



What is Quantity Surveying?

Quantity Surveying includes all types of Estimating, Feasibility studies and Cost Planning, Budget / Detail Estimating, Takeoff / Measurement, contractual and Tendering / Bid advices, Site Measurements, Valuation and Final Account / Closing, Measure / Evaluate term contracts, Preparation and settlement of claims, Preparation of Contracts / Bid documents claims / Delay Analysis, Value Management, Construction Loan advice and monitoring, Life cycle costing, Scheduling, Risk Management, Arbitration / Settlement or Disputes, Construction Work Audit.



Brief History of Quantity Surveying.

The **Quantity Surveyor** emerged in England at the beginning of the nineteenth century, although the firm of Henry Cooper and Sons of reading was established as early 1785. Prior to the first recorded usage of the term "Quantity Surveyor" in 1859, the terms "measure" custom Surveyor" or "Surveyor" were used.

In 1922, the Standard Method of Measurement for building works was first published in the United Kingdom. It provides a uniform basis for measuring building works as well as giving detailed information where necessary, in order to define the exact nature and extent of the work required. The Standard Methods of Measurement applies to both proposed and completed works.

During the 19th. century, the Industrial Revolution in Britain contributed to a booming building industry.



Builders had To Whom It May Concern: prepare bids by measuring the same quintettes from the architect's drawings. Hence, they were duplicating the same activities for each bid. The logical solution was for them to get together and employ one individual to measure the work and detail it in bill of quantities booklet. After pricing the work, the successful bidder would pay the person, called a **Quantity Surveyor** and include his fee in the bid. Since the owner has to eventually pay for the services of the quantity surveyor, it was thought wise for him to be retained permanently and also to provide costing advice where necessary.

After these changes, a common problem occurring was that different quantity surveyors would measure work in different ways. Disputes arose where the surveyor in the measurement of a related item included extra work claimed by the builder for an item of work. These disputes led to the introduction of the Standard Methods Of Measurement by the Surveyors Institution in the United Kingdom. Over



ADOPTION OF TAKE-OFF METHOD IN PAKISTAN

What is Quantity Take-off?

Take-off is the measurement of construction work for drawings. It is a technical function that requires both knowledge and expertise. A thorough examination of the project plan, specifications, tender documents, designs and drawings help the estimator determine the total unit of work for each items of the project. The accuracy of the quantity take-off is directly related to the reliability of the estimate.

The procedure for quantity take-off entails the listing of quantities for the various work items to be priced separately. All take-off work must be recorded properly to enable verification of the quantities. A casual way of entering quantities may lead to an estimate full of errors. Normally, two conflicting constraints occur while carrying out quantity take-off. They are the degree of accuracy required and the time allocated for the take-off.

Quantity take-off is a boring, repetitive and most time-consuming part of detail quantities. It is a view shared by most estimators. However, it must be done accurately to produce a precise estimate. Generally, cost, time and human resources determine the take-off procedure required.

Measuring Quantities:

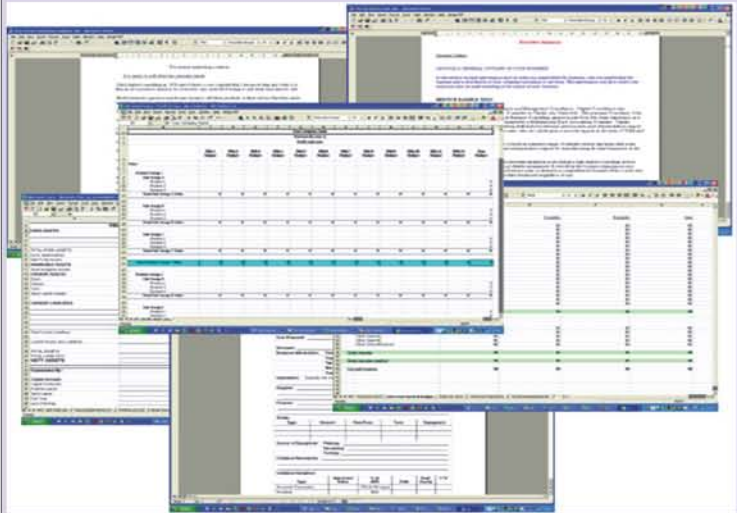
The role of quantity take off and the measuring of quantities in the estimation process.

Quantity Take-off:

Quantity take off is the first stage in the formation of an estimate. It entail the measurement of work items that constitute the project. The estimator breaks down the design shown on the drawings and described in the specifications into work items. These items correspond to the operations that the contractor has to perform for successful execution of the project.

