

CHAPTER 2

CONTRACT STRATEGY

At the early stage of a project and once a project manager is selected, the main issue that faces the owner is to decide on the contract strategy that best suits the project objectives. Contract strategy means selecting organizational and contractual policies required for the execution of a specific project. The development of the contract strategy comprises a complete assessment of the choices available for the management of design and construction to maximize the likelihood of achieving project objectives. The scope of such contracts is very wide, from a simple purchase of standard article to multi-millionpound

projects. The size and complexity of the contract matter vary accordingly.

A proper contract strategy for a project involves five key decisions:

- Setting the project objectives and constraints
- Selecting a proper project delivery method
- Selecting a proper contract form / type
- Contract administration practices

2.1 What is a Contract

A contract is defined as: "*an agreement made between two or more parties which is enforceable by law to provide something in return for something else from a second party*". Contracts can be very simple or they may be very long and complicated legal documents. When a contract is properly set-up it is legally binding upon. The two parties are expected to perform the various obligations they have undertaken, as expressed in a mutually agreed set of contract documents. A contract therefore, is necessary to protect both client and contractor. According to its simple definition, a contract is an agreement enforceable at law, but not all agreements are contracts. Some elements must be present before an agreement becomes a contract. These elements are:

- **Competent Parties:** For an agreement to be a contract, there must be two or more competent parties. In order to be considered competent, a part must have a certain legal standing.
- **Proper Subject Matter:** For the subject matter of a contract to be proper, the first requirement is that it was be clearly defined as to the rights and obligations of each party. Second, the purpose of the contract must not violate the law.
- **Consideration:** There must be a lawful and valuable consideration given b both parties. A consideration often called "Something for Something." A consideration must, also, be possible.
- **Agreement:** For valid contract, there must be a mutual agreement. An agreement is considered to have been reached when an offer made by one party is accepted by the second party. Both parties must wish and intend their bargain to be enforceable by law.
- **Proper Form:** The terms of a contract must be written so that both parties are very sure of what their rights and responsibilities are.
- **Consent of the Parties:** The agreement must be free from: Misrepresentation, Duress Undue influence, etc.

The main steps to be taken before placing contract are presented in Fig. 2.1.

2.2 Selection of Contract Type

The selection of contract type to be used for a construction project is made by the owner, acting upon the advice of his Engineer and his legal advisor. The selection must meet the owner Objectives and takes into account the constraints that might relate to the project. Consultants and contractors should be fully informed by the project objectives and constraints. The scope and the nature of the project will primarily affect the selection of type of contract.

Fig. 2.1: Steps of contracting process

2.2.1 Project objectives

The client will have a number of overall objectives. These objectives may be of primary and/or secondary importance. Primary objectives include functional performance, time objectives, and cost objectives.

a. Project Scope (performance): The project scope defines the extent or the area that the contract covers. Any additions or omissions during the life of the project will increase or decrease the quantity of work involved. Likewise, any changes in design must be discussed carefully to establish whether or not they are likely to affect the scope of the project.

b. Time: The scope and time are closely interrelated. Decisions must often be made on the effect of increasing or decreasing scope on time. If the completion date of a project is critical, then increasing scope will call for an accelerated program. The extra cost associated with this acceleration must be quantified.

Identify Project

Prepare Scope

Select Contract

Prepare Tender Documents

Invite Tenderes

Tender Meetings

Revise and Evaluation

Place Contract

c. Price: The cost of a project is closely related to scope and time. The effect of the contract on price, and the various incentives and penalties that can help to keep price steady must be discussed and clearly defined.

On the other hand, secondary objectives could arise on a construction project and would exert a major influence over contract strategy decisions. Examples of secondary objectives are:

- Allocation and payment for risk.
- Training of the client's staff.
- Transfer of technology.
- Involvement of contractor in design.
- Involvement of client in contract management.
- Choice of labor-incentive construction.
- Use of local material and resources.
- Protection of the environment.

2.2.2 Project constraints

All construction projects have constraints that influence the achievement of the project objectives. These constraints should therefore, be considered when choosing an appropriate contract strategy. There are a variety of constraints and these are examples:

- Availability of funds.
- Availability of contractual incentives.
- Method of tendering.
- Project location.
- Target dates of the project.
- Possibility of design changes.
- Availability of resources.
- Seasonal working.
- Number of contractors willing or able to tender.
- Inflation.

Factors influencing contract choice

Three main factors influence the choice of a given contract including: the incentive, risk sharing and the flexibility.

