G.P. Dhangar

Quantity Surveying and Valuation

Er. Sandeep
Civil Engg. Deptt.

CONTENTS

INTRODUTION

- QUANTITY SURVEYING:-Is computation or calculation of the quantities required and expenses likely to be incurred in the construction of work.
- ESTIMATING:-The procedure of working out of approx. cost of a work by working out the quantities and then calculating the cost at suitable rates.
- COSTING:-The determination of actual cost of the work before the execution of it.
- VALUATION:-The procedure of finding out the value of fair price of the properties.

TYPES OF ESTIMATES

- Rough cost estimate.
- Plinth area estimate.
- Cubical content estimate.
- Detailed estimate.
- Revised estimate.
- Supplementary estimate.
- Annual repair.
- Extension estimate.

METHOD OF ESTIMATING

- Complete and fully dimensioned plans and section.
- Detailed specification.
- Rate of various items.

MAIN ITEMS OF WORK

- Earth work.
- Concrete in foundation.
- D.P.C
- Masonry.
- Flooring.
- Roofing.
- Pillars.
- Drip course, Cornice and parapet.
- Plastering and Pointing.
- Wood work and Iron work.

DETAILED MEASUREMENT FORM

Detail of Measurement Form :

Item No.	Description or Particulars	No.	Measurements			Content or Quantity
			Length m	Breadth m	Height or Depth, m	

Abstract of cost. The cost of each item of work is calculated from the quantities multiply by rate (current or schedule of rates) in a prescribed form *abstract of cost* and then total cost is worked out. A percentage of 5% is added for contingencies. Then the grand total will give the estimated cost of the project.

Abstract of Cost Form :

Item No.	Description or Particulars	Quantity	Unit of payment	Rate	Amount

UNIT MEASUREMENT

Units of Measurements, Units of Payments in MKS and FPS system.

