Construction Contracts Administration
(CE110401348)

1 – Introduction

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Construction Contracts Administration

- What is construction?
  - Construction is the execution of the work as required by the contract documents.
  - Construction is the process that sets up a portable plant, bring material to the site, and on completion of the work moves the plant away, leaving its output standing
    - Output: all immobile structures (airports, buildings, dams, roads and tunnels, power plants, municipal treatment plants, pipelines …etc)

Construction Contracts Administration II

- What is a contract?
  - Legally binding document that describes the responsibilities and rights of the parties
- How are contracts formed?
  - Owner issues Invitation for Bids (IFB)
  - Contractor prepares and submits bid
  - Owner reviews and accepts bid
  - A contract document is developed, reviewed, and agreed upon by parties
  - The contract is signed by parties

Construction Contracts Administration III

- What is Construction Contract Administration?
  - Construction contract administration (CCA) involves the activities necessary to effect and determine the fulfillment of the contract requirements by the parties to the construction contract.
- Construction contract administration begins when the agreement between the owner and contractor is executed and ends when final payment is accepted by the contractor.

Project's Contract Administration I

- What is project?
  - Project: A temporary effort undertaken to create a unique product or service.
  - "Any undertaking with a defined *STARTING* and *ENDING* point and defined *OBJECTIVES* by which completion is identified. In practice, most projects depend on limited *RESOURCES* by which the objectives of the project are accomplished."

Project Management Institute

Project's Contract Administration II

- Project attributes :
  - Has a well-defined objective—an expected result or product (unique purpose).
  - Is temporary.
  - Requires resources, often from various areas, to carry out the tasks.
  - A project has a primary customer or sponsor that provides direction and the funds necessary to accomplish the project.
    - In a business setting, the customer can be internal or an external to your organization.

Project's Contract Administration III

- Project attributes:
  - A project has a specific time frame - a start time and a date by which the objective must be accomplished.
  - A project is carried out through **a series of interdependent tasks** in a certain sequence in order to achieve the project objective.
  - Involves uncertainty.

Who are Project Stakeholders?

- **Stakeholders** are the people involved in or affected by project activities.
- Stakeholders include:
  - Project sponsor
  - Project manager
  - Project team
  - Support staff
  - Customers
  - Users
  - Suppliers
  - Opponents to the project

Project Participants (Construction) I

- The main participants are:
  - The Owner
  - The A/E (Designer/Consultant)
  - The Contractor
- Other participants: involved in the project with one of the main participants.
  - Subcontractors
  - Product representatives, who assist with submittals and furnish field services such as inspecting installed work

Project Participants (Construction) II

- Suppliers, who furnish materials or products for the project
- Manufacturers, who produce materials or products
- Consultants, who provide professional services to the A/E, contractor, or owner
- Testing laboratories and inspection agencies, which provide quality control (QC) services to the owner and contractor
- Financial advisers and institutions that arrange for the project financing

Project Participants (Construction) III

- Attorneys, who coordinate the legal and contractual issues of the project
- Insurance advisers and companies that provide risk coverage to the owner, contractor, and A/E
- Bonding companies, which ensure the performance of the contractor and subcontractors
- Authorities and regulatory agencies which have jurisdiction over the construction and that establish criteria in the form of codes, ordinances, and permits

Project Categories

- Public vs. Private Projects
  - A private party can award a contract in any way they choose to anyone they choose.
  - Private party can make one contract or multiple
  - Public party is limited by laws and regulations
  - Public party commonly awards bids by competitive bidding.

Phases of a Project

- Business Planning
- Conceptual Design
- Detailed Design
- Procurement
- Construction
- Testing, Start-up & Implementation
- Operations & Utilization
- Decommissioning

Project management

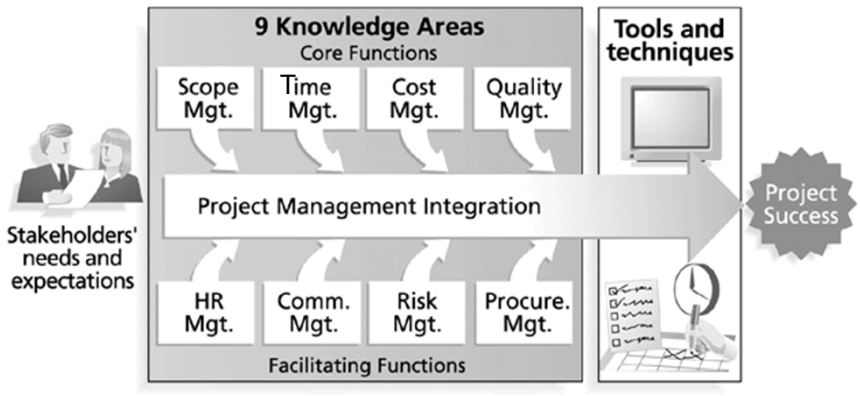
- Project management is the application of knowledge, skills, tools, and techniques to project activities in order to meet project requirements (meet or exceed stakeholders' expectation from a project)
- Organizing and managing resources so the project is completed within defined scope, quality, time and cost constraints

Construction Management

- Construction Management: the act of managing the construction process
- The construction manager manages the basic resources of construction
  - Workers and subcontractors
  - Equipment and construction plant
  - Materials
  - Money (income, expenditure, and cash flows)
  - Time

Project Management Framework

- A set of processes, tools and templates, designed to be used together to manage a project through its lifecycle



Nine Project Management Knowledge Areas I

- Scope Management
- Time Management
- Cost Management
- Quality Management
- Human Resources Management
- Communications Management
- Risk Management
- Procurement Management
- Integration Management

Nine Project Management Knowledge Areas II

- Knowledge areas describe the key competencies that project managers must develop.
  - Four core knowledge areas lead to specific project objectives (scope, time, cost, and quality).
  - Four facilitating knowledge areas are the means through which the project objectives are achieved (human resources, communication, risk, and procurement management).
  - One knowledge area (project integration management) affects and is affected by all of the other knowledge areas.
  - All knowledge areas are important!

PM Triple Constraints I

- **Time**
- **Cost**
- **Scope**

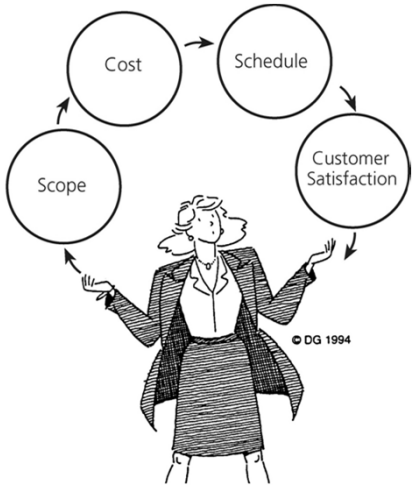
Manage these or they will manage you!

PM Triple Constraints II

- **Scope**: all the work to be done in order for the deliverables to meet the requirements agreed upon at the onset of the project.
- **Cost**: the amount the customer has agreed to pay for acceptable project deliverables.
- **Schedule**: the timetable that specifies when each activity should start and finish.
- **Customer's satisfaction**: To complete the scope within budget by a certain time to satisfy the customer.

PM Triple Constraints III

- It is the project manager's duty to balance these three often-competing goals.



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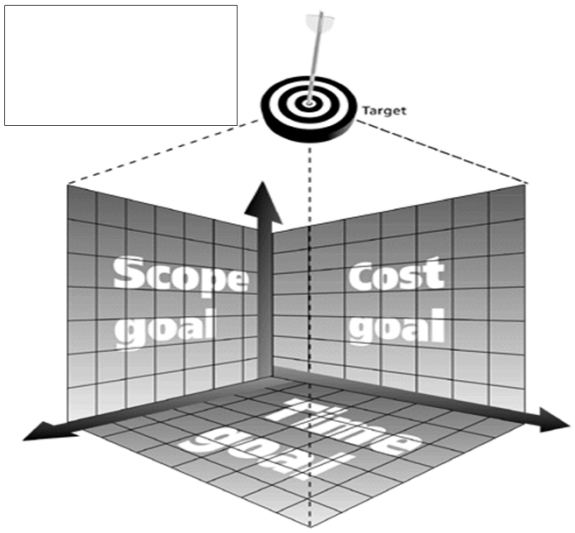
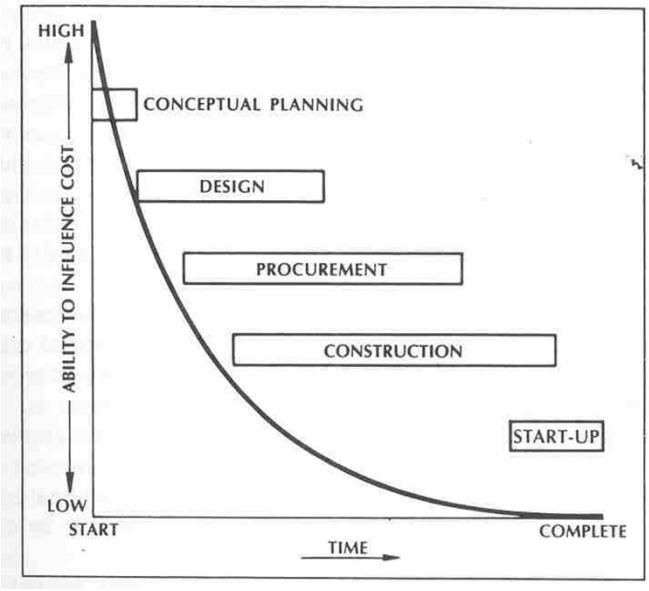
PM Triple Constraints IV

- Successful project management means meeting all three goals (scope, time, and cost) – and satisfying the project's sponsor!



