

Chickamauga Lock Project Update Inland Waterways Users Board Meeting No. 91

Mr. Adam Walker
Project Manager
Nashville District
Great Lakes and Ohio River Division
23 May 2019



"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."

BUILDING STRONG®
and Taking Care of People!



US Army Corps
of Engineers®



Chickamauga Lock Replacement

- **Bottom Line Up Front**

- ▶ **Lock Excavation Construction**

- Contract closeout proceeding.

- ▶ **Lock Chamber Construction**

- Preparing for monolith concrete placements anticipated to begin in June 2019.
 - Exercised options 4, 6, 7, & 8 on 28 Mar 2019
 - Anticipate exercising an additional partial option in Aug 2019 using remaining FY19 Work Plan funding.

- ▶ **Post Authorization Change Report (PACR)**

- OMB review on-going.

CHICKAMAUGA LOCK PROJECT OVERVIEW

Road & Bridges - \$6M
Completed Feb 2007

Site Restoration
Award scheduled: Sep '23

Approach Walls & Decommissioning
Award scheduled: Sep '21

Contract Legend

Completed

Current

Future

Lock & Associated Facilities	\$752M
Road and Bridges	6M
Total	\$758M (Oct '17 P.L.)

\$255.3M Expended thru Mar 2019 = 34% completed

Bridge Fabrication - \$400K
Completed June 2011

Gates & Valves - \$17M
Awarded Sep 2009, Comp 2012

Approach Beams - \$14M
Awarded Apr 2010, Comp 2013

Cofferdam - \$86M
Awarded Sep 2006, Comp 2012

Cofferdam Stabilization - \$3.1M
Awarded Sep 2015, Comp 2016

Lock Chamber - \$240M
Awarded: Sep 2017
Earliest Comp: May 2023

Lock Excavation - \$34.9M
Awarded Sep 2016
Demobilized: 1 Feb 2019