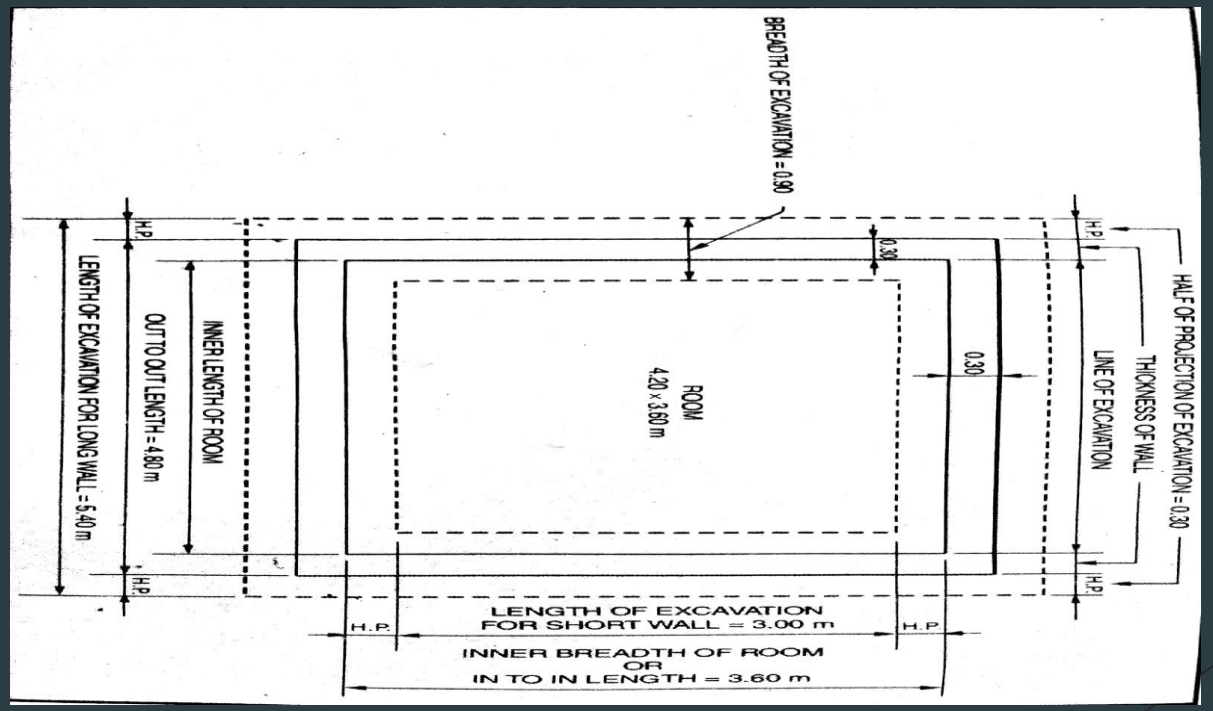
S. No.	Particulars of items	Units of measurements in M.K.S.	Units of payments in M.K.S.	Units of payments in F.P.F.
	I. EARTH WORK :			
1.	Earth work in excavation in ordinary soil including 1.5 m lift and 30 m lead and filling the excavated earth around masonry in 15 cm (6") layers with compaction	cu m	% cu m	% cft
2.	Earth filling under floors, (rammed)	cu m	% cu m	% cft
3.	Rock excavation	cu m	% cu m	% cft
4.	Earth work in banking, digging in road and irrigation channel	cu m	% cu m	% cft
5.	Puddling or puddle clay core	cu m	% cu m	% cft
6.	Surface dressing and levelling, etc.	sq. m	per sq. m	% sft
7.	Cutting of trees (Girth-specified)	no	per no	per no
8.	Sand filling.	cu m	per cu m	% cft
	II. CONCRETE :			
1.	Cement concrete 1 : 4 : 8 in foundation	cu m	per cu m	% cft
2.	Cement concrete 1 : 5 : 10 in foundation	cu m	per cu m	% cft
3.	Cement concrete 1 : 6 : 18 in foundation	cu m	per cu m	% cft
4.	Plain cement concrete 1 : 2 : 4	cu m	per cu m	% cft
5.	Reinforced cement concrete (R.C.C.) 1 : 2 : 4 in beams, slabs, lintels, etc.	cu m	per cu m	per cft
6.	R.C.C. shelves 1 : 2 : 4 (thickness spacified, generally 4 cm thick)	sq. m	per cu m	per sft
7.	R.C.C. chajja and sun-shade	cu m	per cu m	per cft
8.	Precast cement concrete	cu m	per cu m	per cft
9.	Cement concrete jali work (thickness specified)	sq. m	per sq m	per sft
10.	Cement concrete bed plates	cu m	per cu m	per cft
11.	Damp proof course (D.P.C.) of cement concrete 1 : 2 : 4 with one or two coats of bitumen laid hot and sprinkled with sand (thickness specified generally 2.5 cm to 4 cm)	sq. m	per sq. m	
12.	Lime concrete in foundation.	cu m	per cu m	
	III. BRICK WORK :			
1.	First class burnt bricks (B.B.) in mud mortar in foundation and plinth	cu m	per cu m	%cft
2.	First class burnt bricks (B.B.) in mud mortar in superstructure	cu m	per cu m	%cft
3.	First class B.B. in cement mortar 1 : 5 in foundation and plinth	cu m	per cu m	% cft

METHOD OF BUILDING ESTIMATE

LONG WALL & SHORT WALL METHOD OR OUT TO OUT & IN TO IN METHOD

The length of long wall add 2times half projection and then calculate the quantity.

The length of short wall subtract 2 times half projection and then calculate the quantity by multiplying the length breadth and height.



WORK OUT THE QUANTITIES OF THE FOLLOWING

1. Excavation for foundation
2. Lime concrete in foundation
3. Mud masonry in foundation
4. Mud masonry in superstructure.