2.3 Project Delivery Methods

The project delivery method translates what project parties are involved in the project and how they interact with each other and called also project organizational structure. The choice of an organizational structure should be related to project objectives and constraints. It can be facilitated considering the following factors:

- Size and nature of the work packages within the project.
- Selection of the design team form in-house resources external consultants or contractors.
- Process of supervision of construction.
- Restrictions upon using combination of organizational structures within the project.
- Expertise which the client wishes to commit to the project.

When plans are completed and the owner is interested in securing the low price, the use of competitive bids is suggested. The competitive bidding results in the type of contract that many are familiar with.

A negotiated contract should be used when construction should start before plans are completed or when the many unknown factors of the project make an accurate estimate impossible. When many changes are expected and when inspection and supervision cannot be done efficiently, the negotiated type of contract should be used. The various project delivery methods are summarized as follows:

2.3.1 Traditional approach

This is the most common approach in civil engineering projects in which the design has to be completed before construction can start. Design and construction are usually performed by two different parties who interact directly and separately with the owner. The pros and cons of this approach are summarized as follow:

Advantages:

- Price competition
- Total cost is known before construction starts
- Well documented approach used in most government projects.

Disadvantages

- Long time
- Design does not benefit from construction expertise
- Conflict between owner, contractor and A/E

Therefore, this method is fine in many cases where the project is clearly definable, design is completed, time need not be shortened, and changes are unlikely to occur during construction.

2.3.2 Direct labor

In this approach, owner organization performs both the design and construction using its in-house labor force.

- Used by large authorities
- The owner performs both the design and the construction
- May use consultants for some specialized designs
- Most suitable for small projects
- Can be used when expertise are available
- Low risk projects
- Inadequate scope definition

2.3.3 Design-build

In this approach, a single organization is responsible for performing both design and construction and, in some cases, providing certain “know-how” for the project. The pros and cons of this approach are summarized as follow:

Advantages:

- One contract that may include know-how

- Minimum owner involvement
- Used for fast-track projects in order to reduce time
- Co-ordination between design and construction and easier in implementing the changes

Disadvantages

- Cost may not be known until end of the construction
- High risk to contractor and more cost to owner
- Design-build company may reduce quality to save cost

The use of this approach, therefore, should be considered when contractors offer specialized design/construction/know-how expertise or when design is strongly influenced by the method of construction.

2.3.4 Turnkey

This approach is similar to the design-build approach but with the organization being responsible for performing both design, construction, know-how (if any), and project financing. Owner payment is then made at the completion (when the contractor turns over the “key”). An example is franchise projects in which a new branch of a restaurant chain needs to maintain the same design, construction quality, and food service quality.

2.3.5 Build-operate-transfer (BOT)

In this approach, a business entity is responsible for performing the design, construction, long-term financing, and temporary operation of the project. At the end of the operation period, which can be many years, operation of the project is transferred to the owner. This approach has been extensively used in recent years and is expected to continue. An example of its use is in express routes and turnpikes. A consortium of companies shares the cost (design, construction, financing, operation, and maintenance) and the profits gained from user fees, for a stipulated number of years. Afterwards, the project returns to the government to become publicly owned. This approach has also been used extensively in large infrastructure projects financed by the World Bank in parts of the world that cannot afford the high investment cost of such projects.

2.3.6 Professional construction management (PCM)

In this approach, the owner appoints a PCM organization (also known as Construction Management organization) to manage and coordinate the design and construction phases of a project using a Teamwork approach. The design may be provided by specialist design firms and in some cases by the PCM organization. With high level of coordination between the participants, innovative approaches of overlapping design and construction (i.e., fast tracking) can be adopted. The PCM organization aims at holding a friendly position similar to that of the consultants in the traditional approach.

The services offered by the PCM organization overlap those traditionally performed by the architect, the engineer, and the contractor. This may include: management and programming of design; cost forecasting and financial arrangements; preparation of tender documents; tender analysis and selection of contractors; selection of methods of construction; recommendations on construction economics; planning and scheduling construction works; materials procurement and delivery expedition; provision for site security, cleanup, and temporary utilities; supervision of control of construction contractors; construction quality assurance; cost control; costing of variations and assessment of claims; and certification of interim and final payments to contractors. The use of PCM approach, therefore, should be considered when there is a need for time saving, flexibility for design changes is required, and owner has insufficient management resources.

