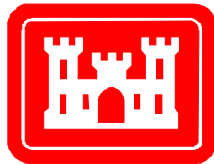


**Westchester County Streams,  
Byram River Basin  
Flood Risk Management  
Fairfield County, Connecticut and  
Westchester County, New York**

**Draft Integrated Feasibility Report &  
Environmental Impact Statement**



**Appendix C – Cost**

## Introduction

This Appendix presents the detailed cost estimates for Alternative 5. The Tentatively Selected Plan (TSP) for flood risk management at Byram River is Alternative 5, removing the Route 1 bridges that straddle the Byram River in Port Chester, NY and replacing them at a higher elevation to allow more water to pass underneath. In the existing condition, the wide piers supporting the bridges and the low road profile constrict the flow of water; this causes water to build up behind the bridge, increases the water surface elevation, and causes properties to flood. Since the Route 1 bridges carry the local traffic of Route 1 as well as Interstate 95 traffic during emergencies, the bridges must be replaced after they are demolished. The Route 1 bridges would be replaced with two bridges in the same location that have roadway profiles about three feet higher than the existing profile and do not have center piers. The plan also includes minor channel improvements to remove accumulated sediment. The construction of the new bridges would be considered a relocation and a non-Federal sponsor responsibility.

The set-up of the bridge removal (i.e., mobilization, demobilization, site preparations, traffic control, excavation and disposal, cofferdams, etc.) and the bridge removal itself are project costs and included in the 08 account (Roads, Railroads, and Bridges). Because the construction of the new bridges is considered a relocation, it is classified in the 02 account (Relocation). The construction of the new bridges would occur immediately after the removal of each of the Route 1 bridges (one bridge to be removed per construction season, to be accomplished over two seasons).

The Route 1 bridges are owned and operated by the New York State Department of Transportation. The primary non-Federal project partner for the implementation of the project is still being coordinated at this time. If the project is authorized for construction, the Town of Greenwich (ToG) and the New York State Department of Environmental Conservation (NYSDEC) would most likely be the Non-Federal cost sharing partners for the project. The Total First Cost is presented in Table C1 below.

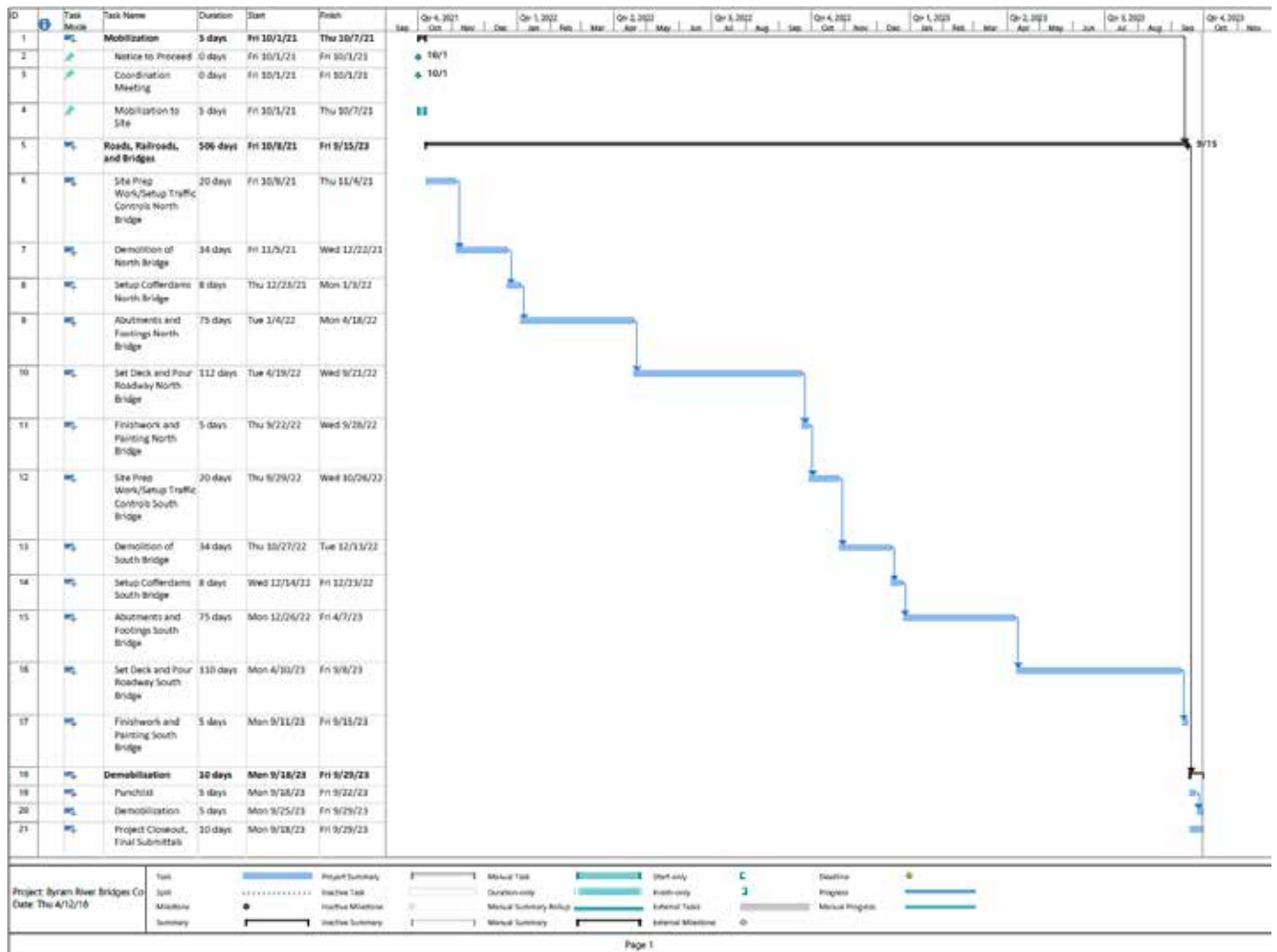
Table C1: Feasibility Report Cost Estimate Summary, FY18 P.L., Alternative 5

