APPENDIX F

COST APPENDIX

Augusta Rocky Creek, Georgia
Flood Risk Management
Section 205 Feasibility Study
Augusta-Richmond County, Georgia

Cost Engineering Appendix

1.0 Cost Methodology

The goal of the cost appendix is to present a Total Project Cost (construction and non-construction costs) for the Tentatively Selected Plan(s) at the constant dollar price level to be used for project justification/authorization and to escalate costs for budgeting purposes. In addition, the costing efforts are intended to produce a final product (cost estimate) that is reliable and accurate, and that supports the definition of the Government's and the non-Federal sponsor's obligations.

The preparation of cost estimate for planning purposes are in accordance with guidelines and policies included in:

- Engineering Regulation (ER) 1110-1-1300 - Cost Engineering Policy and General Requirements, 26 March 1993
- ER 1110-2-1302 - Civil Works Cost Engineering, 15 September 2008
- ER 1105-2-100 – Planning Guidance Notebook, 22 April 2000
- Engineering Manual (EM) 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule, Region III, April 2014
- EM 1110-2-1304, Civil Works Construction Cost Index System (CWCCIS), 31 March 2012 (tables updated 30 September 2015)
- Engineering Technical Letter (ETL) 1110-2-573, Construction Cost Estimating Guide for Civil Works, 30 Sept 2008
- Cost and Schedule Risk Analysis Process, March 2008

The estimate was prepared using MCACES/MII Version 4.2 Unit Price Books, labor rates, and equipment rates to apply unique crews to detailed work items and obtaining material and supply quotes where possible for significant cost items. The resulting estimate is shown in the Total Project Cost Summary (TPCS).

2.0 Project Alternatives

ROM, rough order of magnitude, estimates were developed to help Planning Division evaluate the three alternatives. There is more on these alternatives in the planning section of this report.

3.0 Tentatively Selected Plan

The Tentatively Selected Plan consists of two (2) measures. The first is the rehabilitation of the Rosedale Detention facility located in the Rocky Creek basin in Augusta, GA. The Rosedale

Detention area consists of an existing dry stormwater detention facility with an outlet control structure and dam that was breached some time ago.

During a brief site visit, the area was observed to have been a dumping grounds for home construction/renovation debris including old carpet, drywall, bricks, CMU, etc. The dam structure itself is heavily overgrown but appears to be fairly intact. The outlet works are non-functioning and cannot be repaired.

Rehabilitation of the facility will include erosion control, clearing and grubbing, earthwork, construction of a new outlet works, and grassing of the embankments.

The second measure consists of demolishing several small homes and building a playground facility for the neighborhood.

4.0 Major Cost Assumptions

Quantities were developed by Savannah District Soils Section. A 10% factor was added to earthwork and grassing quantities to account for minor variations in quantities. Earthwork quantities are based on bank volume calculations.

Although the estimate relied upon the unit price book, the accuracy of these numbers have been checked against similar work such as dredged material disposal areas as well as dam rehabilitations at Fort Gordon and Fort Bragg.

4.1 Earthwork

Suitable borrow material is not available on-site. Potential borrow areas have not been identified during the feasibility but will be identified during the implementation phase. For planning purposes, it is assumed that a suitable borrow site will be identified within close proximity to the site.

The earthen dam was observed to be heavily overgrown but fairly intact. However, based on discussion with the Project Delivery Team (PDT), it is assumed that about 80% of the existing earthen may need to be degraded and backfilled with suitable soils. The PDT assumed that half of the excavated material would be suitable for reuse. Cleared vegetation, any unsuitable soils, and any other debris will need to be removed from the site and disposed of in accordance with Federal, State and local regulations. Suitable spoil sites have not been identified but will be investigated during the implementation phase. For planning purposes, it is assumed that a suitable spoil site will be identified within close proximity to the site.

4.2 Dewatering/Diversion

It is assumed that a temporary coffer dams upstream and downstream of the existing breach in the earthen dam. Dewatering and temporary creek flow diversion can be completed utilizing

sump pumps to pump water downstream of the construction area. Use of the sump pump can be discontinued once the outlet works and earth fill have achieved a safe level above the new outlet discharge pipe.

4.3 Outlet Works

The outlet works will consist of a box culvert with concrete wing walls placed at up and downstream inlets, a concrete apron between the wing walls, and riprap at the downstream end. Additionally, a concrete lined broad crested spillway will be on the earthen dam in line with and above the box culvert. Geotextile fabric will be required beneath the concrete lined spillway and between the riprap and existing ground.

4.4 Acquisition

An acquisition strategy meeting has not taken place. Based on discussions with the PDT and contracting methods used on similar projects it is assumed that a small disadvantaged business (8a) set aside will be used for the project.

5.0 Project Feature Accounts

The baseline cost estimate was prepared and organized according to the Civil Works Breakdown Structure (CWBS). As such, the estimate includes the following feature accounts:

5.1 Account 01 – Lands and Damages

This feature account includes the cost for all real estate costs including administrative and land costs.

5.2 Account 04 – Dams

This feature includes clearing and grubbing, earthwork, construction of the outlet works and grassing required to rehabilitate the Rosedale Detention area.

5.3 Account 14 – Recreation Facilities

This feature includes the removal of existing structures and construction of a playground area in the Kissingbower neighborhood.

5.4 Account 30 – Planning, Engineering and Design

This feature includes project management, project planning, engineering analysis, surveying, final design, preparation of plans and specifications, engineering during construction (EDC), advertisement, opening of bids, and contract award. The cost for the 30 account was provided by the Project Manager.

5.5 Account 31 – Supervision and Administration

This feature includes onsite supervision for the work on this project and contract administration. The cost for the 31 account was provided by the Project Manager.

6.0 Cost Schedule Risk Analysis

Due to the size of the project, an Abbreviated Risk Analysis (ARA) was performed on this project to identify the 80% confidence level project cost and schedule duration.