Project Management

- The level of influence concept



Construction Contractors

- Construction contractors: Companies and individuals engaged in the business of construction
  - They operate under a contract arrangement with the owner
- Construction contractors
  - General contractors: engage in a wide range of construction activities and execute most major construction projects
  - Specialty contractors: limit their activities to one or more construction specialties

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2 – Project Delivery Approaches

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Introduction

- Three major participants in a project:
  - Owner (employer)
  - Designer (architect/engineer)
  - Builder (contractor, subcontractor)
- Three Major Project Phases
  - Design phase
  - Bidding and Award phase
  - Construction phase

Design Phase

- The owner enters into a contract with the architect/engineer to plan and design a project
- At this stage, the owner participates to set criteria for:
  - Design (architectural, structural, mechanical, etc.)
  - Cost
  - Schedule
  - Other decision making inputs

Bidding Phase

- After completion of the planning and design phase, the project is advertised for construction
- Opening bids
- In most cases the bid is awarded to the lowest responsive bidder

Award Phase

- The owner enters into contract with the contractor
- Both parties sign an agreement

Construction Phase

- The owner issues notice to proceed
- Usually contractors hires subcontractors to construct portions of the project
- The contractor and the subcontractor enter into agreement; the owner is not involved in this agreement
- The contractor is fully responsible in front of the owner for the whole project, whether executed by the contractor or the subcontractors

Initiating a Project

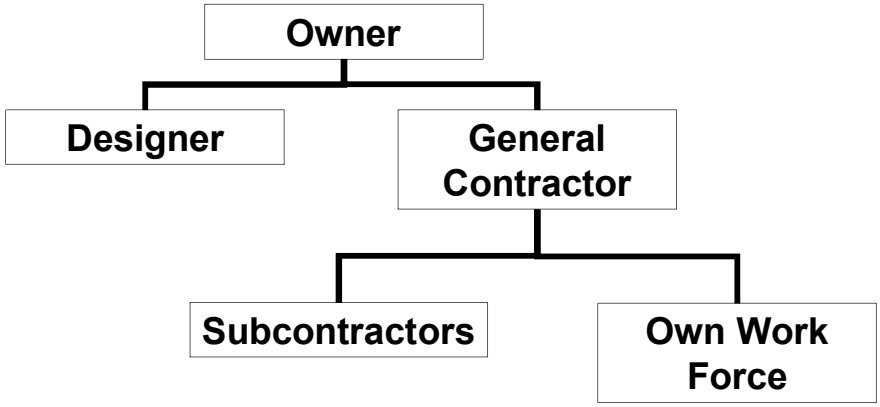
- The 5-step process
  1. Advertise for bids
  2. Open bids
  3. Award contract
  4. Sign agreement
  5. Issue notice to proceed

Project Delivery Approaches

- Four major approaches:
  - Traditional
  - Design/Build
  - Construction Management
  - Owner/Builder

Project Delivery Approaches

- Traditional



Traditional Delivery Approach

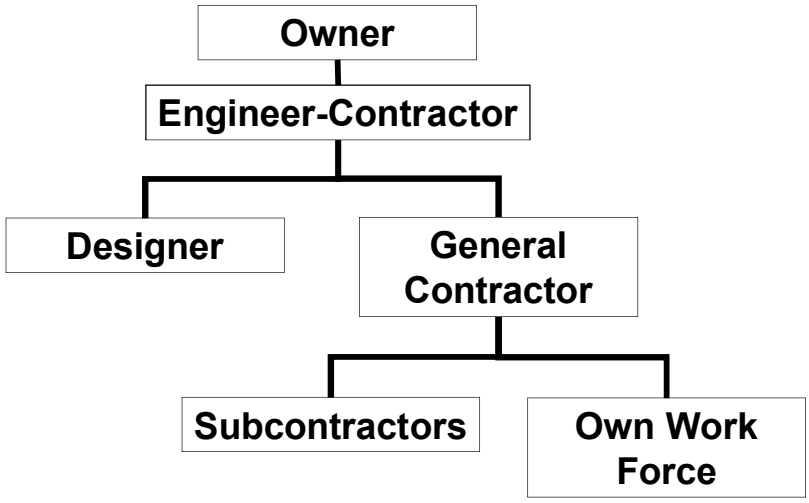
- **Owner enters into two separate contracts**
  - Architect/Engineer
  - General Contractor
- **Advantages**
  - Fixed price for the project before any work commences
  - Price competition between contractors

Traditional Delivery Approach

- Disadvantages
  - Contractors/subcontractors have little opportunities to suggest improvements until after the award is announced
  - Difficult to phase or fast-track the project
  - Less opportunity for interaction between the significant parties
  - Misinterpretation of the drawings and specifications can be difficult to eliminate

Project Delivery Approaches

- Design-Build (Turnkey)



Design-Build Delivery Approach

- Under this approach, the owner enters into one single contract:
  - Design/Builder (D/B)
- The D/B is responsible for both design and construction
- Can be achieved using joint ventures between a designer (A/E) and a builder (GC)
- Because of the low bid system in public bidding, the D/B approach can not be used

Design-Build Delivery Approach

- The D/B approach is usually used in:
  - The case of fast track, where construction can start before design is completed
    - Main objective for fast track is to shorten construction time
  - The case of complex projects where few companies are qualified to design/build such as petroleum refineries

Design-Build Delivery Approach

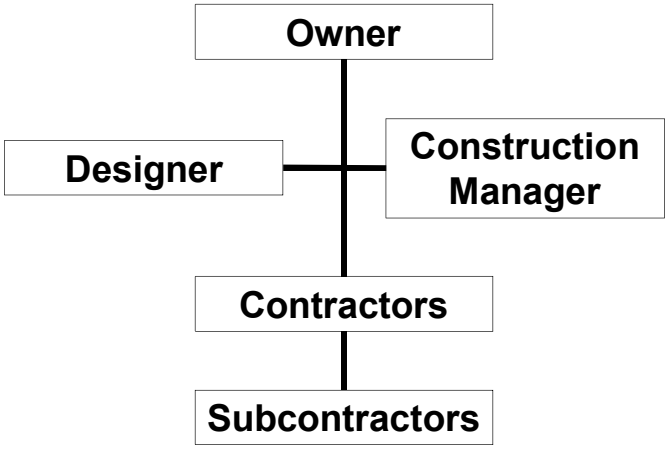
- Advantages
  - Seamless communication within the single firm encompassing both design and construction (One source of responsibility)
  - Contractor is able to improve constructability
  - Scheduling is more effective, and fast-tracking is possible
  - Design changes are simpler

Design-Build Delivery Approach

- Disadvantages
  - Owner may not have a firm fixed price in hand early
  - Owner' knowledge and awareness of the project is less (Crucial Decision making)
  - Less checks on contractors' performance (More vulnerable)

Project Delivery Approaches

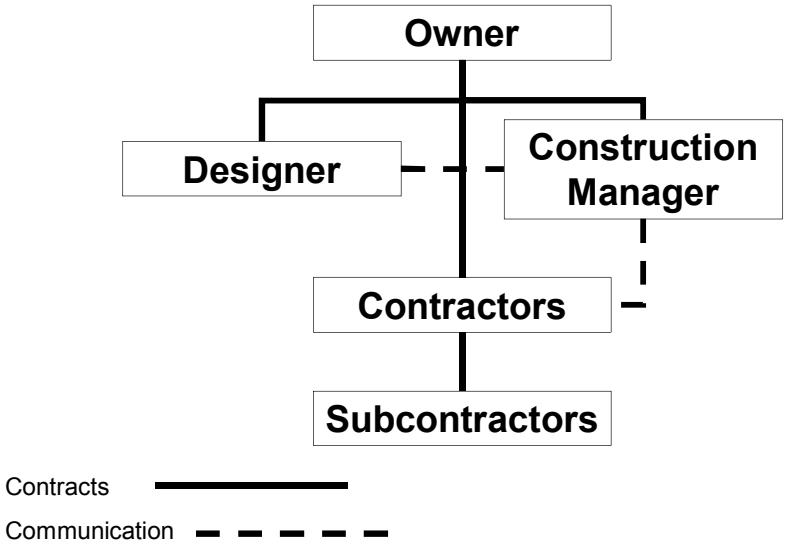
- Construction Management



Construction Management Delivery Approach

- Many owners engage construction managers (CMs) to assist in developing bid documents and overseeing project construction.
- CM:
  - Is a professional or a firm trained in the management of construction processes.
  - Is generally interposed between the owner and some or all of the other participants.
- There are two general types of CM:
  - Construction Managers as Agent (ACM)
  - Construction managers-at-risk (CM-at-risk)

Construction Management as Agent



Construction Management as Agent

- Owner enters into 3 contracts
  - A/E (Designer)
  - CM
  - GC
- The CM acts as the owner representative in both design and construction (CM acts as advisor to the owner)
- The trade contracts are held by the owner rather than the construction manager. With the CM Agency approach, the owner is responsible for procuring all trade contracts for the construction phase, which the CM can coordinate.

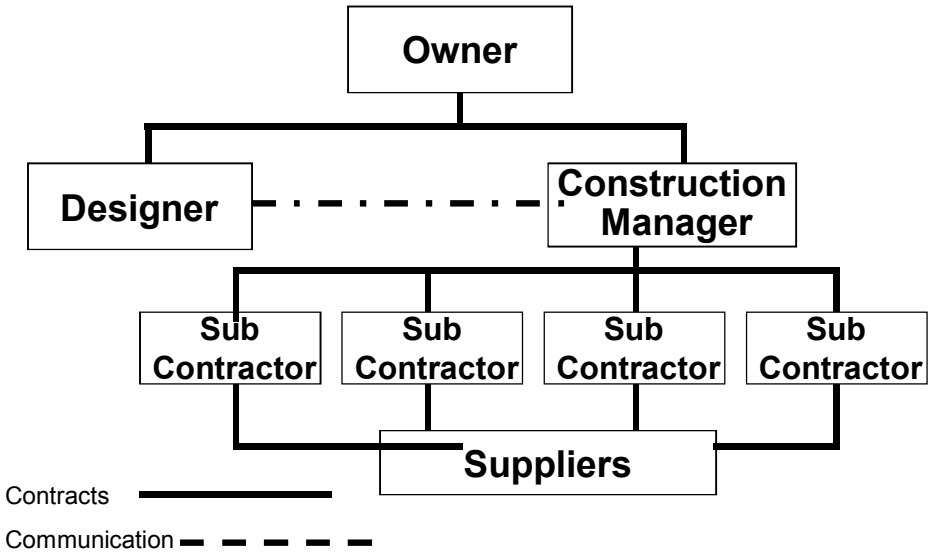
Construction Management as Agent

- The CM provides for the project:
  - Project management
  - Schedulers
  - Estimators
  - Construction coordinators, field engineers, quality control personnel, etc.
- Construction can start for some portions of the project as soon as design of that portion is completed
  - Overall design is not completed yet
  - i.e., foundation construction starts as soon as its design is complete, before columns, beams, and slabs are designed

Construction Management as Agent

- Advantages
  - Extends the owner's internal capabilities in performing traditional owner responsibilities.
  - Builder selection flexibility
  - Effective communication between the three parties
  - Allow simultaneously phasing various tasks in the project in coordinated effort (Faster schedule delivery)
  - Owner is able to benefit from competitive bidding by contractors and subcontractors
- Disadvantages
  - Possible communication problems between parties involved

Construction Management at Risk



Construction Management at Risk

- The CM at Risk delivery method**:**
  - The CM act as consultant to the owner in the development and design phases, similar to CM-as-Agent
  - The CM act as the equivalent of a general contractor during the construction phase.
- The Construction Manager at Risk contracts directly with multiple subcontractors and has single point of responsibility for the delivery of the project
  - Here, the CM holds the risk of subcontracting the construction work to trade subcontractors

Construction Management at Risk

- CM-at-risk arrangement increases significantly owner's delegation of control and risk.
- CM-at-risk typically contracts with the owner in two stages.
  - First, CM-at-risk manages and undertakes services during conceptual & preliminary design phases with the design professional.
  - When design is complete, owner and CM-at-risk then agree on a price and schedule for the completion of the construction work.

