Schedule

- February 16 - Building Information Modeling
- February 21 - Midterm Review
- February 23 - Midterm
In the industry the term “Pre-Construction Services” is utilized when defining the first five stages of the project life cycle.

Pre-Construction Services
1. Project Conception
2. **Project Delivery**
3. Design
4. Construction Documents
5. Bidding/Negotiating/Procurement

This is where the industry and owners are beginning to see an opportunity to increase the success of the project by the integration of design and construction throughout these stages of the project life cycle.
Al look at the pre-construction design phase

- Project Concept
- Project Delivery
- Design
  - Schematic Design (SD)
  - Design Development (DD)
- Contract or Construction Documents (CD)
2. Project Delivery

Project Delivery is the process by which all of the procedures and components of designing and building a project are organized and put together in an agreement that results in a completed project. The Owner’s approach to organizing the project team that will manage the entire design and construction process.

Project Delivery is the contractual relationships between the owner, architect/engineer (A/E), contractor(s), and the management services utilized to design and construct a project.
Contract Types

- In addition to choosing a delivery system for a project, the owner must decide what type of contract to use.
- A contract is simply an agreement between two or more entities in which they agree to provide a specific task in exchange for something in return.
- The contract type basically is the format on how the owner pays for the services of the contractor.
What You Need to Know

- The Traditional Delivery Method - Design-Bid-Build
- Design-Negotiate-Build
- The Construction Management Delivery Methods
- The Design/Build Delivery Method
- Contract types
  - Lump Sum or Fixed Price
  - Unit Price
  - Cost Plus Fee
  - Cost Plus with a GMP
Project Delivery Methods

Many factors will effect the method selection such as:

- Owner’s experience, qualifications and capability
- The magnitude, form, function and complexity of the project.
- Time is of the essence.
  - Sequencing of the project.
  - Establishing the project timeline.
  - Fast-tracking utilizing multiple contractors or contracts to condense the project timeline.
- Cost/Budget/ Other Financial Challenges
Project Delivery Methods and Services

- Traditional “Design-Bid-Build”
- Design-Negotiate-Build
- Construction Management
  - As Owner’s Agent
  - CM at risk (CM>GC)
- Design-Build
The Traditional Method - Design-Bid-Build

- The Design-Bid-Build method is most common.
- The Owner first contracts with a Design Professional who provides the design. The basis of this delivery method is that design is completed prior to bidding/pricing and construction.
- Competitive bidding is a method of determining the least cost for accomplishing the scope of work defined by the bid documents. Once the design is complete, the Owner contracts with the Builder who provides the most responsive competitive bid for construction.
Traditional Method- “Design-Bid-Build”

- Owner
  - Architect/Engineer
    - Design Consultants
  - General Contractor
    - Subcontractors
    - Craft Workers
    - Suppliers/Vendors
  - Craft Workers
  - Suppliers/Vendors
Traditional Method

- Well defined relationships, procedures and rules of conduct have been worked out and understood.
- A known quantity. Lots of experience in this method by all parties.
- The risk of cost increases depends to a large extent on the accuracy and completeness of the work scope and contract documents.
- The actual construction price of the project is not known until all bids are received.

**No collaboration from the contractor.**

- Normally design-bid-build with a specific timeframe. This does not allow for fast tracking the project.
- **This process is inherently adversarial.**

- **Price is based on a specific scope of work.** If the documents are poor or scope of work is undefined then the potential for change orders is extreme. This can lead to contract problems and litigation.
Design-Negotiate-Build

- Same structure as Design-Bid-Build usually the design is complete before negotiations.
- The contractor may be selected on other factors than low price including qualifications, expertise, reputation and timeline.
- This negotiating process allows both parties to work together on issues including design, product selection, project phasing, optimum constructability, scheduling and budgeting.
- Cost is not usually the primary consideration for selection but the firm’s history of successfully completing complex projects on time which will usually mean an ultimate savings of money and time with collaboration and working together.
The lowest cost may not be obtained due to the absence of competition and inflated prices.

