

# Kentucky Lock Project Update Inland Waterway Users Board Meeting #85

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# KY Lock Addition BLUF

## ■ Bottom Line Up Front

### ▶ Downstream Cofferdam Construction

- Value Engineering Proposal to eliminate underwater blasting
  - ▷ Savings of over \$1.5 million coming back to the Project
  - ▷ Reduces Safety and Schedule Risk
  - ▷ Expected closure of existing lock going down from 30 days to 10 days.

### ▶ Level III Economic Update is proceeding well

### ▶ Site, Demolition, and Utilities contract (<\$5M) on track Dec 2017 award

### ▶ Downstream Lock Excavation contract (\$25M to \$100M) on track for FY18 award

# KY Lock Project Overview

Bridges Superstructures - \$104M  
Completed Jul 2014

Bridges Substructures - \$44M  
Completed Mar 2006

D/S Excavation  
Award – Sept. 2018

D/S Cofferdam - \$67.1M  
Award - Sept. 2016

U/S Miter Gate Fab. - \$5.6M  
Completed Dec 2016

D/S Lock  
Award – Sept. 2019

Upstream Cofferdam - \$17M  
Completed Nov 2006

Upstream Lock - \$110M  
Completed Feb 2017

Approach Walls  
Award – Sept. 2021

Site, Demolition, &  
Utilities  
Award – Dec 2017

Lock & Associated Facilities	\$1,044M
TVA Transmission Towers	13M
P & L Railroad	97M
Hwy 62 and other roadways	100M
Total	\$1,254M

\$499M Obl thru Sep 2017 = 40% complete

## Downstream Cofferdam

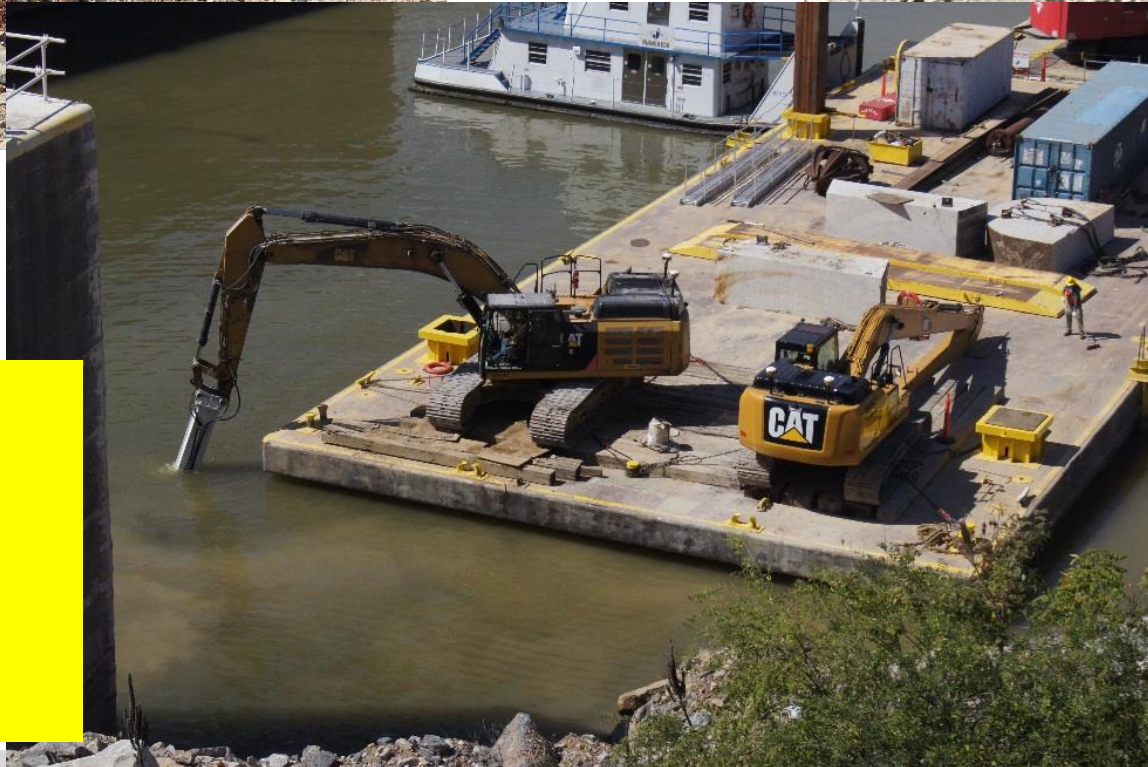
- Low Bid: \$67.1M (IGE \$55M)
- Low Bidder: Johnson Bros.
- Award: September 2016
- Complete: December 2019