The process of taking off follow standard rules set out by the estimating profession. The dimensions of items are stated in the order of length, width and depth or height, where applicable. Furthermore, measurements to be determined are calculated and scaled dimensions are a last resort for the estimator. In addition, leadings and notes are inserted to explain the type of work involved as well as the location of the activity. Side notes and leadings help provide a means for the estimator or any other interested party to review the take off these is some of the notes that the estimator has to adhere to when taking off quantities.

Quantity take off is necessary in estimating the probable cost of construction work. In the initial stages of construction planning, an estimate helps to determine whether the project is feasible or not. Also, the estimate is required to formulate a cost control programme whereby cash flows for specific periods are allocated based on the activities to be executed. Hence, estimates form a basis for control of expenditure on a project. In building construction, quantity take off by items is essential since most contracts result form competition among contractors. They supply goods and services according to specification to a fixed sum of money. Generally, quantity takeoff is a vital



function in the estimation process.

ACCURACY IS MOST IMPORTANT PART OF MEASUREMENT:

Different Estimators / Quantity Surveyors have adopted their own particular style of taking off. According to local system, the take off procedure various from consultants to consultants as well as contractor to contractor. When disputes arise and settlements become necessary, then all quantities are corrected on the basis of the Standard Method of Measurement. Hence, the accuracy of measurement is dependent on the individual method of take off of each company. Generally, the degree of accuracy of a take off is closely related to the nature of the work and the cost of achieving it.

NET IN PLACE:

It is a method of measuring contract work according to the dimensions shown on the contract drawings. Hence, quantities are calculated using the sizes and dimensions indicated on the drawings with as adjustments to the values obtained. However, allowance is made

For waste in the items unit price and not on the measured quantities. The Standard Method of Measurement used in the limit Kingdom specify that all measurements shall be net in place. In North America, the final quantities of individual items are by adding on factors to the net in place amount.

UNIT OF MEASUREMENT:

In construction industry, these are two system of measurement. These are the English and the metric system. Square measurements may be in square meters or square yards/ foot. It is essential for estimators to work entirely in one system according to the units used on the drawings. Mixing different units of measurement on one estimate increases the likelihood of errors.

There are five basic categories of unit used in estimating. There are Number, Length, Area, Volume and Weight. In the English system, the unit of length, area and volume are feet, square feet and cubic feet respectively. Similarly pounds or tons are the units for weight. The unit for number is common for both systems. It is the value obtained by connecting the number of items. However, the units of length, area and volume in the metric system are the meter square meter and cubic meter respectively. In the metric system, the unit of weight is the kilogram or Metric Ton.

Standard Method of Measurement

Practically, there are two types of standard methods of measurement used in estimating namely CSI & SMM (one is North American system and one is British system which are adopted more or less all over the world except few countries.

CSI System:

In North America & Canada, The Construction Specification Institute and Construction Specification Canada published a uniform basis for measurement. It is known as the Method of Measurement for Construction Works. Based on 16 Divisions system, but revised in 2004 and divided into 49 divisions. They are listed as follows: -

Division 1:General Requirements

FACILITY CONSTRUCTION SUBGROUP.

Division 2 Existing Conditions

Division 3 Concrete

Division 4 Masonry

Division 5 Metals

Division 6 Wood and Plastics

Division 7 Thermal and Moisture Protection

Division 8 Openings

Division 9 Finishes

Division 10:Specialties

Division 11:Equipment

Division 12:Furnishings

Division 13:Special Construction

Division 14:Conveying Systems

Division 15 ~ 19. :Reserved

FACILITY SERVICES SUBGROUP.

Division 20 Reserved

Division 21 Fire Suppression

Division 22 Plumbing

Division 23 Heating, Ventilation and Air Conditioning.

Division 24 Reserved

Division 25 Integrated Automation

Division 26 Electrical

Division 27 Communications

Division 28 Electronic Safety and Security.

Division 29 Reserved



SITE AND INFRASTRUCTURE SUBGROUP.

Division 30 Reserved

Division 31 Earth Work.

Division 32 Exterior Improvement.

Division 33 Utilities.

Division 34 Transportation.

Division 35 Waterway and Marine Construction.

Division 36 ~ 39 Reserved

PROCESS EQUIPMENT SUBGROUP.

Division 40 Process Integration

Division 41 Material Processing and Handling Equipment.