Example 2.4. *Work out the quantities of the following items of work from the given drawing of a room 4.20 m × 3.60 m :*

1. *Excavation for foundation*
2. *Lime concrete in foundation*
3. *Mud masonry in foundation and plinth*
4. *Mud masonry in superstructure.*

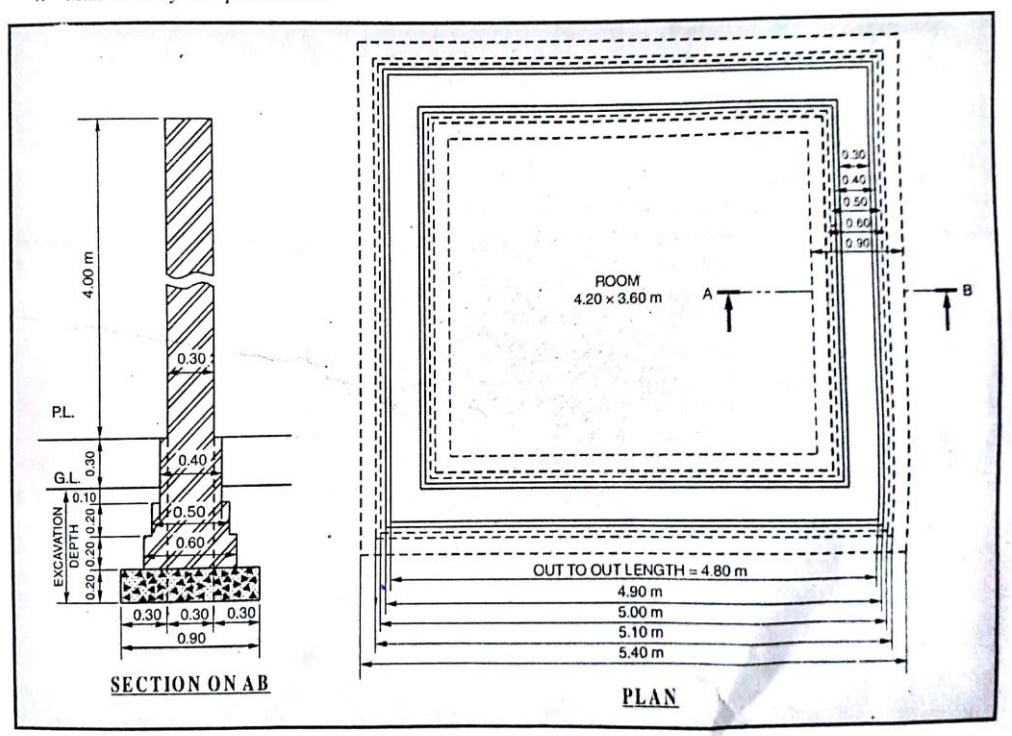


Fig. 2.5.

