The I-70 Twin Tunnels Project

DAVID SINGER, CDOT
BRANDON SIMAO, KRAEMER OBAYASHI JV

The Benefits of CM/GC on Environmental Stewardship
Discussion Points

• Construction Manager / General Contractor 101
• Twin Tunnels Project Overview
• Using CM/GC to advance Environmental Stewardship
  • Contractor Participation during NEPA
  • Approach to Multiple Contracts & SWMP Design
  • Fostering Partnerships
• What’s Remaining
• Lessons Learned
CM/GC Basics

- CM/GC is Construction Manager/General Contracting.
- Based off of the vertical CMAR or Construction Manager at Risk.
- A contracting method that involves a Contractor in both the design and construction phases of a project.
- The intent is to form a partnership with CDOT, the Design Consultant, and the Contractor.
CM/GC Process

• Owner hires designer and CM/GC contractor (after preliminary design)
  – CM/GC contractor hired with Best Value selection—the earlier the better
  – CDOT selection criteria has Experience, Project Approach, Price, and Approach to Price

• Team works on design
  – Contractor provides advice on Constructability, Schedule, Materials and Budget
  – Iterations address risk (Heavy involvement from owner specialty units)
  – Periodically owner asks CM/GC to price job
CM/GC Analogy

- Designer
- Contractor
- Owner
Two possible outcomes of “bid”

1. Owner gets acceptable Guaranteed Maximum Price (GMP)
   - Proceed with construction
   Or

2. Owner doesn’t get acceptable price
   - Proceed with more design
     —ultimately convert to Design-Bid-Build
Project Delivery Phase Comparisons
Differences in Risk Allocation

- **Unit of Risk**
  - **DBB**
  - **CMGC**
  - **DB**

- **Contractor Risk**
Benefits of CM/GC

- Optimizing construction schedules
- Mitigating risk

- Improving cost control
- Improving design quality
- Fostering innovation
Twin Tunnels Widening Project Purpose

**Eastbound:** Improve eastbound highway safety, operations, and travel time reliability in the Twin Tunnels area of the I-70 Mountain Corridor at the east end of Idaho Springs.

**Westbound:** Capitalize upon existing construction infrastructure to reduce cost and upgrade Westbound tunnel to meet the long-term needs of I-70 Mountain Corridor.
Twin Tunnels Project Area

Figure 1.1. Twin Tunnels Project Area
Twin Tunnels: The Challenge

Project Team

• CDOT and FHWA
• Multiple teams led by CH2M Hill (NEPA)
• Multiple teams led by Atkins (Design)
• Kraemer Obayashi Joint Venture (CM/GC Contractor)

Schedule: Open three lanes of traffic by Fall 2013 & again in Fall 2014

Maintain Corridor-wide momentum and stakeholder support
Site Specific Project Challenges

- Highly compressed time table to deliver project
- Narrow project corridor with restricted access
- Large number of stakeholders taking advantage of local area
- Highly visible, dangerous work, along primary transportation corridor.
Environmental Goals

- Adhere to all environmental compliance requirements, including those in the final decision document

- Implement innovative methods for environmental stewardship and community supported enhancements
Adaptive Mitigation

- Takes advantage of collaborative nature of CM/GC process.
- Allows for innovations in construction methods to avoid impacts.
- Avoids the need for reevaluations.
## Adaptive Mitigation Example

### Table 3-56. Summary of Proposed Action Construction Impacts and Mitigation Commitments

<table>
<thead>
<tr>
<th>Activity</th>
<th>Location</th>
<th>Impact</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tunnel blasting operations</td>
<td>Eastbound tunnel</td>
<td>Dust emissions</td>
<td>In accordance with Colorado Air Quality Regulation #1, CDOT will use all available practical methods which are technically feasible and economically reasonable in order to minimize fugitive dust emissions from blasting activities. CDOT will install and operate two PM$_{10}$ monitors to assess the impacts of tunnel excavation, using the data for adaptive mitigation. See additional discussion above.</td>
</tr>
</tbody>
</table>
Innovations in Construction Methods

Ideas must meet certain criteria

Impact analysis initiated and documented

Provided for public and agency review
Innovations in Design

Ideas must meet certain criteria

Impact analysis initiated and documented

Provided for public and agency review
Multiple Contracts & Permitting

• Eastbound and Westbound projects comprised of six individual construction contracts

• Common Plan of Development Approach
Integrating Contractor Phase & SWMP Planning

- Division of responsibilities between contractor and designer
- Design Team → “Final” plan at conclusion of contract
- Construction Team → “Everything In Between” to achieve “Final” plan

<table>
<thead>
<tr>
<th>Item</th>
<th>Units</th>
<th>Package 1A</th>
<th>Package 1B</th>
<th>Package 2</th>
<th>Westbound*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Estimated</td>
<td>Estimated</td>
<td>Plan</td>
<td>Plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Used</td>
<td>Used</td>
<td>Used</td>
<td>Used</td>
</tr>
<tr>
<td>Erosion Log</td>
<td>LF</td>
<td>500</td>
<td>2000</td>
<td>2700</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>500</td>
<td>230</td>
<td>1040</td>
<td>0</td>
</tr>
<tr>
<td>Gravel/Aggregate Bags</td>
<td>LF</td>
<td>3350</td>
<td>700</td>
<td>6600</td>
<td>2500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3350</td>
<td>834</td>
<td>4345</td>
<td>529</td>
</tr>
<tr>
<td>Removal of Sediment (Labor)</td>
<td>HR</td>
<td>60</td>
<td>40</td>
<td>120</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>123</td>
<td>101</td>
</tr>
<tr>
<td>Removal of Sediment ( Equip)</td>
<td>HR</td>
<td>40</td>
<td>60</td>
<td>80</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>22</td>
</tr>
<tr>
<td>Sweeping</td>
<td>HR</td>
<td>40</td>
<td>60</td>
<td>260</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14.5</td>
<td>51.5</td>
<td>121</td>
<td>73.5</td>
</tr>
</tbody>
</table>

*Represents 6-months of construction April 2014-October 2014

- Result: $150,000 in project savings attributed to innovation & planning
Partnering Opportunities & Execution

• Technical Team Workshops
  – County Stakeholder / Contractor Collaboration
  – Site Walks & Progress Updates

• Issue Task Forces

• Colorado Parks & Wildlife
Partnering Opportunities & Execution

• Early contractor involvement led to KOJV/CDOT/Black Hawk information share

“Eager to try out filtration system”
Jim Ford, Black Hawk Water System Coordinator
Best Practices & Lessons Learned

• Stakeholder support for decision making process
• Active participation from contractor on multidisciplinary teams
• Co-location
• Dedicated agency staff and resources
• Conditions attached to environmental clearance for each phase
• Commitment Tracking
Blasting Videos
Thank You

• Questions?