Negotiated contracts are rarely used for publicly funded projects because laws are requiring competitive bidding to protect the public’s interest.

In this method the final price may be negotiated on partial information. Modifications to design documents after the price is negotiated may lead to cost increases or the project scope may be reduced. These modifications are sometimes referred to as scope creep.

By negotiating agreement, the owner becomes financially committed to the project without knowing the total cost.

More known's by selecting a contractor.
Construction Management
As Owner Agent

- Allows construction input during Pre-Construction.
- The Owner pays the contractors directly, the CM acts as the Owner’s agent.

As GC

- Allows construction input during Pre-Construction
- Can be called CM/GC.
- Usually proposes a guaranteed maximum price (GMP) on a scope of work.
- Sometimes called at-risk construction management.
Construction Management As owner’s agent

- Owner
- Architect/Engineer
- Construction Manager
- Contractors
- Subcontractors/Vendors
Construction Management
At-risk, CM/GC

Owner

Architect/Engineer  Construction Manager

CM to GC

Subcontractors/Vendors
Construction Management Approach

- Good communications among owner, designer and CM firm is established early in the project.
- Usually involve multiple contracts or fast-tracking or complex projects that require intense professional management.
- Knowledge of construction, systems costs and scheduling is utilized during the design phase. Good opportunities for cost savings and value engineering by having construction expertise involved early.
- The Owner receives the cost benefit of the competition among the subcontractor and supplier bids.
- Good communication leads to a less difficult change process.
- This delivery system requires the project team to share responsibilities where trust, proper ethics and a cooperative environment is a must.
- Its important you have a strong CM/Design Team the advantages of this method can turn to the disadvantages fast.
CM/GC approach becoming popular

- The CM/GC approach assumes one entity, manages all facets of the construction effort including preconstruction services.
- During pre-construction the contractor is a CM and converts to GC after the guaranteed maximum price is decided upon.
- The firm could subcontract, on a lump sum or cost plus basis, work that the Client feels is suitable for local hire such as specialty subcontractors (painting, insulation, HVAC, refractory, grading/paving and site development).
The Design-Build Method

- A single entity provides both design and construction of the project.
- The Design-Build is obligated to meet the design criteria and performance requirements specified in the bidding documents.
- On a design/build project the contractor and designer work together to serve the Owner on cost, schedule and scope of work.
- Ability for fast track/phased construction.

- Three types of design-build entities
  - Contractor Led (subcontract design or joint venture)
  - Designer Led (subcontract construction or joint venture)
  - A single firm with both capabilities internally
Design/Build

Owner

Design-Build Firm

Design Consultants

Subcontractors

Vendors/Suppliers
Design-Build is not a new concept!
A long history of Design-Build!

The Master Builder

Egyptian Pyramids

The Dome of the Cathedral in Florence, Italy

The Renaissance

The Dark Ages

The 1900s – Separation/Limit Liability
Why Design/Build?

- Ability for fast track/phased construction.
- Higher quality projects.
- Reduction of claims and litigation against owners.
- Identification of costs early.
- Better relations and communication, more Contractor involvement throughout the process. The design-builder provides only the necessary documentation to build the project efficiently.
A Main Difference in Design-Build

The contractor is responsible for the risk of design in their contractual relationship with the Owner.
Design-Build in the Public and Private Sectors –”New issues to deal with.”

- Scope development and the selection process.
- The need for new documents.
- The differentiation of design and construction.
- Legal and professional issues.
- Owner expertise.
- Public and federal procurement rules and policies.
- Insurance/Bonding/Indemnification/Limits of Liability.
The Design-Build Institute of America predicted that by 2005, 55% of private commercial projects will use design-build method.

Not so but alternate delivery systems are becoming much more common in the industry.
The bidding process may change with each project delivery method but each one will select one of the below bid processes.

