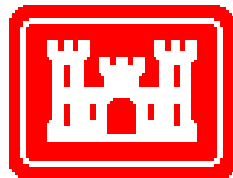


**Savannah Harbor Expansion Project (SHEP), Fish Passage at New
Savannah Bluff Lock and Dam (NSBLD) Savannah River, Georgia
and South Carolina Section**

Post-Authorization Change Report

Appendix B:

Cost Engineering



**US Army Corps
of Engineers®**

Savannah District

June 2019

Appendix B – Cost Engineering

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Introduction/Scope

The scope of work for this sub-project is to construct a fish passage at New Savannah Bluff Lock and Dam located on the Savannah River in Aiken County, SC and Richmond County, GA (Augusta, GA area) in support of the Savannah Harbor Expansion Project (“SHEP”). The design of the fish passage alternatives other than the recommended plan (2-6D) have been developed to a ~ 10% design level. The design of the fish passage shown in the Recommended Plan of Alternative 2-6D has been developed to the 35% design level (via a set of drawings). Some of the features in the recommended plan include: construction of access roads; excavation and offsite removal of existing bank and channel sediment; and placement of bedding stone, armor stone, and weir stone; temporary cofferdam; removal of the spillways gates; and removal of the locks and dam piers down to EL. 91.29.

This Fish Passage feature is part of the Savannah Harbor Expansion Project (SHEP). The objective is to complete a post-authorization analysis study report and recommendation as required by the Water Infrastructure Improvements for the Nation (WIIN) Act of 2016 that de-authorizes the NSBLD and provides the Secretary of the Army with options to modify the SHEP fish passage mitigation feature as follows:

1) Option A/Alternative 1:

- Repair the NSBLD lock wall and modify the structure such that the structure is able to:
 - Maintain the pool for navigation, water supply, and recreational activities
 - Allow safe passage over the structure to historic spawning grounds of shortnose sturgeon, Atlantic sturgeon, and other migratory fish; or

2) Option B/Alternative 2:

- Construction at an appropriate location across the Savannah River of a structure that is able to maintain the pool for water supply and recreational activities;
- Removal of the New Savannah Bluff Lock and Dam on completion of construction of the fish passage structure.

The final array of alternatives that were priced out are as follows:

Alternative 1-1 - 2% Slope - Repair Lock Wall & Dam, 200' Fixed Crest Weir - Alternative 1-1 consists of repairing the NSBL&D gates and piers and the riverside lock wall. The lock chamber and portions of the esplanade will be demolished and a 200' wide fish ramp structure would be constructed on the north side of the remaining lock wall. The fish passage structure would be constructed with boulders and stone sized according to the same specifications that were previously-approved for the bypass in the 2012 GRR. The structure would have a 2% slope upstream to the weir crest, and a 10% slope upstream from the crest to the river bed. All of the lock and spillway work outlined in the following sections would need to be performed.

Alternative 2-3 - 2% Slope - Fixed Crest Weir – Alternative 2-3 includes the removal of both lock walls, removal of dam gates and piers, and partial demolition of the dam foundation to elevation 91.2. A rock ramp 500' in width will then be placed on the upstream side of the dam, sloping 2% upstream to the ultimate weir crest elevation of 107 NGVD29 (106.2 NAVD88). The weir crest for this alternatives is in a terraced configuration, with the thalweg located on the north side of the weir.

Alternative 2-6a - 2% Slope - Fixed Crest Weir w/ Floodplain Bench: Alternative 2-6 consists of a fixed crest weir with a rock ramp sloping upstream from the existing dam location and a low-lying floodplain bench in the right overbank to provide additional flow conveyance. The lock and dam would be removed, including the foundation down to elevation 91.2 (NAVD88). The weir would be 500 feet in width with an average crest

elevation of 109.2 feet NAVD88 (110.0 NGVD29). A floodplain bench approximately 275 feet in width would be excavated down to elevation 110 (NAVD88) on the Georgia side of the existing dam location. The bench would ease the passage of flood waters past that point in the river. The bench would be grassed lined to prevent erosion.

Alternative 2-6b - 2% Slope - Fixed Crest Weir w/ Floodplain Bench: Same, but with a different channel profile/weir elevation.

Alternative 2-6c - 2% Slope - Fixed Crest Weir w/ Floodplain Bench: Same, but with a different channel profile/weir elevation.

Alternative 2-6d - 2% Slope (RECOMMENDED PLAN). The original slope of the channel was intended to be 1.3%, but further refinement led to a slope of 2% for the channel bottom. The anticipated work plan/scope/construction sequence is as follows. Access roads will be constructed into the park to get the GA side of the lock & dam, and on the SC side which will wind through the land off of Gum Swamp Rd (Hwy 201), roughly 2 miles. It is assumed that the south (SC) side of the dam will be worked on first. A cofferdam (assumed combi-wall, W40 x 149 with PZC-13 sheets) will be constructed to cut off the south half of the river. Once the cofferdam is up, the area will be dewatered and the channel bottom will be excavated out a few feet down to the appropriate grade. A 12" layer of bedding stone and a 24" layers of rip rap will be placed over the entire area. The weirs will be spaced roughly 60 ft apart and will span the river width (roughly 500 ft) in an arc shape. Cross sections can be found in quantity backup documents and in the engineering appendix. The banks of the river will also be lined with bedding stone and rip rap to prevent erosion. The weir steps are assumed to be constructed with special boulders/river stone. A sheetpile cutoff will be driven across the most upstream weir (the ramp), so that is anticipated to be done early in the process once the cofferdam is in place so that the stone can be placed around it. Concurrently with the stone work will be the removal of spillway gates 3, 4 and 5, and dam piers 3, 4 & 5. The cofferdam is anticipated to tie in somewhere close to pier 2 in order to allow these gates and piers to be demolished. All of the machinery/catwalk/metals on top of the gates will be removed first, then the gates themselves will be removed and hauled off and disposed of. (No salvage value for the steel has been included as a credit in order to be conservative). Then each pier will be wrecked/demolished and hauled off. All concrete assumed to be taken to the Augusta Cty landfill. Once all the work on the south half of the river is complete, the area will be rewatered, the upstream end of the cofferdam will be pulled and flipped to the north side, and a similar scope of work will be performed. A boat ramp (shown on the plans) will also be constructed once the cofferdam is in place and the work area is dewatered. The north side of the area will be excavated down to the appropriate floodplain bench levels and the lock walls will be removed down to EL 91.29 also.

(Alternative 2-6 had 4 different layouts that were analyzed, but were all permutations of the same alternative so they were given alphabetical values as well as numerical.)

Alternative 2-8 - 2% Slope - Fixed Crest Weir w/ Bypass Channel and Gates - Alternative 2-8 consists of a fixed weir with a rock ramp at the existing dam site with an active flood passage structure in an excavated bypass channel through the park on the Georgia side of the river. The fish passage structure would constructed as described in the previously described alternatives. The structure in the bypass channel would consist of two 50' gates used to pass high flows. The assumed size/dimensions are roughly equivalent to the current structure on site. The bypass channel would ease the passage of flood waters past that point in the river. The rock weir would be 500 feet in width with an average crest elevation of 109.2 feet (NAVD88, 110.0 NGVD29). The lock and dam would be removed, including the foundation down to 91.2 (NAVD88).

A brief description of each of the features of work follows. Note this is a summary of features; every alternative does not include all of this work:

Repair Lock Wall and Dam

Dam Spillway Piers - There is considerable pier cracking. Spillway Piers Nos. 1 through 4 have large open cracks near the water line, at approximately El. 100, that extend to approximately El. 120. It is assumed that the cracks occur below the water down to the base of the Spillway Pier at El. 90. The South Carolina abutment has exhibited similar cracking and was previously repaired. The cracks are up to $\frac{3}{4}$ inch in width at the surface and pinch down to tight cracks within 3-4 inches (estimated) into the concrete. Any crack repair would be applied to Spillway Piers Nos. 1 through 4. The crack repair would extend from about approximately El. 126 down to base of the piers at El. 90.5 at the low point. Most of the perimeter of the piers are cracked and need repair with the exception of near and around the gate slots, which are reinforced. The recommended repair consists of tying the piers together with through steel anchors that would prevent the concrete from coming apart and insure that the pier remains stable. There has been some consideration given to injecting a flexible epoxy resin into the surface cracks to lessen the water intrusion that feeds the alkali-silica reaction (ASR). This is still under study.

Catwalk: Replace all steel plate bearings of the existing catwalk with $\frac{3}{4}$ " elastomeric bearing pads. The paint on the existing steel frames of the catwalk is peeling. After confirming that the paint is devoid of the lead, scrap the framing and repaint the framing.

Sand Blast and Repaint all Embedded Metal and Armor: Lock embedded metal and armor is badly corroded and needs repainting. The embedded metal and armor for the lock and dam apparently has never been repainted and is badly corroded. Repainting would give additional life to these components and would provide a much better appearance.

Retrofitting Top of Spillway Piers to Receive New Gate Hoists: Spillway gate hoists replacements are proposed for gates 1, 4 and 5. Retrofitting tops of spillway piers to receive new gate hoists will be required. This will require some concrete demolition and installation of new concrete and structural steel foundations at the top of spillway piers to support the new gate hoists.

Lock Floor Repair: Voids beneath the lock floor adjacent to the lock river wall have been documented in previous Periodic Inspection reports. Grouting beneath the lock floor would first consist of providing a "grout wall" to outline the void areas in question by using a stiffer mix grout for early setting. This "grout wall" can also be used to make a grid within the lock floor to further locate and quantify the void(s). The grouting will be installed into the existing lock floor "weep holes" and be left to set. After the initial set of the grout, the "weep holes" should be re-drilled, grout removed, backfilled with granular material and a containment screen installed over each "weep hole".

Lock River Wall Erosion Repair: This repair includes a sheet pile wall with a top elevation of +102 ft and tip elevation of +50 ft. This wall will encapsulate No. 57 gravel to an approximate elevation of +82 ft with a five (5) foot overlay of riprap to an approximate elevation of +87 ft. Adjacent to the sheet pile wall, the riprap will be placed on a 3:1 slope and extend to a distance required to meet the existing mudline elevation.

Lock Wall Erosion Repair - During de-watering in 1998, and further confirmed by a dive inspection in May 1999, it was revealed that approximately 50 feet of a rock crib is missing from the downstream end of the lock riverside wall, and that there is a depression in the river bottom approximately 13 feet deep at the end of the wall. Also, a dye test was performed in the lock chamber in the area of boils observed in the lock floor during the dewatering. Several areas of seepage were noted along the riverside wall. The loss of foundation material under the wall has an adverse effect on the lateral stability. Instrumentation indicates the riverside wall moves up to a 1/4-inch at the base when the lock is filled if the differential heads between the upper and lower pools exceed 16 feet.

Lock Filling/Emptying Valves - The valves are in poor condition and lock operational restrictions have been imposed to prevent failure of the valves, and thus the lock operational capabilities. The landside wall filling valve is working erratically and sticks during operation. The valve bearings are in very poor condition (worn out). The failure of the valves is imminent and need to be rebuilt as soon as possible. When the valve bearings fail, the lock will be inoperable.

Lock Hydraulic Repairs - Due to hydraulic pipe leaks and the age of the hydraulic pump, reservoir, etc., the hydraulic system for the lock needs to be repaired or replaced with new piping and operating equipment. Problems existed during the refilling of the lock after de-watering due to contamination in the hydraulic system.

Dam, Gates, Hoists, Chaines, etc. - Remove and install new gate hoist machinery on gates 1, 4 and 5, as per gates 2 and 3. Install secondary containment on existing and new hydraulic cylinders. Top of concrete gate piers will have to be reworked as per gates 1 and 2. Install hold open struts on gate hoist access covers on existing hoist machines on gate numbers 2 and 3.

Electrical Work: The remote control capability of the gates shall be transferred from J. Strom Thurmond to others. Communications link from dam to Strom Thurmond is a leased telephone line. Transfer of remote control capabilities shall include transfer and setup of computer hardware from Strom Thurmond to others (coordination of transfer of equipment ownership is required). One-line for communication cabling and proposed transfer hardware, including new hydraulic gate hoists. All necessary revisions in programming in order to accommodate the revised control scheme of gates 1, 4, and 5 shall be accomplished. Install heaters and thermostats in all spillway gate hydraulic control panels, both new and existing (control panels for gates 2 and 3 do not currently contain heaters and thermostats). The control systems for spillway gates 1, 4, and 5 shall be revised, modified, and improved as per gates 2 and 3 and as shown on the drawings. This shall include hardware expansion (additional modules, terminal blocks, etc.) of the existing gate control panel and terminal cabinet located on the first floor of the lock control building. Provide separate circuits to each gate control cabinet heater and to each gate control cabinet. Remove spillway lighting fixtures from spillway piers that are to be rehabilitated (top of concrete gate piers will be reworked as per gates 2 & 3; this work consists of concrete replacement for new hoisting equipment) prior to start of rehabilitation work on pier. Reinstall lighting fixtures after rehab work is complete. Additionally, portions of 16370A Electrical Distribution System, Aerial and 16375A Electrical Distribution System, Underground may be utilized as necessary in order to create one Electrical Work Specification section. The control system work will have to be a created specification section utilizing portions of other specification sections as applicable. The 50KW electric generator currently located on the second floor of the operations building will likely need to be replaced as replacement parts are no longer available. A replacement generator of equivalent capacity that has been identified for the project will not fit in the space where the current generator is located. A new building for the generator and supporting equipment has been identified for the alternatives involving this work. Additional discussion regarding the generator requirements can be found in the 2016 inspection report. Install new lightning protection system on Control Building roof consisting of properly spaced air terminal interconnected by roof conductors. Provide ground connection to all existing ungrounded metallic structures, devices, and components mounted on the Control Building roof and across the spillway structure. Replace existing grounding conductor across spillway and install second lightning protection grounding conductor across spillway catwalk on opposite side of catwalk from existing conductor and make connection to South Carolina side grounding grid. Install new grounding grid: Install a new grounding conductor compatible with the new lightning protection system across lock chamber. The lightning protection design shall be in accordance with NFPA 780, Lightning Protection Systems, and, specifically, paragraph 3-9 of NFPA 780 shall be addressed in the design (i.e., “Main conductors shall interconnect all strike termination devices and shall form two or more paths from each strike termination device downward, horizontally, or rising at no more than ¼ pitch to connections with ground terminals, except as permitted by 3-9.1 and 3-9.2”). The new overhead grounding conductor shall be connected to the existing control building tower and land side riser pole so as to maintain a “downward” path away from the control building tower to the new grounding grid installed on the Georgia side of the lock.

Lock Timber Sidewall - The lock timber sidewalls will be replaced.

Fixed Crest Weir - The original slope of the channel was intended to be 1.3%, but further refinement led to a slope of 2% for the channel bottom. The channel bottom will be excavated out a few feet down after using a cofferdam to cut off roughly half the river. The weir will span the width of the river (roughly 500') and will have roughly 60 feet in between steps. Cross sections can be found in backup documents and in the engineering appendix. The modified channel will have 12" of crushed stone base/DGA, topped with 3 ft of rip rap. The banks will also be lined with bedding stone and rip rap to prevent erosion. The weir steps are assumed to be constructed with special boulders/river stone.

Pumping Plant Work – Some additional work that was designed/estimated by CDM Smith (an A/E firm) for inclusion in the project scope is incorporated via the TPCS. The estimate backup and description can be found in the cost backup files.

Real Estate Costs (01 account) and Cultural Resources Costs (18 acct) provided by PDT members for those specific areas. Cultural Resources costs assumed to cover any mitigation requirements for the project.

General Estimate Information

Acquisition Plan

Due to the size of the job (>\$20M), it is assumed that this will be advertised as a Full and Open/Unrestricted project. Per conversations with PDT members and leadership, typically projects over \$15-20M would be put out as Unrestricted, with all projects smaller than that typically going to MATOCs.

Markup Info

-Assumed the following markups for the Prime, who is at this stage of estimate is assumed to sub out a good portion of the project and self-perform a small portion. Subbed out work includes marine work, mechanical work, weir work. Demo assumed to be covered by Prime. Prime markups assumed to be:

JOOH - 10%

HOOH - 10%

Profit - 10%

Bond - 1.5%

Mob/Demob - 5%; this has been applied to the CWBS account folders in the project item view, rather than trying to break out 5% of each account separately.

