Design-Build & Best Practices for the Estimator
Topics of Discussion

- Design-Build fundamentals
- The role of the Estimator on the Design-Build team
- The *Art* of Conceptual estimating
- Design influences affecting project costs
- Value Management
- Design-Build Best Practices
Owners Always Ask Two Questions

With any project:
- How much is it going to cost?
- How long is it going to take?

How do the answers differ in a:
- Hard Bid Project?
- Design Build Project?
The Changing World

- How Owners buy buildings
- Market drivers
- How teams form
- How teams design and construct buildings
Choose the Delivery Method for the Right Reason

- Not all project delivery methods are right for each project
- Not all owners are capable of managing a design build project
- Not all teams are capable of delivering a design build project
- Team members must be educated in alternate project delivery methodologies and best practices
Major Project Delivery Methods

- Design-Bid-Build
- CM@R
- CM as Agent
- Multi Prime
- Design-Build (Single Party)
- IPD (Multi Party)
- Public-Private Partnership (P3’s)
- Design-Build-Operate-Maintain (DBOM’s)
Primary Selection Methods

- Best Value (BVS)
- Qualification Based (QBS)
- Low Bid
- Low Price, Technically acceptable
- Single Step (no Qual’s)
- Two Step (Quals, proposal)
## Comparison of Project Delivery Methods

### (CII/Penn State Study)

<table>
<thead>
<tr>
<th>Metric</th>
<th>DB vs. DBB</th>
<th>CM@R vs. DBB</th>
<th>DB vs. CM@R</th>
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</thead>
<tbody>
<tr>
<td>Unit Cost</td>
<td>6.1% lower</td>
<td>1.6% lower</td>
<td>4.5% lower</td>
</tr>
<tr>
<td>Construction Speed</td>
<td>12% faster</td>
<td>5.8% faster</td>
<td>7% faster</td>
</tr>
<tr>
<td>Delivery Speed</td>
<td>33.5% faster</td>
<td>13.3% faster</td>
<td>23.5% faster</td>
</tr>
<tr>
<td>Cost Growth</td>
<td>5.2% less</td>
<td>7.8% more</td>
<td>12.6% less</td>
</tr>
<tr>
<td>Schedule Growth</td>
<td>11.4% less</td>
<td>9.2% less</td>
<td>2.2% less</td>
</tr>
</tbody>
</table>

## Comparison of Delivery Methods

**CII/Penn State & Univ. of Reading**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Research Study</th>
<th>CII Penn State (US) DB vs. DBB</th>
<th>Reading DB Forum (UK) DB vs. DBB</th>
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<td>Delivery Speed</td>
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<td>33% Faster</td>
<td>30% Faster</td>
</tr>
</tbody>
</table>
Comparison of Delivery Methods
CII/Penn State & Univ. of Reading

- D-B delivers equal or higher quality:
- D-B out performed traditional D-B-B in every category
  - Startup
  - Call Backs
  - O&M
  - Exterior & Structure
  - Interior
  - Environmental
  - Equipment
Design Build Fundamentals
Solicitation & Basis of Award

Design-Bid-Build

Issued for Bid

Low Bid

Prescriptive Plans & Specs

Quantitative Only

Low Bid
Design is Fixed – Design dictates cost (and performance becomes a variable)

Change Orders
Solicitation & Basis of Award

Design-Build

RFP

Team selection based on **BEST VALUE** not low cost

Quantitative

Qualitative

Performance Requirements

HENSEL PHELPS
Design/Cost Relationship

**Design-Build**

Cost (and performance are fixed) – We are designing to the cost range of design details.
Design-Build Early Cost Determination

Design Bid Build
- Program
- Design
- Bid
- Construction
- Re-design
- Scope reduction
- Value Engineering
- Substitutions

Design Build
- Program
- Proposal
- Design
- Construction
- Value Management
- Design to budget
- Innovation
- Information
QBS - Qualification Based Design Build

- Progressive D-B
  - Prequalification of 3-5 teams
  - Teams selected on caliber of the proposed team members and fees
  - May include RFP or may require development of Program, budget and schedule
  - Scope developed with Owner and Design Builder
  - iGMP’s, Trending and development of Final GMP
Qualification Based Source Selection

Post Award Integration is a team sport lead by the Owner
BVS - Best Value Design Build

