APPENDIX G - COST APPENDIX

LIST OF TABLES

APPENDIX G - COST APPENDIX

INITIAL PROJECT CHARGES

1. General: This section presents detailed cost estimates for construction resulting in total project costs for flood damage reduction plans for the subject project. The NED plan and its associated flood risk management structures will consist of stormwater runoff detention facilities. The facilities consist of an upstream earthen embankment, an overflow spillway, downstream gabion walls and an engineered outlet structure that controls the flow through each embankment.

The typical structure section consists of an upstream earthen embankment having a slope of three horizontal to one vertical, a 15 foot top width, and a terraced gabion basket wall along the downstream face. An impervious key trench will be located within the embankment. The preliminary key trench dimensions consists of a six foot deep key with side slopes of one horizontal to two vertical. The key will have a width of five feet at the base, and an eleven foot width at its widest point. The depth of the key trench was assumed to be six feet; however, the actual depth will vary from site to site and will be based on depths to rock or depths to suitable sub-base material.

The earthen/gabion embankment is designed to be overtopped. For each site, the crest is proposed at a consistent elevation to allow the entire length of embankment to act as a spillway to maximize storage capacity within the area behind the embankment while keeping water velocities over the structure as low as possible.

2. Basis of Cost: Cost estimates presented herein for the NED plan are based on May 2015 price levels. The unit prices were developed in accordance with the construction procedures outlined herein. All construction costs presented in this appendix are NED costs.

3. Alternatives Considered: Preliminary costs used to screen alternative plans were prepared using 2015 price levels. Individual costs for each basin were added together for the following alternatives:

Alternative 1: No Action Plan
Alternative 2: The Upper Tookany Plan (D1 & D28)
Alternative 3: The Baederwood Creek Plan (D9 & D12)
Alternative 4: The Comprehensive Plan (D27 & D30)
Alternative 5: The Rock Creek Plan (D15)

1. D1 – 5 detention basins on the Upper Tookany
2. D9 – 3 detention basins on Baederwood Creek
3. D12 – 1 storage area on Baederwood Creek at West Highland Ave
4. D15 – 1 detention basin at Washington Land on Rock Creek
5. D16 – 3 detention basins on Rock Creek
6. D25 – The combined plans of D1, D9, & D16
7. D27 – 5 detention basins on the Upper Tookany, 3 on Baederwood, and 1 on Rock Creek

8. D28 – 3 detention basins on the Upper Tookany
9. D30 – The combined plans of D28, D12, & D15

Alternative 4 reduces peak flow rates and flood damages to a greater degree and extent than any other with project condition. Further, Alternative 4 analysis indicates that it is the alternative plan with the greatest net economic benefits consistent with protecting the nation's environment. Through the process of plan formulation, it was determined that Alternative 4: The Comprehensive Plan (D27) would be the optimal plan for FRM in this study area.

4. Cost for the NED Plan: Construction costs are based on the assumption of utilizing typical site work construction equipment. Dry detention basins will be constructed using downstream gabion baskets and upstream earthen embankments. It was assumed that all excavated material will stay onsite and be used in construction of the embankments. Additional clay key trenches are necessary to prevent seepage and piping underneath the structures. Embankments will be planted with native grasses. It was assumed that embankment work would be performed by subcontractors. NED real estate acquisition costs and pertinent contingency, engineering and design and construction management costs are also included. Construction costs are shown in Table 1.

ANNUAL CHARGES FOR THE NED PLAN

5. General: The estimate of annual charges for the NED plan is based on an economic project life of 50 years, an interest rate of 3.375% and using 2015 price levels. The annual charges include first cost and interest during construction. It is noted that interest during construction was developed for the first cost of the project constructed over a 24 month period.

6. Mobilization and demobilization: Costs are based on the assumption that construction equipment located within 200 miles from the project site will perform the work and be readily available. Construction access would be by local streets.

CONTINGENCIES, PRECONSTRUCTION ENGINEERING & DESIGN, AND CONSTRUCTION MANAGEMENT FOR THE NED PLAN

7. Contingencies: The estimated cost for each major subdivision or feature of the recommended project includes an item for "contingencies". The item for "contingencies" is an allowance against some adverse or unanticipated condition not susceptible to exact evaluation from the data at hand but which must be expressed or represented in the cost estimate. The contingency allowances used in the development of the cost estimate for the selected project were estimated as an appropriate percentage using Crystal Ball software for preparing risk analysis. Thirty percent was applied to construction work to account for concerns detailed in the Cost and Schedule Risk Analysis.

8. Preconstruction Engineering & Design (P, E & D): Preconstruction Engineering and Design costs include local cooperative agreements, environmental and regulatory activities, general design memorandum, preparation of plans and specifications, engineering during construction, A/E liability actions, cost engineering, construction and supply contract award activities, project management, and the development of the PCA. P, E & D costs were estimated as lump sums

(including contingency) for construction. A contingency factor of 15% is included in the P, E & D costs.

9. Construction Management (S&A): Construction Management costs include contract administration, review of shop drawings, inspection and quality assurance, project office operation, contractor initiated claims and litigations, and government initiated claims and litigations. S&A related costs were estimated as lump sums for construction. A contingency factor of 15% was included in all S&A costs.

CONSTRUCTION AND FUNDING SCHEDULE FOR THE NED PLAN

10. General: The construction and project schedules of the NED plan are given in Tables 2 and 3 respectively of this Engineering Technical Appendix. The schedules are based on the timeliness of the report's approval and allocation of funds by OMB, the foregoing construction procedures, and the ability of local interests to implement the necessary items of local cooperation.

