Fire Island Inlet to Montauk Point, NY

Final General Reevaluation Report

APPENDIX C

COST ENGINEERING

U.S. Army Corps of Engineers
New York District

February 2020

Appendix C

Cost Engineering

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Introduction

The draft GRR and EIS that included the TSP were released in July 2016 for public and agency comment. Based on the comments received and further coordination with DOI and NYS subsequent to the public comment period, a recommended plan was identified that is supported by DOI and NYS. Since the recommended plan included project features that were not part of the National Economic Development (NED) Plan, a policy exception was requested and granted by the Assistant Secretary of the Army (Civil Works) on Oct 11, 2017. The policy exception allows USACE to recommend the "mutually acceptable" plan consistent with requirement of the authorizing law, Section 8 of Public Law 88-587 that established Fire Island National Seashore. The Recommended Plan is the "mutually acceptable Plan" identified to the Secretary of the Army and Secretary of the Interior, and supported by the non-Federal sponsor, includes the following:

Inlet Sand Bypassing

- Provides for sufficient sand bypassing across Fire Island, Moriches, and Shinnecock Inlets to restore the natural longshore transport of sand along the barrier island for 50 years. Scheduled O&M dredging of the authorized navigation channel and deposition basin with sand placement on the barrier island will be supplemented, as needed, by dredging from the adjacent ebb shoals of each inlet to obtain the required volume of sand needed for bypassing.
- The bypassed sand will be placed in a berm template at elevation +9.5 ft NGVD 29 in identified placement areas.
- Monitoring is included to facilitate adaptive management changes.

Mainland Nonstructural Measures

- Includes up to 4,432 structures within the ten percent floodplain using nonstructural measures, primarily, structural elevations and floodproofing, based upon structure type and condition.
- Ringwalls are provided for 93 structures that are not suitable for nonstructural measures. The ringwalls will meet all requirements of structural measures.
- Includes acquisition of 14 structures in areas subject to high frequency flooding, and reestablishment of natural floodplain function.

Breach Response on Barrier Islands

- Proactive Breach Response – is an action that is triggered when the level of project performance at the shoreline falls below the condition under which the four percent flood would be capable of breaching the barrier island.
- Reactive Breach Response – is an action that is triggered when a breach has occurred, and there is an exchange of ocean and bay water during normal tidal conditions. It is applicable to locations where there is agreement that a breach should be mechanically closed quickly, such as the Talisman Federal tract, where there is an acknowledgement of the high vulnerability of breaching, deep water in the back bay, and new infrastructure that connects communities east and west of this location.
- Conditional Breach Response – is an action that is triggered when a breach has occurred, and there is an exchange of ocean and bay water during normal tidal conditions. It is applicable to most Federally-owned tracts within FIIS. A decision about potential breach closure will be made by the Breach Closure Team. Mechanical closure of the breach will take place if the breach does not close naturally within 60 days of opening.
- Wilderness Breach Response – is an action that is triggered when a breach has occurred, and there is an exchange of ocean and bay water during normal tidal conditions. It is applicable to the Federally-owned Wilderness tracts within FIIS, and is consistent with the Wilderness Breach Management Plan/EIS prepared by NPS. A decision about potential breach closure will be made by the Breach Closure Team. Mechanical closure of the breach may take place if decided by the Breach Closure Team.

Beach and Dune Fill on Shorefront

- Provides for a 90 ft width berm and +15 ft dune along the developed shorefront areas on Fire Island and Westhampton barrier islands.
- All dunes will be planted with dune grass except where noted.

- On Fire Island the post-Hurricane Sandy optimized alignment is followed and includes overfill in the developed locations to minimize tapers into Federal tracts.
- Renourishment takes place approximately every 4 years for up to 30 years after project completion; while proactive breach response takes place from years 31 to 50. Inlet bypassing and CPF renourishment takes place for 50 years on the same cycle timeline.
- Provides for adaptive management to ensure the volume and placement configuration accomplishes the design objectives of offsetting long-term erosion.
- Provides for construction of a feeder beach every 4 years for up to 30 years at Montauk Beach.

Groin Modifications

- Provides for removal of the existing Ocean Beach groins.

Coastal Process Features (CPFs)

- Provides for 12 barrier island locations and two (2) mainland locations as coastal process features and provide habitat for protected species.
- Includes placement of approximately 4.2 M cy of sediment to be placed along the barrier island bayside shoreline over the 50-year period of analysis that reestablishes the natural coastal processes consistent with the reformulation objective of no net loss of habitat or sediment. The placement of sediment along the bay shoreline will be conducted in conjunction with other nearby beach fill operations undertaken on the barrier island shorefront.

The planned contract structure for this project is as follows:

Contract 1 - Dredging at Fire Island Inlet with sand placement on Gilgo Beach and Robert Moses State Park
Contract 2 - Dredging at Moriches and Shinnecock Inlets with sand placement within sub-reaches MB 1A, 1B, 2A and SB 1D and 2B, and also at the New Made Island and Pattersquash CPF's.
Contract 3 - Dredging at offshore borrow sites with sand placement within sub-reaches SB- 1B, 1C, 1D and M-1 F (Montauk feeder beach).
Contract 4 - Dredging at offshore borrow site with sand placement within sub-reaches MB- 2C, 2D, 2E (Westhampton vicinity)
Contract 5 - Groin modification at Ocean Beach
Contract 6 - Year 1 Non-Structural measures (500 structures)
Contract 7 - Year 2 Non-Structural measures (1,000 structures)
Contract 8 - Year 3 Non-Structural measures (1,250 structures)
Contract 9 - Year 4 Non-Structural measures (1250 structures)
Contract 10 - Year 5 Non-Structural measures (432 structures)

Separate – No contracts planned/required: Breach closure, renourishment, and Monitoring.

Dredging/beachfill costs have been estimated in CEDEP and the unit costs for mob/demob and dredging have been transferred to MII in a typical fashion for dredging work. The groin work has been included in the MII estimate with typical labor/eq/material setup. Both dredging and groin work have been assumed to go out under Unrestricted/Full & Open acquisition methods. The work in the estimates have been assigned mostly to the Prime Contractor, who is assumed to be capable of performing most of the work.

