

RAHWAY RIVER (TIDAL)
STORM RISK MANAGEMENT
FEASIBILITY

COST ENGINEERING APPENDIX

May 2017

APPENDIX C – COST ESTIMATES

Table of Contents

Project Background	C-1
Basis of Cost	C-1
Contingencies	C-2
Planning, Engineering and Design	C-2
Construction Management.....	C-2
Interest During Construction	C-3
Operation and Maintenance	C-3
Estimated Annual Charges.....	C-3
Cost Summary.....	C-4

List of Tables

Table C1 - First Cost Table for Alternative 4a.....	C-1
Table C2 – Alternative 4a Contingency Factors	C-2
Table C3 – Estimate Alternative 4a Annual Charges.....	C-3

List of Figures

Figure C1 – Total Project Cost Summary for Alternative 4a	C-5
Figure C2 – Construction Schedule for Alternative 4a	C-12
Figure C3 – Abbreviated Risk Analysis for Alternative 4a	C-13

List of Attachments

Attachment C1 – MII Report.....	C-21
Attachment C2 – District Quality Control (DQC)	C-23

COST ENGINEERING

PROJECT BACKGROUND

C1. This appendix presents the detail cost estimate for Alternative 4a which includes both the Structural and the 10-Year Nonstructural treatment in the Rahway River located in northeastern New Jersey. Alternative 4a consists of a 3,520 lf levee in section D and the 10-year nonstructural treatment elsewhere. The first cost for alternative 4a is presented in Table C1.

Table C1 – First Cost Table for Alternative 4a (includes structural and 10-yr. nonstructural)

**Rahway River (Tidal) – Alternative 4a
October 2017 Price Level**

Storm Risk Management Feasibility Study

Feature Account	Description	Qty	UoM	Subtotal	Cont. %	Cont. \$\$	Total Cost
01	Lands & Damages	1	LS	\$ 1,883,736	16.4%	\$ 308,034	\$ 2,191,770
	Total Lands & Damages			\$ 1,883,736		\$ 308,034	\$ 2,191,770
06	Fish & Wildlife Facilities	1	LS	\$ 1,629,616	17.5%	\$ 284,631	\$ 1,914,247
	Total Fish & Wildlife Facilities			\$ 1,629,616		\$ 284,631	\$ 1,914,247
11	Levees & Floodwalls	3,520	LF	\$ 8,083,096	27.4%	\$ 2,213,732	\$ 10,296,828
	Total Levees & Floodwalls			\$ 8,083,096		\$ 2,213,732	\$ 10,296,828
18	Cultural Resource Preservation	1	LS	\$ 2,929,142	13.4%	\$ 391,977	\$ 3,321,119
	Total Cultural Resource Preservation			\$ 2,929,142		\$ 391,977	\$ 3,321,119
19	Buildings, Grounds, & Utilities	1	LS	\$ 24,144,547	36.6%	\$ 8,844,591	\$ 32,989,138
	Total Buildings, Grounds, & Utilities			\$ 24,144,547		\$ 8,844,591	\$ 32,989,138
30	Planning, Engineering, & Design	1	LS	\$ 9,356,654	24.7%	\$ 2,311,280	\$ 11,667,934
31	Construction Management	1	LS	\$ 3,928,738	15.0%	\$ 590,548	\$ 4,519,286
	Total Alternative 4a			\$ 51,955,528		\$ 14,944,793	\$ 66,900,321

BASIS OF COST

C2. The construction cost estimate was developed in MCACES, Second Generation (MII) using the appropriate Work Breakdown Structure (WBS) and based on current estimated quantities provided by the Hydraulics & Hydrology Engineers. The cost estimate was developed from these quantities using cost resources such as RSMeans, historical data from similar construction features, and MII Cost Libraries. The contingencies were developed based on input to the Abbreviated Cost Schedule Risk Analysis (ARA) (template provided by the Cost Mandatory Center of Expertise, MCX, Walla Walla District). These contingencies were applied to the construction cost estimates to develop the Total Project First Cost. The overall construction duration for alternative 4a was estimated at 24 months as shown in Figure C2 on page C-11. The schedule assumes that both the levee construction and the nonstructural construction would be performed concurrently with no phasing or breaking into separate elements. At this level of project development it is assumed that the levee construction will be obtained under a single full and open

contract acquisition method and the nonstructural work will also be obtained under a single full and open contract acquisition method. The construction schedule was also developed based on the crew outputs referenced from RSMeans with the assumption that multiple crews would work simultaneously. Levee construction is assumed to begin October 2019 and go through September 2021. It is expected that all of the 136 nonstructural treatments can be accomplished during this same time period. Work may be performed concurrently to meet this schedule.

CONTINGENCIES

C3. As stated in ER 1110-2-1302, the goal in contingency development is to identify the uncertainty associated with an item of work or task to an acceptable degree of confidence. Consideration must be given to the detail available at each stage of planning, design, or construction for which a cost estimate is being prepared. Contingency may vary throughout the cost estimate and could constitute a significant portion of the overall costs when data or design details are unavailable. Final contingency development and assessment of the potential for cost growth is included in this cost estimate. To develop the Total Project First Cost, contingencies developed in the ARA were applied. The contingency factors used in alternative 4a are summarized in Table C2.

Table C2 - Alternative 4a Contingency Factors

Element	Contingency Factor
Fish and Wildlife Facilities	17.5%
Levees and Floodwalls	27.4%
Cultural Resource Preservation	13.4%
Buildings, Grounds & Utilities	36.6%
Total Construction Contingency	30.8%
Lands & Damages	16.4%
Planning, Engineering, and Design	24.7%
Construction Management	15.0%

PLANNING, ENGINEERING, AND DESIGN

C4. The costs were developed for all activities associated with the planning, engineering and design effort. The cost for this account includes the preparation of Design Documentation Reports and plans and specifications for each construction contract and engineering support during construction through project completion. It includes all the in-house labor based upon work-hour requirements, material and facility costs, travel and overhead. The percentage breakout in the Total Project Cost Summary (TPCS), as shown in Figure C1, was developed based on input from respective offices in accordance with the CWBS.

CONSTRUCTION MANAGEMENT

C5. The costs were developed for all construction management activities from pre-award requirements through final contract closeout. These costs include the in-house labor based upon work-hour requirements, materials, facility costs, support contracts, travel and overhead. Costs were developed based on the input from the construction division in accordance with the CWBS and include but are not limited to anticipated items such as the salaries of the resident engineer and staff, surveyors, inspectors, draftsmen, clerical, and custodial personnel; operation, maintenance and fixed charges for transportation and for other field equipment; field supplies; construction management, general construction supervision; project office administration, distributive cost of area office and general overhead charged to the project. The work items and activities would include, but not be limited to: the salaries of all supervisory,

engineering (including resident geologist and geological staff), office and safety field personnel; all on site expenses.

INTEREST DURING CONSTRUCTION

C6. Interest during construction (IDC) is the cost of construction money invested before the beginning of the period of economic analysis and before the accumulation of benefits by the project. IDC costs have been added to the project cost to determine investment costs. Average annual costs were determined based on investment costs which include IDC. The pre-base year costs were estimated using the Federal interest rate of 2.875 percent (FY17).

OPERATION AND MAINTENANCE

C7. The Operation and Maintenance (O&M) costs were estimated to represent the anticipated annual costs necessary to maintain the project at full operating efficiency throughout the project life. Following completion of the project, operation and maintenance of project facilities would be performed by the local cooperating agency in accordance with federal regulations and operations manual.

ESTIMATED ANNUAL CHARGES

C8. Annualized costs are based on an economic project life of 50 years and an interest rate of 2.875%. The annual charges include the annualized investment costs along with annual operation and maintenance costs. A detailed breakdown of annual costs for alternative 4a is presented in Table C3.

Table C3 – Estimated Alternative 4a Annual Charges

Alternative 4a - Segment D Levee & 10-yr. Nonstructural Structural & Nonstructural Items

First Cost	\$	66,900,321
Sunk Cost	\$	-
Investment Cost		
Interest During Construction ^(a)	\$	1,598,186
Total Investment Cost:	\$	68,498,507
Annual Costs		
Annualized Investment Cost ^(b)	\$	2,599,387
Annualized Operation & Maintenance Cost ^(c)	\$	51,484
Total Annual Cost*	\$	2,650,871

(a) Based on sum of multiple segments over a total of 24 months of construction @ 2.875% (IDC, E&D, RE calculated separately and included in this total)

(b) Annualized investment cost only includes the remaining features. I = 2.875% and n = 50 yrs

(c) Annual O&M for structural items ONLY.

COST SUMMARY

The Total Fully Funded Project cost for Alternative 4a including both the Structural and the 10-Year Nonstructural treatment is \$70,930,000. This cost is 65% federally funded and 35% non-federally funded.

