Alternative Delivery Methods for Construction Projects

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Presenter
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Outline of Presentation

• Background
• Capital Project Goals and Considerations
• Capital Project Delivery Methods
• Implementing a Capital Project – A Case Study
• Summary and Conclusions
Acknowledgements

- Manitowoc Public Utilities Commission
- American Water Works Association
- The Evolving Water Utility Publication
- CDM Smith Consulting Engineers
BACKGROUND
America’s Infrastructure – D

- Aviation: D
- Bridges: C
- Dams: D
- Drinking Water: D-
- Energy: D+
- Hazardous Waste: D

Source: American Society of Civil Engineers
America’s Infrastructure – D

- Solid Waste: C+
- Transit: D
- Wastewater: D-
- OVERALL – GPA: D

5 year Estimated Need - 2.2 Trillion

- Drinking Water Shortfall – $11 billion

Source: American Society of Civil Engineers
Figure 1: Percent of Cities “Better Able/Less Able” to Meet Financial Needs in FY 2010
Background

- Gap between needs and revenues will continue to grow over the next decade.
- More pressure on local and regional governing bodies
- Need to be smart about investing to avoid cannibalizing generations of infrastructure investment in the U.S. & avoid crises
CAPITAL PROJECT GOALS AND CONSIDERATIONS
Project Delivery Options

Traditional Delivery

- **Design-Bid-Build (DBB)**
  - Owner
  - Designer
  - Builder

- **Construction Management at Risk (CMAR)**
  - Owner
  - Designer
  - CM
  - Local Subconsultants
  - Local Subcontractors

Alternative Delivery

- **“Progressive” Design-Build (GMP)**
  - Owner
  - Design/Builder
  - Local Subconsultants/Subcontractors

- **Fixed Price Design-Build (FP)**
  - Owner
  - Design/Builder

- **Design-Build-Operate/Finance, etc.**
  - Owner
  - Design/Builder
  - Operator
Goals for Capital Projects

- Quality of the designed and constructed project
- Life cycle costs
- Effective and efficient O & M
- Project schedule
- Meet regulatory requirements
Key Considerations

• Degree of Utility control
  – Integration of expertise

• Legal Authority
  – Law varies state by state

• Risk Management
  – Performance requirements
  – Permitting
  – Site conditions

• Internal and External Influences
  – Philosophical beliefs
  – Influences/politics
Key Considerations

- Utility Experience
  - Comfort level
  - Motivation
  - Expertise/experience
- Schedule
  - Driver
- Costs
  - Lowest life cycle costs
  - Future expansion
- Public or Private Utility
  - Flexibility
CAPITAL PROJECT DELIVERY METHODS
Project Delivery Options

Traditional Delivery

<table>
<thead>
<tr>
<th>Design-Bid-Build (DBB)</th>
<th>Construction Management at Risk (CMAR)</th>
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<tbody>
<tr>
<td>Owner</td>
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</table>

Alternative Delivery
Design-Bid-Build

• Advantages
  – Decades of successful use by utilities
  – Well understood and accepted

• Disadvantages
  – Does not integrate design, construction, and operations
  – Growing concern on low bid contractor
  – Overhead burden (i.e., 30-40%)
  – Change order process cumbersome
  – Life cycle costs
Factors for Alternative Methods

- Private enterprise actively promoting alternative methods
  - Lower costs
  - Faster schedule
- Capabilities of utilities employees
- Concern on low bid quality
- Flexibility in state laws
Design-Build (DB) Methods

• Perceived Benefits
  – A single point of responsibility for design and construction teams
  – Reduced administrative burden for the owner
  – Improved scheduling
  – Potential for savings in capital costs
  – Reduced claims and disputes
Design-Build Methods (cont’d)

• Perceived Challenges
  – Faster and cheaper - project quality
  – Less influence over the project’s outcome
  – The design-build team assumes greater risk
  – The procurement process is more complicated
  – Motivation to make a profit could influence equipment and long-term maintenance
# Design-Build Fixed Price

## Advantages to Owner

- Construction cost is known at the time of initial contract signing
- Technical scope is proposed and can be evaluated with proposals and weighed against cost factors
- Shortest schedule for actual delivery *once contract awarded*
- Procurement documents can define key Owner criteria and features to be included

## Disadvantages to Owner

- Work with multiple designers: one with design/builder; one for procurement development
- Can be expensive and protracted procurement process
- Stipend oftentimes needed to offset significant investment cost to proposers
- Scope as proposed is usually different than scope anticipated
- Limited participation in scope advancement without triggering change orders
Top 10 Strategies for DB

1. Involve key stakeholders early in process
2. Choose the qualified people you want to work with
3. Consider the approach presented by the potential design-builder
4. Establish a decision-making process for the project to promote rapid decision-making
5. Senior management (designer-builder and owner) to meet regularly to review project status and issues
Top 10 Strategies for DB

