“The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation.”
TODAY’S SPEAKERS

Tommy Long, P.E.
Resident Engineer
Chickamauga Lock Resident Office
Nashville District

Adam Walker, P.E.
Project Manager
Chickamauga Lock Replacement Project
Nashville District
OBJECTIVES

• Review the background of Collaborative Risk Management (Why are we doing this?)

• Review development of the Joint Risk Register for the Chickamauga Lock Replacement Project

• Highlight the JRR implementation at CHI/L

• Future Implementation
JOINT RISK MANAGEMENT BACKGROUND

• “...partnering is the creation of an owner-contractor relationship that promotes achievement of mutually beneficial goals. It involves an agreement in principle to share the risks involved in completing the project, and to establish and promote a nurturing partnership environment.” – IWR Pamphlet 91-ADR-P-4

• “The government and the contractor(s) normally maintain separate risk management efforts, but there is a need for collaborative risk management work between the government and contractor(s).”
• Applicability
  • Military Programs and Civil Works construction contracts
  • >$4M and advertised after 01 AUG 2018
  • Level of effort should be commiserate with complexity of contract

• What is required?
  • Minor edits to UFGS 01 30 00 Admin Requirements
    • No Criteria Change Request has been submitted yet.
DPM CW-MP 2018-01: CONSTRUCTION PHASE JOINT RISK MANAGEMENT

• Proposed edits to Unified Guide Specification 01 30 00 Administrative Requirements (Aug 2015)

1.8 PRECONSTRUCTION CONFERENCE

After award of the contract but prior to commencement of any work at the site, meet with the Contracting Officer to discuss and develop a mutual understanding relative to the administration of the value engineering and safety program, preparation of the schedule of prices or earned value report, shop drawings, and other submittals, scheduling programming, prosecution of the work, and clear expectations of the "Interim DD Form 1354" Submittal, and the processes for joint risk management between the Contractor and Government. Major subcontractors who will engage in the work must also attend.

1.9 PARTNERING

To most effectively accomplish this contract, the Government requires the formation of a cohesive partnership within the Project Team whose members are from the Government, the Contractor and their Subcontractors. Key personnel from the Supported Command, the End User (who will occupy the facility), the Government Design and Construction team and Subject Matter Experts, the Installation, the Contractor and Subcontractors, and the Designer of Record will be invited to participate in the Partnering process. The Partnership will draw on the strength of each organization in an effort to achieve a project that includes joint risk management, is without any safety mishaps, conforms to the Contract, and stays within budget and on schedule.

The Contracting Officer will provide Information on the Partnering Process and a list of key and optional personnel who should attend the Partnering meeting.
• **Location** - Tennessee River Mile 471 (Chattanooga, TN)
• **Scope** – Replaces the existing 60’ x 360’ navigation lock that is affected by Alkali Aggregate Reaction (AAR) with a new 110’ x 600’ lock.
• **Total Project Cost Estimate** - **$792M**
  • Fully Funded Oct 2018 $’s, 2024 completion
• **35% Complete** thru September 2019
CHICKAMAUGA LOCK – JOINT RISK REGISTER PILOT

- Lock Chamber (LC) Construction Contract
  - Total Value – $240M (Base with 13 Options)
  - Contractor – AECOM Energy and Construction, Inc.
  - Awarded – 28 Sept 2017;
  - NTP – 02 Nov 2017
  - Earliest Completion - June 2023 with efficient annual funding.
    - Overlapped with Lock Excavation contract until 1 Feb 2019.
LOCK CHAMBER CONTRACT OPTIONS

- Option 1 – Concrete Conveyor System
- Option 2 – Foundation Preparation
- Option 3 – Foundation Preparation
- Option 4
- Option 5
- Option 6
- Option 7
- Option 8
- Option 9
- Option 10
- Option 11
- Option 12
- Option 13 – Dry Commissioning

Legend

- Total Value (Base & 13 Options) = $240M
- Awarded (Base & 8 Options): ~$156M
- Current Contract End Date: 11 Dec 2020
**JOINT RISK REGISTER – INITIAL DEVELOPMENT**