The non-structural estimates for contracts 6-10, though founded in MII, are based on Microsoft Excel since that is the export program used by the algorithm to determine the N-S pricing by the A/E. The basis for those input costs were generated in MII using labor/eq/materials for single structures and the associated fixes. The acquisition strategy for the non-structural cost is akin to a MATOC or Small Business, where the performing

contractors are mostly subcontractors of the Prime. Those individual MII costs for each individual non-structural fix were input into the simulation, which spit out the corresponding fixes for each of the structures in the inventory.

The Breach Response costs were developed by a computer program from an A/E, based on likelihood of occurrence in any given year due to the storm models. The risk simulations identify the occurrence of breaches by future year with about 10,000 random storm lifecycles. The simulated number of response actions over the lifecycles are extracted, and have closure cost values in the model. The annualized costs are the results from the model; as only in the annualized costs (used as the basis for B/C ratio).

Physical and Environmental Monitoring costs were developed by NY District Engineering & Environmental PDT members, resectively. The adaptive management/breach closure costs were developed by AECOM. The output from their monte carlo simulation provided an annualized cost number for the breach closure plan; this number was assumed for every year in the 50 year project life. For TPCS purposes, it was broken down into 4 year increments (to align with the renourishment schedule) and escalated to the midpoint of those 4 years in order to show a concise listing.

There is also continuing construction costs, for periodic renourishment for the beachfill. The cycle is every 4 years, for 50 years, for a total of 13 renourishment cycles. The areas to receive renourishment are mainly in contracts. Similarly, both the engineering and the environmental monitoring costs are estimated for 50 years. Note that only the inlet bypassing and CPF nourishment is for 50 years; otherwise renourishment is for 30 years, with proactive breach response for years 31-50. Table 31 of the Main Report provides a description by sub-reach of what is provided over the project life cycle.

With regards to net benefits and beachfill plan 3a providing the greatest storm damage reduction benefits (as outlined in the Main Report), there was not a Cost ATR conducted on the project cost estimates used to determine the benefits - the initial formulation estimates were done several years ago (sometime around 2009-2010). The initial formulation efforts, which included an initial Screening of Measures, preliminary design of alternatives, and design optimization are described in detail in Appendix E - Plan Formulation. In May 2009, a draft Formulation Report was provided to the partner agencies, the Department of Interior and the State of New York Department of Environmental Conservation for review and comment. There is no record of an ATR performed on these measures/alternatives.

Lands and Damages (01 Account) costs were received from Real Estate Division. Contract 2 is the only one with no real estate costs assigned to it.

The periodic renourishment volumes at each location are to be placed at 4-year cycles subsequent to commencement of construction and throughout the 30-year economic life. For contracts 1 and 2, the renourishment volumes are to be placed every 2 years. As such, the cost for these two reaches have been doubled in the calculation of renourishment costs for the 4-year cycles. The renourishment beach fill is assumed to be placed in the same manner as the beach fill for the main contracts; with a large hopper dredge pumping the fill onto the shore, and a shore crew placing the material. Additional renourishment costs due to adapting the design for the “intermediate” sea-level change (SLC) scenario have been incorporated into the costs as well. They can be found on the last page of the TPCS, and backup can be found in the cost product documentation and after the annualized renourishment costs shown in Table C-2.

Major rehabilitation costs are for restoring the design profile due to significant storm events beyond those that were designed for in the renourishment cycle. The threshold at which major rehabilitation costs are incurred is based on the storm event that causes the erosion volume to exceed 15 cy/lf along the beach front. This is the

average nourishment volume anticipated to be available at the midpoint of the renourishment cycle because the significant storm event has a 50% chance of occurring earlier or later than the cycle midpoint. Annualized major rehab costs are shown in Table C-3.

Monitoring Costs are shown in Table C-4; additional information on these costs can be found in the Monitoring Appendix (Appendix I).

The Cost Apportionment for this project can be found in table C-5. The initial construction cost is 100% Federally-Funded; however, the continuing construction costs are shared by the Federal Government and the local sponsor. The cost share for coastal restoration projects is 65%/35%. O&M and Major Rehab costs are the responsibility of the non-Federal sponsor.

The TSP with the Intermediate SLC scenario has been certified. The TSP was previously certified by Walla Walla in August of 2016. Both the current and previous certifications can be found at the end of this appendix.

****Note** - the costs presented in this appendix represent the intermediate SLC scenario. The reduction in cost from what is shown for the Low SLC scenario is simply the removal of the SLC Adaptation costs from the 'Continuing Construction' costs, which amount to $26.16m. The array of costs for the different scenarios can be found in Table C-2, where the costs and benefits for the Low, Intermediate, and High SLC Scenarios are all shown. Additionally, the SLC adaptation cost is shown in Table C-7. The Low SLC version of this table is shown in pdf below, for comparison (double click to open).**

FIMP, Fire Island Inlet to Montauk Point, NY

Cost Apportionment*

Cost-Sharing	Federal Share	Non-Federal Share	Total
Project First Costs			
Cash Contribution	$ 1,367,656,000	$ -	$ 1,367,656,000
Real Estate Lands & Damages	$ 153,277,000	$ -	$ 153,277,000
TOTAL FIRST COST	$ 1,520,933,000	$ -	$ 1,520,933,000
Continuing Construction First Cost			
Scheduled Beach Renourishment, Westhampton & Pikes (a)	$ 85,936,000	$ 85,936,000	$ 171,872,000
Scheduled Beach Renourishment, All Others (b)	$ 612,420,000	$ 329,765,000	$ 942,185,000
Environmental Monitoring (c)	$ 71,715,000	$ 38,616,000	$ 110,331,000
Engineering Monitoring	$ 35,030,000	$ 18,862,000	$ 53,892,000
SLC Adaptation			
Breach Closure (d)	$ 76,270,000	$ 41,069,000	$ 117,339,000
SUBTOTAL CONTINUING CONSTRUCTION COST	**$ 881,371,000**	**$ 514,248,000**	**$ 1,395,619,000**
TOTAL CUMULATIVE CONSTRUCTION COST (e)	**$ 2,402,304,000**	**$ 514,248,000**	**$ 2,916,552,000**
Emergency Beach Fill (f)	$ -	$ 56,329,000	$ 56,329,000
Annual Beach & Groin Maintenance Cost	$ -	$ 660,000	$ 660,000
TOTAL ANNUAL O&M COSTS	**$ -**	**$ 56,989,000**	**$ 56,989,000**