ACCOUNT	DESCRIPTION	QTY	UOM	SUBTOTAL	CONT. %	CONT. \$\$	TOTAL COST
01	LANDS AND DAMAGES	1	LS	\$1,102,500	30%	\$330,750	\$1,433,250
02	RELOCATIONS	1	LS	\$8,373,358	17%	\$1,455,290	\$9,828,648
06	FISH AND WILDLIFE FACILITIES	1	LS	\$34,000	15%	\$5,260	\$39,260
08	ROADS, RAILROADS AND BRIDGES	1	LS	\$4,713,705	17%	\$819,242	\$5,532,947
18	CULTURAL RESOURCE PRESERVATION	1	LS	\$1,500,000	15%	\$232,050	\$1,732,050
30	PLANNING, ENGINEERING AND DESIGN	1	LS	\$3,216,634	24%	\$782,929	\$3,999,563
31	CONSTRUCTION MANAGEMENT	1	LS	\$1,462,106	19%	\$273,706	\$1,735,813
	Total BRYRAM RIVER ROUTE 1 BRIDGES			\$20,402,304		\$3,899,226	\$24,301,530

## Basis of Cost

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 CDM Smith Report. 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 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 construction duration for Alternative 5 was estimated at 24 months, as shown in Figure C1. The construction schedule was developed based on the crew outputs referenced from RSMeans with the assumption that multiple crews would work simultaneously.

Figure C1 – Construction Schedule



## Contingencies

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 construction cost contingency developed per ARA for Alternative 5 is shown in Table C2.

Table C2: Contingencies

FEATURED ACCOUNT	ELEMENT	CONTINGENCY FACTOR
02	Relocations	17.38%
06	Fish & Wildlife Facilities	15.47%
08	Roads, Railroads & Bridges	17.38%
18	Cultural Resource Preservation	15.47%
	<b>Total Construction Contingency</b>	<b>17.18%</b>
01	Lands & Damages	30.00%
30	Planning, Engineering, and Design	24.34%
31	Construction Management	18.72%

## Lands and Damages

To construct the proposed plan, local stakeholders are required to provide certain lands and easements. Studies were conducted by the Real Estate Division to determine the estimated value of lands and easements needed for the channel improvement.

## Planning, Engineering and Design

The cost was developed for all activities associated with the planning, engineering and design effort. The cost for this account includes the preparation of Design Documentation Reports, plans, and specifications for Alternative 5 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 breakdown in the Total Project Cost Summary (TPCS), as shown in Figure C2 on page C5, was developed based on input from respective offices in accordance with the CWBS.

## Construction Management

The cost was developed for all construction management activities from pre-award requirements through final contract closeout. This cost includes the in-house labor based upon work-hour requirements, materials, facility costs, support contracts, travel and overhead. The cost was developed based on the input from the construction division in accordance with the Civil Works Work Breakdown Structure (CWBS) and includes, but is not limited to, anticipated items such as

the salaries of the resident engineer and staff, surveyors, inspectors, drafters, clerical, and custodial personnel; operation, maintenance and fixed charges for transportation and for other field equipment; field supplies; construction management, general construction supervision; and project office administration, distributive cost of area office and general overhead charged to the project.

