Chapter 5
Types of Construction Contracts

5.1 Introduction

In general, the construction contract price includes direct and indirect project costs plus profit. While construction contracts serve as a means of pricing overall construction, they also structure the allocation of risk to the various parties involved. The Owner has to decide what type of contract should be used for a specific project to be constructed and to set forth the terms in a contractual agreement. It is important to understand the Owner and Contractor's risk profiles associated with different types of construction contracts.

There are several types of contracts based on pricing arrangements according to which Contractors are paid for their work done. There are also many variations and combinations that can be used; however, the most commonly used types and criteria are discussed here:

1. *Price based*: Lump sum or unit price contracts, in which the prices are quoted by the Contractor at bidding stage.
2. *Cost based*: Cost reimbursable contracts, in which the actual costs incurred by the Contractor are reimbursed together with a fee to cover overheads and profit.

5.2 Price-Based Contracts

5.2.1 Lump Sum Contract

A lump sum contract, also called stipulated price or fixed price contract, is the most basic form of agreement between Owner and the Contractor. In lump sum contracts, the Contractor calculates his rates based on the drawings and specifications

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prepared by the Designer. He then submits one lump sum price for the whole works or gives breakdown of the total sum against major activities or sections of the work. Payments made to the Contractor are usually assessed on the basis of percentage of work completed on a monthly basis. This is governed by CCDC 2 Conditions of Contract [1].

The lump sum contract is mostly used in projects or purchases where the plans and specifications are complete in detail before requesting bids. This procedure allows the Owner to know the cost of the project or purchase in advance. This type of contract is not advisable when plans and specifications are incomplete because the resulting bids will generally be inflated relative to actual cost as a reflection of the lack of certainty. To avoid changes, the scope of work must be well defined at the bidding stage.

Sometimes, lump sum contracts include the usual bill of quantities with estimated quantities, the rates against which are quoted by the contractors and total figure is treated as a lump sum price. In this case, a condition or provision shall be added in the contract saying "the approximate quantities are solely included for the Contractor's information. They will not be subject to re-measurement and no adjustment shall be made to the lump sum price in the event of the actual quantities of work executed by the Contractor differing from those included in Bill of Quantities except where such difference is the result of a change in scope." Also the rates quoted by the Contractor within the bill of quantities can be used as a basis for valuation of scope changes.

Basically, this type of contract is considered as a fixed price contract but seldom remains fixed during construction. Changes in scope, flaws in drawings and specifications, and changed site conditions cause variation to the original quoted contract price. Hence owners usually add contingency amounts in their estimates to address such issues.

5.2.1.1 Strengths and Weaknesses

In a lump sum contract, the Owner has assigned most of the risks to the Contractor. The construction means, methods, techniques, sequences, and procedures are the Contractor's responsibility. The Contractor, in turn, can be expected to ask for a higher markup in order to take care of unforeseen contingencies. Besides the fixed lump sum price, other commitments are often made by the Contractor in the form of submittals, such as a specific schedule, the management reporting system, or a quality control program. If the actual cost of the project is under estimated, it will reduce the Contractor's profit by that amount, whereas overestimate will have an opposite effect. Any modifications to scope, design, or schedule will give rise to a cost change. Contractors can bury anticipated or incurred costs within change orders during the construction process.

5.2.2 Unit Price Contract

A unit price contract is the traditional system and most popular in both the building and civil engineering sectors. Under this form, the detailed bill of quantities is prepared by the quantity surveyor of the Consultant based on drawings and specifications. The contractors quote their rates against these calculated quantities on basis of unit rate method. However, the contractors are paid for the work measured in place on the basis of actual quantity multiplied by quoted rate.

This method is advantageous when the quantities cannot be accurately identified in advance or in such works having a high content of ground surface work where the quantities are rather unpredictable. This method is particularly favored for linear construction like roads, railway tracks, sewers, water mains, or buried/aerial utility lines. The estimated quantities at the proposed unit prices submitted by bidders are used in comparing the bids. If changes occur, the unit prices and rates in the bill of quantities can be used as a basis for valuation. Typically, a change or variation in quantities up to 15% is permitted in this type of contract without the need of a formal change order as long as the items remain generally the same as in the initial contract. This is governed by CCDC 4 Conditions of Contract [2].

Note, as per FIDIC [3] Conditions of Contract, Sub-clause 12.3, if the actual measured quantities of the items vary more than 10% from the quantity of bill of quantities (schedule of rates), then a new rate shall be appropriate for an item. Whereas, according to the Contract Document CCDC-4 [2], if the actual quantities exceed or fall short of estimated quantities by more than 15%, then the Owner or the Contractor may request an adjustment to a unit price of the related item provided in the schedule of prices.