Construction Management at Risk

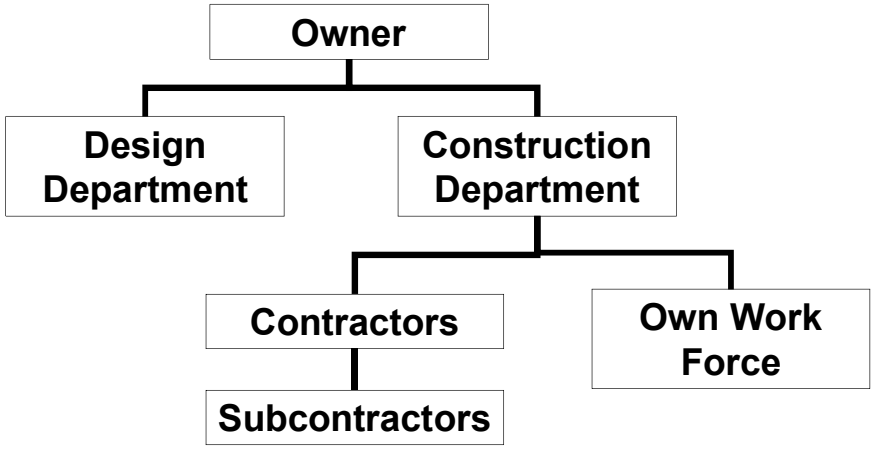
- **CM At Risk Advantages**
  - Majority of project risk is passed to the CM, limiting owner's liability
  - A high level of control over cost and schedule early on in the project
  - Single point of accountability: CM At Risk signs contracts with all subcontractors
  - Enables fast-track delivery – time savings
  - Full pre-construction services available (CM hired pre-design allows design assist and CM involvement in estimating and constructability)

Construction Management at Risk

- **CM At Risk Disadvantages**
  - Difficult for Owner to evaluate value of contract
  - Typically less competition in bidding (especially for self-performed work)
  - Additional pre-construction fees and CM fee may increase "first cost" (but may result in lower final cost)

Project Delivery Approaches

- Owner-Builder



Responsibilities for Subcontractors Coordination

- For the traditional, design/build and CM approaches:
  - As long as the owner awards the contract to one single GC, he has no coordination responsibility; the GC is fully responsible for coordinating the work of the subs
- For the Owner/builder approach:
  - The owner has coordination responsibilities if he awards the contract to multiple contractors; or if he performs part of the work with his own forces

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3 – Contract Types (Contract Pricing)

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Contract Pricing

- Because of the unique nature of constructed facilities, it is almost imperative to have a separate price for each facility
- The construction contract price includes the direct project cost including field supervision expenses plus the markup imposed by contractors for general overhead expenses and profit
- The factors influencing a facility price will vary by type of facility and location as well.
- All pricing arrangements have some common features in the form of the legal documents binding the owner and the supplier(s) of the facility

Procurement Methods

- Two major procurement methods:
  - Competitive bidding
  - Negotiated bidding

Competitive Bidding

- The basic structure of the competitive bidding process consists of:
  - The formulation of detailed plans and specifications of a facility based on the objectives and requirements of the owner
  - Invitation for Bid (IFB) is issued by owner
  - Contractors prepare bid
  - Contract is typically awarded based on lowest responsive or responsible bid

Competitive Bidding II

- Invitation for Bid (IFB) is often restricted to qualified contractors
- The definition of a qualified contractor usually calls for a minimal evidence of previous experience and financial stability
- In the private sector, the owner has considerable latitude in selecting the bidders, ranging from open competition to the restriction of bidders to a few favored contractors

Competitive Bidding III

- In the public sector, the rules are carefully delineated to place all qualified contractors on an equal footing for competition, and strictly enforced to prevent conspiracy among contractors and unethical or illegal actions by public officials

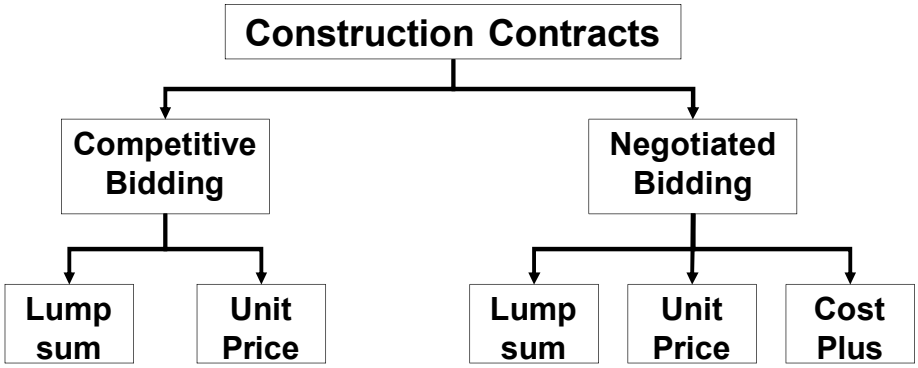
Negotiated Bidding

- Negotiated Bidding: The basic structure of the negotiated bidding process consists of:
  - Bidders are often selected by owner
  - Bidders prepare price, schedule, and presentation on qualifications
  - Owner selects successful bidder and negotiates a final price
- Common in the private sector

Negotiated Bidding II

- A major reason for using negotiated contracts is the flexibility of this type of procurement, particularly for:
  - Projects of large size and great complexity
  - Projects which substantially duplicate previous facilities sponsored by the owner.

Construction Contracts



Contract Types

- Two fundamental contract families
  - Fixed price
    - Lump sum
    - Unit price
  - Cost reimbursable
    - Cost plus
    - Guaranteed Maximum Price

Lump-sum Contracts

- The contractor agrees to perform a stipulated job of work for a predetermined price that includes profit
- Scope of work is typically well-defined
- The contractor must complete the work for the fixed price shown as long as the scope of the contract has not been altered by change orders
  - Any cost overruns must come out of the contractor's pocket
  - Similarly, any money that is saved on the job, as long as it conforms to the plans and specifications, belongs to the contractor

Lump-sum Contracts II

- The lump sum contract is popular among owners because
  - the total cost of the project is known in advance
- Lump sum contracts are more popular in building projects compared to highway projects
  - Quantities are usually known in the case of building construction and unknown in the case of highway construction

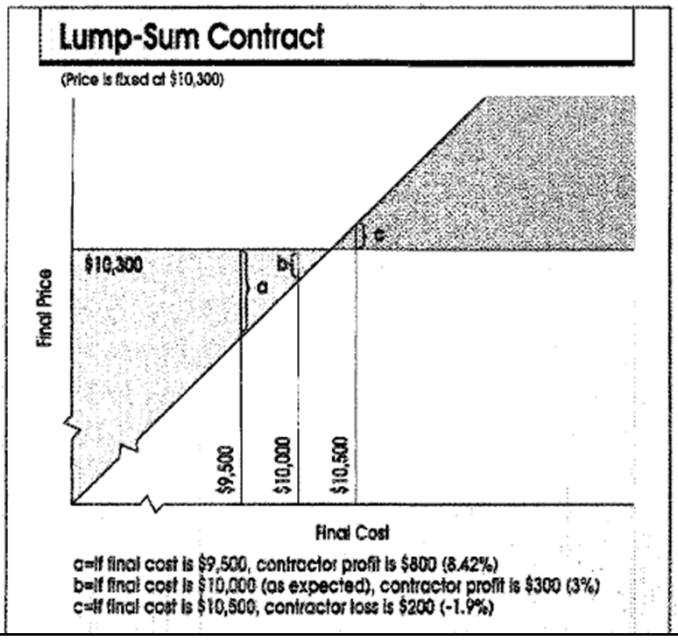
Lump-sum Contracts III

- When it is appropriate?
  - When the plans are fully completed and accurate quantities of work can be estimated
  - When the owner has a limited budget because it is the only form that gives a fairly accurate indication of the final cost of the project

Lump-sum Contracts IV

- Advantages:
  - Generally competitive bid contracts
  - Benefits owners because they know exactly what they have to pay
  - Total price fixed in advance
  - The simplest type of contract
- Disadvantages
  - Risk is on the contractor but he can make money by finishing faster
  - Scope must be fully defined (no fast tracking)
  - Bid unbalancing can occur

Lump-sum Contracts V



Unit Price Contracts

- Another form of fixed cost contracts
- Unit price contracts are based on:
  - An A/E estimate of quantities of defined work items
  - A unit price for each of these work items
- The owner/design firm provides a list of all individual bid items, along with an “engineer’s estimate” of the quantities involved

Item	Unit	Quantity	Unit Price $	Bid Amount $
Excavate sand	Cubic Meters	8,000		
Excavate rock	Cubic Meters	2,000		
Fill material	Ton	4,000		
Total				

Unit Price Contracts II

- Blanks are provided in the proposal document for the bidder to insert a price per unit
- Multiplying this unit price by the quantity shown in the A/E' estimate indicates the total amount of bid for each item
- The sum of the unit costs multiplied by estimated quantities of all items in the contract is used to determine the low bidder

Item	Unit	Quantity	Unit Price $	Bid Amount $
Excavate sand	Cubic Meters	8,000	4	32,000
Excavate rock	Cubic Meters	2,000	20	40,000
Fill material	Ton	4,000	12	48,000
Total				120,000

Unit Price Contracts III

- Because payment to the contractor is made on the basis of units of work actually done and measured in the field:
  - The owner need to provide a field force for the measurement and determination of the true quantities of work accomplished
- The contractor is obligated to perform the quantities of work actually required in the field at the quoted unit prices, whether they are greater or less than the owner estimates

