21	
	(d) Sun shades for –						9.30 is outer to outer = 8.4+2x0.45
	Front verandah front	1	9.30	0.45	0.06	(av.)	
	" " sides	2	2.00	0.45	0.06		
	Over windows W (pair)	2	3.00	0.45	0.06		
	" " W_1	3	1.20	0.45	0.06		1.20 same as lintel
		T.L.	22.90	0.45	0.06	0.61	
					Total	10.14	cu m

Sl. No.	Description of item	No.	L. m	B. m	H. m	Qty.	Explanatory Notes
9.	**Mild steel bars** for R.C.C. work including bending binding etc.	@	1% vol. of item 10.14	$\times \frac{1}{100} \times$	(8) = 78.5 = Total	8.18 8.10 Qtl	Wt. of mild steel per cum = 78.5 quintals.
10.	**8cm thick lime concrete** in roof terracing.						Considered the clear surface area between parapets as the item includes rounding edges. The inserted portion has been accounted as brickwork for parapet.
	Roof over rooms ...	1	8.00	4.40	—	35.20	
	Roof over front verandah	1	8.40	1.80	—	15.12	
	Roof over back verandah	1	8.40	2.60	—	21.84	
					Total	72.16 sq m	
11.	**Sal wood work** in door & window frames						
	(a) Doors D ...	4	5.20	0.10	0.08	0.166	Door frames 2 verts. and 1 hors. 5.20 = 2 x 2.10 + 1.00
	" D_1 ...	2	5.10	0.10	0.08	0.082	
	(b) Windows W ...	6	5.70	0.10	0.08	0.274	
	" W_1 ...	3	5.10	0.10	0.08	0.122	
	(c) Clearstorey Window						
	" CW ...	10	2.40	0.60	0.50	0.072	Window frames 2 verts. and 3 hors. 5.70 = 2 x 1.10 + 3 x 1.10
	" CW_1 ...	2	2.10	0.06	0.05	0.013	
					Total	0.729 cu m	CW frames 2 verts and 2 hors
*12.	**35 mm thick panelled Shutters** of Indian teak wood in doors and windows with fittings						
	(a) Doors D ...	4	0.87	—	2.03	7.06	0.87 = 1.00–2 x 0.08(frame) + 2 x 0.015 (rebate) 2 .03 = 2.1–0.08 + 0.015 –0.005 (bottom gap) 1.20–3 x 0.08 + 4 x 0.015
	" D_1 ...	2	0.77	—	2.03	3.13	
	(b) Windows W ...	6	0.97	—	1.02	5.94	
	" W_1 ...	3	0.77	—	1.02	2.36	
					Total	18.49 sq m	
13.	**25 mm thick glazed Shutters** of Indian teak wood for C.W. Shutters						
	CW ...	10	0.68	—	0.38	2.58	
	CW_1 ...	2	0.53	—	0.38	0.40	
					Total	2.98	sq m

* Fittings for doors and windows may be estimated separately counting the different fittings.

Sl. No.	Description of item	No.	L. m	B. m	H. m	Qty.	Explanatory Notes
14.	**16mm dia. window grating** bars including fitting fixing						
	(a) Windows W ...	6x8	1.40	—	—	67.2	Bars are @ 10 cm
	" W_1 ...	3x6	1.20	—	—	21.6	c/c vertically
	(b) Clearstorey windows						
	" CW ...	10x3	0.76	—	—	22.5	
	" CW_1 ...	2x3	0.60	—	—	3.6	
						114.9m	@1.58kg/m
					=	181.5 kg	
15.	**M.S. clamp** 250 mm long end bifurcated with 40x6 mm flat iron			Total	=	1.82	Qtl.
	(a) For door frames ...	6x6	—	—	—	36	May be masured
	(b) Window frames ...	9x4	—	—	—	36	by weight also.
	(c) Clearstorey windows ...	12x2	—	—	—	24	
				Total	=	96	nos.
16.	**10 cm thick lime concrete floor**						
	Room bigger ...	1	4.10	3.90	—	15.99	4.10 = 4.2–
	Room smaller ...	1	4.10	3.50	—	14.35	2 x 0.05 (offsets)
	Verandah front ...	1	7.90	1.50	—	11.85	
	Kitchen ...	1	2.30	2.70	—	6.21	
	Verandah back ...	1	4.90	2.70	—	13.23	
				Total	=	61.63	sq m
17.	**25 mm thick cement** concrete (1:2:4) floor finished smooth with neat cement						
	Room bigger ...	1	4.20	4.00	—	16.80	
	Room smaller ...	1	4.20	3.60	—	15.12	
	Verandah front ...	1	8.40	1.80	—	15.12	
	Kitchen ...	1	2.40	2.80	—	6.72	
	Verandah back ...	1	5.00	2.60	—	13.00	
	Door sills D ...	4	1.00	0.30	—	1.20	
	" " D_1 ...	2	0.90	0.20	—	0.36	
	Deduction for pillars ...	5	0.40	0.20	—	0.40(-ve)	
				Total	=	67.92	sq m
18.	**20 mm thick cement plastering** (1:4) finished with neat cement						
	(a) Plinth wall from G.L. —						
	Back and front ...	2	8.50	—	0.50	8.50	0.50 = 0.45 + 0.05
	Sides ...	2	9.25	—	0.50	9.25	(offset)
	(b) Steps back and front						
	Treads ...	2x2	2.30	—	0.30	2.76	Rises of steps has
	Sides ...	2x2	0.30 + 0.60/2	—	0.30	0.54	been considered in plinth
				Total	=	21.05	sq m
19.	**12 mm thick cement plaster (1:6)**						
	(a) Inside—						
	(i) Rooms—						
	Bigger room, Long walls	2	4.20	—	3.80	31.92	
	" " Short walls	2	4.[illegible]	—	3.80	30.40	
	C.O. ...			...		62.32	

Sl. No.	Description of item	No.	L. m	B. m	H. m	Qty.	Explanatory Notes
	B.F.	...		...		62.32	
	Bigger room Ceiling	1	4.20	4.00	—	16.80	
	Smaller room, Long walls	2	4.20	—	3.80	31.92	
	" " Short walls ...	2	3.60	—	3.80	27.36	
	" " Ceiling	1	4.20	3.60	—	15.12	
	Webs of R.C. beams ...	2x2	4.20	—	0.15	2.52	
	Jambs, sills and soffits of shelves	2	5.00	0.20	—	2.00	5.0 = 2(1.1 + 1.4) shelves dimen...
	(ii) Kitchen –						
	Long walls ...	2	2.80	—	3.0	16.80	
	Short walls ...	2	2.40	—	3.0	14.40	
	Ceiling ...	1	2.80	2.40	—	6.72	
	(iii) Front verandah –						
	Front of rooms ...	1	8.40	—	3.0	25.20	
	Front above openings ...	1	8.00	—	0.50	4.00	8.0 = 8.4–2 x 0.20
	Sides above openings ...	2	1.60	—	0.50	1.60	
	Ceiling ...	1	8.40	1.80	—	15.70	0.50 = 3.0–2.5
	(iv) Back verandah –						
	Back portion of rooms ...	1	5.00	—	3.00	15.00	
	Long side above openings	1	5.00	—	0.50	2.50	
	Side and kitchen front ...	2	2.40	—	3.00	14.40	
	Ceiling ...	1	5.00	2.60	—	13.00	2.6 = 2.4 + 0.20 .
	(v) Pillars three sides						0.80 = 0.40 + 2 x 0.20
	Front pillars ...	4	0.80	—	2.50	8.00	Following I.S.I.
	Back pillar ...	1	0.80	—	2.50	2.00	for both faces
	Deduction for –						deduct one side.
	Door openings, D ...	4	1.00	—	2.10	8.40(-ve)	Deduction for
	" " D_1 ...	2	0.90	—	2.10	3.73(-ve)	other window
	Window openings W ...	2	1.10	—	1.29	2.64(-ve)	openings has been
	Clear-storey window CW ...	6	0.75	—	0.45	2.02(-ve)	made in outside
	Ends of front verahdah ...	2	0.20	—	0.50	0.20(-ve)	plastering
	Area of pillars ...	5	0.40	0.20	—	0.40(-ve)	0.50 = 3.0–2.5
	(b) **Outside –**		Total	of insi	de =	277.87	sq m
	(i) Rooms with outside parapet						
	Sides of rooms ...	2	4.80	—	4.53	43.49	4.53 = 3.8 + 0.10
	Front & back of rooms						+ 0.80 + 0.45 + 0.10 = 4.53
	(above low roof) ...	2	8.40	—	1.35	22.68	(projection) 1.35 =
	(ii) Verandah (as solid first)						(as above)–3.0–
	Front & back verandah long	2	8.40	—	3.18	53.42	0.10–0.08
	Front verandah sides ...	2	1.80	—	3.18	11.45	2.6 = 2.4 + 0.20
	Back verandah sides ...	2	2.60	—	3.18	16.54	
	(iii) Parapet inside over –						8.00 = 8.40 –2 x 0.20
	Back and front of rooms	2	8.00	—	0.45	7.20	(parapet thickness)
	Sides of rooms ...	2	4.40	—	0.45	3.96	8.6 = 8.4 + 2 x 0.10
	(iv) Parapet top –						(projections)
	Back & front (out to out)	2	8.60	0.30	—	5.16	4.4 = 4.20 + 2 x 0.30
	Sides (in to in) ...	2	4.40	0.30	—	2.64	–2 x 0.20
	C.O. ...			...		166.22	