* October 2018 Price Level
** Shared based on 65% Federal and 35% non-Federal for construction and renourishment
(a) Beach Renourishment = roughly every 4-year cycle; cost share 50% Federal, 50% Non-Federal.
(b) Beach Renourishment = roughly every 4-year cycle; cost share 65% Federal, 35% Non-Federal.
(c) Environmental Monitoring varies yearly and is broken down in the Environmental Monitoring Cost Table
(d) Both Proactive and Reactive breach closure costs
(e) Cumulative Costs include Total First Cost and Cumulative Construction
(f) Emergency Beach Fill = Assumed to happen every 4 years similar to renourishment

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Table C-1 – Initial Construction Costs and MII/Cost Backup (Project First Cost)

(double-click to open in Adobe)

FIRE ISLAND INLET TO MONTAUK POINT, NY
Tentative Selected Plan with Post Sandy Amendments
Summary of Components

	Contracts	NOTES	Cost	Duration (Mo.)	Contract Start (NTP)	Midpoint	Finish	PRICE LEVEL
1	Inlet Dredging: Fire Island	First Cost	$ 22,422,681	8.00	10-Nov-20	27-Feb-21	17-Jun-21	Oct-18
2	Inlet Dredging: Moriches, Shinnecock	First Cost	$ 14,576,308	7.00	16-Apr-21	29-Jul-21	11-Nov-21	Oct-18
3	Tiana Beach, Downtown Montauk Beachfill	First Cost	$ 30,759,113	7.00	10-Nov-20	10-Feb-21	13-May-21	Oct-18
4	Smith's Point/Westhampton Beachfill	First Cost	$ 11,618,877	7.00	14-Jun-21	16-Sep-21	20-Dec-21	Oct-18
5	Ocean Beach Groin Modifications	First Cost	$ 3,864,496	6.00	3-Sep-21	26-Nov-21	18-Feb-22	Oct-18
6	Year 1 Non-Structural Inventory	First Cost	$ 73,610,178	14.00	5-Sep-22	30-Mar-23	23-Oct-23	Oct-18
7	Year 2 Non-Structural Inventory	First Cost	$ 147,220,356	14.00	7-Sep-23	31-Mar-24	24-Oct-24	Oct-18
8	Year 3 Non-Structural Inventory	First Cost	$ 184,025,445	14.00	5-Sep-24	30-Mar-25	23-Oct-25	Oct-18
9	Year 4 Non-Structural Inventory	First Cost	$ 184,025,445	14.00	8-Sep-25	2-Apr-26	26-Oct-26	Oct-18
10	Year 5 Non-Structural Inventory	First Cost	$ 64,188,075	14.00	7-Sep-26	1-Apr-27	25-Oct-27	Oct-18
11	Coastal Process Features - Initial Only	First Cost	$ 18,022,391	7.00	11-Feb-21	22-May-21	30-Aug-21	Nov-18
	Fish & Wildlife Facilities Costs (Initial Enviro Monitoring)	First Cost; Included in 06 Acct	$ 780,000	n/a				Oct-18
	Cultural Resources	First Cost	$ 11,500,000	n/a				Oct-18
		Total:	**$ 766,613,365**					
		Project Duration:	109 months					

(tracks to CWBS Initial contract cost on TPCS summary sheet, cell M24)
Does not include cost-shared costs - renourishment, monitoring, breach closure

Table C-2 – Annualized Cost

(double-click to open in Adobe)

Table C-2: Annualized Cost Summary - Recommended Plan				
Price level October 2018, Federal Discount Rate 2.875%, Base year 2028				
		Low SLC*	Intermediate SLC*	High SLC*
	02 Relocations	$0	$0	$0
	06 Fish & Wildlife Facilities	$1,016,000	$1,016,000	$1,016,000
	10 Breakwater & Seawalls	$5,033,900	$5,033,900	$5,033,900
	17 Beach Replenishment	$126,872,400	$126,872,400	$126,872,400
	18 Cultural Resources	$14,979,900	$14,979,900	$14,979,900
	19 Buildings, Grounds & Utilities	$850,688,300	$850,688,300	$850,688,300
	Construction Estimate Totals	***$998,590,500***	***$998,590,500***	***$998,590,500***
	01 Land and Damages	$153,276,600	$153,276,600	$153,276,600
	30 Planning, Engineering & Design	$281,281,000	$281,281,000	$281,281,000
	31 Construction Management	$87,784,800	$87,784,800	$87,784,800
	Project Cost Totals	***$1,520,932,900***	***$1,520,932,900***	***$1,520,932,900***
	IDC	$29,661,300	$29,661,300	$29,661,300
	Investment Cost	**$1,550,594,200**	**$1,550,594,200**	**$1,550,594,200**
Annualized Cost	Amortized Investment Cost	$58,842,000	$58,842,000	$58,842,000
	Periodic Renourishment for 30 years	$20,879,000	$20,879,000	$20,879,000
	Inlet Bypassing for 50 years (includies ebb shoal dredging)	$9,340,000	$9,340,000	$9,340,000
	Proactive Breach Closure	$685,000	$636,000	$468,000
	Breach Closure Costs	$839,000	$1,162,000	$3,060,000
	Coastal/Engineering Monitoring	$1,264,300	$1,264,300	$1,264,300
	Environmental Monitoring	$2,332,000	$2,332,000	$2,332,000
	O&M	$659,600	$659,600	$659,600
	Emergency Beach Fill	$1,891,000	$1,891,000	$1,891,000
	SLC Adaptation [1]	$0	$647,000	$3,134,000
	Total Annual Cost	**$96,731,900**	**$97,652,900**	**$101,869,900**
Damages	Damages – Breach Open	$9,314,000	$26,999,000	$139,081,000
	Damages – Back Bay Inundation	$77,920,000	$81,351,000	$256,539,000
	Damages - Shore Front	$7,002,500	$8,004,000	$13,450,000
	Total Damages	***$94,236,500***	***$116,354,000***	***$409,070,000***
	Benefits – Breach Open	$10,148,000	$33,268,000	$482,197,000
	Benefits – Back Bay Inundation	$81,572,000	$133,317,000	$288,701,000
	Benefits – Shore Front	$8,293,000	$8,289,000	$7,926,000
	Total Storm Damage Reduction Benefits	***$100,013,000***	***$174,874,000***	***$778,824,000***
	Cost Avoided – Breach Closure	$3,148,000	$4,296,000	$11,558,000
	Non-Federal Renourishment Cost Avoided	3,007,200	3,007,200	3,007,200
	Recreation Benefits	$24,623,000	$24,623,000	$24,623,000
	Total Benefits	**$130,791,200**	**$206,800,200**	**$818,012,200**
	Net Benefits (Damage Reduction Only)	**$34,059,300**	**$109,147,300**	**$716,142,300**
	BCR	**1.35**	**2.12**	**8.03**

1 - Low SLC, Int. SLC, and High SLC based on USACE guidance. ETL, dated 30 June 2014.

