ALTERNATIVE PROCUREMENT & CONTRACTING FOR MEGAPROJECTS

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- Past President, American Underground Construction Assoc.
- Previously Chair of 2 ITA Working Groups (13 and 20)
- U.C. Berkeley M.Sc.; University of Sydney B.E. (Hons).
- 50 years experience in the management of complex, highway, transit and transportation programs involving earth and rock tunnels, underground stations, bridges, buildings, historic structures.
- Contracting and delivery methods using design-bid-build, design-build, CMGC and, in the future, alliancing.
- Management of cost and risk, development of WSDOT’s Cost Estimate Validation process (CEVP®), book chapters / publications
- Partnering & Team-Alignment implementation.
- Initiation, management and member of high-level Expert Panels
- Author of over 75 papers & presentations.
- Your friend and advocate…….
Presentation covers:

1. Megaprojects – characteristics
   - Key goals & objectives, supporting processes
   - The importance of people & Team Alignment
2. Contracting Methodologies – basic North American
   - Design-Bid-Build, Design-Build
3. Changes, initiatives (International, US)
4. Contracting Methodologies – alternatives, benefits
   - CMGC, Relationship Contracting, Alliancing
5. Summary / Conclusions / Examples
   - Sydney Northside Tunnel (Cost savings, Alliancing)
   - Alaskan Way, (Strategy, DB) – today, RETC 2011
   - Lake Mead, Nevada (Relationship, DB)
   - Green Line Extension Boston (Flexibility, CM/GC)
   - Sound Transit, Northlink, current ST initiatives for better contracting and delivery (Dick Sage)

Presentation is based on:

- Megaprojects management consulting
- Strategic management & technical assistance
- Expert Review Panels & discussions 1996-2013
- WSDOT report to the Legislature 2005-2008
- LACMTA - report on Westside Delivery 2012
- MBTA Green Line CMGC determination (TCRP-131)
Management - Megaprojects

Characteristics of Megaprojects (*)

- Very large - multiple billions $$
- High level of public involvement and scrutiny
- Multiple stakeholders and interest groups
- Federal level involvement
- Extended schedule – multiple political cycles
- Complex and/or unusual in one, usually many, respects
- Multiple contractors/sub-contractors/suppliers
- Complex risk structure – interdependent risk events
- We need to “step up our game” for megaprojects
- We need different procedures than for routine projects

(*) See “Gigaprojects”, ed. Galloway, Nielsen & Dignum
Thinking about Megaprojects

Issues, Delivery of Megaprojects

Planning, management, design, contracting and construction of complex projects is difficult

– Many projects have had major problems
– Some reasons common to all locations
– Other reasons are specific to one location
– How to categorize the differences?

LA Metro, 1990’s

Boston Central Artery 1990’s
The Importance of People

Peter Drucker, “Management”, 1973, preface xiii

Management is tasks
Management is discipline
But, management is people.

- Every achievement is the achievement of a manager
- Every failure is the failure of a manager
- People manage rather than “forces” or “facts”
- The vision, dedication and integrity of managers determines whether there is (effective) management….

Megaprojects, fundamental requirements

We need to have the Public’s understanding and acceptance of the project
- “buy-in”, support, funding, resilience for problems, this relates to:

  - Political strategy – stakeholders, key goals, public process, support
  - Funding – approval, availability + stability (deal with political changes)
  - Ability to determine a realistic budget and schedule (CEVP®)
  - Ability to meet realistic budget and schedule (management tools)
  - Alignment of Agency/designer/contractor
  - Good communication, media
Relationships are critical

- Contracting Methodology

- The contracting method is a critical determinant
- We need to match the contracting process to the project and its environment (considering risk, applicable regulations, agency practice, experience and capability)
- Contracting procedures generally used in the US:
  - Design-Bid-Build (DBB)
  - Design-Build (DB)
- Newer contracting procedures being used/of interest:
  - General Contractor / Construction Manager (CM/GC)
  - Alliancing / Relationship / Consensus Contracting
- Other International applications (FIDIC, NCE-3c)
Comments on the “Low-Bid”

- “Low-bid” does not always result in the lowest cost for the public at the end of the day – or the best value.
- The low-bid environment is characterized by the ability of each party to treat the other party as an adversary – for their gain at the potential expense of the other (see Quick’s paper).
- Each party enters a contract at their own risk.
- To be “low bidder”, the contractor must do at least two things:
  - Determine the lowest cost to deliver the work at minimum (required) quality.
  - Determine a strategy to bid that cost – or lower – in order to secure the work, with the expectation that deficiencies in price can be made up by claims and changes.

