



Alternative Delivery Methods for Design and Construction of Sites Project

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COMPREHENSIVE ENGINEERING, ENVIRONMENTAL, AND CONSTRUCTION SERVICES

Agenda

- Overview
- Presentation of Alternative Project Delivery Methods
- Summary

What Do We Mean by Alternative Project Delivery?

- Alternative ways to contract for design and construction services to deliver a project
- For public works projects, Design-Bid-Build (D/B/B) has been the most conventional delivery method used.
- In recent years, other delivery methods have been gaining wider acceptance.

Alternative Project Delivery Methods - - Goals and Objectives

General Project Objectives - - Project must be

- Economically viable and efficient
- Completed On-time, below budget
- Environmentally acceptable
- Sustainable
- Broadly accepted by the public



To meet the project objectives, both the Owner's and the Contractor's objectives need to be considered ...

Owner's and Contractor's Objectives.....

.... Are Sometimes Diverging

Owner's Objectives	Contractor's Objectives
■ Optimize cost	■ Maximize profits
■ Maximize quality	■ Maximize workforce efficiency
■ Early delivery	■ Meet Schedule
■ Flexibility to change	■ Receive equitable payment for changes during construction
■ Delegate risk	■ Minimize contractor risk
■ Having control of the design	■ Cover all expenditures

Common, Yet Very Important Project Risks

- Site Access - Logistics
- Subsurface Conditions
- Utility Service Interruptions
- Late Delivery of Critical Equipment
- Weather
- External Impediments
- Escalation
- Volatility of Commodity Pricing
- Labor Shortages – Skilled, Unskilled
- Intervention – Local Community Relations
- Security
- Equipment performance
- Working Hour Restrictions
- Regulatory Agency Requirements

Alternative Project Delivery Methods

1. Design/Bid/Build (D/B/B)
2. Conventional Design/Build (D/B)
3. Progressive Design/Build
4. Construction Manager at Risk (CMAR)
5. Portland Method
6. Project Alliance

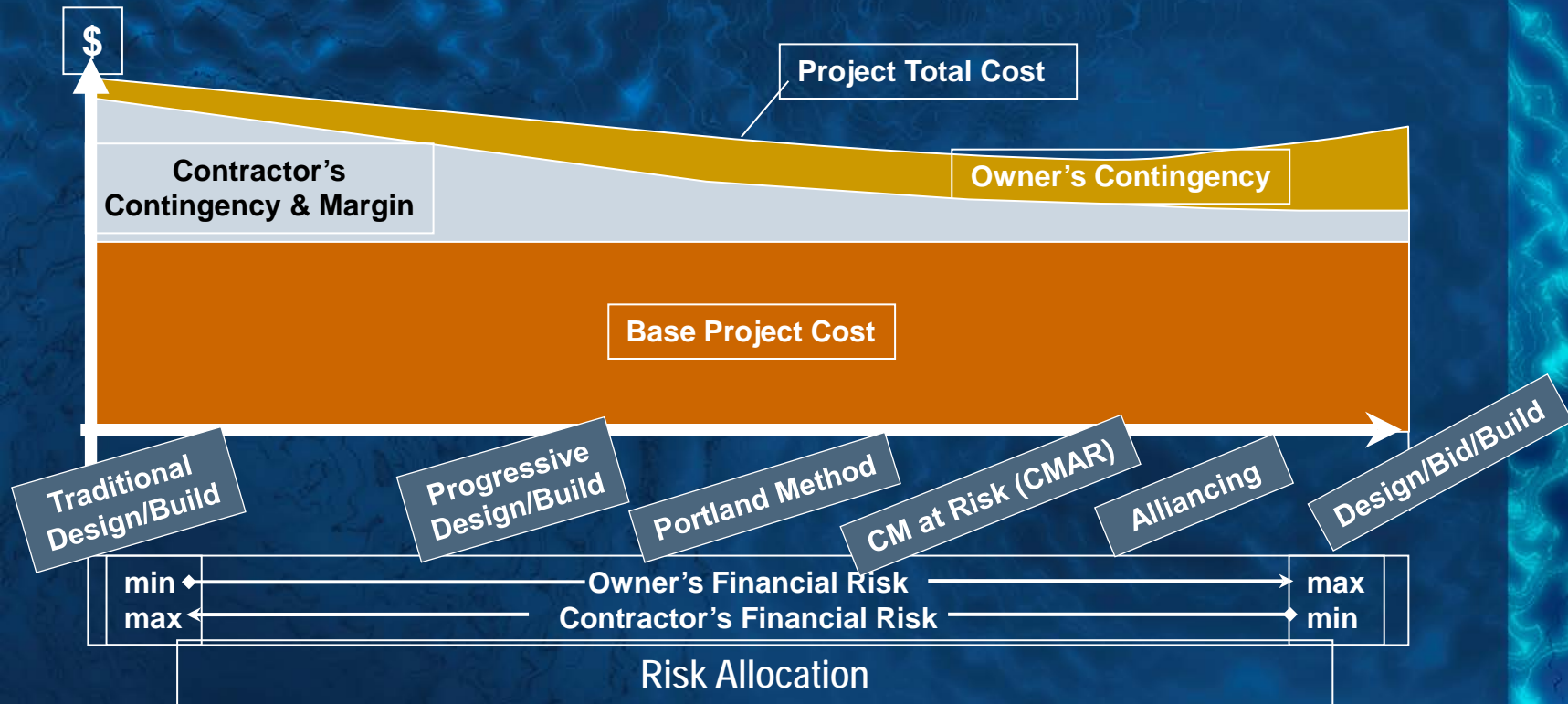


7. Early Procurement

Each of these alternatives has its own merits, and can sometimes be used in combination with each other for large multi-feature Projects .