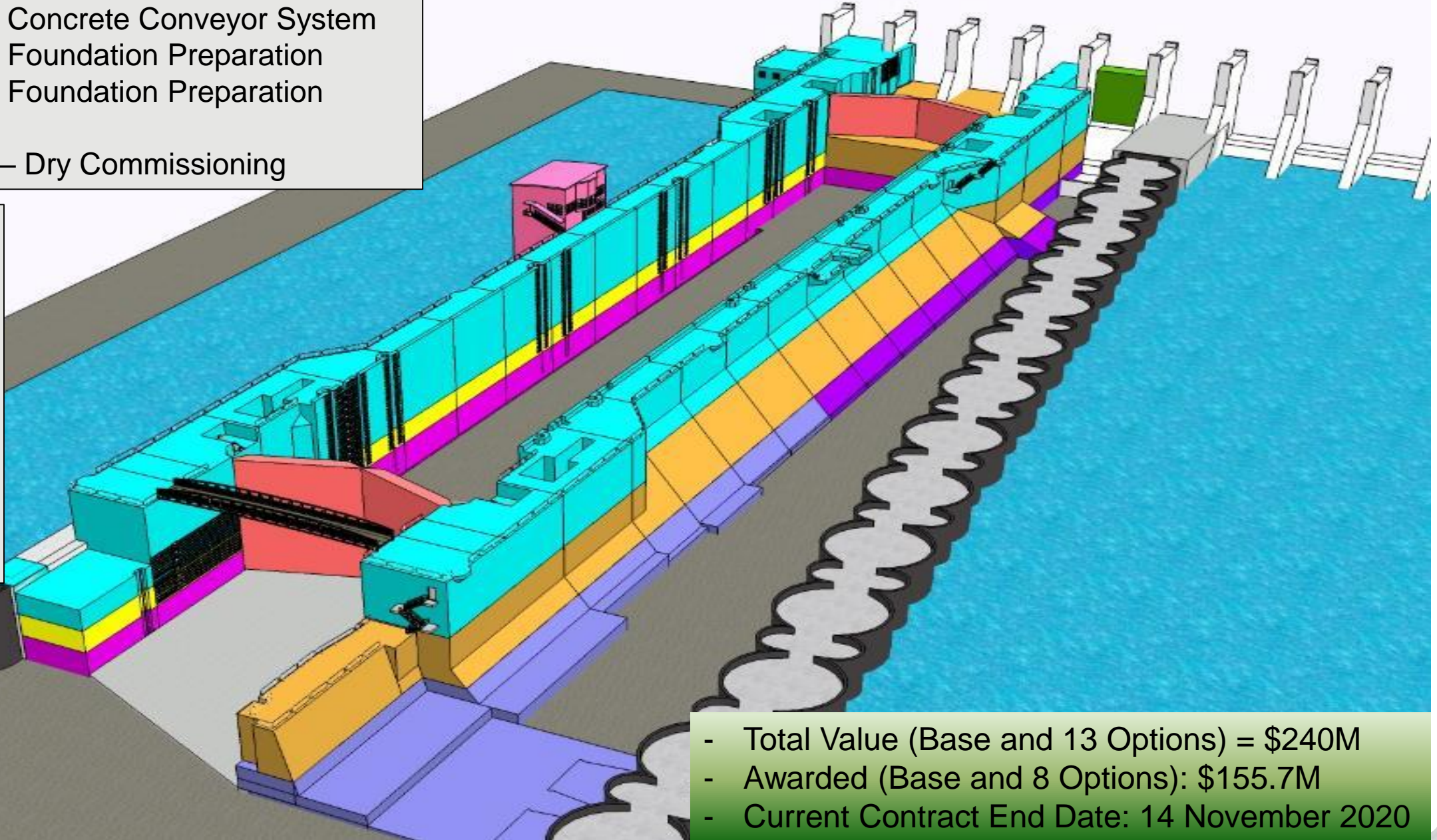


Lock Chamber Construction Contract

- ✓ Option 1 – Concrete Conveyor System
- ✓ Option 2 – Foundation Preparation
- ✓ Option 3 – Foundation Preparation
- ⋮
- Option 13 – Dry Commissioning

Legend

- ✓ Option 4
- ✓ Option 5
- ✓ Option 6
- ✓ Option 7
- ✓ Option 8
- Option 9
- Option 10
- Option 11
- Option 12



- Total Value (Base and 13 Options) = \$240M
- Awarded (Base and 8 Options): \$155.7M
- Current Contract End Date: 14 November 2020

Current project photos

1



1. 18 April 2019: Lock Chamber contract – Clean up after high water event that resulted in turning off dewatering system for 28 days. Mucking out dam apron in preparation for spillway apron removal.

BUILDING STRONG®
and Taking Care of People!

Chickamauga Lock & Dam, Tennessee River, TN

	ARRA	CG	IWTF	Total
Total Project Cost (TPC):				\$757,666,000 ¹
Allocations through FY2014:	\$49,307,619	\$68,391,511	\$68,389,500	\$186,088,630
FY15 Allocation:	\$0	\$1,500,000	\$1,500,000	\$3,000,000
FY16 Allocation:	NA	\$14,800,000	\$14,800,000	\$29,600,000
FY17 Allocation:	NA	\$20,000,000	\$20,000,000	\$40,000,000
FY18 Allocation:	NA	\$38,250,000	\$38,250,000	\$76,500,000
FY19 Allocation:	NA	\$76,245,000	\$13,455,000	\$89,700,000
Total Allocations to Date:	\$49,307,619	\$219,186,511	\$156,394,500	\$424,888,630
Remaining TPC Balance:				\$332,777,370
Remaining Balance Change From Last Meeting				\$0

Note: ¹Cost & Schedule data reflect the FY2018 risk based total project cost update, Fully Funded, assuming Dec 2024 completion.

