

Selma, Alabama

Flood Risk Management Study
Integrated Feasibility Report and Environmental Assessment

APPENDIX F



US Army Corps
of Engineers
Mobile District

May 17, 2021



APPENDIX-F: Cost

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F.1. Introduction

F.1.1. Study Area

The Alabama River passes through Selma, Alabama on its journey to the Gulf Coast. Selma itself is a largely historic town known for its significance during the Civil Rights Movement. At the city of Selma, the Alabama River is characterized by sheer banks made of chalky clay material. The riverfront of Selma parallels the main historical reach of Selma’s downtown area.

Due to its higher elevation along the riverbank the downtown ward of Selma (ward 8) is not directly impacted by water during major flood events. While direct water damage is not typical during these events, flood stage water levels tend to increase the speed of erosion along these waterfront properties. These primary waterfront properties are historic structures and there is an imminent threat to their stability. The bank line of Selma is in need of protection from these high water events in order to stabilize the bank erosion and prevent further damage to these structures and their foundations.

F.1.2. Purpose

The purpose of this study is to quantify the risk of flood and the related flood damages in the city of Selma which are associated with the Alabama River. It is then necessary to evaluate potential alternatives that will aid in reducing flood associated risks within the city of Selma. This cost appendix serves as a summary of the Selma FRM study cost estimate documents. The final estimate is intended to provide a basis of comparison for the various alternatives chosen by the project development team and to provide for the authorization and budgeting of the project recommended plan. The construction cost estimates for the final array of alternatives were developed to class 4 based on the level of design presented for the alternatives as required by ER 1110-2-1302. The recommended plan estimate was developed to a class 3 per ER-1110-2-1302.

F.2. Development and Description of Alternatives

F.2.1. Development of Alternatives

Many alternatives and measures were developed and screened out prior to development of any reliable cost estimates. The initial array of alternatives presented at the Alternatives Milestone Meeting (AMM) included 10 measures as presented in **Table F-1** along with the screening status. These alternatives were screened on factors other than cost, so a complete description of the measures and explanation of the screening is available in other parts of this report.

Table F-1: Initial Array of Alternatives

Initial Array of Alternatives	Screened out / Carried Forward
No Action Alternative	Carried Forward
Alt. 1: Non-Structural (A-Buyouts, B-Raise Structural Elevation, Structural Move)	Carried Forward Alt. 1.A Screened Out Alt. 1.B
Alt. 2: 1967 Selma Levee	Carried Forward
Alt. 3: Optimized (Short) Selma Levee	Carried Forward
Alt. 4: Bank Stabilization	Carried Forward
Alt. 5: Bank Stabilization + Buyouts	Carried Forward

Alt. 6: Optimized Selma Levee + Buyouts + Bank Stabilization	Carried Forward
Alt. 7: Optimized Selma Levee + Valley Creek Levee + Pump Station & Sluice Gate + Bank Stabilization	Screened Out
Alt. 8: Optimized Selma Levee + Valley Creek Levee + Buyouts + Bank Stabilization	Screened Out
Alt. 9: Optimized Selma Levee + Valley Creek Levee + Buyouts	Screened Out
Alt. 10: Optimized Selma Levee + Valley Creek Levee + Pump Station with Sluice Gate	Screened Out

The focused array of alternatives, including site specific options, was developed after the AMM. The focused array of alternatives includes one non-structural alternative and five structural and/or combination alternatives. The complete list is included in **Table F-2**.

Table F-2: Focused Array of Alternatives

Focused Array of Alternatives	Screened Out / Carried Forward
No Action Alternative	Carried Forward
Alt. 1: Non-Structural (A-Buyouts)	Carried Forward
Alt. 2: 1967 Selma Levee	Screened Out due to Partial/ROM estimates being much greater than ROM benefits
Alt. 3: Optimized (Short) Selma Levee	Carried Forward
Alt. 4: Bankline Stabilization	Carried Forward
Alt. 5: Bankline Stabilization + Buyouts	Carried Forward
Alt. 6: Optimized Selma Levee + Buyouts + Bank Stabilization	Carried Forward

F.2.2. Screening of Focused Array

This array of alternatives was analyzed for both feasibility and economic benefits and the Alternative 2: 1967 Levee was screened out prior to assessing the final array of alternatives. This alternative was screened in part due to the overwhelming cost of construction, the resulting O&M cost, the and the constructability.

