

# LRD IWTF Projects Update Inland Waterway Users Board

MS. JEANINE HOEY, PE, PMP  
CHIEF, E&C Division  
Pittsburgh District

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# Lower Mon Bottom Line Up Front

✓ Current Schedule: **On Schedule**

- ▶ 2023 (Project Operational)
- ▶ 2023 (Project Complete)

✓ Current Cost: **On Budget**

- ▶ TEP (\$1.2 B) – Total Estimated Price

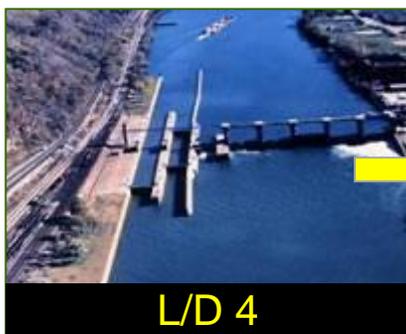
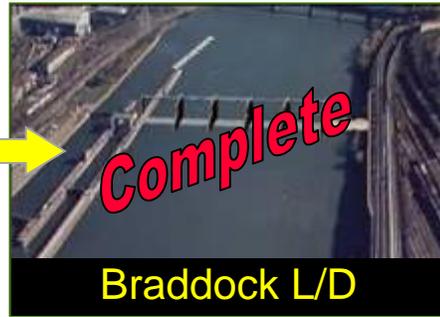
✓ Keys:

1. Fiscal year capability must include contingencies for modifications to fully funded contracts in order to avoid schedule slips.
2. Development of alternatives to bring project in ahead of schedule was evaluated.
  - Linear nature of RCC contract has best case reduction of 5 months (to achieve 90% of project benefits, associated with Breaching of L/D3)
  - Removal of L/D 3 is the final critical path item, following breach (benefits)
  - L/D 3 removal contract performance period– reduction possible, will be evaluated when P&S are developed.

# Lower Mon - Project Overview

Pre-Project Condition

Post-Project Condition



## Major Project Features

- New Dam at Braddock
- New Locks at Charleroi
- Dredging
- Removal of Locks and Dam 3
- Relocations

## Financial

- 902 Limit: \$1.76 Billion
- Current Estimate at Completion \$1.2 Billion, including contingencies

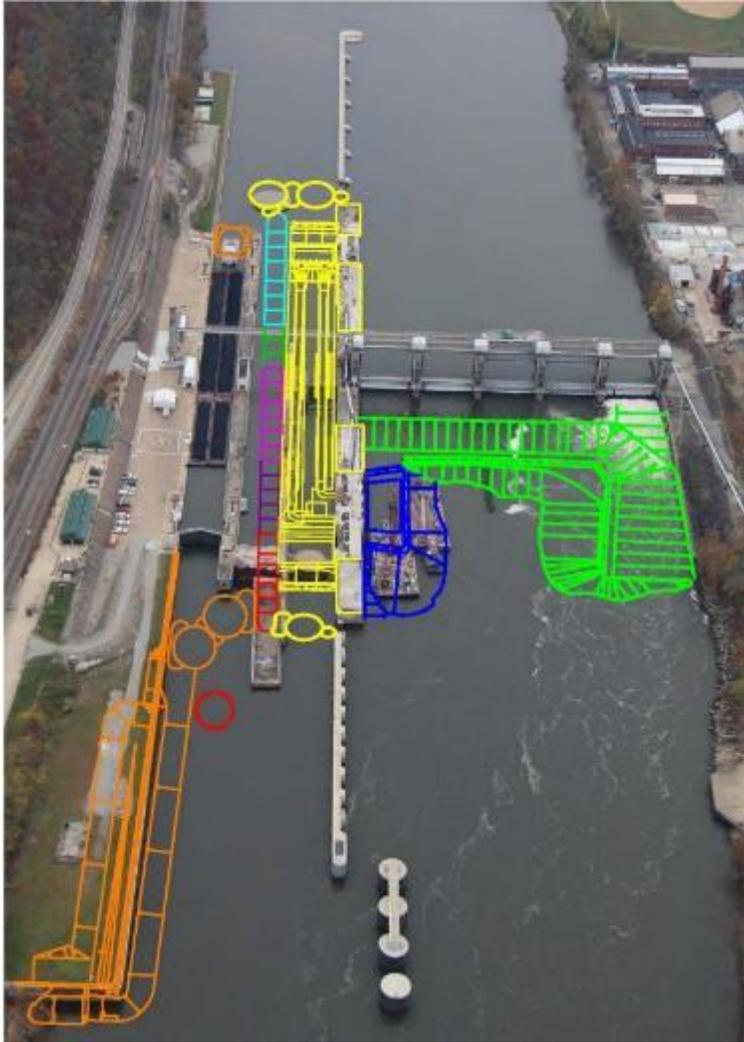
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## Lower Mon - Project Schedule

