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Estimating Quantity and Cost of Multi Storey Hospital Building

M Rohit*, Smd Abubakar Siddiq*, Misbha Ur Rahman*, Md Munneruddin*, Mahadev Shreemanth**

*Students of civil engineering, ACE Engineering College, Ghatkesar, Hyderabad, Telangana – 501 301
**Assistant Professor, Department of civil engineering, ACE Engineering College, Ghatkesar, Hyderabad, Telangana – 501 301

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Abstract

It is required to know the probable cost of a construction known as estimation and costing for all engineering works. If it is seen that 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 specification. In this paper, estimation and costing was done for a multistoried hospital building in Uppal, Hyderabad. The rates in the estimation provided for the complete work consist of the cost of material, cost of transport, cost of labor cost of scaffolding, cost of tools and paints, cost of establishment and supervision and reasonable profit of contractor etc. In Hyderabad, the general practice of estimating and costing is done by manually and due to improper way of the process, several mistakes remain in costing.
Therefore, the proper forecasting cannot be done.

Keywords: *Estimation and costing, Storey Hospital Building etc.*

Introduction

Estimation: estimation is the scientific way of working out the approximate cost of an engineering project before execution of the work. It is totally different from calculation of the exact cost after completion of the project. Estimation requires a thorough knowledge of the construction procedures and cost of materials & labor in addition to the skill, experience, foresight and good judgment. An estimate of cost of construction job is probable cost of that job is computed from plans and specifications. For a good estimate the, actual cost of the proposed work after completion should not differ by more than 5 to 10% from its approximate cost estimate, provided there are no unusual unforeseen circumstances. Estimation is help to work financial resources; it the proposal is approved. Requirements of controlled materials, such as cement and steel can be estimated for

TYPES OF ESTIMATIONS

Estimations are mainly classified into two types that are

1. ROUGH COST ESTIMATION

making applications to the controlling arthurites. Estimation is used for framing the tenders for the works and to check contractors work during and after the execution for the purpose of making payments to the contractors. From quantities of different items of work calculated in detailed estimation, resources are allocated to different activities of the project and ultimately their durations and whole planning and scheduling of the project is carries out. Site conditions are affected by the cost estimation so that all are site conditions are considered (I.e., transportation, water quality, pollutions and etc.). accuracy in estimation is verry important, if estimate is exceeded it becomes very difficult problem for engineers to explain, to account for and the additional money. Inaccuracy in preparing estimate, omission of items, changes in design, improper rates, etc.

2. Detailed Estimation

1. ROUGH COST ESTIMATION

Estimation of cost before construction from plans or architectural drawings of the project scheme, when even detailed or structural design has been carried out, is called rough cost estimate. These estimates are used for obtaining administrative approval from concerning authorities. Sometimes, on this basis of rough cost estimates, a proposal may be dropped altogether. Unit cost is worked out for the project under consideration carried out recently in nearly the same site conditions. Unit cost means cost of a unit quality of the work. To find rough cost of any project, this worked average unit cost is multiplied with total quality of the present work in the same units.

Detailed estimate is an accurate estimate and consist of working out the quantities of each item of works, and working the cost. The dimensions, length, breadth, and height of each item are taken out correctly out correctly from drawing and quantity of each item are calculated, and abstracting and billing are done. Detailed estimates are prepared by carefully and separately calculating in detail the costs of various items of the work.

The detailed estimate is prepared in two stages
a. The details of measurement and calculation of quantities.
b. Abstract of estimated cost.

For examples, in case of building, plinth area (sq fts.) of the proposed building is worked out, which is then multiplied by the cost per unit area (rest /ft2) of similar building actually constructed in near past in nearly the same site conditions, to find out the rough cost estimate of the building.

2. DETAILED ESTIMATION:

A. The details of measurement and calculation of quantities.
The detail of measurement of each item of the work taken out correctly from plan drawing and quantities under each item are computed or calculated in a tabular form named as details of measurements.

B. Abstract Of estimated cost.
The cost of each team of work is calculated in the tabular form the quantities already computed and total cost is worker out in an abstract of estimate form. The rates well of different items of word what they can as per schedule rates end working build rates or analyzes rates for finishing item of work a percentage usually 3% of estimated cost is added to allow for contingencies for miscellaneous petty items which do not come under any classified ahead of items of work and percentage of about 2% is provided for work change charge establishment the grand total does obtained gives the estimated cost of birth of work.
Detailed estimates are divided into following types it is based upon the purpose of estimation: -
a. Contractors estimate.