Sl. No.	Description of item	No.	L. m	B. m	H. m	Qty.	Explanatory Notes
	B.F. ...		...			166.22	
	(v) Sun shades both faces—						
	Front verandah front ...	1x2	9.30	0.45	—	8.37	Dimensions are
	" " sides ...	2x2	2.00	0.45	—	3.60	same as in item
	Over windows, W (pair)	2x2	3.00	0.45	—	5.40	no. (8d)
	" " W_1 ...	3x2	1.20	0.45	—	3.24	
	Front edges ...	1	22.90	0.05	—	1.14	22.90 is total length
	Side edges ...	1.2	0.45	0.06	(av.)	0.32	
	Deductions for—						
	Window openings, W ...	4	1.10	—	1.20	5.28(-ve)	
	" " W_1	3	0.90	—	1.20	3.24(-ve)	
	Clear-storey openings, CW	4	0.75	—	0.45	1.35(-ve)	
	" " CW_1	2	0.60	—	0.45	0.54(-ve)	
	Front verandah openings						
	Front ...	1	6.80	—	2.50	17.00(-ve)	6.80 = 8.40-4x0.40
	Sides ...	2	1.60	—	2.50	8.00(-ve)	
	Back verandah openings ...	2	2.30	—	2.50	11.50	
		Total of Total inside		outsi + out	de = side	141.38	sq m
		= 227.87		+141	.38 =	369.25	sq m
20.	**White washing** three coats Inside walls and ceiling ...	Same as item (19 a) =				277.87	sq m
21.	**Colour washing** two coats over a coat of white wash Outside ...	Same as item (19 b) =				141.38	sq m
22.	**Painting to woodwork** two coats over a coat to priming						Multiplying factor for both faces is 2 x 1.30 = 2.6 times the area of opening for panelled shutter. Multiplying factor is 2 x 0.80 = 1.6 times area of opening for both faces of glazed shutter
	(a) Panelled doors D ...	4x2.6	1.00	—	2.10	21.84	
	" " D_1 ...	2x2.6	0.90	—	2.10	9.83	
	(b) Panelled windows W ...	6x2.6	1.10		1.20	20.59	
	" " W_1 ...	3x2.6	0.90		1.20	8.42	
	(c) Glazed windows CW ...	10x1.6	0.75	—	0.45	5.40	
	" " CW_1 ...	2x1.6	0.60	—	0.45	0.86	
				Total	=	66.94 sq m	
23.	**Creosoting of solignum treatment** at back of frames						
	Doors, D ...	4	5.20	0.10	—	2.08	
	Doors, D_1 ...	2	5.10	0.10	—	1.02	
	Windows W ...	6	4.60	0.10	—	2.76	4.60 = 2(1.20 + 1.10) middle piece is not to be considered.
	Windows W_1 ...	3	4.20	0.10	—	1.26	
	Clear-storey windows CW	10	2.40	0.06	—	1.44	
	" " CW_1	2	2.10	0.06	—	0.25	4.2 = 2(0.90 + 1.2)
				Total	=	8.81 sq m	
24.	**Painting to iron works** two coats						Multiplying factor = 1 for painting all over measured flat overall.
	For window gratings, W ...	6x1	0.94	—	1.04	5.87	
	" " W_1 ...	3x1	0.74	—	1.04	2.31	
	Clearstorey window gratings, CW	10x1	0.65	—	0.35	2.28	
	" " " CW_1	2x1	0.50	—	0.35	0.35	
				Total	=	10.81	sq m
25.	**100 mm dia. C.I.** rain water spouts with painting ...	6	0.90	—	—	5.4	r m

Deductions for openings bearing in masonry

No direction is made for the following:-

1. Opening each up to 1000 cm^2 or 0.1 m^2.
2. Ends of beams, pores, reaction, purlins etc. up to 500cm^2 or 0.05m^2 ,72 $inch^2$.
3. Bed plate, wall plate, bearing of chajjas & they like up to 10cm,4inch depth.

- For rectangular openings full deduction is made deduct= L x h x thickness of wall
- Doors and windows with small segmental arches;

  Deduction is made for rectangular portions only up to the springing line. The segmental portion is considered as solid to allow for the extra expense in constructing the arch & the filling of with thin wall.

  Then the deduction is L x h x thickness of wall
- Segmental earth openings;

  Deduction is made for the whole opening, the rectangular portion as well as the segmental portion. The area of segmental portion = $\frac{2}{3}$rl + $\frac{Rq}{12}$

  Then the total deduction will be, $\left[(l\ x\ h) + \left(\frac{2}{3}\ x\ l\ x\ r\right)\right]$x thickness of wall
- Semicircular arch openings;

  The area of semicircular portion is $\frac{\pi r^2}{2}$, but from the deduction the area of the semicircular is obtained approximately $\frac{3}{4}$ of span x rise $\left(\frac{3}{4}\ x\ l\ x\ r\right)$

  The total deduction will be $\left[(l\ x\ h) + \left(\frac{3}{4} lr\right)\right]$x thickness of wall
- Arch masonry work;

  Masonry work in arches is calculated in cubic meter separated by multiplying the mean length of the arch by the thickness of the arch & the quantity of arch masonry = lm x t x thickness of wall
- Lintel over opening;

  Lintels are either of R.C.C. or R.B. quantities are calculated in m^3

  Length of lintels = l x t x thickness of wall

  Deduction =l x t x thickness of wall

Plastering:

Plastering usually 12mm thick is calculated in mm^2

- For walls the measurements are taken from the whole face of the wall for both sides of solid & deductions for openings are made in the following manner;

I. No deduction is made for ends of beams, posts, rafters, etc.
II. For small opening up to 0.5 m^2 no deduction is made.
III. For opening exceeding 0.5m^2 but not excluding 5m^2,Deduction is made for one face only.
IV. For opening above 3m^2 deduction is made for both faces of the openings.

White washings:

The quantities are computed in m^2 & are usually same as plastering.

- The inside is usually white washed or distempered and this item will be same as foe inside plaster. The outside is colour washed & the quantities of colour washing will be same as for outside plaster.

Painting:

Painting or varnishing of doors & windows are computed in m^2.

- The dimension should be taken for outer dimensions of the chow khat i.e., outer dimension of doors &windows. The area is measured flat (not greater).
- No separate measurement is taken for the chow khat, the area is same as the area of wall opening.
- For iron bars, grills etc. the area of the clear opening inside the chow khat is taken.
- For both faces of doors & windows, the simple area as measured above is multiplied by appropriate nos. as below.
  i. Paneled, framed, braced, ledged & batten end or ledge battened & braced - $2\,{}^{1}/_{4}$ times one surface area, foe both sides.
  ii. Fully glazed or gauged – one time one surface area for both sides.
  iii. Partly paneled & partly gauged – Two times one surface area for both sides.
  iv. Flush door – Same two times one surface area for both sides.
  v. Venetian – Three times one surface area for both sides.
  vi. Iron bars, grills, in windows – One time the area of clear opening in between chow khat for overall.