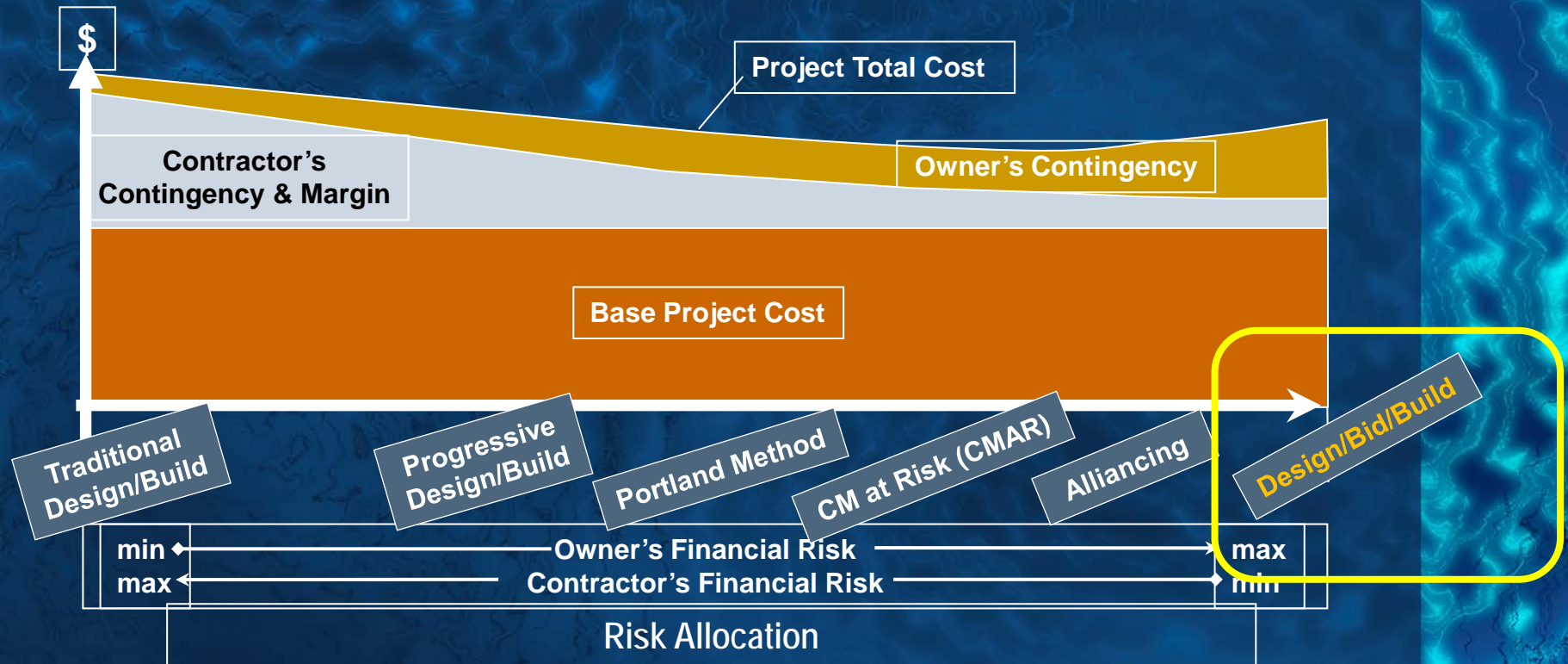
Spectrum of Owner and Contractor Risk Allocation

- Who holds the project Contingency?
- Risk extremes are "D/B" and "D-B-B"



1. Design-Bid-Build (D/B/B)

- Spectrum of options
- Spectrum of Owner and Contractor Risk Allocation (i.e. Who holds the contingency?)
- Risk extremes are "D/B" and "D-B-B"
- Owner chooses optimal cost/risk/control allocation



1. Design/Bid/Build (D/B/B)

Key Elements

- Well established, most widely used project delivery method
- Strong, proven, contractual basis
- Contractor and Owner interests are not always aligned
- Can end up being adversarial



Calaveras Dam

1. Design/Bid/Build (D/B/B)

Main Risks

Risk	Possible Result
<ul style="list-style-type: none">■ Incomplete investigations and/or inadequate design details	<ul style="list-style-type: none">■ Claims
<ul style="list-style-type: none">■ Poorly defined risk allocation	<ul style="list-style-type: none">■ Time extensions/claims
<ul style="list-style-type: none">■ Claims resolution and litigation	<ul style="list-style-type: none">■ High costs/time issues
<ul style="list-style-type: none">■ Higher risk projects	<ul style="list-style-type: none">■ Contingencies on contingencies/ owner pays a premium for same risk
<ul style="list-style-type: none">■ Longer Schedule	<ul style="list-style-type: none">■ Potential for increased uncertainty in market pricing for equipment and commodities

1. Design/Bid/Build (D/B/B)

Key Steps Needed for Managing and Mitigating Risks with D/B/B

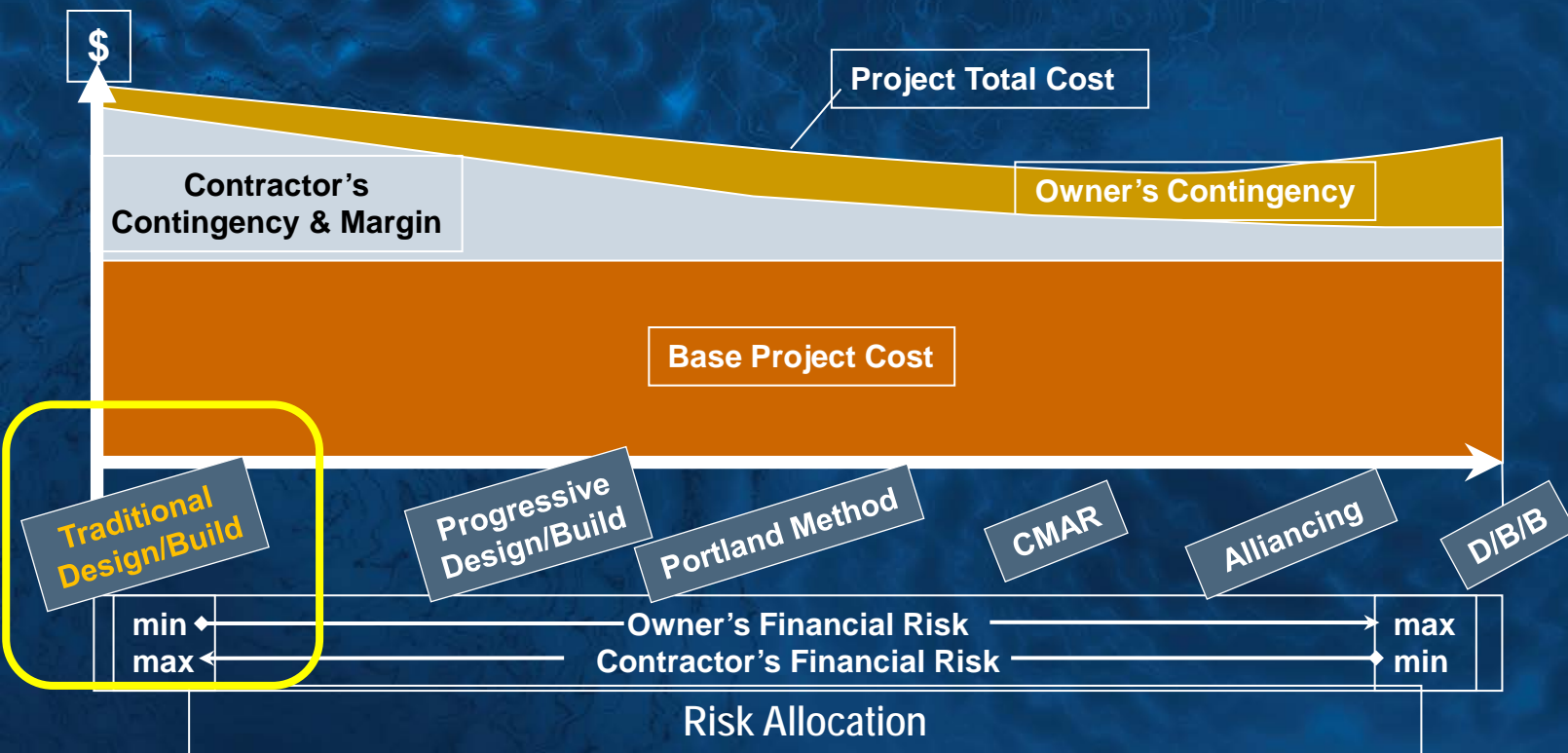
- Comprehensive site investigations
- Robust, constructible design details
- Clear definition of risk allocation in contracts
- Fair allocation of the cost of risk
- Establishment of strong partnering culture