Figure C1 – Total Project Cost Summary for Alternative 4a

PROJECT: Rahway (Tidal) - Alternative 4a (Segment D Levee and 10-Year Nonstructural w/o Ringwalls)
PROJECT NO: 0
LOCATION: Rahway, NJ

DISTRICT: New York District
POC: CHIEF, COST ENGINEERING, Mukesh Kumar

PREPARED: 5/15/2017

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	Civil Works Feature & Sub-Feature Description	COST	CNTG	CNTG	TOTAL	ESC	COST	CNTG	TOTAL	Program Year (Budget EC): Effective Price Level Date: 2018 1 OCT 17	TOTAL FIRST COST	INFLATED	COST	CNTG	FULL
		(\$K)	(\$K)	(%)	(\$K)										
A	B	C	D	E	F	G	H	I	J	Spent Thru: 1-Oct-16	K	L	M	N	O
										(\$K)					
06	FISH & WILDLIFE FACILITIES	\$1,600	\$279	17.5%	\$1,880	1.8%	\$1,630	\$285	\$1,914	\$0	\$1,914	6.0%	\$1,728	\$302	\$2,030
11	LEVEES & FLOODWALLS	\$7,936	\$2,174	27.4%	\$10,110	1.8%	\$8,083	\$2,214	\$10,297	\$0	\$10,297	6.0%	\$8,571	\$2,347	\$10,919
18	CULTURAL RESOURCE PRESERVATION	\$2,876	\$385	13.4%	\$3,261	1.8%	\$2,929	\$392	\$3,321	\$0	\$3,321	6.0%	\$3,106	\$416	\$3,522
19	BUILDINGS, GROUNDS & UTILITIES	\$23,707	\$8,684	36.6%	\$32,391	1.8%	\$24,145	\$8,845	\$32,989	\$0	\$32,989	6.0%	\$25,603	\$9,379	\$34,982
CONSTRUCTION ESTIMATE TOTALS:		\$36,119	\$11,522		\$47,641	1.8%	\$36,786	\$11,735	\$48,521	\$0	\$48,521	6.0%	\$39,009	\$12,444	\$51,452
01	LANDS AND DAMAGES	\$1,850	\$302	16.4%	\$2,152	1.8%	\$1,884	\$308	\$2,192	\$0	\$2,192	6.0%	\$1,998	\$327	\$2,324
30	PLANNING, ENGINEERING & DESIGN	\$9,031	\$2,231	24.7%	\$11,262	3.6%	\$9,357	\$2,311	\$11,668	\$0	\$11,668	3.6%	\$9,690	\$2,394	\$12,084
31	CONSTRUCTION MANAGEMENT	\$3,792	\$570	15.0%	\$4,362	3.6%	\$3,929	\$591	\$4,519	\$0	\$4,519	12.2%	\$4,407	\$662	\$5,069
PROJECT COST TOTALS:		\$50,792	\$14,625	28.8%	\$65,417		\$51,956	\$14,945	\$66,900	\$0	\$66,900	6.0%	\$55,103	\$15,827	\$70,930
		CHIEF, COST ENGINEERING, Mukesh Kumar													
		PROJECT MANAGER, Rifat Salim													
		CHIEF, REAL ESTATE, Noreen Dr													
ESTIMATED TOTAL PROJECT COST:											\$70,930				
Federal Cost Share (65%):											\$46,104				
Non-Federal Cost Share (35%):											\$24,825				

Rahway Tidal
Rahway River Basin, New Jersey

**** CONTRACT COST SUMMARY ****

PROJECT: Rahway (Tidal) - Alternative 4a (Segment D Levee and 10-Year Nonstructural w/o Ringwalls)
LOCATION: Rahway, NJ
This Estimate reflects the scope and schedule in report; 0

DISTRICT: New York District
POC: CHIEF, COST ENGINEERING, Mukesh Kumar
PREPARED: 5/15/2017

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: Effective Price Level:		1-Oct-16 1-Oct-16		Program Year (Budget EC): Effective Price Level Date:		2018 1 OCT 17						
WBS	Civil Works	RISK BASED				ESC	COST	CNTG	TOTAL	Mid-Point	INFLATED	COST	CNTG	FULL
NUMBER	Feature & Sub-Feature Description	COST	CNTG	CNTG	TOTAL	(%)	(\$K)	(\$K)	(\$K)	Date	(%)	(\$K)	(\$K)	(\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
06	Segment A - Alt 1 Levee - Nonstructural													
	FISH & WILDLIFE FACILITIES	\$0	\$0	17.5%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
11	LEVEES & FLOODWALLS	\$0	\$0	27.4%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
18	CULTURAL RESOURCE PRESERVATION	\$368	\$49	13.4%	\$417	1.8%	\$375	\$50	\$425	2021Q1	6.0%	\$397	\$53	\$451
19	BUILDINGS, GROUNDS & UTILITIES	\$4,770	\$1,747	36.6%	\$6,517	1.8%	\$4,858	\$1,780	\$6,637	2021Q1	6.0%	\$5,151	\$1,887	\$7,038
	#N/A	\$0	\$0	0.0%	\$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	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
CONSTRUCTION ESTIMATE TOTALS:		\$5,138	\$1,796	35.0%	\$6,934		\$5,233	\$1,830	\$7,062			\$5,549	\$1,940	\$7,489
01	LANDS AND DAMAGES	\$218	\$44	20.0%	\$261	1.8%	\$222	\$44	\$266	2021Q1	6.0%	\$235	\$47	\$282
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	\$128	\$32	24.7%	\$160	3.6%	\$133	\$33	\$165	2018Q3	1.9%	\$135	\$33	\$169
1.0%	Planning & Environmental Compliance	\$51	\$13	24.7%	\$64	3.6%	\$53	\$13	\$66	2018Q3	1.9%	\$54	\$13	\$67
15.0%	Engineering & Design	\$771	\$190	24.7%	\$961	3.6%	\$799	\$197	\$996	2018Q3	1.9%	\$814	\$201	\$1,015
1.0%	Reviews, ATRs, IEPRs, VE	\$51	\$13	24.7%	\$64	3.6%	\$53	\$13	\$66	2018Q3	1.9%	\$54	\$13	\$67
0.5%	Life Cycle Updates (cost, schedule, risks)	\$26	\$6	24.7%	\$32	3.6%	\$27	\$7	\$34	2018Q3	1.9%	\$27	\$7	\$34
1.0%	Contracting & Reprographics	\$51	\$13	24.7%	\$64	3.6%	\$53	\$13	\$66	2018Q3	1.9%	\$54	\$13	\$67
2.0%	Engineering During Construction	\$103	\$25	24.7%	\$128	3.6%	\$107	\$26	\$133	2021Q1	12.2%	\$120	\$30	\$149
2.0%	Planning During Construction	\$103	\$25	24.7%	\$128	3.6%	\$107	\$26	\$133	2021Q1	12.2%	\$120	\$30	\$149
0.0%	Project Operations	\$0	\$0	24.7%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	\$411	\$62	15.0%	\$473	3.6%	\$426	\$64	\$490	2021Q1	12.2%	\$478	\$72	\$549
0.0%	Project Operation:	\$0	\$0	15.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
2.5%	Project Management	\$128	\$19	15.0%	\$147	3.6%	\$133	\$20	\$153	2021Q1	12.2%	\$149	\$22	\$171
CONTRACT COST TOTALS:		\$7,178	\$2,238		\$9,417		\$7,343	\$2,287	\$9,630			\$7,788	\$2,422	\$10,210

Rahway Tidal
Rahway River Basin, New Jersey

**** CONTRACT COST SUMMARY ****

PROJECT: Rahway (Tidal) - Alternative 4a (Segment D Levee and 10-Year Nonstructural w/o Ringwalls)
LOCATION: Rahway, NJ
This Estimate reflects the scope and schedule in report; 0

DISTRICT: New York District
POC: CHIEF, COST ENGINEERING, Mukesh Kumar
PREPARED: 5/15/2017

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: Effective Price Level:		1-Oct-16 1-Oct-16		Program Year (Budget EC): Effective Price Level Date:		2018 1 OCT 17						
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	Mid-Point Date P	INFLATED (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
Segment A - No Levee Protection - Nonstructural														
06	FISH & WILDLIFE FACILITIES	\$0	\$0	17.5%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
11	LEVEES & FLOODWALLS	\$0	\$0	27.4%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
18	CULTURAL RESOURCE PRESERVATION	\$656	\$88	13.4%	\$744	1.8%	\$668	\$89	\$758	2021Q1	6.0%	\$708	\$95	\$803
19	BUILDINGS, GROUNDS & UTILITIES	\$2,713	\$994	36.6%	\$3,707	1.8%	\$2,763	\$1,012	\$3,775	2021Q1	6.0%	\$2,930	\$1,073	\$4,003
	#N/A	\$0	\$0	0.0%	\$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	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
CONSTRUCTION ESTIMATE TOTALS:		\$3,369	\$1,082	32.1%	\$4,451		\$3,431	\$1,102	\$4,533			\$3,638	\$1,168	\$4,807
01	LANDS AND DAMAGES	\$388	\$78	20.0%	\$466	1.8%	\$395	\$79	\$474	2021Q1	6.0%	\$419	\$84	\$503
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	\$84	\$21	24.7%	\$105	3.6%	\$87	\$21	\$109	2018Q3	1.9%	\$89	\$22	\$111
1.0%	Planning & Environmental Compliance	\$34	\$8	24.7%	\$42	3.6%	\$35	\$9	\$44	2018Q3	1.9%	\$36	\$9	\$45
15.0%	Engineering & Design	\$505	\$125	24.7%	\$630	3.6%	\$523	\$129	\$652	2018Q3	1.9%	\$533	\$132	\$665
1.0%	Reviews, ATRs, IEPRs, VE	\$34	\$8	24.7%	\$42	3.6%	\$35	\$9	\$44	2018Q3	1.9%	\$36	\$9	\$45
0.5%	Life Cycle Updates (cost, schedule, risks)	\$17	\$4	24.7%	\$21	3.6%	\$18	\$4	\$22	2018Q3	1.9%	\$18	\$4	\$22
1.0%	Contracting & Reprographics	\$34	\$8	24.7%	\$42	3.6%	\$35	\$9	\$44	2018Q3	1.9%	\$36	\$9	\$45
2.0%	Engineering During Construction	\$67	\$17	24.7%	\$84	3.6%	\$69	\$17	\$87	2021Q1	12.2%	\$78	\$19	\$97
2.0%	Planning During Construction	\$67	\$17	24.7%	\$84	3.6%	\$69	\$17	\$87	2021Q1	12.2%	\$78	\$19	\$97
0.0%	Project Operations	\$0	\$0	24.7%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	\$270	\$41	15.0%	\$311	3.6%	\$280	\$42	\$322	2021Q1	12.2%	\$314	\$47	\$361
0.0%	Project Operation:	\$0	\$0	15.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
2.5%	Project Management	\$84	\$13	15.0%	\$97	3.6%	\$87	\$13	\$100	2021Q1	12.2%	\$98	\$15	\$112
CONTRACT COST TOTALS:		\$4,953	\$1,420		\$6,373		\$5,066	\$1,451	\$6,517			\$5,372	\$1,537	\$6,909