Major Feature Construction	Last Reported Completion (Oct 2016) No FY17 W.P.	Last Reported Completion (Oct 2016) with FY17 W.P.	Revised (with FY17 W.P.)
Charleroi River Wall	FY 2016		FY 2017 *
Charleroi M22-M27	FY 2019		
Charleroi Dam Stilling Basin	FY 2021		
Charleroi River Chamber Completion	FY 2027	FY 2023	
Dredging Pool 3	FY 2027	FY 2022	
Relocations	Variable		
Lock and Dam 3 Removal	FY 2027	FY 2023	

\* Completion of punch list items extended into December 2016.

## Lower Mon – Charleroi Ongoing / Pending Construction Plan



Description	Last Reported Completion	Current Completion (FY17 Work Plan)	Current Completion (No FY17 Work Plan)	Previously Planned Award	Current Planned Award	Option Expires	% Complete
M22-M27	2018	2019	2019	Completed		NA	38%
RCC Base	2023	2023	2019	Completed		NA	39%
RCC Opt 1	2023	2023	2027	May 17	May 17	30 Sep 17	NA
RCC Opt 2	2023	2023	2027	Jun17	Jun17	30 Sep 18	NA
RCC Opt 3	2023	2023	2027	Nov 17	Nov 17	30 Sep 18	NA
RCC Opt 4	2023	2023	2027	Dec 18	Dec 18	31 Mar 20	NA
RCC Opt 5	2023	2023	2027	Nov 20	Nov 20	31 Mar 21	NA
Stilling Basin	2021	2021	2021	Oct 18	Oct 18	NA	NA

### Notes:

- RCC – River Chamber Completion
- **RCC Option 1 will be awarded in May17, funds permitting.**
- **RCC Option 2 will be awarded in June17, funds permitting.**
- Risk informed RCC completion is 2027.

- Remaining project features not shown on this slide:

Dredging  
Pool Clearing  
Lock and Dam 3 Removal  
Relocations

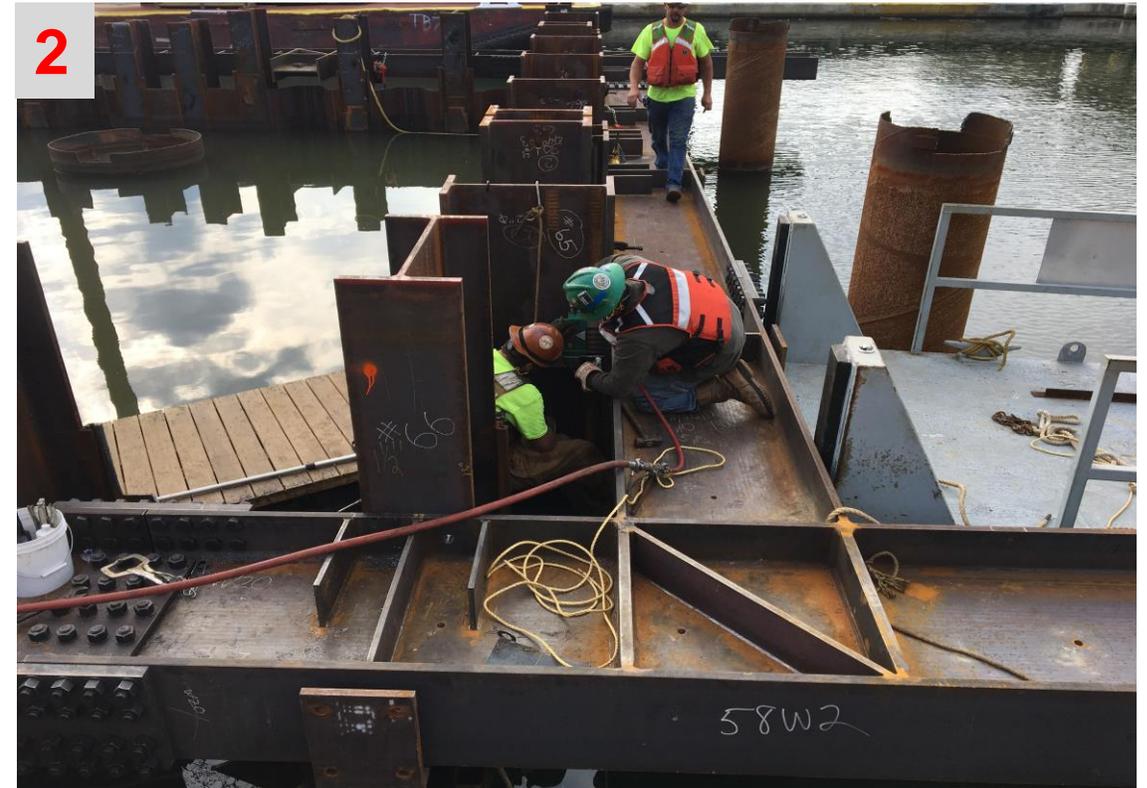
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# Charleroi Construction Images



1 - M22-M27 Contract: Airlifting in monolith M22

2 - RCC Base Contract: Showing installation upper waler of M7

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# Lower Monongahela River Project Time and Cost Scorecard



## Expenditures

Planned (BCWS)      **\$622.2M**  
 Earned (BCWP)      **\$631.62M**  
 Actual (ACWP)      **\$634.8M**

**Target:** Actual as compared to Planned: (<5% = Green); (>5% and <10% = Yellow); and (>10% = Red)

Values shown reflect project sunk cost of \$550.6M thru FY 2014 and Current data thru **Oct 2016**  
**CV = -0.5%, CPI=1.00**

## Schedule

*(Baseline)/(Current Early)*

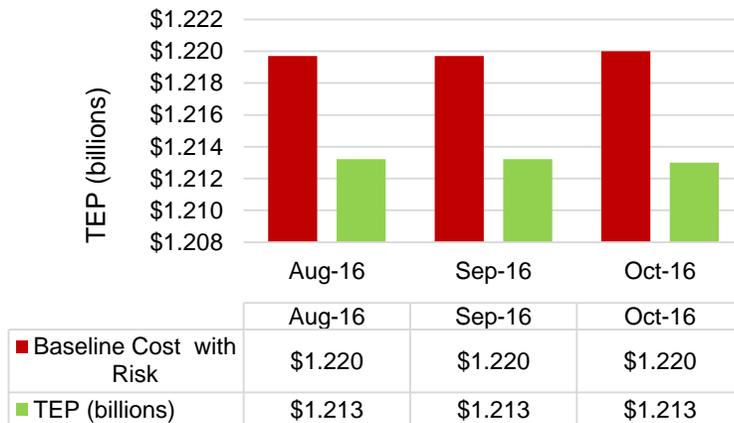
*Operational (Realize over 90% of project Benefits) 2027 / 2023 \**  
*Operational (Realize over 90% of project Benefits) 2027 / 2026 \*\**  
*Project Complete 2029 / 2028*

\* With FY 2017 work plan funding  
 \*\* Without FY 2017 work plan funding



## Budget

Lower Mon Project TEP Trend



## Major Activity Schedule

Activity	Baseline	Current
Award RCC Option 1 (w/ concrete)	NA	May 17
Award RCC Option 2 (w/ concrete)	NA	Jun 17
Real Estate Plan, Submit to LRD / Approval	NA	Oct 16 A / Nov 16 A
Stilling Basin Model	FY17	Feb 17
Dredging RTA	FY17	May 17