Los Vaqueros Dam

2. Design/Build (Traditional) (D/B)

- Spectrum of options
- Spectrum of Owner and Contractor Risk Allocation (i.e. Who holds the contingency?)
- Risk extremes are "D/B" and "D-B-B"
- Owner chooses optimal cost/risk/control allocation



2. Design/Build (Traditional)

Key Elements

- Designer and contractor on the same contractor-led team to deliver a project
- Risk is allocated to contractor/designer
- Owner often has limited influence on design
- Works best where risks are well defined and schedule is limited
- Performance disappointment is not uncommon



2. Design/Build (Traditional)

Bid Phase

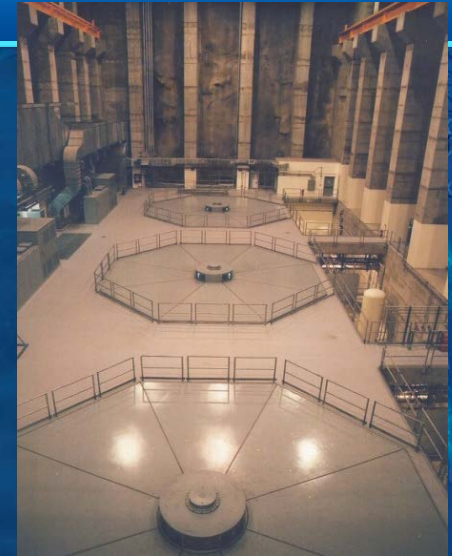
- Typically 3 designer/contractor teams are short-listed
- Design concept may not be fully developed at time of bid
- Environmental permitting process sometimes done concurrently
- Bidders usually fund up-front design work
- Limited geotechnical baseline information
- Strong inducement for cost saving innovations
- Limited time for design and bidding



2. Design/Build (Traditional) Cont.

Design Phase

- Design is typically fast-track
- High risk of data gaps with fast track geotechnical & environ. investigations
- Little time to improve the concept design
- Limited innovation because focus is typically on refining previously delivered projects
- Early constructability reviews by contractor team member
- Schedule advantages result from ability to initiate construction prior to completing all detailed designs



2. Design/Build (Traditional) Cont.

Construction Phase

- High risk of Changed Conditions
- Active designer role can help manage risk
- Contractor **allowed** to build project with limited interference by owner
- Problems must be resolved in a timely manner
- Fast paced with a strong schedule incentive
- Reduced opportunity for contractor claims against owner - - as long as Owner fulfills its obligations



2. Design/Build (Traditional) Cont.

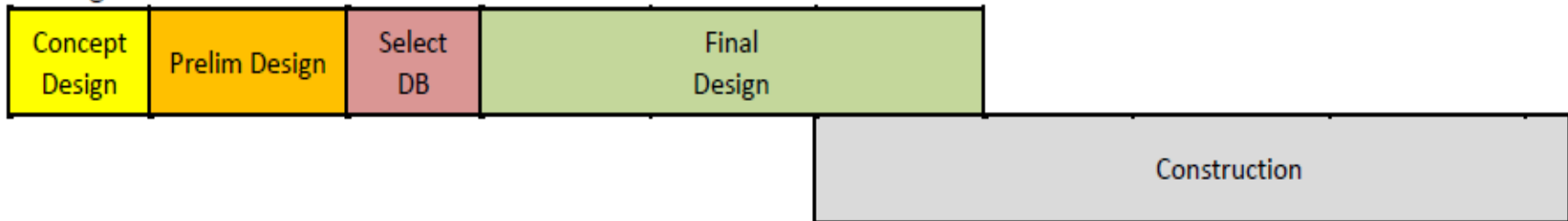
Primary Benefit of D/B Delivery is Schedule