Is a contract necessarily adversarial?

Introduction to Alliancing and Relationship Contracting

Roger Quick
Partner
GADGETS LAWYERS BRISBANE

Introduction

The words Relationship Contracting are used to describe various methods that companies use to manage their relationships with their customers. Relationship contracts are not necessarily adversarial, but they do allow for flexibility in managing the relationship. By using the terms in the contracts, each party can make sure their interests are protected. The main concern of the relationship contracts is that they are not necessarily adversarial, but they do allow for flexibility in managing the relationship. By using the terms in the contracts, each party can make sure their interests are protected.
Adversarial / conflicts

- In DBB and DB, potential conflicts exacerbated by:
  - Interpretation of the contract – i.e. how are terms interpreted – do they mean that the owner (or the contractor) must bear a certain risk? How is that known during the bidding phase? And therefore how could it be clearly priced?
  - How do contract terms deal with an event or consequence which has arisen from performance of the agency or contractor? Who is responsible for a breach of those terms? What did the parties really agree to – and how can this be priced or resolved in a construction dispute?
  - How to treat risk events under the terms of the contract – i.e. who has agreed to bear those significant (but usually unknown) risks? How can this be anticipated? How can this be estimated?

Design-Bid-Build & Design Build

- Design-Bid-Build (DBB) is the traditional Contracting method for North American infrastructure contracts.
  - A basic approach, used where there is clarity of deliverable with low probability of major risk and/or changed conditions.
- Design-build (DB), including Design-Build-Operate-Maintain (DBOM) and other similar methods are gaining momentum. Indications of advantages:
  - Schedule compression - more reliable, faster than DBB
  - Fewer changes and less cost growth
  - More innovation potential by design-builder
  - More risk transfer to design-builder (LA)

1 UK Reading study, 2 CII. Penn State study
Design-Bid-Build Concerns

- Time consuming - 100% design before construction
- Potential for changes in construction (bid pressures)
- Design typically performed without contractor’s input
- Opportunity lost for contractor to add value.
- Contractor’s lack of involvement can contribute to a subsequent adversarial environment
- In DBB, as in DB, there is an inherent conflict embodied in contractual provisions uncertainties
  (Contract provisions & interpretations, cf. Quick’s paper)

Design-Build Comments

➤ Not all early DB projects have been successful:
  NJT - 2 projects, Tren Urbano, Route 3 Boston…..
  - but we’re getting better
➤ Difficulty estimating the final cost prior to inviting proposals.
  – DB commitment made when design is ~30% complete.
➤ DB contractor will build only what is required
  - not necessarily what is desired by the Agency.
➤ So, with DB, if the contract documents do not specifically require it, it will probably not get done.
In the late 1980s, many countries made significant changes to contracting methods for infrastructure projects. “Alternative” methodologies became primary methodologies. In particular, UK, European & Australian agencies appeared to be better at exploiting efficiencies & resources of the private sector by:

- innovative financing,
- alternative contracting techniques,
- design-build,
- concessions,
- performance contracting and active asset management.

These methods generally involved using a framework or team approach - working to establish an atmosphere of trust leading to innovation, added value, better risk allocation.
Issues, drivers

- DBB, DB and are often ill-suited to underground projects,
  - Particularly large, complex projects with substantial risk
- Owners need better contractual tools to respond to enhanced risk, complex design and increased claims, disputes & litigation
  - And to deal equitably with changes during construction
- Some alternative methods can produce better results
  - i.e. value for the agency, profitability for the contractor
- These include:
  - Construction Manager / General Contractor (CM/GC)
  - Relationship Contracting
    (Alliancing, Early Contractor Involvement, Consensus documents)
How do you evaluate and make the choice?

- TCRP-131, “Guidebook for the Evaluation of Project Delivery Methods” TRB, Touran, Molenaar et. al.
  - TCRP Web-Only Document 41: “Evaluation of Project Delivery Methods”
- Comparative matrix of alternatives, pros-cons e.g. Reilly, LACMTA WSE 2012
- Experience of other Agencies e.g. Sound Transit, MBTA, UDOT, LACMTA

Two promising alternative methods:

1. **Construction Manager / General Contractor (CM/GC*)**
   - UDOT
   - Construction Manager General Contract (CMGC)

2. **Relationship Contracting**
   - Alliancing (e.g. Victoria guidelines)
   - Consensus Documents
   - Early Contractor Involvement
     - (e.g. NCE-3c includes early contractor involvement, target cost + pain/gain).