-Assumed the following markups for the Subcontractors:

JOOH - 5-8%

HOOH - 8-10%

Profit - 8-10%

-The MII cost estimate does not include any contingency or escalation markups. Escalation will be applied in TPCS sheets.

-The cost estimate includes contingency (as calculated by a Risk Analysis).

Labor/Productivity Info

-Assumed a work schedule of 5 days a week, 10 hours per day. 6 - 10's shown for the cofferdam work in order to expedite the schedule.

- Construction duration of roughly 33 months (1,005 cd) for recommended plan

-LS&H percentage for in-channel contractors increased to 150% to account for work on navigable waterways.

-Davis-Bacon Wage Rates used for the Richmond County, GA area - Combo of GA165 09/08/2017, GA90 07/14/2017, and GA16 10/13/2017, as well as the August Wage Survey rates from 2017 (included in backup).

-Local Augusta/surrounding labor pool assumed to be sufficient to handle the demand for this project (ie., no

subsistence/per diem included for craft workers)

Miscellaneous items

-Sales tax of 7% included for all items, unless sales tax is included in price quote (will be noted in either Project Item or CSI task).

-Gas and Diesel prices updated on **19 Oct 18** from: <http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp>. Used Lower Atlantic prices as of 17 Oct for gas and on-road diesel. Subtracted \$0.592/gallon for off-road diesel for GA.

-Price for electricity updated on **19 Oct 18** from: <http://www.eia.gov/fuelelectric.html>. Used GA commercial electric price per Kwh for May 18 (latest one).

-Cost of money updated on **19 Oct 18** from <http://www.fms.treas.gov/prompt/rates.html>

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

PROJECT: SHEP Fish Passage
PROJECT NO: P2 xxxxxx
LOCATION: Augusta, GA

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 6/17/2019

This Estimate reflects the scope and schedule in report;

SHEP Fish Passage PMP

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)				
WBS NUMBER <i>A</i>	Civil Works Feature & Sub-Feature Description <i>B</i>	COST (<i>\$K</i>) <i>C</i>	CNTG (<i>\$K</i>) <i>D</i>	CNTG (%) <i>E</i>	TOTAL (<i>\$K</i>) <i>F</i>	ESC (%) <i>G</i>	COST (<i>\$K</i>) <i>H</i>	CNTG (<i>\$K</i>) <i>I</i>	TOTAL (<i>\$K</i>) <i>J</i>	Program Year (Budget EC): Effective Price Level Date:	TOTAL FIRST COST (<i>\$K</i>) <i>K</i>	INFLATED (%) <i>L</i>	COST (<i>\$K</i>) <i>M</i>	CNTG (<i>\$K</i>) <i>N</i>	FULL (<i>\$K</i>) <i>O</i>
										2020 1 OCT 19					
05	LOCKS	\$27,090	\$9,048	33.4%	\$36,138	2.0%	\$27,632	\$9,229	\$36,861	\$0	\$36,861	5.6%	\$29,183	\$9,747	\$38,930
06	FISH & WILDLIFE FACILITIES	\$21,345	\$7,129	33.4%	\$28,474	2.0%	\$21,772	\$7,272	\$29,044	\$0	\$29,044	5.6%	\$22,994	\$7,680	\$30,674
18	CULTURAL RESOURCE PRESERVATION	\$494	\$165	33.4%	\$658	2.0%	\$503	\$168	\$671	\$0	\$671	5.6%	\$532	\$178	\$709
CONSTRUCTION ESTIMATE TOTALS:		\$48,929	\$16,342		\$65,271	2.0%	\$49,907	\$16,669	\$66,576	\$0	\$66,576	5.6%	\$52,708	\$17,605	\$70,313
01	LANDS AND DAMAGES	\$25	\$6	25.0%	\$31	2.0%	\$25	\$6	\$32	\$0	\$32	0.0%	\$25	\$6	\$32
30	PLANNING, ENGINEERING & DESIGN	\$2,449	\$818	33.4%	\$3,267	4.2%	\$2,551	\$852	\$3,403	\$0	\$3,403	2.3%	\$2,611	\$872	\$3,483
31	CONSTRUCTION MANAGEMENT	\$2,446	\$817	33.4%	\$3,263	4.2%	\$2,548	\$851	\$3,399	\$0	\$3,399	11.7%	\$2,847	\$951	\$3,797
PROJECT COST TOTALS:		\$53,849	\$17,983	33.4%	\$71,832		\$55,032	\$18,379	\$73,411	\$0	\$73,411	5.7%	\$58,191	\$19,434	\$77,625

CHIEF, COST ENGINEERING, xxx

ESTIMATED TOTAL PROJECT COST: \$77,625

PROJECT MANAGER, xxx

CHIEF, REAL ESTATE, xxx

CHIEF, PLANNING, xxx

CHIEF, ENGINEERING, xxx

CHIEF, OPERATIONS, xxx

CHIEF, CONSTRUCTION, xxx

CHIEF, CONTRACTING, xxx

CHIEF, PM-PB, xxx

CHIEF, DPM, xxx

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

**** CONTRACT COST SUMMARY ****

PROJECT: SHEP Fish Passage
LOCATION: Augusta, GA
This Estimate reflects the scope and schedule in report;

SHEP Fish Passage PMP

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 6/17/2019

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 1-Oct-18		Effective Price Level: 1-Oct-18		Program Year (Budget EC): 2020		Effective Price Level Date: 1 OCT 19						
		RISK BASED												
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
Alternative 1-1														
05	LOCKS	\$27,090	\$9,048	33.40%	\$36,138	2.0%	\$27,632	\$9,229	\$36,861	2022Q4	5.6%	\$29,183	\$9,747	\$38,930
06	FISH & WILDLIFE FACILITIES	\$21,345	\$7,129	33.40%	\$28,474	2.0%	\$21,772	\$7,272	\$29,044	2022Q4	5.6%	\$22,994	\$7,680	\$30,674
18	CULTURAL RESOURCE PRESERVATION	\$494	\$165	33.40%	\$658	2.0%	\$503	\$168	\$671	2022Q4	5.6%	\$532	\$178	\$709
CONSTRUCTION ESTIMATE TOTALS:		\$48,929	\$16,342	33.4%	\$65,271		\$49,907	\$16,669	\$66,576			\$52,708	\$17,605	\$70,313
01	LANDS AND DAMAGES	\$25	\$6	25.0%	\$31	2.0%	\$25	\$6	\$32	2020Q1	0.0%	\$25	\$6	\$32
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	\$245	\$82	33.40%	\$327	4.2%	\$255	\$85	\$340	2020Q1	0.0%	\$255	\$85	\$340
0.5%	Planning & Environmental Compliance	\$245	\$82	33.40%	\$327	4.2%	\$255	\$85	\$340	2020Q1	0.0%	\$255	\$85	\$340
1.0%	Engineering & Design	\$489	\$163	33.40%	\$652	4.2%	\$509	\$170	\$680	2020Q1	0.0%	\$509	\$170	\$680
0.5%	Reviews, ATRs, IEPRs, VE	\$245	\$82	33.40%	\$327	4.2%	\$255	\$85	\$340	2020Q1	0.0%	\$255	\$85	\$340
0.5%	Life Cycle Updates (cost, schedule, risks)	\$245	\$82	33.40%	\$327	4.2%	\$255	\$85	\$340	2020Q1	0.0%	\$255	\$85	\$340
0.5%	Contracting & Reprographics	\$245	\$82	33.40%	\$327	4.2%	\$255	\$85	\$340	2020Q1	0.0%	\$255	\$85	\$340
0.5%	Engineering During Construction	\$245	\$82	33.40%	\$327	4.2%	\$255	\$85	\$340	2022Q4	11.7%	\$285	\$95	\$380
0.5%	Planning During Construction	\$245	\$82	33.40%	\$327	4.2%	\$255	\$85	\$340	2022Q4	11.7%	\$285	\$95	\$380
0.5%	Project Operations	\$245	\$82	33.40%	\$327	4.2%	\$255	\$85	\$340	2020Q1	0.0%	\$255	\$85	\$340
31	CONSTRUCTION MANAGEMENT													
3.0%	Construction Management	\$1,468	\$490	33.40%	\$1,958	4.2%	\$1,529	\$511	\$2,040	2022Q4	11.7%	\$1,708	\$571	\$2,279
1.0%	Project Operation:	\$489	\$163	33.40%	\$652	4.2%	\$509	\$170	\$680	2022Q4	11.7%	\$569	\$190	\$759
1.0%	Project Management	\$489	\$163	33.40%	\$652	4.2%	\$509	\$170	\$680	2022Q4	11.7%	\$569	\$190	\$759
CONTRACT COST TOTALS:		\$53,849	\$17,983		\$71,832		\$55,032	\$18,379	\$73,411			\$58,191	\$19,434	\$77,625

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PREPARED: 6/17/2019

This Estimate reflects the scope and schedule in report;

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WBS NUMBER <i>A</i>	Civil Works Feature & Sub-Feature Description <i>B</i>	COST (\$K) <i>C</i>	CNTG (\$K) <i>D</i>	CNTG (%) <i>E</i>	TOTAL (\$K) <i>F</i>	ESC (%) <i>G</i>	COST (\$K) <i>H</i>	CNTG (\$K) <i>I</i>	TOTAL (\$K) <i>J</i>	Program Year (Budget EC): 2020 Effective Price Level Date: 1 OCT 19		TOTAL FIRST COST (\$K) <i>K</i>	INFLATED (%) <i>L</i>	COST (\$K) <i>M</i>	CNTG (\$K) <i>N</i>	FULL (\$K) <i>O</i>
										Spent Thru: 1-Oct-18 (\$K)						
04	DAMS	\$2,222	\$605	27.3%	\$2,827	2.0%	\$2,266	\$617	\$2,883	\$0	\$2,883	\$2,883	5.6%	\$2,393	\$652	\$3,045
05	LOCKS	\$5,652	\$1,540	27.3%	\$7,192	2.0%	\$5,765	\$1,571	\$7,336	\$0	\$7,336	\$7,336	5.6%	\$6,089	\$1,659	\$7,748
06	FISH & WILDLIFE FACILITIES	\$40,875	\$11,138	27.3%	\$52,014	2.0%	\$41,693	\$11,361	\$53,054	\$0	\$53,054	\$53,054	5.6%	\$44,033	\$11,999	\$56,031
13	PUMPING PLANT	\$1,154	\$314	27.3%	\$1,468	2.0%	\$1,177	\$321	\$1,497	\$0	\$1,497	\$1,497	5.6%	\$1,243	\$339	\$1,581
18	CULTURAL RESOURCE PRESERVATION	\$494	\$134	27.3%	\$628	2.0%	\$503	\$137	\$641	\$0	\$641	\$641	5.6%	\$532	\$145	\$676
	CONSTRUCTION ESTIMATE TOTALS:	\$50,396	\$13,733		\$64,129	2.0%	\$51,404	\$14,008	\$65,411	\$0	\$65,411	\$65,411	5.6%	\$54,289	\$14,794	\$69,082
01	LANDS AND DAMAGES	\$2,822	\$706	25.0%	\$3,528	2.0%	\$2,879	\$720	\$3,598	\$0	\$3,598	\$3,598	0.0%	\$2,879	\$720	\$3,598
30	PLANNING, ENGINEERING & DESIGN	\$2,520	\$687	27.3%	\$3,207	4.2%	\$2,625	\$715	\$3,341	\$0	\$3,341	\$3,341	2.3%	\$2,687	\$732	\$3,419
31	CONSTRUCTION MANAGEMENT	\$2,520	\$687	27.3%	\$3,207	2.0%	\$2,570	\$700	\$3,271	\$0	\$3,271	\$3,271	5.6%	\$2,714	\$740	\$3,454
	PROJECT COST TOTALS:	\$58,258	\$15,812	27.1%	\$74,070		\$59,478	\$16,143	\$75,621	\$0	\$75,621	\$75,621	5.2%	\$62,568	\$16,985	\$79,554

CHIEF, COST ENGINEERING, xxx

ESTIMATED TOTAL PROJECT COST: \$79,554

PROJECT MANAGER, xxx

CHIEF, REAL ESTATE, xxx

CHIEF, PLANNING, xxx

CHIEF, ENGINEERING, xxx

CHIEF, OPERATIONS, xxx

CHIEF, CONSTRUCTION, xxx

CHIEF, CONTRACTING, xxx

CHIEF, PM-PB, xxxx

CHIEF, DPM, xxx

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

**** CONTRACT COST SUMMARY ****

PROJECT: SHEP Fish Passage
LOCATION: Augusta, GA
This Estimate reflects the scope and schedule in report; SHEP Fish Passage PMP

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 6/17/2019

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 1-Oct-18		Effective Price Level: 1-Oct-18		Program Year (Budget EC): 2020		Effective Price Level Date: 1 OCT 19						
		RISK BASED												
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
Alternative 2-3														
04	DAMS	\$2,222	\$605	27.25%	\$2,827	2.0%	\$2,266	\$617	\$2,883	2022Q4	5.6%	\$2,393	\$652	\$3,045
05	LOCKS	\$5,652	\$1,540	27.25%	\$7,192	2.0%	\$5,765	\$1,571	\$7,336	2022Q4	5.6%	\$6,089	\$1,659	\$7,748
06	FISH & WILDLIFE FACILITIES	\$40,875	\$11,138	27.25%	\$52,014	2.0%	\$41,693	\$11,361	\$53,054	2022Q4	5.6%	\$44,033	\$11,999	\$56,031
13	PUMPING PLANT	\$1,154	\$314	27.25%	\$1,468	2.0%	\$1,177	\$321	\$1,497	2022Q4	5.6%	\$1,243	\$339	\$1,581
18	CULTURAL RESOURCE PRESERVATION	\$494	\$134	27.25%	\$628	2.0%	\$503	\$137	\$641	2022Q4	5.6%	\$532	\$145	\$676
CONSTRUCTION ESTIMATE TOTALS:		\$50,396	\$13,733	27.3%	\$64,129		\$51,404	\$14,008	\$65,411			\$54,289	\$14,794	\$69,082
01	LANDS AND DAMAGES	\$2,822	\$706	25.0%	\$3,528	2.0%	\$2,879	\$720	\$3,598	2020Q1	0.0%	\$2,879	\$720	\$3,598
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	\$252	\$69	27.25%	\$321	4.2%	\$263	\$72	\$334	2020Q1	0.0%	\$263	\$72	\$334
0.5%	Planning & Environmental Compliance	\$252	\$69	27.25%	\$321	4.2%	\$263	\$72	\$334	2020Q1	0.0%	\$263	\$72	\$334
1.0%	Engineering & Design	\$504	\$137	27.25%	\$641	4.2%	\$525	\$143	\$668	2020Q1	0.0%	\$525	\$143	\$668
0.5%	Reviews, ATRs, IEPRs, VE	\$252	\$69	27.25%	\$321	4.2%	\$263	\$72	\$334	2020Q1	0.0%	\$263	\$72	\$334
0.5%	Life Cycle Updates (cost, schedule, risks)	\$252	\$69	27.25%	\$321	4.2%	\$263	\$72	\$334	2020Q1	0.0%	\$263	\$72	\$334
0.5%	Contracting & Reprographics	\$252	\$69	27.25%	\$321	4.2%	\$263	\$72	\$334	2020Q1	0.0%	\$263	\$72	\$334
0.5%	Engineering During Construction	\$252	\$69	27.25%	\$321	4.2%	\$263	\$72	\$334	2022Q4	11.7%	\$293	\$80	\$373
0.5%	Planning During Construction	\$252	\$69	27.25%	\$321	4.2%	\$263	\$72	\$334	2022Q4	11.7%	\$293	\$80	\$373
0.5%	Project Operations	\$252	\$69	27.25%	\$321	4.2%	\$263	\$72	\$334	2020Q1	0.0%	\$263	\$72	\$334
31	CONSTRUCTION MANAGEMENT													
3.0%	Construction Management	\$1,512	\$412	27.25%	\$1,924	2.0%	\$1,542	\$420	\$1,963	2022Q4	5.6%	\$1,629	\$444	\$2,072
1.0%	Project Operation:	\$504	\$137	27.25%	\$641	2.0%	\$514	\$140	\$654	2022Q4	5.6%	\$543	\$148	\$691
1.0%	Project Management	\$504	\$137	27.25%	\$641	2.0%	\$514	\$140	\$654	2022Q4	5.6%	\$543	\$148	\$691
CONTRACT COST TOTALS:		\$58,258	\$15,812		\$74,070		\$59,478	\$16,143	\$75,621			\$62,568	\$16,985	\$79,554