Conceptual Comparison of DBB and DB Project Delivery Schedules

Design-Bid- Build

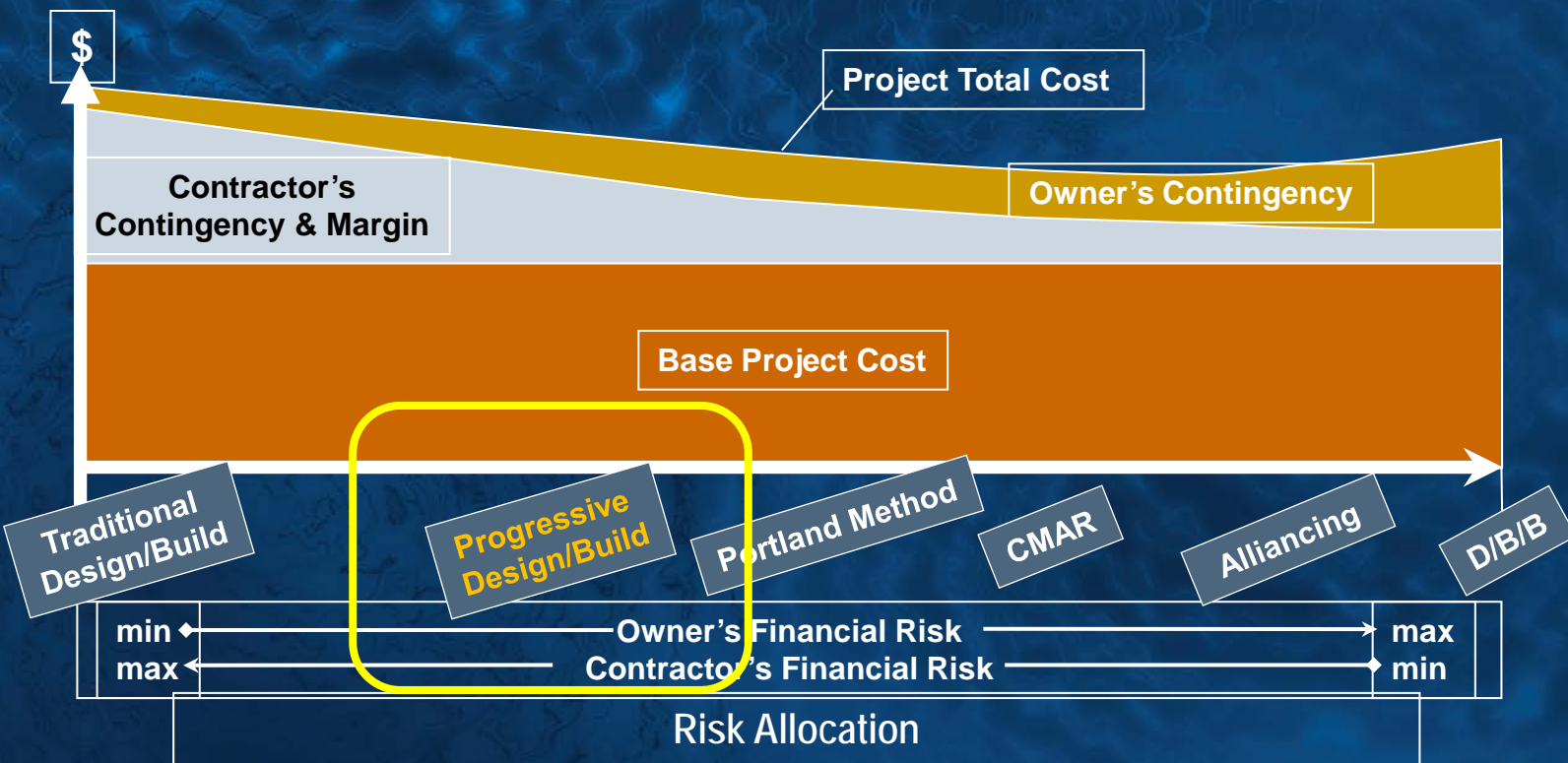


Design-Build



3. Progressive Design/Build

- Spectrum of options
- Spectrum of Owner and Contractor Risk Allocation (i.e. Who holds the contingency?)
- Risk extremes are "D/B" and "D-B-B"
- Owner chooses optimal cost/risk/control allocation



3. Progressive Design/Build

Work is Performed in a 2-Step Process

- *Step 1 – 30% Design & GMP*
- *Step 2 – Final Design and Construction*

Selecting On-Call DB Teams

- Qualification Based Shortlisting (3 to 5 Designer/ Contractor DB Teams)
- Shortlisted firms submit proposal for Step 1 (30% Design and GMP Development) Services
- Selection of Step 1 DB Team



3. Progressive Design/Build

Proposal for Step 1 - 30% Design & GMP

- Shortlisted DB Teams receive RFP
- DB Team Approach is fully presented
 - Technical Approach
 - Permitting process approach
 - Identify additional studies/geotechnical studies
 - Identify public outreach requirements
- Strong inducement for cost saving innovations and approach



3. Progressive Design/Build

Step 1 – 30% Design and Development of Guaranteed Maximum Price (GMP)

- DB Team develops 30% design, GMP, and schedule in full collaboration with Owner
- Owner has greater involvement in Design and GMP development

Step 2 – Final Design and Construction

- Design is developed for construction
- Public outreach program is implemented
- Agency, Environmental, and Construction permits obtained
- Designer assists in managing risks during construction
- Owner and DB Team collaboratively implement construction
- All work is conducted in **“open book”** manner