Detailed estimate is usually prepared work -voice under sub-work as main building servant quarters, garage, boundaries walls etc.,

The detailed estimate is accompanied with
a. Report
b. general specification
c. detailed specification
d. Drawings - Plan elevation sectional elevations detailed drawings site plans or layout plans or index plans etc.
e. calculation and designs
f. analysis of rates if rates are not as per schedule of rates or for non-schedule items.

b. engineers estimate.
c. progress estimate.

Costing

The disciplines of last engineering can be considered to encompass a wide range of cost related aspects engineering and programmer management but in particular cost estimating, cost analysis/cost assessment, designed-to-cost schedule analysis planning and risk assessment these are fundamental task which may be undertaken by different groups in different organizations but they turn cost engineering implies that they are undertaken throughout the project lifecycle by train and professional utilizing appropriate techniques cost models list and database in a real big Raceway and applying expert judgement with its due regards to the specific circumstances of the activity and the information available in most instances, the output of a cost engineering exercise is notated in itself but rather an input to the decision-making process.
classification of cost

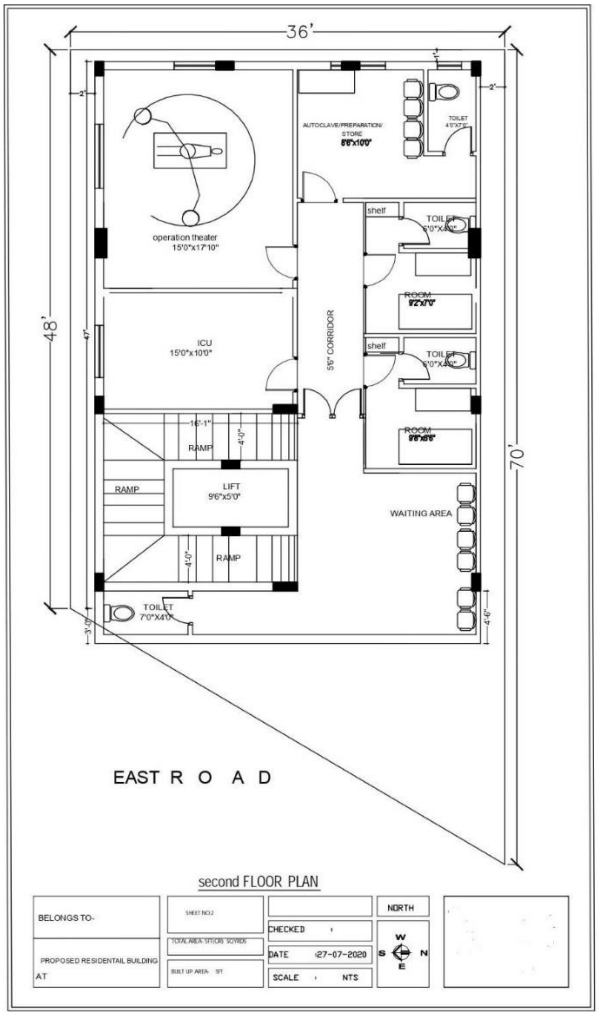
The cost is classified as the mainly three types that as followed

1. Direct cost
a. Labor cost
b. direct labor
c. indirect labor
d. material cost
e. equipment cost
2. indirect cost
3. markup

Analysis of multi-story hospital building

The tallness of a building is relative and cannot be defined in absolute terms either in relation to height are the number of stories but from a structural engineer's point of view the tall Building or multi-Storey building can be defined as one that by virtue of its height is affected by lateral forces due to wind or at the earthquake or both to an extent that they play an important role in these structural design tall structures have fascinated and kind from the beginning of civilization. Egypt pyramids, one among the several wonders of world constructed in 2600 BC add among such and she had told structures. but the structures constructed but defense and took show pride of the population in their civilization the growth in modern multistory building construction.