2.3.7 Contractual relationships

Within each project delivery method, the contractual relationships among the project participants can take various arrangements and the owner needs to make a decision regarding the proper arrangement that suits the project and the parties involved. The

different contractual relationships associated with various project delivery methods are illustrated in Figs. 2.2 (A represents services and \$ contractual relationships).

Direct force Traditional Design-build (turn-key)

Fig. 2.2: Contractual relationships

2.4 Types of Contracts

There are many types of contracts that may be used in the construction industry.

Construction contracts are classified according to different aspects. They may be classified according to the method of payment to the contractor. When payment is based on prices which submitted by the contractor in his tender, they are called cost-based contracts. Examples are cost-reimbursable and target cost contracts. Contracts may be classified in the point of view of the risk involved. The range of risk runs from a fixed price

contract to a totally non-risk cost-reimbursable contract at the other end.

2.4.1 Lump-sum contract

A single tendered price is given for the completion of specified work to the satisfaction of the client by a certain date. Payment may be staged at intervals on the completion. The contract has a very limited flexibility for design changes. The tendered price may include high level of financing and high risk contingency. Where considerable risk has been placed with the contractor, this contract may lead to cost cutting, trivial claims, or bankruptcy. Contract final price is known at tender. A lump-sum contract would seem to prevent risks for the client where in fact it just changes them. An important risk to the client is that of not receiving competitive bids from desirable contractors who may avoid a high-risk lump-sum contract.

This contract may be used for a turnkey construction. It is appropriate when work is defined in detail, limited variations are expected, level of risk is low and quantifiable, and client does not wish to be involved in the management of his project.

2.4.2 Admeasurement contract

In this type of contracting, items of work are specified in Bills of Quantities or Schedule of Rates. The contractor then specifies rates against each item. The rates include risk contingency. Payment is paid monthly for all work completed during the month. The contract offers a facility for the client to introduce changes in the work defined in the tender documents. The contractor can claim additional payment for any changes in the work content of the contract. Claims resolution is very difficult because the client has no knowledge of actual cost or hidden contingency. Tender price is usually increased by variations and claims. Two forms of admeasurement contract are usually used: bill of quantities and schedule of rates.

Bill of Quantities Contract: Tenderers enter rates against each item of the estimated quantities of work. The quantities are re-measured during the course of the contract, valued at the tendered rates and the contract price adjusted accordingly.

Schedule of Rates Contract: It contains inaccurate quantities of work, possibly with upper and lower probable limits. Therefore, it is common for separate rates to be quoted for labour, plant, and materials. The contract price is derived by measuring the man-hours, plant-hours and the quantities of materials actually consumed, and then pricing them at the tendered price. This contract is best suitable for repetitive works.

The admeasurement contract is well understood and widely used. It can be used when little or no changes are expected, level of risk is low and quantifiable, and when design and construction need to be overlapped.

2.4.3 Cost-reimbursable contract (cost-plus contract)

The contractor is reimbursed for actual cost plus a special fee for head office overheads and profit, no special payment for risk. Payment may be made monthly in advance. The contract involves a high level of flexibility for design changes. Final price depends on

changes and extent to which risks materialize. The contractor must make all his records and accounts available for inspection by the client or by some agreed third party. The fee may be a fixed amount or a percentage of actual costs. This contract has no direct financial incentives for the contractor to perform efficiently. It may be used when it is desirable for design to proceed concurrently with construction and when the client wishes to be involved in contract management.

2.4.4 Target cost contract

Cost targets may be introduced into cost-reimbursable contracts. In addition to the reimbursement of actual cost plus percentage fee, the contractor will be paid a share for any saving between target and actual cost, while the fee will be reduced if actual cost exceeds the target. The target figure should be realistic and the incentive must be sufficient to generate the desired motivation. Specified risk' can be excluded from the tendered target cost. When these occur, the target cost is adjusted accordingly and the client pays the actual cost incurred by the contractor. The target may also be adjusted for major changes in work and cost inflation. This contract can be used in the same circumstances as the cost-plus contract.

A brief summary of the level of risk exposed by each of the discussed contract forms is illustrated in Fig. 2.3. As shown in the figure, competitive bidding contracts (Lump Sum and Unit Price) are among the top risky contracts to contracts and thus present a challenge in estimating their cost and schedule at the bidding stage and before a commitment is made.

