SOUTH SHORE OF STATEN ISLAND, NY
COASTAL STORM RISK MANAGEMENT

INTERIM FEASIBILITY STUDY
FOR
FORT WADSWORTH TO OAKWOOD BEACH

Cost Appendix

US Army Corps of Engineers
New York District

September 2016

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ATTACHMENTS

Attachment A – CSRA
Attachment B – MII

1.0 INTRODUCTION

This appendix provides the detailed cost estimate for the National Economic Development (NED) Plan described in the South Shore of Staten Island Interim Feasibility Study for Fort Wadsworth to Oakwood Beach. The plan will provide coastal flood risk management along portions of the Staten Island, New York shoreline.

The project area consists of approximately five miles of coastline in the Borough of Staten Island, New York City, New York, extending along Lower New York Bay and Raritan Bay. The approximate western and eastern limits of the study area are Oakwood Beach and the easternmost point of land within Fort Wadsworth at the Narrows, respectively.

The coastal flood risk management project consists of two components: the primary Line of Protection (LOP) and Interior Drainage Features.

1.1 Line of Protection Features

The LOP extends from Oakwood Beach at the western end to Fort Wadsworth at the eastern end and consists of a buried seawall/armored levee along a majority of the reach (approximately 80%) serving as the first line of defense against severe coastal surge flooding and wave forces. The remainder of the Plan consists of a T-Type Vertical Floodwall, and Levee. The Plan also includes a closure structure at Hylan Boulevard, drainage control structures for existing storm water outfalls, tide gate structures, and vehicle and pedestrian access structures. The LOP was split into four engineering reaches based on different design sections as listed below:

- Reach A-1: Levee
- Reach A-2: Levee
- Reach A-3: Floodwall
- Reach A-4: Buried Seawall

Starting in Oakwood Beach in Shoreline Reach A-1, the earthen levee with a 10-foot wide crest ties into high ground on the northwest side of Hylan Boulevard. The earthen levee continues southeast through Oakwood Beach parallel to Oakwood Creek and Buffalo Street until the levee crosses over Oakwood Creek. A tide gate structure is proposed at this location. The total length of this Shoreline Reach A-1 is 2,800 ft.

Shoreline Reach A-2 is a 600 foot long earthen levee section with a 15-foot wide crest as a functional replacement of the existing boardwalk and esplanade to accommodate maintenance vehicles accessing the tide gate structure. This wider levee section begins on the south side of the tide gate and terminates at the northwest corner of the Oakwood Beach Waste Water Treatment Plant.

In Shoreline Reach A-3 the structure transitions from an earthen levee to a vertical concrete T-shaped floodwall due to the limited area between Oakwood Creek and the Oakwood Beach Waste Water Treatment Plant (WWTP). The 1,800 foot long vertical floodwall protects the west and south sides of the WWTP.

Shoreline Reach A-4 extends 22,700 feet from the southeast corner of the WWTP to Fort Wadsworth. The LOP includes a continuous buried seawall structure at a consistent height of 20.5 feet NGVD. The proposed alignment in this area is landward of New York City's sanitary sewer interceptor to the WWTP. A bend in the alignment occurs at the eastern end of Oakwood Beach to accommodate a second proposed tide gate structure.

From Midland Beach to Fort Wadsworth the alignment generally follows the footprint of the existing promenade and FDR Boardwalk. There are a few exceptions where the alignment was shifted landward to maintain a protective buffer between the shoreline and buried seawall/armored levee. This is most noticeably at the eastern end of the project area where the beach narrows. The buried seawall/armored levee ties-in to high ground at Fort Wadsworth.

Approximately 80% of NYC's sanitary sewer interceptor is landward of the line of protection. For areas where the interceptor is seaward of the line of protection, the design includes service vehicle access seaward of the buried seawall to facilitate operation and maintenance of the wall and interceptor pipe. The access construction includes the elevation of the interceptor manholes to +10 feet NGVD, and sealing of the manhole covers. The area seaward of the buried seawall and the interceptor includes a low lying area that will be restored to a tidal wetland. The tidal wetland area limits exposure to high wave energy or erosion

1.2 Interior Drainage Features

Interior drainage features for drainage areas A, B and D include only the minimum facilities necessary to limit residual flooding. Interior drainage features for drainage areas C and E include optimized features. The interior drainage features are summarized below. Full details of the interior drainage components are described in the Interior Drainage Appendix.

Area A: The Minimum Facilities for drainage Area A include 17.2 acres of natural flood storage. A flowage easement will be required for this area. The Minimum Facilities also include a tide gate structure with three 5' X 5' slide gates that allow Oakwood Creek to flow through the LOP. In addition to the tide gate, two sluice gate structures will help drain the interior flooding for the Minimum Facility Plan.

Area B: The Minimum Facilities for Area A include an excavated pond providing 94,200 cubic yards (CY) of additional stormwater storage. The Minimum Facilities also include placing new gate chambers on three existing outlets (Tysens Lane, Ebbitts Street and New Dorp Lane) to prevent backflow through the coastal storm risk management system. Details of the gate chambers are included in the Engineering and Design Appendix. In

addition a new tide gate structure will be implemented at the outlet of the excavated pond and will have dimensions and specifications similar to the Area A Oakwood Creek tide gate. Kissam Avenue will be raised as part of the Minimum Facility Plan and additional drainage culverts to convey flow towards the Area B tide gate. Mill Road will be raised to an elevation of approximately 7.1 feet NGVD 1929 to prevent the spillover of interior floodwaters from Area A to Area B for the entire range of studied frequency events.