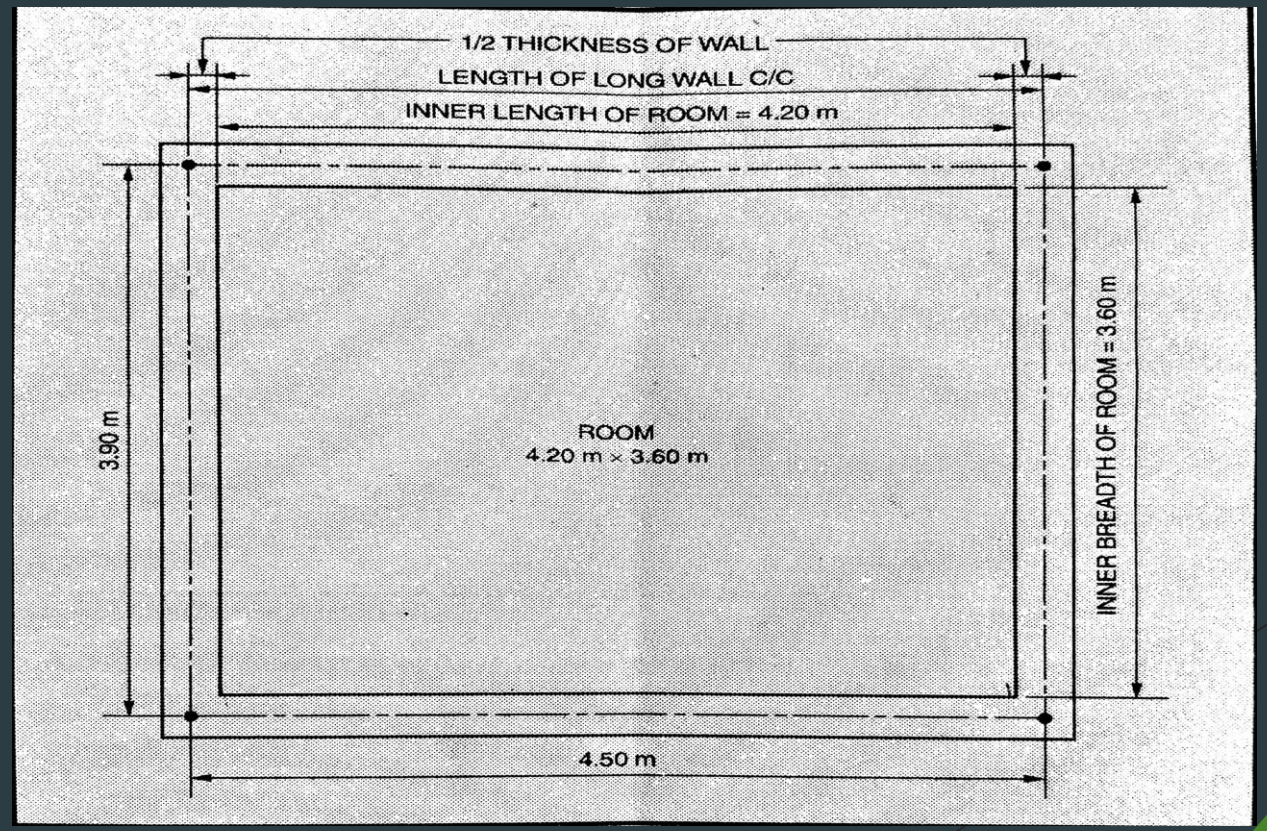
Item No.	Particulars	No.	Measurements L m	B m	H m	Quantity	Experimental notes
1.	**Excavation of foundation :**						H.P. = $\frac{(0.90-0.30)}{2}$ = 0.30 m
	Long walls of room	2	5.40	0.90	0.70	6.80	$L = 4.80 + 0.30 + 0.30 = 5.40$ m
	Short walls of room	2	3.00	0.90	0.70	3.78	$L = 3.60 - 0.30 - 0.30 = 3.00$ m
	Total					**10.58**	**cu m**
2.	**Lime concrete in foundation :**						
	Long walls of room	2	5.40	0.90	0.20	1.94	*L* = Same as excavation
	Short walls of room	2	3.00	0.90	0.20	1.08	*L* = Same as excavation
	Total					**3.02**	**cu m**
3.	**Mud masonry in foundation & plinth :**						H. P. = (0.60 – 0.30) / 2 = 0.15 m
	I Footing :						$L = 4.80 + 0.15 + 0.15 = 5.10$ m
	Long walls of room	2	5.10	0.60	0.20	1.22	$L = 3.60 - 0.15 - 0.15 = 3.30$ m
	Short walls of room	2	3.30	0.60	0.20	0.79	H.P = (0.50 – 0.30) / 2 = 0.10 m
	II Footing :						$L = 4.80 + 0.10 + 0.10 = 5.00$ m
	Long walls of room	2	5.00	0.50	0.20	1.00	$L = 3.60 - 0.10 - 0.10 = 3.40$ m
	Short walls of room	2	3.40	0.50	0.20	0.68	H.P. = $\frac{(0.40-0.30)}{2}$ = 0.5 m
	III Footing including plinth :						$L = 4.80 + 0.05 + 0.05 = 4.90$ m
	Long walls of room	2	4.90	0.40	0.40	1.57	$L = 3.60 - 0.05 - 0.05 = 3.50$ m
	Short walls of room	2	3.50	0.40	0.40	1.12	
	Total					**6.38**	**cu m**
4.	**Mud masonry in super-structure :**						
	Long walls of room	2	4.80	0.30	4.00	11.52	*L* = out-to-out
	Short walls of room	2	3.60	0.30	4.00	8.64	*L* = in-to-in
	Total					**20.16**	**cu m**