The following is a brief discussion of the risk drivers by risk element.

Scope Growth – This project will require standard construction techniques and goals of the construction are relatively low-risk and technically simple. A critical element and the main risk driver for scope growth is the possibility of encountering contaminated soils or hazardous construction debris observed at the Rosedale Detention Area or in the demolition of the 1960s era homes in the Kissingbower neighborhood. There is a degree of uncertainty with regards to the number and complexity of features for the playground/park. Additionally, there is a chance that the sump pump will not be sufficient dewatering and that a small well-point system may be required.

Acquisition Strategy – There is no predefined strategy for acquisition for this project; however, projects of this magnitude are frequently sent to the 8A program. This typically results in 10-15% cost increases due to higher overhead rates for smaller firms.

Construction Elements – The design, construction, and other portions of this project are not considered to be complex or inherently risky. It is anticipated that there should be a sufficient pool of contractors experienced in similar work.

Design and Quantities – Variation and possible increase in quantities is identified as a major risk driver. Much of the site investigation will be completed during implementation phase prior to issuing a solicitation. The embankment quantities are likely to increase as are the unsuitable soil quantities, the pervious and impervious soil quantities, haul distances, staging area sizes etc.

Cost Estimate Assumptions – Various assumptions based on experience with similar projects and professional judgement were made during the development of the estimate that may be revised during implementation. These assumptions include fuel cost, proximity of spoil and borrow areas, the depth of excavation required for the box culvert, the presence of utilities, and competition in the bid environment.

External Project Risks – The main external project risk is timely funding.

Completion of the ARA determined that a contingency rate of 31% for construction features was required to achieve an 80% confidence level. The contingency rate for Real Estate is 25%. The PED phase has a contingency rate of 9% and 5% for construction management activities.

7.0 Construction Schedule

A construction schedule was prepared utilizing input from the PDT and reflects all project construction components. The schedule considers durations of individual components of construction to create an overall schedule that was used for the generation of the TPCS.

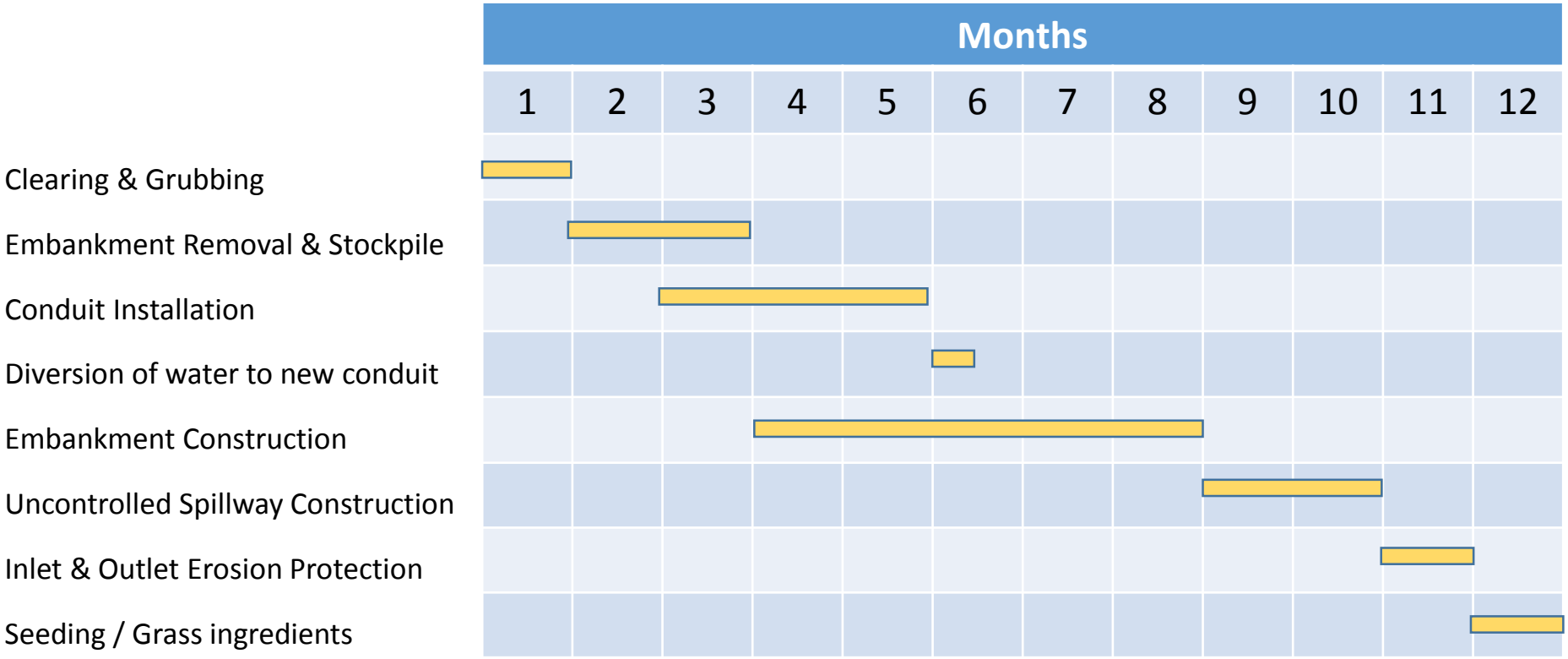
Construction is anticipated to start in August of 2019 and to be completed by end of the calendar year 2020. The schedule is attached at the end of this appendix.

8.0 Total Project Cost Summary

The cost estimate for the TSP is prepared with an identified price level date and inflation factors are used to adjust the pricing to the constant dollar value in the program year. This is known as the Project First Cost. The TPCS also shows the estimate escalated to the midpoint of construction for the various activities. This is known as the Fully Funded Cost. The TPCS includes all Federal and non-Federal costs: Lands, Easements, Rights of Way and Relocations; construction features; Planning Engineering and Design; Construction Management; Contingency; and Inflation. The TPCS, is attached at the end of this appendix.

