
Contract Construction

18-1 INTRODUCTION

The Construction Process

The several organizational and management methods by which construction may be accomplished were described in Chapter 1. Construction by a general contractor employed under a prime construction contract is only one of these methods. However, since this method of obtaining construction services is widely used, it will form the basis for this chapter's discussion of contract construction, including bidding and contract award, construction contracts, plans and specifications, and contract administration.

Construction Contract Law

Construction professionals are not usually lawyers and therefore should not attempt to act as their own lawyers. However, construction professionals must have a thorough understanding of the customary practices and underlying legal principles involving contract construction. Virtually every action taken by a contractor, construction manager, or architect/engineer at a construction site has legal implications. There is simply not time to consult a lawyer every time a decision must be made. Thus construction professionals must understand the contractual consequences of their activities and be able to recognize when legal advice should be secured. Hence the purpose of the discussion of contract law in this chapter is to familiarize the reader with the general principles of construction contract law and practice and to provide a basis for further study. A study of the summaries of court decisions pertaining to construction contract disputes found in many professional magazines will also be very helpful in acquiring further knowledge in this area.

18-2 BIDDING AND CONTRACT AWARD

Bid Preparation

In the United States, as in much of the world, construction contracting is a highly competitive business. To prosper and grow, a construction company must achieve a reputation for quality

workmanship and timely completion while achieving a reasonable return on its capital investment. Thus profit is an obvious and principal motive for bidding on a construction contract. However, there are a number of other reasons why a contractor may choose to bid on a project. During times of low construction activity, contractors may submit bids with little or no profit margin in order to keep their equipment in operation and prevent the loss of skilled workers and managers. Although such a policy may be successful on a short-term basis, it is apparent that it will lead to financial disaster if long continued. Other reasons for bidding on a project include a desire for prestige and the maintenance of goodwill with regular clients. Projects that receive wide publicity because of their national importance or their unusual nature are often bid at low profit margins for the prestige they confer on the builder. In these cases, the loss of potential profit can be justified by the public recognition gained. Likewise, contractors sometimes bid on relatively undesirable projects in order to maintain a relationship with an owner. In such cases, the profit margin used for the bid would be expected to be high.

Regardless of motivation, a contractor who has decided to bid on a project must then prepare a detailed cost estimate for the execution of the project. The first step in preparation of a cost estimate is to take off (or extract) the quantities of material required by the plans and specifications. These quantities are then extended (or multiplied by unit cost estimates) to provide a total estimated material cost for the project. Similar estimates are made for labor, equipment, and subcontract costs. The costs of equipment, labor, and material are often referred to as *direct costs*. Next, estimates are made of the administrative and management expenses that will be incurred at the project site. These costs are often referred to as job overhead or *indirect costs*.

After all project costs have been estimated, it is necessary to add an additional amount (or markup) for general overhead and profit. *General overhead* must cover the cost of all company activities not directly associated with individual construction projects. Major items of general overhead include salaries of headquarters personnel (company officials, estimators, clerks, accountants, etc.), rent and utilities, advertising, insurance, office supplies, and interest on borrowed capital. The usual procedure for prorating general overhead expenses to projects is to estimate total annual overhead expense, divide by the expected dollar volume of construction work for the year, and then multiply by the project bid price. The amount to be added for *profits* is, of course, a management decision. Although some projects may be bid with low profit margins for the reasons discussed earlier in this section, in the long run, construction operations must yield a reasonable return on invested capital. Unless the return on capital is greater than the yield of standard commercial investments, the owner would be better off investing in such items than in operating a construction business.

Bidding strategy, or the selection of a specific bid price for a fixed-price construction contract, is a mixture of art and science that is beyond the scope of this book. Methods used range from statistical analyses and application of game theory to seat-of-the-pants decisions. The bid price actually submitted by a contractor is usually based on an analysis of the expected competition and the state of the construction market in addition to the contractor's estimate of the cost to execute that project.

Bidding Procedure

The principal steps in the bidding procedure for a fixed-price construction contract include solicitation, bid preparation, bid submission, bid opening, selection of the lowest qualified bid, and contract award. Solicitation may range from an invitation sent to a selected few

contractors to public advertisement. Except in special circumstances, U.S. governmental agencies are required to solicit bids by public advertising. To ensure adequate competition, at least three bids should be obtained.

