

Appendix H: Cost-Engineering

GREEN AND BARREN LOCK AND DAM DISPOSITION STUDY

Appendix H

Cost Estimate

Table of Contents

1.1. References

1.2. Basis of Estimates

1.3. Construction Methods

1.4. Pricing

1.5. Markups

1.6. Estimate Reports

1.7. Project Schedules

1.8. Total Project Cost Summaries

1.1. REFERENCES

- 1.) *“Navigation Disposition Study – Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1”* U.S. Army Corps of Engineers, dated September 2004
- 2.) *“Project Maps and Data Sheets – Volume 1 – River and Harbors – Green River R/H 8-2 Lock and Dam 6*, US Army Corps of Engineers, dated 30 September 1980
- 3.) *“Project Maps and Data Sheets – Volume 1 – River and Harbors – Green River R/H 7-2 Lock and Dam 5*, US Army Corps of Engineers, dated 30 September 1980
- 4.) *“Project Maps and Data Sheets – Volume 1 – River and Harbors – Green River R/H 6-2 Lock and Dam 4*, US Army Corps of Engineers, dated 30 September 1995
- 5.) *“Project Maps and Data Sheets – Volume 1 – River and Harbors – Green River R/H 5-2 Lock and Dam 3*, US Army Corps of Engineers, dated 30 September 1995
- 6.) *“Project Maps and Data Sheets – Volume 1 – River and Harbors – Barren River R/H 9-2 Lock and Dam 1*, US Army Corps of Engineers, dated 30 September 1978

1.2. BASIS OF ESTIMATES

The estimates (Recommended Estimate and Alternate Recommended Estimate) are based upon a previous feasibility study conducted September 2004 entitled “NAVIGATION DISPOSITION STUDY – Green River Locks and Dams 3, 4, 5, and 6 and Barren River Lock and Dam 1”, “Project Maps and Data Sheets – Volume 1 – River and Harbors”, a recent project site visit, common construction practices, assumptions by the estimator, and technical recommendations from the appropriate PDT members.

-WBS: The estimates are organized per the Civil Works Work Breakdown Structure (WBS) by work feature.

-Acquisition Strategy: Per PDT discussions, this project is anticipated to be awarded through the MATOC process.

-Contractor Hierarchy: The estimator assumes different contractor hierarchies due to the different features of work. The features of work include: Dam Demolition, Earthwork, Dredging, Concrete, Signage, Fencing and Asphalt Paving. If the MATOC process is employed then it is reasonable to assume that the MATOC Contractor (Prime Contractor) may not self perform any of the major features of work, but rather subcontract them.

1.3. CONSTRUCTION METHODS

-Recommended Estimate:

The scope of work is demo Green River Dam 6, fill Green River Lock 6 with dam demolished material and place surplus demolished material along lower approach wall, extend the concrete ferry ramps at the Houchins Ferry, dredge the ferry canal at the Green River Ferry, install warning signs on the land side lock chamber walls at Green River Lock 3 – 6 and Barren River 1, install fan gates prior to miter gates, and install a concrete plug at the upper miter gates at Green River Lock 3.

Prior to demolishing of the Green River Dam 6 a temporary road will be constructed from the existing paved road through the woods to the dam and lock. The demolishing of the dam will be accomplished by constructing a road in the river just upstream of the dam to approximately mid-point of the dam to enable equipment to gain access to the dam from the lock side. The dam will then be breached by the use of an excavator with a hydraulic hammer attachment. Once the upper and lower pools have equalized, then the road will be completed across the river. The dam will be demolished and the debris will be loaded into off-road articulating trucks and hauled to land and further demolished if necessary. The demo material will be placed in the lock chamber by a track crane until the chamber is full and then placed along the lower approach wall. The material used to construct the road will be dismantled and hauled off-site.

After the demo of the dam resulting in loss of pool, modifications at the two upstream ferry crossings (Houchins and Green River Ferry) will be necessary to allow the ferries to continue operating. A design drawing for extending the ramps was provided by CELRL-ED-T-G. Access to the sites should not be a problem; included in the estimate is cost for traffic warning signs and barriers as needed. – At the Houchins Ferry the concrete aprons of the approach ramps will be extended further into the river. A coffer dam will be installed to divert the water away from the work area. Cast-in-place concrete 24' wide x 45/52' long x 8" thick will be first added to the existing ramps. The remainder of the ramp extensions will be accomplished with precast concrete planks (12" wide x 24' long x 8" thick). The planks will be threaded together with a steel cable secured at the bottom plank continuously to the cast-in-place ramp section. – At the Green River Ferry, it was determined from the September 2004 Feasibility Study that the ferry is located at a relatively high spot in the river; therefore, extending the ramps would not work. It was decided that dredging a channel in the river bottom would be most practical. A dredging depth of 2' was assumed to be adequate. The channel is to be dredged by a crane with a clamshell bucket and loaded onto dump trucks and hauled off-site.

Three warning signs will be equally spaced and installed on the lock side chamber walls at Green River Locks 3 – 6 and Barren River Lock 1. These warning signs will serve to inform pedestrian and/or vehicular traffic the danger of the lock chamber. A fan fencing barricade will be placed just prior to the miter gates in effort of preventing someone from walking onto the top of the miter gates.

At Green River Lock 3 the upstream gates are not fully mitered and the pool is being held by the downstream gates. Therefore to maintain pool, a concrete plug will be installed against the upstream gates.

-Alternate Recommended Estimate:

The scope of work is to demo Green River Dam 6, fill Green River Lock 6 with dam demo material and place surplus demo material along lower approach wall, extend the concrete ferry ramps at the Houchins Ferry, dredge the ferry canal at the Green River Ferry, and fill Green River Lock 3 – 5 and Barren River 1 with Rip-Rap.