Downstream  
Cofferdam

# Drum Cutter Demonstration 27 Sep 2017



## Drum Cutter Production Start 4 Oct 2017

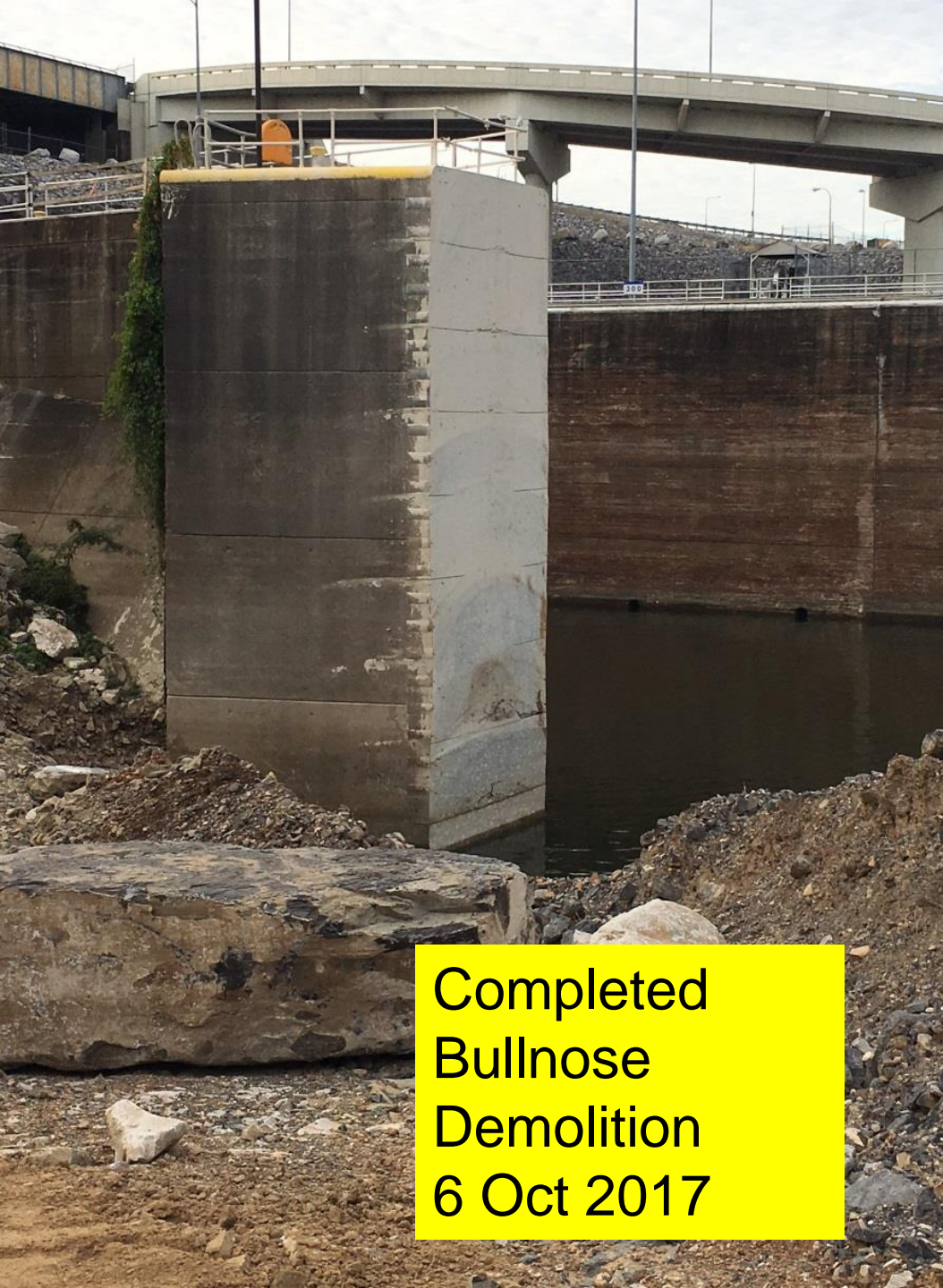