Contractors indicating an interest in bidding should be supplied with at least one complete set of contract documents. A deposit may be required to ensure the return of project plans and specifications furnished to unsuccessful bidders. The time allowed for bid preparation should be based on the size and complexity of the project. Three weeks has been suggested as a reasonable minimum time.

The Associated General Contractors of America, in cooperation with other professional organizations, has developed recommended bidding procedures for both building construction and engineered construction which are designed to ensure fairness to both contractors and owners (references 6 and 8). Among these recommendations are the use of standard bid proposal forms, specifying the order of selection of alternates, and suggested minimum times to be allowed for bid preparation. Alternates are optional items beyond the basic project scope. Since alternates may or may not be selected by the owner, their order of selection will affect the determination of the lowest bid price.

Bid openings are frequently open to the public, and in such cases bid prices are announced as the bids are opened. To facilitate communications between contractors and subcontractors immediately prior to bid submission, the deadline for submission of bids should not occur on a holiday or the day immediately following a holiday.

Contract Award

After the bids are opened, they are evaluated by the owner to determine the lowest qualified bid. The *qualification* of a contractor is the determination that the contractor possesses both the technical and financial ability to perform the work required by the contract. The method of qualification used will depend on the owner involved. U.S. government regulations require the *contracting officer* (person empowered to execute contracts binding the government) to make a formal finding that a contractor is qualified to perform before a contract may be awarded.

Another method of bidder qualification is called *prequalification*. Under this procedure only those contractors determined to be capable of performing are invited to submit bids for the project. A more common, although indirect, method of prequalification is to require bonding of the contractor. Bonds used in construction include bid bonds, performance bonds, and payment bonds. A *bid bond* guarantees that a contractor will provide the required performance and payment bonds if awarded the contract. A *performance bond* guarantees completion of the project as described in the contract documents. A *payment bond* guarantees the payment of subcontractors, laborers, and suppliers by the contractor. After identifying of the lowest responsible (i.e., one from a qualified bidder) and responsive (i.e., complying with bid requirements) bid, the winning bidder is notified by a letter of acceptance or notice of award. This document brings into force the actual construction contract between the owner and the contractor.

Subcontracts

Subcontracts are contracts between a prime contractor and secondary contractors or suppliers. Subcontracts are widely used in building construction for the installation of electrical, plumbing, and heating and ventilating systems. The contractual arrangements

between the prime contractor and the subcontractors are similar to those between the owner and the prime contractor. However, subcontractors are responsible only to the prime contractor (not to the owner) in the performance of their subcontracts. Subcontracts are included in this section only for the purpose of relating them to the bidding process.

Since subcontract costs often make up a major portion of the cost for a project, it is essential that the prime contractor obtain timely and competitive prices for subcontract services. In fairness, the successful prime contractor should execute contracts with those subcontractors whose prices have been used for preparation of the bid. However, after receiving the contract award, some contractors attempt to obtain lower subcontract prices by negotiating with other subcontractors. This practice is referred to as *bid shopping* and is widely considered an unethical practice which leads to poor subcontractor performance. As a result, bidding procedures often require the bidder to identify subcontractors at the time of bidding and to use only these subcontractors on the project. Some governmental agencies even go so far as to award separate prime contracts for general construction and for each area of specialty work. While protecting the subcontractors, such a procedure greatly complicates project control and coordination.

18-3 CONSTRUCTION CONTRACTS

Contract Elements

The legally essential elements of a construction contract include an offer, an acceptance, and a consideration (payment for services to be provided). The offer is normally a bid or proposal submitted by a contractor to build a certain facility according to the plans, specifications, and conditions set forth by the owner. Acceptance takes the form of a notice of award, as stated earlier. Consideration usually takes the form of cash payment, but it may legally be anything of value.

Contract Types

Contracts may be classified in several ways. Two principal methods of classification are by method of award and by method of pricing. The types of contract by *method of award* are formally advertised contracts and negotiated contracts. The procedure for the solicitation and award of an advertised construction contract was described in the previous section. A *negotiated contract*, as the name implies, is one negotiated between an owner and a construction firm. All terms and conditions of the final contract are those mutually agreed to by the two parties. While federal procurement regulations establish formally advertised competitive bidding as the normal process, negotiated contracts are permitted under special circumstances. Private owners may, of course, award a contract in whatever manner they choose.