Table C-3 – Renourishment Cost

(double-click to open in Adobe)

Fire Island to Montauk Point, NY

FIMP Periodic Nourishment Costs
Recommended Plan (Oct 18 PL)

Inlet Management Costs (Per 4-yr Renourishment Cycle)			$	28,652,564
		Mob & Demob	$	-
		Subtotal	$	28,653,000
	Contingency	30.26%	$	8,671,000
		E&D	$	2,985,900
		Construction Management	$	2,851,500
		Total Cost Per Operation	$	43,161,400
Renourishment/Sediment Management			$	79,216,000
Costs (Per 4-yr Renourishment Cycle; Yr 4 Only)		Mob & Demob	$	13,352,000
		Subtotal	$	92,568,000
	Contingency	30.26%	$	28,012,000
		E&D	$	9,646,300
		Construction Management	$	7,922,600
		Total Cost Per Operation	$	138,148,900
Renourishment/Sediment Management				$59,315,000
Costs (Per 4-yr Renourishment Cycle; Yrs 8-23 Only)		Mob & Demob	$	13,352,000
		Subtotal	$	72,667,000
	Contingency	30.26%	$	21,990,000
		E&D	$	7,572,500
		Construction Management	$	6,428,300
		Total Cost Per Operation	$	108,657,800
Renourishment/Sediment Management				$81,964,000
Costs (Per 6-yr Renourishment Cycle; Yrs 24-30 Only)		Mob & Demob	$	13,352,000
		Subtotal	$	95,316,000
	Contingency	30.26%	$	28,843,000
		E&D	$	7,572,500
		Construction Management	$	6,194,100
		Total Cost Per Operation	$	137,925,600
Ebb Shoal				$17,370,400
Costs (Per 4-yr Renourishment Cycle; Yrs 31-50 Only)		Mob & Demob		
		Subtotal	$	17,371,000
	Contingency	30.26%	$	5,257,000
		E&D	$	1,810,200
		Construction Management	$	1,832,000
		Total Cost Per Operation	$	26,270,200

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Table C-4 – Emergency Beach Fill Cost

(double-click to open in Adobe)

Fire Island to Montauk Point, NY

FIMP Emergency Beach Fill Costs (Oct 18 PL)

MINIMUM REAL ESTATE BASLINE, MEDIUM DESIGN TEMPLATE
GSB-2A-2D, GSB-3A, GSB-3C, GSB-3E, GSB-3G, MB-1A-1B, MB-2A (Fire Island)

Return Period (yr)	Frequency (events/yr)	Frequency Interval	Permanent Loss Factor (%)	Erosion Volume (cy/ft)	Emergency Fill (cy/ft)	Average Emergency Fill (cy)	Average Emergency Fill ($)	Annual Emergency Fill ($)	Annual Emergency Fill (cy/yr)
10	0.1		16%	18.50	2.96				
		0.05				233,050	$8,156,744	$ 407,837	11,652
20	0.05		22%	20.69	4.55				
		0.03				327,262	$11,454,168	$ 343,625	6,545
50	0.02		27%	22.21	6.00				
		0.01				421,316	$14,746,053	$ 147,461	4,213
100	0.01		33%	22.98	7.58				
		0.005				515,149	$18,030,229	$ 90,151	2,576
200	0.005		38%	23.74	9.02				
Total Fill Length (ft):		62,049	63,095						
TOTAL REHABILITATION VOLUME:						**1,496,777**			**24,987**

MINIMUM REAL ESTATE BASLINE, MEDIUM DESIGN TEMPLATE
MB-2C-2E (Westhampton)

Return Period (yr)	Frequency (events/yr)	Frequency Interval	Permanent Loss Factor (%)	Erosion Volume (cy/ft)	Emergency Fill (cy/ft)	Average Emergency Fill (cy)	Average Emergency Fill ($)	Annual Emergency Fill ($)	Annual Emergency Fill (cy/yr)
10	0.1		16%	15.25	2.44				
		0.05				76,941	$2,692,924	$ 134,646	3,847
20	0.05		22%	17.07	3.76				
		0.03				108,872	$3,810,534	$ 114,316	2,177
50	0.02		27%	18.56	5.01				
		0.01				141,331	$4,946,575	$ 49,466	1,413
100	0.01		33%	19.30	6.37				
		0.005				173,906	$6,086,701	$ 30,434	870
200	0.005		38%	20.09	7.63				
Total Fill Length (ft):		24,838	26,872						
TOTAL REHABILITATION VOLUME:						**501,050**			**8,307**

Subtotal Annualized Emergency Fill Cost	**$1,318,000**	**$15.17**
Subtotal Emergency Fill (every 4 year total):	**$5,272,000**	
Construction Contingency:	**$1,595,000**	
E&D (Incl. Contingency):	**$549,000**	
S&A (Incl. Contingency):	**$631,000**	
Total Emergency Fill Cost (every 4 year total):	**$8,047,000**	
Total Emergency Fill for Project:	**$56,329,000**	
Total Annualized Emergency Fill Cost:	**$1,891,000**	

Notes:
Loss Factor: This is the percent of eroded volume permanently lost to the profile. The factors are based on experience at Ocean City, Md.
Erosion Volume:
Maximum erosion volume landward of a given profile position computed from SBEACH (50,100 and 200 year storms extraploated from northeasters)
Emergency Fill Cost: Based on for trucked sand (cy) = $35

Full Cost (With E&D/S&A and Contingency)

YEAR	FUTURE WORK	PRESENT WORTH FACTOR	PRESENT WORTH
0	$0	1.00000	$0
4	$8,047,000	0.89281	$7,184,468
8	$8,047,000	0.79712	$6,414,388
12	$8,047,000	0.71168	$5,726,850
16	$8,047,000	0.63539	$5,113,008
20	$8,047,000	0.56729	$4,564,961
24	$8,047,000	0.50648	$4,075,657
28	$8,047,000	0.45219	$3,638,801
32	$8,047,000	0.40372	$3,248,769
36	$8,047,000	0.36045	$2,900,544
40	$8,047,000	0.32181	$2,589,644
44	$8,047,000	0.28732	$2,312,068
48	$8,047,000	0.25652	$2,064,245
SUM OF PRESENT WORTHS	$96,564,000		$49,833,403
TOTAL ANNUAL COST			**$1,891,000**