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

PROJECT: SHEP Fish Passage
PROJECT NO: P2 xxxxxx
LOCATION: Augusta, GA

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 6/17/2019

This Estimate reflects the scope and schedule in report;

SHEP Fish Passage PMP

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)					
WBS NUMBER <i>A</i>	Civil Works Feature & Sub-Feature Description <i>B</i>	COST (\$K) <i>C</i>	CNTG (\$K) <i>D</i>	CNTG (%) <i>E</i>	TOTAL (\$K) <i>F</i>	ESC (%) <i>G</i>	COST (\$K) <i>H</i>	CNTG (\$K) <i>I</i>	TOTAL (\$K) <i>J</i>	Program Year (Budget EC): 2020 Effective Price Level Date: 1 OCT 19		TOTAL FIRST COST (\$K) <i>K</i>	INFLATED (%) <i>L</i>	COST (\$K) <i>M</i>	CNTG (\$K) <i>N</i>	FULL (\$K) <i>O</i>
										Spent Thru: 1-Oct-18 (\$K)						
04	DAMS	\$3,668	\$1,000	27.3%	\$4,668	2.0%	\$3,742	\$1,020	\$4,761	\$0	\$4,761	\$4,761	5.6%	\$3,952	\$1,077	\$5,028
05	LOCKS	\$6,593	\$1,797	27.3%	\$8,390	2.0%	\$6,725	\$1,833	\$8,558	\$0	\$8,558	\$8,558	5.6%	\$7,103	\$1,935	\$9,038
06	FISH & WILDLIFE FACILITIES	\$66,755	\$18,191	27.3%	\$84,946	2.0%	\$68,090	\$18,555	\$86,645	\$0	\$86,645	\$86,645	5.6%	\$71,911	\$19,596	\$91,507
18	CULTURAL RESOURCE PRESERVATION	\$470	\$128	27.3%	\$598	2.0%	\$479	\$131	\$610	\$0	\$610	\$610	5.6%	\$506	\$138	\$644
CONSTRUCTION ESTIMATE TOTALS:		\$77,487	\$21,115		\$98,602	2.0%	\$79,036	\$21,537	\$100,574	\$0	\$100,574	\$100,574	5.6%	\$83,472	\$22,746	\$106,218
01	LANDS AND DAMAGES	\$3,708	\$927	25.0%	\$4,635	2.0%	\$3,782	\$946	\$4,728	\$0	\$4,728	\$4,728	0.0%	\$3,782	\$946	\$4,728
30	PLANNING, ENGINEERING & DESIGN	\$3,871	\$1,055	27.3%	\$4,926	4.2%	\$4,033	\$1,099	\$5,132	\$0	\$5,132	\$5,132	2.3%	\$4,127	\$1,125	\$5,252
31	CONSTRUCTION MANAGEMENT	\$3,875	\$1,056	27.3%	\$4,931	2.0%	\$3,953	\$1,077	\$5,030	\$0	\$5,030	\$5,030	5.6%	\$4,174	\$1,137	\$5,311
PROJECT COST TOTALS:		\$88,941	\$24,153	27.2%	\$113,094		\$90,804	\$24,659	\$115,463	\$0	\$115,463	\$115,463	5.2%	\$95,555	\$25,954	\$121,509

CHIEF, COST ENGINEERING, xxx

ESTIMATED TOTAL PROJECT COST: \$121,509

PROJECT MANAGER, xxx

CHIEF, REAL ESTATE, xxx

CHIEF, PLANNING, xxx

CHIEF, ENGINEERING, xxx

CHIEF, OPERATIONS, xxx

CHIEF, CONSTRUCTION, xxx

CHIEF, CONTRACTING, xxx

CHIEF, PM-PB, xxxx

CHIEF, DPM, xxx

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

**** CONTRACT COST SUMMARY ****

PROJECT: SHEP Fish Passage
LOCATION: Augusta, GA
This Estimate reflects the scope and schedule in report; SHEP Fish Passage PMP

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 6/17/2019

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 1-Oct-18		Effective Price Level: 1-Oct-18		Program Year (Budget EC): 2020		Effective Price Level Date: 1 OCT 19						
		RISK BASED												
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
Alternative 2-6a														
04	DAMS	\$3,668	\$1,000	27.25%	\$4,668	2.0%	\$3,742	\$1,020	\$4,761	2022Q4	5.6%	\$3,952	\$1,077	\$5,028
05	LOCKS	\$6,593	\$1,797	27.25%	\$8,390	2.0%	\$6,725	\$1,833	\$8,558	2022Q4	5.6%	\$7,103	\$1,935	\$9,038
06	FISH & WILDLIFE FACILITIES	\$66,755	\$18,191	27.25%	\$84,946	2.0%	\$68,090	\$18,555	\$86,645	2022Q4	5.6%	\$71,911	\$19,596	\$91,507
18	CULTURAL RESOURCE PRESERVATION	\$470	\$128	27.25%	\$598	2.0%	\$479	\$131	\$610	2022Q4	5.6%	\$506	\$138	\$644
CONSTRUCTION ESTIMATE TOTALS:		\$77,487	\$21,115	27.3%	\$98,602		\$79,036	\$21,537	\$100,574			\$83,472	\$22,746	\$106,218
01	LANDS AND DAMAGES	\$3,708	\$927	25.0%	\$4,635	2.0%	\$3,782	\$946	\$4,728	2020Q1	0.0%	\$3,782	\$946	\$4,728
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	\$387	\$105	27.25%	\$492	4.2%	\$403	\$110	\$513	2020Q1	0.0%	\$403	\$110	\$513
0.5%	Planning & Environmental Compliance	\$387	\$105	27.25%	\$492	4.2%	\$403	\$110	\$513	2020Q1	0.0%	\$403	\$110	\$513
1.0%	Engineering & Design	\$775	\$211	27.25%	\$986	4.2%	\$807	\$220	\$1,027	2020Q1	0.0%	\$807	\$220	\$1,027
0.5%	Reviews, ATRs, IEPRs, VE	\$387	\$105	27.25%	\$492	4.2%	\$403	\$110	\$513	2020Q1	0.0%	\$403	\$110	\$513
0.5%	Life Cycle Updates (cost, schedule, risks)	\$387	\$105	27.25%	\$492	4.2%	\$403	\$110	\$513	2020Q1	0.0%	\$403	\$110	\$513
0.5%	Contracting & Reprographics	\$387	\$105	27.25%	\$492	4.2%	\$403	\$110	\$513	2020Q1	0.0%	\$403	\$110	\$513
0.5%	Engineering During Construction	\$387	\$105	27.25%	\$492	4.2%	\$403	\$110	\$513	2022Q4	11.7%	\$450	\$123	\$573
0.5%	Planning During Construction	\$387	\$105	27.25%	\$492	4.2%	\$403	\$110	\$513	2022Q4	11.7%	\$450	\$123	\$573
0.5%	Project Operations	\$387	\$105	27.25%	\$492	4.2%	\$403	\$110	\$513	2020Q1	0.0%	\$403	\$110	\$513
31	CONSTRUCTION MANAGEMENT													
3.0%	Construction Management	\$2,325	\$634	27.25%	\$2,959	2.0%	\$2,372	\$646	\$3,018	2022Q4	5.6%	\$2,504	\$682	\$3,187
1.0%	Project Operation:	\$775	\$211	27.25%	\$986	2.0%	\$791	\$215	\$1,006	2022Q4	5.6%	\$835	\$227	\$1,062
1.0%	Project Management	\$775	\$211	27.25%	\$986	2.0%	\$791	\$215	\$1,006	2022Q4	5.6%	\$835	\$227	\$1,062
CONTRACT COST TOTALS:		\$88,941	\$24,153		\$113,094		\$90,804	\$24,659	\$115,463			\$95,555	\$25,954	\$121,509

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

PROJECT: SHEP Fish Passage
PROJECT NO: P2 xxxxxx
LOCATION: Augusta, GA

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 6/17/2019

This Estimate reflects the scope and schedule in report;

SHEP Fish Passage PMP

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)					
WBS NUMBER <i>A</i>	Civil Works Feature & Sub-Feature Description <i>B</i>	COST (\$K) <i>C</i>	CNTG (\$K) <i>D</i>	CNTG (%) <i>E</i>	TOTAL (\$K) <i>F</i>	ESC (%) <i>G</i>	COST (\$K) <i>H</i>	CNTG (\$K) <i>I</i>	TOTAL (\$K) <i>J</i>	Program Year (Budget EC): 2020 Effective Price Level Date: 1 OCT 19		TOTAL FIRST COST (\$K) <i>K</i>	INFLATED (%) <i>L</i>	COST (\$K) <i>M</i>	CNTG (\$K) <i>N</i>	FULL (\$K) <i>O</i>
										Spent Thru: 1-Oct-18 (\$K)						
04	DAMS	\$3,081	\$840	27.3%	\$3,920	2.0%	\$3,143	\$856	\$3,999	\$0	\$3,999	\$3,999	5.6%	\$3,319	\$904	\$4,223
05	LOCKS	\$5,652	\$1,540	27.3%	\$7,192	2.0%	\$5,765	\$1,571	\$7,336	\$0	\$7,336	\$7,336	5.6%	\$6,089	\$1,659	\$7,748
06	FISH & WILDLIFE FACILITIES	\$46,116	\$12,567	27.3%	\$58,682	2.0%	\$47,038	\$12,818	\$59,856	\$0	\$59,856	\$59,856	5.6%	\$49,678	\$13,537	\$63,215
13	PUMPING PLANT	\$1,154	\$314	27.3%	\$1,468	2.0%	\$1,177	\$321	\$1,497	\$0	\$1,497	\$1,497	5.6%	\$1,243	\$339	\$1,581
18	CULTURAL RESOURCE PRESERVATION	\$470	\$128	27.3%	\$598	2.0%	\$479	\$131	\$610	\$0	\$610	\$610	5.6%	\$506	\$138	\$644
CONSTRUCTION ESTIMATE TOTALS:		\$56,472	\$15,389		\$71,861	2.0%	\$57,602	\$15,696	\$73,298	\$0	\$73,298	\$73,298	5.6%	\$60,834	\$16,577	\$77,412
01	LANDS AND DAMAGES	\$108	\$27	25.0%	\$135	2.0%	\$110	\$28	\$138	\$0	\$138	\$138	0.0%	\$110	\$28	\$138
30	PLANNING, ENGINEERING & DESIGN	\$2,821	\$769	27.3%	\$3,590	4.2%	\$2,939	\$801	\$3,740	\$0	\$3,740	\$3,740	2.3%	\$3,008	\$820	\$3,827
31	CONSTRUCTION MANAGEMENT	\$2,824	\$770	27.3%	\$3,594	2.0%	\$2,880	\$785	\$3,665	\$0	\$3,665	\$3,665	5.6%	\$3,042	\$829	\$3,871
PROJECT COST TOTALS:		\$62,226	\$16,954	27.2%	\$79,180		\$63,532	\$17,310	\$80,841	\$0	\$80,841	\$80,841	5.5%	\$66,994	\$18,253	\$85,248

CHIEF, COST ENGINEERING, xxx

ESTIMATED TOTAL PROJECT COST: \$85,248

PROJECT MANAGER, xxx

CHIEF, REAL ESTATE, xxx

CHIEF, PLANNING, xxx

CHIEF, ENGINEERING, xxx

CHIEF, OPERATIONS, xxx

CHIEF, CONSTRUCTION, xxx

CHIEF, CONTRACTING, xxx

CHIEF, PM-PB, xxxx

CHIEF, DPM, xxx

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

**** CONTRACT COST SUMMARY ****

PROJECT: SHEP Fish Passage
LOCATION: Augusta, GA
This Estimate reflects the scope and schedule in report; SHEP Fish Passage PMP

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 6/17/2019

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 1-Oct-18		Effective Price Level: 1-Oct-18		Program Year (Budget EC): 2020		Effective Price Level Date: 1 OCT 19						
		RISK BASED												
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
Alternative 2-6b														
04	DAMS	\$3,081	\$840	27.25%	\$3,920	2.0%	\$3,143	\$856	\$3,999	2022Q4	5.6%	\$3,319	\$904	\$4,223
05	LOCKS	\$5,652	\$1,540	27.25%	\$7,192	2.0%	\$5,765	\$1,571	\$7,336	2022Q4	5.6%	\$6,089	\$1,659	\$7,748
06	FISH & WILDLIFE FACILITIES	\$46,116	\$12,567	27.25%	\$58,682	2.0%	\$47,038	\$12,818	\$59,856	2022Q4	5.6%	\$49,678	\$13,537	\$63,215
13	PUMPING PLANT	\$1,154	\$314	27.25%	\$1,468	2.0%	\$1,177	\$321	\$1,497	2022Q4	5.6%	\$1,243	\$339	\$1,581
18	CULTURAL RESOURCE PRESERVATION	\$470	\$128	27.25%	\$598	2.0%	\$479	\$131	\$610	2022Q4	5.6%	\$506	\$138	\$644
CONSTRUCTION ESTIMATE TOTALS:		\$56,472	\$15,389	27.3%	\$71,861		\$57,602	\$15,696	\$73,298			\$60,834	\$16,577	\$77,412
01	LANDS AND DAMAGES	\$108	\$27	25.0%	\$135	2.0%	\$110	\$28	\$138	2020Q1	0.0%	\$110	\$28	\$138
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	\$282	\$77	27.25%	\$359	4.2%	\$294	\$80	\$374	2020Q1	0.0%	\$294	\$80	\$374
0.5%	Planning & Environmental Compliance	\$282	\$77	27.25%	\$359	4.2%	\$294	\$80	\$374	2020Q1	0.0%	\$294	\$80	\$374
1.0%	Engineering & Design	\$565	\$154	27.25%	\$719	4.2%	\$589	\$160	\$749	2020Q1	0.0%	\$589	\$160	\$749
0.5%	Reviews, ATRs, IEPRs, VE	\$282	\$77	27.25%	\$359	4.2%	\$294	\$80	\$374	2020Q1	0.0%	\$294	\$80	\$374
0.5%	Life Cycle Updates (cost, schedule, risks)	\$282	\$77	27.25%	\$359	4.2%	\$294	\$80	\$374	2020Q1	0.0%	\$294	\$80	\$374
0.5%	Contracting & Reprographics	\$282	\$77	27.25%	\$359	4.2%	\$294	\$80	\$374	2020Q1	0.0%	\$294	\$80	\$374
0.5%	Engineering During Construction	\$282	\$77	27.25%	\$359	4.2%	\$294	\$80	\$374	2022Q4	11.7%	\$328	\$89	\$418
0.5%	Planning During Construction	\$282	\$77	27.25%	\$359	4.2%	\$294	\$80	\$374	2022Q4	11.7%	\$328	\$89	\$418
0.5%	Project Operations	\$282	\$77	27.25%	\$359	4.2%	\$294	\$80	\$374	2020Q1	0.0%	\$294	\$80	\$374
31	CONSTRUCTION MANAGEMENT													
3.0%	Construction Management	\$1,694	\$462	27.25%	\$2,156	2.0%	\$1,728	\$471	\$2,199	2022Q4	5.6%	\$1,825	\$497	\$2,322
1.0%	Project Operation:	\$565	\$154	27.25%	\$719	2.0%	\$576	\$157	\$733	2022Q4	5.6%	\$609	\$166	\$774
1.0%	Project Management	\$565	\$154	27.25%	\$719	2.0%	\$576	\$157	\$733	2022Q4	5.6%	\$609	\$166	\$774
CONTRACT COST TOTALS:		\$62,226	\$16,954		\$79,180		\$63,532	\$17,310	\$80,841			\$66,994	\$18,253	\$85,248