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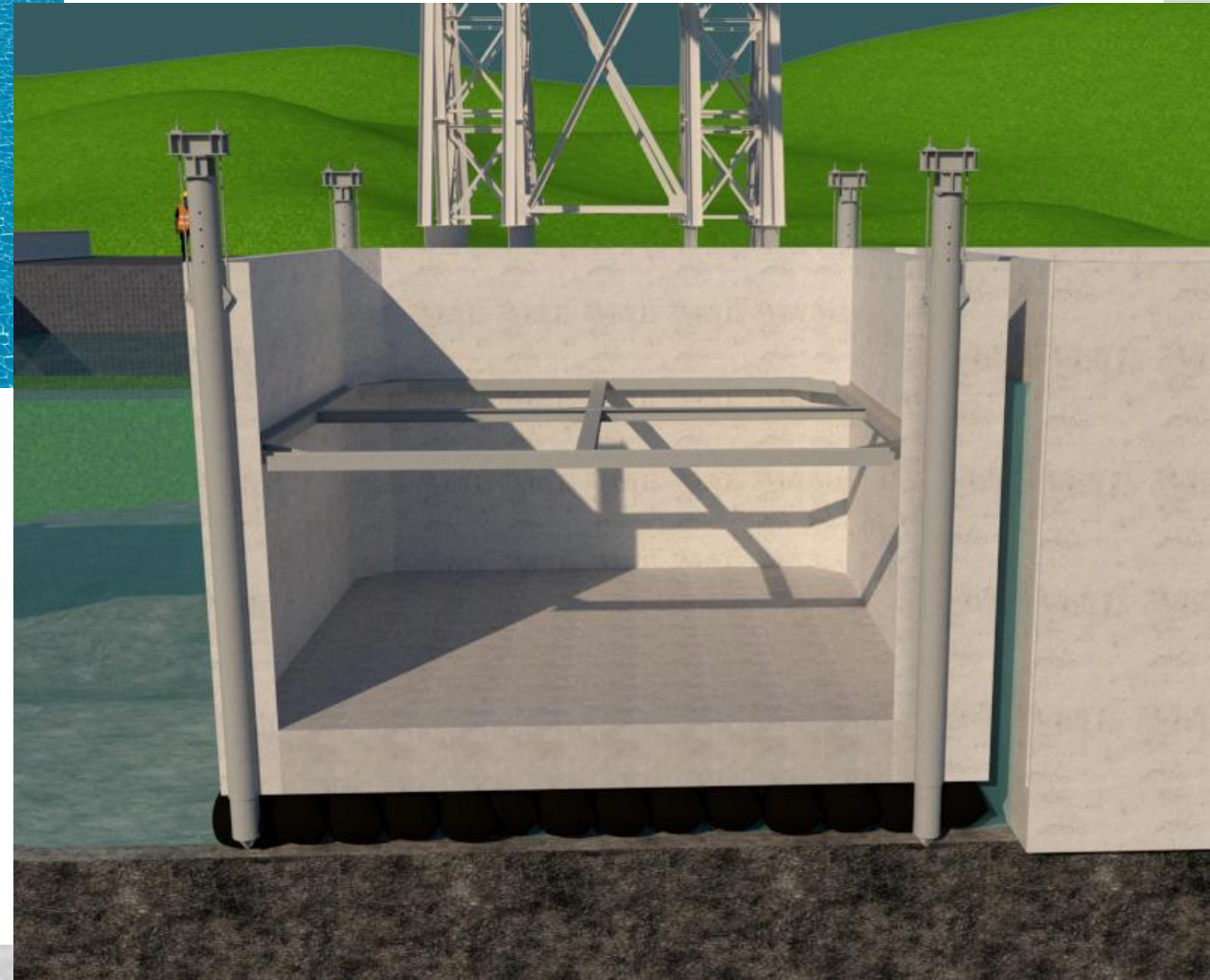
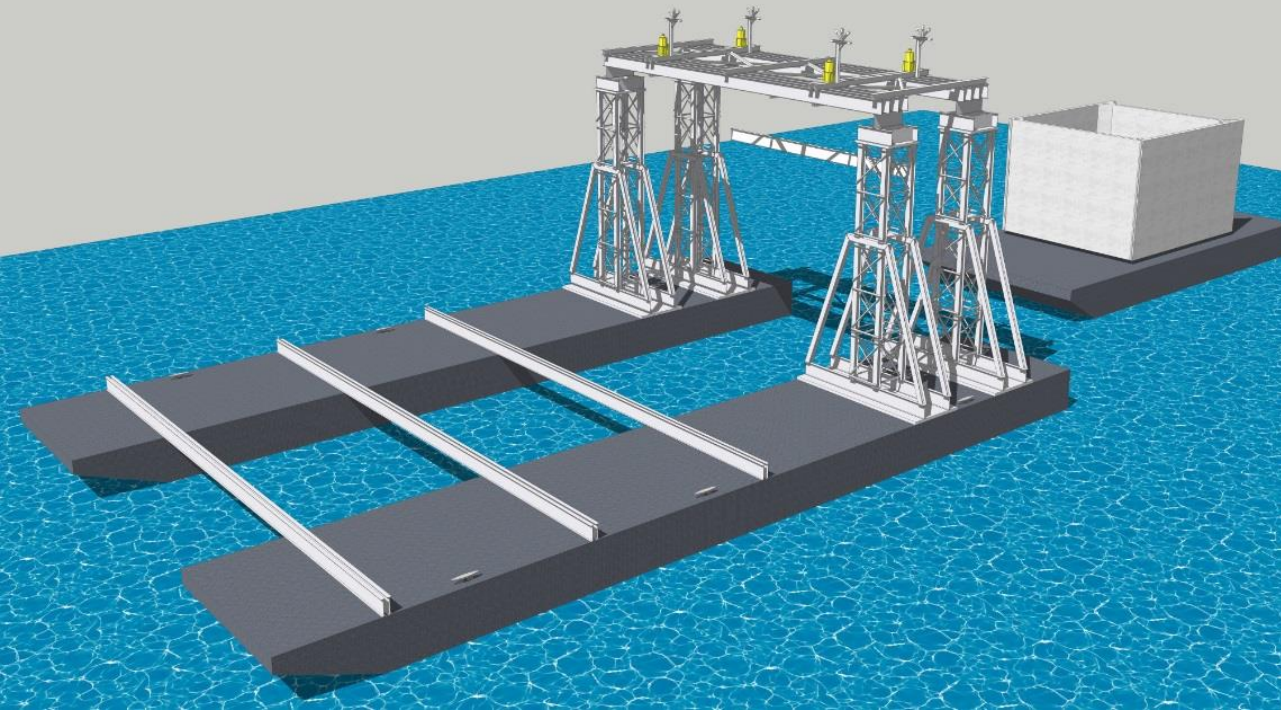