This covers also for chow khat or three faces, painting is done in 2 or 3 coats , usually over a coat & priming.

CH-3

Analysis of rate

The process of determining the unit rate of finished item of work is known as *Analysis of rate or Rate of analysis.*

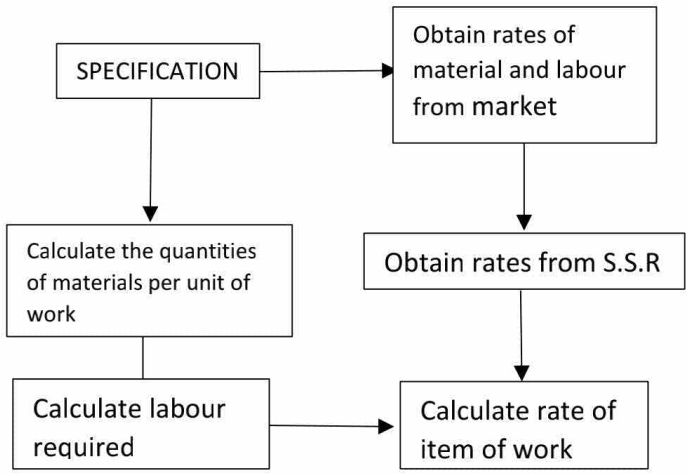
The unit of a finished item of work depends on the following;

- The quantities of materials required of desired quality & their cost.
- The quantities of required proportions of mortars with their cost.
- The labour charges for required number, for construction.
- Miscellaneous petty expenditure.

Purpose of rate analysis;

- To work out the actual cost of item per unit quantity.
- To work out the economical use of materials and labour.
- To work out the cost of extra items which were not provided in the agreement, but are to be done as per directions of the department.
- To revise the schedule of rates due to increase in the cost of material and labour.

Flow chart of rate analysis;



Standard Schedule Rates(S.S.R.):

The rates of materials at source and wages of labour of various categories and conveyance charges of materials including loading, unloading and special allowance such as area allowance, ghat road allowance etc. needed for the construction of works at various departments is fixed by the concerned board of chief engineers at state level with their construction knowledge during every financial year and communicated ta all the government departments for adoption in their construction activities.

- The rates fixed by the concerned engineering authority for the materials and wages of labour for the financial year are known as S.S.R. and they are adopted.

Cost of material:

Cost of material at source,

- Cost of material where it is available.
- Cost of material offered by a company or by distributor.
- It does not include the cost of transportation.
- It is a basic rate per unit of material at the place of manufacture or production.
- It is fixed in standard schedule of rate.

Cost of material at site,

- It includes of cost of material and cost of transportation.
- It includes, Cost of material at source, Cost of loading & unloading, Road tax, Cost of stacking and storing, Toll gate fee.

Labour Cost:

- The cost of wages paid to workers during an accounting period on daily, weekly or monthly basis.
- In order to obtain costs, the number of various categories of labour required per unit item is known from the standard data book and daily wages of each labour is fixed in standard schedule of rate of current year.
- The number multiplied by the respective wage per day gives the labour cost.

Standard data Book:

- The quantities of material and labour required per unit of various finished item of work have been standardized and given in the data book by the british engineers.
- It is being followed in all the government departments of states & also in government of India.

Types of labour in construction:

- Mulia(Men and Women)
- Casual Labour
- Watchman
- Electrician
- Plumber
- Painter
- Carpenter
- Welder
- Bar Bender
- Mason
- Mechanic
- Blaster
- Driver
- Machine Operator

Classification based on skill of labour:

- 1st class- Skilled labour
- 2nd class- Semi skilled labour
- 3rd class- Unskilled labour

Variation in labour rates:

- Labour rates varies from place to place.
- Labour rates are more in urban areas.
- Labour rates are more in places like forests and hilly areas.
- The rate given S.S.R are based on average rates.

Area allowances :

- The labour rates given in S.S.R shall be adopted after adding suitable areas allowance given in S.S.R. for, Municipal corporation, Hills, Jail premises, Industrial area, Agency/Tribal areas etc.
- 25% extra over the rates on labour component of works is allowed in all Municipal Corporation of states.
- 40% extra over the rates on labour component of works for greater town area.
- Allow 20% extra over basic rates on labour component of works in all district headquarters and the remaining municipal limits (upto a belt of 12 km from municipal limits)
- 15% extra is allowed over labour rates for the works in the jail compounds. Only equivalent number of men mulia shall be provided in the Jail premises and no women milia are allowed inside.

Rate of analysis of earthwork excavation :

Example 1

Earthwork excavation and depositing on bank with initial lead of 30.00 m and initial lift of 1.5 m in loamy and clayey soils like black cotton, red earth and ordinary gravelly soils for foundations unit 10.00 cum.

Description of work	Quantity	Rate	Per	Amount
Rate as per S.S.R. for loamy and clay soils like black cotton, red earth and ordinary gravelly soils.	10.00 cum	200	1 cum	2000.00
50% extra for foundation trenches		200 x 50%	1 cum	100.00
				Rs 2100.00

Rate of analysis of lime concrete:

Example 2

Lime concrete in foundation with 40mm gauge brick ballast unit 1 cum. & Quantity 10 cum. With white lime and surkhi 1 : 2 (proportion 1:2:6)

Particulars	Quantity or Nos.	Rate Rs. P.	Cost Rs. P.
Materials-			
Brick ballast 1st Class 40 mm gauge—	10 cum	1000.00/cum	10000.00
White lime slaked —	1.6 cum	1000.00/cum	1600.00
Surkhi --	3.2 cum	800.00/cum	2560.00
		Total=	14160.00
Labour-			
Mistri(Head Mason) --	½ nos.	450.00 per day	212.50
Mason --	1 nos.	400.00 per day	400.00
Blender --	12 nos.	250.00 per day	3000.00
Men or women coolie --	12 nos.	230.00 per day	2760.00
Water man --	2 nos.	230.00 per day	460.00
Sundries T&P etc. (Misc. petty things)-	Lump sum	150.00 L.S.	150.00
		Total of materials and labour	21142.5
Add 1 ½ % water charges –			317.14
Add 10% Contractor's profit –			2114.25
		Grand total=	23573.85 for 10 cum
Rate per cum $=\frac{23573.85}{10}$ =Rs 2357.00			

Rate analysis for cement concrete:

- The total quantity of materials for 10 cum concrete & the dry material will be (let take 52% of total volume) 15.2, the proportion of cement concrete 1:4:8
- Quantity of cement will be, Cement =$\frac{1}{1+4+8} x$ 15.2 x1440 =1683.7 kg =34 bag
- Therefore sand =$\frac{4}{13} x15.2$ =4.67 cum & Aggregate=$\frac{8}{13} x15.2$=9.35 cum

Particulars	Quantity or number	Rate Rs. P.	Cost Rs. P.
Materials-			
Aggregate 40mm gauge-	9.35 cum	1000.00/cum	9350.00
Sand(local) -	4.67 cum	1500.00/cum	7005.00
Cement (34 bags) -	1.17 cum	9700.00/cum	11349.00
Labour-		Total=	27704.00
Head mason -	½ no	425.00 per day	212.5
Mason -	1 ½ no	400.00 per day	600.00
Blender -	12 no	250.00 per day	3000.00
Men or women coolie -	18 no	230.00 per day	4140.00
Bhishti(including curing)-	4 no	230.00 per day	920.00
Sundries T&P etc. -	Lump sum	150.00 L.S.	150.00
		Total=	9022.50
		Total of material and labour	36726.50
		Add 1 ½ % of water charge -	550.90
		Add 10% contractor's profit -	3672.65
		Grand total=	40950.05
Rate per cum=40950.05/10= Rs 4095.00			

Rate analysis of I-class brickwork with mortar:

Example 3

I-class brickwork in superstructure with 20 x10 x10 cm brick with 1:6 cement mortar unit 1 cum. Total quantity 10 cum.