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

PROJECT: SHEP Fish Passage
PROJECT NO: P2 xxxxxx
LOCATION: Augusta, GA

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 6/17/2019

This Estimate reflects the scope and schedule in report; SHEP Fish Passage PMP

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)				
WBS NUMBER <i>A</i>	Civil Works Feature & Sub-Feature Description <i>B</i>	COST (\$K) <i>C</i>	CNTG (\$K) <i>D</i>	CNTG (%) <i>E</i>	TOTAL (\$K) <i>F</i>	ESC (%) <i>G</i>	COST (\$K) <i>H</i>	CNTG (\$K) <i>I</i>	TOTAL (\$K) <i>J</i>	Program Year (Budget EC): Effective Price Level Date: 2020 1 OCT 19 Spent Thru: 1-Oct-18 (\$K) <i>K</i>	TOTAL FIRST COST (\$K) <i>K</i>	INFLATED (%) <i>L</i>	COST (\$K) <i>M</i>	CNTG (\$K) <i>N</i>	FULL (\$K) <i>O</i>
04	DAMS	\$3,081	\$840	27.3%	\$3,920	2.0%	\$3,143	\$856	\$3,999	\$0	\$3,999	5.6%	\$3,319	\$904	\$4,223
05	LOCKS	\$5,652	\$1,540	27.3%	\$7,192	2.0%	\$5,765	\$1,571	\$7,336	\$0	\$7,336	5.6%	\$6,089	\$1,659	\$7,748
06	FISH & WILDLIFE FACILITIES	\$47,424	\$12,923	27.3%	\$60,347	2.0%	\$48,372	\$13,181	\$61,554	\$0	\$61,554	5.6%	\$51,087	\$13,921	\$65,008
13	PUMPING PLANT	\$228	\$62	27.3%	\$290	2.0%	\$233	\$63	\$296	\$0	\$296	5.6%	\$246	\$67	\$313
18	CULTURAL RESOURCE PRESERVATION	\$470	\$128	27.3%	\$598	2.0%	\$479	\$131	\$610	\$0	\$610	5.6%	\$506	\$138	\$644
CONSTRUCTION ESTIMATE TOTALS:		\$56,855	\$15,493		\$72,348	2.0%	\$57,992	\$15,803	\$73,795	\$0	\$73,795	5.6%	\$61,246	\$16,690	\$77,936
01	LANDS AND DAMAGES	\$108	\$27	25.0%	\$135	2.0%	\$110	\$28	\$138	\$0	\$138	0.0%	\$110	\$28	\$138
30	PLANNING, ENGINEERING & DESIGN	\$2,841	\$774	27.3%	\$3,615	4.2%	\$2,960	\$806	\$3,766	\$0	\$3,766	2.3%	\$3,029	\$825	\$3,854
31	CONSTRUCTION MANAGEMENT	\$2,844	\$775	27.3%	\$3,619	2.0%	\$2,901	\$790	\$3,691	\$0	\$3,691	5.6%	\$3,063	\$835	\$3,898
PROJECT COST TOTALS:		\$62,648	\$17,069	27.2%	\$79,717		\$63,963	\$17,427	\$81,390	\$0	\$81,390	5.5%	\$67,449	\$18,377	\$85,827

CHIEF, COST ENGINEERING, xxx

ESTIMATED TOTAL PROJECT COST: \$85,827

PROJECT MANAGER, xxx

CHIEF, REAL ESTATE, xxx

CHIEF, PLANNING, xxx

CHIEF, ENGINEERING, xxx

CHIEF, OPERATIONS, xxx

CHIEF, CONSTRUCTION, xxx

CHIEF, CONTRACTING, xxx

CHIEF, PM-PB, xxx

CHIEF, DPM, xxx

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

**** CONTRACT COST SUMMARY ****

PROJECT: SHEP Fish Passage
LOCATION: Augusta, GA
This Estimate reflects the scope and schedule in report; SHEP Fish Passage PMP

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 6/17/2019

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 1-Oct-18		Effective Price Level: 1-Oct-18		Program Year (Budget EC): 2020		Effective Price Level Date: 1 OCT 19						
		RISK BASED												
WBS NUMBER <i>A</i>	Civil Works Feature & Sub-Feature Description <i>B</i>	COST (\$K) <i>C</i>	CNTG (\$K) <i>D</i>	CNTG (%) <i>E</i>	TOTAL (\$K) <i>F</i>	ESC (%) <i>G</i>	COST (\$K) <i>H</i>	CNTG (\$K) <i>I</i>	TOTAL (\$K) <i>J</i>	Mid-Point Date <i>P</i>	INFLATED (%) <i>L</i>	COST (\$K) <i>M</i>	CNTG (\$K) <i>N</i>	FULL (\$K) <i>O</i>
Alternative 2-6c														
04	DAMS	\$3,081	\$840	27.25%	\$3,920	2.0%	\$3,143	\$856	\$3,999	2022Q4	5.6%	\$3,319	\$904	\$4,223
05	LOCKS	\$5,652	\$1,540	27.25%	\$7,192	2.0%	\$5,765	\$1,571	\$7,336	2022Q4	5.6%	\$6,089	\$1,659	\$7,748
06	FISH & WILDLIFE FACILITIES	\$47,424	\$12,923	27.25%	\$60,347	2.0%	\$48,372	\$13,181	\$61,554	2022Q4	5.6%	\$51,087	\$13,921	\$65,008
13	PUMPING PLANT	\$228	\$62	27.25%	\$290	2.0%	\$233	\$63	\$296	2022Q4	5.6%	\$246	\$67	\$313
18	CULTURAL RESOURCE PRESERVATION	\$470	\$128	27.25%	\$598	2.0%	\$479	\$131	\$610	2022Q4	5.6%	\$506	\$138	\$644
CONSTRUCTION ESTIMATE TOTALS:		\$56,855	\$15,493	27.3%	\$72,348		\$57,992	\$15,803	\$73,795			\$61,246	\$16,690	\$77,936
01	LANDS AND DAMAGES	\$108	\$27	25.0%	\$135	2.0%	\$110	\$28	\$138	2020Q1	0.0%	\$110	\$28	\$138
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	\$284	\$77	27.25%	\$361	4.2%	\$296	\$81	\$376	2020Q1	0.0%	\$296	\$81	\$376
0.5%	Planning & Environmental Compliance	\$284	\$77	27.25%	\$361	4.2%	\$296	\$81	\$376	2020Q1	0.0%	\$296	\$81	\$376
1.0%	Engineering & Design	\$569	\$155	27.25%	\$724	4.2%	\$593	\$162	\$754	2020Q1	0.0%	\$593	\$162	\$754
0.5%	Reviews, ATRs, IEPRs, VE	\$284	\$77	27.25%	\$361	4.2%	\$296	\$81	\$376	2020Q1	0.0%	\$296	\$81	\$376
0.5%	Life Cycle Updates (cost, schedule, risks)	\$284	\$77	27.25%	\$361	4.2%	\$296	\$81	\$376	2020Q1	0.0%	\$296	\$81	\$376
0.5%	Contracting & Reprographics	\$284	\$77	27.25%	\$361	4.2%	\$296	\$81	\$376	2020Q1	0.0%	\$296	\$81	\$376
0.5%	Engineering During Construction	\$284	\$77	27.25%	\$361	4.2%	\$296	\$81	\$376	2022Q4	11.7%	\$331	\$90	\$421
0.5%	Planning During Construction	\$284	\$77	27.25%	\$361	4.2%	\$296	\$81	\$376	2022Q4	11.7%	\$331	\$90	\$421
0.5%	Project Operations	\$284	\$77	27.25%	\$361	4.2%	\$296	\$81	\$376	2020Q1	0.0%	\$296	\$81	\$376
31	CONSTRUCTION MANAGEMENT													
3.0%	Construction Management	\$1,706	\$465	27.25%	\$2,171	2.0%	\$1,740	\$474	\$2,214	2022Q4	5.6%	\$1,838	\$501	\$2,338
1.0%	Project Operation:	\$569	\$155	27.25%	\$724	2.0%	\$580	\$158	\$739	2022Q4	5.6%	\$613	\$167	\$780
1.0%	Project Management	\$569	\$155	27.25%	\$724	2.0%	\$580	\$158	\$739	2022Q4	5.6%	\$613	\$167	\$780
CONTRACT COST TOTALS:		\$62,648	\$17,069		\$79,717		\$63,963	\$17,427	\$81,390			\$67,449	\$18,377	\$85,827

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

PROJECT: SHEP Fish Passage
PROJECT NO: P2 xxxxxx
LOCATION: Augusta, GA

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, Bart Smith

PREPARED: 12/20/2018

This Estimate reflects the scope and schedule in report;

SHEP Fish Passage PMP

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)					
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Program Year (Budget EC): Effective Price Level Date: 2020 1 OCT 19	Spent Thru: 1-Oct-18 (\$K)	TOTAL FIRST COST (\$K)	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
04	DAMS	\$2,935	\$800	27.3%	\$3,735	2.0%	\$2,994	\$816	\$3,809		\$0	\$3,809	5.6%	\$3,162	\$862	\$4,023
05	LOCKS	\$5,061	\$1,379	27.3%	\$6,440	2.0%	\$5,162	\$1,407	\$6,569		\$0	\$6,569	5.6%	\$5,452	\$1,486	\$6,938
06	FISH & WILDLIFE FACILITIES	\$52,014	\$14,174	27.3%	\$66,188	2.0%	\$53,054	\$14,457	\$67,512		\$0	\$67,512	5.6%	\$56,032	\$15,269	\$71,300
13	PUMPING PLANT	\$323	\$88	27.3%	\$411	2.0%	\$329	\$90	\$419		\$0	\$419	5.6%	\$348	\$95	\$443
18	CULTURAL RESOURCE PRESERVATION	\$494	\$135	27.3%	\$629	2.0%	\$504	\$137	\$641		\$0	\$641	5.6%	\$532	\$145	\$677
CONSTRUCTION ESTIMATE TOTALS:		\$60,827	\$16,575		\$77,402	2.0%	\$62,044	\$16,907	\$78,950		\$0	\$78,950	5.6%	\$65,526	\$17,856	\$83,381
01	LANDS AND DAMAGES	\$108	\$29	27.3%	\$137	2.0%	\$110	\$30	\$140		\$0	\$140	0.0%	\$110	\$30	\$140
30	PLANNING, ENGINEERING & DESIGN	\$3,040	\$828	27.3%	\$3,868	4.2%	\$3,167	\$863	\$4,030		\$0	\$4,030	2.3%	\$3,241	\$883	\$4,124
31	CONSTRUCTION MANAGEMENT	\$3,041	\$829	27.3%	\$3,870	4.2%	\$3,168	\$863	\$4,031		\$0	\$4,031	11.7%	\$3,539	\$964	\$4,504
PROJECT COST TOTALS:		\$67,016	\$18,262	27.3%	\$85,278		\$68,489	\$18,663	\$87,152		\$0	\$87,152	5.7%	\$72,416	\$19,733	\$92,149

CHIEF, COST ENGINEERING, Bart Smith

ESTIMATED TOTAL PROJECT COST: \$92,149

PROJECT MANAGER, April Patterson

CHIEF, REAL ESTATE, Ralph W

CHIEF, PLANNING, Steven Fischer

CHIEF, ENGINEERING, Tracy Hendren

CHIEF, OPERATIONS, Michael Montone

CHIEF, CONSTRUCTION, Kenneth Gray

CHIEF, CONTRACTING, Paige Blechinger

CHIEF, RM, Cynthia Powers

CHIEF, DPM, Erik Blechinger

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

**** CONTRACT COST SUMMARY ****

PROJECT: SHEP Fish Passage
LOCATION: Augusta, GA
This Estimate reflects the scope and schedule in report;

SHEP Fish Passage PMP

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, Bart Smith

PREPARED: 12/20/2018

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 17-Dec-18		Effective Price Level: 1-Oct-18		Program Year (Budget EC): 2020		Effective Price Level Date: 1 OCT 19						
		RISK BASED												
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
Alternative 2-6d Recommended Plan														
04	DAMS	\$2,935	\$800	27.25%	\$3,735	2.0%	\$2,994	\$816	\$3,809	2022Q4	5.6%	\$3,162	\$862	\$4,023
05	LOCKS	\$5,061	\$1,379	27.25%	\$6,440	2.0%	\$5,162	\$1,407	\$6,569	2022Q4	5.6%	\$5,452	\$1,486	\$6,938
06	FISH & WILDLIFE FACILITIES	\$52,014	\$14,174	27.25%	\$66,188	2.0%	\$53,054	\$14,457	\$67,512	2022Q4	5.6%	\$56,032	\$15,269	\$71,300
13	PUMPING PLANT	\$323	\$88	27.25%	\$411	2.0%	\$329	\$90	\$419	2022Q4	5.6%	\$348	\$95	\$443
18	CULTURAL RESOURCE PRESERVATION	\$494	\$135	27.25%	\$629	2.0%	\$504	\$137	\$641	2022Q4	5.6%	\$532	\$145	\$677
CONSTRUCTION ESTIMATE TOTALS:		\$60,827	\$16,575	27.3%	\$77,402		\$62,044	\$16,907	\$78,950			\$65,526	\$17,856	\$83,381
01	LANDS AND DAMAGES	\$108	\$29	27.25%	\$137	2.0%	\$110	\$30	\$140	2020Q1	0.0%	\$110	\$30	\$140
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	\$304	\$83	27.25%	\$387	4.2%	\$317	\$86	\$403	2020Q1	0.0%	\$317	\$86	\$403
0.5%	Planning & Environmental Compliance	\$304	\$83	27.25%	\$387	4.2%	\$317	\$86	\$403	2020Q1	0.0%	\$317	\$86	\$403
1.0%	Engineering & Design	\$608	\$166	27.25%	\$774	4.2%	\$633	\$173	\$806	2020Q1	0.0%	\$633	\$173	\$806
0.5%	Reviews, ATRs, IEPRs, VE	\$304	\$83	27.25%	\$387	4.2%	\$317	\$86	\$403	2020Q1	0.0%	\$317	\$86	\$403
0.5%	Life Cycle Updates (cost, schedule, risks)	\$304	\$83	27.25%	\$387	4.2%	\$317	\$86	\$403	2020Q1	0.0%	\$317	\$86	\$403
0.5%	Contracting & Reprographics	\$304	\$83	27.25%	\$387	4.2%	\$317	\$86	\$403	2020Q1	0.0%	\$317	\$86	\$403
0.5%	Engineering During Construction	\$304	\$83	27.25%	\$387	4.2%	\$317	\$86	\$403	2022Q4	11.7%	\$354	\$96	\$450
0.5%	Planning During Construction	\$304	\$83	27.25%	\$387	4.2%	\$317	\$86	\$403	2022Q4	11.7%	\$354	\$96	\$450
0.5%	Project Operations	\$304	\$83	27.25%	\$387	4.2%	\$317	\$86	\$403	2020Q1	0.0%	\$317	\$86	\$403
31	CONSTRUCTION MANAGEMENT													
3.0%	Construction Management	\$1,825	\$497	27.25%	\$2,322	4.2%	\$1,901	\$518	\$2,419	2022Q4	11.7%	\$2,124	\$579	\$2,703
1.0%	Project Operation:	\$608	\$166	27.25%	\$774	4.2%	\$633	\$173	\$806	2022Q4	11.7%	\$708	\$193	\$900
1.0%	Project Management	\$608	\$166	27.25%	\$774	4.2%	\$633	\$173	\$806	2022Q4	11.7%	\$708	\$193	\$900
CONTRACT COST TOTALS:		\$67,016	\$18,262		\$85,278		\$68,489	\$18,663	\$87,152			\$72,416	\$19,733	\$92,149

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

PROJECT: SHEP Fish Passage
PROJECT NO: P2 xxxxxx
LOCATION: Augusta, GA

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 6/17/2019

This Estimate reflects the scope and schedule in report;

SHEP Fish Passage PMP

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	Program Year (Budget EC): Effective Price Level Date:			Spent Thru: 1-Oct-18 (\$K)	TOTAL FIRST COST (\$K)	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
							2020	1 OCT 19							
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
04	DAMS	\$2,797	\$1,331	47.6%	\$4,128	2.0%	\$2,853	\$1,357	\$4,210	\$0	\$4,210	4.6%	\$2,983	\$1,419	\$4,403
05	LOCKS	\$6,317	\$3,271	51.8%	\$9,587	2.0%	\$6,443	\$3,336	\$9,779	\$0	\$9,779	4.6%	\$6,737	\$3,488	\$10,225
06	FISH & WILDLIFE FACILITIES	\$72,131	\$19,656	27.3%	\$91,787	2.0%	\$73,574	\$20,049	\$93,623	\$0	\$93,623	4.6%	\$76,932	\$20,964	\$97,895
09	CHANNELS & CANALS	\$0	\$0	-	\$0	-	\$0	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0
15	FLOODWAY CONTROL & DIVERSION STRUC	\$26,887	\$9,174	34.1%	\$36,061	2.0%	\$27,425	\$9,357	\$36,782	\$0	\$36,782	4.6%	\$28,676	\$9,784	\$38,461
18	CULTURAL RESOURCE PRESERVATION	\$470	\$154	32.8%	\$624	2.0%	\$479	\$157	\$637	\$0	\$637	4.6%	\$501	\$164	\$666
	CONSTRUCTION ESTIMATE TOTALS:	\$108,602	\$33,585		\$142,187	2.0%	\$110,774	\$34,257	\$145,031	\$0	\$145,031	4.6%	\$115,830	\$35,820	\$151,650
01	LANDS AND DAMAGES	\$0	\$0	-	\$0	-	\$0	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0
30	PLANNING, ENGINEERING & DESIGN	\$5,430	\$1,480	27.3%	\$6,910	4.2%	\$5,657	\$1,541	\$7,198	\$0	\$7,198	1.1%	\$5,718	\$1,558	\$7,276
31	CONSTRUCTION MANAGEMENT	\$5,430	\$1,480	27.3%	\$6,910	2.0%	\$5,539	\$1,509	\$7,048	\$0	\$7,048	4.6%	\$5,791	\$1,578	\$7,369
	PROJECT COST TOTALS:	\$119,462	\$36,544	30.6%	\$156,006		\$121,969	\$37,308	\$159,277	\$0	\$159,277	4.4%	\$127,339	\$38,956	\$166,295