Division 42 Process Heating, Cooling, Drying

- Division 43 Process Gas and Liquid Handling, Purification, and Storage Equipment.
- Division 44 Pollution Control Equipment.
- Division 45 Industry-Specific Manufacturing Equipment.
- Division 46 Reserved
- Division 47 Reserved.
- Division 48 Electrical Power Generation.
- Division 49 Reserved

Under each division are subdivisions with their respective descriptions e.g. Division 3

- Division 3: Concrete General
- 03100 Concrete forms and accessories
- 03200 Concrete reinforcement
- 03300 Cast in place concrete
- 03400 Precast concrete
- 03500 Cementitious decks and underlayment
- 03600 Grout
- 03900 Concrete restoration and cleaning

Each subdivision is further broken down as in the case of 03900 Concrete restoration and cleaning. It is measured in the following categories.

- 03910- concrete cleaning
- 03920- concrete resurfacing
- 03930- concrete rehabilitation

The Method of Measurement of Construction Works state that work in this category be measured in square meters or square yards. Similarly, other divisions will have sub-divisions with their respective categories and the descriptions for the measurement of each category.

SMM System:

In the United Kingdom, The Royal Institute of Chartered Surveyors published the Standard Method of Measurement, is used as a basis to measure construction works. It is divided into sections and utilizes metric units. The main sections are further subdivided into subsections. The order of activities is as follows (Based on POMI June 1979). The latest version of SMM-7 is available on RICS.

General Rules

Section	GP	General Principles
Section	A -	General Requirements.
Section	B -	Site Works
Section	C -	Concrete Work
Section	D -	Masonry.
Section	E -	Metal Works.
Section	F -	Wood Work

Section	G-	Thermal & Moisture Protection.
Section	H -	Doors and Windows.
Section	J -	Finishes.
Section	K -	Accessories.
Section	L -	Equipment.
Section	M -	Furnishings
Section	N -	Special Construction.
Section	P -	Conveying Systems.
Section	Q -	Mechanical
Engineering Installations		
Section	R -	Electrical Engineering Installations.

Each sections listed above are divided into subsections as in the case of "C" Concrete Work.

- C1 Generally.
- C2 Poured Concrete.
- C3 Reinforcement.
- C4 Shuttering.
- C5 Precast Concrete
- C6 Prestressed Concrete.
- C7 Sundries.

The description of the method of measurement is fully described under each heading.



Conclusion

In last I would suggest to all Professional, Quantity Surveyors / Estimators to study both International method of measurement and adopt any one of above system to avoid any discrepancy or hassle in quantity work, and maintain a standardized system in Pakistan. **INSHALLAH**, In next issue I will discussed other topic like costing, Tendering, escalation etc.

By Ahsan Ali & Muhammad Asif

ESTIMATION SYSTEM

The costs of a constructed facility to the owner include both the initial capital cost and the subsequent operation and maintenance costs. Each of these major cost categories consists of a number of cost components.

The capital cost for a construction project includes the expenses related to the initial establishment of the facility:

- Land acquisition.
- Planning and feasibility studies
- Architectural and engineering design
- Construction, including materials, equipment and labor
- Field supervision of construction
- Construction financing
- Insurance and taxes during construction
- Owner's general office overhead
- Equipment and furnishings not included in construction
- Inspection and testing

The operation and maintenance cost in subsequent years over the project life cycle includes the following expenses:

- Land rent, if applicable
- Operating staff
- Labor and material for maintenance and repairs
- Periodic renovations
- Insurance and taxes
- Financing costs
- Utilities
- Owner's other expenses

The magnitude of each of these cost components depends on the nature, size and location of the project as well as the management organization, among many considerations. The owner is interested in achieving the lowest possible overall project cost that is consistent with its investment objectives.

It is important for design professionals and construction managers to realize that while the construction cost may be the single largest component of the capital cost, other cost components are not insignificant. For example, land acquisition costs are a major expenditure for building construction in high-density urban areas, and construction financing costs can reach the same order of magnitude as the construction cost in large projects such as the construction of nuclear power plants.

From the owner's perspective, it is equally important to estimate the corresponding operation and maintenance cost of each alternative for a proposed facility in order to analyze the life cycle costs. The large expenditures needed for facility maintenance, especially for publicly owned infrastructure, are reminders of the neglect in the past to consider fully the implications of operation and maintenance cost in the design stage.

In most construction budgets, there is an allowance for contingencies or unexpected costs occurring during construction. This contingency amount may be included within each cost item or be included in a single category of construction contingency. The amount of contingency is based on historical experience and the expected difficulty of a particular construction project. For example, one construction firm makes estimates of the expected cost in five different areas:

- Design development changes,
- Schedule adjustments,
- General administration changes (such as wage rates),
- Differing site conditions for those expected, and
- Third party requirements imposed during construction, such as new permits.

Contingent amounts not spent for construction can be released near the end of construction to the owner or to add additional project elements.