(*) Sometimes called GC/CM. Structure varies depending on location and what is allowed by law. Incentives can be included.
CM/GC

Construction Manager/General Contractor

- Significant differences depending on the state, agency and what is permitted under local legislation.
  - Initial design by owner/consultant
  - General contractor selected on relevant experience and price
  - General contractor advises design completion
  - During final design contractor develops the cost estimate - addresses areas of high cost, recommends changes.
  - Contractor submits guaranteed maximum price
  - Agency can accept or reject or negotiate
  - Design risk owned by the agency at design completion
  - CM/GC Contractor responsible for completing work at or under the guaranteed maximum price.

CM/GC Examples

- Portland Tri-Met Light Rail extension to Portland Airport – successful delivery (Irwin, Portland Tri-Ma, APTA 2003)
- CM/GC process used for Portland’s Combined Sewer Overflow (CSO) (Gibbon et. al. RETC 2005)
  - To avoid disputes, claims & litigation
  - Poor experience with DBB inc. partnering
  - Wanted to focus on solving problems
  - Open book cost reimbursement plus fixed fee for overheads and profit
  - Owner substantially involved
  - Identified risks and mitigation addressed
  - Owner & contractor avoided use of contingency (collaborative process)
Portland CM/GC benefits reported,

- Contractor input on construct / innovation
- Contractor buy-in to the design
- Changes handled quickly, best interest of the job – less paper work, no delay, no claims.
- Owner and contractor did not have to “take a position” or be adversarial, - resolve issues in the best interest of the project, better objectivity/team alignment.
- The owner is involved on site, understands the work, is part of the process.

Relationship Contracting

- Several forms
  - Included in NCE-3c
  - Basic to the “Consensus Documents”
  - History of the Australian experience
  - Process has evolved, checks & balances
  - Secondary beneficial outcomes
  - Alliancing is the most extreme form of Relationship Contracting
Alliance Contracting - initial results

- Greater benefits and performance can be obtained (e.g., over partnering) by contractually defining project relationships and targets
- First applied to the offshore oil platforms in the North Sea with the following reported cost savings:

<table>
<thead>
<tr>
<th>Off-shore Oil Project (All amounts in £M)</th>
<th>Target Cost</th>
<th>Actual Cost</th>
<th>Cost Saving</th>
<th>Percent Saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Britinnia</td>
<td>1,500</td>
<td>1,200</td>
<td>300</td>
<td>20%</td>
</tr>
<tr>
<td>BE ETAP</td>
<td>926</td>
<td>742</td>
<td>85</td>
<td>9%</td>
</tr>
<tr>
<td>BP Andrew</td>
<td>373</td>
<td>287.5</td>
<td>85.5</td>
<td>23%</td>
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<tr>
<td>Interconnector</td>
<td>316.5</td>
<td>240</td>
<td>76.5</td>
<td>24%</td>
</tr>
</tbody>
</table>

Alliance Contracting – collaborative process

- Team = Agency, Engineer and Contractor working closely together (contractually one entity)
- No secrets – “open book” accounting
- Total process approach – most efficient work plan
- Pain-Gain levels contractually defined
- Performance is measured and evaluated continually by the integrated management team, according to pre-established performance requirements
- Difficult decisions made quickly in the best interest of the project (costs allocated accordingly)
- Risk shared strategically by the participants - most capable member leads the work
- No litigation within the alliance (except for malfeasance)
- See Ross, Wilke data and Reilly summary from meetings with Australian Owner / Contractors
Alliancing shares under-runs and over-runs

Creates incentives for efficient performance + innovation (Ross)

Intensive up-front planning

See Jim Ross’s papers and the State of Victoria Alliancing Practitioner’s Guide
Examples of Alliancing

- Sydney Northside Storage Tunnel Project
  - 19.5 km tunnel, 3 TBMs - 6.3, 6.0, 3.8m diameter
  - Competitive award components
  - Client-engineer-contractor in joint venture
    (simple contract arrangement, open book accounting)
  - Pain-Gain (risk-reward) agreement
  - Comprehensive performance measurement system
  - Agency is satisfied with the outcome (ref. evaluation data)

- Channel Tunnel Rail Link, UK
  - Completed under target cost and ahead of schedule

CTRL UK

“There are not, frankly, many Prime Ministers, or indeed many Ministers, that launch an infrastructure project or accept its completion in front of the words “on time” and “on budget.”

