Design-Build &
Best Practices for the Estimator

Presentation material originally compiled by Greg Gidez - DBIA, AIA, Director of Design Services, Hensel Phelps
Presentation updated by Chris Vine - LEED®AP, DBIA– Project Superintendent, Hensel Phelps

HENSEL PHELPS
Plan. Build. Manage.

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

HENSEL PHELPS
Plan. Build. Manage.

Owners Always Ask Two Questions

With any project:

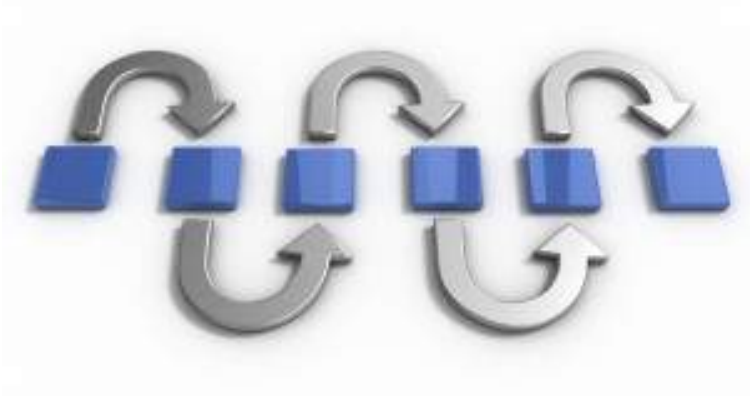
- How much is it going to cost?
- How long is it going to take?

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)

HENSEL PHELPS
Plan. Build. Manage.

DBIA
DESIGN-BUILD
INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

Primary Selection Methods

- Best Value (BVS)
- Qualification Based (QBS)
- Low Bid
- Low Price, Technically acceptable
- Single Step (no Qual's)
- Two Step (Quals, proposal)

HENSEL PHELPS
Plan. Build. Manage.

DBIA
DESIGN-BUILD
INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

Comparison of Project Delivery Methods
(CII/Penn State Study)

Metric	DB vs. DBB	CM@R vs. DBB	DB vs. CM@R
Unit Cost	6.1% lower	1.6% lower	4.5% lower
Construction Speed	12% faster	5.8% faster	7% faster
Delivery Speed	33.5% faster	13.3% faster	23.5% faster
Cost Growth	5.2% less	7.8% more	12.6% less
Schedule Growth	11.4% less	9.2% less	2.2% less

Re: "Comparison of U.S. Project Delivery Systems," Mark Konchar & Victor Sanvido, *Journal of Construction Engineering and Management, Vol. 124, No. 6 (1998), pp. 435-444.*

HENSEL PHELPS
Plan. Build. Manage.

Comparison of Delivery Methods

CII/Penn State & Univ. of Reading

Research Study / Parameter	CII Penn State (US) DB vs. DBB	Reading DB Forum (UK) DB vs. DBB
Unit Cost	6% Less	13% Less
Construction Speed	12% Faster	12% Faster
Delivery Speed	33% Faster	30% Faster

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

HENSEL PHELPS
Plan. Build. Manage.

DBIA
DESIGN-BUILD INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

Solicitation & Basis of Award
Design-Bid-Build

Prescriptive Plans & Specs

Issued for Bid → **Low Bid**

Quantitative Only

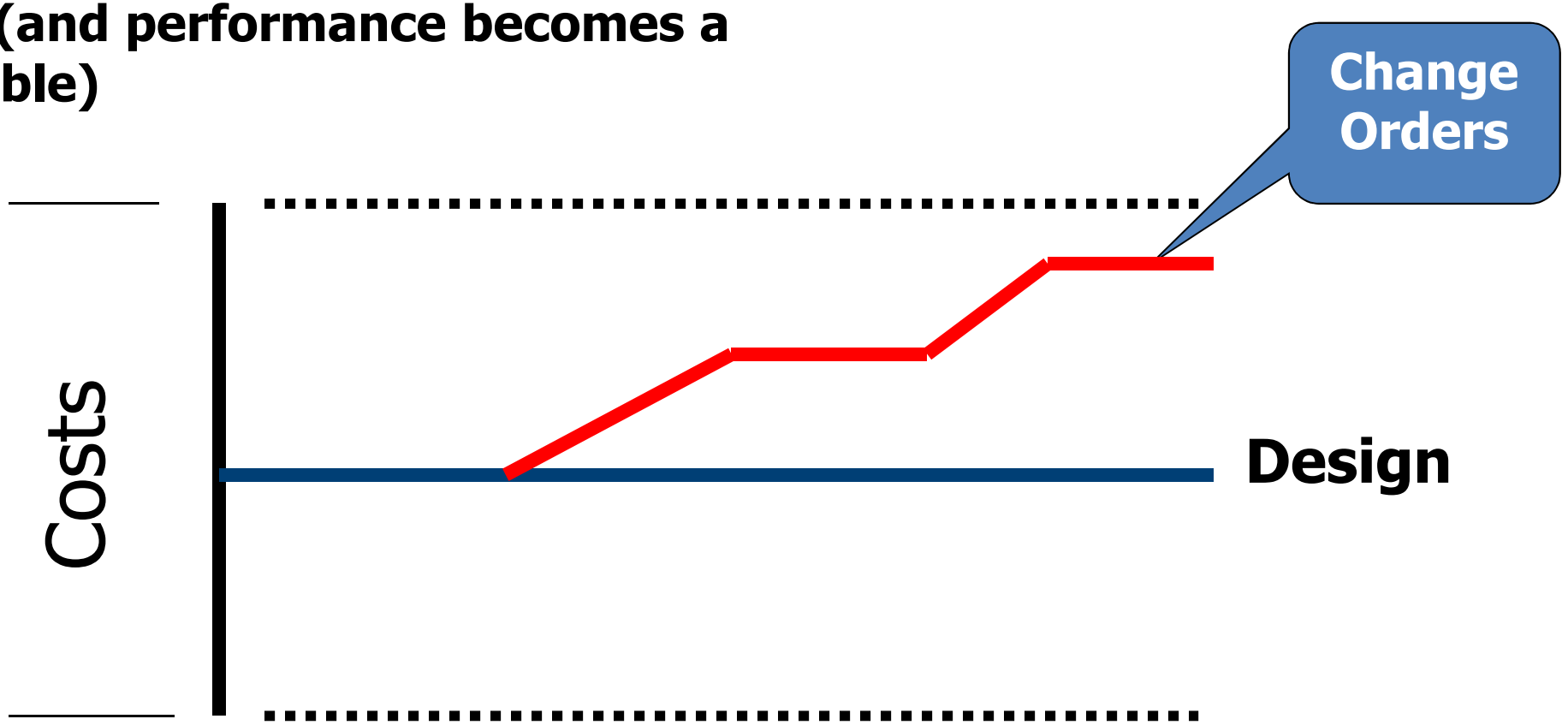
HENSEL PHELPS
Plan. Build. Manage.

