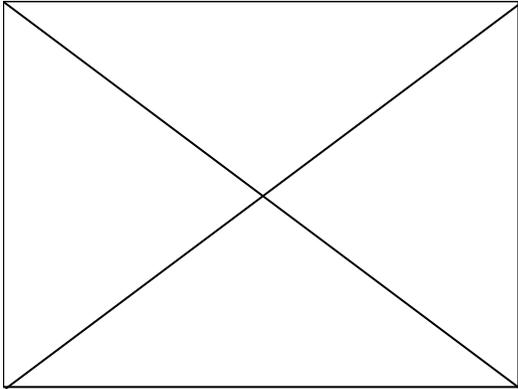


# Construction Estimating Techniques

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## Civil Engineering Estimates

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- . **Purpose of Estimating:**

*To give a reasonably accurate idea of the cost*

An estimate is necessary to give the owner a reasonably accurate idea of the cost to help him decide whether the work can be undertaken as proposed or needs to be curtailed or abandoned, depending upon the availability of funds and prospective direct and indirect benefits. For government works proper sanction has to be obtained for allocating the required amount. Works are often let out on a lump sum basis, in which case the Estimator must be in a position to know

exactly how much expenditure he is going to incur on them

#### *1. Estimating Materials*

From the estimate of a work it is possible to determine what materials and in what quantities will be required for the work so that the arrangements to procure them can be made.

#### *2. Estimating Labor*

The number and kind of workers of different categories who will have to be employed to complete the work in the specified time can be found out from the estimate.

#### *3. Estimating Plant*

An estimate will help in determining amount and kind of equipment needed to complete the work.

#### *4. Estimating Time*

The estimate of a work and the past experience enable one to estimate quite closely the length of time required to complete an item of work or the work as a whole.

Whereas the importance of knowing the probable cost needs no emphasis, estimating materials, labor, plant and time is immensely useful in planning and execution of any work.

### **. Types of Construction Estimates:**

There are several kinds of estimating techniques; these can be grouped into two main categories

1. Approximate estimates
2. Detailed estimates

#### *1. Approximate Estimates*

An approximate estimate is an approximate or rough estimate prepared to obtain an approximate cost in a short time. For certain purposes the use of such methods is justified.

#### *2. Detailed Estimate*

A detailed estimate of the cost of a project is prepared by determining the quantities and costs of every thing that a contractor is required to provide and do for the satisfactory completion of the work. It is the best and most reliable form of estimate. A detailed estimate may be prepared in the following two ways

- (a). Unit quantity method
- (b). Total quantity method.

#### *(a) Unit Quantity Method*

In the unit quantity method, the work is divided into as many operations or items as are required. A unit of measurement is decided. The total quantity of work under each item is taken out in the proper unit of measurement. The total cost per unit quantity of each item is analyzed and worked out. Then the total cost for the item is found by multiplying the cost per unit quantity by the number of units. For example, while estimating the cost of a building work, the quantity of brickwork in the building would be measured in cubic meters. The total cost (which includes cost of materials, labor, plant, overheads and profit) per cubic meter of brickwork would be found and then this unit cost multiplied by the number of cubic meters of brickwork in the building would give the estimated cost of brickwork.

This method has the advantage that the unit costs on various jobs can be readily compared and that the total estimate can easily be corrected for variations in quantities.

*(b) Total Quantity Method*

In the total quantity method, an item of work is divided into the following five subdivisions:

- (I) Materials
- (II) Labor
- (III) Plant
- (IV) Overheads
- (V) Profit.

The total quantities of each kind or class of material or labor are found and multiplied by their individual unit cost. Similarly, the cost of plant, overhead expenses and profit are determined. The costs of all the five sub-heads are summed up to give the estimated cost of the item of work. For example, the cost of brickwork in a building would be determined as below:

I ( i ) Cost of Materials at the source	\$
Bricks	\$
Sand	\$
Cement	\$
Water	\$
(ii) Cost of Handling and transporting above materials	\$
II Cost of Labor, both skilled and unskilled	\$
III Cost of plant	\$
IV Overheads	\$
V Profit	\$
Total Cost of Brickwork	\$

**. Qualifications of an Estimator**

A good estimator should possess the following qualifications:

1. A thorough understanding of architectural drawings.
2. A sound knowledge of building materials, construction methods and customs prevailing in the trade.
3. A fund of information collected or gained through experience in construction work, relating to materials required, hourly output of workers and plant, overhead expenses and costs of all kinds.
4. An understanding of a good method of preparing an estimate.
5. A systematic and orderly mind.
6. Ability to do careful and accurate calculations.
7. Ability to collect, classify and evaluate data that would be useful in estimating.

Good instruction or careful and thorough study of a standard book will help a beginner to become a good estimator. He must, however, try to develop all the above mentioned qualities while obtaining practical experience.

## **. Data Required for Preparing an Estimate:**

In order to prepare a detailed estimate the estimator must have with him the following data:

1. Plans, sections and other relevant details of the work.
2. Specifications indicating the exact nature and class of materials to be used.
3. The rates at which the different items of work are carried out.

To enable an estimator to take out the quantities accurately, the drawings must themselves be clear, true to the fact and scale, complete, and fully dimensioned. The estimator has also to bear in mind certain principles of taking out quantities.

## **. Steps in Preparation of an Estimate:**

There are three clearly defined steps in the preparation of an estimate.

### ***1. Taking out quantities***

In the first step of taking out quantities, the measurements are taken off from the drawings and entered on measurement sheet or dimension paper. The measurements to be taken out would depend upon the unit of measurement. For example, in the case of stone masonry in superstructure, length, thickness and height of the walls above plinth level would be taken out from the drawings and entered on the measurement sheet, whereas, in the case of plastering only the lengths and heights of the walls would be entered. Obviously, the unit of measurement in the first case is cubic meter and that in the second case is square meter.

### ***2. Squaring out***

The second step consists of working out volumes, areas, etc. and casting up their total in recognized units.

### ***3. Abstracting***

In the third step all the items along with the net results obtained in the second step are transferred from measurement sheets to specially ruled sheets having rate column ready for pricing.

The second and third steps above are known as working up. All calculations in these stages and every entry transferred should be checked by another person to ensure that no mathematical or copying error occurs.

## **. Standard Method of Measurement of Building Works:**

The different methods of measuring used by various Central and State Government departments and by construction agencies were found to be a serious difficulty to estimators and a standing cause of disputes. For this reason a unification of the various systems at the technical level had been accepted as very desirable and wanting.

Although the standard has no legal sanction and as such need not be adopted unless it is referred to in the contracts.

## **. Principles of Deciding Unit of Measurement:**

A beginner may find it difficult to remember the units of measurement of different items. Memorizing of units of measurement would be greatly simplified if he knows the principles kept in view while selecting the units of measurements. Following are the most important principles of selection of unit of measurement:

1. The unit of measurement should be simple and convenient to measure, record and understand.
2. It should be one, which provides for fair payment for the work involved.
3. In the result it should yield quantities, which are neither too minute nor too large.
4. The price per unit should not be a very small figure or a very large one, that is, generally costlier items will be measured in smaller units, cheaper ones in larger units.
5. The unit of measurement may sometimes depend upon the unit for the raw material and/or labor and/or important dimensions. For example, stone masonry is measured in cubic meters because raw materials are measured in cubic meters plastering or pointing is measured in square meters, as the labor is considerable.

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