Prior to demolishing of the Green River Dam 6 a temporary road will be constructed from the existing paved road through the woods to the dam and lock. The demolishing of the dam will be accomplished by constructing a road in the river just upstream of the dam to approximately mid-point of the dam to enable equipment to gain access to the dam from the lock side. The dam will then be breached by the use of an excavator with a hydraulic hammer attachment. Once the upper and lower pools have equalized, then the road will be completed across the river. The dam will be demolished and the debris will be loaded into off-road articulating trucks and hauled to land and further demolished if necessary. The demo material will be placed in the lock chamber by a track crane until the chamber is full and then placed along the lower approach wall. The material used to construct the road will be dismantled and hauled off-site.

After the demo of the dam resulting in loss of pool, modifications at the two upstream ferry crossings (Houchins and Green River Ferry) will be necessary to allow the ferries to continue operating. A design drawing for extending the ramps was provided by CELRL-ED-T-G. Access to the sites should not be problem; included in the estimate is cost for traffic warning signs and barriers as needed. At the Houchins Ferry the concrete aprons of the approach ramps will be extended further into the river. A coffer dam will be installed to divert the water away from the work area. Cast-in-place concrete 24' wide x 45/52' long x 8" thick will be first added to the existing ramps. The remainder of the ramp extensions will be accomplished with precast concrete planks (12" wide x 24' long x 8" thick). The planks will be threaded together with a steel cable secured at the bottom plank continuously to the cast-in-place ramp section. At the

Green River Ferry, it was determined from the September 2004 Feasibility Study that the ferry is located at a relatively high spot in the river; therefore, extending the ramps would not work. It was decided that dredging a channel in the river bottom would be most practical. A dredging depth of 2' was assumed to be adequate. The channel is to be dredged by a crane with a clamshell bucket and loaded onto dump trucks and hauled off-site.

Green River Locks 3 – 5 and Barren River Lock 1 are to be filled with rip-rap. For Green River Locks 3 and 4, the rip-rap will be hauled to the lock by commercial trucks and then placed in the lock by a crane. Green River Lock 5 and Barren River Lock 1 are more remote; the rip-rap will have to be dumped out at the end of the existing paved road and hauled to the locks by off-road articulating trucks via constructed temporary roads. For Green River Locks 3 – 5 and Barren River Lock #1, the existing paved roads leading up to the lock or to where the temporary roads begin were all determined to be secondary roads (not DOT maintained). It was my assumption that these secondary roads would not hold up to the traffic of the commercial trucks hauling the rip-rap. Therefore, the estimate includes cost for resurfacing the roads with a lift of asphalt binder prior to filling the locks, provisions for maintaining/patching the roads, and a lift of surface asphalt after filling the locks.

1.4. PRICING

Quotes for aggregates were received from local material suppliers.

Crew and production rates were used were from the cost book, derived by the estimator, or derived by discussions with other estimators.

Cost Sources: 2012 Cost Book – English. Updated material cost per quotes received and production rates as appropriate per estimator's judgment.

Wage Rates: As indicated by the Davis-Bacon Act, Kentucky Counties – Butler, Edmonson, Muhlenberg, and Warren; KY140102 01/03/2014.

Materials: 2012 Cost Book – English. Updated material cost per quotes received.

All costs identified Feature 01 – Lands and Damages are totals costs to owner provided by Corps of Engineers, Real Estate Department, Louisville District; Cost include a 50% contingency; no contractor assigned.

Project Planning, Engineering, and Design (PED) are assessed at 14% and 12% for the Recommended Pricing and Alternate Recommended Pricing respectively of the estimated construction cost consisting of Feature 04, Feature 05, and Feature 09.

Construction Management: 7% for Recommended Pricing and Alternate Recommended Pricing was used for Construction Department's oversight during construction and is based on the recent projects.

1.5. Markups

Price Level Adjustment for the Alternate Recommended Estimate: For Work Features (WF) 01 Lands & Damages, 04 Dams, 05 Locks, 08 Roads-Railroads-Bridges, and 09 Channels-Canals the cost items were based on the 2012 Cost Book Data Base with an inflation adjustment of 3.90% applied. For WF's PED and CM inflations in the amount of 8.00% and 3.80 were applied respectively. An escalation adjustment was applied to the MII Estimate for the purpose of escalating the effective price level date of FY 2016 Q1 to midpoint of construction of FY 2019 Q3 as follows: WF 01 Land & Damages 2.90 %, WF 04 Dams 6.80%, WF 05 Locks 6.80%, WF 08 Roads-Railroads-Bridges 6.80%, WF 30 PED 8.25%, and WF 31 CM 6.80%.

Price Level Adjustment for the Alternate Recommended Estimate: For WF's 01 Lands & Damages, 04 Dams, 05 Locks, 08 Roads-Railroads-Bridges, and 09 Channels-Canals the cost items were based on the 2012 Cost Book Data Base with an inflation adjustment of 3.90% applied. For WF's PED and CM inflations in the amount of 8.00% and 3.80 were applied respectively. An escalation adjustment was applied to the MII Estimate for the purpose of escalating the effective price level date of FY 2016 Q1 to midpoint of construction of FY 2020 Q3 as follows: WF 01 Land & Damages 2.90 %, WF 04 Dams 8.85%, WF 05 Locks 8.85%, WF 08 Roads-Railroads-Bridges 8.85%, WF 30 PED 9.00%, and WF 31 CM 8.80%.

Contingencies: For both estimates the contingencies were developed via of the Abbreviated Risk Analysis worksheet (CSRA) and are listed below.

