Session 3
Risk Management Best Practices: Developing Contract Terms Part II

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Risk Allocation and Contracting Decisions

Goals:

• Level playing field;

• Minimize need for large contingency;

• Appropriate Risk Allocation;

• Incentivize Work
Alaska Way Bored Tunnel Project

Seattle, WA
Proposed SR 99 Bored Tunnel

- Approximately two miles long, 57.5’ diameter.
- Stacked configuration, two 11’ lanes with shoulders.
- Tunnel designed to 2,500 year earthquake standard (in the range of a 9.0 earthquake).
- State-of-the-art safety systems.
### Sample Bored Tunnel Risk Matrix

#### Risk Identification

<table>
<thead>
<tr>
<th>Date Identified</th>
<th>Summary Description of Risk Event</th>
<th>Detailed Description of Risk Event</th>
<th>Risk Trigger</th>
<th>Probability (%)</th>
<th>Impact</th>
<th>Risk Matrix</th>
<th>ACTION TO BE TAKEN</th>
<th>Activity</th>
<th>Risk Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/2/2009</td>
<td>Risk sharing procurement</td>
<td>Opportunity</td>
<td>Cost</td>
<td>Low</td>
<td></td>
<td>H V H</td>
<td>Review cost estimate for further optimization of procurement and risk sharing strategy.</td>
<td>Review cost estimate for further optimization of procurement and risk sharing strategy.</td>
<td>WSDOT</td>
</tr>
<tr>
<td>11/12/2009</td>
<td>Threat</td>
<td>Major Intervention (replacement)</td>
<td>Cost</td>
<td>High</td>
<td></td>
<td>M H L</td>
<td>Prevent intervention to replace component</td>
<td>Prevent intervention to replace component</td>
<td>Design/PS &amp; E</td>
</tr>
<tr>
<td></td>
<td>Threat</td>
<td>Settlement</td>
<td>Cost</td>
<td>Low</td>
<td></td>
<td>L H H</td>
<td>Design Builder</td>
<td>Design Builder</td>
<td>Design/PS &amp; E</td>
</tr>
</tbody>
</table>

#### Monitoring and Control

<table>
<thead>
<tr>
<th>Status</th>
<th>Risk Type</th>
<th>Probability (%)</th>
<th>Impact</th>
<th>Risk Matrix</th>
<th>ACTION TO BE TAKEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/12/2009</td>
<td>Cost</td>
<td>High</td>
<td></td>
<td>M H L</td>
<td>Prevent intervention to replace component</td>
</tr>
<tr>
<td></td>
<td>Cost</td>
<td>Low</td>
<td></td>
<td>L H H</td>
<td>Design Builder</td>
</tr>
</tbody>
</table>
Categories of Risk

- Geotechnical Risk (Soils/TBM Maintenance)
- Deformation/Settlement
Risk Allocation for Soils

- Large machine w/ unknown maintenance issues;
  - Max 5 bar pressure
  - Variety soil types
  - Abrasive soils
  - Precedent experience
- Comprehensive GBR & boring program

Contractual Concepts

- Interventions
- Differing Site Conditions
- Additional shared contingency $40m
Intervention Work

Subsurface work

• **Intervention work** defined as any work performed by workers in or around the TBM under hyperbaric conditions.
  
  • Measured on hour by hour basis, beginning when the first worker enters the hyperbaric chamber for compression and ending when the last worker has completed decompression or TBM resumes excavation whichever occurs first.
  
  • 1,440 hours of intervention work included in contract price and schedule.
  
  • Routine maintenance (under free air) is not considered intervention work.
  
  • Intervention Work or Extraordinary Intervention Work resulting from DSC addressed as DSC.

• **Extraordinary intervention** work defined as intervention work in excess of 1,440 hours.
  
  • STP entitled to costs for extraordinary intervention work (without profit of home office overhead) from the shared contingency fund and time (if on critical path).
  
  • STP entitled to costs for extraordinary intervention work from WSDOT if the shared contingency fund is consumed.

** Shared Contingency Fund = $40 M  Unused amounts split 75/25**
Differing Site Conditions

Subsurface Work (continued)

• **Differing Site Conditions**
  
  • GBR, EBR, and GEDR are contract documents used to determine differing site conditions.
  
  • Written notice of DSC required within 7 Days of when Design Builder should have known of potential.
  
  • Design Builder required to continue to progress work until both parties agree unreasonable.
  
  • Compensation allowed for costs directly attributable to DSC, including extended site overhead and profit, (excluding home office overhead).
  
  • Time extension allowed for delay to Critical Path caused by DSC.

**Shared contingency fund = $40M** Unused amounts split 75/25 (If shared contingency fund exhausted, WSDOT remains responsible for DSC costs.)
WSDOT Evaluation:

- Group A – 20 Buildings (Mitigation before/during construction)
- Group B – 138 Buildings (Monitor & mitigate/repair)
Generalized Tunnel Design Reaches
Deformation Mitigation Approach

.5% Volume Loss

Group A - Mandatory mitigation (1/2 “settlement limits)

Group B - All other buildings within zone of influence (1” settlement)

DMS Deformation Mitigation Submission

WSDOT defined building categories A & B

Modified by design-builder (DMS)

Accepted in contract

Deformation Mitigation & Repair Fund

$20m to be shared for Group B mitigation or repairs to property owners.
Remaining balance shared 75:25

Risk sharing
Deformation Mitigation and Repair

Allocation of Deformation Mitigation and Repair

• Group A structures – five buildings + viaduct.
• Group B structures – all other buildings (153) and structures.
• Deformation mitigation and repair fund = $20M;
  • Provides compensation for direct costs for Group B Structures.
  • Will also be used to repair any property damage due to settlement.
• Unused amounts split 75 percent / 25 percent between STP and WSDOT.
• Once the deformation and mitigation fund is exhausted:
  • WSDOT responsible for cost’s if deformation is within tolerance of < or = .5”.
  • STP responsible for costs if deformation is outside of tolerance of < or =1”.
• Grouting operations will be compensated on a unit price basis.
Insurance Coverage

**Design Build Tunnel**
- Commercial General Liability ($2 mil/$4 mil/$4 mil)
- Automobile ($1 mil/accident)
- Environmental ($100 mil)
- Excess ($200 mil)
- Professional (E&O) ($25 mil)
- Builders Risk ($500 mil/earth movement and flood probable max loss.)
- Railroad (Coverage per RR)
- Aircraft ($25 mil/occ)
- Marine ($5 mil/$10mil)
- Owners Contractors Protective (OCP) ($2 mil/$4 mil)
- Self Insured Retention ($1 mil)

**Typical Design Bid Build**
- Commercial General Liability ($3 mil/occ and aggregate.)
- Automobile ($1 mil/occ)
- Owners Contractors Protective (OCP) ($3 mil/occ and project)
- Railroad (Coverage per RR)
Bonding

Legal Framework

• Projects under 250 million must maintain 100% Contract Bond covering performance and payment risk
• Projects over 250 Million split performance and payment bonds covering 100% of risk to the state

Bored Tunnel Project Requirements

Risk analysis set bond coverage for Project at
• $500 million performance
• $500 million payment
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