

COSTING AND QUANTITY ESTIMATION OF RESIDENTIAL BUILDING

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Abstract: An estimate is the anticipated or probable cost of a work and is determined theoretically by mathematical calculations based on the drawing (plans, section.etc.), specifications and current rates. The entire Cost of construction and the infrastructure used for the purpose of construction is estimated and the final costing is done.The primary object of the estimate is to enable one to know beforehand, the cost of the work and hence its feasibility can be determined i.e., whether the project could be taken up within funds available or not. It also gives an idea of time required for the completion of the work. It is also required for inviting tenders and to arrange contract and to control the expenditure during the execution.

The main objective of the project is to estimate the total cost required to construct a given residential building. Estimating involves preparing detailed estimate, calculating the rate of each unit of work and preparing abstract of estimate.

1. INTRODUCTION

For all engineering works it is required to know beforehand its probable cost of construction known as estimated cost. If the estimated cost is greater than the money available, then attempts are made to reduce the cost by reducing the work or by changing the specifications. From this the importance of estimate for engineers may be understood. In preparing an estimate, the quantities of different items of work are calculated by simple mensuration method and from these quantities the cost is calculated. The subject of estimating is simple, but knowledge of drawing is essential. One who understands and can read drawing may find out the dimensions.

An estimate is computation or calculation of the quantities required and expenditure likely to be incurred in the construction know beforehand. The primary object of the estimate is to enable one to know beforehand, the cost of the work (buildings, structures, etc). The estimate is the probable cost of a work and is determined theoretically by mathematical calculations based on the drawing (plans, section.etc.), specifications and current rates. The entire Cost of construction and the infrastructure used for the purpose of construction is estimated and the final costing is done. Approximate estimate may be prepared by various methods but accurate estimate is prepared by detailed estimate method.

Estimating involves preparing detailed estimate, calculating the rate of each unit of work and preparing abstract of estimate

2. LITERATURE REVIEW

Preliminary Estimate or Approximate or Abstract Estimate: Preliminary or Approximate or Abstract Estimate is required for preliminary studies of various aspects of a work project, to decide the financial position and policy for administrative sanction by the component administrative authority. The approximate estimate is prepared from the practical knowledge and cost of the similar works. This estimate is prepared showing separately the approximate cost of all important items of work as cost of land, cost of each building, cost of roads, water supply sanitary works, electrification, etc. The estimate is accompanied by a brief report explaining the necessity and utility of the project showing how the costs of separate items have been arrived at. This is also accompanied with a site plan or layout plain. A percentage of about 5% to 10% is added as contingencies.

3. METHODOLOGY

Description Of Residential Building

The plot area of the residential building is 20.20mX25.20m. Out of this the built up area is 9.80mX15.70m. The ground floor area is divided into number of rooms such as sitting, living room, kitchen, 2 bedrooms, bathroom, toilet, etc. The dimension of each room is as follows

Sitting 5.00mX4.00m

Living room 5.00mX4.30m

Kitchen 3.00mX2.90m

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- Bedroom 1 4.20mX4.00m
- Bedroom2 4.70mX4.00m
- Bathroom 2.80mX2.40m
- Toilet 1.80mX2.00m
- Dressing mirror 1.20mX0.20m

Above the roof there is a parapet wall of height 2.00m. Over the staircase there is an RCC slab at a height of 3.00m from the roof, for the over head water tank. A syntex tank of capacity 1000 litres is placed on this roof. A parapet wall is also provided for this roof with a height of 1.5m.