### Interest During Construction

Interest during construction (IDC) is the amount of interest the construction cost would earn were it invested from the beginning of construction until the accumulation of benefits begins. IDC cost has been added to the project cost to determine investment cost. Average annual cost was determined based on investment cost, which includes IDC. The pre-base year costs were estimated using the Federal interest rate of 2.75 percent (FY18).

### Operation and Maintenance

The Operation and Maintenance (O&M) cost was 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 the responsibility of the non-Federal sponsor in accordance with Federal regulations and operations manual.

### Estimated Annual Cost

Annual costs are based on an economic period of analysis of 50 years and an interest rate of 2.75%. The annual costs include the annualized investment cost along with annual operation and maintenance cost. A detailed breakdown of annual costs for Alternative 5 is presented in Table C3 below.

Table C3: Annualized Cost

<b>First Cost</b>	\$24,301,530
<b>Sunk Cost</b>	\$-
<b>Investment Cost</b>	
Interest During Construction <sup>(a)</sup>	\$643,150
<b>Total Investment Cost:</b>	<b>\$24,944,680</b>
<b>Annual Costs</b>	
Annualized Investment Cost <sup>(b)</sup>	\$923,974
Annualized Operation & Maintenance Cost <sup>(c)</sup>	\$25,000
<b>Total Annual Cost*</b>	<b>\$948,974</b>

- (a) Based on 24 months of construction @ 2.75% (IDC, E&D, RE and Sunk costs calculated separately and included in this total)
- (b) Annualized investment cost only includes the remaining features. For annualized investment cost with the sunk cost, please see the economic appendix.  $I = 2.75\%$  and  $n = 50$  years
- (c) From New York State Department of Transportation letter dated 09JAN2017, annual O&M costs on current bridge are estimated \$25,000.

# Cost Summary

The Total Fully Funded Project cost is \$27,300,000. The cost sharing partner for implementation is being coordinated and has not been identified as of the release of this Draft Report.

Figure C2 – Total Project Cost Summary

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

Printed: 5/24/2018  
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\*\*\*\* CONTRACT COST SUMMARY \*\*\*\*

PROJECT: Byram River Rt. 1 Bridges Alternative 5      DISTRICT: NAN - New York      PREPARED: 5/24/2018  
 LOCATION: Greenwich, CT      POC: CHIEF, COST ENGINEERING, Mukesh Kumar