3. Progressive Design/Build

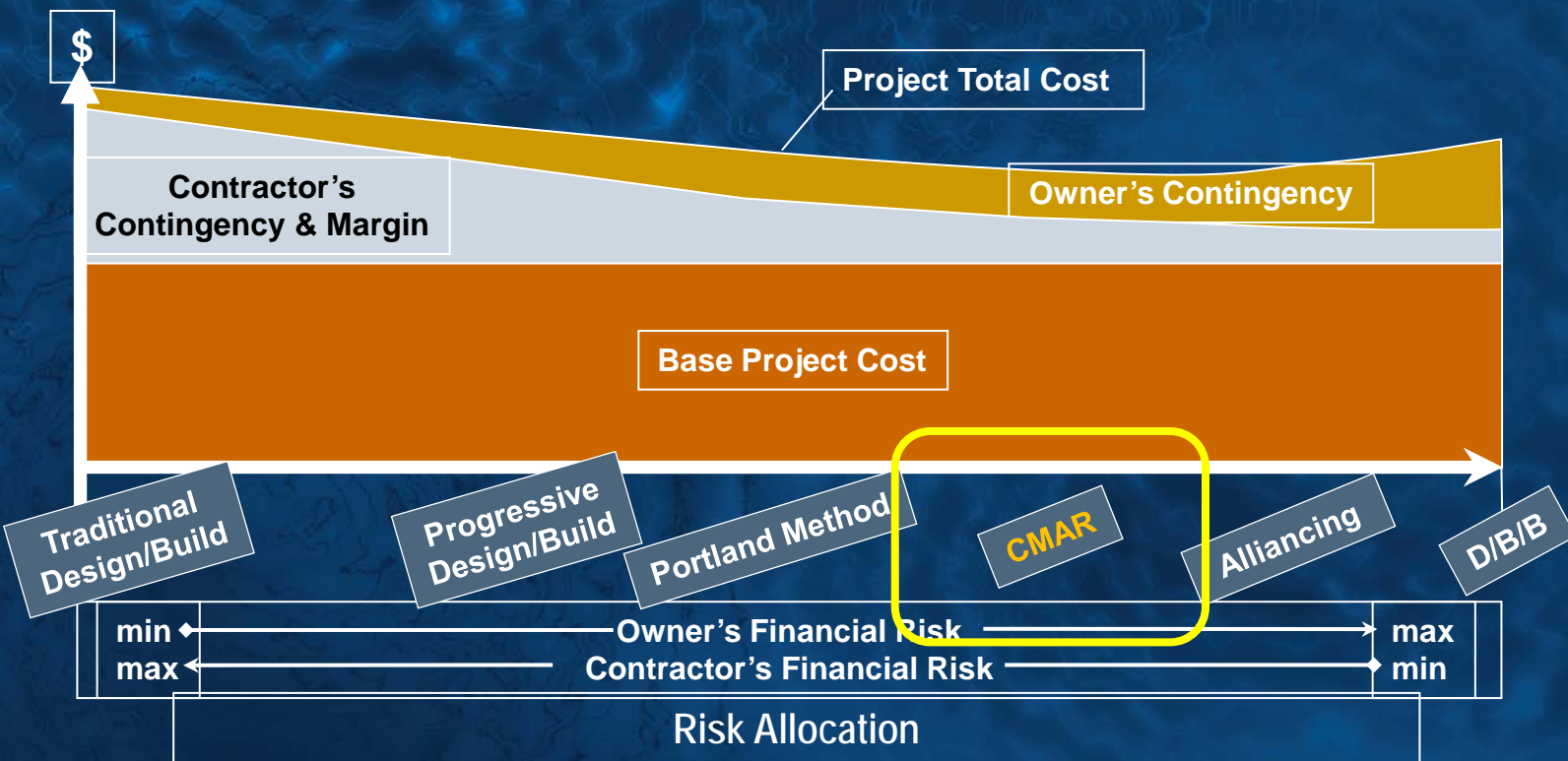
Summary

- Owner has full participation throughout the 2 step process
- Owner can modify work based on Contractors open-book costing
- Reduced opportunity for contractor claims against owner on project risks – unforeseen conditions
- Project Delivery Schedule can be reduced
- Progressive D/B fee and contingency is typically less than traditional D/B Delivery Process



4. Construction Manager at Risk (CMAR)

- Spectrum of options
- Spectrum of Owner and Contractor Risk Allocation (i.e. Who holds the contingency?)
- Risk extremes are "D/B" and "D-B-B"
- Owner chooses optimal cost/risk/control allocation



4. Construction Manager at Risk (CMAR)

- Two separate contracts (Designer and General Contractor – CMAR)
- Selection of Designer and Construction Manager is made on qualifications basis
- Project benefits from early contractor input to design and cost and development
- Owner has full control of design
- CMAR acts as general contractor
- Guaranteed maximum price (GMP) for construction typically negotiated at 60% design



4. Construction Manager at Risk (CMAR)

Typical Payment Terms In a CMAR GMP

- CM Fixed Fee/Overhead: 5%
- General Conditions: 10%
- Bid Contracts: 50%
- Estimate for Un-bid Subcontracts: 30%
- Padding ?
- Contingency 5%



4. Construction Manager at Risk (CMAR)

Benefits of CMAR Delivery Approach

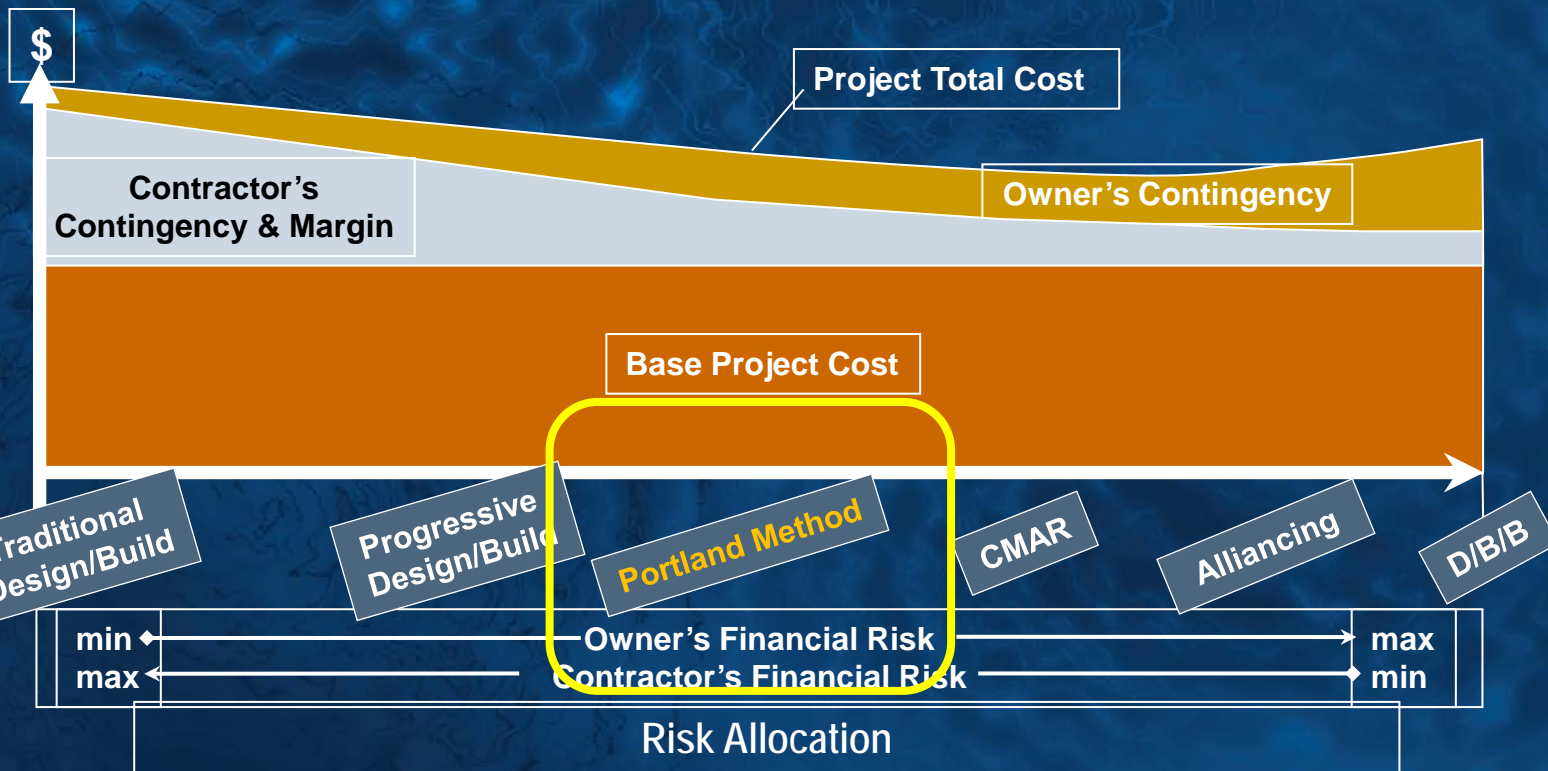
- CM is selected based on qualifications
- CM provides very useful input on constructability and cost during design
- Subcontracts are established competitively
- Portions of work can be started before design is complete
- Work is open book