Rahway Tidal
Rahway River Basin, New Jersey

**** CONTRACT COST SUMMARY ****

PROJECT: Rahway (Tidal) - Alternative 4a (Segment D Levee and 10-Year Nonstructural w/o Ringwalls)
LOCATION: Rahway, NJ
This Estimate reflects the scope and schedule in report; 0

DISTRICT: New York District
POC: CHIEF, COST ENGINEERING, Mukesh Kumar
PREPARED: 5/15/2017

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 1-Oct-16 Effective Price Level: 1-Oct-16				Program Year (Budget EC): 2018 Effective Price Level Date: 1 OCT 17								
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	Mid-Point Date P	INFLATED (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
Segment B - Alt 1 Levee - Nonstructural														
06	FISH & WILDLIFE FACILITIES	\$0	\$0	17.5%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
11	LEVEES & FLOODWALLS	\$0	\$0	27.4%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
18	CULTURAL RESOURCE PRESERVATION	\$48	\$6	13.4%	\$54	1.8%	\$49	\$7	\$55	2021Q1	6.0%	\$52	\$7	\$59
19	BUILDINGS, GROUNDS & UTILITIES	\$406	\$149	36.6%	\$554	1.8%	\$413	\$151	\$564	2021Q1	6.0%	\$438	\$160	\$598
	#N/A	\$0	\$0	0.0%	\$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	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
CONSTRUCTION ESTIMATE TOTALS:		\$454	\$155	34.2%	\$609		\$462	\$158	\$620			\$490	\$167	\$657
01	LANDS AND DAMAGES	\$28	\$6	20.0%	\$34	1.8%	\$29	\$6	\$35	2021Q1	6.0%	\$31	\$6	\$37
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	\$11	\$3	24.7%	\$14	3.6%	\$11	\$3	\$14	2018Q3	1.9%	\$12	\$3	\$14
1.0%	Planning & Environmental Compliance	\$5	\$1	24.7%	\$6	3.6%	\$5	\$1	\$6	2018Q3	1.9%	\$5	\$1	\$7
15.0%	Engineering & Design	\$68	\$17	24.7%	\$85	3.6%	\$70	\$17	\$88	2018Q3	1.9%	\$72	\$18	\$90
1.0%	Reviews, ATRs, IEPRs, VE	\$5	\$1	24.7%	\$6	3.6%	\$5	\$1	\$6	2018Q3	1.9%	\$5	\$1	\$7
0.5%	Life Cycle Updates (cost, schedule, risks)	\$2	\$0	24.7%	\$2	3.6%	\$2	\$1	\$3	2018Q3	1.9%	\$2	\$1	\$3
1.0%	Contracting & Reprographics	\$5	\$1	24.7%	\$6	3.6%	\$5	\$1	\$6	2018Q3	1.9%	\$5	\$1	\$7
2.0%	Engineering During Construction	\$9	\$2	24.7%	\$11	3.6%	\$9	\$2	\$12	2021Q1	12.2%	\$10	\$3	\$13
2.0%	Planning During Construction	\$9	\$2	24.7%	\$11	3.6%	\$9	\$2	\$12	2021Q1	12.2%	\$10	\$3	\$13
0.0%	Project Operations	\$0	\$0	24.7%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	\$36	\$5	15.0%	\$41	3.6%	\$37	\$6	\$43	2021Q1	12.2%	\$42	\$6	\$48
0.0%	Project Operation:	\$0	\$0	15.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
2.5%	Project Management	\$11	\$2	15.0%	\$13	3.6%	\$11	\$2	\$13	2021Q1	12.2%	\$13	\$2	\$15
CONTRACT COST TOTALS:		\$643	\$196		\$839		\$658	\$200	\$858			\$697	\$212	\$909

Rahway Tidal
Rahway River Basin, New Jersey

**** CONTRACT COST SUMMARY ****

PROJECT: Rahway (Tidal) - Alternative 4a (Segment D Levee and 10-Year Nonstructural w/o Ringwalls)
LOCATION: Rahway, NJ
This Estimate reflects the scope and schedule in report;

DISTRICT: New York District
POC: CHIEF, COST ENGINEERING, Mukesh Kumar
PREPARED: 5/15/2017

0

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 1-Oct-16 Effective Price Level: 1-Oct-16				Program Year (Budget EC): 2018 Effective Price Level Date: 1 OCT 17				FULLY FUNDED PROJECT ESTIMATE				
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	Mid-Point Date P	INFLATED (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
Segment C - Alt 1 Levee - Nonstructural														
06	FISH & WILDLIFE FACILITIES	\$0	\$0	17.5%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
11	LEVEES & FLOODWALLS	\$0	\$0	27.4%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
18	CULTURAL RESOURCE PRESERVATION	\$16	\$2	13.4%	\$18	1.8%	\$16	\$2	\$18	2021Q1	6.0%	\$17	\$2	\$20
19	BUILDINGS, GROUNDS & UTILITIES	\$142	\$52	36.6%	\$194	1.8%	\$144	\$53	\$197	2021Q1	6.0%	\$153	\$56	\$209
	#N/A	\$0	\$0	0.0%	\$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	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
CONSTRUCTION ESTIMATE TOTALS:		\$158	\$54	34.3%	\$212		\$161	\$55	\$216			\$170	\$58	\$229
01	LANDS AND DAMAGES	\$11	\$2	20.0%	\$14	1.8%	\$12	\$2	\$14	2021Q1	6.0%	\$12	\$2	\$15
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	\$4	\$1	24.7%	\$5	3.6%	\$4	\$1	\$5	2018Q3	1.9%	\$4	\$1	\$5
1.0%	Planning & Environmental Compliance	\$2	\$0	24.7%	\$2	3.6%	\$2	\$1	\$3	2018Q3	1.9%	\$2	\$1	\$3
15.0%	Engineering & Design	\$24	\$6	24.7%	\$30	3.6%	\$25	\$6	\$31	2018Q3	1.9%	\$25	\$6	\$32
1.0%	Reviews, ATRs, IEPs, VE	\$2	\$0	24.7%	\$2	3.6%	\$2	\$1	\$3	2018Q3	1.9%	\$2	\$1	\$3
0.5%	Life Cycle Updates (cost, schedule, risks)	\$1	\$0	24.7%	\$1	3.6%	\$1	\$0	\$1	2018Q3	1.9%	\$1	\$0	\$1
1.0%	Contracting & Reprographics	\$2	\$0	24.7%	\$2	3.6%	\$2	\$1	\$3	2018Q3	1.9%	\$2	\$1	\$3
2.0%	Engineering During Construction	\$3	\$1	24.7%	\$4	3.6%	\$3	\$1	\$4	2021Q1	12.2%	\$3	\$1	\$4
2.0%	Planning During Construction	\$3	\$1	24.7%	\$4	3.6%	\$3	\$1	\$4	2021Q1	12.2%	\$3	\$1	\$4
0.0%	Project Operations	\$0	\$0	24.7%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	\$13	\$2	15.0%	\$15	3.6%	\$13	\$2	\$15	2021Q1	12.2%	\$15	\$2	\$17
0.0%	Project Operation:	\$0	\$0	15.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
2.5%	Project Management	\$4	\$1	15.0%	\$5	3.6%	\$4	\$1	\$5	2021Q1	12.2%	\$5	\$1	\$5
CONTRACT COST TOTALS:		\$227	\$69		\$296		\$232	\$71	\$303			\$246	\$75	\$321

Rahway Tidal
Rahway River Basin, New Jersey

**** CONTRACT COST SUMMARY ****

PROJECT: Rahway (Tidal) - Alternative 4a (Segment D Levee and 10-Year Nonstructural w/o Ringwalls)
LOCATION: Rahway, NJ
This Estimate reflects the scope and schedule in report;

DISTRICT: New York District
POC: CHIEF, COST ENGINEERING, Mukesh Kumar
PREPARED: 5/15/2017