4. CALCULATION OF REINFORCEMENT

1. Footings: There are 38 footings. In the footing, bars of 12mm are provided each way at spacing of 200 mm. The typical section of the footing is shown in the fig 4.1

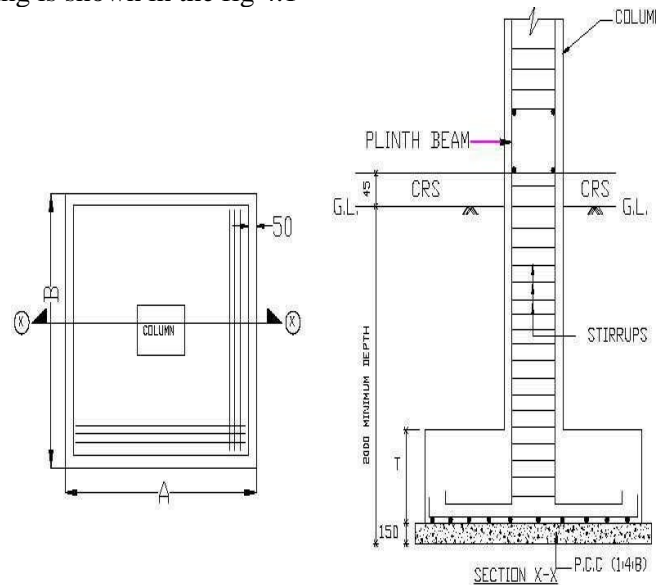


Fig 4.1 Typical Section of footing Let us consider footing F1 (1400X1400)

$$\begin{aligned} \text{Length of the bar} &= 1400 - 2(\text{side cover}) + 2(\text{hook}) \\ &= 1400 - 2(50) + 2(150) \\ &= 1600 \text{ mm (X-direction)} \end{aligned}$$

$$\begin{aligned} \text{Length of the bar} &= 1400 - 2(\text{side cover}) + 2(\text{hook}) \\ &= 1400 - 2(50) + 2(150) \\ &= 1600 \text{ mm} \\ &= 1.6 \text{ m (Y-direction)} \end{aligned}$$

$$\begin{aligned} \text{Number of bars} &= \frac{\text{Length}}{\text{Spacing}} + 1 \\ &= \frac{1600}{200} + 1 \\ &= 8 \text{ (Both direction)} \end{aligned}$$

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Similarly length of bars and number of bars are calculated for the remaining footings. Table 4.1 Schedule of Footing

Footings	Size			Reinforcement
	A	B	T	
F1	1400	1400	400	Ø12 @ 200 E.W.
F2	1600	1600	400	Ø12 @ 200 E.W.
F3	1600	2400	400	Ø12 @ 200 E.W.
F4	1000	2000	300	Ø12 @ 200 E.W.
F5	1200	1200	300	Ø12 @ 200 E.W.
F6	1000	1000	300	Ø12 @ 200 E.W.

2. Columns up to plinth beams: In the columns 16 mm diameter vertical bars and 8 mm diameter ties are provided.

Let us consider column C3 (600X200)

Length of bar from footing to plinth beam „L“

$$L = 2 + 0.45 + 0.6 - \text{PCC} - \text{cover} + \text{bend } L = 2 + 0.45 + 0.6 - 0.15 - 0.05 + 0.65 \quad L = 3.5 \text{ m}$$

$$\text{Length of Ties} = 2(450-40-40) + 2(200-40-40) + 24(\text{dia of ties})$$

$$= 980 + (24 \times 8)$$

$$= 1172 \text{ (1 set)}$$

$$\text{For 2 sets of ties} = 1172 + 1172$$

$$= 2.34 \text{ m}$$

$$\text{Number of ties} = \quad + 1$$

$$= \quad + 1$$

$$= 13$$

Therefore, provide 16 mm diameter, 10 vertical bars of length 3.5 m and 8 mm diameter, 13 ties of length 2.34 m in 2 sets.

3. Plinth Beams: Two different sizes of plinth beams are provided, one for boundary wall of size 500x200mm and other is 600x200mm size. The spacing between the stirrups is 200 mm.

$$\text{Length of the bars} = \text{total length of the beam} - 2(\text{side cover}) + 2(\text{hook}) \quad \text{Length of the stirrups} = 2[B-2(\text{cover})] + 2[D-2(\text{cover})] + \text{hook value}$$

$$\text{Number of stirrups} = \text{length of beam} / \text{spacing}$$

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Fig 4.2 Plinth Beams

4. Columns from plinth beam to roof beam: In the columns 16 mm diameter vertical bars and 8 mm diameter ties are provided