F.3. Development of Alternative Estimates for Final Array

F.3.1. Price Level

The total estimated cost for each of the final alternatives consists of the estimated construction cost, the demolition cost, the real estate cost, the Planning, Engineering and Design (PED) cost, the Construction Management (CM) cost, and a contingency developed using an Abbreviated Risk Analysis (ARA). Each estimate has been performed to a class 4 level estimate per ER 1110-2-1302.

F.3.2. Cost Estimate Structure

The cost estimate was developed using a collaboration of several components. The various components used in creating the total project cost estimates may be seen in the below paragraph.

The construction cost estimates were prepared using MCACES 2nd generation software (MII). Prices used in developing the construction estimates have been found in the 2016 MII Cost library and material pricing has been validated by requesting quotes from local suppliers. The MII equipment library was set to the 2016 Region III Equipment Library which captures equipment rates in the southeast United States. These rates were backchecked and modified as required to reflect accurate equipment pricing from recent historical projects in Alabama. Labor rates were modified per Davis-Bacon wage rates in Dallas County Alabama. Project markups were included in the MII estimate as appropriate. PED and CM costs were developed using typical rates from previous civil works project studies completed by Mobile District. Rates were validated by the project development team and changes were made as necessary to reflect accurate PED and CM costs. An Abbreviated Risk Analysis (ARA) was conducted for each of the study alternatives to provide a basis for carrying contingency forward as appropriate. These contingency rates were included in the Total Project Cost Summaries (TPCS). Real estate costs and their respective contingency and administrative costs were provided by real estate division and included for each alternative.

F.3.3. Risk Analysis and Contingency

For the analysis an ARA was prepared for each alternative. The ARA's were prepared with input from the PDT to quantify the risks and assigning likelihood and impact of each risk.

F.3.4. Cost Estimate Presentation

A Total Project Cost Summary (TPCS) was prepared for each alternative. The TPCS combines the RE costs, construction costs, Contingency, PED, and CM, and applies escalation factors to calculate a first cost and total project cost for each alternative. The First Cost is used for the Economics analysis in conjunction with the damage reduction estimates to determine net benefits for each alternative. **Table F-3** shows the First Costs, estimated operations and maintenance (O&M) costs, and estimated durations for each of the final array of alternatives.

Table F-3: First Costs and Durations of Final Array

Final Array of Alternative	First Cost	Annual O&M	Construction Duration
Alt 1.A Acquisition and Buy-Out	\$4,950,000	\$0	18 Months
Alt 3. Optimized Levee Alignment	\$74,040,000	\$27,000	36 Months
Alt 4. Bank Stabilization	\$22,716,000	\$4,000	18 Months
Alt 5. Bank Stabilization and Buy-Out	\$32,400,000	\$4,000	30 Months
Alt 6. Combination Alternative	\$104,860,000	\$29,500	42 Months

F.3.5. Development of Operations and Maintenance Costs

Operations and maintenance costs of the final array of alternatives, although not a part of the TPCS, are used in the economics analysis. To support that, an O&M estimate was prepared for each alternative in MII. The O&M costs for the levee alignments consist of mowing and land maintenance costs in accordance with USACE levee maintenance guidelines. The retaining wall alternatives consist of minor landscaping costs to maintain an aesthetically please project. The O&M cost totals may be seen in **Table F-3**.

F.4. Development of the Estimated Schedule

The estimated construction durations have been developed based on the anticipated project requirements from “notice to proceed” through construction completion. The projected project construction durations may be seen in **Table F-3**.

F.5. Selection of the Recommended Plan

The estimates of the final array of alternatives were used to perform an economics analysis of the alternatives. It was determined through analysis that the Recommended Plan alternative consisting of a Soldier-Pile Wall and a Flood Response Plan (FRP) has the best economic impact on the community. In addition to the economic analysis results it was determined by the PDT that the construction of the Recommended Plan alternative would benefit the community through extensive Other Social Effects (OSE) benefits. Due to the perceived benefits the PDT has chosen the Soldier-Pile Wall and FRP as the Recommended Alternative.