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Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 1-Oct-16 Effective Price Level: 1-Oct-16				Program Year (Budget EC): 2018 Effective Price Level Date: 1 OCT 17				FULLY FUNDED PROJECT ESTIMATE				
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	Mid-Point Date P	INFLATED (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
No Levee Protection - Nonstructural														
06	FISH & WILDLIFE FACILITIES	\$0	\$0	17.5%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
11	LEVEES & FLOODWALLS	\$0	\$0	27.4%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
18	CULTURAL RESOURCE PRESERVATION	\$1,088	\$146	13.4%	\$1,234	1.8%	\$1,108	\$148	\$1,256	2021Q1	6.0%	\$1,175	\$157	\$1,332
19	BUILDINGS, GROUNDS & UTILITIES	\$15,676	\$5,743	36.6%	\$21,419	1.8%	\$15,966	\$5,849	\$21,815	2021Q1	6.0%	\$16,931	\$6,202	\$23,133
	#N/A	\$0	\$0	0.0%	\$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	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
CONSTRUCTION ESTIMATE TOTALS:		\$16,764	\$5,888	35.1%	\$22,653		\$17,074	\$5,997	\$23,071			\$18,106	\$6,359	\$24,465
01	LANDS AND DAMAGES	\$644	\$129	20.0%	\$772	1.8%	\$656	\$131	\$787	2021Q1	6.0%	\$695	\$139	\$834
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	\$419	\$104	24.7%	\$523	3.6%	\$434	\$107	\$541	2018Q3	1.9%	\$442	\$109	\$552
1.0%	Planning & Environmental Compliance	\$168	\$41	24.7%	\$209	3.6%	\$174	\$43	\$217	2018Q3	1.9%	\$177	\$44	\$221
15.0%	Engineering & Design	\$2,515	\$621	24.7%	\$3,136	3.6%	\$2,606	\$644	\$3,249	2018Q3	1.9%	\$2,656	\$656	\$3,312
1.0%	Reviews, ATRs, IEPs, VE	\$168	\$41	24.7%	\$209	3.6%	\$174	\$43	\$217	2018Q3	1.9%	\$177	\$44	\$221
0.5%	Life Cycle Updates (cost, schedule, risks)	\$84	\$21	24.7%	\$105	3.6%	\$87	\$21	\$109	2018Q3	1.9%	\$89	\$22	\$111
1.0%	Contracting & Reprographics	\$168	\$41	24.7%	\$209	3.6%	\$174	\$43	\$217	2018Q3	1.9%	\$177	\$44	\$221
2.0%	Engineering During Construction	\$335	\$83	24.7%	\$418	3.6%	\$347	\$86	\$433	2021Q1	12.2%	\$389	\$96	\$485
2.0%	Planning During Construction	\$335	\$83	24.7%	\$418	3.6%	\$347	\$86	\$433	2021Q1	12.2%	\$389	\$96	\$485
0.0%	Project Operations	\$0	\$0	24.7%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	\$1,341	\$202	15.0%	\$1,543	3.6%	\$1,389	\$209	\$1,598	2021Q1	12.2%	\$1,558	\$234	\$1,793
0.0%	Project Operation:	\$0	\$0	15.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
2.5%	Project Management	\$419	\$63	15.0%	\$482	3.6%	\$434	\$65	\$499	2021Q1	12.2%	\$487	\$73	\$560
CONTRACT COST TOTALS:		\$23,360	\$7,317		\$30,677		\$23,896	\$7,475	\$31,371			\$25,344	\$7,917	\$33,261

Rahway Tidal
Rahway River Basin, New Jersey

**** CONTRACT COST SUMMARY ****

PROJECT: Rahway (Tidal) - Alternative 4a (Segment D Levee and 10-Year Nonstructural w/o Ringwalls)
LOCATION: Rahway, NJ
This Estimate reflects the scope and schedule in report; 0

DISTRICT: New York District
POC: CHIEF, COST ENGINEERING, Mukesh Kumar
PREPARED: 5/15/2017

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 1-Oct-16 Effective Price Level: 1-Oct-16				Program Year (Budget EC): 2018 Effective Price Level Date: 1 OCT 17				FULLY FUNDED PROJECT ESTIMATE				
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	Mid-Point Date P	INFLATED (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
Segment D - Alt 1 Levee - Structural														
06	FISH & WILDLIFE FACILITIES	\$1,600	\$279	17.5%	\$1,880	1.8%	\$1,630	\$285	\$1,914	2021Q1	6.0%	\$1,728	\$302	\$2,030
11	LEVEES & FLOODWALLS	\$7,936	\$2,174	27.4%	\$10,110	1.8%	\$8,083	\$2,214	\$10,297	2021Q1	6.0%	\$8,571	\$2,347	\$10,919
18	CULTURAL RESOURCE PRESERVATION	\$700	\$94	13.4%	\$794	1.8%	\$713	\$95	\$808	2021Q1	6.0%	\$756	\$101	\$857
19	BUILDINGS, GROUNDS & UTILITIES	\$0	\$0	36.6%	\$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	0.0%	\$0	\$0	\$0
	#N/A	\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
		\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
CONSTRUCTION ESTIMATE TOTALS:		\$10,236	\$2,547	24.9%	\$12,783		\$10,426	\$2,594	\$13,019			\$11,055	\$2,750	\$13,806
01	LANDS AND DAMAGES	\$560	\$45	8.0%	\$605	1.8%	\$571	\$45	\$616	2021Q1	6.0%	\$605	\$48	\$653
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	\$256	\$63	24.7%	\$319	3.6%	\$265	\$66	\$331	2018Q3	1.9%	\$270	\$67	\$337
1.0%	Planning & Environmental Compliance	\$102	\$25	24.7%	\$127	3.6%	\$106	\$26	\$132	2018Q3	1.9%	\$108	\$27	\$134
15.0%	Engineering & Design	\$1,535	\$379	24.7%	\$1,914	3.6%	\$1,590	\$393	\$1,983	2018Q3	1.9%	\$1,621	\$400	\$2,022
1.0%	Reviews, ATRs, IEPs, VE	\$102	\$25	24.7%	\$127	3.6%	\$106	\$26	\$132	2018Q3	1.9%	\$108	\$27	\$134
0.5%	Life Cycle Updates (cost, schedule, risks)	\$51	\$13	24.7%	\$64	3.6%	\$53	\$13	\$66	2018Q3	1.9%	\$54	\$13	\$67
1.0%	Contracting & Reprographics	\$102	\$25	24.7%	\$127	3.6%	\$106	\$26	\$132	2018Q3	1.9%	\$108	\$27	\$134
2.0%	Engineering During Construction	\$205	\$51	24.7%	\$256	3.6%	\$212	\$52	\$265	2021Q1	12.2%	\$238	\$59	\$297
2.0%	Planning During Construction	\$205	\$51	24.7%	\$256	3.6%	\$212	\$52	\$265	2021Q1	12.2%	\$238	\$59	\$297
0.0%	Project Operations	\$0	\$0	24.7%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	\$819	\$123	15.0%	\$942	3.6%	\$849	\$128	\$976	2021Q1	12.2%	\$952	\$143	\$1,095
0.0%	Project Operation:	\$0	\$0	15.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
2.5%	Project Management	\$256	\$38	15.0%	\$294	3.6%	\$265	\$40	\$305	2021Q1	12.2%	\$297	\$45	\$342
CONTRACT COST TOTALS:		\$14,430	\$3,385		\$17,815		\$14,760	\$3,461	\$18,222			\$15,655	\$3,664	\$19,319

Figure C2 – Construction Schedule for Alternative 4a

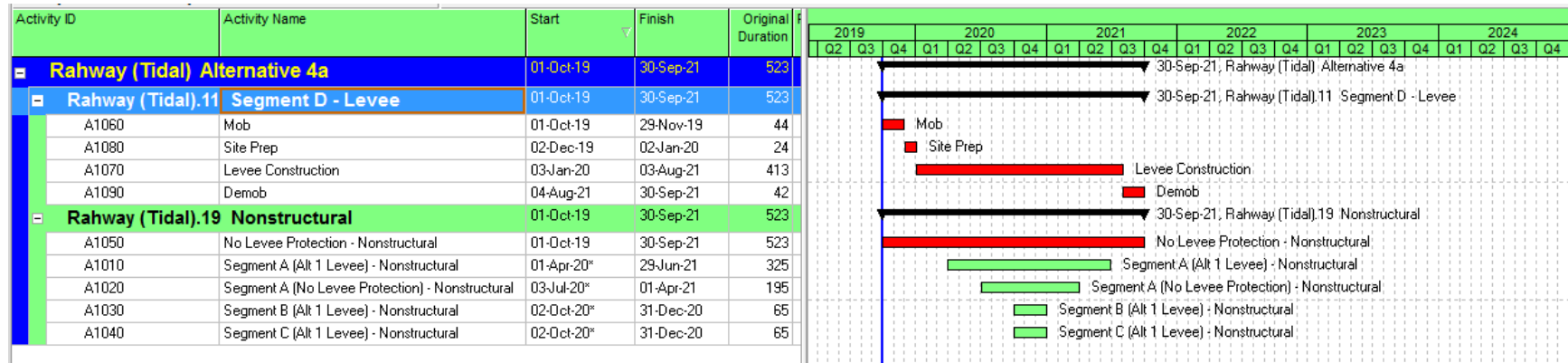


Figure C3 – Abbreviated Risk Analysis- Alternative 4a

Abbreviated Risk Analysis

Project (less than \$40M): **Rahway River (Tidal) Basin Storm Risk Mangament**
Project Development Stage/Alternative: **Feasibility (Alternatives)**
Risk Category: **Moderate Risk: Typical Project Construction Type**

Alternative: 4a (Segment D Levee & 10-yr Nonstructural)

Meeting Date: 9/27/2016

Total Estimated Construction Contract Cost = **\$ 36,119,004**

CWWBS	Feature of Work	Estimated Cost	% Contingency	\$ Contingency	Total
01 LANDS AND DAMAGES	Real Estate	\$ 1,849,549	16.4%	\$ 302,437	\$ 2,151,986
1 06 FISH AND WILDLIFE FACILITIES	Mitigation	\$ 1,600,043	17.5%	\$ 279,465	\$ 1,879,508
2 18 CULTURAL RESOURCE PRESERVATION	Cultural Resource Preservation	\$ 2,876,000	13.4%	\$ 384,865	\$ 3,260,865
3 19 BUILDINGS, GROUNDS, AND UTILITIES	Nonstructural Measures (10-yr)	\$ 23,706,508	36.6%	\$ 8,684,129	\$ 32,390,637
4 11 LEVEES AND FLOODWALLS	Segment D Levee	\$ 7,936,453	27.4%	\$ 2,173,570	\$ 10,110,023
5		\$ -	0.0%	\$ -	\$ -
6		\$ -	0.0%	\$ -	\$ -
7		\$ -	0.0%	\$ -	\$ -
8		\$ -	0.0%	\$ -	\$ -
9			0.0%	\$ -	\$ -
10		\$ -	0.0%	\$ -	\$ -
11		\$ -	0.0%	\$ -	\$ -
12 All Other	Remaining Construction Items	\$ -	0.0%	\$ -	\$ -
13 30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$ 9,031,000	24.7%	\$ 2,230,837	\$ 11,261,837
14 31 CONSTRUCTION MANAGEMENT	Construction Management	\$ 3,792,000	15.0%	\$ 569,995	\$ 4,361,995
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)				