DBIA DESIGN-BUILD INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

Design/Cost Relationship
Design-Bid-Build

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



HENSEL PHELPS
Plan. Build. Manage.

Solicitation & Basis of Award
Design-Build

RFP

Team selection based on *BEST VALUE* not low cost

Quantitative

Qualitative

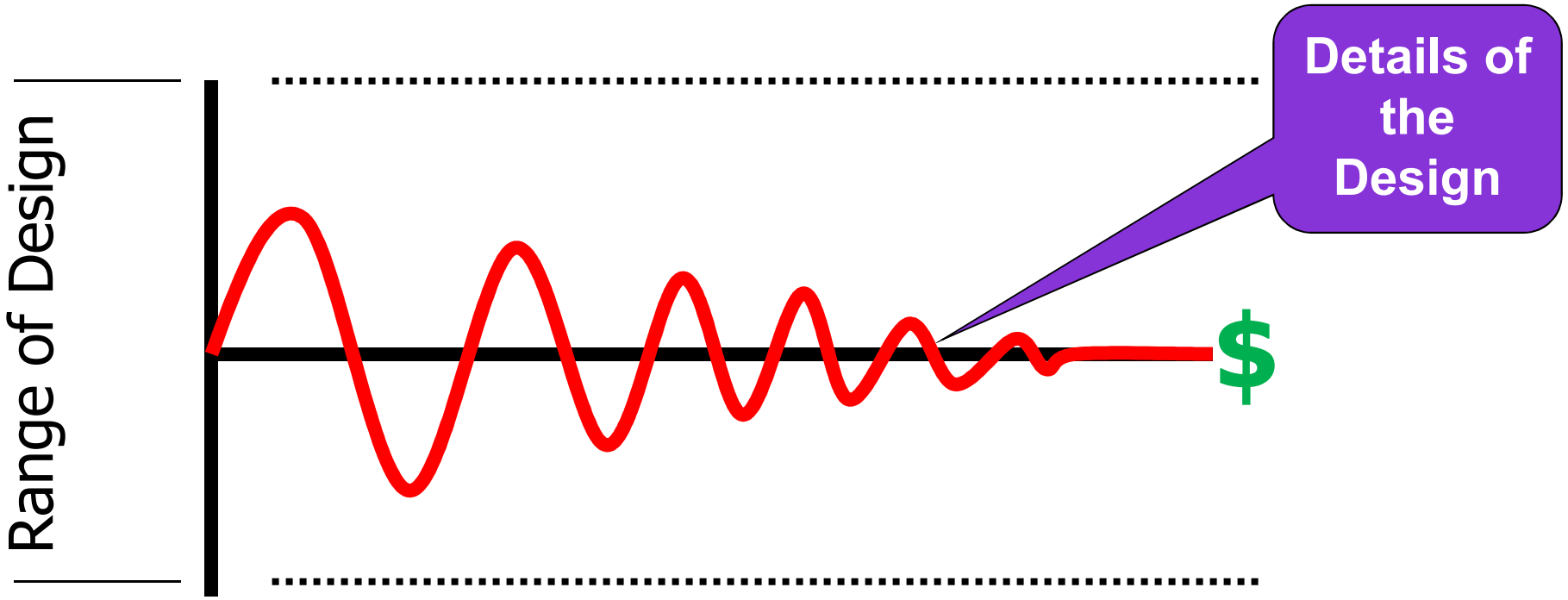
Performance Requirements

HENSEL PHELPS
Plan. Build. Manage.