Table 1 – Total First Cost – NED Plan

CWBS

Price Level: **May 2015**

TOOKANY CREEK
CIVIL WORKS BREAKDOWN STRUCTURE
MCACES CONSTRUCTION PRODUCT WBS

Section 205, Flood Damage Reduction Number	Product Description	Quantity	UOM	Unit Price	Estimated Amount	Contingency	Total Estimated Amount
01 -- -- --	LANDS AND DAMAGES	1.00	LS	$784,924.00	$784,924.00	$117,739.00	$902,663.00
15 -- -- --	FLOODWAY CONTROL AND DIVERSION STRUCTURES				$5,014,232.00	$1,504,269.56	$6,518,501.56
	TOTAL CONTRACT ESTIMATED AMOUNT				**$5,799,156.00**	**$1,622,008.56**	**$7,421,164.56**
30 -- -- --	PLANNING, ENGINEERING AND DESIGN	1.00	LS	$795,000.00	$795,000.00	$119,250.00	$914,250.00
31 -- -- --	CONSTRUCTION MANAGEMENT (S&A)	1.00	LS	$806,895.24	$806,895.24	$121,034.29	$927,929.53
	TOTAL CONTRACT ESTIMATED AMOUNT				**$7,401,051.24** **$7,401**	**$1,862,292.84** **$1,862**	**$9,263,344.08** **$9,263**

Note: Estimated Duration 24 Months

Table 2 – Construction Schedule

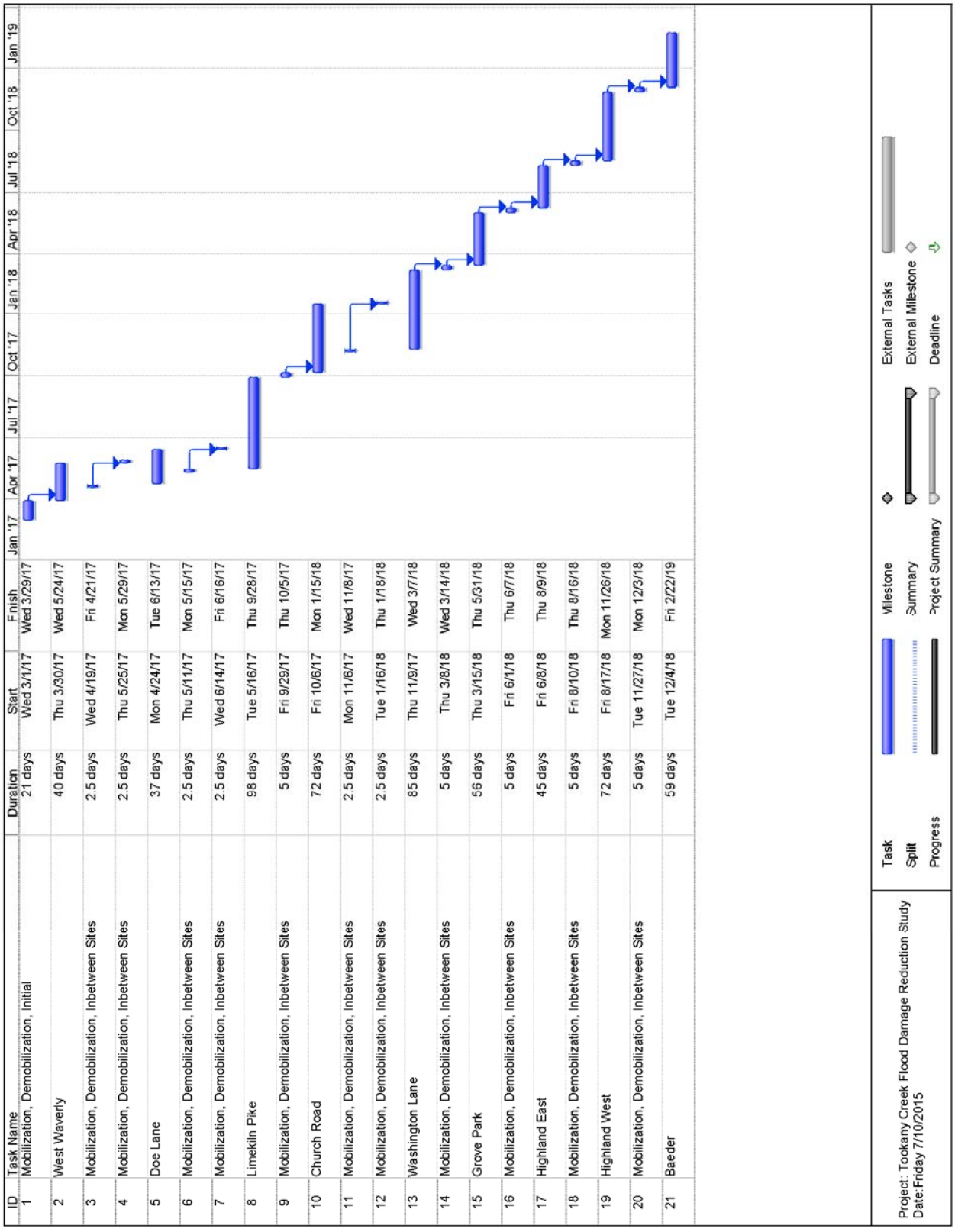

Table 3 – Project Schedule