Totals								
	Real Estate*	\$	1,849,549	16%	\$	302,437	\$	2,151,986.20
	Total Construction Estimate	\$	36,119,004	32%	\$	11,522,030	\$	47,641,034
	Total Planning, Engineering & Design	\$	9,031,000	25%	\$	2,230,837	\$	11,261,837
	Total Construction Management	\$	3,792,000	15%	\$	569,995	\$	4,361,995
	Total Excluding Real Estate	\$	48,942,004	29%	\$	14,322,862	\$	63,264,866
*Includes a 20% contingency provided by Real Estate								
Confidence Level Range Estimate (\$000's)				Base		50%		80%
				\$48,942k		\$57,536k		\$63,265k

* 50% based on base is at 5% CL

Rahway River (Tidal) Basin Storm Risk Management 4a (Segment D Levee & 10-yr Nonstructural)

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 27-Sep-16

	Risk Level				
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
	Negligible	Marginal	Moderate	Significant	Critical

Risk Register

Use/View	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 75%
Yes	PS-1	Mitigation	Scope provided by Environmental	Standard mitigation scope based on design quantities for acreage disturbed. If design quantities change then mitigation scope would also.	Marginal	Possible	1
Yes	PS-2	Cultural Resource Preservation	Assumptions made on scope due to unknowns until archaeological investigation can be completed. High level scope assumptions	Risk exists that could drive scope up.	Marginal	Possible	1
Yes	PS-3	Nonstructural Measures (10-yr)	Rough initial scope.	Measures are standard nonstructural but scope could change (significantly) as design is further developed.	Moderate	Likely	3
Yes	PS-4	Segment D Levee	Further design investigation and optimization could increase levee length and/or size.	possible risk but would not expect length to increase by too much	Marginal	Possible	1
Yes	PS-5	0			Negligible	Unlikely	0
Yes	PS-6	0			Negligible	Unlikely	0
Yes	PS-7	0			Negligible	Unlikely	0
Yes	PS-8	0			Negligible	Unlikely	0
Yes	PS-9	0			Negligible	Unlikely	0
Yes	PS-10	0			Negligible	Unlikely	0
Yes	PS-11	0			Negligible	Unlikely	0
Yes	PS-12	Remaining Construction Items			Negligible	Unlikely	0
Yes	PS-13	Planning, Engineering, & Design	Design evolution could change scope.	Design cost is calculated by percentage of construction cost estimate and may change as design is developed.	Marginal	Possible	1
Yes	PS-14	Construction Management	Design evolution could change scope.	Construction management cost is calculated by percentage of construction cost estimate and may change as design is developed.	Marginal	Possible	1

Rahway Tidal
Rahway River Basin, New Jersey

	Acquisition Strategy				Maximum Project Growth		30%
Yes	AS-1	Mitigation	No firm contracting plan established. Subcontracting restrictions may impact cost.	Full & open expected with sufficient competition.	Marginal	Possible	1
Yes	AS-2	Cultural Resource Preservation	No firm contracting plan established. Subcontracting restrictions may impact cost.	Full & open expected with sufficient competition.	Marginal	Possible	1
Yes	AS-3	Nonstructural Measures (10-yr)	No firm contracting plan established. Subcontracting restrictions may impact cost.	Full & open expected with sufficient competition. If 8A or small business required could cause moderate increase.	Moderate	Possible	2
Yes	AS-4	Segment D Levee	No firm contracting plan established. Subcontracting restrictions may impact cost.	Full & open expected with sufficient competition.	Marginal	Possible	1
Yes	AS-5	0			Negligible	Unlikely	0
Yes	AS-6	0			Negligible	Unlikely	0
Yes	AS-7	0			Negligible	Unlikely	0
Yes	AS-8	0			Negligible	Unlikely	0
Yes	AS-9	0			Negligible	Unlikely	0
Yes	AS-10	0			Negligible	Unlikely	0
Yes	AS-11	0			Negligible	Unlikely	0
Yes	AS-12	Remaining Construction Items			Negligible	Unlikely	0
Yes	AS-13	Planning, Engineering, & Design	Potential of having to AE out some/all of design.	Significant design costs could be realized.	Significant	Possible	3
Yes	AS-14	Construction Management	None identified.	N/A.	Negligible	Unlikely	0

Rahway Tidal
Rahway River Basin, New Jersey

	Construction Elements				Maximum Project Growth		25%
Yes	CON-1	Mitigation	Standard wetland mitigation activities.	No significant concerns.	Negligible	Unlikely	0
Yes	CE-2	Cultural Resource Preservation	None identified.	N/A	Negligible	Unlikely	0
Yes	CE-3	Nonstructural Measures (10-yr)	Standard nonstructural construction activities. But dealing with some old structures in poor condition.	Claims or mods are possible	Marginal	Possible	1
Yes	CE-4	Segment D Levee	Excavated material is assumed already unusable. Landside access to levee footprint may not always be possible.	Riverside work might have to be performed in portions.	Marginal	Likely	2
Yes	CE-5	0			Negligible	Unlikely	0
Yes	CE-6	0			Negligible	Unlikely	0
Yes	CE-7	0			Negligible	Unlikely	0
Yes	CE-8	0			Negligible	Unlikely	0
Yes	CE-9	0			Negligible	Unlikely	0
Yes	CE-10	0			Negligible	Unlikely	0
Yes	CE-11	0			Negligible	Unlikely	0
Yes	CE-12	Remaining Construction Items			Negligible	Unlikely	0
Yes	CE-13	Planning, Engineering, & Design	Mods or claims could impact this element	Moderate risk as is a feasibility estimate	Moderate	Possible	2
Yes	CE-14	Construction Management	Mods or claims could impact this element	Moderate risk as is a feasibility estimate	Moderate	Possible	2

Rahway Tidal
Rahway River Basin, New Jersey

	Specialty Construction or Fabrication				Maximum Project Growth		65%
Yes	SC-1	Mitigation	None.	N/A.	Negligible	Unlikely	0
Yes	SC-2	Cultural Resource Preservation	None identified.	N/A.	Negligible	Unlikely	0
Yes	SC-3	Nonstructural Measures (10-yr)	Standard building construction.	N/A.	Negligible	Unlikely	0
Yes	SC-4	Segment D Levee	Typical levee construction.	No Specialty Fabrication or Equipment is anticipated.	Negligible	Unlikely	0
Yes	SC-5	0			Negligible	Unlikely	0
Yes	SC-6	0			Negligible	Unlikely	0
Yes	SC-7	0			Negligible	Unlikely	0
Yes	SC-8	0			Negligible	Unlikely	0
Yes	SC-9	0			Negligible	Unlikely	0
Yes	SC-10	0			Negligible	Unlikely	0
Yes	SC-11	0			Negligible	Unlikely	0
Yes	SC-12	Remaining Construction Items			Negligible	Unlikely	0
Yes	SC-13	Planning, Engineering, & Design	None identified.	N/A.	Negligible	Unlikely	0
Yes	SC-14	Construction Management	None identified.	N/A.	Negligible	Unlikely	0

Rahway Tidal
Rahway River Basin, New Jersey

	Technical Design & Quantities				Maximum Project Growth		30%
Yes	T-1	Mitigation	Scope/design provided by Environmental. Standard mitigation activities	Standard mitigation scope based on design quantities for acreage disturbed. If design quantities change then mitigation scope would also	Marginal	Possible	1
Yes	T-2	Cultural Resource Preservation	None identified.	N/A.	Negligible	Unlikely	0
Yes	T-3	Nonstructural Measures (10-yr)	Further investigation(s) may increase structures requiring protection	Increased # of structures increases the quantities and a possible increase in risk.	Marginal	Possible	1
Yes	T-4	Segment D Levee	Level of design at this stage based on limited information. Greenbrook project used as design template	Some variations (+/-) may change height of levees due to optimization.	Marginal	Likely	2
Yes	T-5	0			Negligible	Unlikely	0
Yes	T-6	0			Negligible	Unlikely	0
Yes	T-7	0			Negligible	Unlikely	0
Yes	T-8	0			Negligible	Unlikely	0
Yes	T-9	0			Negligible	Unlikely	0
Yes	T-10	0			Negligible	Unlikely	0
Yes	T-11	0			Negligible	Unlikely	0
Yes	T-12	Remaining Construction Items			Negligible	Unlikely	0
Yes	T-13	Planning, Engineering, & Design	If selected as preferred alternative then design/qty could change as design evolves.	Risk exists that could drive increase engineering effort.	Marginal	Possible	1
Yes	T-14	Construction Management	None identified.	N/A.	Negligible	Unlikely	0