Particulars	Quantity or number	Rate	Cost
		Rs. P.	Rs. P.
Materials-			
Brick I-class (500 brick per cum) –	5000 nos.	8000.00 /cum	40000.00
Cement(13.5 bags) --	0.45 cum	9700.00/cum	4365.00
Sand (Local) --	2.7 cum	1500.00/cum	4050.00
Labour-		Total=	48415.00
Head mason --	½ no.	425.00/day	212.50
Mason --	10 no.	400.00/day	4000.00
Blender --	7 no.	250.00/day	1750.00
Coolie --	10 no.	230.00/day	2300.00
Bhishti --	2 no.	230.00/day	460.00
Scaffolding --	Lump sump	350.00 L.S.	350.00
Sundries T&P etc. --	Lump sump	120.00 L.S.	120.00
		Total=	9192.50
		Total of materials and labour –	57607.50
		Add 1 ½ % water charges --	864.00
		Add 10% Contractor's profit --	5760.75
		Grand total=	64232.25
Rate per cum= 64232.25/10 = Rs 6423.00			for 10 cum

Rate of analysis of plastering :

Example 4

12 mm Plastering 1:6 unit, 1 sq. m. Quantity 100 sq.m.

Particulars	Quantity or numbers	Rate	Cost
		Rs. P.	Rs. P.
Materials-			
Cement (9 bags) --	0.30 cum	9700.00/cum	2910.00
Sand(local) --	1.80 cum	1500.00/cum	2700.00
Labour –		Total=	5610.00
Head mason --	1/3 no.	425.00/day	141.70
Mason --	10 no.	400.00/day	4000.00
Blender including ranking of joints ---	15 no.	250.00/day	3750.00
Bhishti (curing) --	¾ no.	230.00/day	172.50

Scaffolding --			
Sundries T&P etc. --	Lump Sump	300.00 L.S.	300.00
		Total=	8364.20
		Total of material & labour-	13974.20
		Add 1 ½ % of water charges --	210.00
		Add 10% of Contractor's profit --	1397.42
		Grand total=	15581.62
Rate per cum=15581.62/10= Rs 155.00			for 10 cum

Rate analysis of scaffolding:

Scaffolding charges for brickwork based on S.S.R.

As per SSR-2014 OPWD

Particular	Per	Rate (Rs)
For superstructure in first floor	1 cum	63.32
For II floor	1 cum	86.00
For III floor	1 cum	108.67
For each additional floor over III floor	1 cum	22.68

Scaffolding charges for plastering based on S.S.R.

Particular	Per	Rate (Rs)
For first floor	10 cum	63.30
For II floor	10 cum	86.00
For III floor	10 cum	108.70
For each additional floor over III floor	10 cum	22.70

Rate of analysis of painting, white washing:

- Painting with best synthetic enamel paint two coats to new wood work over primary coat of white lead including cost and conveyance of all materials and all labour charges etc. complete for finished item of work in wood.(Quantity 10 cum)

Sl no.	Description	Quantity	Rate	per	Amount
1	Wood primer	1.60 lit	135.00	1 lit	216.00
2	Synthetic enamel paint	1.20 kg	238.00	1 kg	285.00
3	Painter I class	0.57 no.	400.00	1 no.	228.00
4	Painter II class	1.33 no.	320.00	1 no.	425.60
				Total=	1155.20

- Oil bound distemper two coats over one coat of primary to interior faces including cost and conveyance of all materials and all labour charges etc. complete for finished item of work(Quantity 10 cum)

Sl no.	Description	Quantity	Rate	per	Amount
1	Primary coat distemper	0.97 kg	81.00	1 kg	78.57
2	Painter I class	0.21 no	400.00	1 no.	84.00
3	Painter II class	0.49 no.	320.00	1 no.	156.80
4	Distemer	1.343 kg	81.00	1 kg.	108.783
5	Painter I class	0.15 no.	400.00	1 no.	60.00
6	Painter II class	0.35 no.	320.00	1 no.	112.00
7	Man Mulia	0.5 no.	280.00	1 no.	140.00
8	Woman mulia	0.8 nos	280.00	1 no.	224.00
				Total=	964.153

- Painting with white cement two coats over primary coat including cost and conveyance of all materials and labour charges etc for exterior walls complete for finished item of work(Quantity 10 cum)

Sl no.	Description	Quantity	Rate	per	Amount
1	Cost of water proof cement	3.75 kg	47.00	1 kg.	176.25
2	Painter I class	0.57 no.	400.00	1 no.	228.00
3	Painter II class	1.33 no.	320.00	1 no.	425.00
4	Man Mulia	0.50 no.	280.00	1 no.	140.00
5	Women mulia	1.00 no.	280.00	1 no.	280.00
				Total=	1249.85

Rate of analysis of reinforcing steel & R.C.C. Works:

R.C.C. (1:2:4) using 20 mm size H.B.G. metal including cost and conveyance of all materials and all labour charges excluding cost of steel etc. Complete for finished item of the work in R.C.C. works(Quantity 1 cum).

Sl no.	Description	Quantity	Rate	per	Amount
1	Cost of 20 mm H.B.G metal	0.92 cum	1150.00	1 cum	1058.00
2	Cost of sand	0.46 cum	540.00	1 cum	248.40
3	Cost of cement (331 kg)	0.23 cum	4100.00	1000 kg	1357.10
4	Mason-I	0.12 no.	350.00	1 no.	42.00
5	Mason-II	0.28 no.	320.00	1 no.	89.60
6	Man Mulia	2.10 no.	280.00	1 no.	588.00
7	Woman mulia	3.50 no.	280.00	1 no.	980.00
8	Vibrating charges		50.00	1 cum	50.00
9	Machine mixig charges		50.00	1 cum	50.00
			Total=		4463.10

R.C.C. (1:2:4) using 20 mm size H.B.G. metal including cost and conveyance of all materials and all labour charges excluding cost of steel etc. Complete for finished item of the work in sun shades 600 mm, wide 75 mm and 50 mm thick at ends in the first floor. (Quantity 1 rm)

Sl no.	Description	Quantity	Rate	per	Amount
1	Cost of R.C.C. in G.F.	0.0375 cum/rm	3843.00	1 cum	144.11
2	Centering charges	1 rm	38.00	1 rm	38.00
3	Lifting charges	0.0375 cum	111.00	1 cum	4.16
				Total=	187.00

Material calculation of reinforcing steel,

For calculation of reinforcement in slab,

BBS of slab,

Dia. Of main bar=10ø

Dia. Of distribution bar=8ø

Spacing =150mm=.150 metre

Main bar quantity= $1+\frac{15}{.150}$ =101 Nos.

Distribution bar quantity= $1+\frac{6}{.150}$ = 41 Nos.

Weight of main bar = $\frac{d^2 * L}{162.2}\ X\ Number\ of\ bars = \frac{10^2 * 6}{162.2}\ x\ 101$ =373 kg

Weight of distribution bar = $\frac{d^2 * L}{162.2}\ X\ Number\ of\ bars = \frac{8^2 * 15}{162.2}\ x\ 101$=243 kg

Total weight = 373 +243 = 616 kg

Price of TATA steel= Rs 46/kg

=616 x 46 =**Rs 28336**

Binding wire =10kg/ton (Thumb rule)

=616/100 = 6.1 kg

Per kg rate =Rs 65

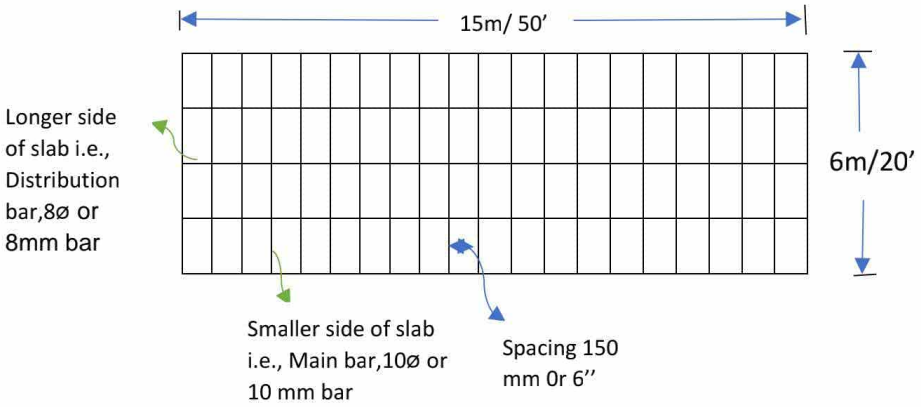
=6.1 x 65 =**Rs 396.5**

Labour rate = Rs 6.5/kg

= 616 x 6.5 =**Rs 4004**

Total cost = 28336+397+4004

=Rs 32,737.00



Rate analysis of Flooring:

➲ Flooring with polished Shahabad stone 15 mm thick laid in cement mortar (1:2) and pointing with Cement mortar (1:2) including cost and conveyance of all materials and all labour charges etc. complete for finished item of work in ground floor.