Unit Price Contracts IV

- The contractor must include all anticipated costs in the bid items
  - Overhead
  - Temporary structures (formwork)
- Often used for public works projects
- Very common with earthwork
- When it is appropriate?
  - When the project is fairly well defined but the actual quantities are difficult to estimate with accuracy

Unit Price Contracts V

- **Advantages**
  - Generally competitive bid contracts
  - Accommodates quantity adjustments
- **Disadvantages**
  - Disadvantage: estimate vs. actual quantities
  - Neither the owner nor the contractor know what the total project cost will be until the completion of the project
  - Bid unbalancing can occur
  - Additional staff requirements are needed by the owner to certify in-place quantities

Cost-”plus” Contracts

- Cost-“plus” contract: The contractor is reimbursed for his expenditures plus an allowance for overhead and profit
- Sometimes referred to as “time and materials” contract
- Normally negotiated between the owner and the contractor
- Two types:
  - Cost plus a percentage fee
  - Cost plus a fixed fee

Cost-”plus” Contracts II

- **Cost-plus-percentage-fee contracts**
  - Contractor agrees to perform the work for the cost of materials and labor plus a percentage fee to cover overhead costs and profit
  - Fee is a percentage of the total cost of the project
- **Cost-plus-fixed-fee contracts**
  - Contractor agrees to perform the work for the cost of materials and labor plus a fixed fee to cover overhead costs and profit
  - Fee is a fixed amount regardless of actual cost of work
  - This form removes the incentive for the contractor to increase costs in an attempt to increase the fee

Cost-”plus” Contracts III

- When is a cost-plus contract appropriate?
  - When the actual costs of a project or portions of a project are difficult to estimate with accuracy
  - Projects of experimental design, new materials or an unusual site that is hard to predict
  - When plans and specifications can not be completed before construction starts
  - When the true nature of the project cannot be accurately described before construction begins (example: remodeling or renovation projects)

Cost-”plus” Contracts IV

- The contractor computes the amount of the fee on the basis of:
  - Size of the project
  - Estimated time of construction
  - Nature and complexity of the work
  - Hazards involved
  - Location of the project
  - Equipment and manpower requirements
  - Similar considerations

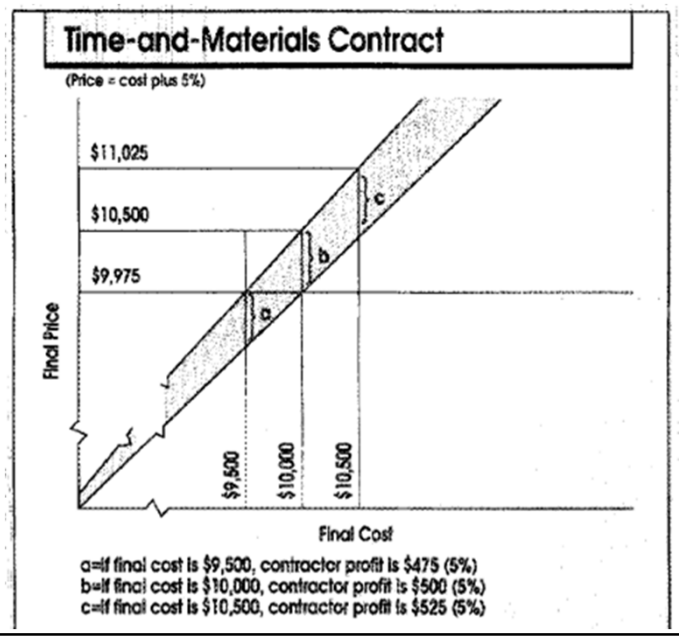
Cost-”plus” Contracts V

- Advantages
  - Does not place the owner and the contractor in an adversarial relationship
  - Construction can start before scope fully defined
  - Changes can be easily incorporated into the scope of work under contract
  - The contractor is almost assured of not losing money

Cost-”plus” Contracts VI

- Disadvantages
  - The owner has little idea of what the actual cost of the project will be
  - Can be bad for the owner if the contractor takes longer than he should
  - The owner must maintain additional staff to monitor the progress of the contractor with an emphasis on documenting reimbursable costs
  - Often noncompetitive bids
  - Risk is on the owner
  - Lack of upper boundary, open-book

Cost-“plus” contract VII



Guaranteed Maximum Price Contracts I

- **Guaranteed maximum price GMP**
  - Cost plus fee with guaranteed maximum price
  - Contractor agrees that the total amount needs to be paid by the owner will not exceed a pre-established maximum price
  - Costs above the guaranteed price are absorbed by the contractor
  - Savings may be reverted to the owner or, in many cases, shared by the owner and the contractor

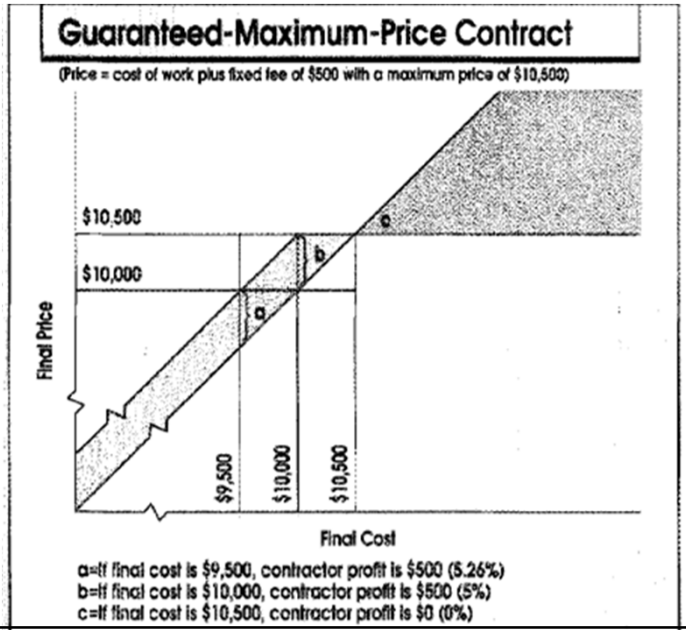
Guaranteed Maximum Price Contracts II

- **Advantages**
  - Does not place the owner and the contractor in an adversarial relationship
  - Construction can start before scope fully defined
  - Changes can be easily incorporated into the scope of work under contract
  - The owner is assured that the total project cost will not exceed a stated amount (upper boundary)

Guaranteed Maximum Price Contracts III

- **Disadvantages**
  - Difficulty in establishing GMP
  - Often noncompetitive bids

Guaranteed Maximum Price Contracts IV



Incentive Contracts

- What?
  - Incentive contracts are:
    - Fixed amount with bonus
    - Fixed amount with an arrangement for sharing any cost savings
- Why?
  - To motivate the contractor to keep the cost of the work and/or the time of construction to a minimum
- The owner and the contractor agree to target estimates of cost and/or time of construction
- Bonus or penalty are tied to these target figures

Incentive Contracts II

- Cost Incentives:
  - As a stimulant for the contracting firm to minimize costs, a bonus clause providing for share savings can be written according to which it shall receive, in addition to a base fee, a stated percentage of the amount by which the total actual cost is less than the target estimate
  - There may also be a provision whereby the contractor's fee is reduced if the construction cost exceeds the target estimate

Incentive Contracts III

- Duration Incentives:
  - When time of completion is of great importance to the owner, the contract can be made to provide that the contractor shall receive, in addition, to the base fee, a fixed sum of money for each day of beneficial occupancy realized by the owner before the originally agreed-on completion date
  - This can be extended to provide that the contractor's fee will be reduced by the same amount for each day completion is delayed

Rate Loading (Bid Balancing)

- The process of adjusting rates throughout the bill of quantities while keeping the total constant
- A balanced bid is one in which the anticipated costs for the various bid items are accurately reflected in the unit prices that are submitted
- Unbalancing a bid is a method used by some contractors in which the unit prices of the various bid items are altered so that they do not reflect the true costs of those items
- Unbalancing does not alter the total bid amount

Rate Loading (Bid Balancing) II

- Why?
  - To minimize money needed to finance the project or to offset mobilization costs that occur at the beginning of the project
    - Front-end loading: obtain greater early income by increasing the rates of the initial site activities
  - Increasing Profit
    - "Estimating Error Unbalancing: Increasing the rates on items the quantities of which are believed to have been underestimated and decreasing the rate on items which are believed to be overestimated
    - Perceived productivity advantages or disadvantages

Rate Loading (Bid Balancing) III

- Front-end loading:
  - Can occur in lump sum contracts and unit price contracts
- "Estimating Error" Unbalancing:
  - Occur only in unit price contracts

Rate Loading (Bid Balancing) IV

- Disadvantages
  - Unbalancing can result in losses to the contractor (change orders)
  - The contracting authority may disqualify the bid as unsuitable if it recognizes these maneuvers (Especially severe unbalancing)
  - Rebidding may occur in large projects, and first bids may be known (Past winning bids are open knowledge)

Example 1: Front-end Loading

- Balanced bid

Item	Unit	Quantity	Unit Price $	Bid Amount $
Excavate sand	Cubic Meters	8,000	4	32,000
Excavate rock	Cubic Meters	2,000	20	40,000
Fill material	Ton	4,000	12	48,000
Total				120,000

- Assume that sand will be excavated before excavation of rock
  - Unbalanced bid

Item	Unit	Quantity	Unit Price $	Bid Amount $
Excavate sand	Cubic Meters	8,000	4.5	36,000
Excavate rock	Cubic Meters	2,000	19	38,000
Fill material	Ton	4,000	11.5	46,000
Total				120,000

Example 2: “Estimating Error” Unbalancing

- Balanced bid

Item	Unit	Quantity	Unit Price $	Bid Amount $
Excavate sand	Cubic Meters	8,000	4	32,000
Excavate rock	Cubic Meters	2,000	20	40,000
Fill material	Ton	4,000	12	48,000
Total				120,000

- Unbalanced bid

Item	Unit	Quantity	Unit Price $	Bid Amount $
Excavate sand	Cubic Meters	8,000	1	8,000
Excavate rock	Cubic Meters	2,000	32	64,000
Fill material	Ton	4,000	12	48,000
Total				120,000

Example 2: “Estimating Error” Unbalancing II

- Actual Cost (Balanced bid)

Item	Unit	Quantity	Unit Price $	Bid Amount $
Excavate sand	Cubic Meters	5,000	4	20,000
Excavate rock	Cubic Meters	5,000	20	100,000
Fill material	Ton	4,000	12	48,000
Total				168,000