DBIA DESIGN-BUILD INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

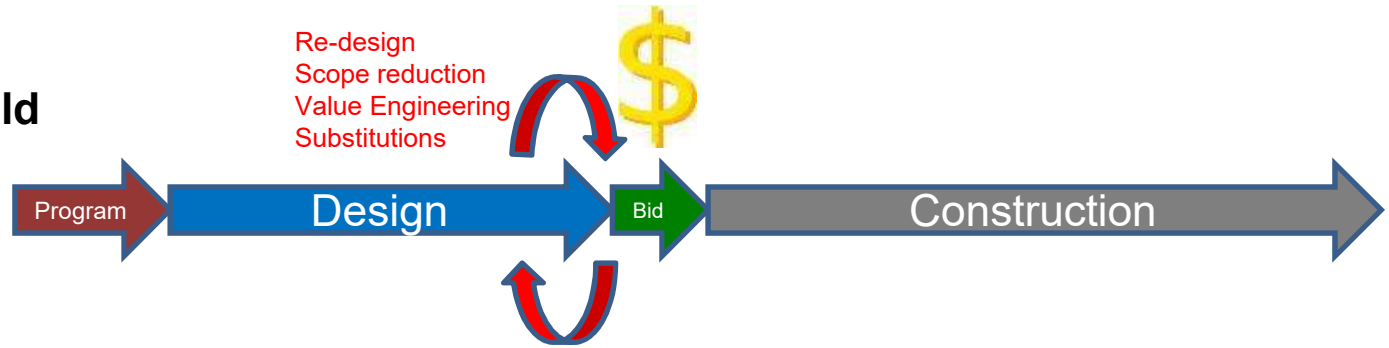
Design/Cost Relationship
Design-Build



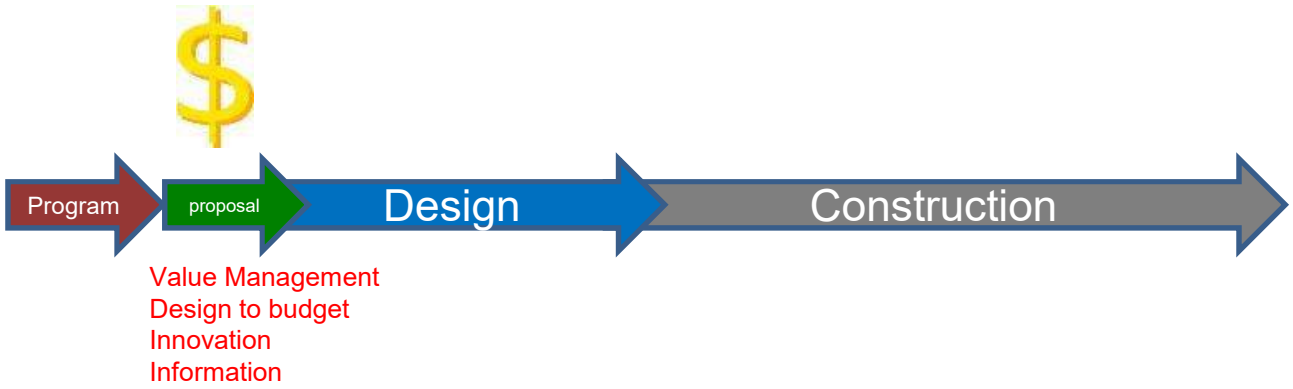
Cost (and performance are fixed) – We are designing to the cost

Design-Build Early Cost Determination

Design Bid Build



Design Build

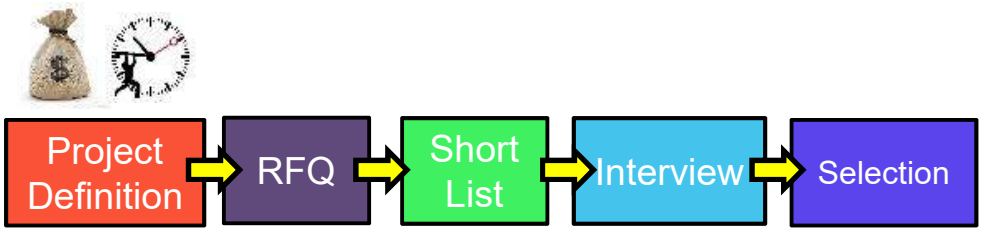


HENSEL PHELPS
Plan. Build. Manage.

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



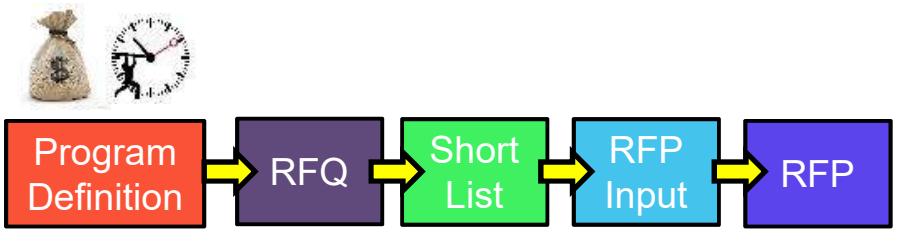
Post Award Integration is a team sport lead by the Owner

HENSEL PHELPS
Plan. Build. Manage.

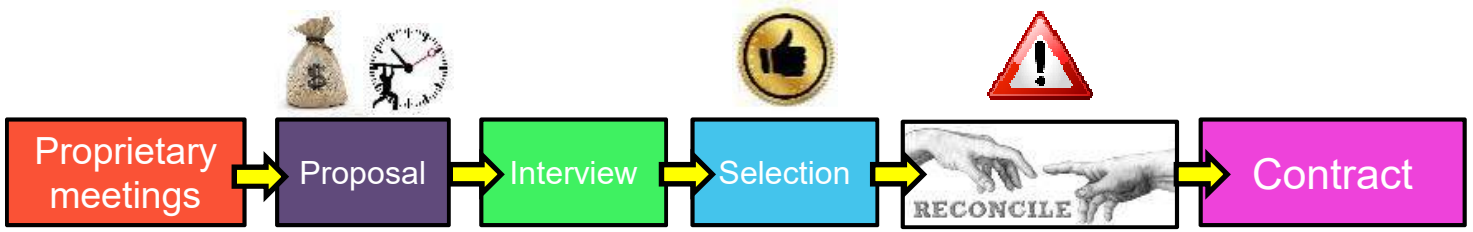
BVS - Best Value Design Build

- 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



STEP TWO

Post Award Integration is a team sport lead by the Owner

HENSEL PHELPS
Plan. Build. Manage.