Interest Rate 2.875%
n=50 years 50

Table C-5 – Environmental Monitoring Cost

(double-click to open in Adobe)

Fire Island to Montauk Point (FIMP)

Environmental Monitoring Costs

			PRESENT	
	1	$8,505,980	0.97205	$8,268,267
	2	$2,123,240	0.94489	$2,006,224
	3	$2,123,240	0.91848	$1,950,157
	4	$2,123,240	0.89281	$1,895,657
	5	$2,123,240	0.86786	$1,842,680
	6	$2,123,240	0.84361	$1,791,183
	7	$2,123,240	0.82003	$1,741,126
	8	$2,123,240	0.79712	$1,692,467
	9	$2,123,240	0.77484	$1,645,169
	10	$2,123,240	0.75318	$1,599,192
	11	$2,123,240	0.73214	$1,554,500
	12	$2,123,240	0.71168	$1,511,057
	13	$2,123,240	0.69179	$1,468,828
	14	$2,123,240	0.67245	$1,427,780
	15	$2,123,240	0.65366	$1,387,878
	16	$2,123,240	0.63539	$1,349,092
	17	$2,123,240	0.61764	$1,311,389
	18	$2,123,240	0.60038	$1,274,741
	19	$2,123,240	0.58360	$1,239,116
	20	$2,123,240	0.56729	$1,204,487
	21	$2,123,240	0.55143	$1,170,826
	22	$2,123,240	0.53602	$1,138,105
	23	$2,123,240	0.52104	$1,106,299
	24	$2,123,240	0.50648	$1,075,382
	25	$2,123,240	0.49233	$1,045,329
	26	$2,123,240	0.47857	$1,016,115
	27	$2,123,240	0.46519	$987,718
	28	$2,123,240	0.45219	$960,115
	29	$2,123,240	0.43956	$933,283
	30	$2,123,240	0.42727	$907,201
	31	$2,123,240	0.41533	$881,848
	32	$1,992,980	0.40372	$804,614
	33	$1,992,980	0.39244	$782,128
	34	$1,992,980	0.38147	$760,270
	35	$1,992,980	0.37081	$739,024
	36	$1,992,980	0.36045	$718,370
	37	$1,992,980	0.35038	$698,294
	38	$2,123,240	0.34059	$723,144
	39	$1,992,980	0.33107	$659,810
	40	$1,992,980	0.32181	$641,371
	41	$1,992,980	0.31282	$623,446
	42	$1,992,980	0.30408	$606,023
	43	$1,992,980	0.29558	$589,087
	44	$1,992,980	0.28732	$572,624
	45	$1,992,980	0.27929	$556,621
	46	$2,123,240	0.27149	$576,429
	47	$1,992,980	0.26390	$525,945
	48	$1,992,980	0.25652	$511,246
	49	$1,992,980	0.24935	$496,959
	50	$1,992,980	0.24239	$483,071
Contingency %:		30.26%		
Sum of Present Worths:		$110,331,000		$61,451,690
TOTAL ANNUAL COST				**$2,332,000**

Table C-6 – Engineering Monitoring Cost

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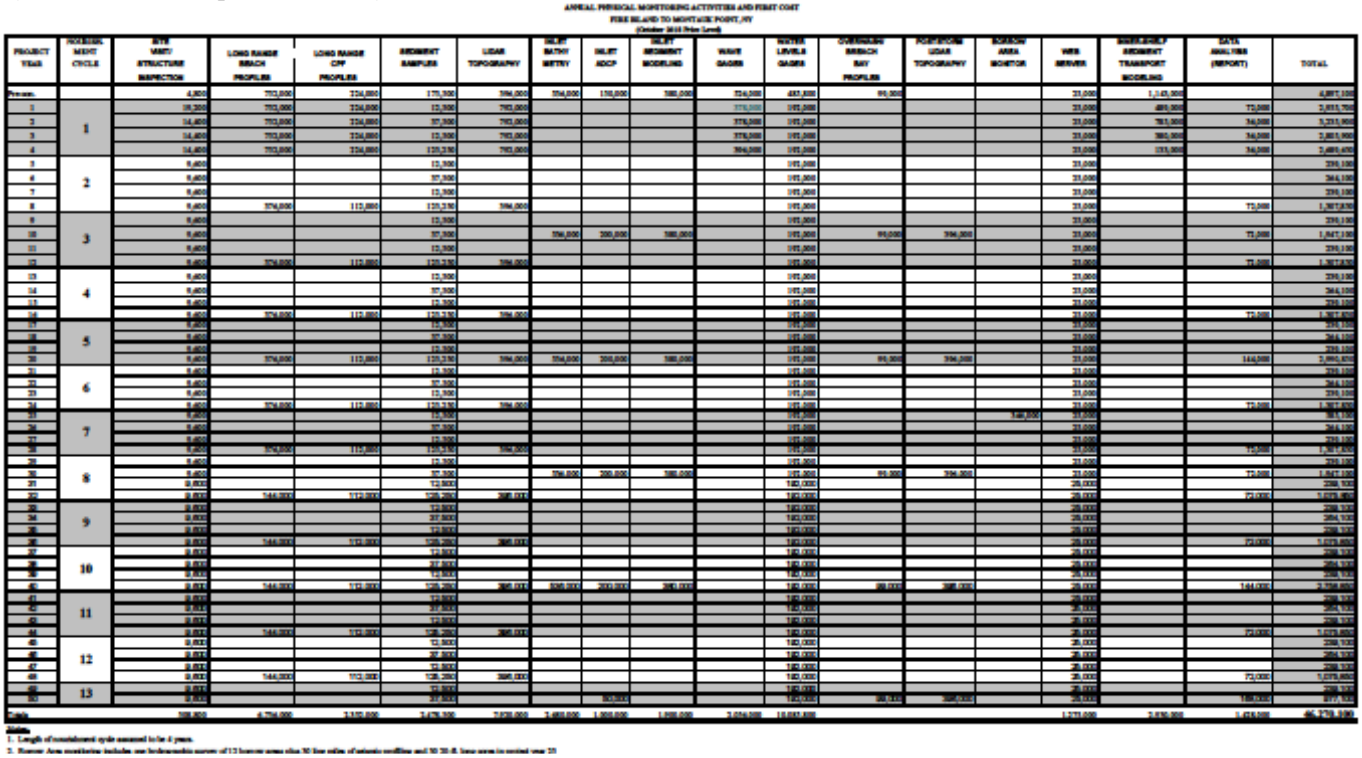