Rahway Tidal
Rahway River Basin, New Jersey

	Cost Estimate Assumptions				Maximum Project Growth		35%
Yes	EST-1	Mitigation	Environmental provided costs.	Change in qty and pricing possible.	Moderate	Possible	2
Yes	EST-2	Cultural Resource Preservation	Assumptions made on scope due to unknowns until archaeological investigation can be completed. High level scope assumptions	Risk exists that could drive scope up.	Marginal	Possible	1
Yes	EST-3	Nonstructural Measures (10-yr)	Based on previously developed nonstructural measures and also newly developed items.	Higher use of costbook items could increase risk in cost accuracy.	Moderate	Possible	2
Yes	EST-4	Segment D Levee	Cost for disposal of contaminated material (uncontaminated is assumed).	Presence of oil refineries & chemical plants may have HTRW or contaminants present in excavation material.	Marginal	Likely	2
Yes	EST-5	0			Negligible	Unlikely	0
Yes	EST-6	0			Negligible	Unlikely	0
Yes	EST-7	0			Negligible	Unlikely	0
Yes	EST-8	0			Negligible	Unlikely	0
Yes	EST-9	0			Negligible	Unlikely	0
Yes	EST-10	0			Negligible	Unlikely	0
Yes	EST-11	0			Negligible	Unlikely	0
Yes	EST-12	Remaining Construction Items			Negligible	Unlikely	0
Yes	EST-13	Planning, Engineering, & Design	Based on a %	PED cost is based on percentage of construction cost estimate and may not be reliable but will be comparable to past similar projects.	Marginal	Possible	1
Yes	EST-14	Construction Management	Based on a %	Construction Management cost is based on percentage of construction cost estimate and may not be reliable but will be comparable to past similar projects.	Marginal	Possible	1

Rahway Tidal
Rahway River Basin, New Jersey

	External Project Risks				Maximum Project Growth		40%
Yes	EX-1	Mitigation	None identified.	N/A.	Negligible	Unlikely	0
Yes	EX-2	Cultural Resource Preservation	None identified.	N/A.	Negligible	Unlikely	0
Yes	EX-3	Nonstructural Measures (10-yr)	Owner reluctance or opting out could drive changes up or down.	Increased risk due to owners insisting on higher protection could drive up costs.	Moderate	Possible	2
Yes	EX-4	Segment D Levee	May intrude on existing real estate structures, roads, parks, etc. Unknown if project can be done as designed.	Further investigation required to insure that real estate conflicts do not exist.	Moderate	Possible	2
Yes	EX-5	0			Negligible	Unlikely	0
Yes	EX-6	0			Negligible	Unlikely	0
Yes	EX-7	0			Negligible	Unlikely	0
Yes	EX-8	0			Negligible	Unlikely	0
Yes	EX-9	0			Negligible	Unlikely	0
Yes	EX-10	0			Negligible	Unlikely	0
Yes	EX-11	0			Negligible	Unlikely	0
Yes	EX-12	Remaining Construction Items			Negligible	Unlikely	0
Yes	EX-13	Planning, Engineering, & Design	None identified.	N/A.	Negligible	Unlikely	0
Yes	EX-14	Construction Management	None identified.	N/A.	Negligible	Unlikely	0

MII

Print Date Mon 15 May 2017
Eff. Date 5/13/2017

U.S. Army Corps of Engineers
Project : Rahway River (Tidal) SRM Feasability Study - Alternative 4a - REV 2
Standard USACE Report Sections

Time 15:17:27

Project Cost Summary Report Page 1

	Description	Quantity	UOM	ProjectCost
Summary				36,119,004
Alternative 4a		1.00	LS	36,119,004
06 Fish & Wildlife		1.00	LS	1,600,043
11 Levees and Floodwalls		1.00	LS	7,936,453
18 Cultural Resource Preservation		1.00	LS	2,876,000
19 Buildings, Grounds, & Utilities		1.00	LS	23,706,508

Labor ID: NLS2012 EQ ID: EP14R01

Currency in US dollars

TRACES MII Version 4.3

DQC Comments

Rahway Tidal
DQC Comments
Cynthia Zhang
April 14, 2017

TABLE OF CONTENT: It appears some of the page numbers does not coincide with their respective page (example: Alternative 4a contingency factors & estimated alternative 4a annual charges). Please revisit and revise.

Concur – revised.

TABLE OF CONTENT: Recommend adding “Contingencies” to the Table of Content.

Concur – added.

FORMAT: Recommend changing the front of the “Cost Engineering” title on page C-1 to coincide with the front on the cost appendix. Also increase the size and bold it.

Concur – changed.

COST: It appears the cost shown under Table C1 and Figure C1 does not match with the cost show in the MII. Please revisit and revise.

Partial Concur:

When costs were entered into the TPCS the values were manually rounded in the contract sheets – this created the major differences (due to compounding rounding) between MII and the cost appendix. Costs have been re-entered without rounding.

Table C1 - MII cost is the estimated cost with a price level of 1 Oct 2016. Hence the MII cost will not match the First Cost (price level 1 Oct 17) shown in Table C1.

Figure C1- the TPCS ‘estimated cost’ does now match MII.

CONTINGENCIES: It appears the contingencies are not consistent in rounding and/or match with the input tab of the ARA except for the 11 account. (Example: 06 Account in the ARA input tab shows 17.5% and the 06 Account used in the First Cost Table and the TPCS shows 17%). Please revisit and revise. Please also consider Table C2.

Concur – contingencies have been corrected and are now consistent between relevant tables.

ANNUALIZED COST: Recommend deleting the note on sunk cost under Note a since this project does not carry a sunk cost.

Concur – deleted.

ARA INPUT TAB: Please revisit the estimated cost under the ARA input tab. Recommend the numbers under the estimated cost column to match with the numbers in MII.

Concur – ARA estimated costs now match MII.

REAL ESTATE COST: The real estate cost in the First Cost Table, TPCS, ARA Input tab does not match with the real estate cost show in the MII. Please revisit and use the correct real estate number.

Concur – MII real estate costs (although now deleted from MII based on the below comment) now match throughout the relevant tables & figures.

MI: The MI should only have the construction cost. Recommend deleting the 01 Lands and Damages folder in the MI.

Concur – 01 Lands & Damages has been omitted in the MI estimate.

WATERMARK: Please delete the watermark – “DRAFT” in the next submission.

Concur – deleted watermark.

DQC
REVIEW COMMENTS

Project Name: Rahway River Basin (Tidal) Coastal Storm Risk
Management

Date: 4/27/2017

Location: Rahway River, Middlesex and Union Counties,
NJ

Organization: Cost Engineering

Document Name: Feasibility Study, TPCS & Cost Appendix

Reviewer Andrew Jordan

:

No.	Ref. Page / Para.	COMMENTS	RESPONSE
1.	MII Estimate	Mark-ups: Productivity is maxed at 100%, recommend providing calculations for reduced productivity at several of the WBS items, such as one for levee work and a separate for non-structural building raising. Work along water bodies as well as in city environments, cause delays and slower productivities. Productivity should be reduced, and assigned as a reducing markup to folders in the WBS, with differing amounts depending on scope.	Non-concur: During the risk analysis it was determined that this is typical levee construction. Risk analysis item CE-4 addresses this comment in the risk analysis rather than in a productivity adjustment as based on past NAN experience.
2.	MII Estimate	Contractor Assignments: Tiering of work assignments to a 2 subcontractor, three tier approach, a prime with a sub, and a sub of the sub, due to the level of effort of the work and variance in work type, as well as the magnitude of the project.	Non-concur: 2 tier contractor approach is appropriate for this work based on NAN experience. A 3 tier approach is not necessary.
3.	MII Estimate	Sales tax at 7.00% as project level mark-up, is this necessary, justify and explain. Sales tax is typically excluded for federal projects.	Concur: Sales tax is applicable. Based on historical data & experience from NAN most sub-contractors do charge sales tax. Primes may or may not.
4.	MII Estimate	Prime Contractor Mark-Ups: HOOH at 3.90, would recommend increasing to 6%. Typical is seen from 6-8% depending on work type, but with this estimate being at feasibility level, and acquisition and detail design are unknown, would recommend carrying a higher percentage. Agree with other markups and PT&I, although sub-contractor PT&I may want to carry higher for same reasons as above.	Non-concur: Markups are based on typical historical NAN projects and are appropriate.

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:

No.	Ref. Page / Para.	COMMENTS	RESPONSE
5.	MII Estimate	Update Equipment factors.	Concur. Factors have been updated.
6.	MII Estimate	Cost data used for equipment and labor are good.	Concur.
7.	MII Estimate	Cost book used is 2012, why not update to 2015, does the estimate carry cost data escalation to get the cost data to current data as TPCS escalation is only for present time to future.	Concur. Yes, escalation is included to bring up to current price level. Future submittals will use the 2015 (or current) Cost Book.
8.	MII Estimate	Herbicide application should be assumed to occur more than once, under Permanent Tidal Wetlands Impact WBS folder. Why assume only 60% of area, reasoning should be documented.	Concur: Design recommendation & quantities provided to CEB include 2 herbicide applications & the 60% area. Source documented in MII.
9.	MII Estimate	Need to add a line item with excavation and hauling, recommend including an excavator to load trucks for hauling. This task is not included in excavation and requires an additional machine.	Concur: Excavator & operator will be added to the folder for Disposal of Common Excavation

REVIEW COMMENTS

Project Name: Rahway River Basin (Tidal) Coastal Storm Risk
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:

No.	Ref. Page / Para.	COMMENTS	RESPONSE
10.	MII Estimate	Excavating line items only include dozer equipment, recommend adding an excavator, as it will take both machines to cut earth while on slopes and in the wet. Productivity is too high for a dozer along the river.	Non-concur: Please clarify location in estimate this comment is for. The project item "Excav. Inspection Trench and Drainage Ditch" at location: Levees and Floodwalls --> Segment D- Alt 1 Levee --> Levees - Segment D --> Sitework --> Excavation, Common does include an excavator.
11.	MII Estimate	Hauling line items for disposal of excavated soil include a distance of 24 miles, has a location been confirmed with actual distance of where material can be disposed? Mileage and therefor cost may need to be increased. Include as notes in the line item.	Concur: The required disposal site for Union County is in Elizabeth, NJ and is 10 miles from the project site. Has been noted in the estimate.
12.	MII Estimate	Loaming and topsoil line items have a material cost of \$28, which would assume to be only material cost, and not include import or hauling cost. Recommend calling a pit or vendor for actual pricing since CY is high. Record actual in line item notes.	Concur: Direct cost of \$28 per CY (includes hauling) is not out of line with recent bid pricing from Greenbrook B-4 from July 2016 for \$30.40 per CY (in place) contract cost. Quotes will be obtained after optimization.
13.	MII Estimate	Productivity seems very high on seeding.	Non-concur: Area to be seeded is a little over 4 acres. Duration of this item is a month long. Does not seem high.