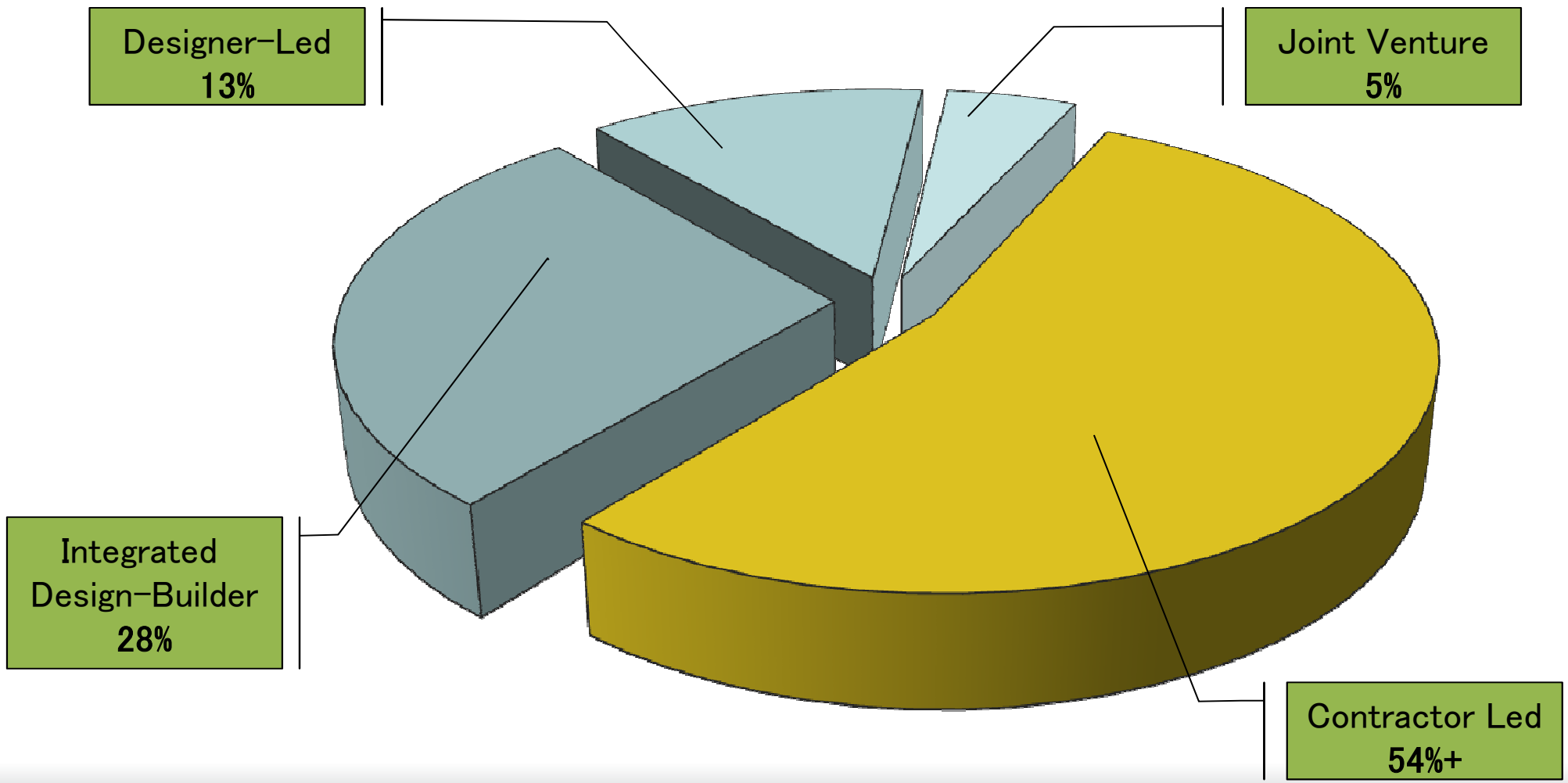
Understanding the Costs of Solicitation

- 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



Source: Zweig-White

HENSEL PHELPS
Plan. Build. Manage.

DBIA
DESIGN-BUILD
INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

Essential Concepts of Design-Build

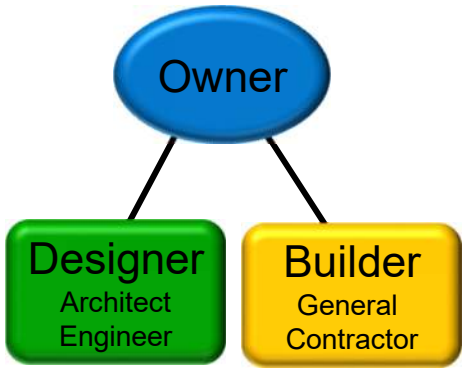
- Contractor & A/E have a direct contractual relationship
- Solicitation & basis of award
- Design process
- Design-cost relationship
- Plans & spec warranty
- DB teaming
- Value proposition
- Single Point of Responsibility

HENSEL PHELPS
Plan. Build. Manage.