Sl. No.	Description	Quantity	Rate	Per	Amount
1	Polished shaded stone 15 mm thick	10.10 sq.m.	1544.00	10 sqm	15594.40
2	Cement mortar(1:2)	0.12 cum	322.30	1 cum	38.676
3	Pointing charges	10 sq.m.	1200.00	10 sqm	1200.00

4	Mason I	0.96 no.	350.00	1 no.	336.00
5	Mason II	2.24 No.	320.00	1 no.	716.00
6	Man Mulia	2.20 No.	280.00	1 no.	627.00
7	Women Mulia	1.10 No.	280.00	1 no.	616.00
				Total=	19129.076

- Measurements for plaster shall be paid on area basis for the area actually plastered.
- Flooring with polished cuddapah stone 15 mm thick laid in cement mortar (1:2) and pointed with cement mortar (1:2) including cost and conveyance of all materials and all labour charges etc. complete for finished item of work in first floor (Quantity 10 sqm)

Sl. No.	Description	Quantity	Rate	Per	Amount
1	Polished shaded stone 15 mm thick	10.10 sq.m.	1287.00	10 sqm	1299.90
2	Cement mortar(1:2)	0.12 cum	322.30	1 cum	30.68
3	Pointing charges	10 sq.m.	1200.00	10 sqm	1200.00
4	Mason I	0.96 no.	350.00	1 no.	336.00
5	Mason II	2.24 No.	320.00	1 no.	716.00
6	Man Mulia	2.20 No.	280.00	1 no.	616.00
7	Women Mulia	1.10 No.	280.00	1 no.	308.00
8	Lifting charges		45.00	10 sqm.	45.00
				Total=	4552.38

Lead and lift:

Lead is the horizontal distance between the center of pit and the center of the back of deposit of sand.

Lift is the vertical distance between the center of the depth of cutting and center of the bank of deposit of sand.

- The initial lead and lift are 10.00 m and 2.00 m respectively.
- For greater lead or lift the rates will be different for every unit of 10 m lead and for every unit of 2m lift.

Additional lead and lift:

- For every additional lead of 10 m or part thereof, one extra lead is to be added.
- For example, when earthwork is carried over a distance of 18 m, one initial lead and additional lead is added (10m + 8m).
- For every additional lift of 2m or part of it, one extra lift is to be added.
- For example, when earthwork is carried over a height of 2.5 m, one initial lift and additional lift is added (2m +0.5 m)

Lead:

- The material is transported from the production place (source or quarry) to the work site (place where the construction is going on), The distance is known as lead.

Lead charges;

- The cost of conveyance of the material from the source to work spot is known as lead charges.
- It varies with reference to types of the material, types of road surface, the material is conveyed.
- In general, the charges on Car Track are 1.1 times the Metal Road and on Sand Track is 1.4 times the metal road.

Blasting charges;

- Materials like rough stone, 40 mm size H.B.G., the stones are extracted by blasting at quarry.
- If the material actually extracted by quarry by blasting, the blasting charges per unit as fixed in S.S.R. are to be added to initial rate.

Cease charges;

- Generally, these charges are also fixed by government from time to time.
- These are normally 37% over seniorage charges.

Stacking charges;

- If the material life 40 mm size H.B.G. conveyed to the road side has to be stacked to the departmental gauge for premeasurements.
- The charges allowed per unit as fixed S.S.R. is known as stacking charges.

Crushing charges;

- If the metal life 20 mm size H.B.G metal are actually crushed from the crushing machines to ensure to correct size.

Conveyance rates of material:

Sl. No	Lead	Per	S.S.R. 2007-2008
1	Up to 250 m	cum	44.80
2	250 to 500 m	cum	66.10
3	1 km	cum	86.70
4	2 km	cum	96.80
5	3 km	cum	96.00

6	4 km	cum	100.30
7	5 km	cum	104.50
8	6 km	cum	113.50
9	7 km	cum	
10	8 km	cum	
11	9 km	cum	
12	10 km	cum	
13	Beyond 20 and upto 30 km (rate/km)	cum	4.10
14	Beyond 30 and upto 50 km (rate/km)	cum	4.00
15	Beyond 50 and upto 80 km (rate/km)	cum	3.90
16	Beyond 80 and upto 100 km (rate/km)	cum	3.60
17	Beyond 100 km (rate/km)	cum	3.40
18	Loading	cum	8.70
19	Un loading	cum	7.20
20	Stacking	cum	4.60

Types of lead:

There are various types of track,

1. Car track
2. Sand track
3. Metal road
4. Ghat road

Conversion of lead to metal track,

- One unit of car track is equal to 1.1 unit of metal road.
- One unit of sand track is equal to 1.4 unit of metal road.
- Ghat road steeper than 1.20 are taken equal to 1.5 to 2.5 times the actual length depending on circumstances.

Example,

Lead for sand has 3 km of sand track, 6 km of cart track and metal road of 15 km. What is the total lead in terms of metal road ?

Total lead = (3 x 1.4)+(6x1.1)+15

=25.8 kms

ABSTRACT OF COST OF ESTIMATE:

- The cost of an item of work is estimated from the amounts already calculated in tabular form and the cumulative cost is calculated in the abstract form of the calculation.
- The prices of various work items are taken for completed work items according to the sequence of rates or actual workable rates or analysed rates.
- To make contingencies for miscellaneous minor items that do not fall under any classified head of work items, a percentage of 3 % of the total expense is typically applied and a percentage of around 2 % is given for work charged institutions. The approximate cost of work is given by the total so collected.

Valuation:

Valuation is the art of assessing the present fair value of a property at a specified time.

- It is the estimate of the value of a particular item in terms of money. It is based on certain facts and factors.
- Cost means the actual cost of construction or purchase, while value means the present market value which may not be same as the cost.
- Value depends upon the supply and demand where as cost is the amount required for construction.
- The term price is used to indicate the cost of the construction plus the profit of the contractor.
- A building whole cost of construction is Rs. 4,50,000.00, when put for sale it may fetch Rs. 5,00,000.00. This sale price is the value of the building.

Necessity of valuation ;

- The subject valuation was first restricted to land acquisition. When some property required to be acquired by the government for public purpose was appropriated and compensation paid to the owner.
- Since almost all the banks are advancing loans against property on regular loan basis, the valuation of property is essentially needed for advancing loans on property. At present valuation of property is mostly needed to give valuation of immovable properties, for the following purposes;

  i. For security of loans and mortgages.
  ii. For sale and purchase purposes.
  iii. For taxation purpose.
  iv. For VISA purpose.
  v. For rent fixation.
  vi. For insurance purposes.
  vii. For fixing court fee stamp.
  viii. For paying compensation in case of compulsory acquisition.
  ix. For rehabilitation the people.
  x. For release of loan installments as and when the construction of building is going on.
  xi. For highlighting the various assets and liabilities.

Factors governing valuation;

- Valuation of a building depends on various factors such as;
  - Types of building,
  - Location of building,
  - Demand of people,
  - Building structure and durability,
  - Size, Shape, Frontage of the building,
  - Width of roadways,
  - Quality of materials used in construction.

Terminology of valuation:

Scrap value :

- Scrap value is the value of dismantled materials.
- For a building when the life is over at the end of its utility period the dismantled materials as steel, bricks, timber, etc. will fetch a certain amount which is the scrap value of building.
- In case of machine the scrap value is the value of metal only.
- The scrap value of a building may be about 10 % of its 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 scrap 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 uneconomic, may be sold and one may purchase the same for use for some other purpose, the sale value of the machine is the salvage value.
- It does not include the cost of removal, sale, etc.
- Normally, the scrap value or the salvage value of a property or an asset has got some positive figure, but it may also be zero or negative.
- For example the scrap value of a R.C.C structure be negative, as dismantling and removal will be costly.