REVIEW COMMENTS

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:

No.	Ref. Page / Para.	COMMENTS	RESPONSE
14.	MII Estimate	Goose netting line item should include double or triple quantity as these usually don't last long and have to be replaced by contractors multiple times throughout project duration. Project duration should be noted, and \$25k is a high number to carry as LS. Another recommendation would be to include an additional line item for maintenance of the netting, which would probably need to occur once a week for one labor, several hours, per location. Depending on the size of these areas; size should also be noted in the estimate.	Concur: Design recommendation, quantities, & pricing were provided to CEB. Comment is noted and will be addressed after optimization. Pricing source & cost verified by CEB.
15.	MII Estimate	Vegetation plugs and planting seem high on productivity. If only plugs this is okay, however, is the design team certain there are no other larger plantings to be installed, as typically for this type of work.	Concur: Plugs only as indicated in quantities provided to CEB.
16.	MII Estimate	Productivity of silt fence and hay bales is very high, recommend carrying half of this productivity.	Concur.
17.	MII Estimate	Is it confirmed that only one access road is needed? The plot plans depict an area that would probably require multiple access points. Would recommend carrying cost for more than one as well as cost for maintenance based on duration of project. Typically these won't last past 6 months.	Concur. Will adjust for additional access roads in case they become necessary.
18.	MII Estimate	Under WBS 'Levees – Segment D, Site Work, Excavation...' Remove unused line items/zero quantity.	Concur.

REVIEW COMMENTS

Project Name: Rahway River Basin (Tidal) Coastal Storm Risk Management

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Reviewer: Andrew Jordan

:

No.	Ref. Page / Para.	COMMENTS	RESPONSE
19.	MII Estimate	Under WBS 'Levees – Segment D, Site Work, Disposal...' Same as earlier comment, need to include additional line item of equipment and cost for loading spoils into truck for hauling and disposal.	Concur: Excavator & operator will be added to the folder for Disposal of Common Excavation
20.	MII Estimate	Under WBS 'Levees – Segment D, Site Work, Embank...' Proof-rolling subgrade productivity at 1000 SY per hour seems excessive. CAT equip handbook recommends a productivity of a 1/10 of this. Rolling is slow moving, and the work area is assumed to be difficult terrain, sloped, wet, etc. The secondary line for compaction, why is it for 18,000 CY opposed to the 24,000 CY import? Also, productivity also seems extremely high for this item as well. Backfilling and then compacting a shaped earth structure like a levee is different than backfilling a trench, and would probably be in the realm of 40 to 60 CY per hour placed and compacted per a team of 1 lrg excavator, roller, 2 operators, 1 foreman, 1 laborer.	Concur: 1. Proof-rolling productivity reduced to 100 SY/hr. 2. Compaction qty changed to match import qty. and productivity cut in half. 3. Backfilling CSI task created based on recommended labor/equipment spread & productivity.
21.	MII Estimate	Under WBS 'Levees – Segment D, Site Work, Impervious Clay Core..' Same as above, crew combination and productivity appears high, an excavator should be used 9loadre trouble with shaping and maneuverability in the wet, and likely 60 Cy will be placed per hour, opposed to 300 CY.	Concur: Backfilling CSI task created based on recommended labor/equipment spread & productivity.

REVIEW COMMENTS

Project Name: Rahway River Basin (Tidal) Coastal Storm Risk
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Reviewer Andrew Jordan
:

No.	Ref. Page / Para.	COMMENTS	RESPONSE
22.	MII Estimate	Estimate includes cost of new pavement and other site features in the Levee- Segment D WBS and other folders. Are any existing pavements or site features needing to be removed or demolished other than the clear and grub line item?	Concur: No other items provided or identified by Design at this time.
23.	MII Estimate	Under WBS 'Drainage Structures' recommend noting quantity calculations in estimate as well as repaving these. Excavation for catch basins and manholes with piping is more than 11 CY. Trenching for RCP piping can be very slow depending on depth. Depths of structures and piping should be noted in the estimate, with realistic assumptions if unknown.	Non-concur: Qtys provided to CEB under separate sheet. Calculations found in Qty spreadsheet. Note that this work is performed during/with levee construction. Structures are through the levee but above the existing grade overall. Example cross section in Alt 1 Quantities spreadsheet.
24.	MII Estimate	Under WBS 'Drainage Structures' will this work be performed in the dry or wet? How was this assumed? Would recommend carrying line items and cost for diversion, local sediment control, cofferdams, and even pumping. This additional cost is extensive and high, but many structures such as sluice gates will be in the wet.	Non-concur: Work is performed during/with levee construction. Structures are through the levee but above the existing grade overall. Example cross section in Alt 1 Quantities spreadsheet.

REVIEW COMMENTS

Project Name: Rahway River Basin (Tidal) Coastal Storm Risk
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Reviewer Andrew Jordan
:

No.	Ref. Page / Para.	COMMENTS	RESPONSE
25.	MII Estimate	Under WBS 'Drainage Structures', many of the line items have low total cost or low quantity. Recommend maxing out some of these based on minimal cost principle; for example, concrete work for 3 to 5 yards, won't cost \$100 to \$300, will be closer to \$1000. Same for backfill and other small items in this drainage structures series.	Concur: When all the structures are taken into consideration this may not be as big of a cost impact as thought. Minor underages covered by contingencies for this first cost. Comment is noted and will be addressed after optimization.
26.	MII Estimate	Under WBS 'Cultural Resource Pres...' since these are LS costs, recommend stating in the notes what the actual work entails, and the history of what the pricing is based on. Understood that the source is noted in the properties tabs under general notes, but the line items should be substantiated further since this is a LS cost of \$4.6M. This much on LS carries a lot of risk and uncertainty, the work involved, assumptions, and accuracy of the data source should at least be noted in detail.	Concur: Comment noted. However this additional information has not been provided to Cost Engineering. Cultural resource details are addressed in the cultural resource section of the report and are owned by them.
27.	MII Estimate	Under WBS 'Buildings, Grounds, & Utilities' a lot of great detail and sub line items, cost look reasonable, however; recommend going through the line items and applying the minimum cost principle to small items, such as seeding priced at \$20 total, which will cost more just based on productivity of having to complete a small task. The productivities should match the small quantity, to capture labor cost and effort of 1 or 2 hours for these small items.	Concur: In agreement with principle but when all the structures are taken into consideration this may not be as big of a cost impact as thought. Comment is noted and will be addressed after optimization.

REVIEW COMMENTS

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Reviewer Andrew Jordan
:

No.	Ref. Page / Para.	COMMENTS	RESPONSE
28.	MII Estimate	Under WBS 'Buildings, Grounds, & Utilities' recommend including tipping or disposal fee for demolition items. Some have hauling, some do not. Some will also need loading cost for hauling. Also need to include cost for foundation removal and disposal for the building removal items.	Concur: For demolish & rebuild items the following was added: tipping fee for all debris, demo/haul for foundation. All nonstructural treatments (except for demolish & rebuild items) already include a 20 CY/5 ton dumpster with weekly dumping to handle the demolition debris.
29.	MII Estimate	Please confirm that all ringwall construction, as omitted from the estimate, has been removed from the project scope completely.	Concur: Ringwalls are not part of the TSP scope.
30.	MII Estimate	Under WBS 'Buildings, Grounds, & Utilities' recommend including cost for foundations and site work for new building construction. Price for new buildings at \$111 per SF seems low. Recommend verifying this LS price source, as typically it's in the \$200 to \$300 per SF range for just the structure without foundation, exterior utilities, and other site work.	Non-concur: For this alternative estimate level SF pricing from 2015 RSMeans was utilized and has been re-verified. It includes standard foundation with strip & spread footings and a slab on grade. The \$111 is a direct cost which comes out to a \$192/sf project cost. What type of cost is the stated \$200-\$300 sf?