Approaches to Cost Estimation

Cost estimating is one of the most important steps in project management. A cost estimate establishes the base line of the project cost at different stages of development of the project. A cost estimate at a given stage of project development represents a prediction provided by the cost engineer or estimator on the basis of available historical data., cost engineering is defined as that area of engineering practice where engineering judgment and experience are utilized in the application of scientific principles and techniques to the problem of cost estimation, cost control and profitability.

Virtually all cost estimation is performed according to one or some combination of the following basic approaches:

Production Function:

In microeconomics, the relationship between the output of a process and the necessary resources is referred to as the production function. In construction, the production function may be

expressed by the relationship between the volume of construction and a factor of production such as labor or capital. A production function relates the amount or volume of output to the various inputs of labor, material and equipment.

Empirical cost inference:

Empirical estimation of cost functions requires statistical techniques which relate the cost of constructing or operating a facility to a few important characteristics or attributes of the system. The role of statistical inference is to estimate the best parameter values or constants in an assumed cost function. Usually, this is accomplished by means of regression analysis techniques.

Unit costs for bill of quantities:

A unit cost is assigned to each of the facility components or tasks as represented by the bill of quantities. The total cost is the summation of the products of the quantities multiplied by the corresponding unit costs. The unit cost method is straightforward in principle but quite laborious in application.

Allocation of joint costs:

Allocations of cost from existing accounts may be used to develop a cost function of an operation. The basic idea in this method is that each expenditure item can be assigned to particular characteristics of the operation. Ideally, the allocation of joint costs should be causally related to the category of basic costs in an allocation process. In many instances, however, a causal relationship between the allocation factor and the cost item cannot be identified or may not exist. For example, in construction projects, the accounts for basic costs may be classified according to (1) labor, (2) material, (3) construction equipment, (4) construction supervision, and (5) general office overhead. These basic costs may then be allocated proportionally to various tasks which are subdivisions of a project.

Types of Construction Cost Estimates

Construction cost estimates may be viewed from different perspectives because of different institutional requirements. In spite of the many types of cost estimates used at different stages of a project, cost estimates can best be classified into three major categories according to their functions. A construction cost estimate serves one of the three basic functions: design, bid and control. For establishing the financing of a project,

either a design estimate or a bid estimate is used.

1. Design Estimates. For the owner or its designated design professionals, the types of cost estimates encountered run parallel with the planning and design as follows:

- Screening estimates (or order of magnitude Estimates)
- Preliminary estimates (or conceptual estimates)
- Detailed estimates (or definitive estimates)
- Engineer's estimates based on plans and specifications

For each of these different estimates, the amount of design information available typically increases.

2. Bid Estimates. For the contractor, a bid estimate submitted to the owner either for competitive bidding or negotiation consists of direct construction cost including field supervision, plus a markup to cover general overhead and profits. The direct cost of construction for bid estimates is usually derived from a combination of the following approaches.

- Subcontractor quotations
- Quantity takeoffs
- Construction procedures.

3. Control Estimates. For monitoring the project during construction, a control estimate is derived from available information to establish:

- Budget estimate for financing
- Budgeted cost after contracting but prior to construction
- Estimated cost to completion during the progress of construction.

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a Professional!

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The language of Flowers

Many of our favorite garden flowers and herbs have ancient symbolic meanings and associations. It's fun to use some of those meanings in flower arrangements, especially those done for special occasions. A birthday breakfast table centerpiece of Johnny Jump-ups, roses, and sage says happy thoughts. I Love You. "May you have a long life and enjoy good health"

If you'd like to add another dimension to your arrangements here's list of common flowers and herbs to get you started.....



Blue Salvia.....I think of you



Ivy.....Friendship



Boxwood.....Constant Love



Johnny Jump-up.....Worthy of praise



Balm.....Memories



Lemon Dianthus..... Bonds of Affection



Coreopsis.....Always cheerful



Lavender.....Devotion



Chamomile.....Patience



Lily of the valley.....Return of happiness



Daffodils.....Regards



Lilac.....Fastidiousness



Daisy.....Innocence



Mint.....Warm



Fennel.....Happy thoughts



Primrose.....Early Youth



Geranium.....Gentility



Pansy.....Thoughts



Goldenrod.....Encouragement



Rosemary.....Remembrance



Heather.....Loneliness



Sage.....long life, good health



Hollyhock.....Ambitions



Sweet Williams.....Gallantry



Honeysuckle.....Friendship



Thyme..... Strength, Activity.



Iris.....My compliments



Violets.....Faithfulness

By: Tahira Kiran
(Q.S. Consultants)

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