- **The Competitive Bid Process**
  - Open Bid
  - Select Bid List

- **Negotiated Bidding**
  - Selection Process
  - Trust
Trends

- Traditional delivery leads to more problems regarding cost overruns and disputes.
- A large majority of large military projects are now design-build.
- Many public companies are going to CM/GC or GC/CM contracting.
- Design-Assist -new terminology
  - Mechanical
  - Exterior Cladding
  - New Rules
- Changes due to Building Information Modeling
Advance Topics
Crossing Over Boundaries

- Constructability/Value Engineering
- Multiple Delivery Methods in a project
  - Example Mechanical Systems - HVAC
  - Sole Source Responsibility
  - Design Assist
  - Design-Build-Maintain
- Capital Cost vs. Life Cycle Analysis
Contract Types

- In addition to choosing a delivery system for a project, the owner must decide what type of contract to use.
- A contract is simply an agreement between two or more entities in which they agree to provide a specific task in exchange for something in return.
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Contract Types

- **Fixed price or lump sum**: The contractor agrees to provide a specified amount of work (known as the scope of work) for a specific sum.
- **Cost plus a fee**: The contractor is reimbursed for their costs and receives a agreed upon fee. A GMP (guaranteed maximum price) may be added to the contract. The contractor may share in savings if provided in the contract. If the contract amount goes over the contractor is responsible for the overage.
- **Time and Materials**: Specific labor rates are agreed to and charged out based on the work accomplished. Materials are reimbursed with an appropriate mark-up.
- **Unit Price or Rate**: The owner and contractor agree on the price to be charged per unit for the major elements of the project.
Contract Type Examples

- **Fixed Price/Lump Sum**
  Based on a scope of services a lump sum or fixed amount decides the value of the contract.

- **Cost Plus Fee**
  Cost Plus is the accumulation of actual costs expended on the project plus an appropriate fee to cover overhead and profit for the contractor.

- **Cost Plus Fee GMP**
  The GMP (Guaranteed Maximum Price) sets a not to exceed price. If the accumulation of actual costs goes over the GMP the contractor pays. If it goes under the contractor may share in savings based on the contract.
Contract Type Examples

- **Time and Materials**
  
  - Carpenter  $50.00 per hour X 400 hours= $20,000.00
  - Laborer  $30.00 per hour X 100 hours= $3,000.00
  - Backhoe  $45.00 per hour X 100 hours= $4,500.00
  - Lumber Invoice  $1500 X .15% markup = $1,725.00
  - Total Project  $29,225.00

- Time labor rates are based on an hourly rate per worker or piece of equipment used which includes all associated costs for providing labor and equipment. Overhead and profit is included in the labor and owned equipment rates. Material is invoiced cost plus a markup or fee.
Contract Type Examples

- **Unit Price or Rate**
  - Gravel: 5000 tons @ $10.00 per ton = $50,000
  - Asphalt: 8000 tons @ $8.00 per ton = $64,000
  - Concrete Barriers: 1500 CY @ $100.00 per CY = $150,000
  - Drain Pipe: 1000 LF @ $10.00 per LF = $10,000
  - Total Price: $274,000

- Used primarily in Heavy/Civil/Highway construction. Unit prices include all associated costs for project. Overall scope is based on those target quantities agreed to by the Owner and Contractor. Any major change in quantities may require renegotiating unit prices. The unit rates include all overhead and profit for the project.
## Types of Contracts

<table>
<thead>
<tr>
<th>Types of Contracts</th>
<th>All Companies</th>
<th>Industrial &amp; Non-residential</th>
<th>Heavy &amp; Highway</th>
<th>Specialty Trades</th>
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<tbody>
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<td>Fixed Price</td>
<td>61%</td>
<td>56%</td>
<td>47%</td>
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<tr>
<td>Cost Plus Guaranteed Max</td>
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<td>28%</td>
<td>1%</td>
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<td>Cost Plus Fee</td>
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<tr>
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<tr>
<td>Other</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
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Project Delivery sets the Rule Book

- The Construction Documents are the rules to play by.
  - The Contract
  - Plans and Specifications