HOSPITAL PLAN



Literature Review

Preetpal Singh carried out study on low-cost housing need for today's world it is observed that construction cost in India is increasing at around 50% over the average inflation levels. It has enumerated increase of up to 15% all year, mainly due to cost of basic building materials such as steel, cement, bricks, timber and other inputs as well as cost of labor. As result, the cost of building by means of conventional constructional materials and construction is becoming beyond the affordable limits particularly for low-income groups of population as well as a big cross section of middle-income groups so, there is essential to adopt cost effective construction methods either by up-gradation of traditional technologies using local resources or applying current construction materials and methods with well-organized inputs leading to economic solutions, by using low cost Housing Technologies, we can reduce approx. 25% of the total cost of housing

Uppal K.B (1997) considers the cost estimation is the determination of quantity and predicting or forecasting "within a defined scope" of the costs required to construct and equip a facility, to manufacture goods, or to furnish a service, in conclusion, cost estimating is the means of forecasting and foreseeing the future costs of a construction project before it actually exists. However, the final project cost will not be known until the construction is finished and facility is operated.

Review- Uppal K.B (1997), 'cost Estimating Made simple Hydrocarbon processing', September 1997. P168c

Alfredo Serpell et.al (2013) studied about the cost estimation of new construction projects using an integrated, computer-based approach. The paper studies the limitations of computer programs based on parametric estimating methodologies and CBR. Historical data was effectively reused in the modeling which is used by the CBR method. 17 historical data of construction were selected for the validation purpose. The system produced a suitably detailed and accurate cost estimate for each of the tested projects. This method generates estimates of construction projects with more accuracy and in an efficient way. The automation and support of CBR problem solving seems to make possible to carry out the scope definition process of a project in a short time and without too much effort. Each stage of the process can be assisted without the participation of manual information handling.

Review- Alfredo Serpell (2013)" estimating the cost of new construction projects using an integrated, computer-based approach", Creative Construction Conference 2013

Hossein Shams Mianaei et.al (2012) have studied about the estimated cost for drilling wells using the cost estimation method Case Based Reasoning. It is obtained by studying the historic data and their problems and uses the data to solve new similar problems. The major findings of his study is that in the proposed CBR model despite limited data, the error of method according to the performance indicators was very low. Therefore, obtained estimation accuracy of the proposed CBR model is high and the model is useful. On the other hand, given that the available estimation methods spend much time to estimate cost, we could save time using the CBR method. In his proposed CBR method, if a feature doesn't have the value, it does not affect the model. While in other methods, if a feature doesn't have the value, then the model is not solved. By this method the speed of drilling which is very important is increased.

Hossein Shams Mianaei (2012) "Application of Case Based Reasoning in cost estimation of drilling wells" IPCSIT vol.31

Murat Gunduza et.al (2015) have studied an early cost estimation model for hydroelectric power plant projects. The main indicators considered and studied in this paper are the amount of energy generated in a hydroelectric power plant and the cost of investment and there by decide whether a project investment is feasible or not. Cost of the project is calculated by detailed hydrological study, site investigation, good basin planning, geotechnical survey and various tests

of the soils. Multiple regression method and artificial neural network analysis are taken for the validation. The models are developed by the data collected from forty- nine hydroelectric power plant projects and five projects are used for the validation of the models. Comparisons of validation results revealed that the regression model had a 9.94%, and neural network model had 5.04% prediction accuracy. In this paper the neural network shows more prediction accuracy than the regression analysis.

Murat Gunduza and Haci Bayram sahin (2015) "An early cost estimation model for hydroelectric power plant projects using neural networks and multiple regression analysis", Journal of Civil Engineering and Management

Conclusion

Our calculation it is based on precise measurements which gave us approximate and accurate values. The structural estimate had been prepared in detail such that the values can be used in the actual project being carried out.

Also, the abstract of the estimated cost was prepared such that the current rate per unit of each item of work were considered.

Hence the estimated costs of the structural requirements of the project are accurate too.

The main object of estimate is to know the required quantity of material, labor and cost before actual execution.

Cost and time project estimate is a critical preparation in project management process. Both of top-down and bottom-up approach is useful and applicable in specific situation. The Bible states that "Be sure you know the condition of your flock, give careful attention to your herds". Estimation as wll as preparation for project, especially mission critical ones, should be done so that it can reduce risks in implementing project, control and assess this implementation process.