Recommended Estimate:

- 01 Lands & Damages, 50%
- 04 Dams, 49.72%
- 05 Locks, 32.49%
- 09 Channels & Canals, 29.61%
- 30 Planning, Engineering, and Design, 44%
- 31 Construction Management, 45%

Alternate Recommended Estimate:

- 01 Lands & Damages, 50%
- 04 Dams, 51.72%

05 Locks, 34.49%

09 Channels & Canals, 31.61%

30 Planning, Engineering, and Design, 39%

31 Construction Management, 39%

1.6. Estimate Reports

Estimated by Dale Polston; USACE Louisville District

Designed by

Prepared by Dale Polston; USACE Louisville District

Preparation Date 1/15/2014

Effective Date of Pricing 10/1/2013

Estimated Construction Time 1,439 Days

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New Report

Description	ContractCost	Escalation	Contingency	ProjectCost
New Section	9,388,275.89	600,278.55	4,115,996.25	14,464,982.45
Base Bid	9,388,275.89	600,278.55	4,115,996.25	14,464,982.45
Dams	4,768,236.61	336,885.45	2,630,726.61	7,921,809.91
Demo Dam	4,768,236.61	336,885.45	2,630,726.61	7,921,809.91
Clear & Grub Rdwy	864.27	61.06	476.83	1,435.87
Construct Road - Mid-point	605,437.36	42,775.36	334,031.28	1,005,856.06
Breach Dam	17,426.15	1,231.19	9,614.34	28,951.30
Construct Road - Mid-point to Other Side	555,213.34	39,226.93	306,321.74	922,415.34
Demo Dam	3,196,999.05	225,874.38	1,763,845.04	5,311,401.43
Demo Road	392,296.44	27,716.53	216,437.39	651,749.91
Locks	1,103,774.22	77,983.86	397,939.23	1,622,744.50
Locks	1,103,774.22	77,983.86	397,939.23	1,622,744.50
Green River L&D #3	235,755.70	16,656.61	84,996.04	346,602.83
Fan Gate	3,684.22	260.30	1,328.26	5,416.46
Warning Signs	1,716.99	121.31	619.02	2,524.28
Reinforced Concrete Plug	230,354.49	16,275.01	83,048.77	338,662.09
Dredge to Open Gates	135,470.69	9,571.27	48,840.70	199,166.01
Sheet Piling	35,447.47	2,504.43	12,779.73	52,114.08
Dewatering	10,137.25	716.22	3,654.74	14,903.55
Construct Concrete Plug	49,299.09	3,483.08	17,773.60	72,478.44
Green River L&D #4	5,401.21	381.61	1,947.28	7,940.74
Fan Gate	3,684.22	260.30	1,328.26	5,416.46
Warning Signs	1,716.99	121.31	619.02	2,524.28
Green River L&D #5	5,401.21	381.61	1,947.28	7,940.74
Fan Gate	3,684.22	260.30	1,328.26	5,416.46
Warning Signs	1,716.99	121.31	619.02	2,524.28
Green River L&D #6	851,814.88	60,182.43	307,101.36	1,252,319.45
Fan Gate	1,842.11	130.15	664.13	2,708.23
Warning Signs	1,716.99	121.31	619.02	2,524.28
Lock Chamber	848,255.78	59,930.97	305,818.21	1,247,086.94
Barren River L&D #1	5,401.21	381.61	1,947.28	7,940.74
Fan Gate	3,684.22	260.30	1,328.26	5,416.46
Warning Signs	1,716.99	121.31	619.02	2,524.28
Roads, Railroads, and Bridges	85,170.59	6,017.47	27,218.80	121,728.51
Roads	85,170.59	6,017.47	27,218.80	121,728.51
Traffic Control	85,170.59	6,017.47	27,218.80	121,728.51
Green River L&D #6	20,677.55	1,460.91	6,608.13	29,553.02
Road Surfacing	64,493.03	4,556.56	20,610.67	92,175.49
Site Work	64,493.03	4,556.56	20,610.67	92,175.49
Temporary Access Roads	64,493.03	4,556.56	20,610.67	92,175.49
Green River L&D #6	64,493.03	4,556.56	20,610.67	92,175.49
Clear & Grub Rdwy	864.27	61.06	276.20	1,235.24
Rough Grade Rdwy	1,658.44	117.17	530.00	2,370.30
#2 Stone @ 10"	34,731.57	2,453.85	11,099.51	49,639.46
#57 Stone @ 6"	17,188.98	1,214.44	5,493.25	24,567.04
Maintain Rdwy	10,049.77	710.04	3,211.70	14,363.46
Channels and Canals	684,094.47	48,332.64	224,771.52	983,878.33
Canals	684,094.47	48,332.64	224,771.52	983,878.33
Associated General Items	526,481.30	37,196.96	172,984.89	757,195.92