Market value:

- The market value of a property is the amount which can be obtained at particular time from the open market if the property it put for sale.
- The market value will differ from time to time according to demand and supply.
- The market value also changes from time to time for various miscellaneous reason such as industry, changes on fashions, means transport, cost of materials and labour etc.

Book value:

- Book value is the amount shown in the account book after allowing necessary depreciation.
- The book value of a property at a particular year is the original cost minus amount of depreciation up to the previous year.
- The book value depends on the amount of depression allowed per year and will be gradually reduced year to year and at the end of the utility period of the property the book value will be only scrap value.
- The book value gradually reduces by a particular amount every year from the original value till it reaches the scrap value.

Rateable value:

- Rateable value is the net annual letting value of property, which is obtained after deducting the amount of yearly repairs from the gross income.
- Municipal and other taxes are charged at a certain percentage on the rateable value of the property.

Obsolescence and annuity:

Obsolescence:

- The value of property or structure become less by its becoming out of date in style, in structure in design, etc. and this is termed as Obsolescence.
- An old dated building with massive walls, arrangements of rooms not suited in present days and for similar reasons, becomes obsolete even if it is maintained in a very good condition and its value becomes less due to obsolescence.
- The Obsolescence may be due to the reason such as progress in arts, changes in fashions, changes in planning ideas, new inventions, improvements in design technique etc.
- A machine of old design may become obsolete, though it may be in good running condition and its value will be less.

Annuity:

- Annuity is the annual periodic payments for repayments of the capital amount invested by a party.
- These annual payments are either paid at the end of the year or at the beginning of the year, usually for a specified number of years.

- Types of annuity,
  - If the amount of annuity is paid for a definite number of periods or years, it is known as **Annuity certain**. In such cases the amount of annuity will be higher, the lesser the number of the years the higher will be the amount and vice versa to clear up to the whole amount of capital.
  - If the amount of annuity is paid at the beginning of each year, this is known as **Deferred annuity**.
  - If the payments of annuity continue for indefinite period, it is known as **perpetual annuity**.
  - Though annuity means annual payments, the amount of annuity may be paid by monthly installments or quarterly of half yearly installments.

Gross income and net income,

- Gross income is the total income and includes all receipts from various sources of outgoings and the operational and collection charges are not deducted.
- Net income is the saving or the amount left after deducting all outgoings, operational and collection expenses from the gross income or total receipt.
- Net income= Gross income – outgoings
- Outgoings or the expenses which are required to be incurred to maintain the revenue of the building. The various types of outgoings are taxes, repairs, sinking fund, loss of rent.

Capital cost,

- Capital cost is the total cost of construction including land or the original total amount required to possess a property.
- It is the original cost and does not change, while value of a property is the present cost which may be calculated by methods of valuation.

Capitalized value,

- The capitalized value of property is the amount of a money whose annual interest at the highest prevailing rate of interest will be equal to the net income from the property.
- To determine the capitalized value of a property it is required to know the net income from the property and highest prevailing rate of interest.

Year's purchase (Y.P.),

- Years purchase is defined as the capital sum required to be invested in order to receive an annuity of Rs. 1.00 at certain rate of interest.
- For 4% interest per annum, to get Rs 4.00 it requires Rs 100.00 to be deposited in a bank.
- To get Rs. 1.00 per year it will be required to deposit ¼ of Rs. 100.00

i.e., 100/4 =25.00

Thus year's purchase = 100/ Rate of interest = 1/ i

Where, i= Rate of interest in decimal

Sinking fund:

The fund which is gradually accumulated by way of periodic on annual deposit for the replacement of the building or structure at the end of its useful life, is termed as sinking fund.

- The object of creating sinking fund is to accumulate sufficient money to meet the cost of construction or replacement of the building or structure after its utility period.
- The sinking fund is created by regular annual or periodic deposits in compound interest bearing investment, which will form the amount of replacement at the end of the utility period of the property.
- The sinking fund may be created by taking a sinking fund policy with an insurance company or by depositing in bank to collect higher compound interest.

- The calculation of sinking fund depends on the life of the building and scrap value of the building for the cost of old materials.
- The cost of land is not taken into account in calculating sinking fund as land remains intact.
- The sinking fund may also be required for payment of loan.
- If a property is owned or constructed by taking loan a sinking fund may be created by setting aside a sum of money annually, to accumulate with compound interest in order to repay the debt at the end of the term of loan.
- The amount thus set aside is also known as **Annuity payment**.
- The amount which will be set aside may also be paid directly to lender by way of annual installment.
- The total amount of sinking fund to be accumulated (S)= Cost of building – scrap value
- The amount of annual installment of the sinking fund may be found out by the formula.

$$I = \frac{Si}{(1+i)^n - 1}$$

Where, S= Total amount of sinking fund to be accumulated.
n= Number of years required to accumulate the sinking fund
i= Rate of interest in decimal (e.g., 5%=0.05)
I= Annual installment required

Q-1 An old building has been purchased by a person at a cost of Rs. 30000 /- excluding the cost of land. Calculate the amount of annual sinking fund at 4% interest assuming the future life of the building as 20 years and scrap value of the building as 10% of the cost of purchase.

Ans.

Given data,

S= 30,000 – scrap value

= 30,000-10/100 x 30000

= Rs 27,000.00 /-

i= 4%=0.04

n = 20 years

Annual installment of sinking fund, $I = \frac{Si}{(1+i)^n - 1}$

$= \frac{27000 \, x \, 0.04}{(1+0.04)^{20} - 1}$ =Rs. 907.20 /-

❖ Annual installment for sinking fund required for 20 years is Rs. 907.20 /-

Depreciation:

Depreciation may also define as the decrease or loss in the value of a property due to structural deterioration use, life wear and tear, decay and obsolescence.

- Depreciation is dependent on original condition, quality of maintenance and usage.
- The general annual decrease in the value of a property is known as annual depreciation.
- Usually, the percentage rate of depreciation is less at the beginning and gradually increase during later years.
- The amount of depreciation is known, the present value of a property can be calculated after deducting the total amount of depreciation from the original cost.
- Depreciation is the gradual exhaustion of the usefulness of a property.

Types of depreciation,

- Physical depreciation
  - Wear and tear from operation
  - Action of time and natural forces.
- Functional depreciation
  - Inadequacy or suppression
  - Obsolescence

Method of solving depreciation:

The various methods of calculating depreciation are;

1. Straight line method
2. Constant percentage method
3. Sinking fund method
4. Quality survey method

1. <u>Straight line method</u>:
   - In this method it is assumed that property loses its value by the same amount every year.
   - A fixed amount of the original cost is deducted every year, so that at the end of the utility period only the scrap value is left.

$$\text{Annual depreciation} = \frac{Original\ cost - Scrap\ value}{Life\ in\ year}$$

$$D = \frac{C-S}{n}$$

Where, C= original cost
n= Life of property
D= Annual depreciation
S= Scrap value

2. <u>Constant percentage method</u> :
   - This method also called declined balance method.
   - Usually, the value of property decreases year after year till expiry of its life period.
   - Here it is assumed that property losses its value by a constant percentage of its value at the beginning of every year.

$=C-PC$

$=C(1-P)$

Value of property at the end of second year,

$=C(1-P)-C(1-P)P$

$=C(1-P)^2$

The value of property at the end of n year,

$S=C(1-P)^n$

$\text{Or } (1-P) = \left(\frac{S}{C}\right)^2 \frac{1}{n}$

   - The above formula does not hold good, when the scrap value becomes zero.

3. <u>Sinking fund method</u> :
   - Here the depreciation of the property is assumed to be equal to annual sinking fund plus the interest on the fund for the year.
   - If R be the annual sinking fund and p,q,r etc. be the interest on the sinking fund succeeding year and C be the original cost.

- Where as the amount of annual installment sinking fund may be found as,

$$R = (1+i)^{n-1}$$

Where,

R= Annual installment required

S= Total amount of sinking fund to be accumulated

n= No of years required for accumulating total sinking fund

i= Rate of interest in decimal (e.g. 8% = 0.08)

4. Quantity survey method :
   - In this method the property is studied in detail and loss in value due to life, wear and tear, decay, obsolescence, etc. worked out.
   - Each and every step is based on some logical ground without any fixed percentage of the cost of the property.