Traditional Drawbacks:

- CMAR may require more oversight (and added cost) by the Owner or Designer
- CMAR controls jobsite documentation – difficult if claims arise against owner or designer
- Potential inability to agree on a GMP, with resulting delays

5. Portland Method

- Spectrum of options
- Spectrum of Owner and Contractor Risk Allocation (i.e. Who holds the contingency?)
- Risk extremes are "D/B" and "D-B-B"
- Owner chooses optimal cost/risk/control allocation



5. Portland Method

Background and History

- Developed by City of Portland BES for the Westside CSO Tunnel in 2001
- Project included:
 - 18,000 linear feet of 14-ft diameter soft ground tunnel
 - 220 MGD pump station
 - 15,000 linear feet of connecting sewers
- Project under Oregon DEQ consent order with construction to be completed by December 1, 2006
- City considered several alternative delivery systems to meet schedule including:
 - Design/Bid/Build (D/B/B)
 - Design/Build (D/B)

5. Portland Method

Background and History

Factors Considered by City in review of Delivery Options

Delivery Method	Considerations
D/B/B	<ul style="list-style-type: none">- Schedule too tight
D/B	<ul style="list-style-type: none">- Concern that Contractor contingencies would be too high- Limited ability for Owner to influence/modify design
CMAR	<ul style="list-style-type: none">- GC typically performs <10% of work - insufficient given specialty tunneling- Questioned whether differing site conditions changes are inside or outside of GMP- GMP could contain excessive contingencies- Often disputes arise as to who owns contingencies

5. Portland Method

Given tight schedule, risk, and specialty nature of the work City opted to use a modified approach (i.e. Portland Method)

- Enables contractor involvement very early in the design process
- Employs 2 forms of contract reimbursement

1. Fixed Contractor Fee

- All offsite and on-site overhead costs
- Site superintendents and management staff
- General Conditions costs
- Profit

2. Payment for cost reimbursable work

- Structured in 3 Phases
 - Phase 1 Contractor Selection
 - Phase 2 Pre-construction
 - Phase 3 Construction



5. Portland Method

Phase 1 Contractor Selection

- Designer and Contractor contract separately with Owner
- Contractor selected based on Interview and Fixed Fee Proposal
- Contractor Selection Criteria (Best Value)
 - Project Approach
 - Key Project Personnel
 - Project Management Plan
 - Approach to Partnership
 - Fixed fee proposal
 - M/W/DBE participation
 - Risk and Safety Approach
- Pre-proposal meeting
- Proposal Interview



5. Portland Method

Phase 2 Pre-Construction

- Develop “Estimate of Reimbursable Cost (ERC)” based on Engineer-developed preliminary (10-30%) design
- Provide design and constructability reviews
- Perform shared-risk assessment
 - Modify design to mitigate risk and
 - Develop contingencies for those risks that cannot be mitigated by design
- Develop and implement subcontractor procurement plan
- Develop cost control system and baseline cash flow curve
- Develop construction management systems

5. Portland Method

Phase 3 Construction

- Contractor paid for all reimbursable costs
- Contractor fee is fixed, unless material scope changes occur
- Type 1 DSCs do not constitute an increase in fee for Prime Contractor (i.e. Prime carries DSC risk)
- Type 1 DSCs are considered for Subcontractors - -Prime paid additional cost plus mark-up
- Additional fee for Prime only if:
 - Owner caused changes or if
 - Subcontractor DSC causes increase in contract time.