- Actual Cost (Unbalanced bid)

Item	Unit	Quantity	Unit Price $	Bid Amount $
Excavate sand	Cubic Meters	5,000	1	5,000
Excavate rock	Cubic Meters	5,000	32	160,000
Fill material	Ton	4,000	12	48,000
Total				213,000

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4 – Bidding Procedures

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1 – Introduction

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Public and Private Bidding

- Two types of owners
  - Private
  - Public
- Bidding requirements and procedures are generally different for these two groups

Private Bidding

- Normally conducted by rules and regulations established by the owner, with the advice and assistance of the design/management professionals
- As such, bidding procedures can be modified, altered, or waived based on the judgment of the owner

Public Bidding

- Rules and procedures are dictated by law and regulations
- Designed to:
  - Protect the public interest
  - Prevent corruption and favoritism
  - Obtain quality construction at reasonable and fair prices

Advertisement for Bids (Public)

- Generally open announcement to invite any interested and qualified contractor
- Notice must be given to contractors in advance of the bidding of any project
- Notice is given by placing advertisement for bids in newspapers (usually for a number of consecutive days – i.e., 3 days)
- Usually called “Notice to Bidders” or “Invitation to Bid”

Advertisement for Bids (Public) II

- The advertisement describes:
  - Nature, extent, and location of the work
  - Authority under which it is originated
  - Place where bidding documents are available and deposit required
  - Time, manner, and place in which bids are to be received
  - Information regarding type of contract, bond requirements, dates when the work is to be started and completed, terms of payment, estimate of cost, and owner right to reject any or all bids

Advertisement for Bids (Private)

- Private owners may proceed in any manner they choose to select
- Usually private owners use “Negotiated Bidding” instead of “Competitive Bidding”
  - In negotiated bidding, the owner sets with the contractor to negotiate the contract

Advertisement for Bids (Private) II

- Sometimes, private owners use a procedure called “Invitational Bidding”
  - Limited announcement to a selected group of contractors
  - The owner selects few contractors who have good reputation
  - The owner invites this small group to bid on the project
  - This procedure offers the owner the advantages of competition while restricting the bidders to a pre-selected number

“To bid” / ”Not to bid” Decision

- After learning that proposals are to be taken on given construction project, the contractor must decide whether to bid or not
- Successful contractors do not bid everything that comes down the road. They bid selectively on projects of a type in which they are experienced, and they spend a bit more time on the pricing function

"To bid" / "Not to bid" Decision II

- **"I've never known a contractor to go out of business because of the job he did not get. However, I've known plenty of contractors who went under because of the jobs they did get."**
- The decision to bid involves a study of many factors:
- Suggest some…….

"To bid" / "Not to bid" Decision III

- The decision "to bid" or "not to bid" involves a study of many factors:
  - Scheduling with existing and future workload (The amount of work currently at hand)
  - Market situation
  - Strength of the company
  - The nature and size of the project as it relates to company experience and equipment (The technical aspects)
  - Risk
  - Location of the job

“To bid” / ”Not to bid” Decision IV

- Competition
- The owner and its financial status
- Contractor's need for work
- Engineer/architect
- The nature of the contract (severity of the contractual terms
- Labor conditions
- The schedule (completion date)
- Bonding capacity
- Quality of plans

“To bid” / ”Not to bid” Decision V

- It is to the contractor’s advantage to make some investigation of the project before spending a considerable effort, time, and money in order to compile and present a bid

Handling Risks

- Risks must be recognized
- Once the risk is identified, management must make a decision as to how to handle it. Some of the options include:
  - Avoiding the risk (eg. Not bidding a project which is far larger and more complex than any others in which the contractor has experience)
  - Pricing the risk (eg. increasing the estimated labor cost on the remote project where skilled craftsman are in short supply)

Handling Risks II

- Options, cont'd:
  - Managing the risk by intense pre-planning and analysis so that additional cost can be avoided
  - Subcontracting high risk work to a qualified, bonded subcontractor
  - Insurance

The Bidding Period

- It is the time set by the owner for the contractors to submit their bids
- It is to the owners interest to give the contractors sufficient time to prepare their bids
  - The estimating process is time consuming
  - Careful study and analysis of the plans and specifications usually result in lower bid prices and substantial savings to the owner

Instruction to Bidders

- "Instruction To Bidders" is part of the bid package
- Part of the information that is included in "Instruction To Bidders" is also included in "Invitation To Bid"
  - What the contract documents are?
  - Place and price to obtain copies of the bid documents
  - Manner, date, and time for submitting bids
  - Manner, date, and time for opening bids (i.e., publicly opened and read loud)
  - Amount of bid bond and performance bond
  - Other related information

Pre-bid Meetings

- Early in the bidding period, the owner may ask to meet all interested bidders to:
  - Review project requirements
  - Answer contractor's questions
  - Clarify and explain any other concerns

Pre-Bid Site Investigation

- Over 20-25% of all changes and claims involve differing site conditions
- It is not unusual for owners and engineers to resist contractors' claims of changed conditions
- Owners and engineers believe that contractors should learn all they can about the physical conditions of the site as a part of their duties under the Pre-bid Site Investigation clause

Pre-Bid Site Investigation II

- After preliminary examination of the drawings and specifications, the construction site must be visited
- Look for anything that may have an impact on costs
- Information is needed regarding a wide variety of site and local conditions

Pre-Bid Site Investigation III

- Information to look for in site visits may include:
  - Topography
  - Soil and subsurface conditions
  - Availability of electricity, water, telephone, and other services
  - Access to the site in different weather conditions
  - Availability of space for storage of materials
  - Material prices and delivery information from local material suppliers
  - Local labor and subcontractors
  - Amount of site clearing required
  - Hazards (e.g.. Power lines)

Pre-Bid Site Investigation IV

[ ]	Access for utilities	[ ]	Protection during construction
[ ]	Accessibility to the site	[ ]	Removing utilities
[ ]	Barricades	[ ]	Security
[ ]	Concrete cutting	[ ]	Street closing fee
[ ]	Debris removal	[ ]	Street repair bond
[ ]	Dust partition	[ ]	Street repair fee
[ ]	Job phone	[ ]	Supplies available nearby
[ ]	Job shack	[ ]	Temporary utilities
[ ]	Job signs	[ ]	Transportation of materials and equipment
[ ]	Material storage facilities or space	[ ]	Travel time
[ ]	Parking	[ ]	Vegetation, soil conditions and topography
[ ]	Protecting adjoining property		

Qualification

- For certain projects, public owners prefer to qualify contractors before issuing bidding documents to those contractors
- This is known as “pre-qualification”
- To pre-qualify, contractors are asked to submit detailed information regarding:
  1. Professional ability of principals, personnel, and firm as a whole
  2. Experience of firm
  3. Current jobs in progress

Qualification II

3. Owned and rented equipment
4. Financial standing
5. References (previous owners that worked with the contractors)

- Evaluation of the above information results in a determination of whether the contractor will be allowed to submit a proposal or not

Post Qualification

- In this case, the owner qualifies the bidders after receiving the bids
- The purpose here is to eliminate the contractors that are:
  - incompetent
  - over extended
  - under financed
  - Inexperienced
- Generally requires contractors to submit financial and technical offers in two separate bid envelopes

Bid Submission

- Bid submittal
  - Bid forms
  - Bid bond or deposit
  - Acceptance period
- Check the instruction to bidders before you seal the envelope
- Essential on government jobs. You have to submit everything exactly the way the agency requires.

Bid Evaluation and Contract Award

- Bid evaluation
  - Bid opening, identification of “apparent low bidder”
  - Corrections by Owner
  - Acceptance or disqualification, per bidding instructions
- Contract award
  - Owner awards a contract to the successful bidder, typically lowest-priced responsible bidder

Bid Shopping

- Bid shopping: Negotiations between GC & prospective subcontractors & suppliers
  - Pre-bid bid shopping: During bid development
    - Is it ethical?
  - Post-bid bid shopping: The efforts of a general contractor to get subcontractors to lower their bids after the general contractor has been declared the low bidder (After contract award)
    - Is it ethical?

Bid Peddling and Bid Rigging

- **Bid peddling**: The effort by a bidder, usually a subcontractor, on a project to determine the relative standing of a quoted bid
  - If the bid is not the lowest bid, the bidder may reassess the amount originally quoted and submit a lower bid before the deadline for bid submittal
- **Bid rigging**
  - Conspiracy among competing bidders to control the bid results
  - In violation of contract law

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5 – Contract Documents

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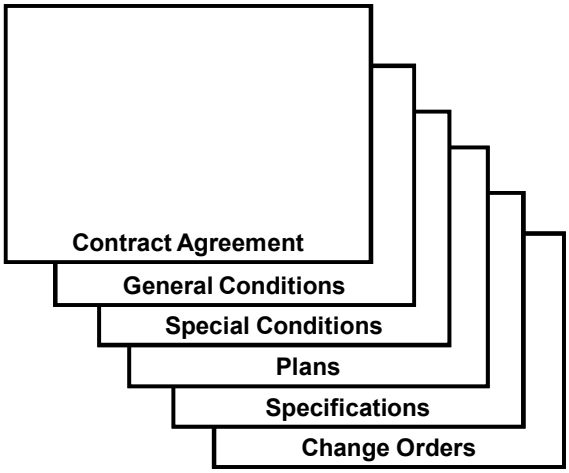
Contract Documents

- It is a universal practice for construction contracts to be formalized by a written document
- The basic purpose of a written contract is to define exactly and explicitly the rights and obligations of each party to it
- The usual construction contract consists of a number of different documents. Exactly which documents constitute the construction contract is variable

Contract Documents II

- Contract documents include:



Contract Agreement

- Definition
  - A document that represents and reflects the legal contract between parties and is traditionally made between the owner and the contractor
- Purpose
  - To record in written form those items agreed to by the owner and the contractor
  - Constitutes legal evidence that a contract exists and forms the basis for its enforcement

Contract Agreement II

- The agreement usually contains the following:
  - The date of the agreement
  - The names of the contracting parties
  - The scope of work (work to be done)
  - Project duration (i.e., time limitations)
  - Contract considerations (i.e., liquidated damages, etc.)
  - Contract price and payment conditions (i.e., contract sum, progress payments, etc.)
  - Reference to other documents
  - Signatures of the parties

General Conditions

- A document used to:
  - Define the responsibilities of the parties affected by the contract
  - Covers change order requirements
  - Establish the payment process
  - Identify warranty period and process
- Examples: FIDIC, AIA