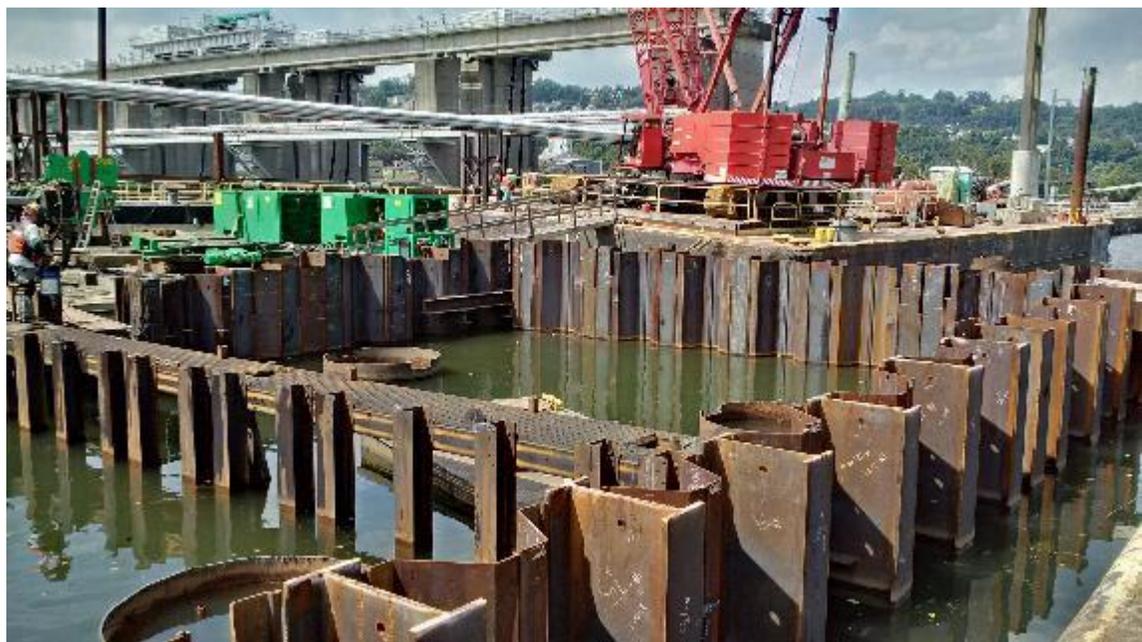
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# Discussion



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# Lower Mon BCR

## Deferral vs. Cancellation

### Port Perry Bridge and Land Chamber

BLUF: Minimal affect on BCR when comparing deferral vs. cancellation

- ▶ We assume seven percent as the real annual rate of return on investments – most important
- ▶ We assume zero inflation – secondary importance.

# Economics

## Inflation and Rate of Return

- Zero inflation means it will cost \$500M to build it no matter when it is built.
- An annual return of 7% means that you only need \$92.1 now to have \$500 million in 2045

# Basis for Assumptions

- Zero inflation is Corps policy dating back to 1950's when the Corps was developing consistent and logical analytic procedures to evaluate the economics of proposed projects
- The 7% is an OMB policy that is intended to reflect the rate of return they believe is standard in the private sector

# Affect on Economics

- Zero inflation means it is generally better to defer investments if possible;
- The 7% return on investment also means it is better to defer investments if possible.

# Simple Example

- Evaluate Three Scenarios – similar to Lower Mon
  - ▶ Immediate - Two chamber project with both constructed at current time.
  - ▶ Defer - Two chamber project with one chamber constructed now and one constructed 25 years from now.
  - ▶ Cancel - Two chamber project but only one constructed and the other not constructed.

# Baseline Scenario – build all in 2020

- Building both now means that present value and current value are equal
- Economic cost is the present value number
- The economic costs are converted into annual average costs using a mortgage-like factor of 7% discount rate and 50 year economic life.