Rocky Creek

Construction Schedule



WALLA WALLA COST ENGINEERING MANDATORY CENTER OF EXPERTISE

COST AGENCY TECHNICAL REVIEW

CERTIFICATION STATEMENT

SAS - PN 321406
Rocky Creek
Augusta, Georgia
Section 205 Flood Risk Management (CAP)

The Rocky Creek Augusta, Georgia Section 205 Flood Risk Management Project, as presented by the Savanah District, has undergone a successful Cost Agency Technical Review (Cost ATR) of remaining costs, performed by the Walla Walla District Cost Engineering Mandatory Center of Expertise (Cost MCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the cost products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of July 5, 2016, the Cost MCX certifies the estimated total project cost:

FY2018 First Costs:	$ 4,836,000
Total Project Costs:	$ 4,962,000

Note: Cost ATR was devoted to remaining work. It did not review spent costs, which requires an audit process. It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management throughout the life of the project.

CALLAN.KIM.C.1231558221

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DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=CALLAN.KIM.C.1231558221
Date: 2016.07.05 15:00:12 -07'00'

Kim C. Callan, PE, CCE, PM
Chief, Cost Engineering MCX
Walla Walla District

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

PROJECT: **Rocky Creek Detention Study (Rosedale Kissingbower Combined w PL costs**
PROJECT NO: **P2 321406**
LOCATION: **Augusta, GA**

DISTRICT: **SAS Savannah District** PREPARED: **3/15/2017**

POC: **CHIEF, COST ENGINEERING, Paul Smith, P.E.**

This Estimate reflects the scope and schedule in report; CAP Feasibility STUDY - ROCKY CREEK

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)			
						Program Year (Budget EC):				2018					
						Effective Price Level Date:				1-Oct- 17					
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	REMAINING COST ($K)	Spent Thru: 10/1/2013 ($K)	TOTAL FIRST COST ($K)	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
04	DAMS	$2,001	$620	31%	$2,621	3.3%	$2,068	$641	$2,709		$2,709	3.0%	$2,129	$660	$2,789
14	RECREATION FACILITIES	$298	$92	31%	$390	3.3%	$308	$95	$403		$403	2.9%	$317	$98	$415
	CONSTRUCTION ESTIMATE TOTALS:	$2,299	$713		$3,012	3.3%	$2,376	$737	$3,112		$3,112	3.0%	$2,446	$758	$3,204
01	LANDS AND DAMAGES	$593	$148	25%	$741	3.3%	$613	$153	$766		$766		$613	$153	$766
30	PLANNING, ENGINEERING & DESIGN	$705	$63	9%	$768	6.4%	$750	$68	$818		$818	3.2%	$774	$70	$844
31	CONSTRUCTION MANAGEMENT	$125	$6	5%	$131	6.4%	$133	$7	$140		$140	5.9%	$141	$7	$148
	PROJECT COST TOTALS:	$3,722	$931	25%	$4,653		$3,872	$964	$4,836		**$4,836**	2.6%	$3,974	$988	$4,962

CHIEF, COST ENGINEERING, Paul Smith, P.E.

PROJECT MANAGER, Robert Sirard

CHIEF, REAL ESTATE, Ralph Werthmann

CHIEF, PLANNING, William Bailey

CHIEF, ENGINEERING, Gordy Simmons

CHIEF, ENGINEERING, Gordy Simmons

CHIEF, CONSTRUCTION, Ken Gray

CHIEF, CONTRACTING, Paige Brosch

CHIEF, PM-C, Margarett McIntosh

CHIEF, DPM, Erik Blechinger

ESTIMATED TOTAL PROJECT COST:		**$4,962**
ESTIMATED FEDERAL COST:	63%	$3,137
ESTIMATED NON-FEDERAL COST:	**37%**	$1,825
22 - FEASIBILITY STUDY (CAP studies):		**$101**
ESTIMATED FEDERAL COST:		$51
ESTIMATED NON-FEDERAL COST:		$50
ESTIMATED FEDERAL COST OF PROJECT		**$3,188**

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

****** CONTRACT COST SUMMARY ******

PROJECT: Rocky Creek Detention Study (Rosedale Kissingbower Combined w PL costs
LOCATION: Augusta, GA
This Estimate reflects the scope and schedule in report; CAP Feasibility STUDY - ROCKY CREEK

DISTRICT: SAS Savannah District
POC: CHIEF, COST ENGINEERING, Paul Smith, P.E.