General Conditions II

- FIDIC general conditions:
  - General provisions
  - The employer
  - The engineer
  - The contractor
  - Nominated subcontractors
  - Staff and labor
  - Plant, materials, and workmanship
  - Commencement, delays and suspension
  - Tests on completion

General Conditions III

- Employer's taking over
- Defects liability
- Measurement and evaluation
- Variation and adjustments
- Contract price and payments
- Termination by employer
- Suspension and termination by contractor
- Risks and responsibility
- Insurance
- Force majeure
- Claims, disputes and arbitration

General Conditions IV

- General conditions standard forms have many advantages:
  - They have become familiar to contractors, owners, and engineers, who clearly understand their meanings and implications
  - Many of the provisions have already been tested in courts
  - Standardization has done much to eliminate disagreements among owners, contractors, and architects

General Conditions V

- General conditions standard forms:
  - Should be used in its entirety
  - Changes done only through supplementary conditions
  - Should not be retyped

Special Conditions

- Also called Supplementary conditions
- Are extensions of the general conditions
- Contain the special legal requirements of the contract that apply only to the project at hand
- Used to:
  - Modify the general conditions
  - To affect deletions from the general conditions
  - To make additions to the general conditions

Special Conditions II

- Describe unique requirements of the project
  - Unusual work hours
  - Site access restrictions
  - Owner-furnished items
  - Other special requirements

Special Conditions III

- Sample contents of the supplementary conditions:
  - Scope (of the entire project)
  - Supplementary definitions (not covered in general conditions)
  - Legal address of owner, A/E, etc.
  - Amounts of bonds (actual or percentage values)
  - Amounts of liquidated damages (actual values)

Special Conditions IV

- Sample contents of the supplementary conditions (Continued):
  - Permits and inspections costs (who pays what)
  - Complete list, by number and title, of the contract drawings
  - Applicable laws and regulations (special requirements for this job)
  - Amounts and types of insurance coverage (not specified in the general conditions)

Plans

- Design drawings, including all changes
  - Usually include
    - Civil (C-X)
    - Landscape (L-X)
    - Architectural (A-X)
    - Structural (S-X)
    - Mechanical (M-X)
    - Plumbing (P-X)
    - Fire Protection (FP-X)
    - Electrical (E-X)
    - Controls (EC-X)
    - Other specialty plans

Specifications

- Specifications
  - Technical information about materials, equipment, work methods, and quality of workmanship
  - Usually follows the CSI Master Format
    - Currently consists of 16 Divisions
      - 01000 General Requirements
      - 02000 Site Work
      - 03000 Concrete
      - 04000 Masonry
      - 05000 Metals
      - 06000 Wood and Plastics
      - 07000 Weather Protection

Specifications II

- Currently consists of 16 Divisions (continued)
  - 08000 Doors, Windows, and Glass
  - 09000 Finishes
  - 10000 Specialties
  - 11000 Equipment
  - 12000 Furnishings
  - 13000 Special Systems
  - 14000 Hoisting Systems
  - 15000 Mechanical
  - 16000 Electrical
- Divisions may be expanded in the future

Change Orders

- Change orders
  - Written approval of a change to the scope of work, contract drawings, or specifications
  - After a change order has been signed by all parties, it becomes part of the contract documents

Precedence of Contract Documents

- Precedence of contract documents: priority of contract documents
- In general:
  - The general conditions of the contract may specify the relative order of precedence of the separate contract documents in the event of a conflict of information
  - When there are ambiguous terms, they are interpreted against the party who drafted the document

Precedence of Contract Documents II

- When a conflict exists, contract documents are given preference in the following order:
  - Agreement
  - Specifications
  - Drawings
- Specifications usually take precedence over drawings
- Specific provisions take precedence over general provisions

Precedence of Contract Documents III

Specifications

- Within the specifications, the order of precedence is as follows:
  - Change orders
  - Agreement
  - Addenda
  - Contractor's bid or proposal

Precedence of Contract Documents IV

Drawings

- Within drawings, the order of precedence is as follows:
  - Figures govern over scaled dimensions
  - Detail drawings govern over general drawings
  - Change orders drawings govern over contract drawings
  - Contract drawings govern over standard drawings
  - Contract drawings govern over shop drawings

Precedence of Contract Documents V

- What is the order of precedence (priority of documents) of contract documents according to FIDIC?

Ordinance & Legislation

- The law may impose requirements that must be fulfilled even though they are not specified in the contract documents
  - Example: Equipment installed in a project may need to meet certain standards of safety, even though these standards may not be spelled out in the contract

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6 – Specifications

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Specifications (What?)

- **What?**
  - Specifications are written instructions to be used in conjunction with the drawings so that together they fully describe and define the work that is to be accomplished along with the quality required
  - Specifications are supplement to the drawings and show information that cannot be easily shown in graphic form

Specifications (Why?)

- **Why? (**Purpose of specifications)
  - Guide bidders in cost estimate for their proposals
  - Guide the contractor during the:
    - Procurement phase
      - Ordering of materials
    - Construction phase
      - Erections and installations
      - Performance of work (quality of workmanship)

Specifications (Who?)

- **Who** prepare them?
  - Owner / owner representative
- While one party or department is responsible for their preparation, the specifications are ultimately done by all those involved in the project

Relationship to the Drawings

- Normally the drawings provide a physical description of the project and the specifications provide information regarding:
  - Quality of materials
  - Quality of workmanship
  - Erection and installation methods
  - Tests and inspections

Specifications Presentation

- The specifications are normally presented:
  - In approximately the same general sequence as the corresponding construction operations actually proceed in the field
  - It is customary that a separate division of the specifications be devoted to each major type of construction operation that will be involved
  - Such as excavation, concrete, structural steel, insulation, electrical work, etc.

Qualifications for Specs Writer

- A thorough knowledge of the construction process and design process
- A good understanding of construction materials and construction methods
- Be skillful with technical writing
- Access to reference information

Qualifications for Specs Writer II

- A specification is not the place to show the extent of the knowledge of the A/E, but is a place to show:
  - How clearly and exactly he can describe the essential and practicable limits of the qualities of work and material needed
  - How well he can protect his client by definite and proper requirements
  - How fair and just he will be in his treatment of contractors.

References for Specifications

- Codes
  - Ministry of public works and housing technical specifications for architectural and civil works
- Standards
  - Professional and industry associations
- Recommendations
  - Material manufacturers

Specifications Approaches

- Two approaches to writing specifications:
  - Performance-based (results) specifications
  - Methods-based (prescription) specifications

Performance (Results) Specifications

Characteristics

- Describe in detail the required performance or service characteristics of the finished product or system
- Methods used to achieve desired results is left to the preference of the contractor, but must be guaranteed
- Methods of testing and measurement, to evaluate the results, should be spelled out in the specifications
- Avoid drastic changes from performance standards

Performance (Results) Specifications II

Presentation

- Present specifications in an orderly fashion to guard against errors and omissions including:
  - General description of product/system
  - Design and installation requirements
  - Product/systems operating conditions
  - Test/measurement information detailed
  - Guaranties/warranties required

Performance (Results) Specifications III

Advantages

- Provide competition among products and systems
- Contractor improve its experience and knowledge in its specialized field
- Specs writer does not need to have an extensive knowledge of products and systems as would be required under prescription specs

Disadvantage

- In some instances, devising adequate testing/measuring systems by which results can be evaluated is difficult

Methods (Prescription) Specifications

Characteristics

- Specifications describe in detail the methods to be used and the procedures to be followed
- If the material is specified by brand name or manufacturer, the specifications writer has the advantage of knowing the performance characteristics of the material/system because of its past performance on other projects
- A specifications writer assumes more responsibility with prescription specifications

Methods (Prescription) Specifications II

- The specifications writer warrants the performance of the products/systems and not the contractor
- The specifications writer should make sure that the requirements are realistic
- The specifications writer should be fully aware of the materials and field methods he is specifying
- Impractical requirements lead to extra cost to the owner

Open vs. Closed Specifications

- Open specifications:
  - Encourages competition among firms/manufacturers
  - A must for publicly funded projects
- Closed specifications
  - The use of only one product brand

Restricted Specifications

- Restricted specifications is the combination of performance (results) and methods (prescription) specifications
  - Minimum 3 brand names listed followed by the phrase *"or approved equal"*
  - The phrase *"or approved equal"* is interpreted to mean approved as equal by the owner
  - Contractors request for another brand to be added to the list must be done at the bidding stage. If the owner is in agreement, an addendum will be issued

Restricted Specifications II

Disadvantages

- Sometimes difficult to find products that are equal and that meet specification writers approval (use performance specs in this case)
- In situations where only one manufacturer is aware of absence of competition, it may increase price
- Costs more to owner

Standard Format

- Single standard format
  - Avoid confusion
  - Assure effective communication
- Ministry of public works and housing format
  - Improved quality of construction specifications
  - Achieve uniformity in specification writing

Standard Format II

- Specifications should be presented:
  - In standard forms
  - In understandable language
  - 4 C's:
    - Clear
    - Concise
    - Correct
    - Complete

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7 – Drawings

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Drawings

- Bidding and construction information are conveyed by two major documents:
  - Specifications (written material)
  - Drawings (graphic presentation)
- **Four types of drawings:**
  - Preliminary drawings
  - Contract drawings
  - Shop drawings (between design and construction)
  - As-built drawings (as completed or executed)

Preliminary Drawings

- Design concepts
- Prepared to the degree that allow us to:
  - Visualize the total project
  - Prepare a rough budget estimate

Contract Drawings

- The contract drawings are used as an essential part of the contract
- Usually the contract drawings set includes the following:
  - Architectural, structural, mechanical, electrical, landscaping, topography
- General conditions require the general contractor (GC) to keep a posted set on the job (with all changes and revisions)

Shop Drawings

- Shop drawings show in detail the proposed fabrication or assembly of project components
- They are used to indicate the installation, form, and fit of materials or equipment being incorporated into the project
- Shop drawings are prepared for works like:
  - Installation and fabrication
  - Structural steel
  - Metal windows and doors
  - Pipes and pumps

Shop Drawings II

- Shop drawings are prepared by:
  - Subcontractors or material suppliers
  - Sometimes by the general contractor
- Shop drawings have to be reviewed and approved by the design professional (A/E)
- However, this approval:
  - Is a restricted approval
  - Aims at checking against the intent of design drawings only
- Responsibility of errors and omissions in shop drawings lies with the GC/Sub

Shop Drawings III

Shop drawings management

- Timely approval of shop drawings is of prime importance
- Might affect project schedule if not submitted on time
- Shop drawings cycle:
  Sub → GC → A/E, then back
- Record shop drawings in contractor's submittal register

Shop Drawings IV

- Shop drawings should be stamped and dated immediately
- Most specifications excuse the contractor from ordering materials until shop drawings are approved officially in writing

As-built Drawings

- Usually these are “location drawings” to which the owner may refer for maintenance and repair
- Contract drawings show “proposed” locations for pipes, valves, man holes, etc…
- As built drawings show “actual” locations of installations

As-built Drawings II

- As built drawings are prepared by GCs and subs
- Requirements for as-built drawings should be included in bidding documents
- If not included in bidding documents, can be prepared by issuing a change order

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8 – Subcontracting

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Subcontractor

- A subcontractor is a construction firm that contracts with the general contractor (GC) to perform some aspect of the GC's work
- The GC and the sub sign an agreement called "subcontract"
- Is there a contractual relationship between the owner and the sub?
- Who is totally responsible for the job in front of the owner?