- Usually a Two Step Process
  - Prequalification of 3-5 teams
  - Competition based on satisfaction of RFP criteria within budget

- Cost Model (Fixed Price/ Best Value) can vary
  - Stipulated Sum
  - Max Allowable Contract
  - Low Price, technically acceptable
Two Step Source Selection (Best Value)

**STEP ONE**
- Program Definition
- RFQ
- Short List
- RFP

**STEP TWO**
- Proprietary meetings
- Proposal
- Interview
- Selection

Post Award Integration is a team sport lead by the Owner
Understanding the Costs of Solicitation

- Cost of pursuit
  - Designers
  - Contractor
  - Trades
- Level of Design for selection
- Level of Design for risk mitigation
- Contracts, Fees
- Technical review
- Project management
Stipends

- Compensation to losing teams
- Defers some of cost to compete
- Important in both hot and cold markets
- Shows commitment
Common Design Build Team Configurations

- Contractor Led: 54%+
- Integrated Design-Build: 28%
- Joint Venture: 5%
- Designer-Led: 13%

Source: Zweig-White
Essential Concepts of Design-Build

- Contractor & A/E have a direct contractual relationship
- Solicitation & basis of award
- Design process
- Design-cost relationship
- Plans & spec warranty
- DB teaming
- Value proposition
- Single Point of Responsibility
Design-Build Responsibility

- Design–Build relies on a single point of responsibility contract and is used by the project owner to:

  minimize risks
  find innovative solutions
  manage cost
  reduce the schedule

Design-Bid-Build

- Dual Responsibility

Design-Build

- Singular Responsibility
How Design-Build is Different

- Compressed schedule with concurrent interdependent design, procurement & construction activities
- More interfaces within the project team
- Cost/schedule risk analysis as design details develop
- Continuous new information that must be integrated into the solution
- Merged cultures, attitudes, preferences, prejudices, agendas – & learning curves
Single Most Important Distinction in a Design Build Project
The Right Team

- The ability to operate & perform effectively on an Integrated Team is NOT automatic ... and not for everyone
- Not every Architect, Contractor, Engineer, or Owner has what it takes
- Effective Design-Build project participants possess Unique Talents

“Just because you can read music doesn’t mean you can play jazz.”
The Right Driver, & the Right People, in the Right Seats

### Off the Bus
- Judgmental – Criticizes
- Reactive & Automatic
- Know-it Already
- EITHER / OR Thinking
- Inflexible & Rigid
- Own Point of View Only
- Intolerant of Self & Others
- Fears Differences
- Defends Assumptions
- Primary Mood – Protective Defensive

### On the Bus
- Accepting – Critiques
- Responsive & Reflective
- Values not Knowing
- BOTH / AND Thinking
- Flexible & Adaptive
- Multiple Perspectives
- Accepting of Self & Others
- Values Differences
- Questions Assumptions
- Primary Mood - Curious
The Difference in Cultures

Design is **Solution**-driven
Construction is **Schedule**-driven

Understanding this basic concept is key to managing the process

*Design-build* facilitates the solution through a collaborative process in order to maintain the schedule & maximize the value
Training and Education
Business Drivers
Motivators
Risk
Legacy relationships
Contract structure

Understanding the differences in cultures and motivators informs and supports the process of Estimating
### Cultural Differences and Motivators

<table>
<thead>
<tr>
<th>Designers</th>
<th>Builders</th>
<th>Owners</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Safety, health and welfare</td>
<td>- Safety oriented</td>
<td>- Safety, health and welfare</td>
</tr>
<tr>
<td>- Start with a blank sheet</td>
<td>- Solution with a plan</td>
<td>- Satisfy the business needs</td>
</tr>
<tr>
<td>- Solution oriented</td>
<td>- Schedule driven</td>
<td>- Prescriptive or performance</td>
</tr>
<tr>
<td>- Problem solvers</td>
<td>- Problem solvers</td>
<td>- Seasoned or rookie</td>
</tr>
<tr>
<td>- Spatial relationships</td>
<td>- Action and tangible results</td>
<td>- Aesthetics</td>
</tr>
<tr>
<td>- Aesthetics</td>
<td>- Linear processes</td>
<td>- Schedule oriented</td>
</tr>
<tr>
<td>- Intangibles</td>
<td>- High degree of expertise</td>
<td>- Cost conscious</td>
</tr>
<tr>
<td>- Technologists</td>
<td>- Cost conscious</td>
<td>- Risk adverse</td>
</tr>
<tr>
<td>- Integrators</td>
<td>- Logistical problem solvers</td>
<td>- Conflict adverse</td>
</tr>
<tr>
<td>- Quality assurance</td>
<td>- Quality control</td>
<td>- Level of experience</td>
</tr>
<tr>
<td>- Professionals</td>
<td>- Professionals</td>
<td>- Level of integration</td>
</tr>
</tbody>
</table>