Length of the vertical bars = total length of the column – 2(side cover) + 2(hook) Length of the ties = 2[B-2(cover)] + 2[D-2(cover)] + hook value

Number of ties = length of column / spacing

5. Roof Beam: There are six different sizes of beams with bars of 16 mm diameter. The diameter of the stirrups is 8mm. The spacing between the stirrups is 200 mm. The typical section of beam is shown in the fig 4.3. Description of beams is given

Table 4.2 Schedule of Beams

Beam	Size		Bottom Bars		Top Bars		Stirrups	
	W	H	A	B	C	D	Size	Spacing at support, mid span and support
B1	200	500	2- Ø16	-	2- Ø16	2- Ø16	Ø8	@ 125, @ 175, @ 125
B2	200	600	2- Ø16	2- Ø16	3- Ø16	3- Ø16	Ø8	@ 125, @ 175, @ 125
B3	200	500	2- Ø16	-	2- Ø16		Ø8	@ 125, @ 175, @ 125
B4	200	500	2- Ø16	2- Ø16	2- Ø16	2- Ø16	Ø8	@ 125, @ 175, @ 125
B5	600	200	4- Ø16	-	4- Ø16		Ø8	@ 125, @ 175, @ 125
CB1	200	500	2- Ø16	-	2- Ø16		Ø8	@ 125, @ 175, @ 125

6. Slab: Two types of slabs are provide, i.e., one-way slab, two-way slab. The description and details of bars are shown in the fig. 4.4

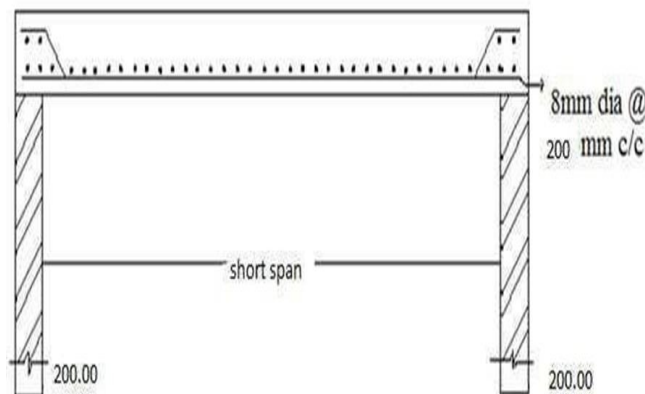


Fig 4.4 Typical section of slab

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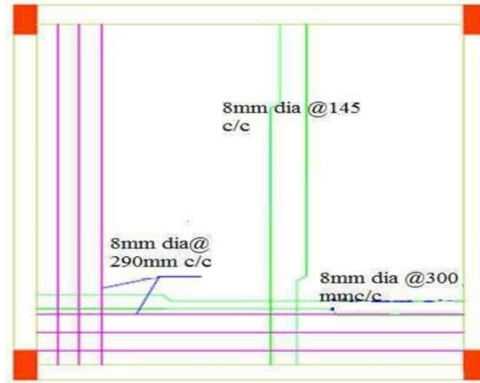
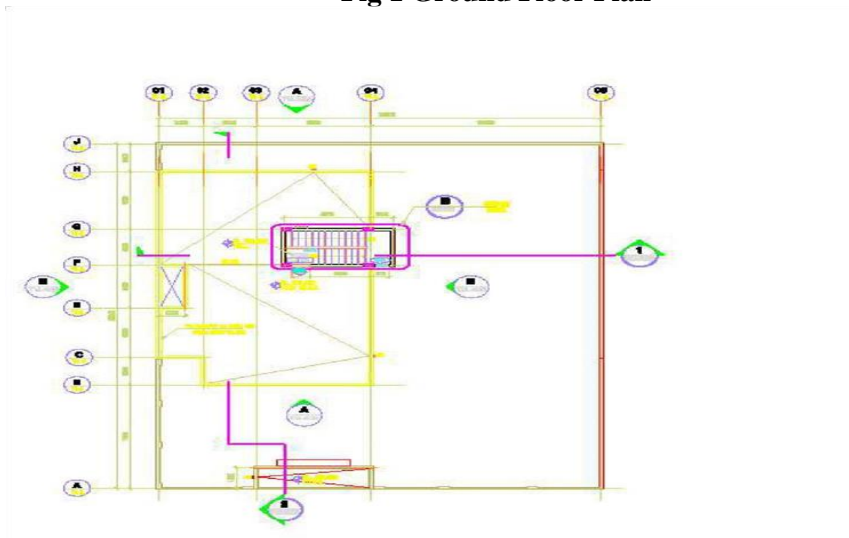