New Report

Description	ContractCost	Escalation	Contingency	ProjectCost
Houchins Ferry - Extend Ferry Ramps	526,481.30	37,196.96	172,984.89	757,195.92
Southeast Ramp	264,534.12	18,689.86	86,917.44	380,458.26
Coffer Dam	102,960.84	7,274.39	33,829.63	148,080.34
Riprap Stone	102,499.54	7,241.80	33,678.06	147,416.88
#2 Lime Stone	6,645.58	469.52	2,183.52	9,557.80
Cast-in-Place Concrete	25,137.51	1,776.02	8,259.38	36,153.26
Concrete Curb	5,897.23	416.65	1,937.64	8,481.51
Precast Concrete Planks	13,303.27	939.90	4,371.03	19,133.03
Seeding and Mulch	8,090.16	571.59	2,658.17	11,635.44
Northwest Ramp	261,947.18	18,507.09	86,067.45	376,737.66
Coffer Dam	102,960.84	7,274.39	33,829.63	148,080.34
Riprap Stone	103,152.08	7,287.90	33,892.47	148,355.37
#2 Lime Stone	6,361.57	449.46	2,090.21	9,149.34
Cast-in-Place Concrete	22,975.88	1,623.29	7,549.14	33,044.38
Concrete Curb	5,103.37	360.56	1,676.80	7,339.77
Precast Concrete Planks	13,303.27	939.90	4,371.03	19,133.03
Seeding and Mulch	8,090.16	571.59	2,658.17	11,635.44
Traffic Control	14,795.10	1,045.30	4,861.20	21,278.61
Houchins Ferry	6,427.24	454.10	2,111.78	9,243.78
Green River Ferry	8,367.86	591.21	2,749.41	12,034.83
Mechanical Dredging	135,247.81	9,555.53	44,438.10	194,516.10
Site Work	135,247.81	9,555.53	44,438.10	194,516.10
Excavation and Disposal	135,247.81	9,555.53	44,438.10	194,516.10
Dredge Ferry Channel	135,247.81	9,555.53	44,438.10	194,516.10
Erosion Control	7,570.26	534.85	2,487.34	10,887.70
Green River Ferry - Silt Fence	819.44	57.89	269.24	1,178.53
Green River Ferry - Debris Removal	2,965.69	209.53	974.43	4,265.32
Houchins Ferry - Silt Fence	819.44	57.89	269.24	1,178.53
Houchins Ferry - Debris Removal	2,965.69	209.53	974.43	4,265.32
Lands and Damages	50,000.00	1,506.55	26,728.28	80,184.83
Planning, Engineering, and Design	2,033,000.00	82,684.80	477,366.91	2,667,291.71
Construction Management	664,000.00	46,867.78	331,244.90	1,067,344.68

Estimated by Dale Polston; USACE Louisville District

Designed by

Prepared by Dale Polston; USACE Louisville District

Preparation Date 1/15/2014

Effective Date of Pricing 10/1/2013

Estimated Construction Time 2,152 Days

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New Report

Description	ContractCost	Escalation	Contingency	ProjectCost
New Section	19,972,272.75	2,553,560.54	8,381,983.66	30,907,816.95
Base Bid	19,972,272.75	2,553,560.54	8,381,983.66	30,907,816.95
Dams	4,640,542.19	607,685.96	2,714,383.60	7,962,611.75
Demo Dam	4,640,542.19	607,685.96	2,714,383.60	7,962,611.75
Green River Dam #6	4,640,542.19	607,685.96	2,714,383.60	7,962,611.75
Clear & Grub Rdwy	835.20	109.37	488.53	1,433.10
Construct Road - Mid-point	621,653.43	81,406.45	363,622.57	1,066,682.45
Breach Dam	13,355.29	1,748.90	7,811.89	22,916.07
Construct Road - Mid-point to Other Side	570,085.41	74,653.54	333,458.99	978,197.94
Demo Dam	3,063,490.89	401,168.73	1,791,921.95	5,256,581.56
Demo Road	371,121.97	48,598.98	217,079.68	636,800.63
Locks	9,036,974.12	1,183,405.32	3,525,008.87	13,745,388.30
Locks	9,036,974.12	1,183,405.32	3,525,008.87	13,745,388.30
Lock Chambers	9,036,974.12	1,183,405.32	3,525,008.87	13,745,388.30
Green River Lock #3	800,967.63	104,887.91	312,429.58	1,218,285.12
Green River Lock #4	750,209.80	98,241.10	292,630.71	1,141,081.61
Green River Lock #5	3,214,697.50	420,969.46	1,253,941.54	4,889,608.50
Barren River Lock #1	3,455,380.18	452,487.22	1,347,823.47	5,255,690.86
Green River Lock #6	815,719.01	106,819.63	318,183.58	1,240,722.22
Roads, Railroads, and Bridges	1,463,726.92	191,677.24	523,273.25	2,178,677.41
Roads	1,463,726.92	191,677.24	523,273.25	2,178,677.41
Traffic Control	99,628.88	13,046.55	35,616.71	148,292.14
Green River L&D #3	19,925.78	2,609.31	7,123.34	29,658.43
Green River L&D #4	19,925.78	2,609.31	7,123.34	29,658.43
Green River L&D #5	19,925.78	2,609.31	7,123.34	29,658.43
Green River L&D #6	19,925.78	2,609.31	7,123.34	29,658.43
Barren River L&D #1	19,925.78	2,609.31	7,123.34	29,658.43
Road Surfacing	1,364,098.04	178,630.68	487,656.55	2,030,385.27
Site Work	1,364,098.04	178,630.68	487,656.55	2,030,385.27
Asphaltic Concrete Pavement	987,629.55	129,331.57	353,071.41	1,470,032.54
Green River L&D #3 - Rochester Lock Road	130,524.38	17,092.36	46,661.65	194,278.39
Asphalt Binder Course	72,436.48	9,485.67	25,895.59	107,817.73
Clip Edges	853.61	111.78	305.16	1,270.55
Tack Coat	4,661.35	610.41	1,666.40	6,938.17
Binder Asphalt @ 2"	62,333.31	8,162.64	22,283.77	92,779.73
Maintain Rdwy	4,588.20	600.83	1,640.25	6,829.29
Asphalt Surface Course	58,087.90	7,606.70	20,766.06	86,460.66
Tack Coat	4,661.35	610.41	1,666.40	6,938.17
Surface Asphalt @ 1.5"	53,426.55	6,996.29	19,099.66	79,522.49
Green River L&D #4 - Lock 4 Road	68,857.17	9,016.95	24,616.01	102,490.13
Asphalt Binder Course	39,305.49	5,147.11	14,051.47	58,504.08
Clip Edges	426.80	55.89	152.58	635.28
Tack Coat	2,383.11	312.07	851.95	3,547.13
Binder Asphalt @ 2"	31,907.37	4,178.32	11,406.69	47,492.38
Maintain Rdwy	4,588.20	600.83	1,640.25	6,829.29
Asphalt Surface Course	29,551.68	3,869.84	10,564.54	43,986.06
Tack Coat	2,383.11	312.07	851.95	3,547.13
Surface Asphalt @ 1.5"	27,168.57	3,557.76	9,712.59	40,438.92
Green River L&D #5 - Lock 5 Road	212,314.78	27,802.94	75,901.21	316,018.93