Problem-1 :

A concrete mixer was purchased for ₹ 1,00,000 /- in the year 1992 . The salvage valve of the machine after 6 years is ₹ 30,000/- . Calculate the depreciation and book value each year by;

i. Straight line method
ii. Constant percentage method
iii. Sinking fund method

Given data,

Capital cost, C= ₹ 1,00,000/-

Salvage value, S= ₹ 30,000/-

i. Straight line method ;

Annual depreciation, $D = \frac{C-S}{n}$

$$= \frac{100000-30000}{6}$$

=₹ 11, 667 /-

ii. Constant percentage method ;

Rate of depreciation,

$$P = \left(1 - \left(\frac{S}{C}\right)^{1/n}\right)$$

$$= \left(1 - \left(\frac{30,000}{1,00,000}\right)^{1/6}\right)$$

= 0.1818

Annual depreciation,

$$D_n = C[(1-P)^{n-1} - (1-P)^n]$$

$$D_1 = ₹1,00,000[(1-0.1818)^{1-1} - (1-0.1818)^1]$$

=₹ 18,180 /-

D_2= ₹1,00,000$[(1-0.1818)^{2-1}-(1-0.1818)^2]$
= ₹14,875 /-

D_3= ₹1,00,000$[(1-0.1818)^{3-1}-(1-0.1818)^3]$
= ₹ 12,171 /-

D_4= ₹1,00,000$[(1-0.1818)^{4-1}-(1-0.1818)^4]$
=₹ 9,958 /-

D_5= ₹1,00,000$[(1-0.1818)^{5-1}-(1-0.1818)^5]$
= ₹ 8,148 /-

D_6= ₹1,00,000$[(1-0.1818)^{6-1}-(1-0.1818)^6]$
=₹ 6,667 /-

Total depreciation,

$D_t = D_1 + D_2 + D_3 + D_4 + D_5 + D_6$

=₹ 18,180 +₹14,875+₹ 12,171+₹ 9,958+₹ 8,148+₹ 6,667

= ₹ 69,999 =₹ 70,000

iii. Sinking fund method ;

Total amount of sinking fund, S=Capital salvage valve

S= 100000- 30000

=₹ 70,000 /-

Rate of interest, i= 5%= 0.005

Annual installment of sinking fund,

$$I=\frac{Si}{(1+i)^n-1}$$

$$=\frac{70,000x0.05}{(1+0.05)^6-1}$$

=₹ 10,291 /-

Annual depreciation,

D_1 =₹ 10,291 /-

D_2 = ₹ 10,291$(1+0.005)^1$ = ₹ 10,291

D_3=₹ 10,291$(1+0.005)^2$=₹ 11,346

D_4=₹ 10,291$(1+0.005)^3$= ₹11,913

D_5=₹ 10,291$(1+0.005)^4$=₹12,509

D_6=₹ 10,291$(1+0.005)^5$=₹13,135

Total depreciation,

$D_t = D_1 + D_2 + D_3 + D_4 + D_5 + D_6$

=₹ 10,291+₹ 10,291+₹ 11,346+₹11,913+₹12,509+₹13,135

=₹70,000/-

Method of valuation :

Building valuation is done following different methods;

1. Rental Method of Valuation
2. Direct comparison with capital value
3. Valuation based on profit
4. Valuation based on cost

5. Development method of valuation
6. Depreciation method of valuation

1. Rental Method of valuation

In this method, net income from the building is calculated by deducting all the outgoings from gross rent. Year's purchase (Y.P.) value is calculated by assuming a suitable rate of interest prevailing in the market. For example, consider a rate of interest as 5%, the Year's Purchase = 100/5 = 20 years.

- The net income multiplied by the year's purchase gives the capitalized value or the valuation of the property. This method is used only when the rent is known or probable rent is determined by enquiries.

2. Direct Comparison with Capital Value

When the rental value is not known, this method of direct comparison with the capital value of a similar property of the locality is used. In this case, the valuation of the property is fixed by direct comparison with the valuation or capitalized value of similar property in the locality.

3. Valuation based on Profit

This method of valuation is suitable for commercial properties such as hotels, restaurants, shops, offices, malls, cinemas, theatres etc. for which the valuation depends on the profit. In such cases, the net annual income is used from the valuation after deducting all the outgoings and expenses from the gross income. The valuation of building or property is found by multiplying the net income by year's purchase. The valuation, in this case, can be too high in comparison with the actual cost of construction.

4. Valuation based on Cost

In this case, the actual cost of construction of the building or the cost incurred in possessing the building is considered as the basis to determine the valuation of the property. In this case, necessary depreciation is allowed and points of obsolescence are considered.

5. Development method of valuation

This method is suitable for properties which are under the developmental stage. For example, if a large place of land is to be divided into plots after provision for roads and other amenities, this method is used. The probable selling price of the plots, the area required for amenities and other expenditures for development is considered for valuation.

- Development method of valuation is also used for properties or buildings which are required to be renovated by making alterations, additions, improvements etc. The value is calculated based on the anticipated net income generated from the building after renovation work is complete.

- The net income multiplied by year's purchase gives the valuation of the property. The actual cost of the property with a total cost of renovation shall be compared with the anticipated value of the property to decide if the renovation is justified.

6. Depreciation Method of Valuation

Based on the depreciation method, the valuation of the buildings is divided into four parts:

1. Walls
2. Roofs
3. Floors
4. Doors and windows

Cost of each part at the present rate is calculated based on detailed measurement. The life of each part is calculated by the formula:

$$D = P\,[(100 - rd)/100)]^n$$

where,

D = depreciated value

r = rate

d = depreciation

n = age of building in years

rd values are considered as per following table:

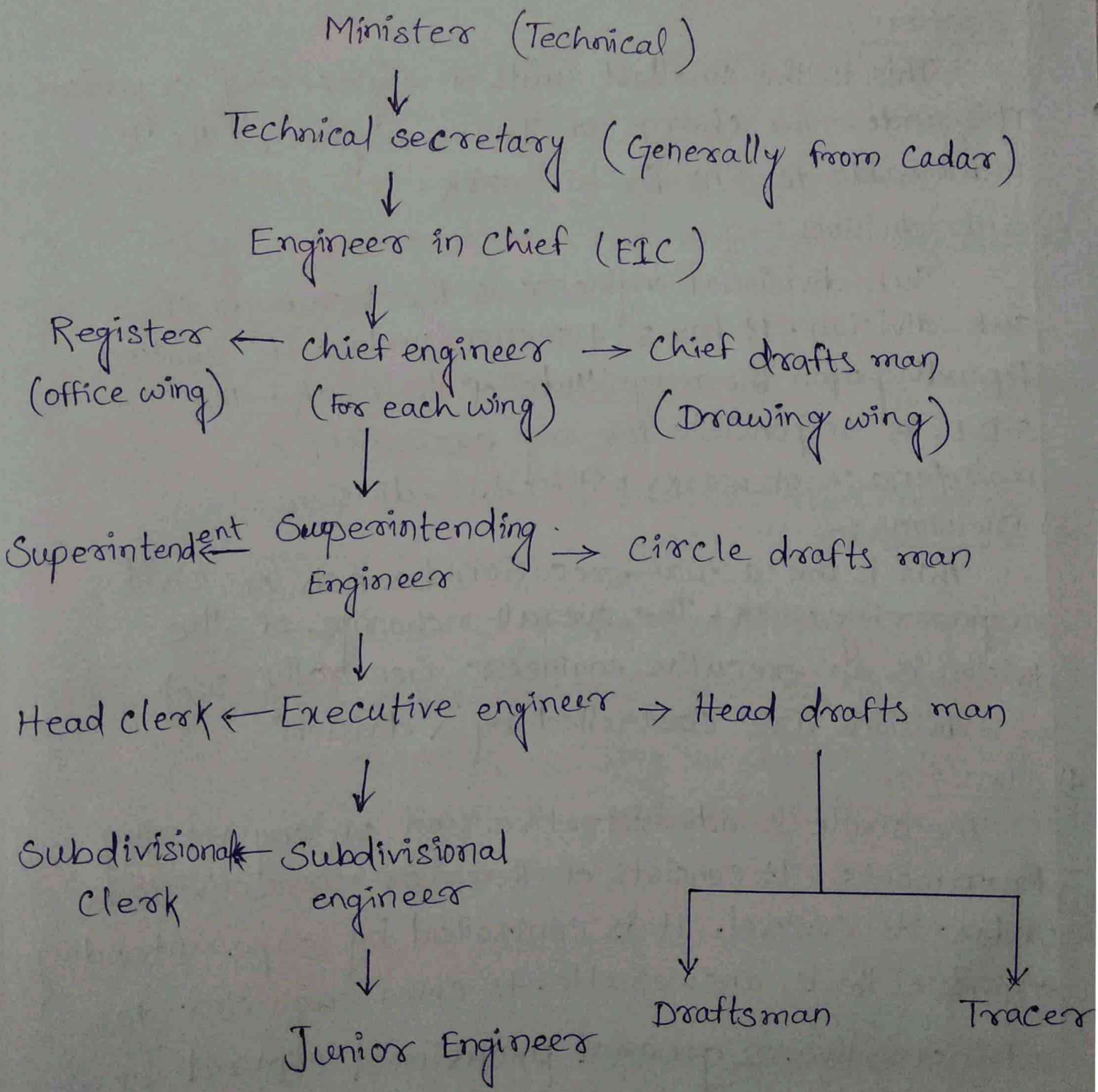
Life of Building	rd
100 years	1.0
75 years	1.3
50 years	2.0
25 years	4.0
20 years	5.0