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	Estimate Prepared: 24-May-18 Effective Price Level: 1-Oct-17			TOTAL (\$K)	Program Year (Budget EC): 2020 Effective Price Level Date: 1 OCT 19			Mid-Point Date	INFLATED [%]	COST (\$K)	CNTG (\$K)	FULL (\$K)	
		COST (\$K)	CNTG (\$K)	CNTG [%]		ESC [%]	COST (\$K)	CNTG (\$K)						TOTAL (\$K)
<b>PHASE 1 or CONTRACT 1</b>														
02	RELOCATIONS	\$8,373	\$1,455	17.4%	\$9,829	4.1%	\$8,718	\$1,515	\$10,233	2023Q1	8.1%	\$9,260	\$1,608	\$10,868
06	FISH & WILDLIFE FACILITIES	\$34	\$5	15.5%	\$39	4.1%	\$35	\$5	\$41	2023Q1	0.1%	\$38	\$6	\$44
08	ROADS, RAILROADS & BRIDGES	\$4,714	\$819	17.4%	\$5,533	4.1%	\$4,907	\$883	\$5,790	2023Q1	8.1%	\$5,207	\$905	\$6,112
18	CULTURAL RESOURCE PRESERVATION	\$1,500	\$232	15.5%	\$1,732	4.1%	\$1,561	\$242	\$1,803	2023Q1	0.1%	\$1,657	\$256	\$1,913
<b>CONSTRUCTION ESTIMATE TOTALS:</b>		<b>\$14,621</b>	<b>\$2,512</b>	<b>17.2%</b>	<b>\$17,133</b>		<b>\$15,220</b>	<b>\$2,615</b>	<b>\$17,834</b>			<b>\$16,151</b>	<b>\$2,775</b>	<b>\$18,926</b>
01	LANDS AND DAMAGES	\$1,103	\$331	30.0%	\$1,433	4.1%	\$1,148	\$344	\$1,492	2023Q1	6.1%	\$1,218	\$365	\$1,583
30	PLANNING, ENGINEERING & DESIGN													
1.0%	Project Management	\$146	\$36	24.3%	\$182	8.2%	\$168	\$39	\$197	2020Q4	3.1%	\$183	\$40	\$223
3.0%	Planning & Environmental Compliance	\$439	\$107	24.3%	\$545	8.2%	\$475	\$110	\$580	2020Q4	3.1%	\$489	\$119	\$608
6.0%	Engineering & Design	\$751	\$178	24.3%	\$900	8.2%	\$791	\$163	\$958	2020Q4	3.1%	\$815	\$198	\$1,013
0.5%	Reviews, ATRs, EPRs, VE	\$73	\$18	24.3%	\$91	8.2%	\$79	\$19	\$98	2020Q4	3.1%	\$82	\$20	\$102
0.5%	Life Cycle Updates (cost, schedule, risks)	\$73	\$18	24.3%	\$91	8.2%	\$79	\$19	\$98	2020Q4	3.1%	\$82	\$20	\$102
1.0%	Contracting & Reprographics	\$146	\$36	24.3%	\$182	8.2%	\$158	\$39	\$197	2020Q4	3.1%	\$183	\$40	\$223
6.0%	Engineering During Construction	\$877	\$214	24.3%	\$1,091	8.2%	\$949	\$231	\$1,180	2023Q1	12.8%	\$1,071	\$261	\$1,332
5.0%	Planning During Construction	\$731	\$178	24.3%	\$900	8.2%	\$791	\$163	\$958	2023Q1	12.8%	\$882	\$217	\$1,100
0.0%	Adaptive Management & Monitoring	\$0	\$0	24.3%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
0.0%	Project Operations	\$0	\$0	24.3%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
31	CONSTRUCTION MANAGEMENT													
9.0%	Construction Management	\$1,310	\$240	18.7%	\$1,552	8.2%	\$1,424	\$267	\$1,690	2023Q1	12.8%	\$1,606	\$301	\$1,907
0.0%	Project Operation:	\$0	\$0	18.7%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
1.0%	Project Management	\$146	\$27	18.7%	\$174	8.2%	\$158	\$30	\$188	2023Q1	12.8%	\$178	\$33	\$211
<b>CONTRACT COST TOTALS:</b>		<b>\$20,402</b>	<b>\$3,899</b>		<b>\$24,302</b>		<b>\$21,429</b>	<b>\$4,102</b>	<b>\$25,531</b>			<b>\$22,611</b>	<b>\$4,389</b>	<b>\$27,000</b>

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

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PROJECT: Byram River Rt. 1 Bridges Alternative 5  
PROJECT NO: P2 xxxxxx  
LOCATION: Greenwich, CT

DISTRICT: NAN - New York  
POC: CHIEF, COST ENGINEERING, Mukesh Kumar

PREPARED: 5/24/2018

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	Program Year (Budget EC): Effective Price Level Date: 2020 1 OCT 19				Spent Thru: 1-Oct-17 (\$K) K	TOTAL FIRST COST (\$K) R	INFLATED (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
						ESC (%) G	COST (\$K) H	CNTG (\$K) I	TOTAL (\$K) J						
02	RELOCATIONS	\$0,373	\$1,455	17.4%	\$9,829	4.1%	\$8,716	\$1,515	\$10,231	\$0	\$10,231	6.1%	\$9,250	\$1,000	\$10,857
06	FISH & WILDLIFE FACILITIES	\$34	\$5	15.5%	\$20	4.1%	\$35	\$5	\$41	\$0	\$41	6.1%	\$38	\$6	\$43
08	ROADS, RAILROADS & BRIDGES	\$4,714	\$819	17.4%	\$5,533	4.1%	\$4,907	\$853	\$5,759	\$0	\$5,759	6.1%	\$5,207	\$905	\$6,112
18	CULTURAL RESOURCE PRESERVATION	\$1,600	\$232	15.6%	\$1,732	4.1%	\$1,581	\$242	\$1,803	\$0	\$1,803	6.1%	\$1,687	\$256	\$1,913
<b>CONSTRUCTION ESTIMATE TOTALS:</b>		\$14,821	\$2,512		\$17,133	4.1%	\$15,220	\$2,615	\$17,834	\$0	\$17,834	6.1%	\$16,151	\$2,775	\$18,926
01	LANDS AND DAMAGES	\$1,103	\$331	30.0%	\$1,433	4.1%	\$1,148	\$344	\$1,492	\$0	\$1,492	6.1%	\$1,218	\$365	\$1,583
30	PLANNING, ENGINEERING & DESIGN	\$3,217	\$783	24.3%	\$4,000	8.2%	\$3,480	\$847	\$4,327	\$0	\$4,327	8.0%	\$3,767	\$915	\$4,872
31	CONSTRUCTION MANAGEMENT	\$1,462	\$274	18.7%	\$1,736	8.2%	\$1,582	\$296	\$1,878	\$0	\$1,878	12.8%	\$1,785	\$334	\$2,119
<b>PROJECT COST TOTALS</b>		\$20,450	\$3,899	19.1%	\$24,300		\$21,420	\$4,100	\$25,931	\$0	\$25,931	6.9%	\$22,911	\$4,380	\$27,300