The Rt Hon Tony Blair at the official opening of Section 1 of the CTRL at the Eurostar Terminal, Waterloo, on 28 September 2003.”
Results: Northside Tunnel

*Evans & Peck* evaluated the Sydney Northside Tunnel Project. They compared the independent Target Cost Estimate to the projected cost for Design & Construction (non-Alliance process) with costs of delays & scope changes actually experienced.

### Northside Storage Tunnel
**Delivery Method Comparison**
Estimates incl. SWC Costs

<table>
<thead>
<tr>
<th>Values in Millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
</tr>
<tr>
<td>---</td>
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<tr>
<td>0</td>
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</tbody>
</table>

- **D&C Tender Estimate**
- **D&C Cost at Completion Estimate**
- **Alliance Budget Cost**
- **Alliance Actual Cost at Completion**

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Considerations for Alliencing, US

- US public/contracting environment requires changes in State Legislation to allow for relationship contracting / alliencing and CM/GC (it appears other countries do not have this problem)
- Concerns having the owner-engineer-contractor on the same team (possible collusion, Wicks law NY)
- Concerns re how the “target cost” is established – must be independently validated.
- Concerns re value-for-money (over traditional procurement)
Using Alliancing and/or CM/GC Principles

- The Washington State Department of Transportation studied alternative contracting methods, with a focus on Alliancing + CM/GC (Reilly & Smith 2005-2007; Laird-Dyer 2008)
- Survey of Australian Agency/construction firms re benefits
- Concluded Alliancing or CM/GC could add value
- But it would take time get legislative approval
- WSDOT’s ERP for the Alaskan Way tunnel concluded that DBB and DB are capable of greater flexibility than traditionally practiced
- WSDOT decided to evaluate the key features of Alliancing & CM/GC, as possible under existing legislation
- SR-519 in Seattle was considered for a test project ($75m)
  – used a partial application of principles
- Alaskan Way Tunnel used some of these concepts

Possible structure, 2009

- Use early contractor involvement (ECI) to increase innovation, value and early construction input.
  - Design to 15%
  - Establish a Target-Price (CEVP base + risk costs)
  - Contractor proposal, confirms can meet target-price
  - Cost-reimbursable contract (no lump sum bidding)
  - Fixed fee (negotiated overhead + profit)
  - Incentive payment below target (gain),
  - Disincentive if over target (pain)
  - Contractor takes risk up to a preset $$ amount – 100% gain up to this amount
  - Owner and contractor share gain beyond that $$ amount
  - Scope changes are the owner’s responsibility
Summary & Conclusions

- Alliancing and CM/GC have potential to deliver better value to owners and profits to contractors for complex infrastructure projects with significant risk & uncertainty.
- These methods have been demonstrated in international settings, including UK, Australia, Canada (Alliancing) and the U.S. (CM/GC).
- Studies documenting this added value are available.
- Incentives and pain-gain are a key component in adding value.
- A non-adversarial cooperative environment can foster innovation and reduce (or eliminate) the need for disputes, claims & litigation.
- It may be possible to use some key attributes of Alliancing and/or CM/GC in current DBB and DB contractual environments with existing legislative provisions and policy guidelines.

REFERENCES - Advanced Procurement

- Many available
Example: DB Project – Lake Mead Tunnel

- Awarded March 2008
  - $447 million
- Compliance with ITIG Risk procedures
- Starter tunnel problems 2010-2011 - delay, cost
- Redirection - better rock
- Current TBM rate good
- Agency & Contractor working “in partnership”

Intake fabrication, lowering in lake (375' deep), tremie concrete 12,000 cy, 11 days, TBM in chamber - production to 391' / week (October 7-13).