Fig. 2.3: Level of risk associated with various contracts

2.4.5 Time and material (T&M) contracts

T&M contracts are a hybrid type of contractual arrangement that contains aspects of both cost-reimbursable and fixed-price-type arrangements. T&M contracts resemble cost-type arrangements in that they are open ended, because the full value of the arrangement is not defined at the time of the award. Thus, T&M contracts can grow in contract value as if they were cost-reimbursable-type arrangements. Conversely, T&M arrangements can also resemble fixed-unit arrangements when, for example, the unit rates are preset by the buyer and seller, as when both parties agree on the rates for the category of "senior engineers."

Most appropriate when the buyer wants to be more in control. It is also used in an emergency to begin work immediately when a scope of work has not yet been completed. Not possible at time of placing contract to estimate extent or duration of the work, or anticipated cost, with any degree of confidence.

2.5 Contract Administration

As it was discussed in the previous sections, there is variety of types of contracts used in civil engineering projects. Each type has its specific characteristics. Contracts may be prepared under the heading of one type but could include characteristics of more than a single type. Many professional societies and government agencies have done a great deal toward the standardization of construction contracts such that the general form and content are well established for the various types of construction that may arise.

2.5.1 Contract documents

The contract is defined by the contract documents, which are developed from the tender documents. In a logical order, these documents refer to the following subjects:

- Input from the client (task description).
- Output of the contract (specifications, results to be achieved).
- Prices for the contractor's contribution.
- Responsibilities and procedures (liability, resources provided, time schedule, payment conditions, change procedures, etc).

Contract documents are usually arranged according to the following sequence:

- General (for any project).

- Special (for a specialty area of the project).
- Supplementary (unique to a given project).
- Additional (during bidding or negotiation).
- Agreement form (for signing very important and particular clauses).
- Modifications (during contract fulfillment).

The complete contract agreement usually consists of the following documents:

- Conditions (general, special, supplementary).
- Drawing and specifications.
- Addenda.
- Agreement form.
- Modifications.

The most important document from the legal point of view is the agreement. It is sometimes called the contract. Since so many documents are included as contract documents, the agreement is the better term for this particular one. The form of the agreement can be standardized and used for many projects, or a unique document can be prepared for each project. The standard form of agreement prescribed by the American Institute of Architects has proved to be satisfactory and has been used on many building projects with good results. The form followed for non-building projects is often more varied. Many agencies have own standard forms, which are used on all their projects. Information usually included in the agreement are of three parts. The first part is a short introductory paragraph which defines the parties, gives the date of the agreement, and state that each party agrees to what follows. The second part contains the elements of contract and defines the work to be undertaken. The final paragraph confirms the agreement and provides space for signatures of the parties. Thus, the agreement usually composed of the following articles:

1. A short introductory paragraph.
2. Scope of the work.
3. Time of completion.
4. Contract documents.
5. Performance bond.
6. Contractor's insurance.
7. Owner's insurance.
8. Laws, regulations and permits.
9. Payments.
10. Extensions of time.
11. Changes in the work.
12. Owner's right to terminate the work.
13. Contractor's right to terminate the work.
14. Confirmation and signatures.

2.5.2 Conditions of contract

The conditions of a contract are rules by which the execution of the contract is to be governed. They set-out the responsibilities, rights, and liabilities of the two parties. They also set-out the actions to be taken by the parties if and when certain eventualities should arise. No two civil engineering contracts are similar. Probably, no two construction contracts are truly the same. Therefore identical conditions of contracts are not likely to be required. However, for work of a similar type, certain conditions will apply for the vast majority of cases. It follows that a standard form of conditions for a given type of work will remove the necessity of thinking out and drafting new sets of conditions for every new contract. By taking the standard form and modifying it to suit the requirements of a particular contract, time and effort will be saved. The terms of a contract legally fall into two categories:

Conditions: They are terms expressing matters basic to the contract. A failure to perform

the requirements of a condition is a fundamental breach of an essential obligation giving the aggrieved party the right to:

1. End the contract and claim damages, or
2. Continue the contract and claim damages.

Warranties: They deal with matters not of the essence of the contract, being subsidiary to the main purposes for which the parties contracted. An example of a warranty is where a nominated sub-contractor warrants that the work will be carried-out to specific standards. The conditions of a contract usually comprise the following:

1. A standard form of general conditions of contract appropriate to the natures of the work involved.
2. A series of amendments to the forging in order to adjust them to the circumstances of the actual contract concerned.
3. A number of special conditions, which deal with matters peculiar to the contract and not dealt with by the standard.