The valuation calculated is exclusive of the cost of land, amenities, water supply, electrical and sanitary fittings etc. and is used only for buildings which are well maintained. If it is not well maintained, then suitable deductions are considered in the valuation calculated above. The present values of the land, amenities, water supply, electrical and sanitary fittings should be added to find the valuation of the property.

ch-4

Administrative set-up & Hierarchy of Engineering Department

The following tree shows the technical & administrative set up of engineering department;



Formation of units :-

1) Section
2) Sub-division
3) Division
4) Circle
5) Chief's office.

1) Section :-

This is the smallest units of engineering organisation. It is under the charge of Junior engineer. He is answerable to S.D.E for his work.

2) Sub-division :-

Sub-divisional engineer is the incharge of a sub-division. It has 3-4 section under its control depending upon the magnitude of the work. The S.D.E. is responsible for any execution & maintenace of works within sub-divisions.

3) Divisions :-

This is the actual execution branch of civil engineering work. The overall incharge of the division is an executive engineer. Generally 3-4 sub divisions are controlled by a division.

4) Circle :-

The circle is administrative unit of engineering departments. It consists of Three or more divisions under its control. It is controlled by superintending engineer. He is answerable to chief engineer for adminstrative & general professional control of public works.

5) Chief's office :-

It is an adminstrative & professional wing headed by a chief engineer. He is responsible for efficient working of a department.

Responsibilities in details :-

(a) Engineer in chief :-

Overall administrator of P.W.D., all chief engineers are responsible to him.

(b) Administrative & technical head of department :-

May be are or more chief engineer's depending upon the quantum of work.

(c) Responsible & Answerable to technical secretary for the performance :-

Helped by register in administrative matters.

(d) Superintending Engineer (SE) :-

There are about 3-4 SE's under chief engineer.

(e) Adminstrative & professional head of a circle :-

He looks after the working of divisions under his control with respect to administrator & profession strictly as per laid down.

→ He is answerable to chief engineer for all works under his control.

→ He controls employment, transverse & other service matters of 5th circle baring engineer office.

superintendent accountants & circle head drafts man.

→ He carries out all the responsibility as assigned to him by chief engineer. He is assisted by circle superintendent, circle head drafts man & accountants and all official matters.

Executive of divisional engineer :-

→ He is incharge of a division.

→ He is responsible for all execution work in his division.

→ He is answerable to S.E. for execution of works & management of his division.

→ He acts as disbursing officer & can withdraw money from the teasury on behalf of government.

→ He is assisted by head draftsman, accountant & head clerk in running day to day administration.

sub-divisional engineer :-

He is incharge of a sub division & a division has 4-5 sub-divisions under it depending upon the quantum of work.

→ Answerable to executive engineer for all work.

→ Maintain records of all expenditures in sub-division & submits reports to executive engineer every month.

→ He is to check stores under his charge twice a year.

→ Any serious accidents or problem during execution is duely informed to executive engineer immediately.

Junior engineer :-

A junior engineer is the junior most technical post having the charge of a section.

→ He is a govt. representative on any construction being carried out by the department.
→ A few duties arries under in relation to stores.
→ He is responsible for proper receipt & stacking of stock items & their prevention from getting damaged.
→ The issue of material should only be done by him on production of duely filled & signed in dent.
→ The shortage & surplus of stores should be promptly dealt with.
→ The checking of stores should be twice a year by him. The items should be physically checked by him on due dates.
→ He should submit the report to S.D.E.

⇒ In relation to work ;

He is to prepare detailed estimates for special repairs going on a building. All survey works in his section are to be carried out by him.

→ The supervision of a building should be done checking the use of specification & quality of work.

→ He has to look after the maintenance of building under his charge.

→ He is to check & submit the progress report of a project.

⇒ In relation to accounts ;-

→ The account should be well maintained & closed on due date.

→ The muster roll, the acquittance roll of contingent labour should be prepared & submitted of proper time.

→ Bill for making payments should be prepared carefully.

Muster roll : Its preparation & use for making payment of pay & wages

Muster Roll is used for keeping a complete record of attendance, payment made , un-paid wages and work done by daily labour engaged on the execution of works. It is the basic records of payment made to daily labour. After the payment is made ,the Muster Roll is kept as a Voucher.

Muster rolls should be prepared and dealt with in accordance with the following rules :

1. One or more muster rolls should be kept for each work, but muster rolls should never be prepared in duplicate. It is permissible, however, to keep one muster roll for labourers employed upon several small works, in cases in which no harm can result if the total unpaid wages are regarded as relating only to the largest work in the group.
2. Labourers may be paid more than once a month and the period covered by each payment may be determined locally; but separate rolls must be prepared for each period of payment.
3. The daily attendances and absences of labourers and the fines inflicted on them should be recorded daily in part I of the muster roll in such a way as —
    (i) to facilitate the correct calculation of the net wages of each person for the period of payment;
    (ii) to render it difficult to tamper with or to make unauthorized additions to or alterations, in entries once made, and
    (iii) to facilitate the correct classification of the cost of labour by works and sub-heads of works where necessary.
4. After a muster roll has been passed by the local officer, payment thereon should be made as expeditiously as possible. Each payment should be made or witnessed by the official of highest standing available, who should certify to the payments individually or by groups, at the same time specifying both in words and in figures, at the foot of the muster roll, the total amount paid on each date. If any items remain unpaid, the details thereof should be recorded in part II of the register of arrears, before the memorandum at the foot of the muster roll is completed by the person who made the payment.
5. Unpaid items should subsequently be carried forward from muster roll to muster roll until they are paid, the payments being recorded and certified in part II in the same way as payments of current items. It is optional, however, with the local officer to adopt any other alternative method of making payments of unpaid wages, provided that a systematic record of items remaining unpaid is maintained on the basis of the original entries made in part II of the muster roll and that suitable precautions are taken to prevent double payments.

6. Wages remaining unpaid for three months should be refunded into Treasury.
7. The payment of daily labour through a contractor instead of by muster roll in the usual way, is objectionable in principle. In a case of great emergency it may sometimes be found impossible to employ labour otherwise than through a contractor. Should it be possible in such a case, to determine the quantities of work done after its completion or at intervals during its progress, it is expedient to pay the contractor, at suitable rates, on the basis of work actually executed. To avoid disputes with the contractors, they should be encouraged to sign the daily reports in token of their acceptance as correct.

   N.B.—The use of the muster roll is not permissible in such cases.

8. When it is necessary to bring labourers and artificers from a distance they may be allowed wages for the number of days occupied in the journey to and from the site of the work, if they join the work with proper despatch. At the discretion of the local officer, bona fide travelling expenses may also be allowed to them. The above charges must be borne by the estimate of the work.