Changes

None

Funding Overview

- Authorized Cost: \$757,666,000 (Oct 17 \$)
- 902 Limit: \$909,199,200 (Oct 17 \$)
- ARRA Funds: \$ 49,307,619 (total FY09-12)
- Engineering & Design Cost: \$ 55,230,000 (thru FY18)
- Supervision & Admin Cost: \$ 9,153,000 (thru FY18)
- Mitigation Cost: TBD

Current Status of the Project

- Lock Chamber contract (**Base & 8 Options**) valued at **\$155.7M**; **17%** financially complete.
- Lock Excavation (LE) contract – **negotiating final mods for contract closeout.**
- OMB review of PACR underway.

Next Steps

- LE contract closeout.
- Lock Chamber contract – **exercise portions of Options 9 & 10 in Aug 2019.**

BUILDING STRONG®
and Taking Care of People!



US Army Corps
of Engineers



Chickamauga Lock & Dam, Tennessee River, TN

Schedule of Remaining Work	Design Initiated	Contract Award	Construction Complete *	Project Benefits**	Capitalized Cost Closeout
Task 1 – Approach Walls Fabrication	30-Mar-04	05-Apr-10	08-Mar-13		
Task 2 – Cofferdam Stabilization	31-Sep-05	25-Sep-15	18-Jul-16		
Task 3 – Lock Excavation	31-Sep-05	26-Sep-16	1 Feb 2019***		
Task 4 – Lock Chamber	11-Aug-05	28-Sep-17	May 2023		
Task 5 – Approach Walls and Decommission	11-Aug-05	30-Sep-21	Dec 2024	Sept 2023	
Task 6 – Site Restoration	11-Aug-05	30-Sep-23	Dec 2024		

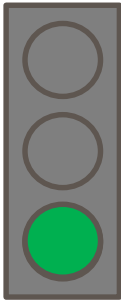
*Dates are achievable based on the most efficient funding profile.

**Based on June 2018 Certified cost estimate Cost and Schedule Risk Assessment, the project has an 80% confidence level of being completed by Jan 2027. Primary driver for the 25 months of schedule contingency is the funding stream uncertainty.

***Date Lock Excavation contractor demobilized from cofferdam work area and laydown yard.

Chickamauga Lock Project

Time and Cost Scorecard



Expenditures	31 Mar
Planned (BCWS)	\$266.7M
Earned (BCWP)	\$255.8M
Actual (ACWP)	\$255.3M

BCWP: Reports the value (based on % complete) of the work performed to date.

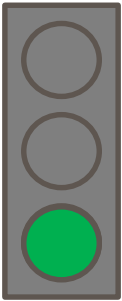
Target:
Actual as compared to Planned: (<1% = Green)
(>1%and <3% = Yellow) and (>3% = Red)

Schedule	31 Mar
	(Baseline)/(Current)

Project Complete	May 2028 / Dec 2024
Lock Operational	Nov 2027 / Sept 2023

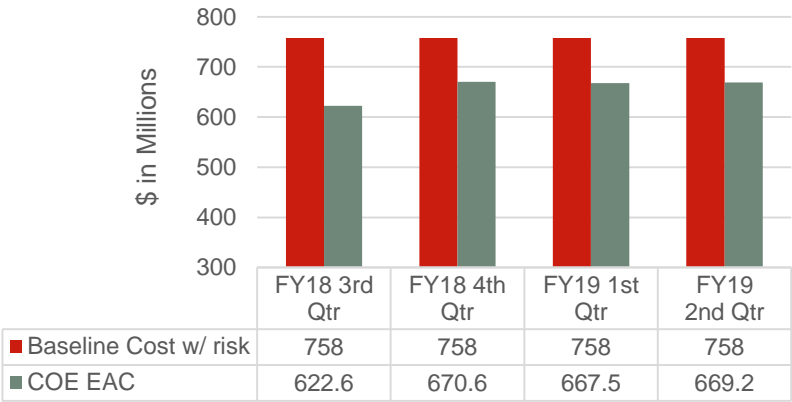
Measures: Planned project completion and Lock operational dates

Target: Lock Chamber contract completion May 2023



Budget

Chickamauga Project EAC Trend



Major Activity Schedule

Activity	Baseline	Current
PACR – OMB Approval	1 Mar 2019	???
Lock Chamber – Initial Monolith Concrete Placement	May 2019	June 2019
Lock Chamber – Exercise Add. CLINS	30 Aug 2019	30 Aug 2019

BUILDING STRONG®
and Taking Care of People!



