

Estimation of a Reinforced Building: A Review

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Abstract - Many items influence and contribute to the cost of a project, each item must be analyzed, quantified and priced. Such determination of probable cost for construction of any given project is building construction estimation. In preparing an estimate the quantities of different items of work are calculated by simple mensuration method and from these quantities cost is calculated. It is necessary for the quantities of the materials including those of reinforcement to be known for estimating the cost of a structure. Accurate quantities of concrete and brick work can be calculated from layout drawings. In accordance with the requirements of standard method of measurements of building work, the quantities are normally described. There are different methods for estimating the reinforcement quantities. It can be worked out using two methods: Long wall-Short wall method and Center line method. In this paper, the quantity and cost estimation of the building are carried out on the basis of Kerala Municipal Building Rules (KMBR). It highlights on the center line method being suitable for the estimation of buildings having walls with similar cross section.

Key Words: Estimation, Cost, Building, Methods, Quantity

1. INTRODUCTION

Building cost estimating concerns on diverse forms of construction of residential properties, high rise civil works. Quantities of concrete and brickwork for estimating its cost can be calculated from the layout drawings. Such estimations are prepared in order to make the project economical. Estimate is prepared before actual construction, and then it must be put into the construction documents. The object of preparing estimate is to [1] know the quantities of various items of work, labour, and material. [2] Decide if the proposal can match the available funds to complete the project. [3] Obtain the sanction of the estimate from the qualified authorities for the completion of the project. [4] Invite tenders based on the estimate for the execution of the project.

Various activities like earthwork in excavation, masonry in foundation and basement etc. can be estimated by either of the two methods.

1.1 Long wall and Short wall Method

In this method the walls along the length of room is considered to be the long wall and the wall perpendicular to long wall is said to be short wall. The External lengths of the walls running in the direction out to outs and the internal lengths of wall running in the transverse direction in to in

and calculate the quantities by multiplying length, breadth, and height .

Length of long wall = center to center length + half breadth on one side + half breadth of other side.

Length of short wall = center to center length - half breadth of one side - half breadth of other side.

This method is accurate and simple and the chances of any error are less.

1.2 Centre Line Method

In this method, total lengths of centre line of all walls, long and short has to found out. Here the total centre line multiplied by breadth and depth of respective items gives the total quantity of each item. For excavation in foundation, concreting in foundation, all footings and super structure, the length will remain same. One has to be cautious by considering the junctions, meeting points of partition or cross walls, etc. For rectangular, circular polygonal buildings having no cross walls, this method is found to be simple. Buildings having single partition walls or cross walls with two junctions , the earth work in foundation trench and foundation concrete, one breadth of trench or concrete from total centre length has to be deducted for two junctions. Similarly for footings, one breadth of footing for two junctions from the total centre length is to be deducted.

This method is easy and quick for the buildings having walls with same cross sections and less number of junctions.

2. LITERATURE REVIEW

In Estimating and Costing in Civil Engineering (Theory and practice including specification and valuation), B.N Dutta has focused on various methods of estimating and costing of quantities. It emphasizes on the calculations of quantities of materials, tools, equipment, labours etc. and cost associated with them. It consists of numerous examples of estimation of buildings, RCC works, culverts, bridges, etc. Method of preparing preliminary estimates, analysis of rates, specification, methods of measurements have been dealt in detail with illustration. Many technical data have been included.

In Design and Estimation of a reinforced building: A Case Study (IOSR Journal of Mechanical and Civil Engineering), the cost of various structures of the administrative block of the building are worked out and the design part is done with the help of IS Code 457:2000.

As per the Kerala Municipal Building Rules (KMBR) 1999, regulation of building construction is one of the important mandatory functions of Municipality Corporation. This rule was framed by Kerala state government in 1999, for the development of the area concerned and also for the safety and well-being of the occupants of the building and the public.

3. PLAN OF RESIDENTIAL BUILDING

Above figure is a plan of sample residential building which has been estimated using center line method. The plinth area of the considered building is 396 sq.ft.

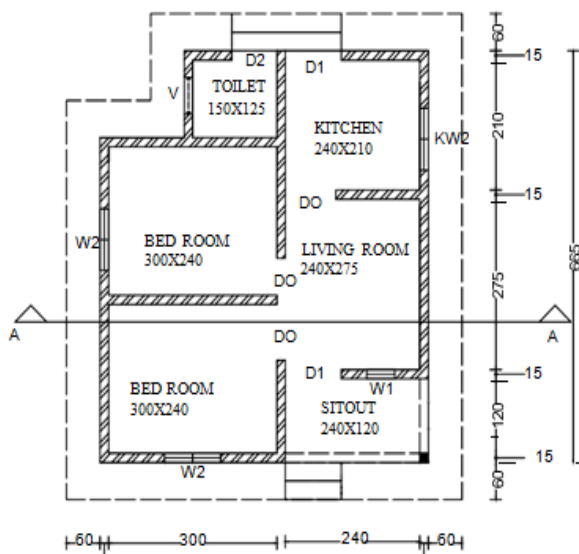


Fig -1: Plan of a sample house

4. ESTIMATION OF THE RESIDENTIAL BUILDING

Estimation of the residential building is done by center line method.