Table C-7 – Cost Apportionment

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FIMP, Fire Island Inlet to Montauk Point, NY

Cost Apportionment*

Cost-Sharing	Federal Share	Non-Federal Share	Total
Project First Costs			
Cash Contribution	$ 1,367,656,000	$ -	$ 1,367,656,000
Real Estate Lands & Damages	$ 153,277,000	$ -	$ 153,277,000
TOTAL FIRST COST	$ 1,520,933,000	$ -	$ 1,520,933,000
Continuing Construction First Cost			
Scheduled Beach Renourishment, Westhampton & Pikes (a)	$ 85,936,000	$ 85,936,000	$ 171,872,000
Scheduled Beach Renourishment, All Others (b)	$ 612,420,000	$ 329,765,000	$ 942,185,000
Environmental Monitoring (c)	$ 71,715,000	$ 38,616,000	$ 110,331,000
Engineering Monitoring	$ 35,030,000	$ 18,862,000	$ 53,892,000
SLC Adaptation	$ 17,009,000	$ 9,159,000	$ 26,168,000
Breach Closure (d)	$ 76,270,000	$ 41,069,000	$ 117,339,000
SUBTOTAL CONTINUING CONSTRUCTION COST	**$ 898,380,000**	**$ 523,407,000**	**$ 1,421,787,000**
TOTAL CUMULATIVE CONSTRUCTION COST (e)	**$ 2,419,313,000**	**$ 523,407,000**	**$ 2,942,720,000**
Emergency Beach Fill (f)	$ -	$ 56,329,000	$ 56,329,000
Annual Beach & Groin Maintenance Cost	$ -	$ 660,000	$ 660,000
TOTAL ANNUAL O&M COSTS	**$ -**	**$ 56,989,000**	**$ 56,989,000**

* October 2018 Price Level

** Shared based on 65% Federal and 35% non-Federal for construction and renourishment

(a) Beach Renourishment = roughly every 4-year cycle; cost share 50% Federal, 50% Non-Federal.

(b) Beach Renourishment = roughly every 4-year cycle; cost share 65% Federal, 35% Non-Federal.

(c) Environmental Monitoring varies yearly and is broken down in the Environmental Monitoring Cost Table

(d) Both Proactive and Reactive breach closure costs

(e) Cumulative Costs include Total First Cost and Cumulative Construction

(f) Emergency Beach Fill = Assumed to happen every 4 years similar to renourishment

8

Total Project Cost Summary

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

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PROJECT: Fire Island to Montauk Point, General Reevaluation Report
PROJECT NO: 403357
LOCATION: Fire Island to Montauk Point, NY
DISTRICT: New York District
POC: CHIEF, COST ENGINEERING, Mukesh Kumar
PREPARED: 9/20/2019

This Estimate reflects the scope and schedule in report: FIMP GRR

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)			
						Program Year (Budget EC): 2019 Effective Price Level Date: 1 OCT 18									
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	Spent Thru: 10/1/2018 ($K)	TOTAL FIRST COST ($K) K	INFLATED (%) L	COST ($K) M	CNTG ($K) N	FULL ($K) O
06	FISH & WILDLIFE FACILITIES	$780	$236	30.26%	$1,016	0.0%	$780	$236	$1,016	$0	$1,016	3.5%	$808	$244	$1,052
10	BREAKWATER & SEAWALLS	$3,864	$1,169	30.26%	$5,034	0.0%	$3,864	$1,169	$5,034	$0	$5,034	6.1%	$4,101	$1,241	$5,342
17	BEACH REPLENISHMENT (Initial Beachfill Only)	$79,377	$24,019	30.26%	$103,396	0.0%	$79,377	$24,019	$103,396	$0	$103,396	4.6%	$82,995	$25,114	$108,110
17	BEACH REPLENISHMENT (Initial CPF Only)	$18,022	$5,454	30.26%	$23,476	0.0%	$18,022	$5,454	$23,476	$0	$23,476	17.2%	$21,116	$6,390	$27,506
18	CULTURAL RESOURCE PRESERVATION	$11,500	$3,480	30.26%	$14,980	0.0%	$11,500	$3,480	$14,980	$0	$14,980	5.3%	$12,106	$3,663	$15,769
19	BUILDINGS, GROUNDS & UTILITIES	$653,069	$197,619	30.26%	$850,688	0.0%	$653,069	$197,619	$850,688	$0	$850,688	12.7%	$736,063	$222,733	$958,796
	CONSTRUCTION ESTIMATE TOTALS:	$766,613	$231,977		$998,591	0.0%	$766,613	$231,977	$998,591	$0	$998,591	11.8%	$857,189	$259,385	$1,116,575
01	LANDS AND DAMAGES	$127,730	$25,546	20.00%	$153,277	0.0%	$127,730	$25,546	$153,277	$0	$153,277	5.7%	$134,972	$26,994	$161,966
30	PLANNING, ENGINEERING & DESIGN	$215,938	$65,343	30.26%	$281,281	0.0%	$215,938	$65,343	$281,281	$0	$281,281	19.9%	$258,824	$78,320	$337,144
31	CONSTRUCTION MANAGEMENT	$67,392	$20,393	30.26%	$87,785	0.0%	$67,392	$20,393	$87,785	$0	$87,785	24.6%	$84,004	$25,419	$109,423
	PROJECT COST TOTALS:	$1,177,674	$343,259	29.15%	$1,520,933		$1,177,674	$343,259	$1,520,933	$0	$1,520,933	13.4%	$1,334,989	$390,119	$1,725,108
	Renourishment/Monitoring/Breach Closure Costs														
06	FISH & WILDLIFE FACILITIES	$84,700	$25,630	30.26%	$110,330	0.0%	$84,700	$25,630	$110,330	$0	$110,330	72.9%	$146,417	$44,306	$190,723
17	BEACH REPLENISHMENT (Breach Closure Costs)	$76,200	$23,058	30.26%	$99,258	0.0%	$76,200	$23,058	$99,258	$0	$99,258	78.4%	$135,903	$41,124	$177,027
17	BEACH REPLENISHMENT (Beachfill Renourishment)	$613,279	$185,578	30.26%	$798,857	0.0%	$613,279	$185,578	$798,857	$0	$798,857	64.4%	$1,008,227	$305,090	$1,313,317
17	BEACH REPLENISHMENT (CPF Renourishment)	$121,460	$36,754	30.26%	$158,213	0.0%	$121,460	$36,754	$158,213	$0	$158,213	79.2%	$217,713	$65,880	$283,593
17	BEACH REPLENISHMENT (SLC Adaptation)	$20,069	$6,079	30.26%	$26,168	0.0%	$20,069	$6,079	$26,168	$0	$26,168	48.3%	$29,784	$9,013	$38,796
	E&D and S&A														
30	PLANNING, ENGINEERING & DESIGN	$117,490	$35,552	30.26%	$153,042	0.0%	$117,490	$35,552	$153,042	$0	$153,042	269.5%	$434,144	$131,372	$565,516
31	CONSTRUCTION MANAGEMENT	$58,281	$17,636	30.26%	$75,917	0.0%	$58,281	$17,636	$75,917	$0	$75,917	298.8%	$232,458	$70,327	$302,784
	RENOURISHMENT COST TOTALS:	$1,091,499	$330,287	30.26%	$1,421,786		$1,091,499	$330,287	$1,421,786	$0	$1,421,786	102.0%	$2,204,596	$667,111	$2,871,707