Example: CM/GC Project – MBTA Green Line Boston

CONTRACTOR (CM/GC) BENEFITS
RISK MANAGEMENT & CONTROL

PM/CM/PE
MassDOT
MBTA
CM/GC
GEC
Subcontractors
Select
Design
Construct
Schedule
Structure

FIGURE 4: Project delivery methods ranked by risk/control shares (adapted from Construction Project Management Handbook 2006).
Sound Transit Program

- **Transit Investments (to date):**
  - 24 express bus projects completed
  - 75 miles (120.6 km) of commuter rail service
  - 17.1 miles (27.5 km) of light rail service

- **Additional Investments (2023):**
  - 17% express bus service increase
  - 8.2 miles (13.2 km) of commuter rail service
  - 36 miles (57.9 km) of light rail service
Sound Transit Light Rail – 7 Mega Projects

- Conceptual Design
- Final Design & Construction
- Under Construction
- In Operation
- D/B Procurement
- Conceptual Design

University Link

- 3.15-mile extension of Central Link
  - twin bored tunnels
  - Capitol Hill Station
  - UW Station and crossover

- Schedule:
  - Final Design: 2007-2010
  - Construction: 2009-2016
  - System testing: 6 months
  - Open for service: Fall 2016

- Project budget: $1.948 billion (including finance cost)
Implementation
Contract Packaging

- 4 major heavy civil contracts
  - I-5 Undercrossing Pits (DBB)
  - UW to Capitol Hill Tunnels (DBB)
  - Capitol Hill to Pine Street Tunnels (DBB)
  - Yard Expansion (DBB)

- 2 major station finishes contracts
  - UW Station (GC/CM) (80%)
  - Capitol Hill Station (GC/CM) (30%)

- 3 major systems/track contracts
  - U-Link Systems and Track (GC/CM) (20%)
  - Network (95%)
  - EMI/Vibration/Wheel Flat Monitoring

- Maintenance of Way Building (DB)
- Procurement of light rail vehicles

Project Status

<table>
<thead>
<tr>
<th>Financial Snapshot</th>
<th>Millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Budget</td>
<td>$1,948</td>
</tr>
<tr>
<td>Committed</td>
<td>$1,571</td>
</tr>
<tr>
<td>Incurred</td>
<td>$1,222</td>
</tr>
</tbody>
</table>

- Estimated Final Cost (EFC) trending approximately $107M under Project Budget

- Schedule
  - 78% Complete
  - Scheduled opening – Sept 2016
  - Original Project Float – 6 Months
  - Remaining Project Float – 6 Months
Future of Alternate Delivery Methods at Sound Transit

- **GC/CM** – Build on U-Link Experience
  - Northgate Link Stations – UDS & RS
  - East Link – Downtown Bellevue Segment

- **Design-Build** – Build on South 200th Experience
  - South 200th – Parking Garage @ Angle Lk Sta
  - Northgate Link – Parking Garage @ NG Sta
  - East Link – 1.8 mile Redmond Segment
  - Potential use as primary contracting method on future extensions

Future of Alternate Delivery Methods in Washington

- **GC/CM** – Current RCW
  - Primarily for Vertical Construction (Buildings)
  - Use of ECCM / MCCM (Negotiated)
  - Maximum allowed work by GC/CM Contractor – 30%
    (Must be competitively bid) (Owner administered when GC/CM bidding) (Low Bid)
  - Other work (subcontract packages) publicly bid by GC/CM Contractor (Low Bid)
Future of Alternate Delivery Methods in Washington

- GC/CM – Future Potential Change in RCW
  (move toward GC/CM concept)
  - Use on heavy civil projects
  - Minimum required work by GC/CM Contractor – 30%,
    (Negotiated prior to signing Contract)
  - Minimum required subcontract bid work – 30%
    (GC/CM precluded from bidding subcontract work)
    (Low Bid)

Factors for Successful Project Delivery

- Very Experienced and Dedicated ST Staff
  - driven for success
- Scheduling
- Estimating
- Risk Assessment & Risk Management Utilization
- Alternate Contract Procurement Methods
- Early Works Construction Contracts
- Hands-On Approach to Construction Management

Thanks for your attention, John will conclude….
Topics covered, in conversations & presentations since 1995:
- Risk Management and Mitigation
- Cost of megaprojects (CEVP®)
- Complex underground / megaprojects
- Policy for complex megaprojects
- Management of megaprojects
- Contracting & delivery practices
- Total-process alignment approach
- Partnering & Team-Alignment


Next ??????? – studies leading to the ITA 2016 Conference in San Francisco.


Further References
www.JohnReilly.us

Thank you for your attention…..