CENTRE LINE METHOD

- CENTRE LINE METHOD:-

LENGTH OF LONG WALL CENTRE TO CENTRE=INNER BREADTH OF ROOM+HALF THICKNESS OF WALL ON ONE SIDE +HALF THICKNESS OF WALL ON ONTHER SIDE

LENGTH OF SHORT WALL CENTRE TO CENTRE=INNERR BREADTH OF ROOM+ONE THICKESS OF WALL.



ESTIMATE THE QUANTITIES OF THE FOLLOWING BY CENTRE LINE METHOD

1. Excavation for foundation.
2. Lime concrete in foundation.
3. Mud masonry in foundation.
4. Mud masonry is superstructure.

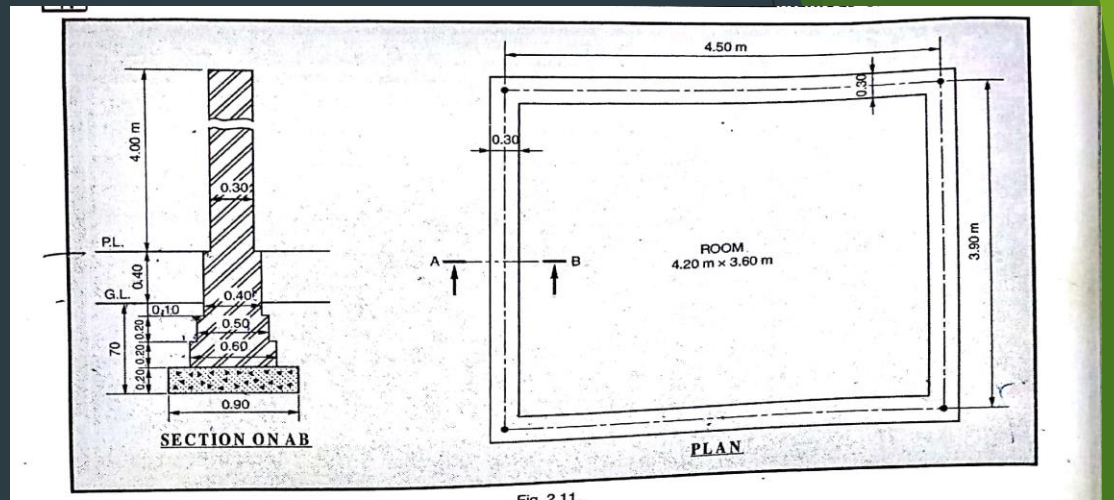


Fig. 2.11.

Solution. Details of measurements and calculation of quantities (Example 2.9).

Item No.	Particulars	No.	Measurements L m	B m	H m	Quantity	Experimental notes
1.	**Excavation for foundation :**						
	Room's long walls	2	4.50	0.90	0.70	5.67	*L* = Centre to centre
	Room's short wall	2	3.90	0.90	0.70	4.91	*L* = Centre to centre
	Total					**10.58**	**cu m**
2.	**Lime concrete in foundation :**						
	Room's long wall	2	4.50	0.90	0.20	1.62	
	Room's short wall	2	3.90	0.90	0.20	1.40	
	Total					**3.02**	**cu m**
3.	**Mud masonry in foundation and plinth :**						
	Room's long wall						
	I Footing	2	4.50	0.60	0.20	1.08	
	II Footing	2	4.50	0.50	0.20	0.90	
	III Footing (including plinth)	2	4.50	0.40	0.80	1.44	
	Room's short wall						
	I Footing	2	3.90	0.60	0.20	0.94	
	II Footing	2	3.90	0.50	0.20	0.78	
	III Footing (including plinth)	2	3.90	0.40	0.80	1.25	
	Total					**6.39**	**cu m**
4.	**Mud masonry in superstructure :**						
	Room's long wall	2	4.50	0.30	4.00	10.80	
	Room's short wall	2	3.90	0.30	4.00	9.36	
	Total					**20.16**	**cu m**