- ROI
- O&M
- DBIA
- Hensel Phelps
- American Society of Professional Engineers
Understanding
Who is willing to guess how many?

JELLY BEAN JAR

For fun?
For $1000?
For $100,000?
For $1,000,000?
What Factors Did You Have to Consider?

- Amount of risk
- Amount of information available
- Quality of the information
- The return on investment

What are the consequences if you are wrong?

What are the consequences if you are right?
Who owns the Design RISK?

The Spearin Doctrine ....

There is an implied warranty

“If the contractor is bound to build according to plans and specifications prepared by the owner, the contractor will not be responsible for the consequences of defects in the plans and specifications” (change orders, schedule extensions etc.)

In Design Build, the design risk shifts to the design builder – except where the Owners provide prescriptive specifications.

Those best able to manage the risk should be assigned the risk
In **Design-Bid-Build**

Courts find Owner warrants the sufficiency of the plans and specs to the Contractor

- Owner owns the details of design
- Owner is liable for any “gaps” between the plans and specs and the Owner’s requirements for performance
- Any short falls-Owner pays

In short,

The Owner bears the risk of the design
Under **Design-Build**:

The Design-Builder warrants the sufficiency of the plans and specs to the Owner

- Design-Builder owns the details of design
- Design-Builder liable for any “gaps” between plans & specs and Owner’s requirements for performance
- Any short falls-the Design Builder pays

In short,

The Design Builder bears the risk
What Influences DB’s Decision to Propose?

- Type of project
- Size of project - rough estimate of budget
- Location of the project
- Quality of the drawings and specifications
- Reputation of the owners, inspectors, architects, engineers, etc.
- Long-term relationships
- Specialized work or equipment requirements
- Anticipated construction problems
- Security and access restrictions
- Safety considerations
- Current and future workload
- Bonding capacity
- Time to prepare estimate and proposal/bid
Factors Influencing Building Costs

- Geographical and site factors
  - Location of site
  - Condition of site
  - Dependable site information
  - Soil conditions
  - Accessibility
  - Environmental issues

- Time factors
- Qualitative factors
- Legal and administrative factors
- Market and external economic conditions
- Owner personality factors
- Design factors
Design Factors –
Are you inside the head of your designers?

- Building Size
- Building Height
- Story Height
- Space Utilization and Efficiency
- Finish Selection
- Aesthetics
- Functionality
- Performance or Prescriptive
- Perception
- Social
- Professional recognition
- Market position
- Schedule
Fundamentally Two Types of Estimates

- Detailed Estimates
- Conceptual Estimates
Purpose Determines Type of Estimate

- **Definitive Pricing – Need Detailed Estimates**
  - Typically 100% docs are available
  - Used in design-bid-build

- **Budgeting and Feasibility Estimates - Need Conceptual Estimates**
  - Design is less than 100% - sometimes none
  - Used extensively in design-build
  - Many different methods and levels
Detailed Estimates

- Used to determine actual cost of project for bidding purposes or change orders
- Utilizes detailed company cost data for labor and equipment expected to be used
- Actual construction methods to be used are determined up front
- Actual materials, suppliers, subcontractors, and labor to be used are determined throughout the estimate development
Relationship Between Specifications and Estimates

- **Prescriptive specifications** focus on the means to an end
  - Dictate exactly how to do what needs to be done and what materials to use
  - Easy to count the specific parts and pieces
  - Design must be complete to use

- Correlate nicely with detailed estimating

- Works well with design-bid-build projects
Conceptual Estimates

- Used to determine expected cost for budgetary and planning purposes - sometimes for firm fixed price!
- Exact contractor resources and costs are not known
- Actual material and subcontractor labor rates are not utilized
- Probable construction methods are presumed
- Requires lots of assumptions
- Contingencies should always be utilized
Performance specifications
focus on the end result