US Army Corps
of Engineers



Civil Works Cost Estimating - Contingency Development

- **Cost and Schedule Risk Analysis (CSRA) –**

- Identify potential **cost and time impacts** from all project features and phases.
- **Risk Register**
 - Team identifies **probability of occurrence and severity of impacts**.
- Probability analysis using a **Monte Carlo (statistical) simulation** method.
- **80% confidence level contingencies** will be reported.

Simplified Sample Risk Register

		Project Cost				Project Schedule			
Risk Event	Impact Statement	Impact	Likelihood	Risk Level	Model Value	Impact	Likelihood	Risk Level	Model Value

Risk Matrix

		Impact or Consequences of Occurrence				
		Negligible	Marginal	Significant	Critical	Crisis
Likelihood of Occurrence	Certain	Low	Moderate	High	High	High
	Very Likely	Low	Moderate	High	High	High
	Likely	Low	Moderate	High	High	High
	Unlikely	Low	Low	Moderate	Moderate	High
	Very Unlikely	Low	Low	Low	Low	High

Civil Works Cost Estimating - Contingency Analysis

- **2018 CSRA - Chickamauga Lock**
 - **Cost Contingency (composite) = 19%**
 - Awarded/On-going contracts = 13%
 - Future contracts = 30%
 - **Schedule Contingency (composite) = 25 months**
 - Awarded/On-going contracts = 11 months
 - Future contracts = 14 months
- **2016 CSRA - Chickamauga Lock**
 - **Cost Contingency = 29% (vs. 19% now)**
 - **Schedule Contingency = 46.5 months (vs. 25 now)**

Confidence Level	Cost Value	Schedule Value
0%	5.06%	2.6 months
10%	11.40%	10.8 months
20%	13.02%	12.9 months
30%	14.16%	14.6 months
40%	15.14%	16.3 months
50%	16.05%	18.1 months
60%	16.97%	20.0 months
70%	17.89%	22.1 months
80%	18.99%	24.7 months
90%	20.45%	28.2 months
100%	27.62%	41.9 months

Chickamauga Lock Replacement

2018 Total Project Cost Estimate - Cost Sensitivity

Cost Contingency = \$90.9M (19%)

