Project Delivery Selection Matrix
If the Project Delivery Approach Fits, Use It

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Chris Harper - University of Colorado Boulder
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Project Delivery Selection Matrix
Water and Wastewater Projects

Design-Build Institute of America (DBIA), Rocky Mountain Region (RMR) Water/Wastewater Committee, and Construction Engineering and Management Program at the University of Colorado Boulder

- In a collaborative effort, developed the Project Delivery Selection Matrix
- Goal – owners selecting the most suitable project delivery method for successful projects
Most Common Project Delivery Methods

- Design/Bid/Build (D/B/B)
- Construction Management At-Risk (CMAR)
- Progressive Design/Build
- Prescriptive-Based Design/Build
The Spearin Doctrine

- Supreme Court – *U.S. v. Spearin* 1918
- Owner provides contractors with two specific implied warranties
  - The plans and specifications it furnishes are accurate
  - The plans and specifications are suitable for their intended purpose
- Additional time and money under the contract changes clause are the remedies
### Comparative Matrix

#### ALTERNATIVE PROJECT DELIVERY METHODOLOGY – COMPARATIVE MATRIX

<table>
<thead>
<tr>
<th>Method</th>
<th>Design/Bid/Build (D/B/B)</th>
<th>Construction Management-At-Risk (CMAR)</th>
<th>Progressive Design/Build (D/B)</th>
<th>Prescriptive-Based Design/Build (D/B)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tool / Elements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legislative / Regulatory</td>
<td>ALLOWED</td>
<td>ALLOWED</td>
<td>ALLOWED</td>
<td>ALLOWED</td>
</tr>
<tr>
<td>State of Colorado</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection Process</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qualifications-Based</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Price-Based</td>
<td>YES</td>
<td>POSSIBLE - BEST VALUE</td>
<td>POSSIBLE</td>
<td>YES</td>
</tr>
<tr>
<td>Pre-Selection</td>
<td>POSSIBLE AS A VARIATION</td>
<td>POSSIBLE</td>
<td>POSSIBLE</td>
<td>POSSIBLE</td>
</tr>
<tr>
<td>Pre-Purchase (by Owner)</td>
<td>POSSIBLE AS A VARIATION</td>
<td>POSSIBLE</td>
<td>POSSIBLE</td>
<td>POSSIBLE</td>
</tr>
<tr>
<td>Pre-Purchase (by Contractor)</td>
<td>NO</td>
<td>POSSIBLE</td>
<td>POSSIBLE</td>
<td>POSSIBLE</td>
</tr>
<tr>
<td>Pre-Qualification</td>
<td></td>
<td>RECOMMENDED FOR CMAR</td>
<td>RECOMMENDED FOR D/B TEAM</td>
<td>RECOMMENDED FOR D/B TEAM</td>
</tr>
<tr>
<td>General Contractors</td>
<td>POSSIBLE AS A VARIATION</td>
<td></td>
<td>RECOMMENDED FOR KEY EQUIPMENT</td>
<td>RECOMMENDED FOR KEY EQUIPMENT</td>
</tr>
<tr>
<td>Subcontractors</td>
<td>POSSIBLE FOR MAJOR</td>
<td></td>
<td>RECOMMENDED FOR KEY EQUIPMENT</td>
<td>RECOMMENDED FOR KEY EQUIPMENT</td>
</tr>
<tr>
<td>Suppliers</td>
<td>POSSIBLE AS A VARIATION</td>
<td></td>
<td>RECOMMENDED FOR KEY EQUIPMENT</td>
<td>POSSIBLE FOR KEY EQUIPMENT</td>
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<tr>
<td>Multiple Contracts</td>
<td>POSSIBLE AS A VARIATION</td>
<td></td>
<td>NOT LIKELY</td>
<td>NOT LIKELY</td>
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<tr>
<td>Multiple Phases</td>
<td>NOT WELL SUITED</td>
<td></td>
<td>NOT LIKELY</td>
<td>NOT LIKELY</td>
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<tr>
<td>Incentives</td>
<td>POSSIBLE</td>
<td></td>
<td>POSSIBLE</td>
<td>POSSIBLE</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contractor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subconsultants</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subcontractors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### General Description

**Design/Bid/Build (D/B/B):** A project delivery method where the owner selects an engineer to design and develop construction documents, from which the owner solicits lump sum bids. Selection is based on the lowest responsive bid, and the contractor serves as a single point of responsibility for construction. The owner procurement rules allow some variations to the "traditional" design/bid/build project delivery method in order to increase level of "control" of certain project elements, if desired. Options include potential pre-qualification of contractors and/or specific suppliers, pre-selection and/or pre-purchase of selected equipment, or other non-standard variations. Selection is based on the lowest responsive bid and the contractor serves as a single point of responsibility for construction.