CHIEF, COST ENGINEERING, xxx

ESTIMATED TOTAL PROJECT COST: \$166,295

PROJECT MANAGER, xxx

CHIEF, REAL ESTATE, xxx

CHIEF, PLANNING, xxx

CHIEF, ENGINEERING, xxx

CHIEF, OPERATIONS, xxx

CHIEF, CONSTRUCTION, xxx

CHIEF, CONTRACTING,xxx

CHIEF, PM-PB, xxxx

CHIEF, DPM, xxx

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

**** CONTRACT COST SUMMARY ****

PROJECT: SHEP Fish Passage
LOCATION: Augusta, GA
This Estimate reflects the scope and schedule in report;

SHEP Fish Passage PMP

DISTRICT: Savannah District
POC: CHIEF, COST ENGINEERING, xxx

PREPARED: 6/17/2019

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 1-Oct-18		Effective Price Level: 1-Oct-18		Program Year (Budget EC): 2020		Effective Price Level Date: 1 OCT 19						
		RISK BASED												
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
Alternative 2-8														
04	DAMS	\$2,797	\$1,331	47.57%	\$4,128	2.0%	\$2,853	\$1,357	\$4,210	2022Q2	4.6%	\$2,983	\$1,419	\$4,403
05	LOCKS	\$6,317	\$3,271	51.78%	\$9,587	2.0%	\$6,443	\$3,336	\$9,779	2022Q2	4.6%	\$6,737	\$3,488	\$10,225
06	FISH & WILDLIFE FACILITIES	\$72,131	\$19,656	27.25%	\$91,787	2.0%	\$73,574	\$20,049	\$93,623	2022Q2	4.6%	\$76,932	\$20,964	\$97,895
09	CHANNELS & CANALS	\$0	\$0	27.25%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
15	FLOODWAY CONTROL & DIVERSION STRU	\$26,887	\$9,174	34.12%	\$36,061	2.0%	\$27,425	\$9,357	\$36,782	2022Q2	4.6%	\$28,676	\$9,784	\$38,461
18	CULTURAL RESOURCE PRESERVATION	\$470	\$154	32.79%	\$624	2.0%	\$479	\$157	\$637	2022Q2	4.6%	\$501	\$164	\$666
CONSTRUCTION ESTIMATE TOTALS:		\$108,602	\$33,585	30.9%	\$142,187		\$110,774	\$34,257	\$145,031			\$115,830	\$35,820	\$151,650
01	LANDS AND DAMAGES	\$0	\$0	25.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	\$543	\$148	27.3%	\$691	4.2%	\$566	\$154	\$720	2019Q4	-1.0%	\$560	\$153	\$712
0.5%	Planning & Environmental Compliance	\$543	\$148	27.3%	\$691	4.2%	\$566	\$154	\$720	2019Q4	-1.0%	\$560	\$153	\$712
1.0%	Engineering & Design	\$1,086	\$296	27.3%	\$1,382	4.2%	\$1,131	\$308	\$1,440	2019Q4	-1.0%	\$1,120	\$305	\$1,425
0.5%	Reviews, ATRs, IEPRs, VE	\$543	\$148	27.3%	\$691	4.2%	\$566	\$154	\$720	2019Q4	-1.0%	\$560	\$153	\$712
0.5%	Life Cycle Updates (cost, schedule, risks)	\$543	\$148	27.3%	\$691	4.2%	\$566	\$154	\$720	2019Q4	-1.0%	\$560	\$153	\$712
0.5%	Contracting & Reprographics	\$543	\$148	27.3%	\$691	4.2%	\$566	\$154	\$720	2019Q4	-1.0%	\$560	\$153	\$712
0.5%	Engineering During Construction	\$543	\$148	27.3%	\$691	4.2%	\$566	\$154	\$720	2022Q2	9.5%	\$619	\$169	\$788
0.5%	Planning During Construction	\$543	\$148	27.3%	\$691	4.2%	\$566	\$154	\$720	2022Q2	9.5%	\$619	\$169	\$788
0.5%	Project Operations	\$543	\$148	27.3%	\$691	4.2%	\$566	\$154	\$720	2019Q4	-1.0%	\$560	\$153	\$712
31	CONSTRUCTION MANAGEMENT													
3.0%	Construction Management	\$3,258	\$888	27.3%	\$4,146	2.0%	\$3,323	\$906	\$4,229	2022Q2	4.6%	\$3,475	\$947	\$4,422
1.0%	Project Operation:	\$1,086	\$296	27.3%	\$1,382	2.0%	\$1,108	\$302	\$1,410	2022Q2	4.6%	\$1,158	\$316	\$1,474
1.0%	Project Management	\$1,086	\$296	27.3%	\$1,382	2.0%	\$1,108	\$302	\$1,410	2022Q2	4.6%	\$1,158	\$316	\$1,474
CONTRACT COST TOTALS:		\$119,462	\$36,544		\$156,006		\$121,969	\$37,308	\$159,277			\$127,339	\$38,956	\$166,295

SHEP - Fish Passage - Savannah District - SAS Cost & Schedule Risk Analysis

Risk No.	Risk/Opportunity Event	Concerns	PDT Discussions & Conclusions	Project Cost				Project Schedule				Variance Distribution	Correlation to Other(s)	Responsibility/POC	Affected Project Component
				Likelihood*	Impact*	Risk Level*	Rough Order Impact (\$)	Likelihood*	Impact*	Risk Level*	Rough Order Impact (mo)				
Internal Risks (Internal Risk Items are those that are generated, caused, or controlled within the PDT's sphere of influence.)															
PROJECT & PROGRAM MGMT															
PPM-1	Dam Demolition	<ul style="list-style-type: none"> Investigations sufficient to support design assumptions? Potential for scope growth, added features and quantities? Design confidence? 	The dam demolition scope is clear at this point, but the potential for growth exists only due to differing site conditions. Since the dam is a rigid structure with known parts (ie, gates), there won't be much additional scope possible, unless the design elevation for demolition is changed. Since that is unlikely, this is a low risk.	Unlikely	Marginal	LOW		Unlikely	Marginal	LOW		Triangular		Project Manager	Project Cost
PPM-2	Lock Demolition	<ul style="list-style-type: none"> Investigations sufficient to support design assumptions? Potential for scope growth, added features and quantities? Design confidence? 	The lock demolition scope is clear at this point, but the potential for growth exists only due to differing site conditions. Since the lock is concrete though there won't be much additional scope possible, unless the design elevation for demolition is changed. Since that is unlikely, this is a low risk.	Unlikely	Marginal	LOW		Unlikely	Marginal	LOW		Triangular		Project Manager	Project Cost & Schedule
PPM-3	Fish Passage in River (Weirs)	<ul style="list-style-type: none"> Design confidence? Investigations sufficient to support design assumptions? 	The layout could change if we were to build this alternative. Since we have another agency involved in the decision-making process, there is a possibility that they could desire a modification to plan. The design is probably conservative even if it were to change (IE, slopes would steepen), but in the event of an unforeseen change it is anticipated that the impact could be moderate.	Very Unlikely	Negligible	LOW		Very Unlikely	Critical	LOW		Triangular		Project Manager	Project Cost & Schedule
PPM-4	Disposal of Excavated material	<ul style="list-style-type: none"> Investigations sufficient to support design assumptions? Potential for scope growth, added features and quantities? Design confidence? Water care and diversion fully understood, planned? 	The disposal of excavated material from the channel is currently planned to be disposed of somewhere on site. There is federal property adjacent that should be able to be used with some coordination. However, in the event that not all of it can be used for disposal, the PDT decided that rather than have the performing contractor take the material to an offsite disposal facility and pay a topping fee, additional land would be purchased (maybe 20 acres) to allow the material to be dumped and spread there. Assume maybe a 50% chance that this needs to occur, and allow roughly \$20k/acre for miscellaneous land or be purchased for this.	Unlikely	Significant	MODERATE		Unlikely	Marginal	LOW		Yes-No		Project Manager	Project Cost & Schedule
PPM-5	Cultural Resources	<ul style="list-style-type: none"> Investigations sufficient to support design assumptions? Potential for scope growth, added features and quantities? 	We do know that impacts to the structure will require mitigation. We don't know if there are cultural resources in the recreation area that will be impacted. Depending on the alternative selected, there will be some requirements for deep trenching to identify whether there are any archaeological deposits. The main variable is the amount of trenching needed; it is very likely to occur but may require more than anticipated. There were investigations done on the South Carolina side and there was nothing found that required mitigation. It is assumed that the findings on the Georgia side would be very similar and thus would not require any mitigation either.	Likely	Negligible	LOW		Likely	Negligible	LOW		Triangular		Project Manager	Project Cost & Schedule
PPM-6	Water Supply Intake	Investigations to water supply intakes downstream for certain alternatives	The estimate from CDM Smith for the recommended alternative is roughly \$228k - applying that to the Prime contractor yields roughly \$328k. That should be sufficient, as the CDM Smith estimate was for the performing Contractor to do the work.	Very Unlikely	Negligible	LOW		Very Unlikely	Marginal	LOW		Triangular		Project Manager	Project Cost & Schedule
CONTRACT ACQUISITION RISKS															
CA-1	Numerous Separate Contracts	Currently, the estimate assumes one contract. Breaking into multiple contracts would increase costs.	Due to the size of the work, it would go out Unrestricted/Full and Open, not to any small business/MATOC. Acquisition will likely be IFB and LPTA, but a tradeoff approach could be used which has the potential to cause a small increase in price. This plan is possible but would cause a marginal impact.	Very Unlikely	Significant	LOW		Very Unlikely	Significant	LOW		Triangular		Project Manager	Project Cost & Schedule
CA-2	Preference to SDB/8(a) Contracts/Productivity	The District is very committed to meeting the SBA goals and attempts to award contracts as much as possible to SDB/8(a) contractors. This risk predominantly captures the risk to overall productivity and effectiveness.	Due to the size of the work, it would go out Unrestricted/Full and Open, not to any small business/MATOC. Acquisition will likely be IFB and LPTA, but a tradeoff approach could be used which has the potential to cause a small increase in price. This plan is possible but would cause a marginal impact.	Very Unlikely	Significant	LOW		Very Unlikely	Significant	LOW		Triangular		Project Manager	Project Cost & Schedule
CA-3	Procurement Strategy - May Use a Tradeoff Approach	There is a chance that the contract could be negotiated via tradeoff (best value). This could increase the costs over the LPTA/IFB processes.	Due to the size of the work, it would go out Unrestricted/Full and Open, not to any small business/MATOC. Acquisition will likely be IFB and LPTA, but a tradeoff approach could be used which has the potential to cause a small increase in price. This plan is possible but would cause a marginal impact.	Unlikely	Marginal	LOW		Unlikely	Significant	MODERATE		Triangular		Project Manager	Project Cost & Schedule

SHEP - Fish Passage - Savannah District - SAS Cost & Schedule Risk Analysis

Risk No.	Risk/Opportunity Event	Concerns	PDT Discussions & Conclusions	Project Cost				Project Schedule				Variance Distribution	Correlation to Other(s)	Responsibility/POC	Affected Project Component
				Likelihood*	Impact*	Risk Level*	Rough Order Impact (\$)	Likelihood*	Impact*	Risk Level*	Rough Order Impact (mo)				
TECHNICAL RISKS															
TL-1	Dam Removal		Loss/waste is accounted for in all quantities that will require new material to be purchased/placed. The dam repair quantities would likely not increase unless there was unforeseen scope added (covered in first element risk). While it's still possible there could be some quantity growth it would likely only be marginal.	Very Unlikely	Significant	LOW		Very Unlikely	Marginal	LOW		Triangular		Technical Lead	Project Schedule
TL-2	Lock Wall Removal		Loss/waste is accounted for in all quantities that will require new material to be purchased/placed. The biggest unknown for this feature would be the grouting required; if large voids were to be hit then there would be a much larger grout take than originally anticipated. This is a definite possibility and could be a significant increase.	Very Unlikely	Significant	LOW		Very Unlikely	Marginal	LOW		Triangular		Technical Lead	Project Cost & Schedule
TL-3	Fish Passage in River (Weirs)		Loss/waste is accounted for in all quantities that will require new material to be purchased/placed. However, any settlement has not been taken into account for the stone to be placed in the river. Settlement could be 10% of total volume (or higher). Assume a range of 0-15% as a risk to the stone quantities used to account for this. While it's likely that the ultimate settlement volume will not be exactly 10%, there will likely be some settlement. Assume a uniform distribution.	Very Likely	Marginal	MODERATE		Very Likely	Marginal	MODERATE		Uniform		Technical Lead	Project Cost & Schedule
TL-4	Excavation/Cofferdam in River		Loss/waste is accounted for in all quantities that will require new material to be purchased/placed. Further investigations could require additional excavation quantities. Assume this could cause a moderate impact to the excavation qty's.	Unlikely	Significant	MODERATE		Unlikely	Negligible	LOW		Triangular			
TL-5	Benched area may need concrete	Grass (as currently estimated) may not be strong enough	H&H reviewer is concerned that the benched slope that is slated to be covered with grass may need a more robust treatment - potentially concrete slope paving or something similar.	Likely	Marginal	MODERATE		Likely	Negligible	LOW		Triangular		Technical Lead	Project Cost & Schedule
LANDS AND DAMAGES RISKS															
LD-1	Real Estate Plan Not Fully Defined	The REP is not fully defined at this time. However, RE has provided a cost for the selected plan	RE cost provided by RE PDT member; based on the selected plan the RE takings would be much less than for the original 2-6D alt; hence the low RE cost. This was one of the reasons the plan was modified so the probability of increased cost/time is very low.	Very Unlikely	Negligible	LOW		Very Unlikely	Negligible	LOW		Triangular		Real Estate	Project Cost & Schedule
REGULATORY AND ENVIRONMENTAL RISKS															
RE-1	Low Flow Impacts to Environmental Issues	There may be impacts to the aquatic habitat and environment in the lake and downstream due to maintaining low flow and low pool for the construction of the dam modifications. Additionally, the team may request lower pools than anticipated after the investigations are complete.	While this may not produce any substantive cost or schedule issues, it may produce some issues for consideration and mitigation from a management and coordination standpoint.	Very Likely	Negligible	LOW		Very Likely	Negligible	LOW		Triangular		Environmental	Project Cost & Schedule
RE-2	New EIS would be needed	For this alternative a new EIS would be required and would take some time	Will be covered by design schedule.	Unlikely	Negligible	LOW		Unlikely	Negligible	LOW		Triangular		Environmental	Project Schedule
RE-3	Boat Dock Mitigation Requirement			Unlikely	Marginal	LOW		Unlikely	Negligible	LOW		Triangular			
RE-4	Cultural Resource Issues		Investigations for cultural resources have been incorporated into the project for whichever alternative is selected; while it has been accounted for, the impact could vary. Assume it's likely to differ from what is in the estimate but the impact would only be marginal.	Very Likely	Negligible	LOW		Very Likely	Negligible	LOW		Triangular			
RE-5	Endangered Species Issues	Part of any revised EA will include a biological survey for endangered species. While downstream aquatic species may be detected, it likely will not impact the dam safety action.	The impacts to endangered species could be mitigated or avoided, and are very unlikely to impact the dam safety modifications, as currently designed. ***UPDATE: this risk is no longer applicable to Phase 2 work.*** *Drew has an endangered species writeup that maybe he can share for info	Very Likely	Negligible	LOW		Very Likely	Negligible	LOW		Triangular			
CONSTRUCTION RISKS															
CON-1	Remote Location	The project site is not that remote of a location. The specialty craft will likely be supplied by the local area and won't have to come from far away be housed on site. Should be no risk.	This is already captured in the cost estimate.	Very Unlikely	Marginal	LOW		Very Unlikely	Negligible	LOW		Triangular		Project Manager	Project Cost & Schedule
CON-2	Limitations on the Staging/Storage Area	There are some limitations as to the footprint of the staging/storage areas.	This could have an impact on the overall construction staging area needs/productivity. However, the estimate should cover any issues/hindrances caused by staging.	Unlikely	Marginal	LOW		Unlikely	Negligible	LOW		Triangular		Real Estate	Project Cost & Schedule
CON-3	Potential Work Stoppage Due to Pool Regulation		This could have an impact on cost and schedule.	Unlikely	Marginal	LOW		Unlikely	Marginal	LOW		Triangular		Project Manager	Project Cost
CON-4	Consideration for Contract Modifications/Claims	There is inherent risk of post-award contract changes due to differing conditions, quantity variations, etc.	Should be no major issues that will increase mods/claims more than a similarly complex project that haven't already been discussed. Assume a range of 3-10% and 0-4 months.	Likely	Marginal	MODERATE		Likely	Marginal	MODERATE		Triangular		Hydrology/Hydraulic Design	Project Cost & Schedule
ESTIMATE & SCHEDULE RISKS															
ES-1	Overall confidence in construction estimate and schedule		The risk is that the schedule does not accurately reflect the level of effort for these features of work. There is uncertainty about the level of effort required, particularly for the grouting and subsequent cut-off wall operation -- due to uncertainty with subsurface conditions.	Unlikely	Significant	MODERATE		Unlikely	Significant	MODERATE		Triangular		Cost Engineering	Project Cost
ES-2	Productivity issues in estimate	Because of phasing/construction restrictions, may see increased prices/slower production		Unlikely	Significant	MODERATE		Unlikely	Significant	MODERATE		Triangular		Cost Engineering	Project Cost
ES-3	Variations in quantities	Quantities may vary	Quantities may vary a bit since this is a heavy stone palcmeent job - assume some low and high side risk for quantity variation in the stone.	Likely	Marginal	MODERATE		Likely	Negligible	LOW		Triangular		Cost Engineering	Project Cost & Schedule
ES-4	Prime/Subcontractor Tiering	Multiple layers of subs would increase costs	Currently, all work in the estimate is assigned to subcontractors - though unlikely, any increase could be classified as significant depending on what portions experienced additional markups.	Unlikely	Significant	MODERATE		Unlikely	Negligible	LOW		Triangular		Cost Engineering	Project Cost & Schedule
ES-5	PED/S&A Estimate	Generic PED/S&A costs may not be suitable	Currently, PED/S&A costs are estimated based on the overall SHEP assumption (2.5% PED and 5% S&A, per Project Manager). Assume that this is likely to increase (potentially up to 5% and 8%, respectively).	Likely	Marginal	MODERATE		Likely	Negligible	LOW		Yes-No		Cost Engineering	Project Cost & Schedule
ES-6	Adverse Weather Days	Adverse Weather Days in Schedule	Currently, construction schedule includes roughly 4.25 AWDs/month, for a total of 50 days/year (every Weds is blocked out). This assumption is slightly aggressive in estimator's view, so assume this would be the best-case scenario. Assume a likely of the same, and a worst case scenario of 8.5 days per month (twice as much, every Tues & Weds blocked). Another schedule has been created and shows a completion roughly 7 months later, as opposed to 1,005 cd.	Likely	Negligible	LOW		Likely	Significant	HIGH		Yes-No		Cost Engineering	Project Cost & Schedule