5.2.2.1 Strengths and Weaknesses

In this type, the Owner takes the risk of changes in the quantities originally estimated. The final cost of the project is not known to the Owner until completion of the project. Bidding can be called based on completed drawings only to start project early. Additional staff will be required to measure, control, and report on quantities. Changes in contract can be made easily as the Contractor will be paid against actual work done on site. The cost of tender is actually reduced because the bidders do not need to set up their own bill of quantities. If changes in scope of work occur, the unit prices and rates in the bill of quantities can be used as a basis for valuation.

Another type of contract available is a combination of lump sum and unit price contracts. There are advantages when a definite number of items, like superstructure of a building or a bridge, can be covered by the lump sum feature, and an indefinite quantity of items, like substructure of a building, can be included in the unit price method. This is common in many government projects.

5.3 Cost Reimbursable Contracts

Also known as cost plus contract, this type entails Contractor reimbursement of the actual cost of carrying out the work plus an additional amount in the form of fees to cover his overheads and profit. The Owner selects a Contractor recognized for dependability, experience, and skills through direct negotiation and establishes the terms of agreement between them and the amount of fee to be paid. The selected Contractor then starts the work and ensures all costs are transparent to the Owner including payments made for labor, material, machinery and equipment, subcontractors, etc. The Owner usually makes interim payments to the Contractor on a monthly basis. By proceeding in this manner, the Contractor gets all expenditures compensated along with his fee, which was determined at the outset of the project.

Under a cost plus contract, the Owner is responsible for payment of any costs resulting from unforeseen conditions. The scope of work also needs to be carefully defined to avoid any disputes.

The Contractor's fee is calculated in various ways such as:

(i) Cost plus percentage fee
(ii) Cost plus fixed fee
(iii) Cost plus variable fee
(iv) Guaranteed maximum price or target price contract
(v) Time and material

5.3.1 Cost Plus Percentage Fee Contract

With this form, the Owner assumes all risks of cost overruns. The Contractor will receive the actual direct job cost plus a fixed percentage of the construction cost and have little incentive to reduce job cost. Furthermore, if there are pressing needs to complete the project, overtime payments to workers are common and will further increase the job cost. Unless there are compelling reasons, like need for urgency, this method is not advisable to the Owner. This method can be used to reduce the time it takes to procure a Contractor.

5.3.2 Cost Plus Fixed Fee Contract

Under this type of contract, the Contractor will receive the actual direct job cost plus a fixed fee and will have some incentive to complete the job quickly since its fee is fixed regardless of the duration of the project. However, the Owner still assumes the risks of direct job cost overrun, while the Contractor may risk loss of profit if the project is delayed beyond the expected completion time.

5.3.3 Cost Plus Variable Fee Contract

For this type of contract, the Contractor agrees to a penalty if the actual cost exceeds the estimated job cost or a reward if the actual cost is below the estimated job cost. The Contractor's fee is made up of two parts: a fixed amount and a variable amount depending upon the relationship between the target cost and the actual cost. Furthermore, the project duration is usually specified and the contractor must abide by the deadline for completion.

This type of contract allocates considerable risk for cost overruns to the Owner but also provides incentives to contractors to reduce/control costs as much as possible but has the disadvantage of requiring the target cost to be fixed on the basis of a rough estimate. The variable fee concept is more illustrated in the following example:

Example 5.1

Bidding costs		Final completion costs	
Estimated cost	$500,000.00	Final cost	$510,000.00
Fixed fee	$50,000.00	Fixed fee	$50,000.00
Variable fee	10% of ± $ 500,000.00 (10% on increases or decrease to estimated cost)	Applicable variable fee: - ($10,000.00 × 10%)	–$1000.00
Tender sum	$550,000.00	Final account	$559,000.00

Cost reimbursable contracts are suitable where Owner has trust in the Contractor and in situations where overall scope of work is not clear at initial stage and where increased frequency of additions and alterations is expected or on emergency work projects. Cost reimbursable contracts allow contractors early involvement at the design stage and allow Owner's participation in contract management.

5.3.4 Guaranteed Maximum Cost Contract (GMC Contract)

On some projects where the scope is well defined, the Owner and the Contractor agree to a project cost guaranteed by the Contractor as maximum, also known as a ceiling price. In this system Contractor takes all the risks, both in terms of actual project cost and project time. Thus, a guaranteed maximum cost arrangement imposes a penalty on a Contractor for cost overruns and failure to complete the project on time. With a guaranteed maximum price contract, any amounts below the maximum are typically shared between the Owner and the Contractor, while the Contractor is responsible for costs above the maximum.