5. Portland Method

Advantages

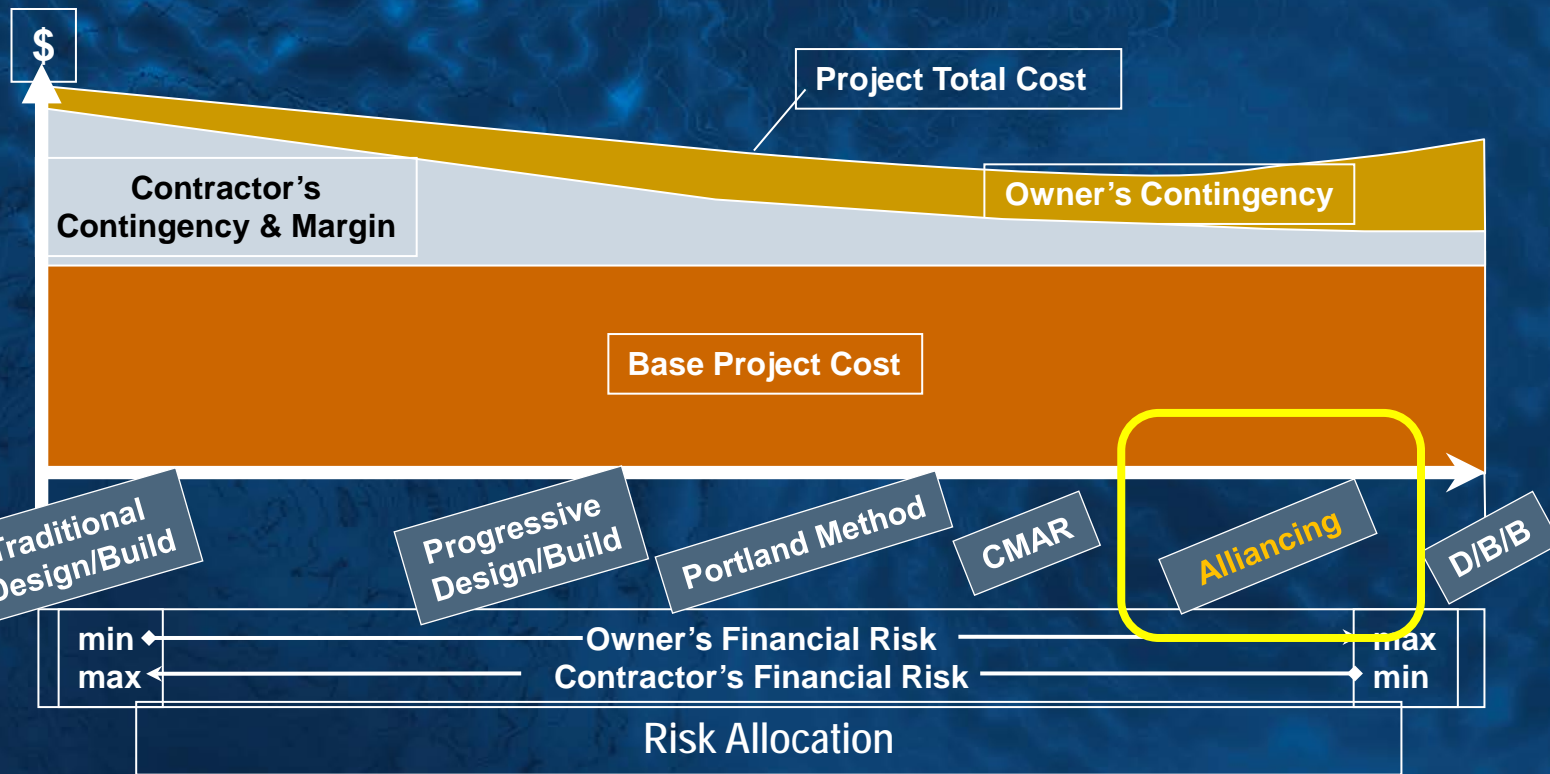
- Allows for innovation and constructability recommendations
- Owner still retains control over the design
- Fixes project cost early
- Enables fast tracking of early components (incl. major equipment purchase) prior to completion of design

Disadvantages

- Best suited to specialized work (i.e. underground work)
- Owner retains design liability and greater risk of DSCs
- Reimbursable cost approach reduces performance risk to the contractor
- No added incentive for contractor to control cost
- Method requires significant and continuous effort to monitor and audit costs

6. Project Alliance

- Spectrum of options
- Spectrum of Owner and Contractor Risk Allocation (i.e. Who holds the contingency?)
- Risk extremes are "D/B" and "D-B-B"
- Owner chooses optimal cost/risk/control allocation



6. Project Alliance

Key Elements

- Similar to a D/B contract supported by a Joint Venture of the entire team (i.e. Owner, Contractor, and Designer)
- Contractor/designer are selected by Owner based on qualifications
- Contractor/designer are paid to develop preliminary design
- Preliminary design is used as basis for developing Target Cost Estimate and Fee

6. Project Alliance

Key Elements (cont.)

- **Pain Sharing** - Contractor/designer fee and a portion of overhead are at risk if target cost is exceeded
- **Gain Sharing** - Contractor/designer share in total project savings if actual cost is less than target cost
- Collectively Responsible for:
 - Performing the work
 - Ownership for all risks