Design-Build Responsibility

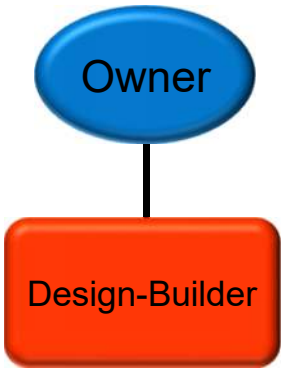
- Design–Build relies on a single point of responsibility contract and is used by the project owner to:

minimize risks
find innovative solutions
manage cost
reduce the schedule



Design-Bid-Build

Dual
Responsibility

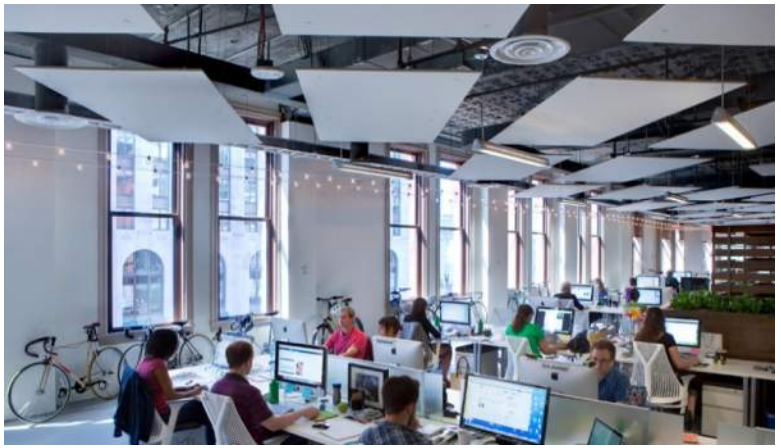


Design-Build

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



HENSEL PHELPS
Plan. Build. Manage.

DBIA
DESIGN-BUILD INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

Single Most Important Distinction in a Design Build Project

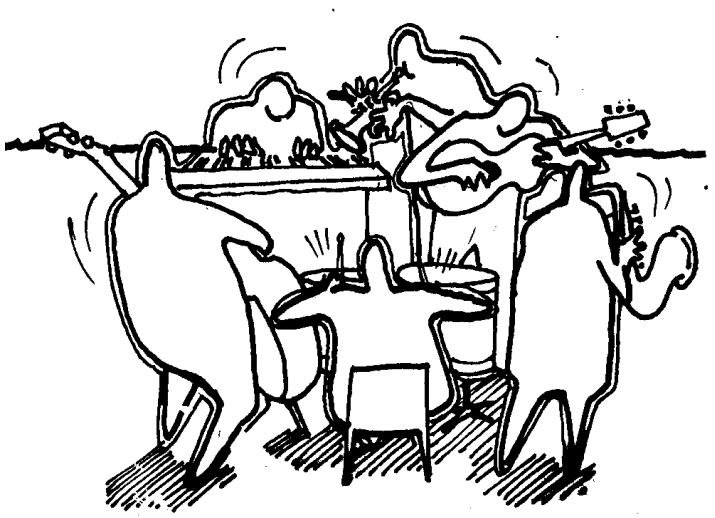
HENSEL PHELPS
Plan. Build. Manage.

DBIA
DESIGN-BUILD
INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

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."

HENSEL PHELPS
Plan. Build. Manage.

DBIA
DESIGN-BUILD INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

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

HENSEL PHELPS
Plan. Build. Manage.

DBIA DESIGN-BUILD INSTITUTE OF AMERICA

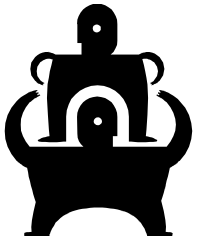
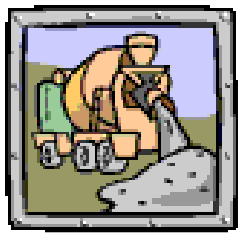
AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

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

HENSEL PHELPS
Plan. Build. Manage.

DBIA
DESIGN-BUILD INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

The Difference in Cultures

- 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

Designers

- Safety, health and welfare
- Start with a blank sheet
- Solution oriented
- Problem solvers
- Spatial relationships
- Aesthetics
- Intangibles
- Technologists
- Integrators
- Quality assurance
- Professionals

Builders

- Safety oriented
- Solution with a plan
- Schedule driven
- Problem solvers
- Action and tangible results
- Linear processes
- High degree of expertise
- Cost conscious
- Logistical problem solvers
- Quality control
- Professionals

Owners

- Safety, health and welfare
- Satisfy the business needs
- Prescriptive or performance
- Seasoned or rookie
- Aesthetics
- Schedule oriented
- Cost conscious
- Risk adverse
- Conflict adverse
- Level of experience
- Level of integration
- ROI
- O&M

Understanding……

HENSEL PHELPS
Plan. Build. Manage.

DBIA
DESIGN-BUILD
INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

Who is willing to guess how many?

JELLY BEAN JAR

For fun?

For $1000?

For $100,000?

For $1,000,000?

HENSEL PHELPS
Plan. Build. Manage.

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?

HENSEL PHELPS
Plan. Build. Manage.

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

HENSEL PHELPS
Plan. Build. Manage.

DBIA DESIGN-BUILD INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS

Plans/Specs Warranty

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

Plans/Specs Warranty

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

HENSEL PHELPS
Plan. Build. Manage.

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

HENSEL PHELPS
Plan. Build. Manage.

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

Relationship Between Specifications and Estimates

- **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

HENSEL PHELPS
Plan. Build. Manage.