F.6. Development of the Recommended Plan

F.6.1. Price Level

The total estimated cost for the recommended plan consists of the estimated construction cost, the demolition cost, the real estate cost, the Planning, Engineering and Design (PED) cost, the Construction Management (CM) cost, and a contingency developed using an Abbreviated Risk Analysis (ARA). The Recommended Plan estimate has been performed to a class 3 level estimate per ER 1110-2-1302. The estimate has been refined to include additional design parameters and construction methodology above and beyond that assumed during the final array of alternative phase of the study.

F.6.2. Cost Estimate Structure

The Recommended Plan cost estimate was developed MCACES 2nd generation software (MII) in conjunction with local supplier quotes on materials and labor. The MII equipment library was set to the 2016 Region III Equipment Library which captures equipment rates in the southeast United States. These rates were backchecked and modified as required to reflect accurate equipment pricing from recent historical projects in Alabama. Labor rates were modified per Davis-Bacon wage rates in Dallas County Alabama. Project markups were included in the MII estimate as appropriate. PED and CM costs were developed using typical rates from previous civil works project studies completed by Mobile District. Rates were validated by the project development team and changes were made as necessary to reflect accurate PED and CM costs. An Abbreviated Risk Analysis (ARA) was conducted for the recommended plan to provide a basis for carrying contingency forward as appropriate. This contingency rate was included in the Total

Project Cost Summaries (TPCS). A Real estate LERRD cost and its respective contingency and administrative costs was provided by real estate division and included on the TPCS document.

F.6.3. Risk Analysis and Contingency

An Abbreviated Risk Analysis was prepared with input from the PDT to quantify the risks and assigning likelihood and impact of each risk regarding the construction of the Recommended Plan. The risk register and results of the ARA for the Recommended Plan is included as an exhibit to this appendix.

F.6.4. Cost Estimate Presentation

A Total Project Cost Summary (TPCS) was prepared for the Recommended Plan combining the RE costs, construction cost, Contingency, PED, and CM, and escalation. **Table F-4** shows the First Costs, estimated operations and maintenance (O&M) costs, and estimated durations for the Recommended Plan.

Table F-4: First Costs and Durations of the Recommended Plan

Recommended Plan	First Cost	Annual O&M	Construction Duration
Alt. 4 Soldier-Pile Wall and FRP	\$23,897,000	\$30,499	18 Months

F.6.5. Development of Operations and Maintenance Costs

Operations and Maintenance Costs were developed for the Recommended Plan for use in the economics analysis of the final alternative. The Recommended Plan O&M consists of twice monthly mowing and landscaping costs in conjunction with power washing all exposed concrete surfaces on a six-month rotation. It is assumed that quarterly groundskeeping labor for general cleaning will take place in addition to the required mowing and power washing effort. The O&M cost total for the Recommended Plan may be seen in **Table F-4**.

F.7. Conclusion

It is recommended that the study cost be further refined should the project move forward towards construction. The current estimate is based on escalation factors to scale cost to the appropriate construction year. It is likely that national and local economic changes will impact the project cost in unforeseen ways. As the study moves towards contract advertisement, it is necessary to refine the cost to a level 2 and a level 1 as appropriate for bid opening. The working estimate for the Recommended Plan is currently at a level 3.

F.8. Exhibits

- 1) Exhibit F-1: Abbreviated Risk Analysis for the Recommended Plan
- 2) Exhibit F-2: TPCS Sheets for the Recommended Plan

Exhibit F-1: Abbreviated Risk Analysis for the Recommended Plan

Abbreviated Risk Analysis

Project (less than \$40M): **Bank Stabilization**
 Project Development Stage/Alternative: **Feasibility (Recommended Plan)**
 Risk Category: **Moderate Risk: Typical Project Construction Type**

Alternative: **Soldier Pile Wall**
 Meeting Date: **5/4/2021**

Total Estimated Construction Contract Cost = \$ **16,400,913**

	CWWBS	Feature of Work	Contract Cost	% Contingency	\$ Contingency	Total
01	LANDS AND DAMAGES	Real Estate	\$ 222,000	0.00%	\$ -	\$ 222,000
1	16 BANK STABILIZATION	Soldier Pile Wall	\$ 16,400,913	24.63%	\$ 4,039,267	\$ 20,440,180
2			\$ -	0.00%	\$ -	\$ -
3			\$ -	0.00%	\$ -	\$ -
4			\$ -	0.00%	\$ -	\$ -
5			\$ -	0.00%	\$ -	\$ -
6				0.00%	\$ -	\$ -
7				0.00%	\$ -	\$ -
8			\$ -	0.00%	\$ -	\$ -
9			\$ -	0.00%	\$ -	\$ -
10			\$ -	0.00%	\$ -	\$ -
11			\$ -	0.00%	\$ -	\$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$ 1,041,000	10.00%	\$ 104,100	\$ 1,145,100
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$ 1,312,000	5.00%	\$ 65,600	\$ 1,377,600