Description	ContractCost	Escalation	Contingency	ProjectCost
Asphalt Binder Course	116,636.80	15,273.76	41,696.93	173,607.50
Clip Edges	853.61	111.78	305.16	1,270.55
Tack Coat	7,723.92	1,011.46	2,761.25	11,496.63
Binder Asphalt @ 2"	103,471.07	13,549.69	36,990.26	154,011.02
Maintain Rdwy	4,588.20	600.83	1,640.25	6,829.29
Asphalt Surface Course	95,677.98	12,529.17	34,204.28	142,411.44
Tack Coat	7,723.92	1,011.46	2,761.25	11,496.63
Surface Asphalt @ 1.5"	87,954.06	11,517.72	31,443.03	130,914.81
Barren River L&D #1 - Greencastle Boat Ramp Road	575,933.22	75,419.32	205,892.54	857,245.08
Asphalt Binder Course	314,102.95	41,132.25	112,289.85	467,525.06
Clip Edges	1,707.22	223.56	610.32	2,541.10
Tack Coat	22,351.85	2,927.01	7,990.65	33,269.50
Binder Asphalt @ 2"	285,455.68	37,380.85	102,048.63	424,885.16
Maintain Rdwy	4,588.20	600.83	1,640.25	6,829.29
Asphalt Surface Course	261,830.27	34,287.07	93,602.69	389,720.02
Tack Coat	22,351.85	2,927.01	7,990.65	33,269.50
Surface Asphalt @ 1.5"	239,478.42	31,360.06	85,612.04	356,450.52
Temporary Access Roads	376,468.48	49,299.11	134,585.14	560,352.73
Green River L&D #5	159,345.21	20,866.49	56,964.92	237,176.63
Clear & Grub Rdwy	1,670.40	218.74	597.16	2,486.29
Rough Grade Rdwy	1,602.50	209.85	572.88	2,385.23
#2 Stone @ 10"	100,021.92	13,098.02	35,757.21	148,877.15
#57 Stone @ 6"	43,916.49	5,750.93	15,699.87	65,367.29
Maintain Rdwy	12,133.92	1,588.95	4,337.80	18,060.67
Green River L&D #6	61,716.47	8,081.86	22,063.25	91,861.58
Clear & Grub Rdwy	835.20	109.37	298.58	1,243.15
Rough Grade Rdwy	1,602.50	209.85	572.88	2,385.23
#2 Stone @ 10"	33,179.49	4,344.90	11,861.46	49,385.86
#57 Stone @ 6"	16,453.15	2,154.56	5,881.90	24,489.61
Maintain Rdwy	9,646.13	1,263.17	3,448.43	14,357.73
Barren River L&D #1	155,406.80	20,350.75	55,556.96	231,314.52
Rough Grade Rdwy	1,602.50	209.85	572.88	2,385.23
#2 Stone @ 10"	97,676.20	12,790.84	34,918.63	145,385.68
#57 Stone @ 6"	42,558.22	5,573.06	15,214.30	63,345.58
Maintain Rdwy	13,569.89	1,777.00	4,851.15	20,198.04
Channels and Canals	672,029.52	88,003.27	234,090.10	994,122.89
Canals	672,029.52	88,003.27	234,090.10	994,122.89
Associated General Items	503,085.58	65,879.81	175,241.34	744,206.73
Concrete	503,085.58	65,879.81	175,241.34	744,206.73
Houchins Ferry - Extend Ferry Ramps	503,085.58	65,879.81	175,241.34	744,206.73
Southeast Ramp	252,788.28	33,103.00	88,054.52	373,945.80
Coffer Dam	98,265.05	12,867.96	34,228.97	145,361.97
Riprap Stone	97,829.80	12,810.96	34,077.35	144,718.11
#2 Lime Stone	6,369.52	834.10	2,218.72	9,422.34
Cast-in-Place Concrete	24,157.78	3,163.50	8,414.95	35,736.23
Concrete Curb	5,709.89	747.72	1,988.95	8,446.56
Precast Concrete Planks	12,732.96	1,667.40	4,435.31	18,835.67
Seeding and Mulch	7,723.28	1,011.38	2,690.27	11,424.93
Northwest Ramp	250,297.30	32,776.81	87,186.82	370,260.93