SHEP - Fish Passage - Savannah District - SAS Cost & Schedule Risk Analysis

Risk No.	Risk/Opportunity Event	Concerns	PDT Discussions & Conclusions	Project Cost				Project Schedule				Variance Distribution	Correlation to Other(s)	Responsibility/POC	Affected Project Component
				Likelihood*	Impact*	Risk Level*	Rough Order Impact (\$)	Likelihood*	Impact*	Risk Level*	Rough Order Impact (mo)				
External Risks (External Risk Items are those that are generated, caused, or controlled exclusively outside the PDT's sphere of influence.)															
Ex-1	Market Conditions/Bidding Climate	There will likely be plenty of competition for this project	However, if competition is scarce then bid costs could increase. There has been a similar project done at Cape Fear in NC, which is fairly close (same area of the county) and there are a number of large, capable contractors in the area. It would be very unlikely that only one contractor would bid, but due to the nature of the project (mostly stone and demo work) it's like that any increase in price would only be marginal. Even if it were significant, the impact would still be low.	Very Unlikely	Significant	LOW		Very Unlikely	Marginal	LOW		Triangular		Project Manager	Project Cost & Schedule
Ex-2	Impact of Flood Event during Low Pool Construction Window		If a major storm event occurs during construction, it could have serious impacts on the project cost and schedule. Running a statistical analysis for elevation-duration of the NSBLD pool using USGS (02196999) in HEC-SSP software for the period of record from 1989-present, the pool has only been above 120 ft NGVD29 once in the period of record. The pool is expected to reach 120ft or higher approximately .1% of the time. All this to say that we are confident that elevation 120 is very safe and will very likely not be overtopped during construction.	Very Unlikely	Significant	LOW		Very Unlikely	Significant	LOW	3-6 mos.	Triangular		Project Manager	Project Cost & Schedule
Ex-3	Escalation/Inflation Underestimation	Escalation may outpace the factors used in CWCCIS	Current OMB escalation is running at 1.2%; current CWCCIS escalation is running around 1.77%. There is a risk that these factors will lag behind actual inflation. Assume a high side risk of 4% escalation, which would represent an additional 2.23% above expected escalation. Project baseline schedule is ~3.0 yrs, so assume 1.5 years of escalation to midpoint of construction as an approximation.	Likely	Marginal	MODERATE		Likely	Negligible	LOW		Triangular		Project Manager	Project Cost & Schedule
Ex-4	All low construction risks	Risks modeled as low/negligible may add up to be a significant risk	This risk is intended to capture all of the risks assigned "low" impacts and thus not included in the model. Individually, they do not add up to much, but collectively they could have a significant impact on the cost and/or schedule.	Unlikely	Significant	MODERATE		Unlikely	Significant	MODERATE		Triangular		Project Manager	Project Cost & Schedule

*Likelihood, Impact, and Risk Level to be verified through market research and analysis (conducted by cost engineer).

1. Risk/Opportunity identified with reference to the Risk Identification Checklist and through deliberation and study of the PDT.
2. Discussions and Concerns elaborates on Risk/Opportunity Events and includes any assumptions or findings (should contain information pertinent to eventual study and analysis of event's impact to project).
3. Likelihood is a measure of the probability of the event occurring -- **Very Unlikely, Unlikely, Moderately Likely, Likely, Very Likely**. The likelihood of the event will be the same for both Cost and Schedule, regardless of impact.
4. Impact is a measure of the event's effect on project objectives with relation to scope, cost, and/or schedule -- **Negligible, Marginal, Significant, Critical, or Crisis**. Impacts on Project Cost may vary in severity from impacts on Project Schedule.
5. Risk Level is the resultant of Likelihood and Impact **Low, Moderate, or High**. Refer to the matrix located at top of page.
6. Variance Distribution refers to the behavior of the individual risk item with respect to its potential effects on Project Cost and Schedule. For example, an item with clearly defined parameters and a solid most likely scenario would probably follow a triangular or normal distribution. An risk item for which the PDT has little data or probability of modeling with respect to effects on cost or schedule (i.e. "anyone's guess") would probably follow a uniform or discrete uniform distribution.
7. The responsibility or POC is the entity responsible as the Subject Matter Expert (SME) for action, monitoring, or information on the PDT for the identified risk or opportunity.
8. Correlation recognizes those risk events that may be related to one another. Care should be given to ensure the risks are handled correctly without a "double counting."
9. Affected Project Component identifies the specific item of the project to which the risk directly or strongly correlates.
10. Project Implications identifies whether or not the risk item affects project cost, project schedule, or both. The PDT is responsible for conducting studies for both Project Cost and for Project Schedule.
11. Results of the risk identification process are studied and further developed by the Cost Engineer, then analyzed through the Monte Carlo Analysis Method for Cost (Contingency) and Schedule (Escalation) Growth.

SHEP - Fish Passage - Savannah District - SAS Cost & Schedule Risk Analysis

Risk No.	Risk/Opportunity Event	Variance Distribution	Project Cost					Crystal Ball Simulation			Project Schedule			Crystal Ball Simulation		
			Likelihood*	Probability of Occurrence	Probability Model	Impact*	Risk Level*	Expected Values (\$\$\$)			Likelihood*	Impact*	Risk Level*	Expected Values (Months)		
								Low	Most Likely	High				Low	Most Likely	High
Internal Risks (Internal Risk Items are those that are generated, caused, or controlled within the PDT's sphere of influence.)																
PROJECT & PROGRAM MGMT																
PPM-4	Disposal of Excavated material	Yes-No	Unlikely	75%	0.00%	Significant	MODERATE	\$0	\$0	\$1,000,000	Unlikely	Marginal	LOW			
PPM-5	Cultural Resources	Triangular	Likely			Negligible	LOW	(\$49,350)	\$0	\$123,375	Likely	Negligible	LOW			
PPM-6	Water Supply Intake	Triangular	Very Unlikely			Negligible	LOW	(\$95,421)	\$0	\$646,842	Very Unlikely	Marginal	LOW			
CONTRACT ACQUISITION RISKS																
CA-3	Procurement Strategy - May Use a Tradeoff Approach	Triangular	Unlikely			Marginal	LOW				Unlikely	Significant	MODERATE	0.0 Mo	0.0 Mo	1.0 Mo
TECHNICAL RISKS																
TL-3	Fish Passage in River (Weirs)	Uniform	Very Likely			Marginal	MODERATE	\$0	\$0	\$3,384,222	Very Likely	Marginal	MODERATE	0.0 Mo	0.0 Mo	2.0 Mo
TL-4	Excavation/Cofferdam in River	Triangular	Unlikely			Significant	MODERATE	\$0	\$0	\$4,227,380	Unlikely	Negligible	LOW	0.0 Mo	0.0 Mo	1.0 Mo
TL-5	Benched area may need concrete	Triangular	Likely			Marginal	MODERATE	\$0	\$0	\$2,218,333	Likely	Negligible	LOW			
CONSTRUCTION RISKS																
CON-4	Consideration for Contract Modifications/Claims	Triangular	Likely			Marginal	MODERATE	\$1,956,557	\$0	\$6,521,856	Likely	Marginal	MODERATE	0.0 Mo	0.0 Mo	4.0 Mo
ESTIMATE & SCHEDULE RISKS																
ES-1	Overall confidence in construction estimate and schedule	Triangular	Unlikely			Significant	MODERATE	(\$5,866,132)	\$0	\$8,799,198	Unlikely	Significant	MODERATE	-2.0 Mo	0.0 Mo	4.0 Mo
ES-2	Productivity issues in estimate	Triangular	Unlikely			Significant	MODERATE	(\$1,341,554)	\$0	\$2,189,763	Unlikely	Significant	MODERATE	-2.0 Mo	0.0 Mo	3.0 Mo
ES-3	Variations in quantities	Triangular	Likely			Marginal	MODERATE	(\$2,933,066)	\$0	\$8,799,198	Likely	Negligible	LOW			
ES-4	Prime/Subcontractor Tiering	Triangular	Unlikely			Significant	MODERATE	(\$5,866,132)	\$0	\$2,933,066	Unlikely	Negligible	LOW			
ES-5	PED/S&A Estimate	Yes-No	Likely	75%	0.00%	Marginal	MODERATE	\$0	\$0	\$2,750,000	Likely	Negligible	LOW			
ES-6	Adverse Weather Days	Yes-No	Likely	66%	0.00%	Negligible	LOW				Likely	Significant	HIGH	0.0 Mo	0.0 Mo	7.2 Mo
Programmatic Risks (External Risk Items are those that are generated, caused, or controlled exclusively outside the PDT's sphere of influence.)																
Ex-3	Escalation/Inflation Underestimation	Triangular	Likely			Marginal	MODERATE	\$0	\$0	\$2,193,678	Likely	Negligible	LOW			
Ex-4	All low construction risks	Triangular	Unlikely			Significant	MODERATE	(\$586,613)	\$0	\$5,866,132	Unlikely	Significant	MODERATE	0.0 Mo	0.0 Mo	2.0 Mo

\$65,218,562

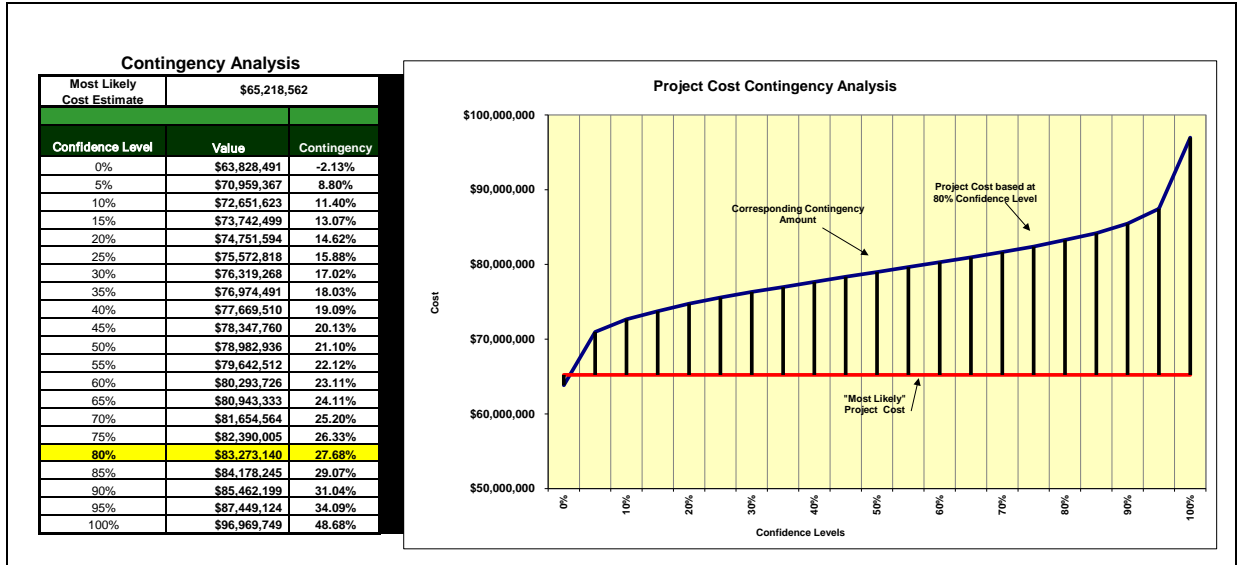
61.8 Mo

TOTAL PROJECT COST (BASELINE)	Percentile	Baseline TPC	Contingency \$\$	Baseline w/ Contingency	Contingency %
5%	\$65,218,562	\$ 5,740,805	\$ 70,959,367	8.80%	
10%	\$65,218,562	\$ 7,433,061	\$ 72,651,623	11.40%	
15%	\$65,218,562	\$ 8,523,937	\$ 73,742,499	13.07%	
20%	\$65,218,562	\$ 9,533,032	\$ 74,751,594	14.62%	
25%	\$65,218,562	\$ 10,354,256	\$ 75,572,818	15.88%	
30%	\$65,218,562	\$ 11,100,706	\$ 76,319,268	17.02%	
35%	\$65,218,562	\$ 11,755,929	\$ 76,974,491	18.03%	
40%	\$65,218,562	\$ 12,450,948	\$ 77,669,510	19.09%	
45%	\$65,218,562	\$ 13,129,198	\$ 78,347,760	20.13%	
50%	\$65,218,562	\$ 13,764,374	\$ 78,982,936	21.10%	
55%	\$65,218,562	\$ 14,423,950	\$ 79,642,512	22.12%	
60%	\$65,218,562	\$ 15,075,164	\$ 80,293,726	23.11%	
65%	\$65,218,562	\$ 15,724,771	\$ 80,943,333	24.11%	
70%	\$65,218,562	\$ 16,436,002	\$ 81,654,564	25.20%	
75%	\$65,218,562	\$ 17,171,443	\$ 82,390,005	26.33%	
80%	\$65,218,562	\$ 18,054,578	\$ 83,273,140	27.68%	
85%	\$65,218,562	\$ 18,959,683	\$ 84,178,245	29.07%	
90%	\$65,218,562	\$ 20,243,637	\$ 85,462,199	31.04%	
95%	\$65,218,562	\$ 22,230,562	\$ 87,449,124	34.09%	
100%	\$65,218,562	\$ 31,751,187	\$ 96,969,749	48.68%	