Quotations Request

- One of the first actions that a GC takes after the decision to bid has been made is to send out quotations' requests to various subcontractors and material suppliers
- The request should contain the following information:
  1. The name of the project for which quotations are requested

Quotations Request II

2. The place where plans and specifications and other bidding documents may be examined
3. How quotations are to be submitted
4. Any unusual requirements in the particular branch of the work that the GC is already aware of
5. Date by which quotations are desired
6. Whether or not the GC requests the use of a standard quotation request form

Subcontract Provisions

- GC may be required to pass provisions to subs
- Subs bound to GC as GC bound to owner
  - Changes
  - Warranty period
- GC to pay sub promptly only after payment by owner

Standard Subcontract Agreement (Articles)

- Work to be accomplished
- Materials and equipment (furnished by whom?)
- Time
- Payment amount and conditions
- Temporary site facilities
- Insurance
- Job conditions
- Other details

GC Responsibilities Regarding Subs

- To provide competent and responsible supervision
- To serve as an advocate for the subcontractor in disputes with the owner or design professional when the subcontractor has a valid claim
- To establish a communication system for the project

How Much to Subcontract?

- The extent to which a GC subcontracts out portions of its work depends on:
  - Contracting system
  - GC business organization
  - Type of construction involved
- There are instances where the job is entirely subcontracted
  - In this case, the GC provides only supervision, job coordination, and general site conditions

How Much to Subcontract? II

- On other instances, the GC does all the work with no subcontracting
- Which one is better?
- How much work is done by subs in the middle east?
  - In the US, 80% of building projects are by subs

How Much to Subcontract? III

- Why Limit the Proportion of Subcontracting Work?
  - To avoid potential problems associated with extensive subcontracting
    - Can seriously complicate the overall scheduling of job operations
    - Lead to a serious division of project authority
    - Fragmentize responsibility
    - Make the coordination of construction activities difficult
    - Weaken communication between management and the field
    - Foster disputes

Why More Subs?

- Reduce risk for prime
  - Subs share project risk with GC (i.e., liquidated damages, insurance requirements, warranties, etc.)
- Increased specialization
  - Subcontractors are able to provide full-time employment for their workers
  - Can afford keeping the most highly qualified tradesmen (skilled labor)
- Improved productivity
  - Qualified subcontractors are usually able to perform their work specialty more quickly and at a lesser cost than can the GC

Fair Subcontracting Laws

- For work on public projects in some countries, laws have been enacted to protect subcontractors and the public against two practices by the GC:
  - Bid shopping
  - Bid peddleing
- These laws state that any bidder must list all subs and material suppliers
- If the GC fails to list a subcontractor for any portion of the work:
  - the GC must perform all such work himself

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9 – Addenda, Change Orders, and Claims

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Addenda

- Addendum: An addition to bidding documents issued to the bidders (plural: Addenda)
- A change in the specifications or one of the contract documents during the bidding phase requires an addendum
- Reasons for issuing addenda include the following:
  - To correct errors
  - To add owner-initiated changes
  - To furnish clarifications
  - To add or delete products
  - To change stated requirements

Addenda II

- Guidelines to go by when issuing addenda
  - No addendum should be issued later than 5 days prior to the bidding due date
  - Addenda should be issued only in proper written form
  - A procedure should be established that requires acknowledgment of the receipt of all addenda

Change Orders

- Change Order: An order issued by an *owner* and agent of the owner according to the terms and conditions of a *construction contract* to the *contractor* to make a specific change in the work that may result in a change in the scope of the contract's work, the contract sum, or the contract time, depending on the change order's purpose and substance

Change Orders II

- Change Order is After Contract
  - Addenda is pre-bid
- Impact
  - Cost = +/-
  - Time = Schedule
  - Quality
  - Scope

Change Orders III

- Reasons for issuing change orders:
  - Owner has secured additional financing
  - Emergence of unforeseen conditions during construction
  - Material nonconformance with original specifications
  - Correct errors or omissions in the original documents
  - Changes requested by the owner, contractor, or design professional

Change Orders IV

- Reasons for issuing change orders (Continued):
  - Over/Under runs in quantities beyond limits
  - Changes instituted by regulatory agencies
  - Impossibility/Impracticability of performance

Change Orders V

- The change order clause provides:
  - Means by which the owner can adjust plans and specifications
  - Means by which the contractor may incorporate suggestions
  - An outline for organizing and presenting claims for additional compensation

Change Orders VI

- Initiation of Change Orders
  - Owner
  - Engineer
  - Contractor
- Change Order Preparation
  - Clear, Concise, and Explicit
  - Standard Forms
  - Drawing and Specifications

Change Orders VII

- Information required on change orders
  - Name and title of the project
  - Date of the change order
  - Number of change order
  - Reason for Change
  - Changes required under this order
  - Change in the contract price
  - Change in time of completion
  - Required signatures

Change Orders VIII

- Problems of change orders
  - Does it fall within the scope of the project?
  - Who has the authority to make the change?
  - Is the time requirement appropriate?
  - Are markups properly applied to ensure contractors will not lose money?

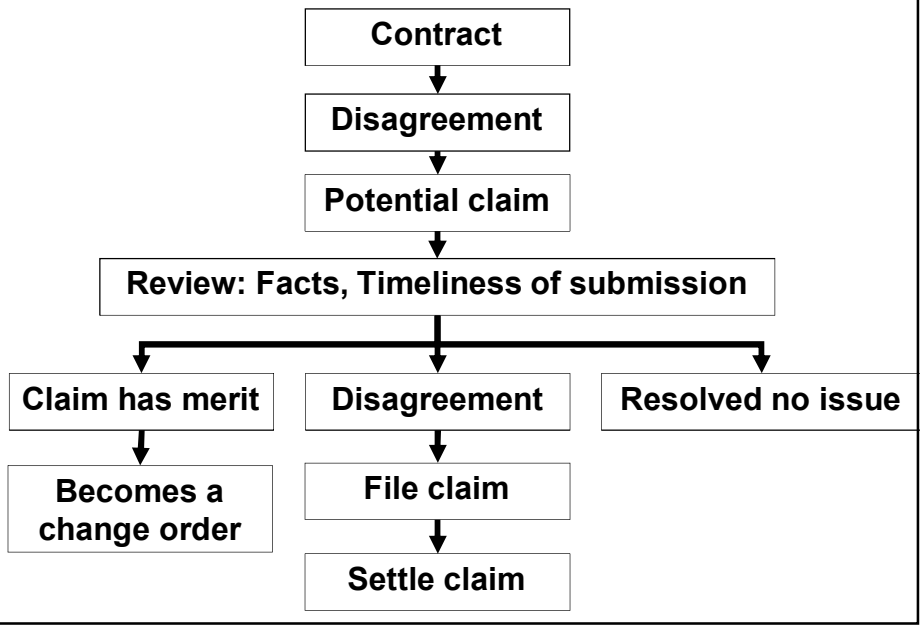
Change Orders IX

- Contract changes do more than alter the scope of the work, they:
  - Disrupt orderly sequences
  - Change prior coordination
  - Change schedule logic
  - Change methods for work not otherwise addressed by the change
  - Cause a contractor to remain mobilized on site longer than originally planned
  - Continue to add administrative costs resulting from rework

Claims

- Potential claims applies to any differences arising out of the performance of the work that might reasonably lead to the later filling of a claim by the contractor if the differences cannot be resolved in the field

Claim's Tree



Claims

- Settlement of claims
  - Some contracts encourage settlements of claims through:
    - Mediation
    - Arbitration
  - Both methods are considered better alternates over litigation

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10 – Measurement and Payment

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Measurement and Payment

- At a pre-arranged date, the contractor is expected to submit a “request for payment”
- Each cost item should contain its own share of profit and overhead
- For unit price bid, the unit price in the bid will be the basis for all progress payments
- In lump sum, a small error one month will be compensated in later payments

Quantity Overruns

- One exception to payment rule:
  - If quantity overrun is in excess of 25% then the contractor is entitled to renegotiate his unit price
  - The contract may state range: 15-25%
  - Under FIDIC conditions of contract, what is this percentage?