**Construction Management-At-Risk (CMAR):** A project delivery method where the construction manager serves as the general contractor providing pre-construction and construction services, while the engineer completes design under a separate contract, with the intent of promoting enhanced collaboration between all parties during design development. Qualification-based selection (QBS) of the CMAR or CM/GC is typically done early in the design process. If no acceptable GMP is reached, the owner still maintains the option to bid out the construction work.

**Progressive Design/Build (D/B):** A project delivery method that uses a qualifications-based selection (QBS, often with a proposed fee structure) similar to CMAR or CM/GC, but combines separate design and construction procurements into one procurement and selection of a single-contract design/build entity. Once selected, design commences and a construction estimate is "progressively" developed in an open-book format until a price can be agreed upon between the design builder and owner. If no acceptable GMP or Stipulated Price is reached, the owner still maintains the option to bid out the construction work.

**Prescriptive-Based Design/Build (D/B):** A project delivery method that typically uses a two-step procurement process, requiring short-listed design/builders to propose lump sum solutions based on the owner’s specifications and project concept, usually using a design developed by others provided in the RFP. The selected design-builder works under a single contract and is required to deliver a facility that meets the owner’s specifications at the proposed price.

#### ALTERNATE TERMINOLOGY

- Competitive Bidding or Hard Bid
- Construction Manager / General Contractor
- Lump Sum Design/Build, Engine-Procure-Construct (EPC)

#### Pricing Structure

<table>
<thead>
<tr>
<th>Method</th>
<th>Fixed Bid Price (Lump Sum)</th>
<th>Negotiated GMP</th>
<th>Negotiated GMP or Stipulated Price</th>
<th>Fixed Price (Lump Sum)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ALLOWED</td>
<td>ALLOWED</td>
<td>ALLOWED</td>
<td>ALLOWED</td>
</tr>
</tbody>
</table>

#### Contractual Relationship

- **Contractual Relationship**
- **Working Relationship**
Project Delivery Selection Matrix (PDSM)
Need for Project Delivery Selection Tool

- To provide for a risk-based, objective project delivery selection approach
- To eliminate arbitrary decisions regarding project delivery methods
- To provide support and justification of the decision
- To use ratepayer funds efficiently
How the PDSM Works

Develop project description checklist and project goals

Evaluate criteria and associated sub-criteria

1. Level of Design
   - O&M considerations
   - Sustainability
   - Level of owner control
   - Project quality,
   - Owner resources
How the PDSM Works

Evaluate criteria and associated sub-criteria

2. Schedule
   • Implementation schedule
   • Construction & operation flexibility

3. Cost
   • Cost competitiveness
   • Cash flow, cost certainty,
   • Market & industry variability
How the PDSM Works

Evaluate criteria and associated sub-criteria

4. Risk allocation
   • Project size & complexity
   • Impact on public
   • Legislative & legal
   • Risk allocation
   • Regulatory compliance
   • ROW & environmental permitting control
# PDSM

<table>
<thead>
<tr>
<th>Level of Design</th>
<th>DBB</th>
<th>CMAR</th>
<th>Progressive DB</th>
<th>Prescriptive DB</th>
</tr>
</thead>
<tbody>
<tr>
<td>O&amp;M Considerations</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Sustainability</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Level of Owner Control</td>
<td>+</td>
<td>++</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Project Quality</td>
<td>+</td>
<td>+</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Owner/Resources Gregarious</td>
<td>-</td>
<td>-</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Implementation Schedule</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Construction &amp; Operational Flexiblity</td>
<td>-</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Cost Competitiveness</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cash Flow</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cost Certainty</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Market &amp; Industry Viability</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Project Size &amp; Complexity</td>
<td>+</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Impact on Public</td>
<td>+</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Legislative &amp; Legal</td>
<td>++</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Risk Allocation</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>++</td>
</tr>
<tr>
<td>Regulatory Compliance</td>
<td>+</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Right of Way &amp; Environmental Permitting Control</td>
<td>+</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
</tbody>
</table>