- Combined Risk Items Associated with LC Contract.
- USACE – Cost and Schedule Risk Analysis (CSRA)
- AECOM – Contract Risk Register
- Removed Quantitative Impacts / Data
- Working Level Staffs Populate Risk Register

---

Chickamauga Lock Chamber - Joint Risk Register - November 2019

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CLC-001</td>
<td>Base and All Options</td>
<td>Open</td>
<td>Overtopping of Cofferdam Cells</td>
<td>The cells are designed for a 100 YR event. There is a concern that the cells could be overtopped which would cause flooding of work area. Equipment that could not be removed prior to overtopping would be severely damaged from water. If the flood facility gate is damaged or impassable it may cause overtopping of the cofferdams.</td>
<td>Evacuation plan to remove as much equipment as possible prior to overtopping. Some equipment would likely have to remain inside the cofferdams such as the 300 ton crane. Coordination with TVA to predict the river crest level to know if removal of equipment is required or if it can be left inside the cofferdams. Repair spillway gate in timely matter. Extremely small potential to use TVA spillway gate to mitigate the overtopping.</td>
<td>Very Unlikely</td>
<td>Critical</td>
<td>Low</td>
<td>Critical</td>
<td>Low</td>
<td>AECOM and LRN Management</td>
<td>Cost &amp; Schedule</td>
<td>Stable</td>
</tr>
<tr>
<td>CLC-002</td>
<td>All Options</td>
<td>Open</td>
<td>Funding stream variations or delay to workflow and contractor planning for efficient work.</td>
<td>Schedule impact, 90 day lead times for design and material suppliers to be prepared to start of option work, cost impact for retraining management/craft labor if options are not exercised timely, efficiency loss of productivity, later options have warranty impacts due to material being delivered but option not being awarded for installation of materials, material impacts due to being exposed to weather longer than anticipated</td>
<td>Communicate with all parties of the expected funding, can spread the work out over a longer period of time and not work OT to meet completion date, don’t purchase materials for future options till funding is known.</td>
<td>Likely</td>
<td>Marginal</td>
<td>Moderate</td>
<td>Significant</td>
<td>High</td>
<td>LRN PM</td>
<td>Cost &amp; Schedule</td>
<td>Stable</td>
</tr>
<tr>
<td>CLC-003</td>
<td>All Options</td>
<td>Open</td>
<td>Consistent funding for execution of remaining options</td>
<td>Limited funding could prevent execution of remaining options prior to current expiration dates.</td>
<td>Communication of needs for the contract are being communicated to LRD, HQ, IWUB, etc. In an effort to educate all on the impacts to limited funding.</td>
<td>Very Unlikely</td>
<td>Significant</td>
<td>Low</td>
<td>Significant</td>
<td>Low</td>
<td>LRN PM</td>
<td>Cost &amp; Schedule</td>
<td>Stable</td>
</tr>
<tr>
<td>CLC-004</td>
<td>Options 9 - 13</td>
<td>Closed</td>
<td>Project Realization Delay</td>
<td>The Project’s expenditures could exceed the authorized limit in fiscal year 2020 if efficient annual funding is not received. Project execution must stop prior to exceeding the authorized limit.</td>
<td>A Post Authorization Change Report (PACR) is being developed in FY18 for submission to Congress to request reallocation to the current estimated cost.</td>
<td>Unlikely</td>
<td>Negligible</td>
<td>Low</td>
<td>Marginal</td>
<td>Low</td>
<td>LRN PM</td>
<td>Cost &amp; Schedule</td>
<td>Stable</td>
</tr>
<tr>
<td>CLC-005</td>
<td>All Options</td>
<td>Open</td>
<td>Extended project overheads if options are not awarded and/or funding gaps occur</td>
<td>The decision will have to be made if material could be demobilized if a funding gap occurs. If AECOM is waiting on options to be exercised, they may have LOOH cost during periods of inactivity due to waiting on an option to be exercised. Another concern would be the risk of losing craft workers if there is no work for them. They will likely find another job and AECOM may not be able to get them back. The loss of craft could affect the productivity and quality of the work.</td>
<td>Based on the Anticipated Future Options there should be additional work. The Government will try to exercise options as early as possible once funding is secured to minimize the 83 days.</td>
<td>Unlikely</td>
<td>Significant</td>
<td>Moderate</td>
<td>Significant</td>
<td>Moderate</td>
<td>LRN PM</td>
<td>Cost &amp; Schedule</td>
<td>Stable</td>
</tr>
<tr>
<td>CLC-006</td>
<td>Base and All Options</td>
<td>Open</td>
<td>Losing critical or key staff at a crucial point in the contract from either AECOM or USACE</td>
<td>Critical key staff could lose at any time during the duration of the contract which would cause a significant loss of working knowledge of the contract and overall project.</td>
<td>Open communication with supervisors and communication of future plans. Have other personnel trained or approved and ready to step in if necessary. Keep accurate, complete files and documentation for the project.</td>
<td>Certain</td>
<td>Negligible</td>
<td>Low</td>
<td>Marginal</td>
<td>Moderate</td>
<td>AECOM and LRN Management</td>
<td>Schedule</td>
<td>Increasing Risk</td>
</tr>
</tbody>
</table>
### JOINT RISK REGISTER - CRITERIA