Example 5.2
Consider an example in which the Owner agreed with the Contractor to the following arrangement:

Target cost: $ 500,000.00
Target profit: $ 50,000.00
Target total cost: $ 550,000.00
Sharing ratio agreed: 70/30 (owner 70%, contractor 30%)
Ceiling price: $ 600,000.00

Scenario-1 Suppose the cost of construction decreases or underran the target cost, the Owner and Contractor would split the savings according to the share ratio. More specifically, if the cost of work completed is $450,000.00 ($50,000.00 less than target cost), the Contractor's share is 30% of underrun, i.e., $15000.00. Hence, the Contractor will get:

Cost of work done ($450,000.00) + target profit ($50,000.00) + underrun share ($15,000.00) = 515,000.00.

Scenario-2 In this scenario, consider that the Contractor completes the work with cost overrun but below ceiling price, say at $520,000.00, overrunning the target cost by $20,000.00. The Contractor's share of overrun is 30% of $20,000.00 ($6000.00). The target profit will be reduced by this amount ($50,000.00–$6000.00) equal to $44,000.00. Hence, the Contractor will then get: $520,000.00 + $44,000.00 = $564 ,000.00, which is $36000.00 below ceiling price.

If the cost of work done exceeds and overran the ceiling price of $600.000.00, the Contractor will receive no profit and has to bear the additional costs.

GMC contracts provide the Owner a nice feeling of security. Entering into a contract of this nature, he is convinced that no matter what happens, the final cost will not be above the maximum and there is a fair chance it could be lower. Any design changes which result from the specific instructions of the Owner would understandably fall outside the guaranteed price.

GMC contracts best achieve the Owner's objective because a partnership is formed between the Owner and the Contractor wherein the Owner agrees to reimburse the Contractor for actual cost as it occurs, not from a schedule of rates. This eliminates the distrust between parties. It also eliminates some contractor's tendency to not pay his suppliers and subcontractors because he gets audited monthly. In today's market, this one issue alone will solve a lot of problems and insure both savings and a smoothly running project.

Benefits include that the Owner can play an active role throughout the entire process. The whole issue of cost is manageable when the savings are shared, rather than negotiated from an adversarial position. When the administration is properly setup and organized, the benefits are truly amazing. Because every purchase order and invoice received from the Contractor is submitted to the Owner as backup, and because the Owner agrees to cut the time for processing and pay promptly, a posi-

tive and successful relationship is encouraged. In general, GMC contracts are very similar to a lump sum contracts.

5.3.5 Time-and-Material (T&M) Contract

Under this contract, the Contractor is paid on the basis of actual cost of labor at fixed hourly rates, actual cost of materials and equipment used, and agreed-upon markup to cover the Contractor's overhead and profit. T&M is commonly known as "Force Account."

T&M contracts contain aspects of both contract categories (cost reimbursable and fixed price). They resemble fixed price type arrangements in that they are priced on fixed hourly rates, and they also resemble cost reimbursable type arrangement because they are open ended as the total cost of material and equipment is unknown. Work on a T&M basis is considered mostly during construction, when the scope of work cannot be well defined.

T&M contracts are not considered beneficial because the Contractor is paid for the number of hours actually used to perform the job and cost of material installed. Hence, the Contractor has no incentive to control material costs or manage the labor force efficiently. Therefore, proper surveillance on the Contractor is required to assure that the Contractor is performing efficiently and using effective cost control measures. Daily work records must be prepared either by the Contractor or by Contract Administrator reporting the labor and equipment employed and the material used and signed by both parties on a daily basis. It is also advisable that the contract shall include a ceiling or not-to-exceed price. Under this arrangement, the Contractor will be bound to charge for labor and material up to a certain maximum and will assume the excessive costs.

5.3.6 Strengths and Weaknesses of Cost plus Contracts

These contracts are faster, as scope or design need not to be defined completely. There is flexibility for changes during execution of the work. Use of guaranteed maximum cost types provide owners with some cost certainty. Additionally, owners have to pay only for the actual work performed and cost actually incurred.

The weaknesses include that the total cost is not well defined. It requires close inspection and review of construction. Since under cost plus contracts, the scope is not well defined, most of the risks are shifted to the Owner. Contractor also needs to develop adequate accounting systems. Certainty of cost is limited until the project is complete. Under T&M, the Contractor has no incentive to be efficient to control the cost; hence, more efforts for monitoring are required by the Owner.

References and Further Reading

1. CCDC-2. (2008). *Canadian Construction Document Committee- Stipulated Price Contract*.
2. CCDC-4. (2011). *Canadian Construction Document Committee – Unit Price Contract*.
3. The FIDIC. (1999). *Conditions of contract for construction – Red book*. Author: FIDIC.