- They do not dictate means of how to get there
- Known parts and pieces are not necessary
- Design does not need to be finished

Correlates nicely with conceptual estimating

Works well for design-build projects
Many Different Types of Conceptual Estimates

- Rough Order of Magnitude
- Square Foot or Cubic Foot
- Assemblies or Systems
- Parameter or Model Estimates
Two Basic Estimate Formats

- **UNIFORMAT II**
  - Commonly used to present cost estimates (i.e., conceptual estimates) during the schematic design phase
  - Arrangement of construction information based on physical parts of a facility called systems and assemblies
  - Systems and assemblies are characterized by their function without identifying the products that compose them

- **MasterFormat® (CSI)**
  - Used primarily for detailed estimating
  - 50 divisions (1995 version had 16 divisions)
  - A breakdown of building materials, products, and activities
UNIFORMAT Characteristics

- 22 Major Building Elements
- Accepted by designers
- Functional/elemental oriented
- Excellent for performance specifications
- **Good for conceptual estimates**
- **Can be used for detailed estimating**
- Challenge for contractor to assemble subcontractor quotes
- **Excellent for design phase cost control**
- Limited use for construction phase cost control
- Excellent to use to compare competing designs
- Excellent for use in assembling/maintaining historical project information
- **Easier to use with BIM**
Why Use UNIFORMAT?

- Provides an “Industry Standard” language for communicating with the project team
- Addresses scope and cost in interchangeable systems
- Allows for use of a database or catalog of unit prices to speed up the estimating process
- Provides a realistic distribution of costs for assigning Design-to-Cost targets
- Consistency of estimates from one estimator to another
- Allows quick analysis of alternatives early in design phases while maintaining a complete audit trail
- Provides a standardized method of collecting, analyzing and utilizing historical data in an easily applied format
- Allows the estimate to be assembled in the same order that actual construction would progress
The Conceptual Estimators Skillset

- Understanding of Estimating principles
- Understanding of the design process
- Ability to read between the lines
- Ability to communicate cost to those not fluent in the language
- Collaborative, team player, balanced in approach
- Ability to build and maintain TRUST
How can you estimate a project when you don’t have final drawings or all the details worked out?
Types of Documents Needed

- For Conceptual Estimating
  - Sketches on paper napkins
  - Project description and use
  - Performance requirements
  - Major pieces of equipment
  - System Narratives
Contingency

- An amount of $$$ added to the estimate to cover risks associated with the unknown

- Types of Contingency:
  - Contractor’s Contingency
  - Owner’s Contingency
  - Design Contingency

Contractors normally have contingency in 100% designed jobs, why wouldn’t they in design-build jobs when the design is less developed and has much greater risk?
Contingency

- What contingency is included in the estimate?
  - Does percentage of the contingency make sense compared to the level of documentation?
  - Where is contingency built into the budget?
  - Did the major subcontractors include contingency?

- Who will control the contingency?
  - Owner or Design Builder?
  - How can it be used and by who?
- Is this something you are embarrassed to earn or pay?
- Should be the reward for taking the risk and delivering value
- Is not guaranteed – even on cost reimbursable contracts
- What is the right amount of profit?
Concept of Cost as a “Function” of Design

- Conceptual estimating is a key “tool” to develop and manage design
- Documentation in conceptual estimating is critical
- Must “operationalize” the numbers – they are dependent on the assumed means and methods
- Must know what the numbers represent (what’s included and what’s not)
Must maintain balance between design and cost throughout the design-build process.
Typical D-B Estimate Timeline

Feasibility Estimate

Program Estimate or Cost Model

50% Schematic Estimate

100% Schematic Estimate

50% DD Estimate

100% DD Estimate (Could be GMP)

(varies)%CD Estimate - GMP

Trend estimating occurs at intervals between formal milestone estimates
Estimating Success Requires …

- Knowledge of construction
  - methods
  - materials and their usage
  - equipment productivity
  - crews and capabilities
- Knowledge of estimating methods and procedures and how to use them
- Thinking outside the box
Estimating Success Requires …

- Thorough understanding of project scope
- Excellent communication skills
- Appropriate behavioral skills
- Interdisciplinary fluency
- TRUST in your design partners
Role of the Estimator in Design-Build