CHIEF, COST ENGINEERING, Mukesh Kumar

PROJECT MANAGER, Frank Verga

CHIEF, REAL ESTATE,

ESTIMATED INITIAL PROJECT COST: **$1,725,108**

ESTIMATED RENOURISHMENT PROJECT COST: **$2,871,707**

ESTIMATED TOTAL PROJECT COST: **$4,596,815**

Filename: FIMP TPCS FY19 update_FINALrev_ATR.xlsx
TPCS

Cost & Schedule Risk Analysis (CSRA) Results

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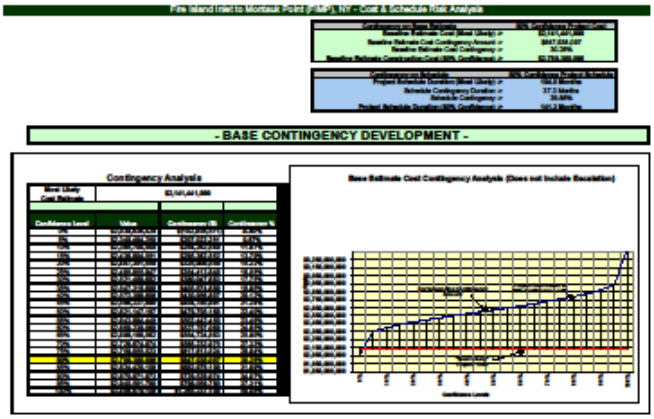
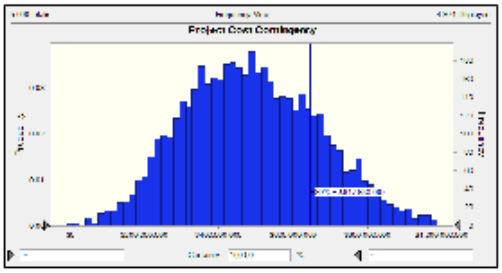
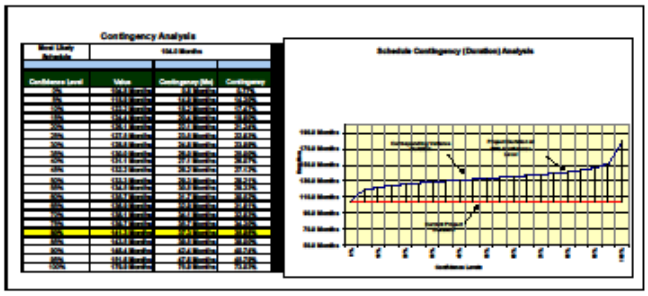
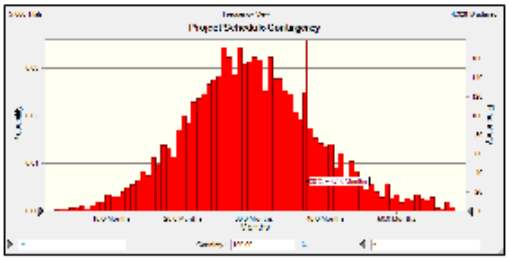