New Report

Description	ContractCost	Escalation	Contingency	ProjectCost
Coffer Dam	98,265.05	12,867.96	34,228.97	145,361.97
Riprap Stone	98,451.97	12,892.43	34,294.08	145,638.48
#2 Lime Stone	6,098.75	798.64	2,124.40	9,021.79
Cast-in-Place Concrete	22,082.97	2,891.80	7,692.23	32,667.00
Concrete Curb	4,941.26	647.06	1,721.20	7,309.52
Precast Concrete Planks	12,734.02	1,667.54	4,435.68	18,837.24
Seeding and Mulch	7,723.28	1,011.38	2,690.27	11,424.93
Traffic Control	16,106.79	2,109.21	5,610.53	23,826.53
Green River Ferry	8,053.40	1,054.60	2,805.26	11,913.26
Houchins Ferry	8,053.40	1,054.60	2,805.26	11,913.26
Mechanical Dredging	145,502.67	19,053.79	50,683.39	215,239.85
Site Work	145,502.67	19,053.79	50,683.39	215,239.85
Excavation and Disposal	145,502.67	19,053.79	50,683.39	215,239.85
Green River Ferry - Dredge Ferry Canal	145,502.67	19,053.79	50,683.39	215,239.85
Erosion Control	7,334.48	960.46	2,554.84	10,849.78
Green River Ferry - Silt Fence	793.64	103.93	276.45	1,174.02
Green River Ferry - Debris Removal	2,873.60	376.30	1,000.97	4,250.87
Houchins Ferry - Silt Fence	793.64	103.93	276.45	1,174.02
Houchins Ferry - Debris Removal	2,873.60	376.30	1,000.97	4,250.87
Lands and Damages	50,000.00	3,456.55	26,728.28	80,184.83
Green L&D 3 Real Estate Disposal Fee	10,000.00	691.31	5,345.66	16,036.97
Green L&D 4 Real Estate Disposal Fee	10,000.00	691.31	5,345.66	16,036.97
Green L&D 5 Real Estate Disposal Fee	10,000.00	691.31	5,345.66	16,036.97
Green L&D 6 Real Estate Disposal Fee	10,000.00	691.31	5,345.66	16,036.97
Barren L&D 1 Real Estate Disposal Fee	10,000.00	691.31	5,345.66	16,036.97
Planning, Engineering, and Design	3,002,000.00	336,148.40	870,927.88	4,209,076.28
Construction Management	1,107,000.00	143,183.81	487,571.69	1,737,755.49

1.7. Project Schedules

1.8. Total Project Cost Summaries

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: Green and Barren Lock and Dam Disposition Study
PROJECT NO: P2 145629 Recommendation
LOCATION: Ohio, Muhlenburg, Butler, Edmonson, Warren Counties; KY

DISTRICT: LRL Lake and Rivers
POC: CHIEF, COST ENGINEERING, James Vermillion
PREPARED: 2/5/2014

This Estimate reflects the scope and schedule in report; Green and Barren Lock and Dam Disposition Study

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST (\$K) C	CNTG (\$K) D	CNTG (%) E	TOTAL (\$K) F	Program Year (Budget EC): 2016 Effective Price Level Date: 1 OCT 15				Spent Thru: 1-Oct-13 (\$K) K	L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
						ESC (%) G	COST (\$K) H	CNTG (\$K) I	TOTAL (\$K) J					
04	DAMS	\$4,768	\$2,371	50%	\$7,139	3.9%	\$4,953	\$2,463	\$7,416	\$0		\$5,291	\$2,631	\$7,922
05	LOCKS	\$1,104	\$359	32%	\$1,463	3.9%	\$1,147	\$373	\$1,520	\$0		\$1,225	\$398	\$1,623
08	ROADS, RAILROADS & BRIDGES	\$85	\$24	29%	\$109	3.9%	\$88	\$25	\$114	\$0		\$94	\$27	\$121
09	CHANNELS & CANALS	\$684	\$203	30%	\$887	3.9%	\$711	\$210	\$921	\$0		\$759	\$225	\$984
CONSTRUCTION ESTIMATE TOTALS:		\$6,641	\$2,956		\$9,597	3.9%	\$6,899	\$3,071	\$9,970	\$0		\$7,370	\$3,281	\$10,651
01	LANDS AND DAMAGES	\$50	\$25	50%	\$75	3.9%	\$52	\$26	\$78	\$0		\$53	\$27	\$80
30	PLANNING, ENGINEERING & DESIGN	\$928	\$413	44%	\$1,341	8.0%	\$1,002	\$446	\$1,448	\$1,105		\$1,081	\$481	\$2,667
31	CONSTRUCTION MANAGEMENT	\$664	\$296	45%	\$960	3.8%	\$689	\$307	\$996	\$0		\$736	\$328	\$1,064
PROJECT COST TOTALS:		\$8,283	\$3,690	45%	\$11,973		\$8,643	\$3,850	\$12,493	\$1,105		\$9,240	\$4,116	\$14,461

- _____ CHIEF, COST ENGINEERING, James Vermillion
- _____ PROJECT MANAGER, Nate Moulder
- _____ CHIEF, REAL ESTATE, Veronica Hiriams
- _____ CHIEF, PLANNING, Sharon Bond
- _____ CHIEF, ENGINEERING, Marilyn Lewis
- _____ CHIEF, OPERATIONS, Eugene Dowell
- _____ CHIEF, CONSTRUCTION, Kirk Dailey
- _____ CHIEF, CONTRACTING, Denise Bush
- _____ CHIEF, PM-PB
- _____ CHIEF, DPM, Steve Durrett

ESTIMATED FEDERAL COST: 100% \$14,461
ESTIMATED NON-FEDERAL COST: 0% \$0
ESTIMATED TOTAL PROJECT COST: \$14,461

**** TOTAL PROJECT COST SUMMARY ****

**** CONTRACT COST SUMMARY ****

PROJECT: Green and Barren Lock and Dam Disposition Study
 LOCATION: Ohio, Muhlenburg, Butler, Edmonson, Warren Counties; KY
 This Estimate reflects the scope and schedule in report; Green and Barren Lock and Dam Disposition Study

DISTRICT: LRL Lake and Rivers
 PREPARED: 2/5/2014
 POC: CHIEF, COST ENGINEERING, James Vermillion