2.5.3 The standard (general) forms of conditions of contract

Standard forms are prepared jointly by professional bodies and organizations representing contractors or by large organizations and public bodies to suit their own circumstances.

The intention is that a common approach by the parties to all contracts will be achieved and standard interpretations of risks and responsibilities involved. There are a number of

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standard forms of conditions of contract used in civil engineering. The most commonly used are:

Institute of Civil Engineering (ICE) Conditions of Contract: This document includes the forms of Tender, Agreement and Bond. It is applicable to all civil engineering construction works. It is particularly suitable for general civil engineering work which is predominantly either in the ground or in, or adjacent to, water, and cares for the attendant risks and claims situations. It is also used, sometimes, for building works and for mechanical and electrical works where such works are included in a civil engineering or building contract.

Federation Internationale Des Ingenieurs-Consueils (FIDIC): These conditions are, in effect, international versions of the ICE conditions to which they are closely related. The fourth edition (1987) of the conditions for works of civil engineering construction comprises:

Part I: General conditions with forms of tender and agreement.

Part II: Conditions of particular application with guidelines for preparation of Part II clauses.

It is intended for general use for works where tenderers are invited on an international basis, but it also suitable to domestic contracts. The objective is to provide a standardized document which is well-known, internationally recognized and accepted, an adequately reflects the interests of the parties concerned. The standard (general) forms of conditions of contract usually cover the general aspects in arranged clauses. For example, FIDIC general conditions of contract comprise clauses that cover the following items:

- Definitions and interpretations.
- Engineer and Engineer's representative.
- Assignment and sub-contracting.
- Contract documents.
- General obligations.
- Labor, Materials, plant, and workmanship.
- Suspension.
- Commencement and delays.
- Defects liability.
- Alternations, Additions and Omissions.

- Procedure of claims.
- Contractors' equipment, temporary works and materials.
- Provisional sums.
- Certificates and payments.
- Remedies.
- Special risks.
- Release for performance.
- Settlement of disputes.
- Notices.
- Default of Employer.
- Changes in cost and legislation.
- Currency and rates of exchange.

Most of the standard forms of conditions of contract contain one or more clauses, which require completion by the Client/Engineer before the conditions are issued.

2.5.4 Special conditions of contract

Special conditions are new clauses to augment the general conditions of a standard form. Usually they deal with subjects not touched on by the standard form. It is often simpler to introduce a special condition than to amend a standard form condition. After a new clause is written, it must be ensured that no conflict or ambiguity is being introduced. The range of possible subjects for special conditions is large. They normally deal with the peculiarities of one contract and one site. There are a variety of choices in which a new subject may be written:

- In the specification (if it is of technical matter). As special condition of contract.
- In the site regulations (if it deals with site administration or discipline).
- In separate correspondence (if it is not essential to incorporate it into the formal contract).

The decision to consider a special condition does not depend on importance. The following are typical examples of subjects for special conditions:

- Special terms of payments.
- Patents and licenses.
- Applicable law.
- Official Language.
- Obligatory use of local labor, plant and material.
- Co-operation with contractor on site.
- Fair wages to be paid.
- Union membership of work force.
- Protection and disposal of historic, valuable, archaeological, etc. finds on site.
- Prohibition of access to named places.
- Restrictions on noise levels, dust, fire hazards, etc.
- Control of demolition work, explosives, etc.
- Responsibility for damage to public services.
- Responsibility for payment of local taxes.

2.5.5 Construction claims

A construction claim is a request for payment or time extension to which the contractor considers him/herself entitled. There are three types under which claims are required:

- Extension of time only.
- Additional cost.
- Both extensions of time and additional cost.

The main reasons for construction claims may include:

- Late possession of site or late provision of working drawings.
- Change of contract start or activities schedule.
- Design change and variation.

- Delays in approval and examining work.
- Work acceleration by the client.
- Late delivery of materials supplied by the client.
- Different ground and/or site conditions.
- Unforeseen events and disasters.

2.6 Selecting the Contractor

Selecting key personnel and organizations that will participate in a project is a major step for the owner and can mean the success or failure of a project. By large, the competitive bidding process has been the main vehicle for contractors to obtain jobs. The process is required by law for public projects, which has been the largest percentage of all projects, except in emergencies such as war or natural disasters. Under this process, a simple quantitative criterion is used to award the bid to the “lowest responsible bidder”, thus potentially obtaining the lowest construction cost. The process, however, has its drawbacks, including: (1) overlooking important criteria such as contractor’s experience and strength; (2) potentially causing construction delays and problems if the contractor bids below cost to win the job; and (3) contributing to adverse relationships between the owner and the contractor. The competitive bidding process encompasses three main steps: announcement, bid preparation and bid evaluation.