CHIEF, COST ENGINEERING, Mukesh Kumar

PROJECT MANAGER, Rifat Salim

CHIEF, REAL ESTATE, Noreen Dress

ESTIMATED TOTAL PROJECT COST: \$27,300  
Federal Cost Share: TBD  
Non-Federal Cost Share: TBD

## MII Report

DESCRIPTION	QUANTITY	UOM	CONTRACT COST	PROJECT COST
Project Cost Summary Report			\$15,723,563	\$15,723,563
01 Lands and Damages	1.00	LS	\$1,102,500	\$1,102,500
02 Relocations	1.00	LS	\$8,373,358	\$8,373,358
06 Fish and Wildlife Facilities	1.00	LS	\$34,000	\$34,000
08 Roads, Railroads, and Bridges	1.00	LS	\$4,713,705	\$4,713,705
18 Cultural Resource Preservation	1.00	LS	\$1,500,000	\$1,500,000



## Abbreviated Risk Analysis (ARA)

**Abbreviated Risk Analysis**

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

Alternative: **Ait 5A**

Meeting Date: **3/6/2017**

Total Estimated Construction Contract Cost = \$ **14,621,963**

CWWBS	Feature of Work	Contract Cost	% Contingency	\$ Contingency	Total
01 LANDS AND DAMAGES	Real Estate	\$ 1,102,500	30.00%	\$ 330,750	\$ 1,433,250
1 02 RELOCATIONS	Relocations	\$ 8,373,350	17.38%	\$ 1,455,029	\$ 9,828,380
1 06 FISH AND WILDLIFE FACILITIES	Fish and Wildlife	\$ 34,000	15.47%	\$ 5,261	\$ 39,261
2 08 ROADS, RAILROADS, AND BRIDGES	Bridges	\$ 4,713,705	17.38%	\$ 819,095	\$ 5,532,801
3 18 CULTURAL RESOURCE PRESERVATION	Cultural Resource	\$ 1,500,000	15.47%	\$ 232,099	\$ 1,732,099
5		\$ -	0.00%	\$ -	\$ -
6		\$ -	0.00%	\$ -	\$ -
7		\$ -	0.00%	\$ -	\$ -
8		\$ -	0.00%	\$ -	\$ -
9		\$ -	0.00%	\$ -	\$ -
10		\$ -	0.00%	\$ -	\$ -
11		\$ -	0.00%	\$ -	\$ -
12 All Other	Remaining Construction Items	\$ -	0.0%	\$ -	\$ -
13 30 PLANNING, ENGINEERING AND DESIGN	Planning, Engineering, & Design	\$ 3,201,000	24.34%	\$ 779,197	\$ 3,980,197
14 31 CONSTRUCTION MANAGEMENT	Construction Management	\$ 1,455,000	18.72%	\$ 272,355	\$ 1,727,355
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)			\$ -	\$ -

Totals	Real Estate				
	\$ 1,102,500	30.00%	\$ 330,750	\$ 1,433,250	
Total Construction Estimate	\$ 14,621,963	17.16%	\$ 2,511,484	\$ 17,133,448	
Total Planning, Engineering & Design	\$ 3,201,000	24.34%	\$ 779,197	\$ 3,980,197	
Total Construction Management	\$ 1,455,000	18.72%	\$ 272,355	\$ 1,727,355	
<b>Total Excluding Real Estate</b>	<b>\$ 15,277,963</b>	<b>18%</b>	<b>\$ 2,563,037</b>	<b>\$ 22,840,100</b>	

Confidence Level Range Estimate (\$000's)	Base	50%	80%
	\$19,277.8	\$21,415.8	\$22,840.8