- Powerful position - Key player in a Design-Build firm
- Estimator often sets the parameters for the design
- Design is flexible but the design process must be managed by the cost model
- Must be able to operate reliably in the arena of great uncertainty and unknowns
- Must be able to manage large amounts of historic price data
- Must be able to manage personalities and balance wants/desires

HENSEL PHELPS

DBIA
Design-Build Institute of America

AMERICAN SOCIETY FOR PROFESSIONALS
Critical Relationship in Design-Build

Designer

Estimator

HENSEL PHELPS
Conceptual Cost Estimating for Design-Build ©2008 by DBIA
Do Designers Understand The Cost of Work?

- What goes into the cost?
- Designers typically rely on “salespeople” to determine early cost for systems
  - Why might this be a bad idea?
Potential Pricing Problems
“Why wasn’t there enough in the estimate?”

Did you understand...

- The designer’s typical details?
- The level and quality of finishes expected?
- Applicable design standards and local permitting requirements (i.e. architectural review boards, code requirements, deed restrictions, impact fees, school district fees, gross receipts taxes, etc.)?
- Productivity constraints
- Labor, permits, inefficiencies, unions, etc.........
Value Engineering

- It’s neither – there is no value and there is certainly no engineering
  
  - Jim Bradburn – Architect
  
  Fentress Bradburn Architects

- It’s scope reduction at the end of the design because the value was not managed during the design phase
Value Management Defined

- An organized effort directed at analyzing the functions of systems, equipment, facilities, services, and supplies for the purpose of achieving the essential function at the lowest life cycle cost consistent with the required performance, reliability, quality, and safety. It occurs throughout the design phase.

\[
\text{Value} = \frac{\text{What you get}}{\text{What you paid}}
\]
Design is an iterative process

Design process must be flexible to stay within bid price or GMP and maintain schedule

Budget trade-offs are required

Focus on value enhancement
Managing Cost Through the Process

- Design changes during early stages of design-build process
- Design changes late in the game
- Can an Owner change their mind during the development of the design?
Managing Cost Through the Process (Cont.)

- **During Later Stages**
  - Changes due to unforeseen conditions
  - Changes due to design omissions
  - Change may be at owner’s discretion
    - Adjust quality standards higher or lower
    - New equipment preferences
    - In response to outside influences
Managing Cost Through the Process

**Trend Management Program**

- Tool used to identify, evaluate, manage, & resolve changes during design, procurement, and construction
- Encourages a proactive approach with the owner to resolve any changes
- Mitigates any disputes before they become bigger problems
Trend Management

- Trend Log
  - Similar to Change Estimate Log
  - Should be reviewed in periodic design team meetings
  - Classify proposed revisions as Approved, Rejected or Pending

- Trend Estimate Report
  - Similar to a Change Estimate
  - Provides an audit trail for tracking all cost impacts

- Trends provide a tool to maintain control of the budget and design process between major estimate phases

- Trends are not always additive and compatible; beware of the “Domino Effect”
**Internal Trends**

- Design development changes
- Missed items that were in the scope but left out of the proposal
- Work quantity adjustments
- Price escalation of materials, labor, or equipment
- Labor and equipment productivity
- Transportation and storage costs

**External Trends**

- Client-driven scope changes
- Client driven quality changes
- Changes in site conditions
- Permitting process requirements
- Force majeure events
- Industry standards changes or owner specified items
- Financial, tax, or legal issues
Value of Tracking Changes and Cost Trends

- Improves risk management for team and owner
- Encourages open discussions
- Initiates corrective actions
- Supports negotiation over changes
- Provides cross-check for cost and schedule forecasting
Design Build Best Practices for Estimators

- Educated on Design Build project delivery
- Knowledge of Contract and Project requirements
- Ability to work in a conceptual environment with designers
- Knowledge of strategies to effectively execute a Design Build estimate
- Understanding of business, cultural, behavioral and ethical concerns of your partners
- Ability to build and maintain TRUST
Take-Aways

- Conceptual estimating is a key component of the design-build process
- Guaranteeing a firm price with little or no design creates a unique challenge
- Good historic price data, knowledge, and practice with estimating methods mitigates risk
- High communication between estimators and designers is critical
- And don’t forget to think outside the box…
You have eternity to think inside the box

Thanks!