To announce for a project, the owner should have the design completed and a bid package prepared with all design information. The owner then announces a general call for bidders or sends a limited invitation to a list of pre-qualified contractors. Through the limited invitation, the owner organization can reduce potential construction problems by avoiding unknown contractors who intentionally reduce their bids to win jobs, particularly if the project requires a certain experience. Owners, therefore, need to maintain a list of qualified contractors with whom they had successful experience or by advertising a call for pre-qualification.

2.7 Sub-Contracting

On almost all construction projects, some of the work is sub-contracted to *specialty* contractors, known as sub-contractors. The greatest part of the work is sub-contracted on building projects, with a lesser amount usually sub-contracted on heavy construction projects. Construction contracts generally have clauses pertaining to sub-contracting. Such clauses often limit the amount of work to be sub-contracted and generally provide that the client retains the right to approve sub-contractors. The contractor who employs sub-contractors to carryout part of the works must be totally responsible for their workmanship, performance, and general behavior on the contract. Any communication on these aspects should be made between the main contractor and the client. It is the former's responsibility. Any restrictions on sub-contracting should be made in the tender documents. If the client wishes a particular sub-contractor to carryout part of the work, he may then make such a nomination. Nominating sub-contractors in such way is useful when work of a specialized nature dictates such action. It is common for clients to place other restrictions on sub-contracting, through confirming the main contractor to a list of approved contractor. This occurs at the tender stage.

2.8 Exercises

1. State if True (T) or False (F):
 - a. Contract changes are more likely to occur on a single fixed price contract than on a cost plus a fee contract.
 - b. The delivery method that an owner chooses should be in response to the amount and type of risk that an owner sees in a project.
 - c. In lump sum contracts, it is allowed to change in the quantity of work performed within a limit of 25%.
 - d. In the admeasurement contracts, the item description, quantity, unit of measure, unit cost and the total cost in the B.O.Q should be cleared.

- e. The owner has the ability to know the contractor profit in the unit price contracts.
 - f. The direct costs are the summation of the cost of the labor, equipment, materials, and subcontractors.
 - g. Overheads include the cost of items which cannot be directly charged to a specific work element.
 - h. Loading of rates may be risky to both the contractor and the owner.
 - i. Contract type has not effect on the project deadline.
2. Select the right answer:
- I. The advantage(s) of a traditional delivery method is (are):
- a. Reduced project time
 - b. Known project cost before construction
 - c. Non-adversarial relationships between participants
 - d. All of the above
- II. The developer of a 40 story high-rise office building desires the shortest possible construction time. What delivery method would be the best?
- a. Traditional
 - b. Design-build
 - c. B and C only
 - d. Construction project management
- III. Which type of contracted arrangement would be best used when the quantities of work are difficult to determine in advance?
- a. Single fixed price
 - b. Unit price
 - c. Cost plus a fee
 - d. None of the above
- IV. If the contractor considers that the quantity of an item in the BOQ has been underestimated:
- a. He should phone the Client to declare this item
 - b. He has to use this quantity.
 - c. He can raise the rate of this item.
- IV. The contractor may decide to subcontract an item of work in order to:
- a. give a chance to another contractor
 - b. cover lack of specialized resources.
 - c. reduce project cost.
3. Briefly differentiate among the various project delivery approaches (various organizational structures).
4. Explain what is meant by loading of rates in B.O.Q.
5. What are the main types of construction contracts?
6. Specify the suitable contract type for each of the following construction project:
- A pumping station of standard design.
 - Sewer and water lines projects.
 - Highways
 - Hospitals
 - Construction of irrigation canals.
 - Bridges.
 - Repetitive and similar units.
 - Military projects.
7. What are the construction contract documents?
8. Explain what is meant by the two terms: “Price-based Contracts” and “Cost-based Contracts”.
9. Compare the following types of contracts from the point of view of flexibility for design changes and variations:
- Lump Sum.
 - Admeasurement.
 - Target cost.
10. Compare the lump sum, admeasurements, and cost plus contracts from the following point of view:
- Early start to construction.

- Risk sharing.

11. Give three examples of secondary objectives which could affect the selection of the contract strategy decision.

12. Give two examples of project organizational structure which can be used to achieve fast-track construction.