PREPARED: 3/15/2017

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 5/31/2016 Estimate Price Level: 1-Oct-2015				Program Year (Budget EC): 2018 Effective Price Level Date: 1-Oct-17								
				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	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	PHASE 1													
04	DAMS	$2,001	$620	31.0%	$2,621	3.3%	$2,068	$641	$2,709	2019Q3	3.0%	$2,129	$660	$2,789
14	RECREATION FACILITIES	$298	$92	31.0%	$390	3.3%	$308	$95	$403	2019Q3	2.9%	$317	$98	$415
	CONSTRUCTION ESTIMATE TOTALS:	$2,299	$713	31.0%	**$3,012**		$2,376	$737	$3,112			$2,446	$758	$3,204
01	LANDS AND DAMAGES	$593	$148	25.0%	$741	3.3%	$613	$153	$766	2018Q1		$613	$153	$766
	RE Costs ($491) + Demo, Salvage ($12)													
30	PLANNING, ENGINEERING & DESIGN													
0.025	Project Management	$40	$4	9.0%	$44	6.4%	$43	$4	$46	2018Q4	2.9%	$44	$4	$48
0.02	Planning & Environmental Compliance	$15	$1	9.0%	$16	6.4%	$16	$1	$17	2018Q4	2.9%	$16	$1	$18
0.15	Engineering & Design	$385	$35	9.0%	$420	6.4%	$410	$37	$447	2018Q4	2.9%	$422	$38	$460
0.01	Engineering Tech Review ITR & VE	$125	$11	9.0%	$136	6.4%	$133	$12	$145	2018Q4	2.9%	$137	$12	$149
0.01	Contracting & Reprographics	$40	$4	9.0%	$44	6.4%	$43	$4	$46	2018Q4	2.9%	$44	$4	$48
0.03	Engineering During Construction	$25	$2	9.0%	$27	6.4%	$27	$2	$29	2019Q3	5.9%	$28	$3	$31
0.02	Planning During Construction	$50	$5	9.0%	$55	6.4%	$53	$5	$58	2019Q3	5.9%	$56	$5	$61
0.02	Project Operations	$25	$2	9.0%	$27	6.4%	$27	$2	$29	2018Q4	2.9%	$27	$2	$30
31	CONSTRUCTION MANAGEMENT													
0.1	Construction Management	$65	$3	5.0%	$68	6.4%	$69	$3	$73	2019Q3	5.9%	$73	$4	$77
0.02	Project Operation:	$30	$2	5.0%	$32	6.4%	$32	$2	$34	2019Q3	5.9%	$34	$2	$35
0.025	Project Management	$30	$2	5.0%	$32	6.4%	$32	$2	$34	2019Q3	5.9%	$34	$2	$35
	CONTRACT COST TOTALS:	$3,722	$931		**$4,653**		$3,872	$964	$4,836			$3,974	$988	**$4,962**

Estimated by SASEN-ET
Designed by SAS-EN
Prepared by E.K. Roughen
Preparation Date 5/26/2016
Effective Date of Pricing 5/26/2016
Estimated Construction Time 360 Days

Right click here and select "Update Field" to build the Table of Contents for this report.

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	ProjectCost
Project Cost Summary Report			**3,682,977**	**0**	**0**	**0**	**3,682,977**
			592,500.00				*592,500.00*
01 Lands and Damages	**1.00**	**EA**	**592,500**	**0**	**0**	**0**	**592,500**
			592,500.00				*592,500.00*
0123 Constructn Contract(s) Documnts	**1.00**	**EA**	**592,500**	**0**	**0**	**0**	**592,500**
			592,500.00				*592,500.00*
012303 Real Estate Analysis Documents	**1.00**	**EA**	**592,500**	**0**	**0**	**0**	**592,500**
			1,962,100.49				*1,962,100.49*
04 Dams	**1.00**	**EA**	**1,962,100**	**0**	**0**	**0**	**1,962,100**
			1,581,091.77				*1,581,091.77*
0401 Main Dam	**1.00**	**EA**	**1,581,092**	**0**	**0**	**0**	**1,581,092**
			42,096.62				*42,096.62*
040101 Mob, Demob & Preparatory Work	**1.00**	**EA**	**42,097**	**0**	**0**	**0**	**42,097**
			25,875.65				*25,875.65*
040103 Care and Diversion of Water	**1.00**	**EA**	**25,876**	**0**	**0**	**0**	**25,876**
			4,312.61				*4,312.61*
04011002 05 Dewatering	**6.00**	**MO**	**25,876**	**0**	**0**	**0**	**25,876**
			378,225.76				*378,225.76*
040110 Earthwork for Structures	**1.00**	**EA**	**378,226**	**0**	**0**	**0**	**378,226**
			378,225.76				*378,225.76*
04011002 Site Work	**1.00**	**EA**	**378,226**	**0**	**0**	**0**	**378,226**
			98,341.72				*98,341.72*
04011002 01 Clearing and Grubbing	**1.00**	**EA**	**98,342**	**0**	**0**	**0**	**98,342**
			2.30				*2.30*
04011002 02 Stripping	**4,200.00**	**CY**	**9,652**	**0**	**0**	**0**	**9,652**
			270,232.38				*270,232.38*
04011002 03 Excavation, Common	**1.00**	**EA**	**270,232**	**0**	**0**	**0**	**270,232**
			1,104,733.17				*1,104,733.17*
040142 Earth and Rockfill Dam	**1.00**	**EA**	**1,104,733**	**0**	**0**	**0**	**1,104,733**
			1,104,733.17				*1,104,733.17*
04014202 Site Work	**1.00**	**EA**	**1,104,733**	**0**	**0**	**0**	**1,104,733**
			26.84				*26.84*
04014202 01 Borrow Excavation, Impervious	**5,000.00**	**ECY**	**134,188**	**0**	**0**	**0**	**134,188**
			23.71				*23.71*
04014202 02 Borrow Excavation, Pervious	**40,000.00**	**BCY**	**948,463**	**0**	**0**	**0**	**948,463**
			5.67				*5.67*
04014202 14 GeoTex	**1,100.00**	**SY**	**6,241**	**0**	**0**	**0**	**6,241**
			2.30				*2.30*