The two types of contract by method of pricing are *fixed-price contracts* and *cost-type contracts*. Each of these types has a number of variations. There are two principal forms of fixed-price contracts: firm fixed-price contracts and fixed price with escalation contracts. Other classifications of fixed-price contracts include *lump-sum contracts* and *unit-price contracts*. A *lump-sum contract* provides a specified payment for completion of the work described in the contract documents. Unit-price contracts specify the amount to be paid for

each unit of work but not the total contract amount. Such contracts are used when the quantities of work cannot be accurately estimated in advance. The principal disadvantages of unit-price contracts are the requirement for accurately measuring the work actually performed and the fact that the precise contract cost is not known until the project is completed. A combination of lump-sum and unit-price provisions may be used in a single contract.

Fixed price with escalation contracts contain a provision whereby the contract value is adjusted according to a specified price index. Such contracts reduce the risk to the contractor during periods of rapid inflation. Since the alternative during periods of inflation is for the contractor to add a large contingency amount for protection, the use of an escalation clause may well result in a lower cost to the owner than would a firm fixed-price contract. In spite of this, fixed-price construction contracts with escalation clauses have not been widely used in the United States.

Cost-type (or cost-plus) contracts are available in a number of forms. Some of these include:

- Cost plus percentage of cost.
- Cost plus fixed fee.
- Cost plus fixed fee with guaranteed maximum cost.
- Cost plus incentive fee.

A cost plus a percentage of cost contract pays the contractor a fee that is a percentage of the project's actual cost. This type of contract may not be used by U.S. government agencies because it provides a negative incentive for the contractor to reduce project cost. That is, the higher the project cost, the greater the contractor's fee. The most widely used form of cost reimbursement contract, the *cost plus fixed fee contract*, does not reward the contractor for an increased project cost but still fails to provide any incentive to minimize cost. The *cost plus fixed fee with guaranteed maximum cost contract* adds some of the risk of a fixed-price contract to the cost reimbursement contract because the contractor guarantees that the total contract price will not exceed the specified amount. Hence it is to be expected that the contractor's fee for this type of contract will be increased to compensate for the added risk involved. The *cost plus incentive fee contract* is designed to provide an incentive for reducing project cost. In this type of contract, the contractor's nominal or target fee is adjusted upward or downward in a specified manner according to the final project cost. Thus the contractor is rewarded by an increased fee if able to complete the project at a cost lower than the original estimate. All cost-type contracts should clearly define the items of cost for which the contractor will be reimbursed and specify the basis for determining the acceptability of costs.

Contract Documents

A construction contract consists of the following documents:

- Agreement.
- Conditions of the Contract (usually General Conditions and Special Conditions).
- Plans.
- Specifications.

The *agreement* describes the work to be performed, the required completion time, contract sum, provisions for progress payments and final payment, and lists the other documents making up the complete contract. The *General Conditions* contain those contract provisions applicable to most construction contracts written by the owner. The *Special Conditions* contain any additional contract provisions applicable to the specific project. The contents of the *plans* and *specifications* are discussed in Section 18–4.

The Associated General Contractors of America, in cooperation with the American Institute of Architects, the American Society of Civil Engineers, and other professional organizations, has developed standard construction contract provisions and a number of associated forms. The federal government also utilizes standard contract documents. The use of such standard contract forms will minimize the amount of legal review that the contractor must perform before signing a contract. However, even if the contractor is familiar with the standard contract forms being used, care must be taken to fully evaluate all special conditions as well as the plans and specifications. The principal contract clauses and their interpretation are discussed in Section 18–5.

Construction contracts may contain a *value engineering (VE) clause*. Value engineering is the analysis of a design with the objective of accomplishing the required function at a lower cost. This objective may also be expressed as eliminating gold plating. When included in a construction contract, a value engineering clause encourages the contractor to propose changes in the project that will reduce project cost without affecting the ability of the facility to perform its intended function. The cost savings resulting from value engineering proposals accepted by the owner are shared between the contractor and owner on the basis specified in the contract. The usual clause prescribes a 50/50 split between the owner and contractor.