Completed  
Bullnose  
Demolition  
6 Oct 2017



Sheetpile  
connector wall  
6 Oct 2017

## Lift-in Arrangement 3D Model



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# KY Lock Project Schedule

Major Feature Construction	Award	Complete <sup>2</sup>	Revised
Upstream Lock Monoliths Construction	Jan 2010	Feb 2017	Complete
Downstream Cofferdam Construction	Sep 2016	Nov 2019	Dec 2019
Site, Demolition & Utilities	Dec 2017	Jan 2019	
Downstream Lock Excavation Construction	Sep 2018	Dec 2020	
Downstream Lock Construction	Sep 2019	Mar 2024	
Approach Walls Construction	Sep 2021	Nov 2023	
Risk Based Total Project Cost Estimate	Mar 2016	3 Jan 2017	Complete
Economic Update	Jan 2017	Jan 2018	
Post Authorization Change Report for 902 Exceedance <sup>1</sup>	Jul 2017	Mar 2018	

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<sup>1</sup>902 Exceedance expected by FY2022

<sup>2</sup> New schedule associated with new cost estimate. Assumes no risk. 80% confidence schedule adds 46 months to project completion date)

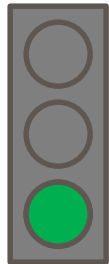


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# Kentucky Lock Project

## Time and Cost Scorecard



### Expenditures

30 Sep

Planned (BCWS)	\$442.5M
Earned (BCWP)	\$440.0M
Actual (ACWP)	\$438.2M

**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

30 Sep

(Baseline)/(Current)