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

\* 8% based on base & 1% C/L

**Byram River - Ait 5A**  
 Feasibility (Alternative)  
 Abbreviated Risk Analysis  
 Meeting Date: 6-Mar-17



**Risk Register**

Risk Element	Feature of Work	Concerns	POT: Decisions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
<b>Project Management &amp; Scope Growth</b>						<b>75%</b>
PS-1	Relocations	Investigations sufficient to support design assumptions?	There has been a decent amount of researched done on the bridges. Unknown field condition can cause design update.	Marginal	Possible	1
PS-2	Fish and Wildlife	Investigations sufficient to support design assumptions? Project accomplish intent?	There are no endangered and/or threaten species, critical habitat within the project limits. Any requirements can be accomplished through restricted construction activities.	Marginal	Possible	1
PS-3	Bridges	Investigations sufficient to support design assumptions?	There has been a decent amount of researched done on the bridges. Unknown field condition can cause design update.	Marginal	Possible	1
PS-4	Cultural Resource	Potential for scope growth. Bridges are eligible for the national register of historic places.	Bridge design must be sympathetic to the surrounding neighborhood.	Marginal	Possible	1
PS-5	0			Negligible	Unlikely	0
PS-6	0			Negligible	Unlikely	0
PS-7	0			Negligible	Unlikely	0
PS-8	0			Negligible	Unlikely	0
PS-9	0			Negligible	Unlikely	0
PS-10	0			Negligible	Unlikely	0
PS-11	0			Negligible	Unlikely	0
PS-12	Remaining Construction Items			Negligible	Unlikely	0
PS-13	Planning, Engineering, & Design	Potential for scope growth, added features and quantities. Design confirms investigations sufficient to support design assumptions.	Change in regulation requiring positive BCR for each structure rather than entire project is likely to cause a significant impact.	Marginal	Likely	2
PS-14	Construction Management	N/A	N/A	Negligible	Unlikely	0

Acquisition Strategy				Maximum Project Growth		30%
AS-1	Relocations	Limited bid competition anticipated? Contracting plan fully established?	Significant amount of contractors can do this work, however the number of contracts that are going out is unknown.	Negligible	Possible	0
AS-2	Fish and Wildlife	Contracting plan fully established? Limited bid competition anticipated?	Significant amount of contractors can do this work, however the number of contracts that are going out is unknown.	Negligible	Possible	0
AS-3	Bridges	Limited bid competition anticipated? Contracting plan fully established?	Significant amount of contractors can do this work, however the number of contracts that are going out is unknown.	Negligible	Possible	0
AS-4	Cultural Resource	Contracting plan fully established. Limited bid competition anticipated.	Significant amount of contractors can do this work, however the number of contracts that are going out is unknown.	Negligible	Possible	0
AS-5	0			Negligible	Unlikely	0
AS-6	0			Negligible	Unlikely	0
AS-7	0			Negligible	Unlikely	0
AS-8	0			Negligible	Unlikely	0
AS-9	0			Negligible	Unlikely	0
AS-10	0			Negligible	Unlikely	0
AS-11	0			Negligible	Unlikely	0
AS-12	Remaining Construction Items			Negligible	Unlikely	0
AS-13	Planning, Engineering, & Design	Limited bid competition anticipated	Specialized project requires specialized staffing.	Marginal	Possible	1
AS-14	Construction Management	Limited bid competition anticipated	Specialized project requires specialized staffing.	Marginal	Possible	1

Construction Elements				Maximum Project Growth		25%
CE-1	Relocations	High risk or complex construction elements, site access, in-water? Water care and diversion plan?	Limitation in site access for staging area due to surrounding properties and neighborhood. Water care diversion plan are more stringent than in 1977.	Marginal	Possible	1
CE-2	Fish and Wildlife	Potential for construction modification and claims?	Nothing unusual	Negligible	Possible	0
CE-3	Bridges	High risk or complex construction elements, site access, in-water? Water care and diversion plan?	Limitation in site access for staging area due to surrounding properties and neighborhood. Water care diversion plan are more stringent than in 1977.	Marginal	Possible	1
CE-4	Cultural Resource	Potential for construction modification and claims	Nothing unusual	Negligible	Possible	0
CE-5	0			Negligible	Unlikely	0
CE-6	0			Negligible	Unlikely	0
CE-7	0			Negligible	Unlikely	0
CE-8	0			Negligible	Unlikely	0
CE-9	0			Negligible	Unlikely	0
CE-10	0			Negligible	Unlikely	0
CE-11	0			Negligible	Unlikely	0
CE-12	Remaining Construction Items			Negligible	Unlikely	0
CE-13	Planning, Engineering, & Design	Potential for construction modification and claims	Unexpected site and home conditions might lead to potential change orders.	Marginal	Likely	2
CE-14	Construction Management	Potential for construction modification and claims	Unexpected site and home conditions might lead to potential change orders.	Marginal	Likely	2