Hinze Dam

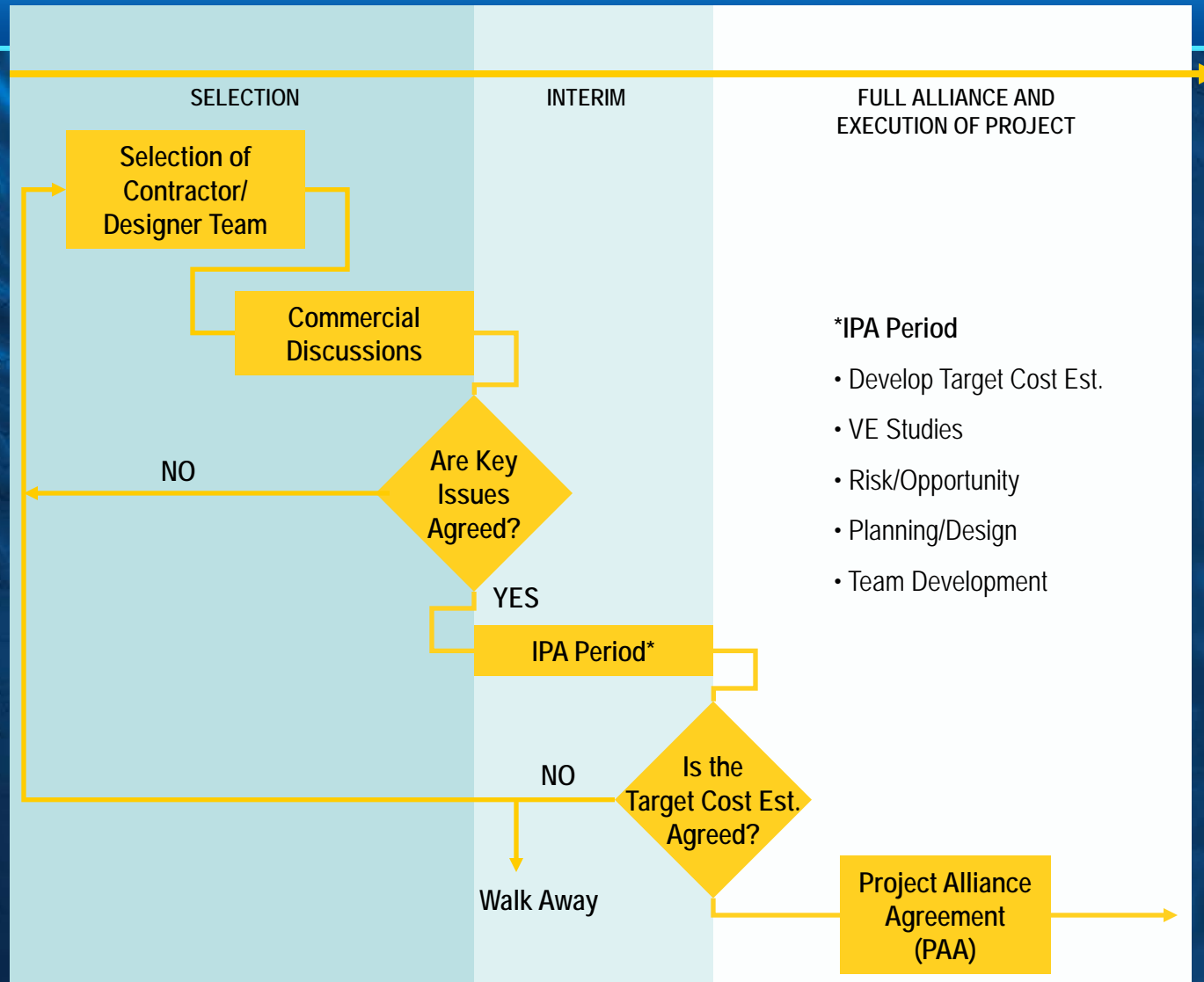
6. Project Alliance

*"All for one and
one for all"*

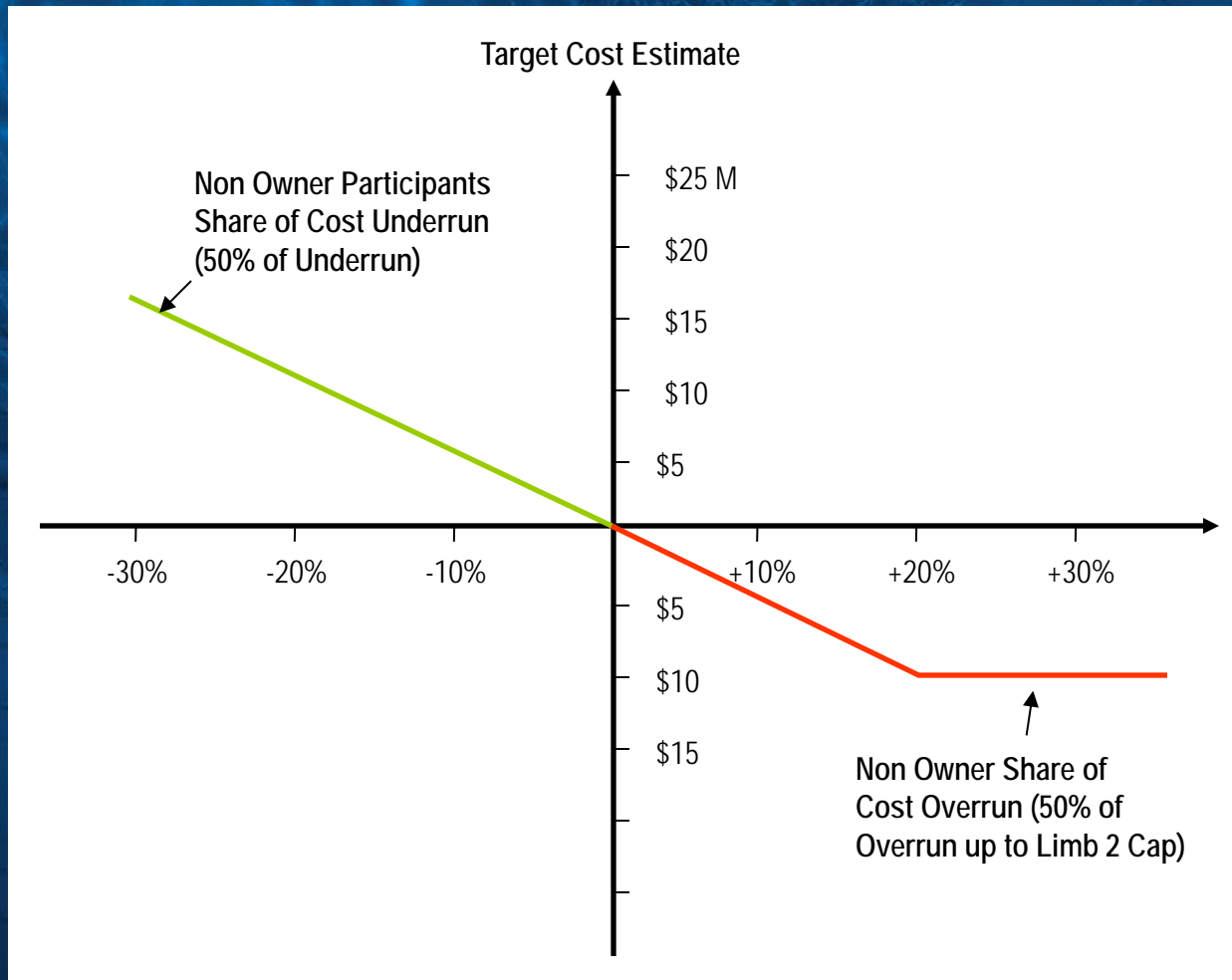
Key Elements (Cont.)

- Owner pays non-owner participants using a 3-limb "open book" model
 - Limb 1: Project costs and overhead (paid at cost)
 - Limb 2: Fee (includes H.O. overhead and profit)
 - Limb 3: An equitable share of "pain" or "gain"
- Project is governed by a Project Alliance Board (PAB)
- All decisions of PAB must be unanimous
- Day-to-day management by integrated project team
- "Best for Project" philosophy
- **No claims or litigation**

Steps Involved in Establishment of Alliance



6. Project Alliance



7. Early Procurement Contracts

- Special Contracts are often needed for early delivery of Owner-procured critical path equipment needed to meet critical path construction schedule requirements.
- Types of equipment that may require early procurement
 - Major Pumps
 - Hydro-electric generating equipment
 - Special heavy construction equipment (i.e. TBMs, etc.)
 - Other special, long-lead-time equipment

Need for early procurement is often overlooked and must be evaluated early on in design process

SUMMARY

- There are a variety of Project Delivery Methods
- Selected Delivery Method(s) must be tailored to the specific needs of project
- Most appropriate project delivery method will depend on several key factors:
 - Project size, complexity and inherent risks
 - Project-specific cost and schedule constraints
 - Need to manage risk and allocate risks fairly
 - Need to minimize and facilitate conflicts among the parties quickly as they arise
 - Best align Owner's and Contractor's objectives

Must Successfully Meet Project Objectives