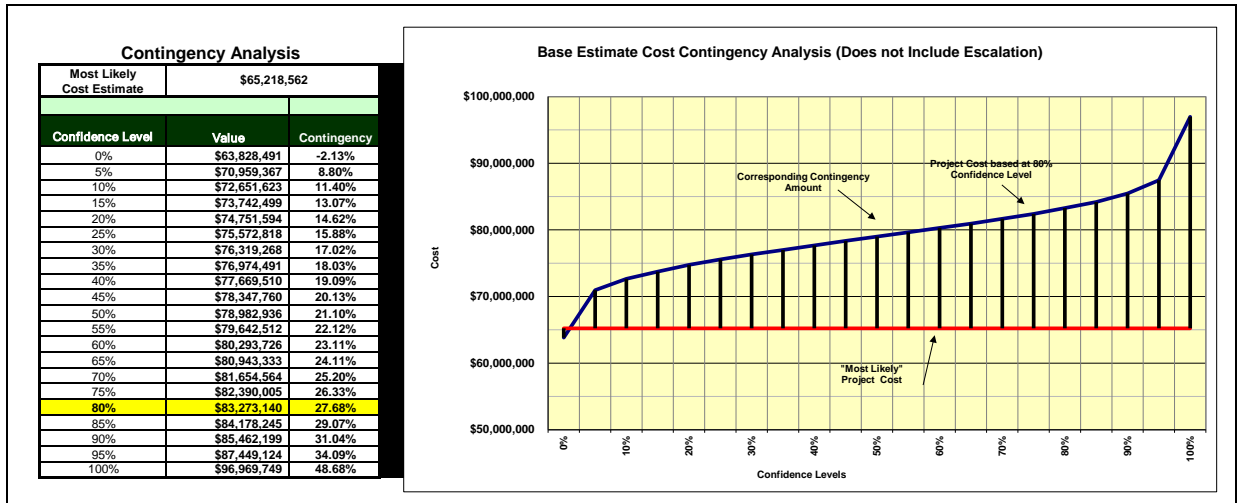
TOTAL PROJECT SCHEDULE (BASELINE)	Percentile	Baseline TPC	Contingency Mo.	Baseline w/ Contingency	Contingency %
5%	61.8 Mo	1.0 Mo	62.8 Mo	1.64%	
10%	61.8 Mo	1.7 Mo	63.5 Mo	2.70%	
15%	61.8 Mo	2.1 Mo	63.9 Mo	3.42%	
20%	61.8 Mo	2.5 Mo	64.3 Mo	4.07%	
25%	61.8 Mo	2.9 Mo	64.7 Mo	4.63%	
30%	61.8 Mo	3.2 Mo	65.0 Mo	5.14%	
35%	61.8 Mo	3.5 Mo	65.3 Mo	5.61%	
40%	61.8 Mo	3.7 Mo	65.5 Mo	6.01%	
45%	61.8 Mo	4.0 Mo	65.8 Mo	6.45%	
50%	61.8 Mo	4.3 Mo	66.1 Mo	6.92%	
55%	61.8 Mo	4.5 Mo	66.3 Mo	7.33%	
60%	61.8 Mo	4.8 Mo	66.6 Mo	7.79%	
65%	61.8 Mo	5.1 Mo	66.9 Mo	8.26%	
70%	61.8 Mo	5.4 Mo	67.2 Mo	8.77%	
75%	61.8 Mo	5.8 Mo	67.6 Mo	9.32%	
80%	61.8 Mo	6.1 Mo	67.9 Mo	9.85%	
85%	61.8 Mo	6.6 Mo	68.4 Mo	10.61%	
90%	61.8 Mo	7.1 Mo	68.9 Mo	11.48%	
95%	61.8 Mo	7.9 Mo	69.7 Mo	12.70%	
100%	61.8 Mo	12.3 Mo	74.1 Mo	19.92%	

Contingency on Base Estimate		80% Confidence Project Cost
Baseline Estimate Cost (Most Likely) ->		\$65,218,562
Baseline Estimate Cost Contingency Amount ->		\$18,054,578
Baseline Estimate Construction Cost (80% Confidence) ->		\$83,273,140
Contingency on Schedule		80% Confidence Project Schedule
Project Schedule Duration (Most Likely) ->		61.8 Months
Schedule Contingency Duration ->		6.1 Months
Project Schedule Duration (80% Confidence) ->		67.9 Months
Project Contingency		80% Confidence Project Cost
Project Contingency Amount (80% Confidence) ->		\$18,054,578
Project Contingency Percentage (80% Confidence) ->		27.68%
Project Cost (80% Confidence) ->		\$83,273,140

- PROJECT CONTINGENCY DEVELOPMENT -



- BASE COST CONTINGENCY DEVELOPMENT -

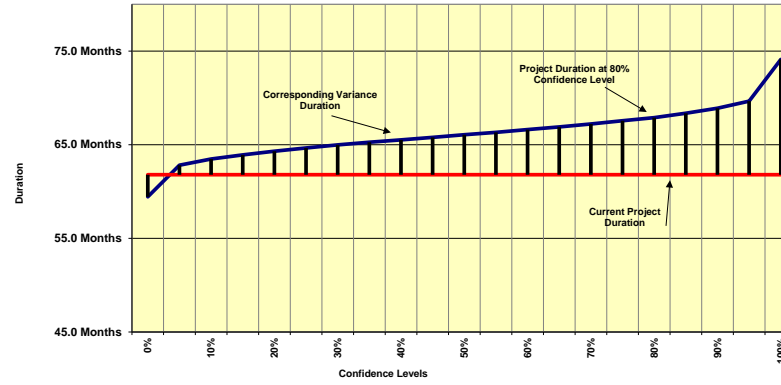


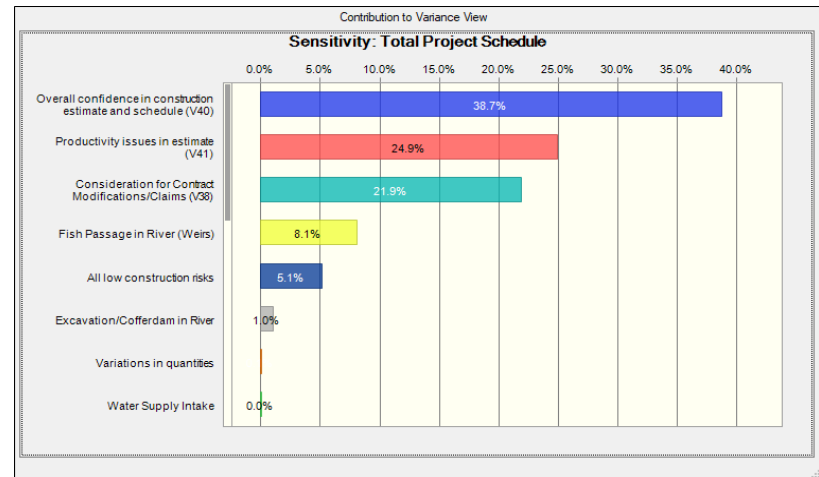
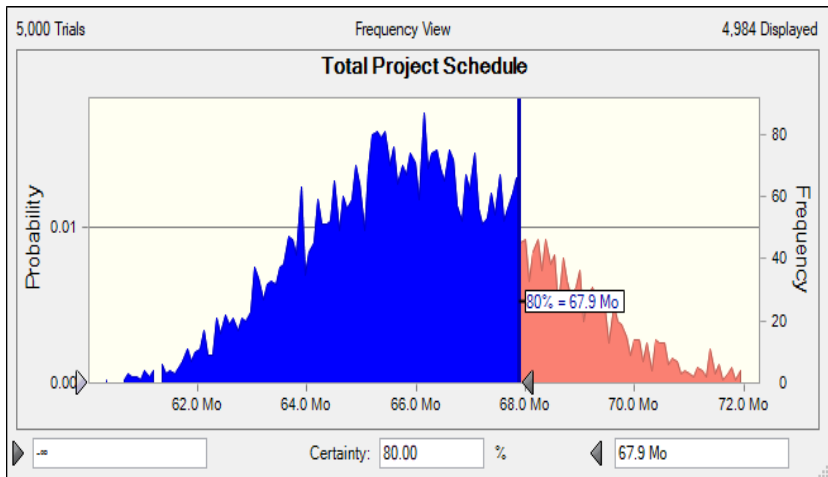
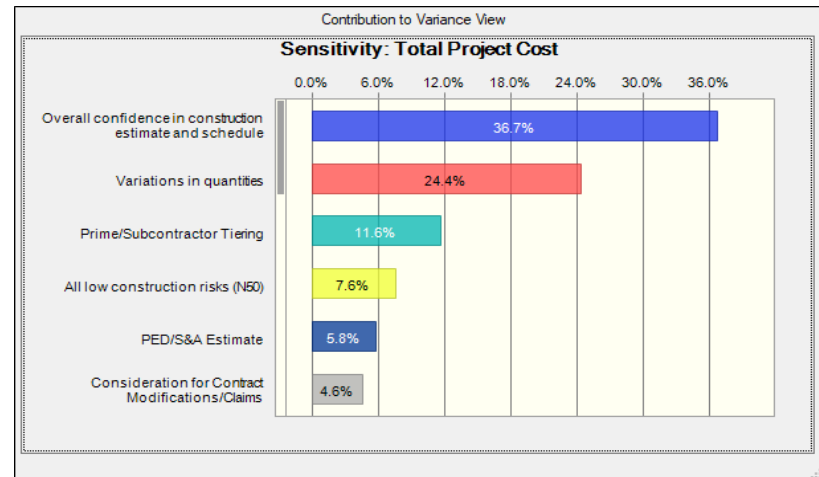
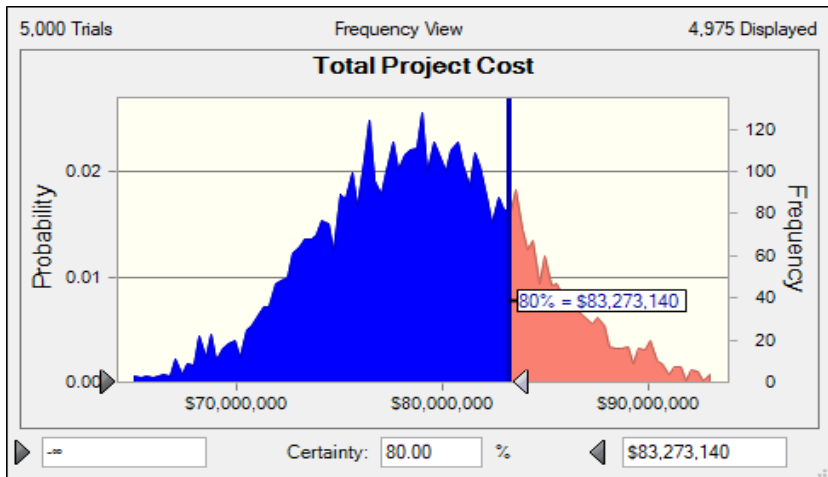
- SCHEDULE CONTINGENCY (DURATION) DEVELOPMENT -

Contingency Analysis

Most Likely Schedule	61.8 Months	
Confidence Level	Value	Contingency
0%	59.4 Months	-3.82%
5%	62.8 Months	1.64%
10%	63.5 Months	2.70%
15%	63.9 Months	3.42%
20%	64.3 Months	4.07%
25%	64.7 Months	4.63%
30%	65.0 Months	5.14%
35%	65.3 Months	5.61%
40%	65.5 Months	6.01%
45%	65.8 Months	6.45%
50%	66.1 Months	6.92%
55%	66.3 Months	7.33%
60%	66.6 Months	7.79%
65%	66.9 Months	8.26%
70%	67.2 Months	8.77%
75%	67.6 Months	9.32%
80%	67.9 Months	9.85%
85%	68.4 Months	10.61%
90%	68.9 Months	11.48%
95%	69.7 Months	12.70%
100%	74.1 Months	19.92%

Schedule Contingency (Duration) Analysis





Annualized Cost Summary

(double-click picture to open in Adobe)

Table C-1: Annualized Cost Summary

Description	Alternatives Summary - 100 yr project life, 3.5% interest rate used to calculate annualized costs								
	SHEP Plan A	Alt 1-1 2% Slope	Alt 2-3 2% Slope	Alt 2-6a 2% Slope	Alt 2-6b 2% Slope	Alt 2-6c 2% Slope	Alt 2-6d 2% Slope	Alt 2-8 2% Slope	Alt 2-8 2% Slope
Initial Cost									
04 Dams	\$0	\$0	\$3,045,283	\$3,028,436	\$4,223,309	\$4,223,309	\$4,023,310	\$4,402,382	
04 Locks	\$22,000,400	\$38,929,304	\$7,327,831	\$9,008,127	\$7,747,851	\$7,747,851	\$6,937,886	\$10,775,433	
06 Fish & Wildlife Facilities	\$32,045,376	\$30,673,831	\$56,031,375	\$91,507,096	\$63,214,970	\$65,008,096	\$71,300,408	\$77,295,344	
13 Pumping Plant	\$0	\$0	\$1,581,447	\$0	\$1,581,447	\$312,541	\$442,767	\$0	
15 Floodway Control and Diversion Structures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$38,460,731	
18 Cultural Resources	\$429,336	\$709,152	\$676,458	\$644,234	\$644,234	\$644,234	\$677,173	\$653,633	
<i>Construction Estimate Totals</i>	<i>\$64,482,116</i>	<i>\$70,312,718</i>	<i>\$69,682,423</i>	<i>\$106,718,894</i>	<i>\$77,477,831</i>	<i>\$77,916,864</i>	<i>\$81,317,348</i>	<i>\$151,649,731</i>	
01 Land and Damages	\$307,148	\$31,275	\$3,592,208	\$4,727,819	\$138,107	\$138,107	\$140,173	\$0	
03 Operation, Maintenance & Design	\$1,809,403	\$3,483,161	\$3,418,974	\$5,781,241	\$3,327,311	\$3,384,543	\$4,124,353	\$7,715,330	
01 Construction Management	\$2,712,294	\$5,797,448	\$3,454,020	\$5,311,242	\$3,870,696	\$3,898,109	\$4,503,531	\$7,369,250	
<i>Project Cost Totals</i>	<i>\$68,210,821</i>	<i>\$77,624,262</i>	<i>\$79,448,547</i>	<i>\$122,498,144</i>	<i>\$85,247,665</i>	<i>\$85,226,624</i>	<i>\$87,749,124</i>	<i>\$166,784,061</i>	
IOC	\$2,711,800	\$3,544,000	\$3,481,700	\$3,332,900	\$3,901,100	\$3,927,700	\$4,202,200	\$3,901,100	
Investment Cost	\$70,922,721	\$81,169,262	\$83,930,247	\$126,831,044	\$89,148,965	\$89,754,324	\$93,551,324	\$170,196,041	
Annualized Cost									
Investment Cost	\$2,565,000	\$2,935,000	\$3,002,000	\$4,587,000	\$3,224,000	\$3,245,000	\$3,484,000	\$6,134,000	
Adaptive Monitoring Costs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Monitoring Costs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
O&M	\$720,000	\$710,000	\$35,000	\$45,000	\$45,000	\$45,000	\$45,000	\$320,000	
Major Rehab	\$285,000	\$285,000	\$0	\$0	\$0	\$0	\$0	\$247,000	
Total Annual Cost	\$3,570,000	\$3,930,000	\$3,037,000	\$4,632,000	\$3,269,000	\$3,290,000	\$3,529,000	\$6,721,000	