Many Different Types of Conceptual Estimates

- Rough Order of Magnitude
- Square Foot or Cubic Foot
- Assemblies or Systems
- Parameter or Model Estimates

HENSEL PHELPS
Plan. Build. Manage.

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

HENSEL PHELPS
Plan. Build. Manage.

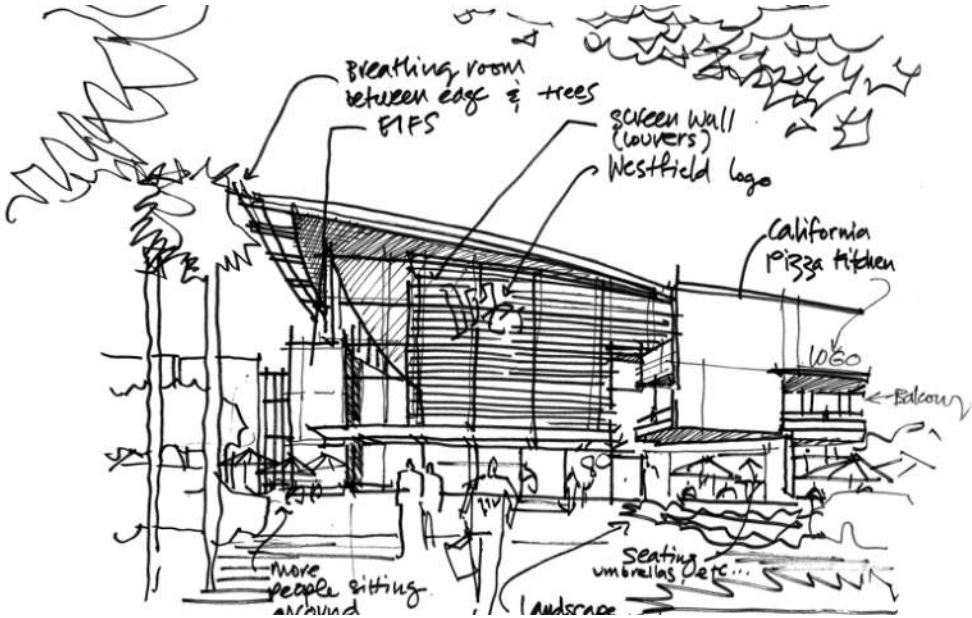
The Fundamental Question of Conceptual Estimating

How can you estimate a project when you don't have final drawings or all the details worked out?

HENSEL PHELPS
Plan. Build. Manage.

Types of Documents Needed

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



Contingency

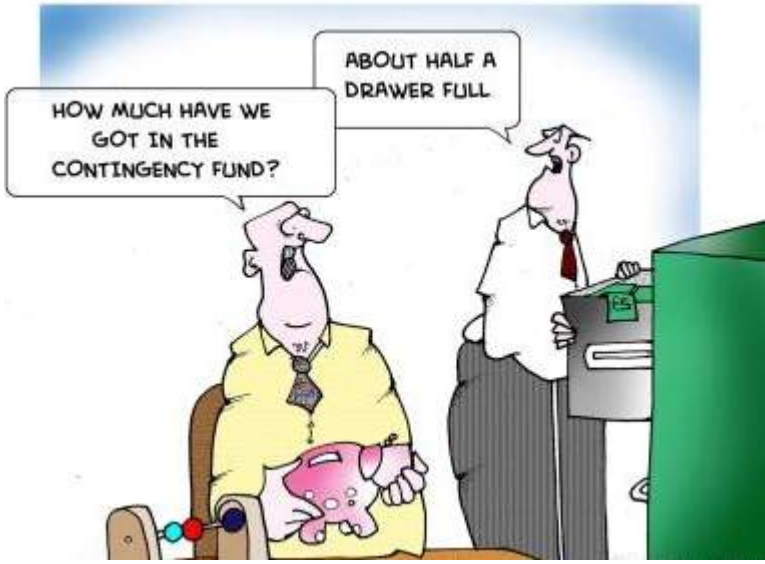
- An amount of $$$ added to the estimate to cover risks associated with the unknown
- Types of Contingency:
  - Contractor's Contingency
  - Owner's Contingency
  - Design Contingency

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

HENSEL PHELPS
Plan. Build. Manage.

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?