Baseline - Construction both chambers and other work in 2020					
	First cost	Year Constructed	Present Value Factor	Economic cost	Ave Annual Equivalent Cost
River chamber plus all other work	\$ 1,200.0	2020	1.000	\$ 1,200.0	\$ 87.0
Land chamber only	\$ 500.0	2020	1.000	\$ 500.0	\$ 36.2
Total	\$ 1,700.0			\$ 1,700.0	\$ 123.2

# Comparison of Three Scenarios

	First cost	Constructed in	Present Value Factor	Economic cost	Ave Annual Equivalent Cost
<b>Baseline - both chambers and other work in 2020</b>					
River chamber plus all other work	\$ 1,200.0	2020	1.000	\$ 1,200.0	\$ 87.0
Land chamber only	\$ 500.0	2020	1.000	\$ 500.0	\$ 36.2
Total	\$ 1,700.0			\$ 1,700.0	\$ 123.2
<b>Defer - Construct river chamber and other work in 2020 and land chamber in 2045</b>					
River chamber plus all other work	\$ 1,200.0	2020	1.000	\$ 1,200.0	\$ 87.0
Land chamber only	\$ 500.0	2045	0.184	\$ 92.1	\$ 6.7
Total	\$ 1,700.0			\$ 1,292.1	\$ 93.6
<b>Cancel - Construct river chamber and other work in 2020 and cancel land chamber</b>					
River chamber plus all other work	\$ 1,200.0	2020	1.000	\$ 1,200.0	\$ 87.0
Land chamber only	\$ -	0	0.000	\$ -	\$ -
Total	\$ 1,200.0			\$ 1,200.0	\$ 87.0

# Discussion of Results

- Baseline vs. Defer: the present value of the land chamber drops from \$500 to 92.1 and the annualized equivalent from 36.2 to 6.7, a \$29.5 decrease
- Defer vs. Cancel: the annualized equivalent cost drops from 6.7 to 0, a \$6.7 decrease.
- Thus the big affect is captured in deferral and not cancellation.

# Benefit to Cost Ratio for the scenarios

		Ave Annual Values		BCR
		Benefits	Costs	
1	Baseline - Construction both chambers and other work in 2020	\$ 123.2	\$ 123.2	1.0
2	Defer - Construct river chamber and other work in 2020 and land chamber in 2045	\$ 131.1	\$ 93.6	1.4
3	Cancel - Construct river chamber and other work in 2020 and cancel the land chamber	\$ 127.1	\$ 87.0	1.5

# Sensitivity

- Discount Rate: Reduce discount rate from 7.0% to 3.5%
- Fully Funded Costs: Use fully funded rather than current cost for future expenditures
- Remaining Costs: Consider only remaining costs (forget sunk costs)

# BCR Sensitivity - costs and discount rate

	Discount rate	7%	7%	7%	3.5%
	Price level	FY16	Fully funded	Remaining As of FY16	FY16
1	Baseline - Construct both chambers and other work in 2020	1.0	1.0	1.2	1.9
2	Defer - Construct river chamber and other work in 2020 and land chamber in 2045	1.4	1.2	2.1	2.7
3	Cancel - Construct river chamber and other work in 2020 and cancel land chamber	1.5	1.3	2.4	2.6

# Sensitivity of BCR

(ranked from greatest effect to least effect)

- Discount rate – high rate of 7% reduces BCR by nearly half.
- Use of remaining rather than total cost – use of total cost reduces BCR by nearly one-third
- Use of fully funded rather than current costs (Oct 16 price level) – reduces BCR by small amount.

# Preliminary BCRs for Lower Mon

Preliminary BCRs for Lower Mon					
		Total		Remaining	
		2.875%	7%	2.875%	7%
1	Construct river chamber and other work in 2020 and land chamber in 2045	2.8	1.5	4.4	2.2
2	Cancel only construction of land chamber	3.2	1.5	5.4	2.3
3	Cancel only construction of bridge	3.0	1.5	4.9	2.4
4	Cancel construction of both land chamber and bridge	3.4	1.6	6.1	2.6

Note: based on preliminary numbers for Oct 16 which will change; the project cost in Oct 16 dollars is \$1,657 million and the fully funded is \$2,654 million.

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# Summary

Why does cancellation of land chamber at Charleroi have such a small affect on BCR

- Primarily because of discounting using 7% with 0% inflation.
- Most of the economic advantages of cancelling construction of the land chamber has already been captured with the “deferred” plan