Project Complete	May 2028 / Jul 2024
Lock Operational	May 2028 / Jul 2024

**Measures:** Planned project completion and Lock operational dates

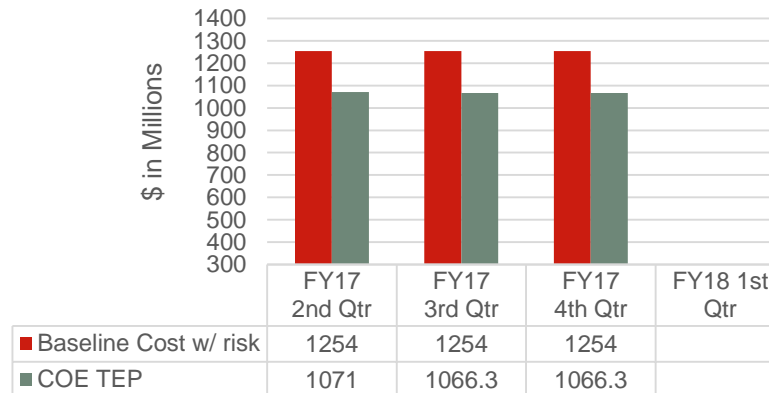
#### Target:

PACR Anticipated in FY18.



### Budget

Chickamauga Project TEP Trend



### Major Activity Schedule

Activity	Baseline	Current
Level 3 Economic Update – Draft Report	14 Nov 2017	14 Nov 2017
Site, Demolition, & Utilities – Award Contract	Sep 2017	Dec 2017
PACR to HQ	Feb 2018	Feb 2018
Downstream Lock Excavation Award Contract	Sep 2018	Sep 2018

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# Corps' Project Cost Estimates

No Inflation

First Cost

- Used in Authorizing Legislation
- Useful for comparing cost estimates

OMB Inflation Rates

Funding Stream and  
Completion Date

Includes Inflation

Fully Funded Cost

- Used for Budget and Reporting purposes
- Updated every year as part of the Budget process

Both:

- Include Risk-based contingencies
- Reported at a FY Price Level
- Include construction duration
- Re-certified every 2 years

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# Inefficient Funding Cost Impacts

## Total Estimated – Past and Future

Cost Component	Kentucky Lock	Chickamauga Lock
Additional construction contractor overhead	\$157M	\$123.2M
Additional Mobilizations	\$10M	\$4M
Additional contract admin costs	\$1M	\$1.4
Additional Corps' Labor	\$60M	\$39M
Additional Inflation (Not applicable to First Costs)	NA	NA
Outdated designs and new processes/standards	\$1.5M	\$2.4M
<b>Total Inefficient Funding Cost Impacts</b>	<b>\$229.5M</b>	<b>\$170.0M</b>
Total First Cost	\$1,181M	\$703.5M
Inefficient Costs Percent of Total First Cost	19.4%	24.2%

### Notes:

- 1) KY Lock's construction period went from 9 years to 29 years and Chick from 6 years to 19 years from Feasibility Study to Risk-Based Schedule.
- 2) All costs are First Costs at FY17 price level.
- 3) There are factors that actually reduce costs for inefficient funding that are not included in above.

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Bid Results for Recent IWTF Projects' IFB Solicitations											
Project	Contract (date)	Contract Fund Type	Low Bid	2nd Low	3rd Low	4th Low	5th Low	6th Low	7th Low	8th Low	9th Low
			(\$'s in millions)								
Kentucky Lock	Bridge Superstructure (2005)	Old CCC	\$88.6	<b>\$90.6</b>	\$94.5	\$102.6	\$109.9				
Chickamauga	Cofferdam (2006)	Old CCC	<b>\$68.0</b>	\$83.0	\$116.3						
Kentucky Lock	U/S Lock Monoliths (2010)	Base w/ 10 Options	\$56.9	\$61.6	<b>\$66.1</b>	\$78.1	\$79.5	\$79.9	\$88.5	\$91.2	\$121.1
Lower Mon	River Chamber Completion (2015)	Base w/ 5 Options	<b>\$234.3</b>	\$240.8	\$306.3	\$322.9					
Kentucky Lock	D/S Cofferdam (2016)	Base w/ 6 Options	<b>\$55.3</b>	\$67.1	\$70.7	\$81.7	\$85.6				
Chickamauga	Lock Excavation (2016)	Base w/ 7 Options	<b>\$31.3</b>	\$33.2	\$34.4	\$36.3					
Chickamauga	Lock Chamber (2017)	Base w/ 13 Options	<b>\$206</b>	\$240.0	\$278.3	\$308.6	\$321.5	\$324.0			
Red font are Independent Government Estimates w/o Profit											