Contract Time

The time allowed (expressed as either days allowed or as a required completion date) for completion of a construction project is normally specified in the contract along with the phrase “time is of the essence.” If no completion date is specified, a “reasonable time,” as interpreted by the courts, is allowed. If the phrase “time is of the essence” is included in a contract and the project is not completed within the specified time, the contractor is liable for any damages (monetary loss) incurred by the owner as the result of late completion. In such a case, the courts will hold the contractor responsible for the actual damages that the owner incurs. A *liquidated damages clause* in the contract may be used to simplify the process of establishing the amount of damages resulting from late completion. Such a clause will specify the amount of damages to be paid by the contractor to the owner for each day of late completion. If challenged in court, the owner must prove that the amount of liquidated damages specified in the contract reasonably represents the owner’s actual loss. If the liquidated damages are shown to be reasonable, the courts will sustain their enforcement.

Construction contracts normally contain provisions for time extensions to the contract due to circumstances beyond the control of the contractor, such as owner-directed changes, acts of God (fire, flood, etc.), and strikes. The purpose of such provisions is, of course, to reduce contractors’ risk from events beyond their control. If such provisions were not included, the contractor would have to increase the bid price to cover such risks.

It should also be pointed out that the owner is financially responsible to the contractor for any owner-caused delays. The subject of changes and delays is discussed further in Section 18–5.

18–4 PLANS AND SPECIFICATIONS

Plans

Construction plans are drawings that show the location, dimensions, and details of the work to be performed. Taken together with the specifications, they should provide a complete description of the facility to be constructed. Types of contract drawings include site drawings and detailed working drawings. Contract drawings are usually organized and numbered according to specialty, such as structural, electrical, and mechanical.

Specifications

Construction technical specifications provide the detailed requirements for the materials, equipment, and workmanship to be incorporated into the project. Contract drawings and specifications complement each other and must be used together. An item need not be shown on both the plans and specifications to be required. Frequently, the item may be identified on only one of these documents. However, when the provisions of the plans and specifications conflict, the General Conditions of the contract generally provide that the requirements of the specifications will govern. In the absence of such a provision, the courts have commonly held that the requirements of the specifications will govern. The two basic ways in which the requirements for a particular operation may be specified are by method specification or by performance specification. A *method specification* states the precise equipment and procedure to be used in performing a construction operation. A *performance* (or result or end-result) *specification*, on the other hand, specifies only the result to be achieved and leaves to the contractor the choice of equipment and method. Recent years have seen an increase in the use of performance specifications, particularly by governmental agencies. Specification writers should avoid specifying both method and performance requirements for the same operation. When both requirements are used and satisfactory results are not obtained after utilizing the specified method, a dispute based on impossibility of performance will invariably result.

The format most widely used for construction specifications consists of 16 divisions, organized as shown in Table 18–1. This format was developed by the Construction Specifications Institute (CSI) and is usually identified as the CSI format or Uniform System for Building Specifications. Although developed for use on building construction projects, it is also widely used for other types of construction.

Shop Drawings and Samples

Shop drawings are drawings, charts, and other data prepared by a contractor or supplier which describe the detailed characteristics of equipment or show how specific structural elements or items of equipment are to be fabricated and installed. Thus they complement but

Table 18-1 Organization of the uniform system for building specifications

Division	Title
1	General Requirements
2	Site Work
3	Concrete
4	Masonry
5	Metals
6	Wood and Plastics
7	Thermal and Moisture Protection
8	Doors and Windows
9	Finishes
10	Specialties
11	Equipment
12	Furnishings
13	Special Construction
14	Conveying Systems
15	Mechanical
16	Electrical

do not replace the contract drawings. *Samples* are physical examples of materials, equipment, or workmanship which are submitted to the owner for approval prior to their incorporation in a project.

Contract documents should contain the specific requirements for submission of shop drawings and samples. Some suggested provisions include:

- Identification of items requiring samples or shop drawings.
- Procedure for submission of shop drawings, including format, marking, and number and distribution of copies.
- Procedure for submission of samples, including size and number required.
- Eliminating the requirement for shop drawings and samples when standard catalog items are to be used.