Building Estimation

Sl no	item Decription	no	Length(m)	Weadth(m)	Height(m)	Quantity(m3)
1	excavation for foundation	C1/F1	1.22	1.525	2.43	4.52
		C2/F2	1.22	1.83	2.43	5.43
		C3/F3	1.403	2.013	2.43	6.86
		C4/F4	1.803	2.44	2.43	10.69
		C5/F5	2.135	2.44	2.43	12.66
		CF	1.83	2.623	2.43	11.66
					Total=	**51.82**
2	PCC at Foundation	C1/F1	1.22	1.525	0.152	0.28
	Thickness=6"	C2/F2	1.22	1.83	0.152	0.34
		C3/F3	1.403	2.013	0.152	0.43
		C4/F4	1.803	2.44	0.152	0.67
		C5/F5	2.135	2.44	0.152	0.79
		CF	1.83	2.623	0.152	0.73
					total=	**3.24**
3	Footing rectangular portion	C1/F1	1.22	1.525	0.45	0.84
		C2/F2	1.22	1.83	0.45	1.00
		C3/F3	1.403	2.013	0.53	1.50
		C4/F4	1.803	2.44	0.6	2.64
		C5/F5	2.135	2.44	0.68	3.54
		CF	1.83	2.623	0.6	2.88
					total=	**12.40**
4	column concrete upto plinth	C1/F1	0.228	0.381	2.73	0.24
		C2/F2	0.457	0.228	2.73	0.28
		C3/F3	0.228	0.457	2.81	0.29
		C4/F4	0.609	0.228	2.88	0.40
		C5/F5	0.304	0.762	2.96	0.69
		CF	0.457	0.228	2.88	0.30
					total=	**2.20**
6	Floor tiles					**m2**
	Operation theater		4.572	5.212	--	23.83
	Autoclave preparation store		2.621	3.048	--	7.99
	ICU		4.572	3.048	--	13.94
	Corridor		1.219	0.518	--	0.63
	Rooms and toilets		2.987	6.583	--	19.66
	Waiting area		4.206	4.785	--	20.13
	Remaing leftover portion		10.972	1.402	--	15.38
					total=	**101.55**
7	Brickwork in superstructure					
	Longwall	2	15.54	0.23	3.35	11.98
	Longwall	1	10.67	0.23	3.35	8.22
	Longwall	1	6.58	0.23	3.35	5.08
	Longwall	2	2.13	0.23	3.35	1.64
	Shortwall	2	10.97	0.23	3.35	8.46
	Shortwall	1	4.91	0.23	3.35	3.78
	Shortwall	2	4.57	0.23	3.35	3.52
	Shortwall	4	2.62	0.23	3.35	2.02
					total=	**44.72**

Costing of hospital building as per TS S.O.R (2020-2021)

Sl no	Description of item	no	Quantity	Units	Material rate	Labour rate	total rate	Per	Amount
1	Earth work in excavation	--	51.82	m3	--	175	175	1m3	9,069
2	P.C.C in Founadation (1:2:4)	--	3.24	m3	1,803	2,855	4,655	1m3	15,082
3	R.C.C Work (1:2:4)	3	17.17	m3	6,228	2,875	9,101	1m3	156,254
4	R.C.C of sab (1:2:4)	3	24	m3	6,228	2,925	9,151	1m3	219,624
5	Brickwork in superstructure (1:4)	3	44.72	m3	1,806	2,865	4,671	1m3	208,867
6	Flooring with Mosaic tiles	3	88.18	m2	2,117	32,800	34,917	1m2	3,209,147
7	plastering in superstructure and Ceiling work (1:4)	3	104	m2	1,803	12,600	14,400	1m2	1,497,500
8	Painting								
	White Whasing	3	104	m2	191	595	786	kg	81,744
	Emulsion paint	3	104	m2	225	595	820	lit	85,280
9	Furniture work								
	Doors	10	1.89	m2	6,496	--	6,496	1m2	64,960
	Windows	6	0.921	m2	5,974	--	5,974	1m2	55,864
	Ventilators	4	0.541	m2	4,246	--	4,246	1m2	13,984
10	Provision for staircase								50,000
								Total amount	5,450,485
11	Provision for water supply and sanitory arrangements @12.5%								681,311
12	Provision for electrification @7.5%								408,786
13	Provision for architectural appearance @2%								109,010
14	Provision for unforeseen items 2%								109,010
15	Provision for P.s and corrdingencies @4%								218,019
								Grand total	6,976,621

Reference

Preetpalsingh, Gurjeet kumar, (2016), "low-cost housing: Need For today's world'.Uppal K.B 1997), 'cost Estimating Made simple Hydrocarbon processing, September 1997.

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