EARTH WORK

- EARTH WORK:-cutting and filling of the earth

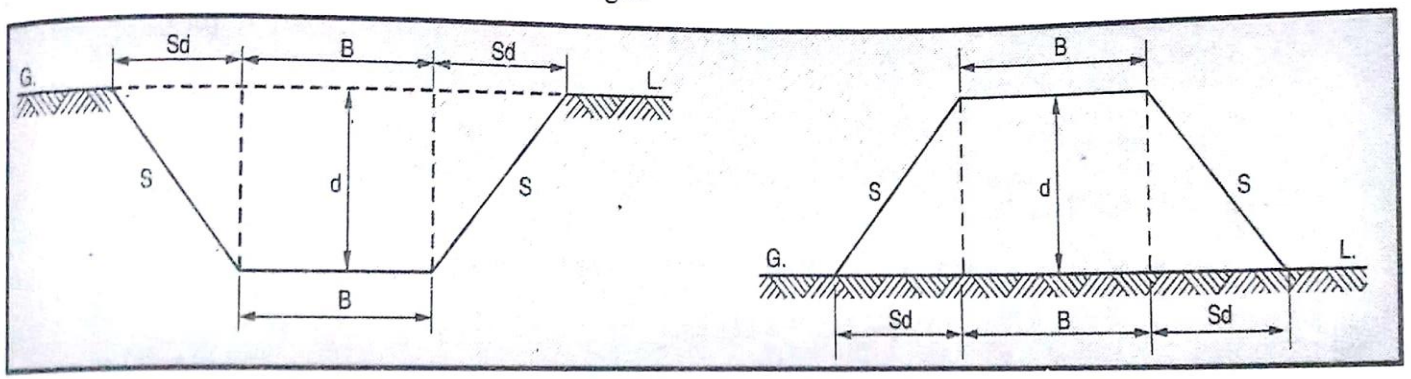


Fig. 5.1. Cutting or Digging.

Fig. 5.2. Banking or Filling.

Work out the cost of earth work for a portion of a road from Rd to Rd 90 m.

Rd	N.S. level	Formation level
0	205.00	210.00
30	205.60	
60	206.00	
90	206.80	

The formation is in a downward gradient of 1 in 30. Formation width is 10 metres and side slope 2 : 1 (Horizontal : Vertical) rate of earth work is Rs. 375.00% cu m.

Solution. Method I :

Rd	N.S. level	Formation level	Filling or Banking
0	205.00	210.00	5.00
30	205.60	209.00	3.40
60	206.00	208.00	2.00
90	206.80	207.00	0.20

Formation level at Rd 0 is given a 210.00 metres. It has downward gradient 1 in 30 so the formation levels at other Rds can be calculated by reducing 1 metre.

Now N.S. levels are already known and formation levels are worked out. So the height of the bank can be calculated as shown above.

Cross-section at Rd 0 :

Applying Trapezoidal formula :

$$\text{Area of filling} = \left(\frac{a+b}{2}\right)h = \left(\frac{10+30}{2}\right)5 = 100 \text{ sq m}$$

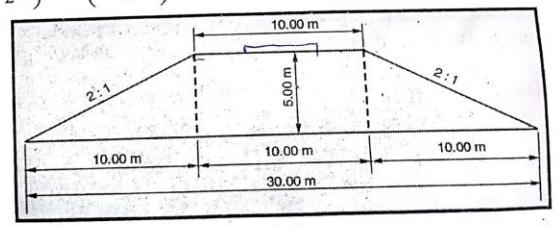


Fig. 5.8.