18-5 CONTRACT ADMINISTRATION

Progress Reports and Payment

Construction contracts commonly require the contractor to submit a proposed progress schedule to the owner shortly after contract award. Upon approval by the owner or owner's representative, this schedule forms the basis for judging the contractor's progress toward project completion. The contract may require the contractor to submit the plan and schedule in the CPM format (Chapter 16) and may also require periodic updating of the schedule as

work progresses. The owner's representative must continuously evaluate the contractor's progress to keep the owner informed and to provide a basis for the approval of the contractor's requests for progress payments. Failure of the contractor to attain a satisfactory rate of progress may provide the basis for termination of the contract by the owner, as described later in this section.

For projects expected to require more than a few months to complete, it is customary for the owner to make *progress payments* to the contractor. Progress payments are made at the interval specified in the contract, usually monthly or upon completion of certain milestones. Payment is customarily made for the work completed, materials delivered to the work site, and work prefabricated but not yet incorporated into the project. It is customary to withhold a percentage of the value of work completed as a guarantee against defective work and to ensure that the remaining work can be completed within the unpaid amount of the contract. The amount withheld is referred to as *retainage* or *retention*. A retainage of 10% is rather typical.

Changes and Delays

It is rare indeed if a construction project is completed without changes being made. The usual construction contract contains a clause authorizing the owner or owner's representative to order changes to the project within the general scope of the contract. The document directing such a change is referred to as a *change order*. The contract also provides that an equitable adjustment in time and contract value will be made for such changes. The majority of changes are due to design modifications initiated by the owner or designer. However, change orders may also be used to formalize adjustments to the contract required by site conditions differing from those anticipated at the time of contract award (commonly referred to as "changed conditions").

To minimize disputes, all change orders issued should contain an adjustment in contract time and price which is mutually acceptable to the contractor and owner. However, it is frequently not possible to delay issuing a change order until such an agreement has been reached without delaying the work in progress. As a result, many change orders are issued before an agreement has been reached on the corresponding price and time adjustment. Agreement must therefore be reached later as work progresses or the item will end up as a dispute. In estimating the cost associated with a change or owner-caused delay, the contractor must be careful to evaluate its effect on other project activities. Frequently, it will be found that changes or delay in one activity will necessitate changes in resource allocation or progress on other activities that result in additional project cost. These costs are sometimes referred to as *consequential costs*. To obtain reimbursement of consequential costs, the contractor must be able to document their existence. A CPM network is a valuable aid in identifying and justifying consequential costs.

Delays in the orderly progress of a construction project may result from a multitude of causes. The three general categories of delay include those beyond the control of either the contractor or owner ("acts of God"), those under the control of the owner, and those under the control of the contractor. The general principles established by law and precedent for financial and time adjustments to the contract as a result of such delays are as follows. In the case of fire, flood, earthquake, or other disaster, and strikes, a compensating time extension

to the contract will be made. Any financial compensation to the contractor would be provided by the contractor's insurance, not by the owner. If the owner is responsible for the delay (such as by the late delivery of owner-provided equipment), the owner must compensate the contractor for any additional costs incurred as well as provide an appropriate time extension to the contract. If the delay is under the control of the contractor, no compensation or time extension is provided to the contractor. Rather, the contractor is responsible for reimbursing the owner for any damages (actual or liquidated) resulting from the delay.

Acceptance and Final Payment

The acceptance of a completed project is customarily based on a final inspection performed by the owner's representative and conditioned upon the correction of any deficiencies noted. The list of deficiencies to be corrected which is prepared at the final inspection is sometimes referred to as the *punch list of record*. If the facility or a portion thereof is substantially complete, the owner's representative will execute a *certificate of substantial completion* for the work. The contractor may then request and receive a final progress payment for the completed portion of the project. However, sufficient retainage is withheld to ensure the correction of any remaining deficiencies. The certificate of substantial completion should clearly state the responsibilities of the contractor and the owner for maintenance, utility service, and insurance until final acceptance.