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 2/4/2014				Program Year (Budget EC): 2016								
		Effective Price Level: 41548				Effective Price Level Date: 1 OCT 15								
		RISK BASED												
WBS	Civil Works	COST	CNTG	CNTG	TOTAL	ESC	COST	CNTG	TOTAL	Mid-Point	ESC	COST	CNTG	FULL
NUMBER	Feature & Sub-Feature Description	(\$K)	(\$K)	(%)	(\$K)	(%)	(\$K)	(\$K)	(\$K)	Date	(%)	(\$K)	(\$K)	(\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
PHASE 1 or CONTRACT 1														
04	DAMS	\$4,768	\$2,371	50%	\$7,139	3.9%	\$4,953	\$2,463	\$7,416	2019Q3	6.8%	\$5,291	\$2,631	\$7,922
05	LOCKS	\$1,104	\$359	32%	\$1,463	3.9%	\$1,147	\$373	\$1,520	2019Q3	6.8%	\$1,225	\$398	\$1,623
08	ROADS, RAILROADS & BRIDGES	\$85	\$24	29%	\$109	3.9%	\$88	\$25	\$114	2019Q3	6.8%	\$94	\$27	\$121
09	CHANNELS & CANALS	\$684	\$203	30%	\$887	3.9%	\$711	\$210	\$921	2019Q3	6.8%	\$759	\$225	\$984
							\$0							
CONSTRUCTION ESTIMATE TOTALS:		\$6,641	\$2,956	45%	\$9,597		\$6,899	\$3,071	\$9,970			\$7,370	\$3,281	\$10,651
01	LANDS AND DAMAGES	\$50	\$25	50%	\$75	3.9%	\$52	\$26	\$78	2017Q3	2.9%	\$53	\$27	\$80
30	PLANNING, ENGINEERING & DESIGN													
2.0%	Project Management	\$133	\$59	45%	\$192	8.0%	\$144	\$64	\$208	2017Q3	6.5%	\$153	\$68	\$221
2.0%	Planning & Environmental Compliance	\$133	\$59	45%	\$192	8.0%	\$144	\$64	\$208	2017Q3	6.5%	\$153	\$68	\$221
5.5%	Engineering & Design	\$365	\$162	45%	\$527	8.0%	\$394	\$176	\$570	2017Q3	6.5%	\$420	\$187	\$607
0.5%	Reviews, ATRs, IEPRs, VE	\$33	\$15	45%	\$48	8.0%	\$36	\$16	\$52	2017Q3	6.5%	\$38	\$17	\$55
0.5%	Life Cycle Updates (cost, schedule, risks)	\$33	\$15	45%	\$48	8.0%	\$36	\$16	\$52	2017Q3	6.5%	\$38	\$17	\$55
1.0%	Contracting & Reprographics	\$66	\$29	44%	\$95	8.0%	\$71	\$31	\$103	2017Q3	6.5%	\$76	\$33	\$109
1.0%	Engineering During Construction	\$66	\$29	45%	\$95	8.0%	\$71	\$32	\$103	2019Q3	15.8%	\$83	\$37	\$119
1.0%	Planning During Construction	\$66	\$29	45%	\$95	8.0%	\$71	\$32	\$103	2019Q3	15.8%	\$83	\$37	\$119
0.5%	Project Operations	\$33	\$15	45%	\$48	8.0%	\$36	\$16	\$52	2017Q3	6.5%	\$38	\$17	\$55
31	CONSTRUCTION MANAGEMENT													
9.5%	Construction Management	\$631	\$281	45%	\$912	3.8%	\$655	\$292	\$947	2019Q3	6.8%	\$700	\$312	\$1,011
0.0%	Project Operation:	\$0	\$0	45%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
0.5%	Project Management	\$33	\$15	45%	\$48	3.8%	\$34	\$15	\$50	2019Q3	6.8%	\$37	\$16	\$53
CONTRACT COST TOTALS:		\$8,283	\$3,690		\$11,973		\$8,643	\$3,850	\$12,493			\$9,240	\$4,116	\$13,356

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: Green and Barren Lock and Dam Disposition Study
PROJECT NO: P2 145629 Alternate Recommendation
LOCATION: Ohio, Muhlenburg, Butler, Edmonson, Warren Counties; KY

DISTRICT: LRL Lake and Rivers
POC: CHIEF, COST ENGINEERING, James Vermillion
PREPARED: 2/5/2014

This Estimate reflects the scope and schedule in report; Green and Barren Lock and Dam Disposition Study

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST (\$K) C	CNTG (\$K) D	CNTG (%) E	TOTAL (\$K) F	Program Year (Budget EC): 2016 Effective Price Level Date: 1 OCT 15				Spent Thru: 1-Oct-13 (\$K) K	L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
						ESC (%) G	COST (\$K) H	CNTG (\$K) I	TOTAL (\$K) J					
04	DAMS	\$4,641	\$2,400	52%	\$7,041	3.9%	\$4,821	\$2,494	\$7,315	\$0		\$5,248	\$2,714	\$7,962
05	LOCKS	\$9,037	\$3,117	34%	\$12,154	3.9%	\$9,388	\$3,238	\$12,626	\$0		\$10,219	\$3,525	\$13,744
08	ROADS, RAILROADS & BRIDGES	\$1,464	\$463	32%	\$1,927	3.9%	\$1,521	\$481	\$2,002	\$0		\$1,656	\$523	\$2,179
09	CHANNELS & CANALS	\$672	\$207	31%	\$879	3.9%	\$698	\$215	\$913	\$0		\$760	\$234	\$994
CONSTRUCTION ESTIMATE TOTALS:		\$15,814	\$6,187		\$22,001	3.9%	\$16,429	\$6,427	\$22,856	\$0		\$17,883	\$6,996	\$24,879
01	LANDS AND DAMAGES	\$50	\$25	50%	\$75	3.9%	\$52	\$26	\$78	\$0		\$53	\$27	\$80
30	PLANNING, ENGINEERING & DESIGN	\$1,897	\$742	39%	\$2,639	8.0%	\$2,049	\$801	\$2,850	\$1,105		\$2,231	\$873	\$4,209
31	CONSTRUCTION MANAGEMENT	\$1,107	\$433	39%	\$1,540	3.8%	\$1,149	\$450	\$1,599	\$0		\$1,251	\$489	\$1,741
PROJECT COST TOTALS:		\$18,868	\$7,387	39%	\$26,255		\$19,679	\$7,705	\$27,384	\$1,105		\$21,418	\$8,385	\$30,909