Cross-section at Rd. 30 :

$$\text{Area of filling} = \left(\frac{10+23.60}{2}\right)3.40$$

$$= 57.12 \text{ sq m}$$

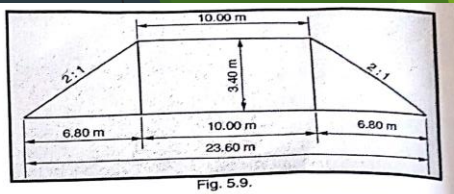


Fig. 5.9.

Cross-section at Rd 60 :

$$\text{Area of filling} = \left(\frac{10+18}{2}\right)2$$

$$= 28 \text{ sq m}$$

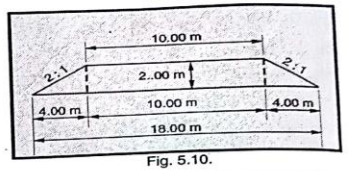


Fig. 5.10.

Cross section at Rd 90 :

$$\text{Area of filling} = \left(\frac{10+10.80}{2}\right)0.20$$

$$= 2.08 \text{ sq m}$$

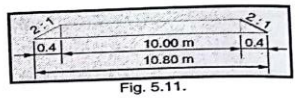


Fig. 5.11.

Abstract of Quantity

Rd.	Area of cross section sq m	Mean area sq m	Length m	Quantity cu m	Remarks
0	100.00	—	—	—	
30	57.12	78.56	30	2356.80	
60	28.00	42.56	30	1276.80	
90	2.08	15.04	30	451.20	
			Total	4084.80	cu m

Earth work in filling = **4084.80 cu m.**

Abstract of Cost

Item No.	Particulars	Quantity	Unit of payment	Rate Rs. P.	Amount Rs. P.
1.	Earth work in banking from Rd. 0 to Rd. 90	4084.80 cu m	% cu m	375.00	15318.00
2.	Add 5% contingencies				765.90
				Grand Total	Rs. 16083.90 Ans.

Method II Tabular Form

Abstract of Quantity (B = 10 ; S = 2)

Rd. in metre	Banking or Filling (d)	$B \times d$	$S \times d^2$	Total area $Bd + Sd^2$ sq m	Mean area sq m	Length or Distance m	Quantity $(Bd + Sd^2) \times L$ cu m	Remarks
0	5.00	50.00	50.00	100.00	—	—	—	
30	3.40	34.00	23.12	57.12	78.56	30	2356.80	
60	2.80	20.00	8.00	28.00	42.56	30	1276.80	
90	0.20	2.00	0.08	2.08	15.04	30	451.20	
						Total	4084.30	cu m

CANALS

- There are three kinds of section of a canal in shape of trapezoid:-

1. Full In cutting .
2. Fully in embankment.
3. Partly in cutting and filling.

Section fully in cutting :

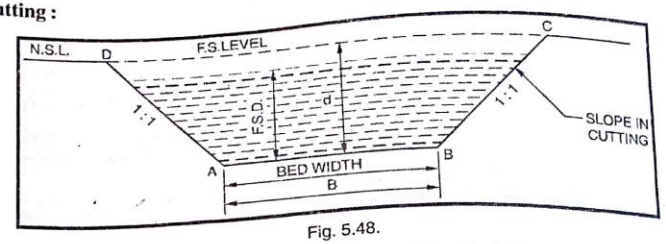


Fig. 5.48.