Bid Results for Recent IWTF Projects' IFB Solicitations - Low Bid Factored-out								
Project	Contract (date)	Contract Fund Type	Low Bid	2nd Low	3rd Low		% increase if Low Bidder is dropped	\$ increase if Low Bidder is dropped
			(\$'s in millions)					(M's)
Kentucky Lock	Bridge Superstructure (2005)	Old CCC	\$88.6	<b>\$90.6</b>	\$94.5		6.7%	\$5.9
Chickamauga	Cofferdam (2006)	Old CCC	<b>\$68.0</b>	\$83.0	\$116.3		40.1%	\$33.3
Kentucky Lock	U/S Lock Monoliths (2010)	Base w/ 10 Options	\$56.9	\$61.6	<b>\$66.1</b>		8.3%	\$4.7
Lower Mon	River Chamber Completion (2015)	Base w/ 5 Options	<b>\$234.3</b>	\$240.8	\$306.3		27.2%	\$65.5
Kentucky Lock	D/S Cofferdam (2016)	Base w/ 6 Options	<b>\$55.3</b>	\$67.1	\$70.7		5.4%	\$3.6
Chickamauga	Lock Excavation (2016)	Base w/ 7 Options	<b>\$31.3</b>	\$33.2	\$34.4		3.6%	\$1.2
Chickamauga	Lock Chamber (2017)	Base w/ 13 Options	<b>\$206.0</b>	\$240.0	\$278.3		16.0%	\$38.3
			Red Font are IGE's				Total	\$152.5

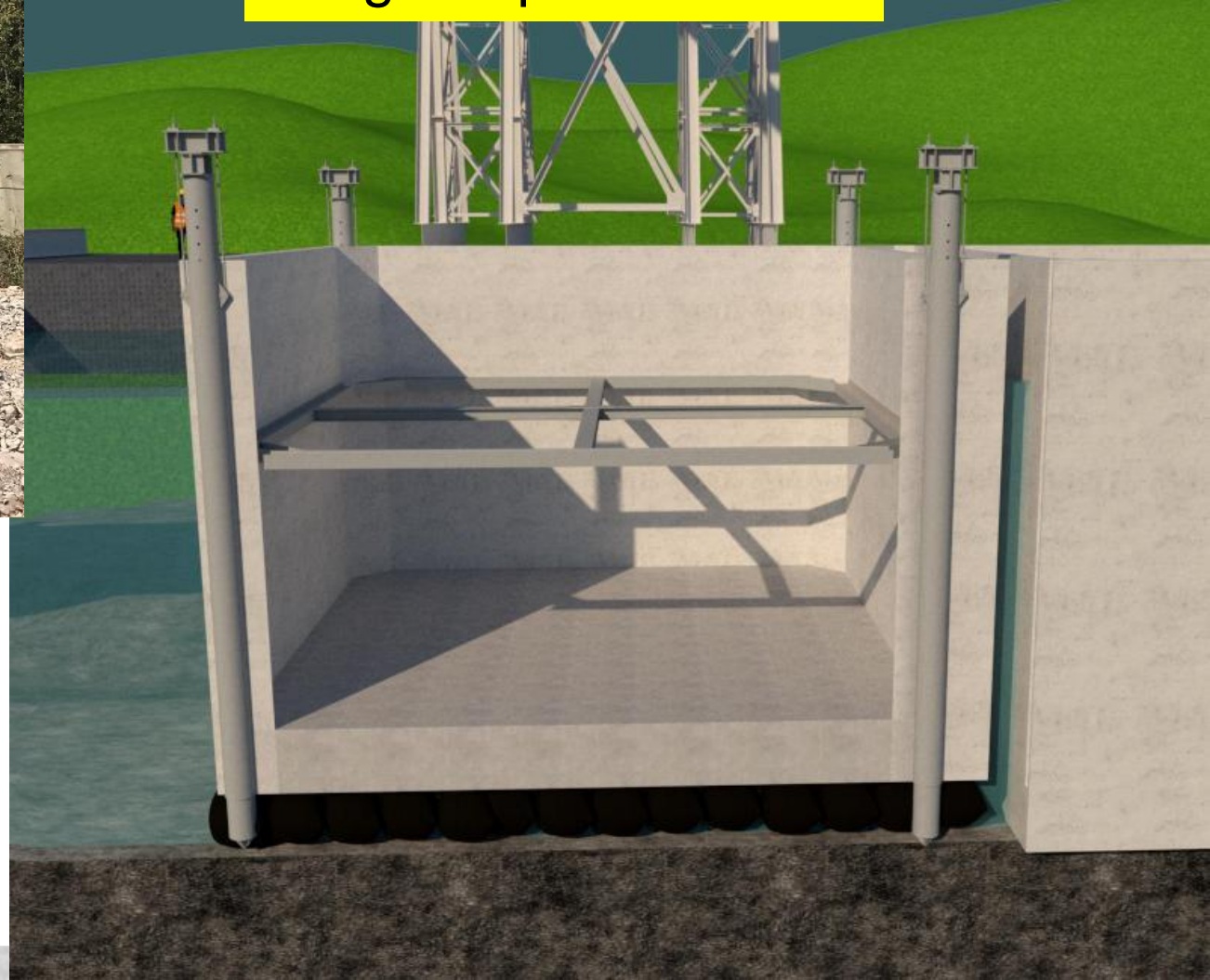
# Cost Estimate Comparison of Categories with Large Differences