- _____ CHIEF, COST ENGINEERING, James Vermillion
- _____ PROJECT MANAGER, Nate Moulder
- _____ CHIEF, REAL ESTATE, Veronica Hiriams
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- _____ CHIEF, ENGINEERING, Marilyn Lewis
- _____ CHIEF, OPERATIONS, Eugene Dowell
- _____ CHIEF, CONSTRUCTION, Kirk Dailey
- _____ CHIEF, CONTRACTING, Denise Bush
- _____ CHIEF, PM-PB,
- _____ CHIEF, DPM, Steve Durrett

ESTIMATED FEDERAL COST: 100% \$30,909
ESTIMATED NON-FEDERAL COST: 0% \$0
ESTIMATED TOTAL PROJECT COST: \$30,909

**** TOTAL PROJECT COST SUMMARY ****

**** CONTRACT COST SUMMARY ****

PROJECT: Green and Barren Lock and Dam Disposition Study
 LOCATION: Ohio, Muhlenburg, Butler, Edmonson, Warren Counties; KY
 This Estimate reflects the scope and schedule in report; Green and Barren Lock and Dam Disposition Study

DISTRICT: LRL Lake and Rivers
 PREPARED: 2/5/2014
 POC: CHIEF, COST ENGINEERING, James Vermillion

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 2/4/2014				Program Year (Budget EC): 2016								
		Effective Price Level: 41548				Effective Price Level Date: 1 OCT 15								
WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED				ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	ESC (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
		COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)									
A	B	C	D	E	F	G	H	I	J					
PHASE 1 or CONTRACT 1														
04	DAMS	\$4,641	\$2,400	52%	\$7,041	3.9%	\$4,821	\$2,494	\$7,315	2020Q3	8.85%	\$5,248	\$2,714	\$7,962
05	LOCKS	\$9,037	\$3,117	34%	\$12,154	3.9%	\$9,388	\$3,238	\$12,626	2020Q3	8.85%	\$10,219	\$3,525	\$13,744
08	ROADS, RAILROADS & BRIDGES	\$1,464	\$463	32%	\$1,927	3.9%	\$1,521	\$481	\$2,002	2020Q3	8.85%	\$1,656	\$523	\$2,179
09	CHANNELS & CANALS	\$672	\$207	31%	\$879	3.9%	\$698	\$215	\$913	2020Q3	8.85%	\$760	\$234	\$994
							\$0							
CONSTRUCTION ESTIMATE TOTALS:		\$15,814	\$6,187	39%	\$22,001		\$16,429	\$6,427	\$22,856			\$17,883	\$6,996	\$24,879
01	LANDS AND DAMAGES	\$50	\$25	50%	\$75	3.9%	\$52	\$26	\$78	2017Q3	2.9%	\$53	\$27	\$80
30	PLANNING, ENGINEERING & DESIGN													
2.0%	Project Management	\$316	\$124	39%	\$440	8.0%	\$341	\$134	\$475	2017Q3	6.5%	\$363	\$142	\$506
2.0%	Planning & Environmental Compliance	\$316	\$124	39%	\$440	8.0%	\$341	\$134	\$475	2017Q3	6.5%	\$363	\$142	\$506
4.0%	Engineering & Design	\$633	\$248	39%	\$881	8.0%	\$684	\$267	\$951	2017Q3	6.5%	\$728	\$285	\$1,013
0.5%	Reviews, ATRs, IEPRs, VE	\$79	\$31	39%	\$110	8.0%	\$85	\$33	\$119	2017Q3	6.5%	\$91	\$36	\$126
0.0%	Life Cycle Updates (cost, schedule, risks)	\$0	\$0	39%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
1.0%	Contracting & Reprographics	\$158	\$62	39%	\$220	8.0%	\$171	\$67	\$237	2017Q3	6.5%	\$182	\$71	\$253
1.0%	Engineering During Construction	\$158	\$62	39%	\$220	8.0%	\$171	\$67	\$237	2020Q3	20.8%	\$206	\$81	\$287
1.0%	Planning During Construction	\$158	\$62	39%	\$220	8.0%	\$171	\$67	\$237	2020Q3	20.8%	\$206	\$81	\$287
0.5%	Project Operations	\$79	\$31	39%	\$110	8.0%	\$85	\$33	\$119	2017Q3	6.5%	\$91	\$36	\$126
31	CONSTRUCTION MANAGEMENT													
6.0%	Construction Management	\$949	\$371	39%	\$1,320	3.8%	\$985	\$386	\$1,371	2020Q3	8.8%	\$1,073	\$420	\$1,492
0.0%	Project Operation:	\$0	\$0	39%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
1.0%	Project Management	\$158	\$62	39%	\$220	3.8%	\$164	\$64	\$228	2020Q3	8.8%	\$179	\$70	\$248
CONTRACT COST TOTALS:		\$18,868	\$7,387		\$26,255		\$19,679	\$7,705	\$27,384			\$21,418	\$8,385	\$29,804