#### Risk Matrix

<table>
<thead>
<tr>
<th>Likelihood of Occurrence</th>
<th>Negligible</th>
<th>Marginal</th>
<th>Significant</th>
<th>Critical</th>
<th>Crisis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certain</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Very Likely</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Likely</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Unlikely</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Very Unlikely</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

#### Likelihood of Occurrence Table

Any changes to these assumptions will change the assumptions in the models.

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Low % Occurrence</th>
<th>High % Occurrence</th>
<th>Chance of Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certain</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Very Likely</td>
<td>75%</td>
<td>90%</td>
<td>75% and 90%</td>
</tr>
<tr>
<td>Likely</td>
<td>50%</td>
<td>75%</td>
<td>50% and 75%</td>
</tr>
<tr>
<td>Unlikely</td>
<td>25%</td>
<td>50%</td>
<td>25% and 50%</td>
</tr>
<tr>
<td>Very Unlikely</td>
<td>10%</td>
<td>25%</td>
<td>10% and 25%</td>
</tr>
</tbody>
</table>

#### Impact or Consequence of Occurrence

Any changes to these assumptions will change the assumptions in the models.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Low Impact</th>
<th>High Impact</th>
<th>Impact Between</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible</td>
<td>0.00%</td>
<td>1.00%</td>
<td>0.00% to 1.00%</td>
</tr>
<tr>
<td>Marginal</td>
<td>1.00%</td>
<td>5.00%</td>
<td>1.00% to 5.00%</td>
</tr>
<tr>
<td>Significant</td>
<td>5.00%</td>
<td>15.00%</td>
<td>5.00% to 15.00%</td>
</tr>
<tr>
<td>Critical</td>
<td>15.00%</td>
<td>30.00%</td>
<td>15.00% to 30.00%</td>
</tr>
<tr>
<td>Crisis</td>
<td>30.00%</td>
<td>100.00%</td>
<td>Over 30.00%</td>
</tr>
</tbody>
</table>
## Chickamauga Lock Chamber - Joint Risk Register

<table>
<thead>
<tr>
<th>Risk No.</th>
<th>Area / Option</th>
<th>Risk Status</th>
<th>Risk Statement</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLC-021</td>
<td>Base and All Options</td>
<td>Open</td>
<td>Multiple contractors working in the same area.</td>
<td>There will be multiple contractors working in the general area during the life of the contract. This includes the Fleet doing repair work at the existing lock, Monolith 48 Anchors, Mechanical and Electrical Contracts for the new lock and Downstream Approach Wall.</td>
<td>Include language in the future contracts that ensures coordination with the existing contractor and on-site COR to mitigate issues. The future contracts should clearly identify the work limits of AECOM and limit the access to these work limits as much as possible. The future contracts should include language of who has priority multiple contractors have to use the existing boat ramp. Good coordination will be required between the Lock Master and the COR so lock repairs being made by the Fleet are communicated to AECOM as soon as possible so they can plan around these outages.</td>
</tr>
</tbody>
</table>
### Chickamauga Lock Chamber - Joint Risk Register