Basis for Payment

- Lump sum contract
  - Contractor must complete the work for the fixed price shown as long as the scope of the contract has not been altered by change orders
  - Any cost overruns must come out of the contractor's pocket
  - Similarly, any money that is saved on the job, as long as it conforms to the plans and specifications, belongs to the contractor

Basis for Payment

- Unit price contract
  - The owner/design firm provides a list of all individual bid items, along with an “engineer’s estimate” of the quantities involved
  - Blanks are provided in the proposal document for the bidder to insert a price per unit for which contractor agrees to build the work which, when multiplied by the quantity shown in the A/E’s estimate, indicates the total amount of bid for each item

Basis for Payment

- Cost plus contract
  - The contractor agrees to a fixed profit level, and is reimbursed for all costs of labor and material at their actual cost, plus the addition of a fixed free rate for profit
  - The contractor’s books must be open to the owner
  - All of the contractor’s costs must be regularly audited to establish the amount of progress payments

Retainage

- Typically: 5-20%
- Used to satisfy claims if prime does not pay subs or suppliers
- May be utilized by the surety to complete work in case of default by the contractor
- Goes to surety company when the contractor defaults

Validation of Contractor's Payment

- The following tasks needs to be performed to validate Contractor's payment:
  - Perform quantity takeoff of work actually completed as of date of request
  - Check inventory of material and equipment delivered but not used in the work
  - Submit estimate of all completed work, using unit prices that were submitted in the bid

Validation of Contractor's Payment

- Review claims for extra work and completed change orders
- On extra work and change orders, check method used to determine profit and overhead, material costs, and proper application of each in accordance with the conditions of the contract
- Audit invoices and costs (cost plus jobs only)
- Check retention
- Prepare recommendation to the project manager and submit along with the contractor's payment request

Final Payment to the Contractor

- After certificate of substantial completion has been filed, the contractor will apply for final payment
- There are several additional requirements before the A/E should issue a final certificate for payment:
  - The contractor must pay all bills to other related parties
  - Under certain contracts, contractor must submit receipts and releases
  - Consent of surety when a surety is involved

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11 – Bonds and Insurance

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Bonds and Insurance

- Bonds
  - Used to guarantee the performance of the contractor
- Insurance
  - Insurance is used by the contractor and owner to cover some of the risks on the project

Bonds and Insurance II

- Types of bonds
  - Bid bond
  - Payment bond
  - Performance bond
  - Warranty bond
- Types of insurance
  - Builder's risk
  - General liability
  - Property damage
  - Workers' compensation

Bonds (Securities)

- Contractors are required to submit at least the following two bonds (securities)
  - Bid bond
  - Performance bond
- These bonds are presented by the contractor to the owner
- Usually, bonds are issued by commercial banks
- In the US, bonds are issued by surety companies

Bonds (Securities) II

- Surety:
  - Surety is a party that assumes liability for the debt, default, or failure in duty of another
  - Therefore, the surety protects the owner in case of default by the contractor
- Similarly, commercial banks when issuing bonds (securities) are protecting the owners against default by the contractor

Bid bond

- Bid bond: A bond provided by a bank/surety company on behalf of a bidder to guarantee to an owner that the bidder will enter into a construction contract with the owner in accordance with his bid if it is accepted by the owner
- Bid bonds are submitted during the bidding phase
- All bidders have to submit bid bonds

Bid bond II

- The purpose of bid bond is to ensure that the contractor will enter into an agreement if he is the successful bidder
- If the successful bidder fails to enter into a contract, he may be liable for the difference between his low bid and the second bid, up to the amount of the bid bond (Face value)
- Bid bond may be a fixed amount or a percentage of the project's cost

Bid bond III

- Usually less than 10% of project cost
- Owners usually keep the bid bond until a contract has been signed
- Owners may also keep the bid bond of the second and third lowest bidders as well

Performance bond

- Performance bond: One by which a bank/surety company guarantees on behalf of the contractor to the owner the proper performance of the construction contract
- Performance bond is required only from the successful bidder who will construct the project
- The purpose of the performance bond is to protect the owner

Performance bond II

- It guarantees to the owner that the contractor will perform the work in accordance with the contract documents
- If contractor defaults, the bonding company will bring in another contractor to complete the work OR will pay the owner the additional cost of hiring another contractor
- On default of the contractor, the burden of contract performance is that of the surety/bank that issued the performance bond

Performance bond III

- Private owners may or may not require performance bond
- Amount of performance bond is
  - 10% to 100% of contract amount
- If additions are made in contract, the amount of performance bond is increased accordingly

Payment bond

- Payment bond: One by which a bank/surety company guarantees that the contractor named in the bond will properly pay all legal debts arising from the construction work
- Also called labor and material bond
- Payment bond protects the interest of the subcontractors, material suppliers, and laborers if the GC fails to make payments
- If contractor defaults, the subcontractor or supplier will be paid by the bonding company

Payment bond II

- It protects the owner
- Payment bond is usually 50% of the contract sum
- Should be sufficient to cover all costs of labor and materials furnished by the third parties

Warranty bond

- Warranty bonds are issued:
  - For different periods
  - To cover different circumstances
  - To cover more particular items
- Examples: roofing bonds, equipment bonds, etc.
- An owner can secure and require bonds for just about anything on the project if there is a sufficient cause to do so

Warranty bond II

- Warranty period: the specified period (usually one year) immediately following substantial completion during which a contractor undertakes to correct work found not in accordance with the construction contract. Special warranties may have different periods

Investigation by the Surety/Bank

- A surety/bank before agreeing to furnish bond on behalf of a construction firm, conducts two-stage investigation
- First stage
  - Data collected to find out whether to bond the firm as a client
- Second stage
  - Data collected to determine whether to bond the firm only on that particular project or not

Investigation by the Surety/Bank II

First Stage Investigation

- Data collected to find out whether to bond the firm as a client
  - Professional ability of principals, personnel, and firm as a whole
  - Financial standing and line of bank credit of firm
  - Experience of firm, principal, and key personnel

Investigation by the Surety/Bank III

Second stage investigation

- Data collected to determine whether to bond the firm only on that particular project or not
  - Type of project to be bonded (size, nature, owner, etc.)
  - Amount of work at present on contractor's hand
    - To prevent the contractor from becoming over extended with regard to working capital, equipment, and organization

Investigation by the Surety/Bank IV

- The amount of money the contractor "left on the table"
  - The spread between the low bid and the next highest
  - A spread that is more than 5-6% between the two lowest bidders can be the cause of some concern
  - The surety/bank wishes to ensure that the contractor's estimating and bidding procedures are accurate

Investigation by the Surety/Bank V

- The largest contract amount of similar work the contractor has successfully completed in the past
  - The surety/bank would like the contractor to stay with the kind of work in which it is most experienced
- Terms of payment under the proposed contract
  - Payment to the contractor
  - Retainage
  - Liquidated damages
- Amount of project that will be subcontracted
  - Ability of subcontractors to perform the required work

Bonding Capacity

- Bonding capacity: Refer to the maximum value of uncompleted work the surety/bank will allow the contractor to have on hand at any one time
- Bonding capacity is a function of:
  - Cash liquidity
  - Volume of work on hand
  - Accumulated retainage on current jobs
  - Type of work involved

Completion by the Surety/Bank

- In case of default by the contractor, the surety/bank (bonding) company is required to perform in accordance with the terms of the bond
- The surety/bank has option of completing the project in their own way
  - Make use of labor and equipment of original competitive contractor
  - Take competitive bids for balance of the work
  - Enter into negotiated contract with a firm

Completion by the Surety/Bank II

- The retainage is usually collected by surety company
- If bonding company loses any money in the completion of the contract:
  - they are entitled, by means of litigation, to collect such money from defaulting contractor

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12 – Innovative Contracting Techniques

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Innovative Contracting Techniques I

- Lane Rental
- A+B Bidding
- Warranty Contracting
- Job Order Contracting

Innovative Contracting Techniques II

- Premise for the Implementation of Innovative Contracting Techniques (Why?)
  - Traditionally highway projects are designed, bid, and built with the contract awarded to the lowest bidder.
  - Innovative contracting allows for other factors such as time, quality, and innovation to be considered, in addition to low bid.

Innovative Contracting Techniques III

- Projects suitable for any innovative contracting technique are:
  - Projects in which right-of-way, utility, environmental, and other socio-political issues have been resolved.
  - Projects where the potential exists for increasing quality, decreasing costs, decreasing time, reducing administration costs, and reducing the possibility for legal claims and change orders.

A+B Bidding I

- Definition: A cost plus time bidding procedure that selects the low bidder based on a monetary combination of the contract bid items (A) and the time (B) needed to complete the critical portion of the project.

A+B Bidding II

Benefits of A+B Bidding

- A+B Bidding is used to motivate the contractor to minimize the delivery time for high priority and highly trafficked roadways. This encourages contractors to finish early by:
  - Offering bonuses for early completion.
  - Assessing disincentives for late completion.

A+B Bidding III

Criteria for Selection of A+B Bidding as a Contracting Procedure

- Traffic restrictions, lane closures, or detours result in high road user costs.
- Safety concerns, or significant impacts to the local community or economy during construction warrant expediting the project.
- Traffic control phasing can be structured to maximize a contractor's ability to reduce the duration of construction.
- The project is relatively free of third party conflicts.
- It is in the public interest to complete the project as soon as possible.

Lane Rental I

- Definition: An innovative contracting technique by which a contractor is charged a fee for occupying lanes or shoulders to do the work.
- Why Pursue Lane Rental (Primary Objective) ?
  - To motivate the contractor to minimize the time that a lane, a shoulder, or a combination of lanes and shoulders are out of service so there is minimized traffic delay to highway users.

Lane Rental: When?

- Lane Rental has been used for projects that contain one or more of the following:
  - Traffic restrictions or lane closures result in high road user costs
  - The use of alternate routes or off-site detours is impractical
  - The traffic control plan allows the contractor flexibility in scheduling work to minimize the impact of lane closures
  - The agency seeks contractor expertise to minimize the time that lanes are out of service.
  - The project is relatively free of third party conflicts (I.e. right-way issues, utilities, etc.).
  - The benefit in terms of reduced impact to the highway user is greater than the additional cost to minimize lane closures.

Lane Rental III

How are Lane Charges Calculated?

- Charges for lanes or shoulders can be on either an hourly or daily basis.
- Charges per lane can vary depending on time of day, amount of traffic, and other road user costs.

Warranty Contracting I

- Definition: “A guarantee of the integrity of a product and of the makers responsibility for the replacement or repair of deficiencies.”

Warranty Contracting II

Advantages of Warranty Contracting

- Less owner risk.
- Eliminates cost of owner QA/QC by transferring this responsibility to the contractor.
- Creates an incentive for overall project quality.
- Assures acceptable level of service or performance for a work item and/or major project element.

Job Order Contracting/ Indefinite Delivery I

- Definition: The combining of like projects into one contract that is administered by the owner/agency.
- These projects are competitively bid with indefinite quantity and indefinite delivery at fixed unit construction prices.

Job Order Contracting/ Indefinite Delivery II

How is Job Order Contracting Different from Traditional Contracts?

- Two Ways
  - Job Order Contracts cover a variety of similar types of construction including: maintenance, repair, renovation, and traffic control projects that are combined under a single contract at fixed unit prices.
  - The contracts are in place before the owner identifies where and when the work is to be done. These contracts are based on a minimum yearly amount of work as long as the contractor performs acceptable work.

Job Order Contracting/ Indefinite Delivery III

Advantages of Job Order Contracting

- Lower costs
  - Quantities are larger by combining similar projects, therefore resulting in lower unit bid prices.
- Incentives for quality
  - The contractor is motivated by the fact that they will continue to receive work so long as their performance is satisfactory.
- Less owner time and administration cost required
  - Several projects can be accomplished under one contract.