Totals						
	Real Estate	\$	222,000	0.00%	\$	-
	Total Construction Estimate	\$	16,400,913	24.63%	\$	4,039,267
	Total Planning, Engineering & Design	\$	1,041,000	10.00%	\$	104,100
	Total Construction Management	\$	1,312,000	5.00%	\$	65,600
	Total Excluding Real Estate	\$	18,753,913	22%	\$	4,208,967
					Base	50%
					80%	
	Confidence Level Range Estimate (\$000's)		\$18,754k		\$21,279k	\$22,963k

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

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

Selma Flood Risk Management Study
Appendix F – Cost Exhibit F-2

DATE
May 17, 2021

Exhibit F-2: TPCS Sheets for the Recommended Plan

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

Printed: 5/4/2021
Page 1 of 2

PROJECT: Selma FRM Study - Recommended Plan - Soldier Pile Wall
PROJECT NO: 0
LOCATION: Selma, AL

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

PREPARED: 5/4/2021

This Estimate reflects the scope and schedule in report, 0

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)					
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST (\$K) C	CNTG (\$K) D	CNTG (%) E	TOTAL (\$K) F	ESC (%) G	COST (\$K) H	CNTG (\$K) I	TOTAL (\$K) J	2022 Spent Thru: 1 OCT 21		TOTAL FIRST COST (\$K) K	INFLATED (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
										1-Oct-20 (\$K)						
16	Selma Flood Risk Management Project	\$16,401	\$4,040	24.6%	\$20,441	3.0%	\$16,893	\$4,161	\$21,054	\$0	\$0	\$21,054	7.7%	\$18,194	\$4,481	\$22,675
	#N/A	\$0	\$0 -		\$0	-	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$0
	#N/A	\$0	\$0 -		\$0	-	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$0
	#N/A	\$0	\$0 -		\$0	-	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$0
	#N/A	\$0	\$0 -		\$0	-	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$0
	#N/A	\$0	\$0 -		\$0	-	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$0
	#N/A	\$0	\$0 -		\$0	-	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$0
	#N/A	\$0	\$0 -		\$0	-	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$0
	CONSTRUCTION ESTIMATE TOTALS:	\$16,401	\$4,040		\$20,441	3.0%	\$16,893	\$4,161	\$21,054	\$0	\$0	\$21,054	7.7%	\$18,194	\$4,481	\$22,675
01	LANDS AND DAMAGES	\$222	\$0	0.0%	\$222	0.0%	\$222	\$0	\$222	\$0	\$0	\$222	0.0%	\$222	\$0	\$222
30	PLANNING, ENGINEERING & DESIGN	\$1,041	\$104	10.0%	\$1,145	3.9%	\$1,082	\$108	\$1,190	\$0	\$0	\$1,190	3.8%	\$1,123	\$112	\$1,235
31	CONSTRUCTION MANAGEMENT	\$1,312	\$66	5.0%	\$1,378	3.9%	\$1,363	\$68	\$1,431	\$0	\$0	\$1,431	13.0%	\$1,540	\$77	\$1,617
	PROJECT COST TOTALS:	\$18,976	\$4,208	22.2%	\$23,184		\$19,560	\$4,337	\$23,897	\$0	\$0	\$23,897	7.6%	\$21,079	\$4,670	\$25,749

CHIEF, COST ENGINEERING, xxx

ESTIMATED TOTAL PROJECT COST: \$25,749

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

**** CONTRACT COST SUMMARY ****

PROJECT: Selma FRM Study - Recommended Plan - Soldier Pile Wall
LOCATION: Selma, AL
This Estimate reflects the scope and schedule in report, 0

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

PREPARED: 5/4/2021