Feature	Authorized Cost	2017 TPCE	Difference	Percent Difference	Sunk Costs	Remaining Costs
	(FY2017 Price Level)	(FY2017 Price Level)				
Approach Channels	\$6,338,182	\$11,501,124	\$5,162,942	81%	\$0	\$11,501,124
Lock Monoliths	\$160,213,038	\$217,039,656	\$56,826,618	35%	~\$50,000,000	\$167,039,656
Lock Excavation	\$12,903,034	\$23,784,911	\$10,881,877	84%	~\$6,000,000	\$17,784,911
Electrical	\$12,075,155	\$9,993,022	-\$2,082,133	-17%	\$0	\$9,993,022
Gates & Machinery	\$46,307,430	\$53,100,199	\$6,792,769	15%	\$15,100,000	\$38,000,199
Cofferdams	\$52,712,225	\$94,358,499	\$41,646,274	79%	\$16,954,711	\$77,403,788
Hwy & RR Relocations	\$60,374,265	\$163,968,191	\$103,593,926	172%	\$163,968,191	\$0
Approach Walls	\$39,793,810	\$99,224,879	\$59,431,069	149%	\$0	\$99,224,879
Plan, Eng, & Design	\$70,604,371	\$125,324,501	\$54,720,130	78%	\$109,461,501	\$15,863,000
Constr. Management	\$32,733,138	\$50,448,542	\$17,715,404	54%	\$18,015,542	\$32,433,000
Grand Total	\$734,419,913	\$1,180,973,724	\$446,553,811	61%	\$425,702,724	\$755,271,000

# KY Lock Controlling Costs

- **Ongoing Downstream Cofferdam Construction:**
  - ▶ **Value Engineering Change Proposal**
    - >\$1.5M returned to the Project (Contract value from \$67.1M to \$65.5M)
    - Significantly reduces schedule and safety risk
  - ▶ **Incentives to minimize closures of existing lock**
    - Expected closure from 30 days down to 10 days due to VECP and Incentives
    - Incentives are \$50K/day to eliminate lock closures
    - \$50K based on cost to Nav industry (Carrot vs. Stick approach)
  - ▶ **Encourage creativity on concrete batch plant**
- **Re-use of Wolf Creek Resident Office**
- **Value Engineering Studies**

Two Key Contractor  
Developed Methods to  
make VECP viable: 1)  
Drum Cutter, and 2)  
Integral Spuds



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Drill Rig on Approach  
Wall with custom  
frame



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New Federal Materials  
Concrete Batch Plant  
1.5 miles away



## Free Resident Office from Wolf Creek Project



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# Value Engineering Studies

- **Past**

- ▶ **Downstream Cofferdam – Confirmed that construction methods should not be constrained or dictated.**

- **Future**

- ▶ **On all construction contracts >\$2M**
- ▶ **Both Upstream and Downstream Approach walls appear to have promise for cost saving measures**

# KY Lock

## Summary and Challenges

- Downstream Cofferdam construction going well – VECF is saving \$'s and reducing schedule and safety risks.
- Recent years average delays at KY Lock >9 hours and traffic levels remain robust. This should bode well for benefits in ongoing Economic Update.
- Downstream Lock Excavation will be configured to maximize funding flexibility