## Summary Matrix

<table>
<thead>
<tr>
<th>Final Project Delivery Selection</th>
<th>DBB</th>
<th>CMAR</th>
<th>Progressive DB</th>
<th>Prescriptive DB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
</tbody>
</table>
## PDSM

<table>
<thead>
<tr>
<th></th>
<th>NA: Not applicable</th>
<th>- : Least appropriate</th>
<th>+ : Appropriate</th>
<th>+ + : Most appropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>X</strong>: Fatal flaw</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Summary Matrix</strong></td>
<td></td>
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</tr>
<tr>
<td>DBB</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>CMAR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progressive DB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prescriptive DB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Level of Design</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O&amp;M Considerations</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
What is the result?

Project Delivery Decision Report

Opportunities/Obstacles

Primary Models Considered

Project Goals

Project Description
What are the Benefits of using the PDSM?

• Provides defensible project delivery method decision

• Promotes a better understanding of project goals, risks and opportunities

• Educates team members on alternative delivery methods

• Promotes organizational learning for owners, designers, and builders
W/WW Project Delivery Selection Matrix

Objective
The Design Build Institute of America Rocky Mountain Region (DBIA RMR) Water/Wastewater Committee found a growing need to identify which project delivery method should be used on water and wastewater construction projects. The idea generated the belief that each project is unique and there is no one-size-fits-all delivery method. The goal of DBIA RMR Water/Wastewater Committee was to develop a project delivery selection matrix (PDSSM) for owners to use when selecting between design-build, construction management at risk, and design-build delivery methods. The outcome of the PDSSM is an objective project delivery selection report that documents the key decision and communicates it to the project stakeholders.

Tools
The DBIA RMR Water/Wastewater Committee, with the help of a research team from the University of Colorado Boulder, has developed two versions of the selection tool; one which can be used to facilitate a ½ day workshop with key team members and one that can be done in a few hours each week for decision-makers. Before using either of these tools, please download and read the background documents.

These background documents define specific terms and provide a basis of understanding of delivery methods which is helpful when using the PDSSM tools found below.

External Resources
For additional assistance, the following links are provided:
- DBIA Rocky Mountain Region
- DBIA National
- Water Design Build Council

Facilitated Project Delivery Selection Matrix
Benefits: Provides more detail, serves as the basis for a team workshop, creates alignment amongst team members
Restrictions: Requires more knowledge to facilitate tool

Abridged Project Delivery Selection Matrix
Benefits: Can be performed by one person, ideal for smaller utilities, fewer hours to complete
Restrictions: Does not provide as much information, does not
### Facilitated Project Delivery Selection Matrix

**Benefits:** Provide more detail, serves as the basis for a team workshop, creates alignment amongst team members.

**Restrictions:** Requires more knowledge to facilitate, takes more time to complete.

**Estimated Time:** 4 hours

**Documents to download:** Introduction Documents and Full Project Delivery Selection Matrix.

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### Abridged Project Delivery Selection Matrix

**Benefits:** Can be performed by one person, ideal for smaller utilities, shorter time to complete.

**Restrictions:** Does not provide as much justification, does not create team alignment.

**Estimated Time:** 1 hour

**Document to download:** Abridged Project Delivery Selection Matrix.

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**Note:** It is recommended to use a facilitator when performing this project delivery selection matrix. Facilitators can be contracted below.

Keith Mekoner: Keith.mekoner@colorado.edu
Jodie Wilmot: jodie.wilmot@weld.rr.com
Jim Maloney: jim.maloney@govtech.doc.ca.au

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Abridged Project Delivery Selection Matrix
Water & Wastewater
Tutorial
Owner’s Experience

Previous experience with DB

- Water Treatment Facility $42M
- Wastewater Treatment Improvements $23M
- Pipeline $17M
- Shooting Range Facility $2.85M

Project Test Case for PDSM

- Wastewater Treatment Improvements $30-M

Contact: Larry Wyeno, P.E.
303-651-8628
larry.wyeno@ci.longmont.co.us
RESOURCES

Design-Build Institute of America
www.dbia.org

The Municipal Water and Wastewater Design-Build Handbook

Water Design-Build Council
www.waterdesignbuild.com

W/WW Project Delivery Selection Matrix
dbiarmc.colorado.edu
CONTACTS

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Questions?