Construction Modifications, Claims – Awarded Contracts

Funding Variations – Awarded Contracts

Contract Acquisition – Schedule of Future Contracts

Low Risk Items & Expected Cost Variances

Variations in Production/Crew Assumptions

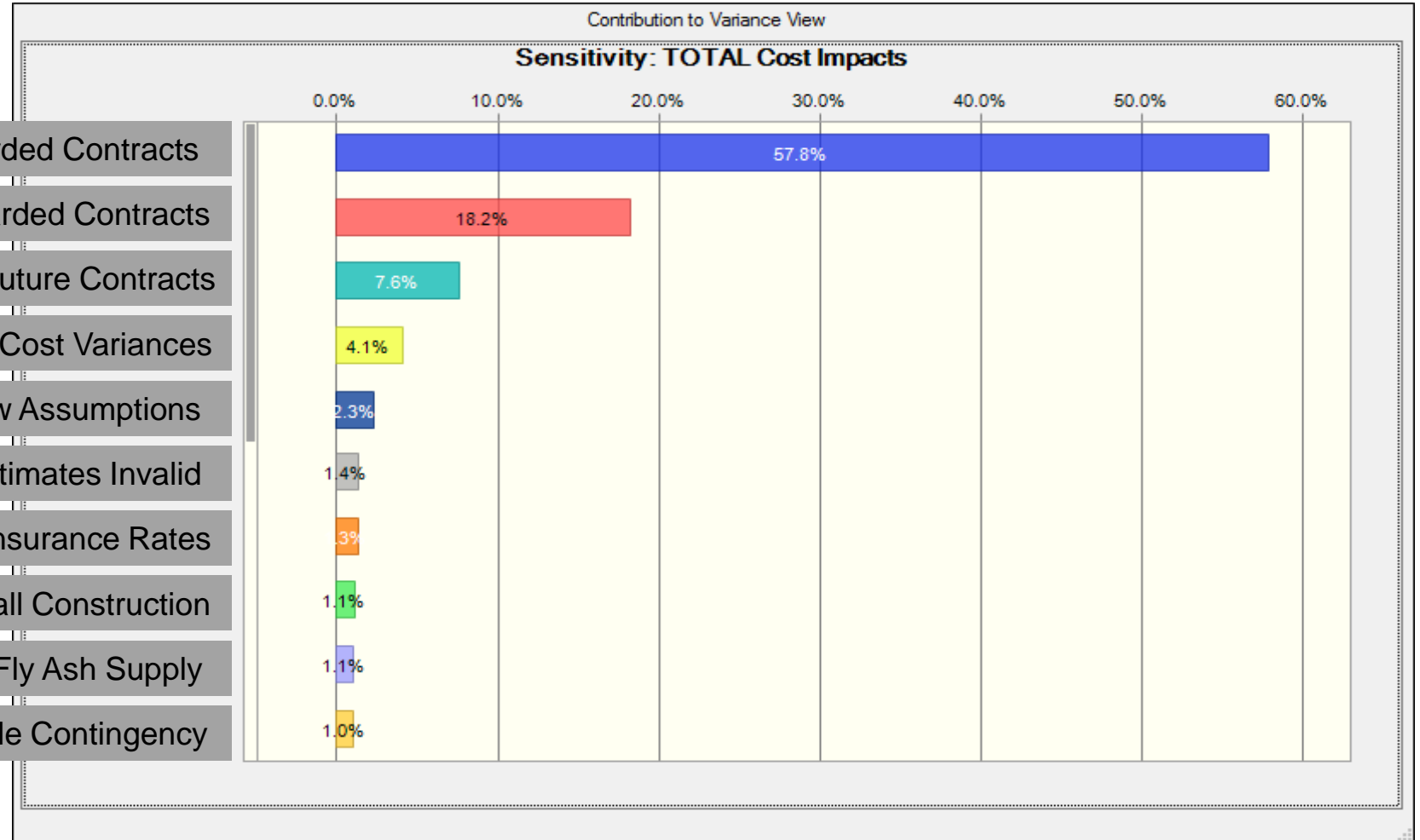
Supply or Material Estimates Invalid

Variations in Insurance Rates

Upstream Approach Wall Construction

Concrete – Fly Ash Supply

Inflation Rate Variations & Due to Schedule Contingency



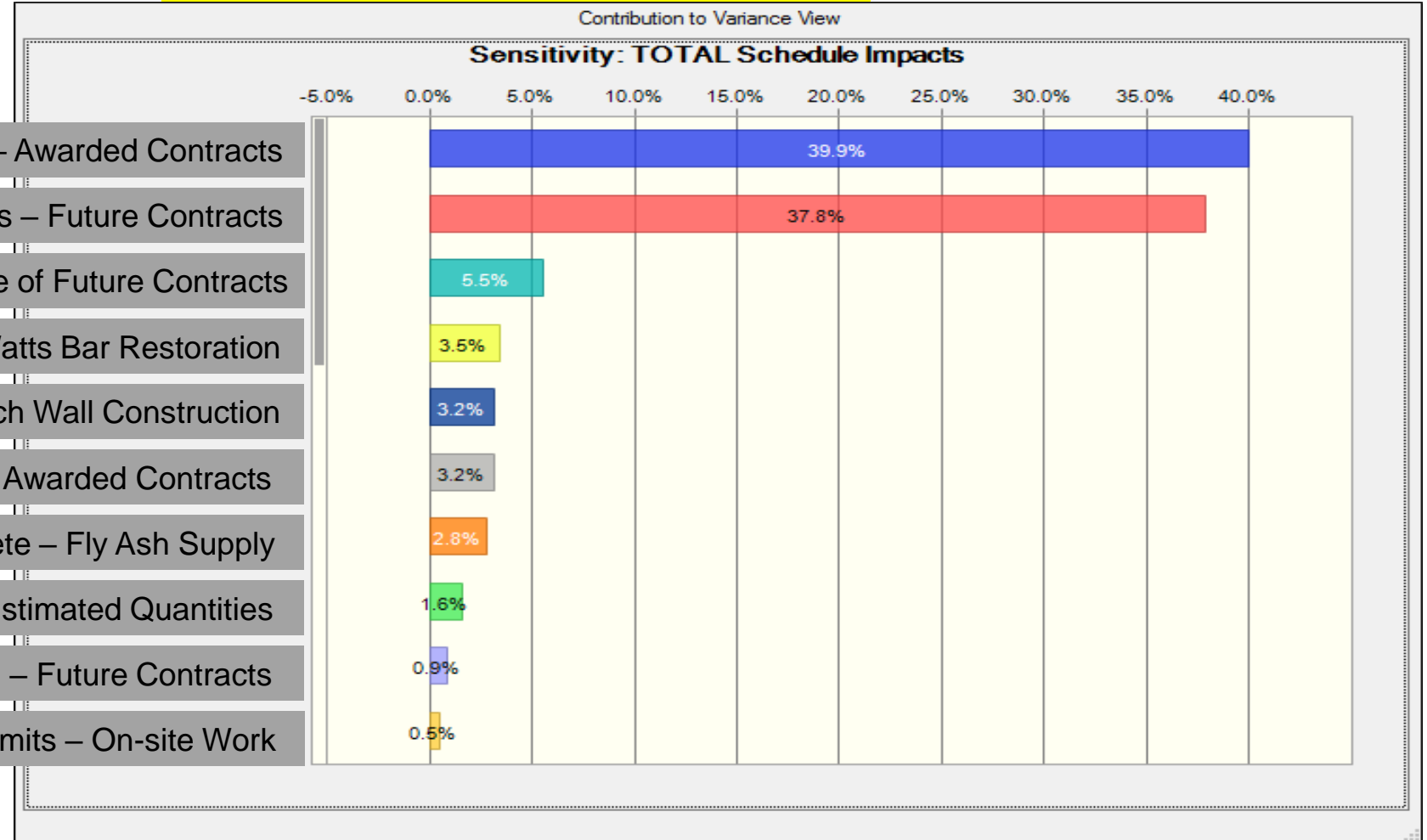
BUILDING STRONG®
and Taking Care of People!

File Name

Chickamauga Lock Replacement

2018 Total Project Cost Estimate - Schedule Sensitivity

Schedule Contingency = 25 months



BUILDING STRONG®
and Taking Care of People!

File Name



US Army Corps
of Engineers



Chickamauga Lock Summary and Challenges

- **Lock Excavation** contract is substantially complete.
 - Working on Contract Closeout
- **Lock Chamber** contract on-going.
 - Exercised 4 Options in March 2019, anticipate partial exercise of options in Aug 2019.
 - Preparing for concrete placements on monoliths as early as June 2019.
- **Efficient Funding Profile**

FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Total
\$94.5M	\$70.4M	\$64.4M	\$74.3M	\$24.2M	\$327.8M