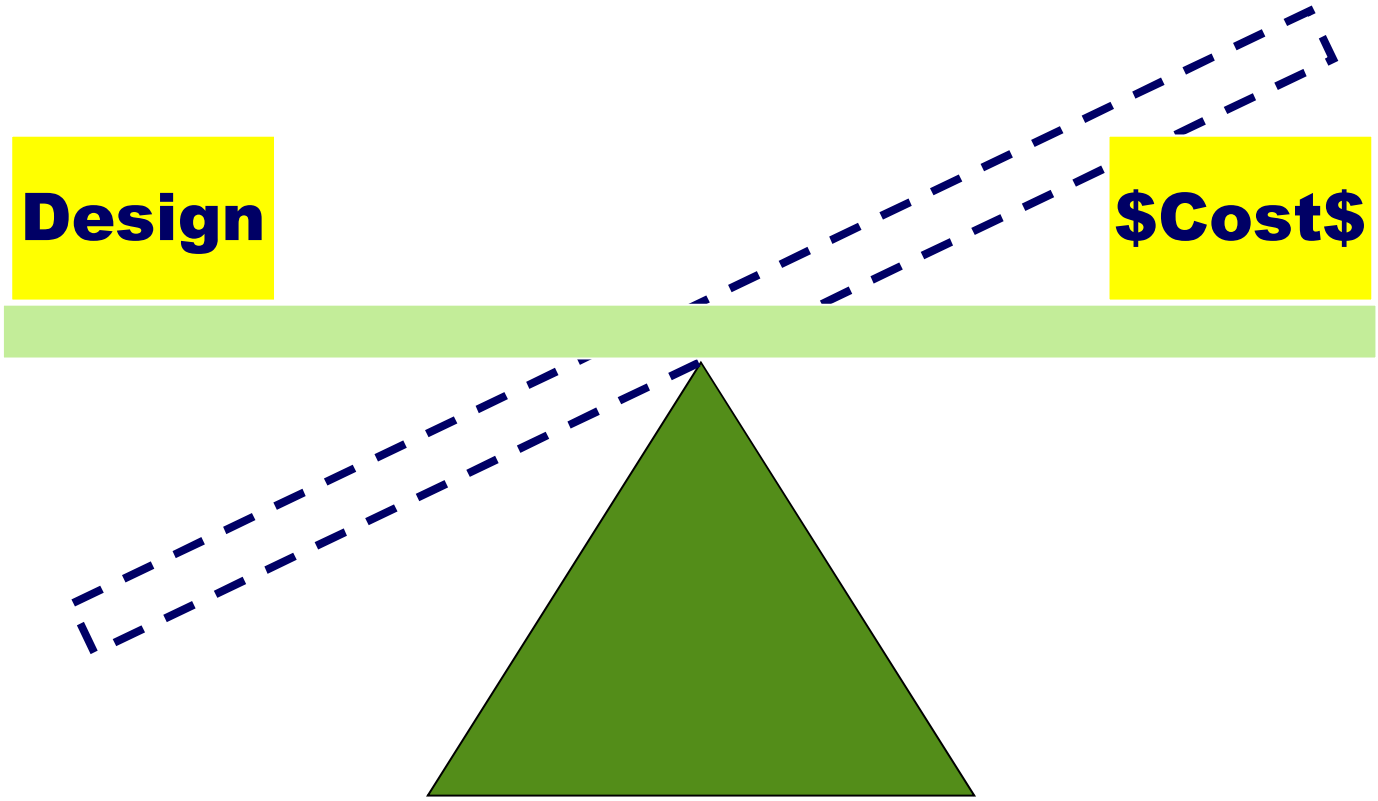
Profit

- 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

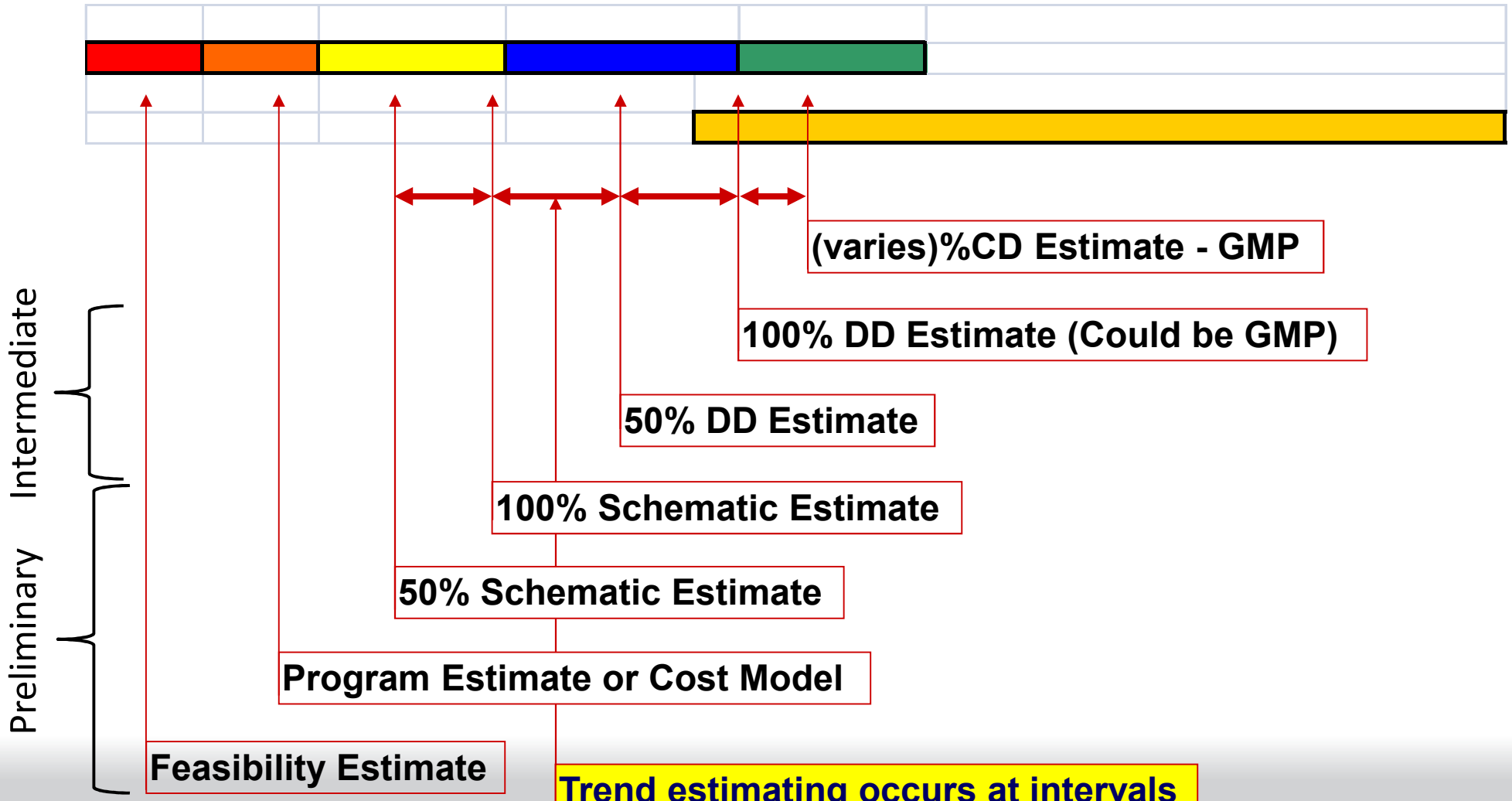
- Conceptual estimating is a key "tool" to develop and manage design
- Documentation in conceptual estimating is critical
- Must "operationalize" the numbers – they are dependent on the assumed means and methods
- Must know what the numbers represent (what's included and what's not)