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	ProjectCost
04014202 17 Topsoil	**4,200.00**	**CY**	**9,659**	**0**	**0**	**0**	**9,659**
			1,545.59				*1,545.59*
04014202 18 Seeding	**4.00**	**ACR**	**6,182**	**0**	**0**	**0**	**6,182**
			30,160.58				*30,160.58*
040199 Demo Homes	**1.00**	**EA**	**30,161**	**0**	**0**	**0**	**30,161**
			4,447.13				*4,447.13*
Demo Small Home	**3.00**	**EA**	**13,341**	**0**	**0**	**0**	**13,341**
			5,606.39				*5,606.39*
Foundation Demolition	**3.00**	**EA**	**16,819**	**0**	**0**	**0**	**16,819**
			381,008.72				*381,008.72*
0402 Spillway	**1.00**	**EA**	**381,009**	**0**	**0**	**0**	**381,009**
			133.41				*133.41*
040232 Apron-Stilling Basin-Deflectors	**330.00**	**CY**	**44,026**	**0**	**0**	**0**	**44,026**
			187,002.76				*187,002.76*
040251 Concrete Outlet	**1.00**	**EA**	**187,003**	**0**	**0**	**0**	**187,003**
			1,026.59				*1,026.59*
04025103 5' x 6' Culvert	**150.00**	**LF**	**153,989**	**0**	**0**	**0**	**153,989**
			16,506.84				*16,506.84*
Wing Walls	**2.00**	**EA**	**33,014**	**0**	**0**	**0**	**33,014**
			149,980.24				*149,980.24*
040252 Concrete Overflow Section	**1.00**	**EA**	**149,980**	**0**	**0**	**0**	**149,980**
			21.43				*21.43*
04025213 Reinforced Conc Spillway	**7,000.00**	**SF**	**149,980**	**0**	**0**	**0**	**149,980**
			298,376.42				*298,376.42*
14 Recreation Facilities	**1.00**	**EA**	**298,376**	**0**	**0**	**0**	**298,376**
			298,376.42				*298,376.42*
1400 Recreation Facilities	**1.00**	**EA**	**298,376**	**0**	**0**	**0**	**298,376**
			15,643.14				*15,643.14*
140004 Permanent Access Roads & Parking	**1.00**	**EA**	**15,643**	**0**	**0**	**0**	**15,643**
			15,643.14				*15,643.14*
14000402 Site Work	**1.00**	**EA**	**15,643**	**0**	**0**	**0**	**15,643**
			15,643.14				*15,643.14*
14000402 11 Paving	**1.00**	**EA**	**15,643**	**0**	**0**	**0**	**15,643**
			251,829.89				*251,829.89*
140072 Day Use Areas	**1.00**	**EA**	**251,830**	**0**	**0**	**0**	**251,830**
			251,829.89				*251,829.89*
14007202 Site Work	**1.00**	**EA**	**251,830**	**0**	**0**	**0**	**251,830**
			2,736.79				*2,736.79*

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	ProjectCost
14007202 01 Picnic Tables	**10.00**	**EA**	**27,368**	**0**	**0**	**0**	**27,368**
			148,841.55				*148,841.55*
14007202 02 Playground Equipment	**1.00**	**EA**	**148,842**	**0**	**0**	**0**	**148,842**
			26,409.75				*26,409.75*
14007202 04 Walking Track	**1.00**	**EA**	**26,410**	**0**	**0**	**0**	**26,410**
			6,368.22				*6,368.22*
14007202 08 Benches	**1.00**	**EA**	**6,368**	**0**	**0**	**0**	**6,368**
			42,842.47				*42,842.47*
14007202 11 Walking Trail	**1.00**	**EA**	**42,842**	**0**	**0**	**0**	**42,842**
			11,195.42				*11,195.42*
140099 Associated General Items	**1.00**	**EA**	**11,195**	**0**	**0**	**0**	**11,195**
			11,195.42				*11,195.42*
14009902 Site Work	**1.00**	**EA**	**11,195**	**0**	**0**	**0**	**11,195**
			739.03				*739.03*
14009902 01 Trash Barrels	**1.00**	**EA**	**739**	**0**	**0**	**0**	**739**
			10,456.39				*10,456.39*
Fencing	**1.00**	**EA**	**10,456**	**0**	**0**	**0**	**10,456**
			19,707.97				*19,707.97*
140023 Site Grading and Landscaping	**1.00**	**EA**	**19,708**	**0**	**0**	**0**	**19,708**
			5,070.71				*5,070.71*
Grading	**2.50**	**ACR**	**12,677**	**0**	**0**	**0**	**12,677**
			7,031.19				*7,031.19*
Landscaping	**1.00**	**EA**	**7,031**	**0**	**0**	**0**	**7,031**
			705,000.00				*705,000.00*
30 Planning, Engineering and Design	**1.00**	**EA**	**705,000**	**0**	**0**	**0**	**705,000**
			705,000.00				*705,000.00*
3020 PED Costs - broken out on TPCS	**1.00**	**EA**	**705,000**	**0**	**0**	**0**	**705,000**
			705,000.00				*705,000.00*
302001 Engineering Analysis/Report	**1.00**	**EA**	**705,000**	**0**	**0**	**0**	**705,000**
			125,000.00				*125,000.00*
31 Construction Management	**1.00**	**EA**	**125,000**	**0**	**0**	**0**	**125,000**
			125,000.00				*125,000.00*
3123 Construction Contracts	**1.00**	**EA**	**125,000**	**0**	**0**	**0**	**125,000**
			125,000.00				*125,000.00*
312311 Supervision and Administration	**1.00**	**EA**	**125,000**	**0**	**0**	**0**	**125,000**

Abbreviated Risk Analysis

Project (less than $40M): **Rocky Creek Detention Area** — **Alternative: Alt A**

Project Development Stage/Alternative: **Feasibility (Recommended Plan)**

Risk Category: **Low Risk: Typical Construction, Simple** — **Meeting Date: 6/2/2016**

Total Estimated Construction Contract Cost = **$ 1,799,914**

	CWWBS	Feature of Work	Estimated Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ 592,500		25%	$ 148,125	$ 740,625
1	04 DAMS	**Mob/Demob**	$ 42,097		16%	$ 6,870	$ 48,967
2	04 DAMS	**Site Prep & Water Diversion**	$ 442,576		41%	$ 179,431	$ 622,007
3	04 DAMS	**Earth & Rock Fill Dam**	$ 1,104,733		24%	$ 270,057	$ 1,374,790
4	04 DAMS	**Spillway Deflectors**	$ 44,026		15%	$ 6,428	$ 50,454
5	04 DAMS	**Low-level Outlet**	$ 187,003		16%	$ 30,707	$ 217,710
6	04 DAMS	**Concrete Sillway**	$ 149,980		16%	$ 24,627	$ 174,607
7	04 DAMS	**Demo Small Homes**	$ 30,161		24%	$ 7,373	$ 37,534.00
8	14 RECREATION FACILITIES	**Small Park**	$ 298,376		61%	$ 180,772	$ 479,148.34
9			$ -		0%	$ -	$ -
10			$ -		0%	$ -	$ -
11			$ -		0%	$ -	$ -
12	All Other	**Remaining Construction Items**	$ -	*0.0%*	0%	$ -	$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	**Planning, Engineering, & Design**	$ 730,000		9%	$ 65,056	$ 795,056
14	31 CONSTRUCTION MANAGEMENT	**Construction Management**	$ 125,000		5%	$ 6,250	$ 131,250
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					$ -	