Note. If the full supply depth (F.S.D.) is within the bed the channel is called *fully in cutting* :

Area $= Bd + Sd^2$ or $\frac{(AB + CD)}{2}\ d.$

Section partly in cutting and partly in embankment :

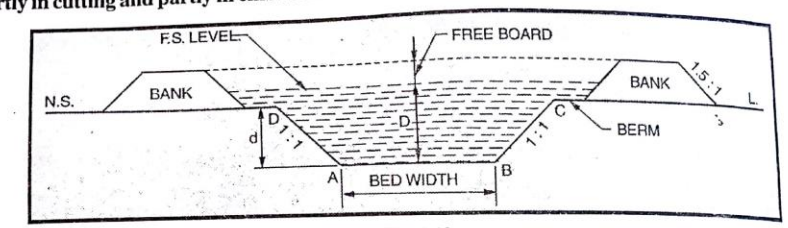


Fig. 5.49.

AB = Bed width of channel ; d = depth of cutting or digging

D = depth or water (F.S.D.) ;

Free board = Height of bank above F.S.L. and Height of bank = D + Free board – d.

Note. If F.S.L. is above N.S.L. the channel is called *Partly in cutting and Partly in embankment.*

Section fully in embankment :

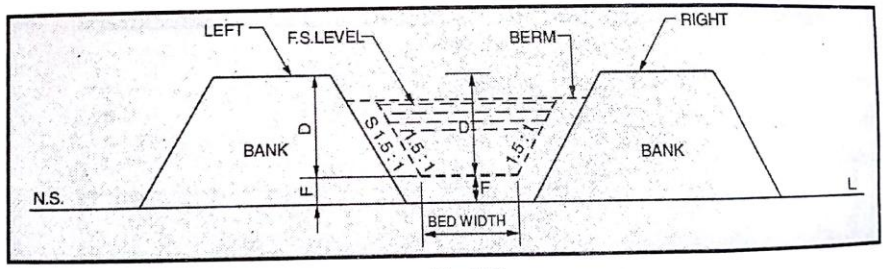


Fig. 5.50.

F = Height of filling and D = Depth of water (F.S.D.)

ANALYSIS OF RATES

- DEFINITION:-To determine the rate of a particular item of work from a quantities of materials and labours required and their cost.

1. Cost of material.
2. Cost of labour.
3. T and P and Sundries.
4. Contractor’s profit.

RATES OF MATERIALS AND LABOURS

Materials

S. No.	Particulars	Rate at site Rs. P.	Units of payment
1.	1st class brick	2,000.00	‰ no.
2.	IInd class brick	1,900.00	‰ no.
3.	Brick ballast	400.00	per cu m
4.	Surkhi	250.00	per cu m
5.	White lime (unslacked)	200.00	per quintal
	or white lime	400.00	per cu m
6.	Shingle (Bajri)	600.00	per cu m
7.	Sand (Pit)	200.00	per cu m

...Contd.

S. No.	Particulars	Rate at site Rs. P.	Units of payment
8.	Sand (coarse)	400.00	per cu m
9.	Cement 50 kg	190.00	per bag
10.	M.S. bar	2,500.00	per quintal
11.	Stone ballast	500.00	per cu m
12.	Local stone	300.00	per cu m
13.	Tile 30 cm × 15 cm × 3 cm	3,000.00	‰ nos.
14.	Clay or mud	20.00	per cu m
15.	Dressed stone	400.00	per cu m
16.	Bitumen	5.00	per kg
17.	Distemper	30.00	per kg
18.	Primer	40.00	per litre

Labour

S. No.	Particulars	Rate	Per day
1.	Brick layer	250.00	Per day
2.	Mason	200.00	Per day
3.	Plasterer	200.00	Per day
4.	Black smith	200.00	Per day
5.	Carpenter	200.00	Per day
6.	Bhishti (waterman)	120.00	Per day
7.	Mazdoor	100.00	Per day
8.	Skilled Mazdoor	120.00	Per day
9.	Painter	150.00	Per day
10.	White washer	130.00	Per day

Note. The *rate* of materials and labour given above are fluctuating in every city. The approximate rates are given only to guide the students.