Must maintain balance between design and cost throughout the design-build process



HENSEL PHELPS
Plan. Build. Manage.

Typical D-B Estimate Timeline



Trend estimating occurs at intervals between formal milestone estimates

HENSEL PHELPS
Plan. Build. Manage.

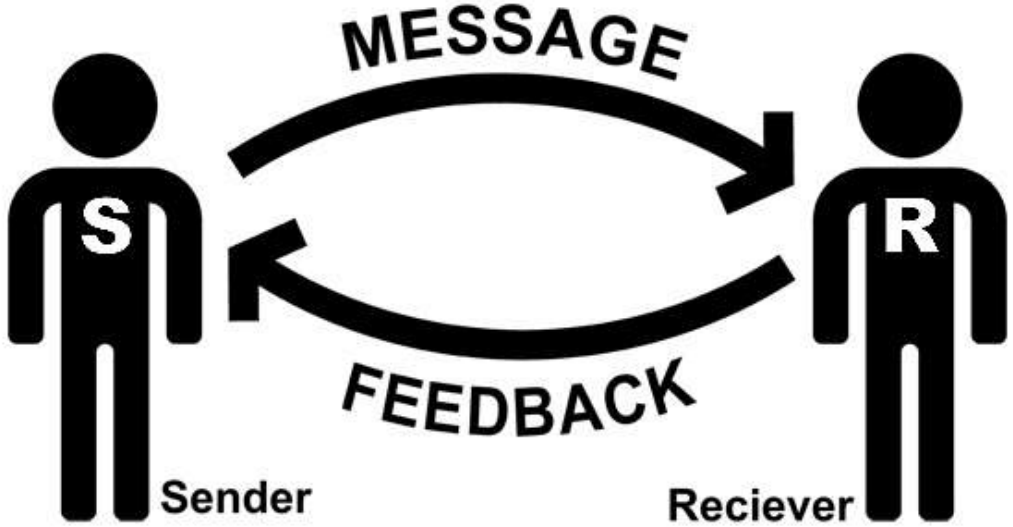
Estimating Success Requires …

- 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

HENSEL PHELPS
Plan. Build. Manage.

Estimating Success Requires …

- Thorough understanding of project scope
- Excellent communication skills
- Appropriate behavioral skills
- Interdisciplinary fluency
- TRUST in your design partners



HENSEL PHELPS
Plan. Build. Manage.

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
Plan. Build. Manage.

Critical Relationship in Design-Build

Designer

Estimator

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

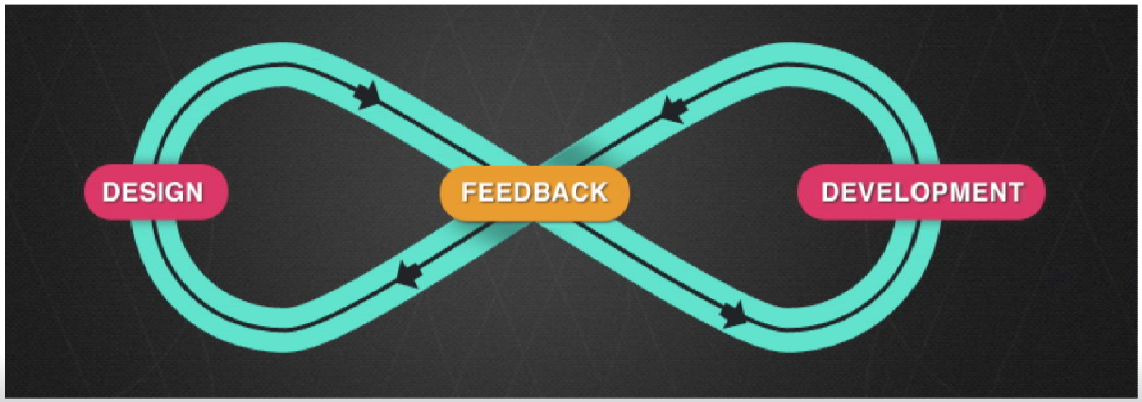
- An organized effort directed at analyzing the functions of systems, equipment, facilities, services, and supplies for the purpose of achieving the essential function at the lowest life cycle cost consistent with the required performance, reliability, quality, and safety. It occurs throughout the design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

$$\text{Value} = \frac{\text{What you get}}{\text{What you paid}}$$

HENSEL PHELPS
Plan. Build. Manage.

Design-Build Process Changes

- 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

HENSEL PHELPS
Plan. Build. Manage.

DBIA
DESIGN-BUILD
INSTITUTE OF AMERICA

AMERICAN SOCIETY OF PROFESSIONAL ESTIMATORS