Totals					
Real Estate	$ 592,500	25%	$ 148,125	$	740,625.00
Total Construction Estimate	$ 2,298,952	31%	$ 706,265	$	3,005,217
Total Planning, Engineering & Design	$ 730,000	9%	$ 65,056	$	795,056
Total Construction Management	$ 125,000	5%	$ 6,250	$	131,250
Total Excluding Real Estate	**$ 3,153,952**	**25%**	**$ 777,572**	**$**	**3,931,524**

Confidence Level Range Estimate ($000's)	**Base**	**50%**	**80%**
	$3,154k	$3,621k	$3,932k

* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.	

Rocky Creek Detention Area Alt A

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: 2-Jun-16

Risk Level

	Negligible	Marginal	Moderate	Significant	Critical
Very Likely	2	3	4	5	5
Likely	1	2	3	4	5
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Management & Scope Growth				**Maximum Project Growth**		**40%**
PS-1	Mob/Demob	Scope of Mob/Demob should not change much.	Not an impact	Negligible	Possible	0
PS-2	Site Prep & Water Diversion	Is there a possibility of contaminated sols, asbestos shinges, fuel tanks, etc..	Area appears to have been usd as a dump for yard and house hold debris. Contaminated soils a concern. Possible cost and schedule impacts. Estimated impact 175K and 6 months	Significant	Likely	4
PS-3	Earth & Rock Fill Dam	If detention structure is classified as a dam will downstream structures causes reclassification of dam safety.	Buying 3 houses downstream as part of this project to eliminate concern.	Moderate	Unlikely	1
PS-4	Spillway Deflectors	Are deflectors to slow water leaving spillway adequately sized.	Deflectors are larger than required not a concern.	Negligible	Unlikely	0
PS-5	Low-level Outlet	Is low-level outlet adequately sized.	Sized according to flood study needs. Possible and not much more expensive.	Marginal	Unlikely	0
PS-6	Concrete Sillway	Is spillway adequately sized?	Sized according to flood study needs. Possible and not much more expensive.	Marginal	Unlikely	0
PS-7	Demo Small Homes	Will additional houses be needed to be purchased?	Not likely but Lands and damages could go up say 50K.	Marginal	Possible	1
PS-8	Small Park	The equipment and boundaries of the park are conceptual and are subject to change. Are there any contaminates which may cause the house debris to require special handeling?	Project scope could grow causing additional costs. If we encounter lead paint, asbestos shingles, or other contaminates this may need to be hauled to a special landfill.	Significant	Likely	4
PS-13	Planning, Engineering, & Design	Contaminated soils could cause PED costs to increase.	Contaminated soils could cause PED costs to increase say 35K	Marginal	Possible	1
PS-14	Construction Management	Contaminated soils could cause CM costs to increase.	Not likely but a possibility say 50K	Negligible	Unlikely	0
Acquisition Strategy				**Maximum Project Growth**		**30%**
AS-1	Mob/Demob	Acquisition strategy has not been selected; however, small projects like this are usually 8A or 8A set-aside. 8A projects are frequently over budget and this is a real concern.	The fact that this project will likely be a set-aside and it's effect upon cost is a real valid concern regarding cost,	Moderate	Likely	3
AS-2	Site Prep & Water Diversion	Acquisition strategy has not been selected; however, small projects like this are usually 8A or 8A set-aside. 8A projects are frequently over budget and this is a real concern.	The fact that this project will likely be a set-aside and it's effect upon cost is a real valid concern regarding cost,	Moderate	Likely	3
AS-3	Earth & Rock Fill Dam	Acquisition strategy has not been selected; however, small projects like this are usually 8A or 8A set-aside. 8A projects are frequently over budget and this is a real concern.	The fact that this project will likely be a set-aside and it's effect upon cost is a real valid concern regarding cost,	Moderate	Likely	3
AS-4	Spillway Deflectors	Acquisition strategy has not been selected; however, small projects like this are usually 8A or 8A set-aside. 8A projects are frequently over budget and this is a real concern.	The fact that this project will likely be a set-aside and it's effect upon cost is a real valid concern regarding cost,	Moderate	Likely	3