6. Jointly address permitting issues, track them and press agencies for action

7. Manage land acquisition as early as possible, including in particular, construction easements

8. Communicate capital availability and constraints so they can be integrated into execution plan

9. Incent the project results you wish to accomplish

10. Celebrate interim success milestones
IMPLEMENTING A CAPITAL PROJECT - A CASE STUDY

MANITOWOC, WISCONSIN, USA
A Case Study

- 80 miles North of Milwaukee
- 40 miles South of Green Bay
The Project

• History
  – Central Brown County Water Authority (CBCWA) formed in 1999 to combine efforts to tackle water problems
  – CBCWA communities on groundwater wells
  – St. Peter Sandstone aquifer cannot meet demands for the CBCWA
  – Most CBCWA wells did not meet EPA standards for radium
  – CBCWA must meet EPA radium standards by December 2006

• Options Considered
  – Sign a long-term contract with the City of Green Bay to buy water from Green Bay for use by its municipal members
  – Construct and operate an independent Lake Michigan water supply system
  – Purchase water from Manitowoc Public Utilities
The Project

- Raw water – 48-inch intake & 25 MGD pump station expandable to 40 MGD

- Water treatment plant – 25 MGD submerged microfiltration technology (CMF-S)

- 3 MG finished water reservoir and 25 MGD pump station

- 65-mile transmission main from MPU water treatment plant to serve six communities
The Project

Manitowoc Public Utilities
Route of Proposed Transmission Main

Route of "Loop System"

Route of 48" Transmission Main
## Capital Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>COSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2200 LF New Intake</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>New Raw Water Pump Station</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>Existing Raw Water Pump Station Modifications</td>
<td>$415,000</td>
</tr>
<tr>
<td>New Raw Water Main and Strainer Building</td>
<td>$734,000</td>
</tr>
<tr>
<td>Water Treatment Plant Modifications</td>
<td>$15,000,000</td>
</tr>
<tr>
<td>Membrane Testing</td>
<td>$200,000</td>
</tr>
<tr>
<td>3 MG Reservoir and Pump Station</td>
<td>$5,000,000</td>
</tr>
<tr>
<td>Transmission Main from MPU to Brown County</td>
<td>$57,750,000</td>
</tr>
<tr>
<td>Pressure Reducing/Increasing Station</td>
<td>$3,200,000</td>
</tr>
<tr>
<td>CBCWA Finished Water System</td>
<td>$34,500,000</td>
</tr>
<tr>
<td><strong>Total Capital</strong></td>
<td><strong>$121,799,000</strong></td>
</tr>
</tbody>
</table>
Project Schedule

- October 2003: CBCWA executed an agreement to initiate good faith discussions for purchase of water from MPU

- February 2004: CBCWA accepts MPU offer to sell water

- July 2004: Approval and execution of agreement

- December 2006: Water to be delivered to CBCWA
Implementation Plan
Communication
Project Management

- Monitoring project progress versus project baseline
  - Schedule
  - Budget
- Identifying deviations between progress and baseline
- Causes for deviation:
  - Regulatory
  - Unforeseen site conditions
  - Internal
  - Contractor
  - Consultant
- Taking action to correct deviations
The Projects

• MPU responsibility:
  – Capital Costs: $27 million
  – Lake Intake – 60 inch
  – 28 MGD - Raw Water Pump Station
  – 3 MG - Reservoir
  – 25 MGD - Finished Water Pump Station
  – 25 MGD - Membrane Plant
  – Two years from conception to completion

• CBCWA – 65 miles transmission
Enhanced Design Bid Build

- Hired an employee with construction experience
- Internal champion to guide process
- Clearly defined and documented goals and objectives
- Operator involvement
- Communication plan w/decision making process
- Evaluate life cycle costs of equipment
- Risk allocation between MPU, manufacturer and contractor
- 18 Equipment contracts & 3 General Contractors
- MPU coordinator!
Raw Water Lake Intake
Finished Water Pump Station
Submerged Microfiltration
Enhanced Design Bid Build

• Strategies for Success
  – Experienced project/site coordinator – not a consultant
  – Weekly Meetings
  – Recognize coordination issues
  – Understand warranty implications
  – Accept the life-cycle costs approach
  – Lower cost
  – Streamlined decision making process
SUMMARY AND CONCLUSIONS
Summary

• Gap between needs and revenues will continue to grow over the next decade
• Utilities need to look at alternatives for construction projects – stretch the $$
• No single project delivery method is best for every utility
• Maximize synergy among designer, manufacturer, contractor and utility
Summary

• Consider & Evaluate alternative capital projects delivery methods –
  – Understand the risks and rewards
  – Involve the stakeholders
  – Define goals and objectives

• No single capital project delivery method for all utilities

• Regulations and laws differ by state

• Enhanced Design, bid, build – best of both worlds – MPU approach
QUESTIONS