<table>
<thead>
<tr>
<th>Risk No.</th>
<th>Area / Option</th>
<th>Risk Status</th>
<th>Risk Statement</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLC-012</td>
<td>All Options</td>
<td>Open</td>
<td>Shortage of aggregates, fly ash, cement, steel or other materials required for construction.</td>
<td>Delay in schedule due to not having materials to continue production or there may be a limited quantity of material available from the suppliers that would prevent achieving full production rates.</td>
<td>Order and stock pile material as much as possible. Have agreements with suppliers to ensure they can supply the anticipated quantity based on a schedule of delivery. Have backup suppliers approved for aggregate, cement and fly ash sources. Good communication of what options will be awarded each year to allow AECOM to discuss options with suppliers.</td>
</tr>
</tbody>
</table>

### Chickamauga Lock Chamber - Joint Risk Register

<table>
<thead>
<tr>
<th>Project Cost</th>
<th>Project Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likelihood</td>
<td>Cost Impact</td>
</tr>
<tr>
<td>Likely</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
### Chickamauga Lock Chamber - Opportunity Register

<table>
<thead>
<tr>
<th>Opportunity No.</th>
<th>Area / Option</th>
<th>Opportunity Status</th>
<th>Opportunity Statement</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLC-OPP-1</td>
<td>CLC-012</td>
<td>Closed</td>
<td>Additional on-site storage capability for flyash</td>
<td>Possible interruptions in flyash supply could occur with little to no lead time and could impact ability to produce concrete</td>
<td>The Government will coordinate with the Louisville District Olmsted project to acquire 4 auxiliary silos to be added to the concrete production facility that will provide additional storage capacity. The 4 auxiliary silos were delivered to the site by 15 December 2018.</td>
</tr>
</tbody>
</table>

### Chickamauga Lock Chamber – Opportunity Register

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Implement. Cost</th>
<th>Benefit Level Cost</th>
<th>Benefit Level Sched.</th>
<th>Action Owner(s)</th>
<th>Affected Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certain</td>
<td>Low-Medium</td>
<td>High</td>
<td>High</td>
<td>PM and RE</td>
<td>Cost &amp; Schedule</td>
</tr>
</tbody>
</table>
FLY ASH SILOS (CLC-OPP-1)
CHICKAMAUGA LOCK – JRR UPDATES

- Initial Joint Risk Register Presented to full team during first Formal Partnering Meeting.

- Update Frequency:
  - **Weekly** – Informal during routine coordination meetings
  - **Monthly** – Register updates through email
    - USACE: Initial mark-up
    - Contractor: Review / mark-up
    - Comment Resolution Meeting
    - Send update to Leadership
  - **Quarterly** – Face to Face Meeting
JRR – EXPANDED PILOT UPDATES

• Expanded to 28 projects Corps of Engineers wide in 2019 including:
  • Civil Works Construction:
    • Inland Navigation, Harbors, Hydropower Rehab, Flood Risk Management, etc.
  • Military Construction:
    • Hangers, Training Facilities, Maintenance Buildings, Fire Stations, Quarters, etc.
  • Support for Others:
    • VA Medical Centers
• Quarterly feedback incorporated into risk strategies for new projects

Survey Feedback
• “Excellent communication tool that is worth the time and effort”
• Important part of planning / design process that should be shared with constructor
• Risk items translate into resolution plans
• Inclusion of stakeholder is very positive, can lead to impacts if relationship isn’t managed
• KTR – Part of our corporate process that proves to be valuable

Key Risks Identified
• Closeout activities
• Coordination of multiple contractors
• Traditional project risks mitigated by enhanced communication
• Impacts of delayed Award / NTP not fullyforeseen within strong market
• Material procurement or fabrication delays outside KTR control
• D-B contingency management during design
DISCUSSION / Q&A
CONTACT INFO

Tommy Long | PE
Resident Engineer
Chickamauga Lock Resident Office, Nashville District
423-875-5027 (O) | 865-210-1253 (C)
wayne.t.long@usace.army.mil

Adam Walker | PE
Project Manager
Chickamauga Lock Replacement Project, Nashville District
615-736-5666 (O) | 615-573-3257 (C)
adam.c.walker@usace.army.mil