AS-5	Low-level Outlet	Acquisition strategy has not been selected; however, small projects like this are usually 8A or 8A set-aside. 8A projects are frequently over budget and this is a real concern.	The fact that this project will likely be a set-aside and it's effect upon cost is a real valid concern regarding cost,	Moderate	Likely	3
AS-6	Concrete Sillway	Acquisition strategy has not been selected; however, small projects like this are usually 8A or 8A set-aside. 8A projects are frequently over budget and this is a real concern.	The fact that this project will likely be a set-aside and it's effect upon cost is a real valid concern regarding cost,	Moderate	Likely	3
AS-7	Demo Small Homes	Acquisition strategy has not been selected; however, small projects like this are usually 8A or 8A set-aside. 8A projects are frequently over budget and this is a real concern.	The fact that this project will likely be a set-aside and it's effect upon cost is a real valid concern regarding cost,	Moderate	Likely	3
AS-8	Small Park	Acquisition strategy has not been selected; however, small projects like this are usually 8A or 8A set-aside. 8A projects are frequently over budget and this is a real concern.	The fact that this project will likely be a set-aside and it's effect upon cost is a real valid concern regarding cost,	Significant	Likely	4
AS-13	Planning, Engineering, & Design	The acquisition strategy should not effect the PED or the CM phase of this project.	The acquisition of this project should have little to no effect on the PED or CM phase.	Negligible	Unlikely	0
AS-14	Construction Management	The acquisition strategy should not effect the PED or the CM phase of this project.	The acquisition of this project should have little to no effect on the PED or CM phase.	Negligible	Unlikely	0
Construction Elements					**Maximum Project Growth**	**15%**
CON-1	Mob/Demob	construction techniques and contractors. Will special limited equipment be needed and will there be qualified contractors to do this work at a reasonable cost.	construction features, and require no specialty fabrication or speciality installation. Additionaly the low complexity also loweres the potential for modifications and claims.	Negligible	Possible	0
CE-2	Site Prep & Water Diversion	construction techniques and contractors. Will special limited equipment be needed and will there be qualified contractors to do this work at a reasonable cost.	construction features, and require no specialty fabrication or speciality installation. Additionaly the low complexity also loweres the potential for modifications and claims.	Negligible	Possible	0
CE-3	Earth & Rock Fill Dam	construction techniques and contractors. Will special limited equipment be needed and will there be qualified contractors to do this work at a reasonable cost.	construction features, and require no specialty fabrication or speciality installation. Additionaly the low complexity also loweres the potential for modifications and claims.	Negligible	Possible	0
CE-4	Spillway Deflectors	construction techniques and contractors. Will special limited equipment be needed and will there be qualified contractors to do this work at a reasonable cost.	construction features, and require no specialty fabrication or speciality installation. Additionaly the low complexity also loweres the potential for modifications and claims.	Negligible	Possible	0
CE-5	Low-level Outlet	construction techniques and contractors. Will special limited equipment be needed and will there be qualified contractors to do this work at a reasonable cost.	construction features, and require no specialty fabrication or speciality installation. Additionaly the low complexity also loweres the potential for modifications and claims.	Negligible	Possible	0
CE-6	Concrete Sillway	construction techniques and contractors. Will special limited equipment be needed and will there be qualified contractors to do this work at a reasonable cost.	construction features, and require no specialty fabrication or speciality installation. Additionaly the low complexity also loweres the potential for modifications and claims.	Negligible	Possible	0
CE-7	Demo Small Homes	construction techniques and contractors. Will special limited equipment be needed and will there be qualified contractors to do this work at a reasonable cost.	construction features, and require no specialty fabrication or speciality installation. Additionaly the low complexity also loweres the potential for modifications and claims.	Negligible	Possible	0
CE-8	Small Park	Of all the construction features this one does require a specialty contractor. Playground equipment, while not overly complex, does require a special contractor to install this equipment.	construction features, and require no specialty fabrication only requiring specialized installation. Additionaly the low complexity also loweres the potential for modifications and claims.	Moderate	Possible	2
CE-13	Planning, Engineering, & Design	The design of this project is something SAS designers do with regularity and should not require special personnel.	construction features, and require no specialty fabrication or speciality installation. Additionaly the low complexity also loweres the potential for modifications and claims.	Negligible	Possible	0
CE-14	Construction Management	The construction managemet of this project is something SAS personnel do with regularity and should not require special personnel.	construction features, and require no specialty fabrication or speciality installation. Additionaly the low complexity also loweres the potential for modifications and claims.	Negligible	Possible	0
Specialty Construction or Fabrication					**Maximum Project Growth**	**50%**
SC-1	Mob/Demob	Nothing special or complex with regards to construction.	The estimator sees nothing in this project which would require speciality fabrication or construction.	Negligible	Unlikely	0
SC-2	Site Prep & Water Diversion	Nothing special or complex with regards to construction.	The estimator sees nothing in this project which would require speciality fabrication or construction.	Negligible	Unlikely	0
SC-3	Earth & Rock Fill Dam	Nothing special or complex with regards to construction.	The estimator sees nothing in this project which would require speciality fabrication or construction.	Negligible	Unlikely	0

SC-4	Spillway Deflectors	Nothing special or complex with regards to construction.	The estimator sees nothing in this project which would require speciality fabrication or construction.	Negligible	Unlikely	0
SC-5	Low-level Outlet	Nothing special or complex with regards to construction.	The estimator sees nothing in this project which would require speciality fabrication or construction.	Negligible	Unlikely	0
SC-6	Concrete Sillway	Nothing special or complex with regards to construction.	The estimator sees nothing in this project which would require speciality fabrication or construction.	Negligible	Unlikely	0
SC-7	Demo Small Homes	Nothing special or complex with regards to construction.	The estimator sees nothing in this project which would require speciality fabrication or construction.	Negligible	Unlikely	0
SC-8	Small Park	This feature does require special fabrification and installation of the playground equipment	Playground equipment is specialty fabricated and installed with a limited number of contractor who can do such tasks and as such there is some risk.	Moderate	Possible	2
SC-13	Planning, Engineering, & Design	Nothing special or complex with regards to construction.	The estimator sees nothing in this project which would require speciality fabrication or construction.	Negligible	Unlikely	0
SC-14	Construction Management	Nothing special or complex with regards to construction.	The estimator sees nothing in this project which would require speciality fabrication or construction.	Negligible	Unlikely	0
Technical Design & Quantities					**Maximum Project Growth**	**20%**
T-1	Mob/Demob	Equipment may be different than what the IGE uses. Larger or heavier equipment may be more expensive.	Larger equipment may be more expensive but productivity increases should help offset additional costs.	Negligible	Possible	0
T-2	Site Prep & Water Diversion	Site prep area could expand or trees might need to be cleared beyond staging area.	There is always a chance for project growth; however, land clearing is not unusually expensive. Even doubling of project area would result in a 10K increase.	Marginal	Possible	1
T-3	Earth & Rock Fill Dam	Unstable or unsuitable soils may cause 25-35% rise in quantities to be placed and hauling costs.	It's very likely that unsuitable soils may result increased quantities of excavation and fill. Haul distances could go up as well.	Moderate	Likely	3
T-4	Spillway Deflectors	Excessive velocities may deem size inadequate and cause redesign of deflectors.	Resizing of riprap will not cost much more per ton than anticipated.	Negligible	Possible	0
T-5	Low-level Outlet	Low level outlet may be under sized.	Increaseing the size and outlet capabilities would not be expensive or require more effort than whhat is now estimated.	Marginal	Possible	1
T-6	Concrete Sillway	Concrete spillway may need to enlarged.	Increasing the spillway capacity would not be much more expensive than what is now estimated.	Marginal	Possible	1
T-7	Demo Small Homes	There is a possibility that we may encounter lead paint or asbestos in structures to be demolished.	schedule. Possible 30-40K additional cost and 2-3 months additional tme. It appears this area was used as a dump for building debris so it is likely that we may find contaminated	Moderate	Likely	3
T-8	Small Park	This feature is the least defined feature and the estimator anticipates changes to the playground needs.	The paper gives a verbal indication of what is expected but since no laundry list of detailed equipment was provided changes are expected.	Moderate	Possible	2
T-13	Planning, Engineering, & Design	Design inadequacies may cause a partial redesign of any portion of this project.	Design has not been finalized so resizing of any portion should not negatively effect cost or schedule.	Negligible	Likely	1
T-14	Construction Management	Would a redesign effect the construction management cost or schedule.	Even a complete redesign should have no effect upon construction management.	Negligible	Unlikely	0
Cost Estimate Assumptions					**Maximum Project Growth**	**25%**
EST-1	Mob/Demob	Estimator used specialized equipment. Contractor may use differing or larger pieces of equipment.	If larger equipment is used productivity should go up to lessen equipment duration.	Marginal	Likely	2
EST-2	Site Prep & Water Diversion	Estimator used UPB item for clearing cost. Water diversion was performed by a sump pump and laborer.	Cost of clearing is consistent with what I regularly pay in the disposal areas after a long period of growth. It is possible a sump pump will not be adequate so a small well-point system	Moderate	Likely	3