Specialty Construction or Fabrication				Maximum Project Growth		65%
SC-1	Relocations	NA	NA	Negligible	Unlikely	0
SC-2	Fish and Wildlife	NA	NA	Negligible	Unlikely	0
SC-3	Bridges	NA	NA	Negligible	Unlikely	0
SC-4	Cultural Resource	NA	NA	Negligible	Unlikely	0
SC-5	0			Negligible	Unlikely	0
SC-6	0			Negligible	Unlikely	0
SC-7	0			Negligible	Unlikely	0
SC-8	0			Negligible	Unlikely	0
SC-9	0			Negligible	Unlikely	0
SC-10	0			Negligible	Unlikely	0
SC-11	0			Negligible	Unlikely	0
SC-12	Remaining Construction Items			Negligible	Unlikely	0
SC-13	Planning, Engineering, & Design	NA	NA	Negligible	Unlikely	0
SC-14	Construction Management	NA	NA	Negligible	Unlikely	0

Technical Design & Quantities				Maximum Project Growth		30%
T-1	Relocations	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	New bridge design has been created per change in regulation. Historical requirement might impact final design.	Marginal	Possible	1
T-2	Fish and Wildlife	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities? Possibility for increased quantities due to loss, waste, or subsidence?	Possible increase in quantities pending mitigation requirements when permit is obtained.	Marginal	Possible	1
T-3	Bridges	Level of confidence based on design and assumptions? Sufficient investigations to develop quantities?	New bridge design has been created per change in regulation. Historical requirement might impact final design.	Marginal	Possible	1
T-4	Cultural Resource	Level of confidence based on design and assumptions. Sufficient investigations to develop quantities. Possibility for increased quantities due to loss, waste or subsidence.	Potential increase in quantities pending execution of memorandum agreement.	Marginal	Possible	1
T-5	0			Negligible	Unlikely	0
T-6	0			Negligible	Unlikely	0
T-7	0			Negligible	Unlikely	0
T-8	0			Negligible	Unlikely	0
T-9	0			Negligible	Unlikely	0
T-10	0			Negligible	Unlikely	0
T-11	0			Negligible	Unlikely	0
T-12	Remaining Construction Items			Negligible	Unlikely	0
T-13	Planning, Engineering, & Design	Potential for construction modification and claims	Changes to design assumptions might lead to potential change orders.	Marginal	Possible	1
T-14	Construction Management	Potential for construction modification and claims	Changes to design assumptions might lead to potential change orders.	Marginal	Possible	1

Cost Estimate Assumptions				Maximum Project Growth		35%
EST-1	Relocations	Overuse of Cost Book, lump sum, allowance. Assumptions related to prime and subcontractor markup/assignments.	Heavily use of cost book. Cost for MPT might increase overall along with increase in policy involvement.	Marginal	Possible	1
EST-2	Fish and Wildlife	Lack of confidence on critical cost items	Cost of mitigation is also dependent on permit requirements.	Marginal	Possible	1
EST-3	Bridges	Overuse of Cost Book, lump sum, allowance. Assumptions related to prime and subcontractor markup/assignments.	Heavily use of cost book. Cost for MPT might increase overall along with increase in policy involvement.	Marginal	Possible	1
EST-4	Cultural Resource	Lack of confidence on critical cost items	Cost of mitigation is also dependent on memorandum agreement requirements	Marginal	Possible	1
EST-5	0			Negligible	Unlikely	0
EST-6	0			Negligible	Unlikely	0
EST-7	0			Negligible	Unlikely	0
EST-8	0			Negligible	Unlikely	0
EST-9	0			Negligible	Unlikely	0
EST-10	0			Negligible	Unlikely	0
EST-11	0			Negligible	Unlikely	0
EST-12	Remaining Construction Items			Negligible	Unlikely	0
EST-13	Planning, Engineering, & Design	Lack of confidence on critical cost items, assumptions regarding crew, productivity, overtime. Assumptions related to prime and subcontractor markup/assignments.	Minor premium due to "Greenwash". Labor rates are higher because the county have set higher rate. Some properties in Port Chester, NY are to be acquired. Consultant office location can impact productivity and accessibility.	Moderate	Possible	2
EST-14	Construction Management	Lack of confidence on critical cost items, assumptions regarding crew, productivity, overtime. Assumptions related to prime and subcontractor markup/assignments.	Minor premium due to "Greenwash". Labor rates are higher because the county have set higher rate. Some properties in Port Chester, NY are to be acquired. Consultant office location can impact productivity and accessibility.	Moderate	Possible	2