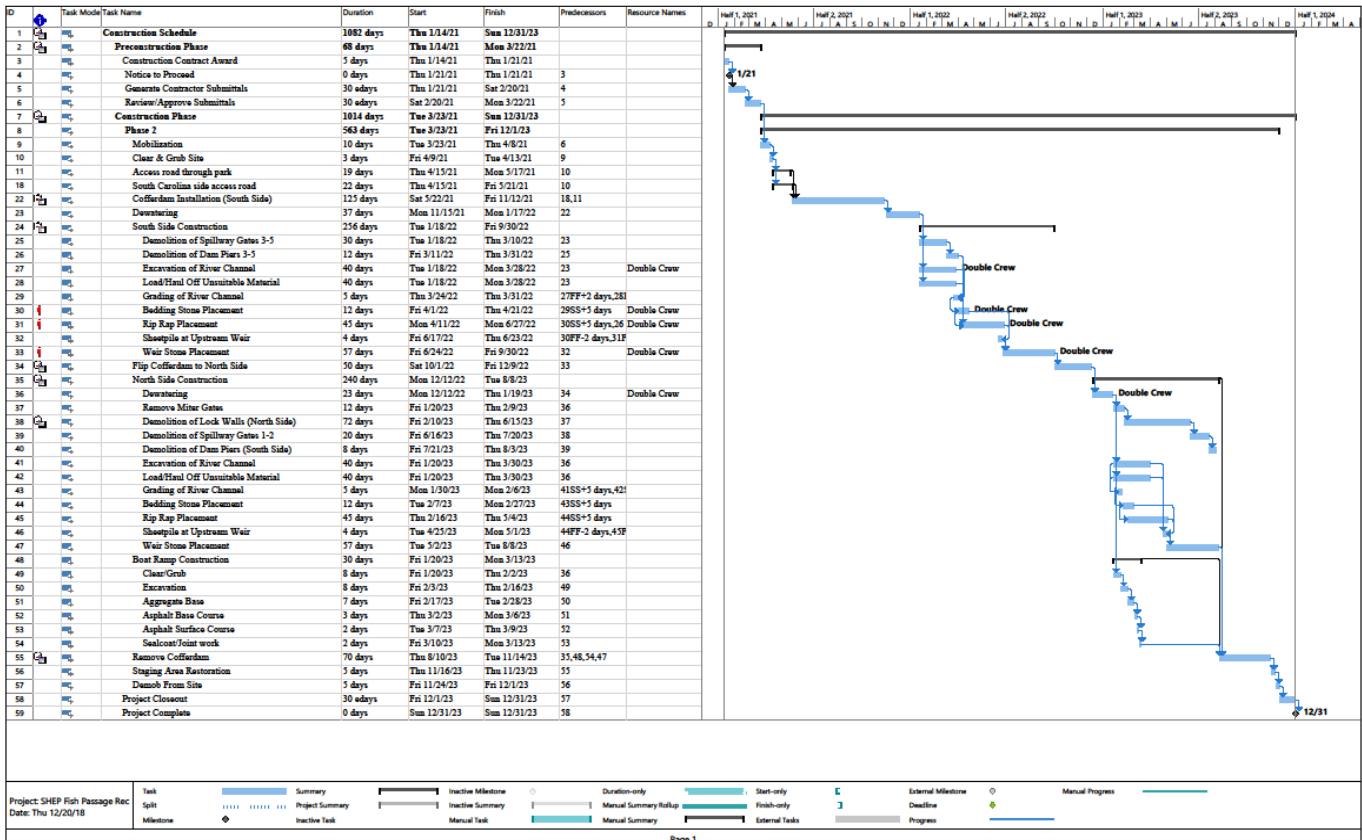
- Annualized costs based on an interest rate of 3.5% and 100-year project life
- IDC calculated on duration of 24 months, based on required schedule completion date of this project and construction schedule developed
- O&M costs developed by PDT for each alternative based on conversations with Ops personnel
- Major Rehab costs developed for certain alternatives that would require major rehab projects in the future. Major Rehab estimated based on current scope of work for the feature to be rehabbed, assumed to occur at year 50 of the project life. For Alt 1-1 this scope was the lock & dam rehab cost contained in the 05 account; for Alt 2-8 this was the 15 account cost for major rehab of the assumed gate structure.

Table C-1: Annualized Cost Summary

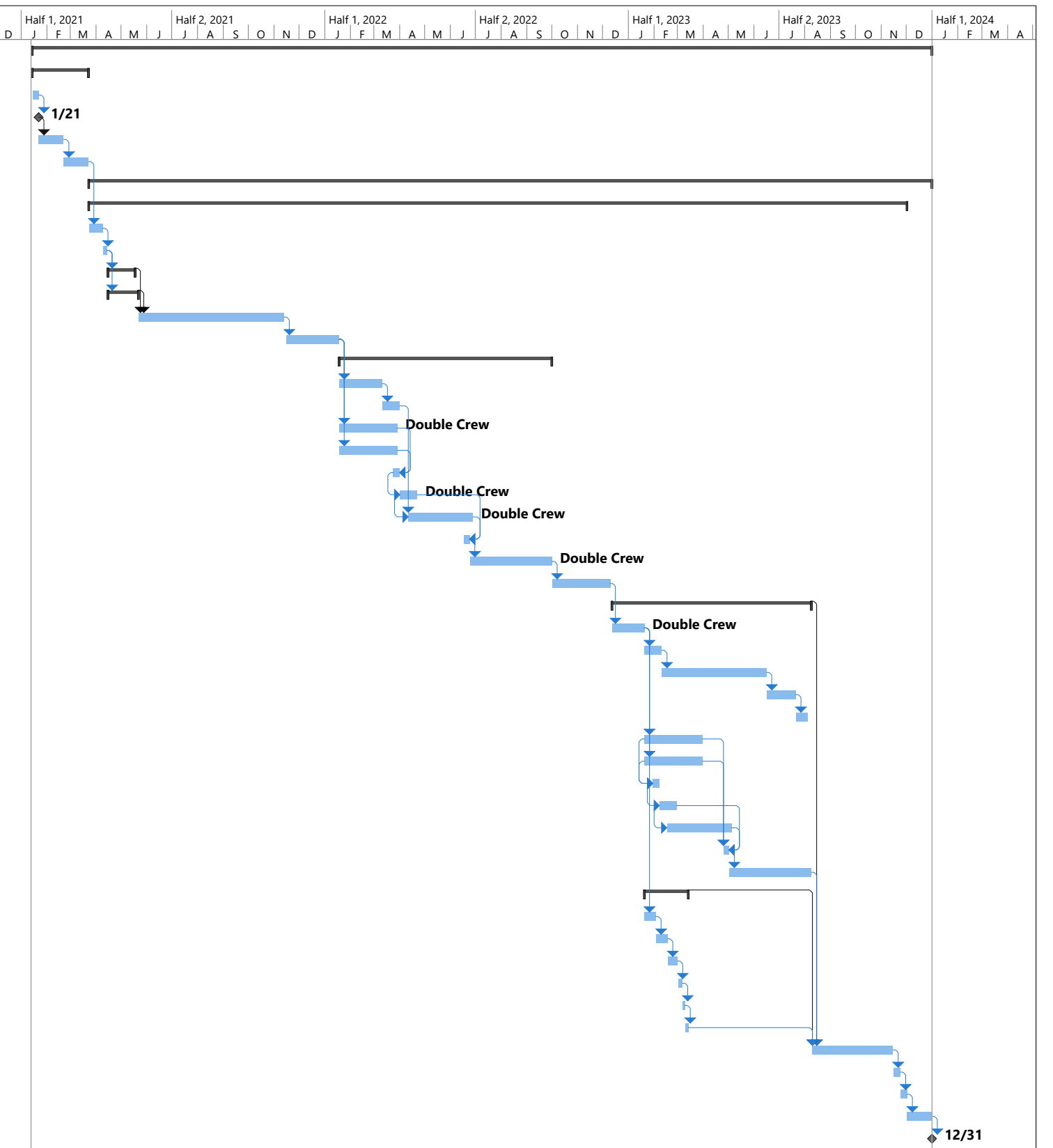
	Description	Alternatives Summary - 100 yr project life, 3.5% interest rate used to calculate annualized costs							
		SHEP Plan A	Alt 1-1_2% Slope	Alt 2-3_2% Slope	Alt 2-6a_2% Slope	Alt 2-6b_2% Slope	Alt 2-6c_2% Slope	Alt 2-6d_2% Slope	Alt 2-8_2% Slope
Initial Cost	04 Dams	\$0	\$0	\$3,834,417	\$3,834,417	\$3,834,417	\$3,834,417	\$4,023,316	\$4,802,926
	05 Locks	\$29,907,405	\$38,929,704	\$6,890,306	\$6,890,306	\$6,890,306	\$6,890,306	\$6,937,586	\$8,784,290
	06 Fish & Wildlife Facilities	\$32,045,376	\$30,673,831	\$58,892,630	\$91,838,168	\$73,536,969	\$75,599,723	\$71,300,408	\$98,229,248
	13 Pumping Plant	\$0	\$0	\$1,581,447	\$0	\$1,581,447	\$312,541	\$442,767	\$0
	15 Floodway Control and Diversion Structures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$38,682,202
	18 Cultural Resources	\$429,336	\$709,182	\$676,488	\$644,274	\$644,274	\$644,274	\$677,173	\$665,652
	<i>Construction Estimate Totals</i>	\$62,382,116	\$70,312,718	\$71,875,287	\$103,207,165	\$86,487,413	\$87,281,261	\$83,381,250	\$151,164,318
	01 Land and Damages	\$307,140	\$31,875	\$3,598,208	\$4,727,819	\$138,107	\$138,107	\$140,178	\$0
	30 Planning, Engineering & Design	\$2,809,403	\$3,483,163	\$3,554,546	\$5,102,506	\$4,274,921	\$4,315,622	\$4,124,359	\$7,262,539
	31 Construction Management	\$2,712,264	\$3,797,448	\$3,592,455	\$5,160,471	\$4,324,379	\$4,364,127	\$4,503,538	\$7,354,337
	<i>Project Cost Totals</i>	\$68,210,923	\$77,625,203	\$82,620,497	\$118,197,962	\$95,224,820	\$96,099,117	\$92,149,324	\$165,781,194
	IDC	\$2,711,800	\$3,544,000	\$3,622,200	\$5,201,100	\$4,358,400	\$4,398,500	\$4,202,200	\$4,358,400
	Investment Cost	\$70,922,723	\$81,169,203	\$86,242,697	\$123,399,062	\$99,583,220	\$100,497,617	\$96,351,524	\$170,139,594
Annualized Cost	Investment Cost	\$2,565,000	\$2,935,000	\$3,118,000	\$4,462,000	\$3,601,000	\$3,634,000	\$3,484,000	\$6,152,000
	Adaptive Monitoring Costs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Monitoring Costs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	O&M	\$720,000	\$710,000	\$35,000	\$45,000	\$45,000	\$45,000	\$45,000	\$320,000
	Major Rehab	\$285,000	\$285,000	\$0	\$0	\$0	\$0	\$0	\$249,000
	Total Annual Cost	\$3,570,000	\$3,930,000	\$3,153,000	\$4,507,000	\$3,646,000	\$3,679,000	\$3,529,000	\$6,721,000

Construction Schedule (Rec. Plan)

(double-click picture to open in Adobe)



ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Half 1, 2021	Half 2, 2021	Half 1, 2022	Half 2, 2022	Half 1, 2023	Half 2, 2023	Half 1, 2024
1		Construction Schedule	1082 days	Thu 1/14/21	Sun 12/31/23									
2		Preconstruction Phase	68 days	Thu 1/14/21	Mon 3/22/21									
3		Construction Contract Award	5 days	Thu 1/14/21	Thu 1/21/21									
4		Notice to Proceed	0 days	Thu 1/21/21	Thu 1/21/21	3								
5		Generate Contractor Submittals	30 edays	Thu 1/21/21	Sat 2/20/21	4								
6		Review/Approve Submittals	30 edays	Sat 2/20/21	Mon 3/22/21	5								
7		Construction Phase	1014 days	Tue 3/23/21	Sun 12/31/23									
8		Phase 2	563 days	Tue 3/23/21	Fri 12/1/23									
9		Mobilization	10 days	Tue 3/23/21	Thu 4/8/21	6								
10		Clear & Grub Site	3 days	Fri 4/9/21	Tue 4/13/21	9								
11		Access road through park	19 days	Thu 4/15/21	Mon 5/17/21	10								
18		South Carolina side access road	22 days	Thu 4/15/21	Fri 5/21/21	10								
22		Cofferdam Installation (South Side)	125 days	Sat 5/22/21	Fri 11/12/21	18,11								
23		Dewatering	37 days	Mon 11/15/21	Mon 1/17/22	22								
24		South Side Construction	256 days	Tue 1/18/22	Fri 9/30/22									
25		Demolition of Spillway Gates 3-5	30 days	Tue 1/18/22	Thu 3/10/22	23								
26		Demolition of Dam Piers 3-5	12 days	Fri 3/11/22	Thu 3/31/22	25								
27		Excavation of River Channel	40 days	Tue 1/18/22	Mon 3/28/22	23	Double Crew							
28		Load/Haul Off Unsuitable Material	40 days	Tue 1/18/22	Mon 3/28/22	23								
29		Grading of River Channel	5 days	Thu 3/24/22	Thu 3/31/22	27FF+2 days,28I								
30		Bedding Stone Placement	12 days	Fri 4/1/22	Thu 4/21/22	29SS+5 days	Double Crew							
31		Rip Rap Placement	45 days	Mon 4/11/22	Mon 6/27/22	30SS+5 days,26	Double Crew							
32		Sheetpile at Upstream Weir	4 days	Fri 6/17/22	Thu 6/23/22	30FF-2 days,31F								
33		Weir Stone Placement	57 days	Fri 6/24/22	Fri 9/30/22	32	Double Crew							
34		Flip Cofferdam to North Side	50 days	Sat 10/1/22	Fri 12/9/22	33								
35		North Side Construction	240 days	Mon 12/12/22	Tue 8/8/23									
36		Dewatering	23 days	Mon 12/12/22	Thu 1/19/23	34	Double Crew							
37		Remove Miter Gates	12 days	Fri 1/20/23	Thu 2/9/23	36								
38		Demolition of Lock Walls (North Side)	72 days	Fri 2/10/23	Thu 6/15/23	37								
39		Demolition of Spillway Gates 1-2	20 days	Fri 6/16/23	Thu 7/20/23	38								
40		Demolition of Dam Piers (South Side)	8 days	Fri 7/21/23	Thu 8/3/23	39								
41		Excavation of River Channel	40 days	Fri 1/20/23	Thu 3/30/23	36								
42		Load/Haul Off Unsuitable Material	40 days	Fri 1/20/23	Thu 3/30/23	36								
43		Grading of River Channel	5 days	Mon 1/30/23	Mon 2/6/23	41SS+5 days,42S								
44		Bedding Stone Placement	12 days	Tue 2/7/23	Mon 2/27/23	43SS+5 days								
45		Rip Rap Placement	45 days	Thu 2/16/23	Thu 5/4/23	44SS+5 days								
46		Sheetpile at Upstream Weir	4 days	Tue 4/25/23	Mon 5/1/23	44FF-2 days,45F								
47		Weir Stone Placement	57 days	Tue 5/2/23	Tue 8/8/23	46								
48		Boat Ramp Construction	30 days	Fri 1/20/23	Mon 3/13/23									
49		Clear/Grub	8 days	Fri 1/20/23	Thu 2/2/23	36								
50		Excavation	8 days	Fri 2/3/23	Thu 2/16/23	49								
51		Aggregate Base	7 days	Fri 2/17/23	Tue 2/28/23	50								
52		Asphalt Base Course	3 days	Thu 3/2/23	Mon 3/6/23	51								
53		Asphalt Surface Course	2 days	Tue 3/7/23	Thu 3/9/23	52								
54		Sealcoat/Joint work	2 days	Fri 3/10/23	Mon 3/13/23	53								
55		Remove Cofferdam	70 days	Thu 8/10/23	Tue 11/14/23	35,48,54,47								
56		Staging Area Restoration	5 days	Thu 11/16/23	Thu 11/23/23	55								
57		Demob From Site	5 days	Fri 11/24/23	Fri 12/1/23	56								
58		Project Closeout	30 edays	Fri 12/1/23	Sun 12/31/23	57								
59		Project Complete	0 days	Sun 12/31/23	Sun 12/31/23	58								



Project: SHEP Fish Passage Rec
Date: Thu 12/20/18

Task		Summary		Inactive Milestone		Duration-only		Start-only		External Milestone		Manual Progress	
Split		Project Summary		Inactive Summary		Manual Summary Rollup		Finish-only		Deadline			
Milestone		Inactive Task		Manual Task		Manual Summary		External Tasks		Progress			