- BASE CONTINGENCY DEVELOPMENT -



- SCHEDULE CONTINGENCY (DURATION) DEVELOPMENT -





Schedule

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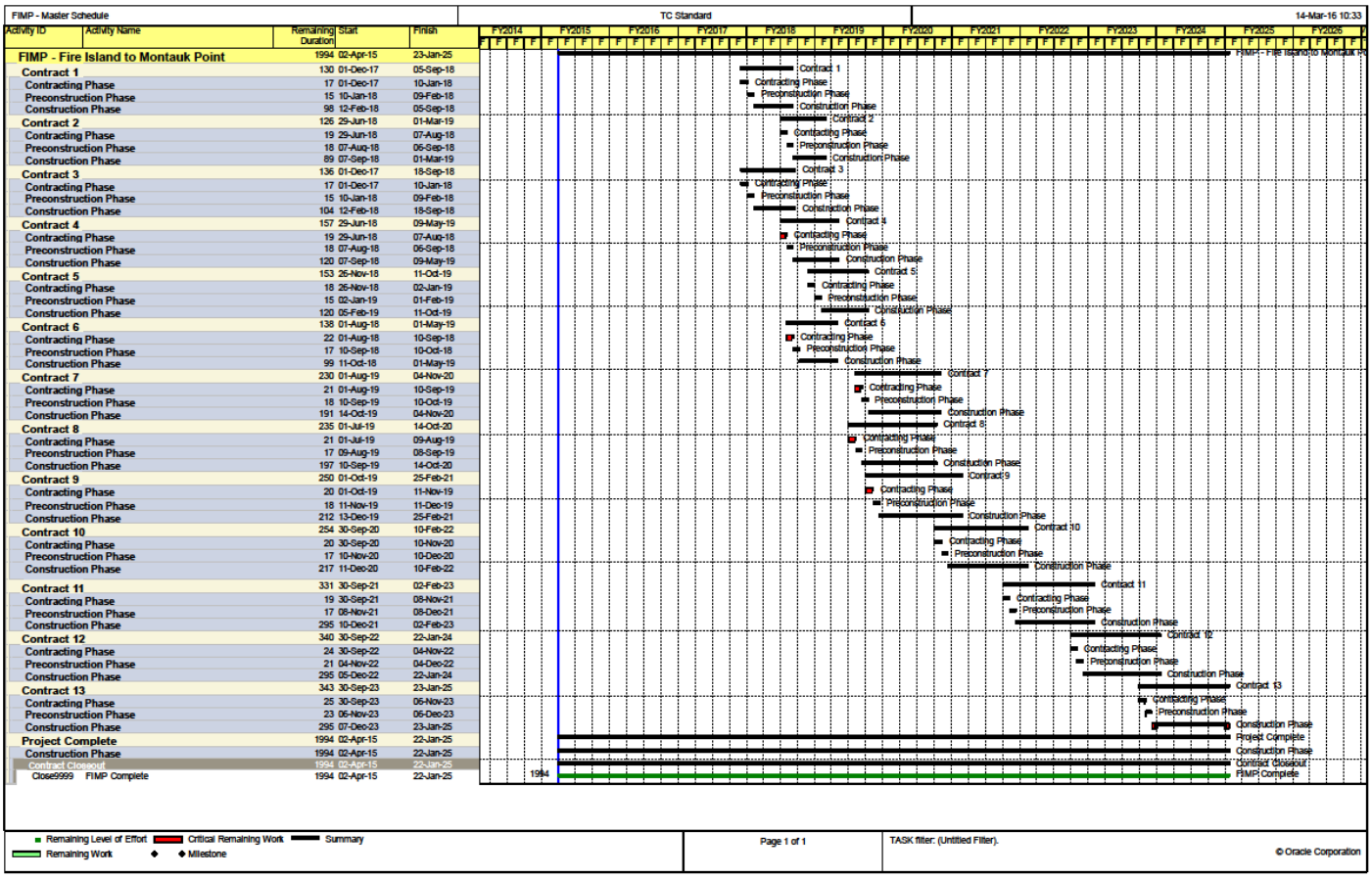

ATR/Cost Certification

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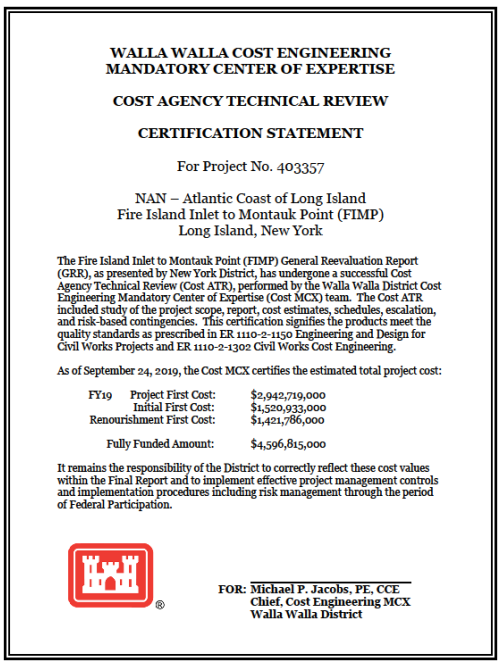


WALLA WALLA COST ENGINEERING
MANDATORY CENTER OF EXPERTISE

COST AGENCY TECHNICAL REVIEW

CERTIFICATION STATEMENT

For Project No. 403357

NAN – Atlantic Coast of Long Island
Fire Island Inlet to Montauk Point (FIMP)
Long Island, New York

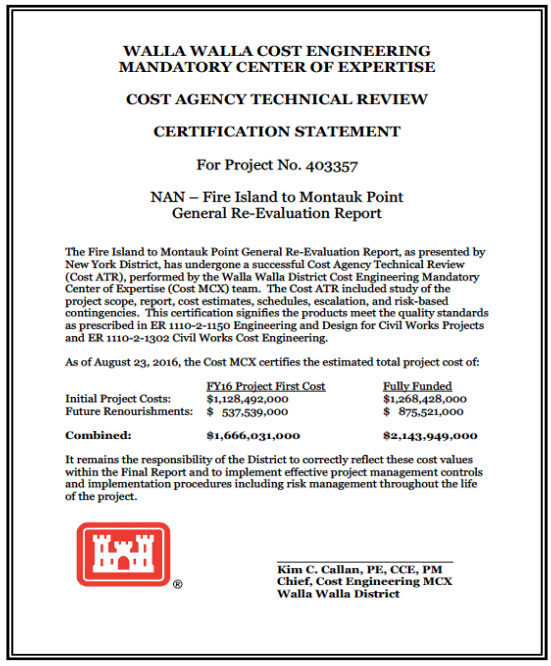
The Fire Island Inlet to Montauk Point (FIMP) General Reevaluation Report (GRR), as presented by New York District, has undergone a successful Cost Agency Technical Review (Cost ATR), performed by the Walla Walla District Cost Engineering Mandatory Center of Expertise (Cost MCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of September 24, 2019, the Cost MCX certifies the estimated total project cost:

FY19	Project First Cost:	$2,942,719,000
	Initial First Cost:	$1,520,933,000
	Renourishment First Cost:	$1,421,786,000
	Fully Funded Amount:	$4,596,815,000

It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management through the period of Federal Participation.

FOR: **Michael P. Jacobs, PE, CCE**
Chief, Cost Engineering MCX
Walla Walla District



WALLA WALLA COST ENGINEERING
MANDATORY CENTER OF EXPERTISE

COST AGENCY TECHNICAL REVIEW

CERTIFICATION STATEMENT

For Project No. 403357

NAN – Fire Island to Montauk Point
General Re-Evaluation Report

The Fire Island to Montauk Point General Re-Evaluation Report, as presented by New York District, has undergone a successful Cost Agency Technical Review (Cost ATR), performed by the Walla Walla District Cost Engineering Mandatory Center of Expertise (Cost MCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of August 23, 2016, the Cost MCX certifies the estimated total project cost of:

	FY16 Project First Cost	Fully Funded
Initial Project Costs:	$1,128,492,000	$1,268,428,000
Future Renourishments:	$ 537,539,000	$ 875,521,000
Combined:	**$1,666,031,000**	**$2,143,949,000**

It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management throughout the life of the project.

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