EST-3	Earth & Rock Fill Dam	Estimate assumes borrow location within a 12 mile round-trip.	Borrow location may be farther away. Higher risk because of the cost. An assembly will be substituted for this UPB item as this study progresses.	Moderate	Possible	2
EST-4	Spillway Deflectors	Rip-rap used as spillway deflectors may be undersized and might need larger pieces.	If rip-rap needs replacing with larger pieces cost and schedule would not change much.	Marginal	Possible	1
EST-5	Low-level Outlet	Production rate for placing pipe may be too aggressive. The operation may be slower.	Rate of 1 - 8 foot section per 1.5 hours should be adequate; hoever estimator reset estimate rate to 8 feet every 3 hours to check for sensitivity. Cost for outlet increased by 10K or 7%.	Marginal	Possible	1
EST-6	Concrete Sillway	Cost for reinforced concrete placement and material cost taken from the UPB may be too low.	The cost from the UPB is 540 $/CY which is close to my ballpark cost of 600 $/CY. If it is higher it won't be much.	Marginal	Possible	1
EST-7	Demo Small Homes	Estimate assumes no lead paint or asbestos will be encountered.	Hazardous materials would negatively effect bith cost and schedule. Possible 30-40K additional cost and 2-3 months additional tme..	Moderate	Possible	2
EST-8	Small Park	A brief listing of what maybe required was provided but the stimator knows changes will be made by the designers when funding and time allows finnishing of the design.	The estimator anticipates changes which could the cost of this feature by 50%.	Moderate	Likely	3
EST-13	Planning, Engineering, & Design	PED, being a percentage of the construction costs, might not be sufficient for the amount of work involved.	Project management has selected the percentage based upon PDT input and should be sufficient.	Marginal	Unlikely	0
EST-14	Construction Management	CM, being a percentage of the construction costs, might not be sufficient for the amount of work involved.	Project management has selected the percentage based upon PDT input and should be sufficient.	Marginal	Unlikely	0
External Project Risks				**Maximum Project Growth**		20%
EX-1	Mob/Demob	The main external risks to this project's construction features is funding since weather delays are accounted for in the contracts front end. There is little concern for unanticipated inflation or market volatility or lack of competition.		Negligible	Unlikely	0
EX-2	Site Prep & Water Diversion	The main external risks to this project's construction features is funding since weather delays are accounted for in the contracts front end. There is little concern for unanticipated inflation or market volatility or lack of competition.		Negligible	Unlikely	0
EX-3	Earth & Rock Fill Dam	The main external risks to this project's construction features is funding since weather delays are accounted for in the contracts front end. There is little concern for unanticipated inflation or market volatility or lack of competition.		Negligible	Unlikely	0
EX-4	Spillway Deflectors	The main external risks to this project's construction features is funding since weather delays are accounted for in the contracts front end. There is little concern for unanticipated inflation or market volatility or lack of competition.		Negligible	Unlikely	0
EX-5	Low-level Outlet	The main external risks to this project's construction features is funding since weather delays are accounted for in the contracts front end. There is little concern for unanticipated inflation or market volatility or lack of competition.		Negligible	Unlikely	0
EX-6	Concrete Sillway	The main external risks to this project's construction features is funding since weather delays are accounted for in the contracts front end. There is little concern for unanticipated inflation or market volatility or lack of competition.		Negligible	Unlikely	0
EX-7	Demo Small Homes	The main external risks to this project's construction features is funding since weather delays are accounted for in the contracts front end. There is little concern for unanticipated inflation or market volatility or lack of competition.		Negligible	Unlikely	0
EX-8	Small Park	are fewer players than in the sitework market. The estimator's experience is that these projects come in 25-35% higher than previous IGEs. I have done 2 of these projects in DOD schools.		Marginal	Likely	2
EX-13	Planning, Engineering, & Design	N/A		Negligible	Unlikely	0
EX-14	Construction Management	N/A		Negligible	Unlikely	0