REVIEW COMMENTS

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Reviewer Andrew Jordan

:

No.	Ref. Page / Para.	COMMENTS	RESPONSE
31.	MII Estimate	Under WBS 'Buildings, Grounds, & Utilities' recommend including cost for jacking structures, this is a labor intensive effort, slow work, and is usually high in total cost. This needs to be applied to all building raising. This may exist in the estimate, but could not locate. Please verify.	Concur: All raised structures include item "Timber shoring, existing building, on cribbing with timber, per box and jack, 35 ton screw jacks" for jacking.
32.	MII Estimate	Under WBS 'Buildings, Grounds, & Utilities' recommend adding sub folders to the building raising WBS folders since there are many line items in these folders. Further organization of work and line items will help to verify all needed work is captured. Some folders have 20+ line items, 5-8 should be targeted.	Concur: Comment is noted and will be addressed appropriately after optimization.
33.	MII Estimate	Under WBS 'Buildings, Grounds, & Utilities' recommend including cost for all building raising that includes line items for Plumber and Electrician to raise utility work, to include costs for materials to accomplish this as well. Some may need new valves, connectors, pipe extensions, etc. Show a calculation to determine average LS price and apply to each.	Concur: Raised structures already include materials for copper pipe, pump, and electrical materials.
34.	MII Estimate	Under WBS 'Buildings, Grounds, & Utilities' recommend including cost for the 'Masonry Warehouse' line item to include demolition debris disposal costs (tipping), cost for new foundation to include higher above ground foundation, cost for site work and utilities, and further recommend reevaluating cost to build warehouse at \$111 per SF. This does not look appropriate, and again would expect this to be around \$300/SF given it will be open bay with deep steel trusses and masonry walls or cladding.	Non-concur: For sf cost used see comment #30. Concur: Added: tipping fee for all debris, demo & haul of foundation, fill for foundation raise, pavement

REVIEW COMMENTS

Project Name: Rahway River Basin (Tidal) Coastal Storm Risk
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Reviewer Andrew Jordan
:

No.	Ref. Page / Para.	COMMENTS	RESPONSE
35.	MII Estimate	Under WBS 'Buildings, Grounds, & Utilities' recommend reevaluating cost for the 'Raise Pumps' line item. Is there more than one? Note includes costs of \$50k, for plural, but quantity is 1. What is cost of \$50k based on? Is this just for pipe extension and resetting pumps, or for new material, new equipment, operation costs, and maintenance costs? A line item of possible costs \$50k to \$150k is a lot to assume without justification of notes or calculations.	Concur: Extremely limited scope provided to CEB at the alternative estimate level. TSP now has only 1 pump for just raise of existing pump with no further details provided.
36.	MII Estimate	In regards to the levee construction, the estimate only appears to carry cost for impervious clay core and structural fill. Will there be any stone or concrete armoring placed on the levee slope or other protection?	Concur: At the current design stage there is no stone or concrete armoring. Seeding only.

REVIEW COMMENTS

Project Name: Rahway River Basin (Tidal) Coastal Storm Risk
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Reviewer Andrew Jordan
:

No.	Ref. Page / Para.	COMMENTS	RESPONSE
37.	Cost Engineering Appendix	Numerous scope items have been found on the plans and in the documents to include, road raising, bridge raising, installation of ring walls, etc. Some of these items are not included in the estimate. Recommend the complete scope of work be verified for completeness. Further, recommend that a full description of the project scope of work be recorded in the cost appendix in the project background as a separate and additional paragraph or section. This listing of the scope of work should also describe the work involved for the major WBS scope items reported in the TPCS summary, such as 'Lands and Damages,' 'Fish & Wildlife Facilities,' Levees & Floodwalls,' etc. Each major task and level of effort for construction needs to be documented, to increase awareness and accuracy to facilitate the understanding of the cost appendix. Without reading the detail within the Mii file, the Cost appendix is difficult to understand in regards to work involved.	Concur: Scope deleted for this TSP will be removed from the backup. Scope for this TSP has been verified to be correct. Non-concur: The H&H appendix and other sections of the report go into the details of the scope; The cost appendix is not meant to be a standalone document and be duplicative of information found elsewhere.
38.	Site Plan	Site Plans provided in the review should also accompany the cost appendix and be referenced. Further, scope items such as ring walls, if not being included in the project current scope, should be removed from the site plans.	Non-concur: Site plan was provided for reference only. It is not a Cost Engineering product.

REVIEW COMMENTS

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:

No.	Ref. Page / Para.	COMMENTS	RESPONSE
39.	Cost Engineering Appendix/De sign Drawing	A substantial cost, \$7M+, is attributed to the Levee construction, and while calculations have been provided in a separate excel spreadsheet document, these should be summarized in the cost appendix to add understanding and validity. Further and more important, the design team should provide a cut section detail of the levee work, and this should be included in the cost appendix and referenced for the quantities and construction elements needed in the estimate such as clay core, structural fill, armoring, etc.	Non-concur: Detailed calcs & qty development are part of the detailed backup. Since this document will become public those details need to be kept protected from disclosure (ER 1110-2-1302, p. 33, item 22(b)(2)). This approach has been used with multiple projects within NAN with successful MCX certification.
40.	Cost Engineering Appendix	The basis of cost paragraph in the cost appendix should also include listing and explanation of all the assumption carried in the cost estimate and a basis or judgement for these assumptions.	Non-concur: The basis of cost in the Cost Appendix is a summary only. Assumptions are detailed in the estimate project notes and detailed backup. Since this document will become public those details need to be kept protected from disclosure (ER 1110-2-1302, p. 33, item 22(b)(2)). This approach has been used with multiple projects within NAN with successful MCX certification.

REVIEW COMMENTS

Project Name: Rahway River Basin (Tidal) Coastal Storm Risk
Management

Date: 4/27/2017

Location: Rahway River, Middlesex and Union Counties,
NJ

Organization: Cost Engineering

Document Name: Feasibility Study, TPCS & Cost Appendix

Reviewer Andrew Jordan
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No.	Ref. Page / Para.	COMMENTS	RESPONSE
41.	Cost Engineering Appendix	Contract Acquisition: is the same contract for the entire project expected? How is it expected for this to be contracted, i.e. Full & Open? Has phasing or breaking the project into pieces been considered? This will impact costs. Discussion of these points should be described in the Cost Appendix and the assumptions made for estimating stated.	Concur: At this stage of study at pre-TSP level going through alternatives analysis it is assumed that there will be one full & open contract for the levee work and one full & open contract for the nonstructural work.
42.	Cost Engineering Appendix	Duration of major WBS features to be listed in the basis of estimate narrative, opposed to be all lumped into a 24 month statement.	Concur: This is at the TSP phase where alt analysis is performed to select a plan. Comment is noted and further details will be developed once optimization has occurred. Details will be shown in backup to but not in the Cost Appendix due to the cost sensitive nature of the details.
43.	Cost Engineering Appendix	Schedule: With a \$65M project, an anticipated construction schedule would be expected to contain more than 6 line items. A true critical path and accurate timelines should be determined for this project, as this will impact construction cost budgeting and decisions for items as acquisition planning. If phasing would to occur a detailed schedule would be needed to show the timeline and impacts. Recommend the schedule WBS go into at least four sub-levels, matching the WBS of the Mii & TPCS cost estimates.	Concur: Comment noted. At this stage of development historical data indicates that project can be done in 24 months. More detail has been included in the current schedule but after optimization and additional details are known a more detailed schedule will be developed and provided as backup consistent with 3x3x3 planning.

REVIEW COMMENTS

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Reviewer Andrew Jordan
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No.	Ref. Page / Para.	COMMENTS	RESPONSE
44.	Cost Engineering Appendix	Risk Analysis: An ARA was performed, but a full risk analysis is needed for this project since total project cost exceeds \$40M. Will a new analysis be performed, or has there been an exception given?	Concur: A full CSRA is recognized needing to be performed and will be performed after optimization.
45.	Cost Engineering Appendix	Risk Register – It is recommended that the current ARA report be finalized and cleaned-up; several line items have only partial blocks completed, such as no information listed for Feature of Work column, but with information listed in the Concerns or PDT Discussions columns, complete or remove partials.	Concur.
46.	Cost Engineering Appendix	Cost Engineering Appendix, TPCS, Contract Cost Summary Report: there are six sub sheets of this in the appendix and all sheets have the same name and title. Recommend adding subtitles to each page to identify the difference in the work as many have the same WBS of 18 and 19 without any description of scope or differing level of effort.	Concur. Subtitles already exist and are found in column B.
47.	Cost Engineering Appendix	More description and source of data, assumptions, etc. should be added to the basis of cost to substantiate the reasoning for carrying the percentages used for WBS 30, Planning, Engineering & Design and WBS 31 Construction Management. There is currently only one sentence in the Cost Appendix under the Planning paragraph, which should be substantiated.	Non-concur: 30 & 31 account percentages were developed by the Technical Manager in coordination with the respective offices as shown in the breakdown in the TPCS. Details can be seen in the TPCS "Input" tab.

REVIEW COMMENTS

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No.	Ref. Page / Para.	COMMENTS	RESPONSE
48.	Cost Engineering Appendix	Within the front end of the report, recommend including discussion under the IDC or schedule discussion paragraphs, stating when the anticipated month and year for construction start, mid-point, and assumptions of schedule such as will project features of work begin at the same time, or will delays or phasing occur.	Concur: Will add to Cost Appendix.
49.	Cost Engineering Appendix	Within the TPCS Table, two escalation columns, carrying rates of 1.8 and 3.6% in one, and 6.0%, 3.6% and 12.2% in the others. Recommend adding a note to the table or in the main body of the report referencing how these escalation rates were determined, the source, and basis.	Non-concur: Rates are based on standard TPCS calculations and are from CWCCIS. Automatic calc in the TPCS.
50.	Cost Engineering Appendix	Within the Risk Register, item T-3 Nonstructural Measures (10-yr), recommend increasing the impact column from marginal to moderate, as these items can have very large cost impacts with the change of scope or quantities for this type of work. This type of work accounts for the largest portion of work in the estimate as well.	Non-concur: This was discussed during the ARA and it was determined that there only a marginal chance of increase in the number of structures. Even if a few structures are added it will not be a drastic increase in cost. Since the ARA was held the number of structures has actually decreased.

REVIEW COMMENTS

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51.	Cost Engineering Appendix	Within the Risk Register, item EST-4 Segment D Levee, recommend increasing the impact column from marginal to moderate, as this disposal of HTRW or contaminated soils can be very expensive and the cost increases depending on type and level of contamination.	Non-concur: This risk was a direct input from Environmental. Although there is always a possibility of contamination their experience & knowledge of site they indicated marginal risk. After discussion with Environmental they stand by the original determination.
52.			
53.			