Sl. no.	Description	No	L (m)	B (m)	H (m)	Q	Unit	Rate/Unit	Amount (Rs)
1	Site clearing and setting out.						LS		2000
2	Earthwork excavation in all classes of soil except hard rock for foundation and pillar footing removing all roots...								
	• Foundation	1	43.8	0.6	0.6	15.678	m ³	400	6307.2
	• Pillar footing	1	0.9	0.9	0.6	0.486	m ³	400	194.4
3	R.R masonry								
	• Foundation	1	43.8	0.6	0.6	15.768	m ³	4500	70956
	• Basement	1	43.05	0.45	0.45	8.718	m ³	4500	39231
4	D.P.C. using P.C.C. 1:4:8 mix.	1	43.05	0.45	0.05	0.969	m ²	5700	5523.3
5	Concrete block masonry in cement mortar 1:6 with approved good quality cement blocks on superstructure of all thickness.	1	40.8	0.15	2.85	17.442			
	Walls								
	Deduction for openings :								
	• Doors								
	➤ D1	2	1	0.15	2.1	0.63			
	➤ D2	1	0.8	0.15	2.1	0.252			
	➤ Do	3	0.9	0.15	2.1	0.851			
	• Windows								
	➤ W1	1	0.5	0.15	1.5	0.113			
	➤ W2	2	1	0.15	1.5	0.45			
	➤ KW1	1	1	0.15	1.5	0.225			

	• Ventilator	1	0.9	0.15	0.6	0.081								
	• Sit out	1	3.6	0.15	2.1	1.134								
						13.706				m ²	5000	68530		
6	Supplying and fixing of concrete doors with shutters.													
	• D1	2								00.	1200	2400		
	• D2	1								00.	900	900		
	• Wood shutter for D1	2								00.	2700	5400		
	• Fibre shutter for D2	1								00.	1700	1700		
7	Supplying and fixing of windows with aluminum shutters.													
	• W1	3								00.	1600	4800		
	• W2	1								00.	800	800		
	• Aluminum shutter for W1	3								00.	2600	7800		
	• Aluminum shutter for W2	1								00.	1200	1200		
	• Ventilator	1								00.	600	600		
8	Reinforced cement concrete 1:1.5:3 mix M20 grade using 20 mm machine crushed blue metal including all formwork, watering, curing etc. complete, but excluding the cost of reinforcement.													
	• Lintel	1	40.8	0.15	0.15	0.918								
	• Pillar footing	1	0.9	0.9	0.2	0.162								
	• Roof slab	1	5.85	5.25	0.1	3.071								
		1	4.35	1.4	0.1	0.609								
	• Sloping shade	1	25.1	1.08	0.08	2.169								
	• Column	1	3	0.22	0.22	0.145								
	• Kitchen slab	1	3.7	0.6	0.08	0.178								
						7.252				m ³	9000	65268		
9	Supplying, cutting, bending and straightening reinforcement for R.C.C. works, binding with 22 gauge binding wire etc. complete in all respects. Steel requirement for roof slabs, sunshade, kitchen slab etc. Say 7.252 @ 65kg/m ³													
											471.38	kg	60	28282.8
10	P.C.C FLOORING 1:4:8 CuM: Providing and laying P.C.C. 1:4:8 using 40mm nominal size broken stone; when consolidated 75mm thick including ramming, curing, etc. complete flooring.													
			5.85	5.25	0.075	2.303								
			4.35	1.4	0.075	0.456				m ²				
						2.759				m ²	5700	15726.3		
11	Floor finishing using red oxide.													
			5.85	5.25		30.713								
			4.35	1.4		6.09								
						36.803				m ²	120	4416.36		
12	Electrification work and plumbing works.									L.S.		20000		
13	Supplying and fixing of sanitary fittings.									L.S.		5000		
GRAND TOTAL: 3,57,036/-														

5. CONCLUSIONS

The estimate of the residential building was prepared successfully. In this paper, a review on the methods of estimating has been done. From this review, we have come to a conclusion that center line method of estimating is the most suitable method for the considered plan as the walls of the building are of similar cross section and have less number of junctions.

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REFERENCES

- [1] B.N.Dutta Estimating and Costing in Civil Engineering (Theory and practice including specification and valuations)
- [2] Kerala Municipal Building Rules (KMBR),1999.
- [3] Akshay Chaudhary, Payal Sachedeva, Maninderpal Singh; Design and Estimation of a reinforced building: A Case study ISR journal of Mechanical and Civil Engineering (ISOR-JMCE)