Upon correction of all deficiencies on the punch list of record, the contractor should notify the owner's representative of this fact and submit a *request for final payment*, together with any other documents required by the contract (such as releases of liens, an affidavit that all payrolls and bills connected with the project have been paid, consent of surety to final payment, etc.). When inspection confirms the correction of all deficiencies, the owner's representative will issue a final *certificate of payment*. The contract customarily provides a warranty against defective work for some period, usually 1 year. Any deficiencies discovered after preparation of the punch list of record should be handled under the warranty provision of the contract. Final payment and its acceptance by the contractor usually constitute a waiver of all claims by either the owner or contractor except for unsettled liens and claims and deficiencies falling under warranty provisions.

Claims and Disputes

A *claim* is a request by the contractor for a time extension or for additional payment based on the occurrence of an event beyond the contractor's control that has not been covered by a change order. Examples of such events include unexpected site conditions, delays in delivery of owner-provided property, and changes directed by the owner. The usual construction contract empowers the owner's representative (architect/engineer or government contracting officer) to decide on the validity of such claims. However, if the contractor is not satisfied with the decision, the matter becomes a dispute.

Disputes are disagreements between the contractor and owner over some aspect of contract performance. In addition to unsettled claims, disputes may involve such matters as substitution for specified materials, the responsibility for delays in project completion, and the effect of changes ordered by the owner. In recent years there has been an increase

in the use of *alternate dispute resolution (ADR)* methods instead of taking the matter to court. When successful, these nonjudicial techniques greatly reduce the time and expense involved in settling disputes. Some ADR techniques include negotiation, mediation, arbitration, nonbinding minitrials, and neutral fact finding. Probably the most common of these techniques are negotiation and arbitration. In 1966, the American Arbitration Association, together with a number of professional organizations involved in construction, established arbitration procedures for the construction industry, known as the *Construction Industry Arbitration Rules*. Under these procedures one or more independent professionals are appointed to resolve the dispute. Hearing procedures are less formal than those of a trial and the arbitrators are not bound by the legal rules of evidence. Because the parties to the dispute must agree to the use of arbitration, no appeal of the arbitration award is usually possible. State laws governing the use of arbitration vary and some states do not recognize the use of a contract clause requiring arbitration of all disputes arising under the contract.

Contract Termination

Although contract termination is usually envisioned as an adversary process, there are a number of nonadversary methods by which a contract may be terminated. Most construction contracts are terminated by satisfactory performance, one method of contract termination. Other nonadversary methods of contract termination include mutual agreement and impossibility of performance.

The principal adversary basis for contract termination is for breach of contract. Either the owner or the contractor may terminate a contract for breach of contract. The basis for termination by the contractor based on breach of contract is usually the failure of the owner to make the specified progress payments or owner-caused delay of the project for an unreasonable period of time. Termination by the owner for breach of contract is most commonly due to failure of the contractor to make reasonable progress on the project or to default by the contractor. When termination is due to breach of contract by the owner, the contractor is generally held to be entitled to payment for all work performed and the expenses of demobilization and cancellation of orders, plus profit. When termination is due to breach of contract by the contractor, the contract commonly permits the owner to take possession of the work site and all on-site equipment and tools owned by the contractor and to complete the project at the contractor's (or surety's) expense.

PROBLEMS

1. Briefly describe the steps that a contractor takes in preparing a cost estimate for a fixed-price construction contract.
2. What are the legally essential elements of a construction contract?
3. List and briefly describe the documents making up a construction contract.
4. What alternate dispute resolution (ADR) methods are available for resolving construction contract disputes? What advantages do these methods have over court proceedings?

5. Briefly describe the two principal types of construction specifications.
6. Briefly explain the advantages and disadvantages of each type of specification described in Problem 5.
7. Briefly explain the legal basis for issuing change orders to a construction contract. Who issues the change order and how are the project cost and duration affected?
8. What type of construction contract provides the greatest incentive for a construction contractor to minimize project cost?
9. How are construction contracts most often terminated?
10. Develop a computer program that can be used to maintain the current status of all active contracts of a construction firm. Input should include contract number and description, contract amount, date of contract award, date work started, required completion date, current work status (percent complete), projected completion date, amount billed to date, payments received to date, payments due but not received, number and value of contract modifications, and number and value of pending modifications and claims. Provide output in a format that can be used by company management as a summary of contract status. Using your computer program, solve an example problem.

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