Fig 4.5 Plan of slab

7. Lintel and sunshade: Lintel beams are provided above the doors and windows. Fig 4.6 gives the details of lintel beam and sunshade



Fig 1 Ground Floor Plan



4. EXCEL SHEETS

**THE DETAILED AND ABSTRACT ESTIMATE
Estimating and Costing of an RCC Residential Building as per SSR 2010-11**

Ground Floor								
S.No	Description of item	No	Length	Breadth	Height	Quantity	Rate	Amount
1	Earth work excavation and depositing on bank with initial lead of 10m and initial lift of 2m in Hard Gravelly Soils (SS 20-B) including shoring, strutting, sheeting, planking and dewatering including cost of hire charges of T & P, labour charges etc., complete for finished item of work for Foundation of Building.							
a) for footings								
F1		1	5	1.70	1.70	2.00		28.90
F2		1	8	1.90	1.90	2.00		57.76
F3		1	2	2.70	1.90	2.00		20.52
F4		1	2	1.30	2.30	2.00		11.96
F5		1	20	1.50	1.50	2.00		90.00
F6		1	1	1.30	1.30	2.00		3.38
212.52								
								Cum
b) for foundation (external walls of building)								
B1-B3, D6-F6, G1-G3		1	3	3.90	0.45	0.60		3.16
B3-B6		1	1	4.80	0.45	0.60		1.30
B6-C6		1	1	3.60	0.45	0.60		0.97
F6-H6, F3-H3, B1-C1		1	3	3.80	0.45	0.60		3.08
H3-H6		1	1	4.60	0.45	0.60		1.24
E1-G1, D1-E1		1	2	2.90	0.45	0.60		1.57
C1-D1		1	1	2.00	0.45	0.60		0.54
C7-D7		1	1	2.44	0.45	0.60		0.66
12.51								
								Cum
c) for foundation (boundary wall)								
A1-B1, A12-B12		1	2	0.98	0.45	0.60		0.53

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A1-A2, A11-A12 A2-A5, A5-A7, A7-A9, A9-A11,	1	2	1.65	0.45	0.60	0.89	
L8-L10 G12-I12, I12-J12, J12-L12, J1-	1	5	3.50	0.45	0.60	4.73	
L1, I1-J1, G1-I1	1	6	2.50	0.45	0.60	4.05	
L10-L12	1	1	2.72	0.45	0.60	0.73	
L6-L8	1	1	2.44	0.45	0.60	0.66	
K6-L6, K3-L3	1	2	1.10	0.45	0.60	0.59	
K3-K6	1	1	4.60	0.45	0.60	1.24	
L1-L3	1	1	3.66	0.45	0.60	0.99	
B12-C12	1	1	4.07	0.45	0.60	1.10	
C12-D12	1	1	2.10	0.45	0.60	0.57	
D12-E12	1	1	2.60	0.45	0.60	0.70	
E12-G12	1	1	3.47	0.45	0.60	0.94	
17.72							
						Cum	
d) for under ground water tank	1	1	1.83	1.83	1.83	6.13	
						Cum	

5. CONCLUSION

The entire cost of construction work and the infrastructure used for the purpose of construction is estimated.

The final costing is done as per the Standard Schedule of Rates 2010-2012. Final cost of the work is Rs. 31, 22,794.

Finally we conclude that the abstract estimate of construction work for the given residential building is economical and feasible

References

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