External Project Risks				Maximum Project Growth		40%
EX-1	Relocations	Political influences, lack of support, obstacles? Unanticipated inflation in bid, key materials?	Lack of public support is possible. Substantially impact traffic and the cost for MPT might increase overall, along with increase in police involvement. Multiple jurisdictions may cause possible delays and implementations.	Marginal	Possible	1
EX-2	Fish and Wildlife	Political influences, lack of support, obstacles?	Low mitigation potential against water table lowered or unstable in existing compliance could be more restrictive. Species being evaluated or known to be protected are to use urban area is possible. Current data suggest the area is not urban.	Marginal	Possible	1
EX-3	Bridges	Political influences, lack of support, obstacles? Unanticipated inflation in bid, key materials?	Lack of public support is possible. Substantially impact traffic and the cost for MPT might increase overall, along with increase in police involvement. Multiple jurisdictions may cause possible delays and implementations.	Marginal	Possible	1
EX-4	Cultural Resource	Political influences, lack of support, obstacles.	There could be additional requirements beyond what is assumed for the memorandum agreement requirement.	Marginal	Possible	1
EX-5	0			Negligible	Unlikely	0
EX-6	0			Negligible	Unlikely	0
EX-7	0			Negligible	Unlikely	0
EX-8	0			Negligible	Unlikely	0
EX-9	0			Negligible	Unlikely	0
EX-10	0			Negligible	Unlikely	0
EX-11	0			Negligible	Unlikely	0
EX-12	Remaining Construction Items			Negligible	Unlikely	0
EX-13	Planning, Engineering, & Design	Political influences, lack of support, obstacles? Unanticipated inflation in bid, key materials?	The site condition might be completely different for what was designed for and demanding property owners might want contractors with long standing experience.	Negligible	Unlikely	0
EX-14	Construction Management	Political influences, lack of support, obstacles? Unanticipated inflation in bid, key materials?	The site condition might be completely different for what was designed for and demanding property owners might want contractors with long standing experience.	Negligible	Unlikely	0

## District Quality Control (DQC)

05 April 2018

OBSERVATION: Alternative 5 cost estimate submitted at FY18 PL with a first cost of \$23,437,690 and fully funded cost of \$24,454,000. **Costs have been updated.**

CONSTRUCTION SCHEDULE: According to the project schedule, it appears that the ADM is scheduled on 1/31/19. However according the construction schedule provided on the cost appendix, it appears the mobilization starts on 10/1/18. Recommend coordinating with PPMD for a more appropriate Notice to Proceed date. Also recommend updating the construction schedule in 3 sections: (1) Mobilization (consisting of noticed to proceed, coordination meeting and mobilization), (2) Roads, Railroads & Bridges (consisting of the construction work to the Route 1 bridge) and (3) Demobilization (consisting of punchlist, demobilization and project closeout). Note that with updated noticed to proceed date, it would affect our midpoint of construction date and thus our fully funded cost. **Adjustments made.**

TPCS: According to the project schedule, the chief report is currently scheduled on 1/30/2020. Recommend updating the first cost for the chief report from FY 19 PL to FY 20 PL. **Updated.**

COST APPENDIX: Recommend adding "Attachment C2 – Abbreviated Risk Analysis (ARA)" under the table of content between MII report attachment and the DQC attachment. Also recommend incorporating the input tab and the risk register tab of the ARA file for alternative 5 in the cost appendix as one of the attachments. **Attachments have been included.**

IDC: Recommend changing the project and location name under the Byram IDC in the excel file provided for alternative 5 to project specific name and location. **Fixed.**

COST TABLES: It appears the excel file provided includes the Byram River TPCS, First Cost table, IDC and Annualized Cost, however it does not include the CWCCIS tab to verify if the Date of Index Factors are up to date for the fully funded cost and the first cost for the chief's report. Recommend incorporating CWCCIS onto the excel file provided. **Updated with newest approved TPCS template.**

ANNUALIZED COST: It appears the excel file provided shows #REF for both the Annualized Investment Cost and the Total Annualized Cost. Please revisit and revise as appropriate. **Fixed reference.**