Area C: The Minimum Facility for Drainage Area C includes placing new gate chambers at the existing Greeley Avenue, Midland Avenue, Naughton Avenue and Seaview Avenue outfalls to prevent backflow through the coastal storm risk management structure and elevating Seaview Avenue to eliminate the predicted overflow of floodwaters from/to Area D Details of the gate chambers are included in the Engineering and Design Appendix. The Plan will also include the acquisition or preservation of 131 acres of natural storage In addition to Minimum Facilities, the Area C plan includes adding 381,800 CY of additional storage in the form of seven excavated ponds located along Seaview Avenue, Father Capodanno Boulevard, Midland Avenue and Hylan Boulevard.

Area D: The Minimum Facilities for Area D include replacing one existing outfall (Quintard Street/Raritan Avenue), with a new gate chamber at the LOP to prevent backflow, and 30 acres of natural flood storage area on land owned by the New York City (NYC) Department of Parks and Recreation.

Area E: Interior drainage features for Area E include one gate chamber at Sand Lane to prevent backflow through the LOP, 46.7 acres of natural storage on properties owned by NYC or approved for acquisition as part of the NYC DEP South Beach Bluebelt Plan, and a piped outfall to a new junction chamber at Quincy Avenue. In addition to the Minimum Facilities, interior drainage features for Area E include construction of two excavated ponds totaling 222,720 CY along McLaughlin Street.

The Project First Cost (Oct 2015 price level) is approximately $560 million, which includes a contingency of approximately $139 million as determined in the Cost and Schedule Risk Analysis (CSRA).

The Total Project Cost (including escalation to midpoint of construction in the second quarter, FY-2020) is approximately $615 million, which includes a contingency of approximately $152 million as determined in the CSRA.

2.0 DETAILED COST ESTIMATE

2.1 Methods

For the detailed cost estimate, project quantities were developed using On Screen Take-Off (OST), Microsoft Excel calculations, and manual calculations, where applicable. The cost estimate was compiled using the Micro-Computer Aided Cost Estimating System, Second Generation (MCACES 2nd Generation or MII).

2.2 Cost Basis

The cost basis for the detailed cost estimate is a combination of MII's 2012 English Cost Book, estimator-created site specific cost items, local subcontractor quotations, and local material suppliers' quotations. For the purposes of updating the Cost Book to present day pricing, a current, area-specific labor library was used to reflect market labor conditions. Major material costs were verified. For cost book material items that did not reflect current commodities pricing, vendor quotes were obtained and estimator judgment applied where warranted.

Lands and Damages:

In addition to lands to be acquired by fee, seven types of easements are required for the coastal risk management project: *Flood Protection Levee Easement* - in locations where the construction, operation, maintenance, patrol, and repair and replacement of the LOP are required; *Temporary Work Area Easement* – to allow right-of-way, in, over and across the land for the planned construction schedule; *Restrictive Easement* – to protect against future development; *Ponding Easement* - Portions of land to be subjected to permanent inundation and portions to be subjected to occasional flooding; *Pipeline Easement* – for construction, O&M of underground storm water drainage structure; *Road Easement* – to construct and maintain road and maintenance vehicle access ramps; *Wetland Easement* – to construct and/or enhance existing wetland features.

The estimated cost to for the Lands, Easements, and Rights-of-way (LER) is approximately $42.6 million, while required Relocations are approximately $42.3 million.

Pre-construction, Engineering, and Design/Supervision and Administration

Pre-construction, Engineering, and Design (PED), and Supervision and Administration were calculated using the Non-Cap Example TPCS Mar 2015 Rev 02. (http://www.nww.usace.army.mil/Missions/CostEngineering.aspx), which was further revised based on engineering judgment. The cost component percentages were revised to reflect an overall PED rate of 14% and an S&A rate of 7%.

Escalation

Escalation calculations were based on the Civil Works Construction Cost Index System (CWCCIS), tables revised as of 31 March 2015 (http://www.nww.usace.army.mil/Missions/CostEngineering.aspx). Computations were based on the following dates and durations:

- Real estate: midpoint 2018Q4
- Design: midpoint 2018Q1
- Construction: midpoint 2020Q3

Contingencies:

Cost contingencies were developed through a standard Cost and Schedule Risk Analysis (CSRA), shown in Attachment A. The overall cost contingency was 32.9%.

The schedule contingency established in the CSRA was 32.4%. This contingency is reflected in the cost through the escalation.

2.3 First Costs

Detailed project first costs for the TSP are presented in Table 1 and shown in the MII in Attachment B.

Table 1: Project First Costs

Description	Amount	Cont.%	Cont. $	Total
01 - Lands and Damages				
Land Acquisition	$32,066,000	32.9%	$10,550,000	$42,616,000
02 – Relocations				
Utility Relocations	$267,000	32.9%	$88,000	$355,000
Road Raisings	$2,231,000	32.9%	$734,000	$2,965,000
Boardwalk	$23,941,000	32.9%	$7,877,000	$31,818,000
Recreation Facilities	$5,390,000	32.9%	$1,773,000	$7,163,000
			Subtotal	$42,301,000
11 - Levees and Floodwalls				
Construction	$224,177,000	32.9%	$73,754,000	$297,931,000
15 - Interior Drainage				
Area A	$4,314,000	32.9%	$1,419,000	$5,733,000
Area B	$15,532,000	32.9%	$5,110,000	$20,642,000
Area C	$30,248,000	32.9%	$9,952,000	$40,200,000
Area D	$1,916,000	32.9%	$630,000	$2,546,000
Area E	$14,894,000	32.9%	$4,900,000	$19,794,000
			Subtotal	$88,915,000
30 - Engineering & Design	$43,595,000	32.9%	$14,343,000	$57,938,000
31 - Construction Management	$22,605,000	32.9%	$7,437,000	$30,042,000
TOTAL	**$421,176,000**		**$138,567,000**	**$559,743,000**

3.0 OPERATION AND MAINTENANCE

3.1 General

The performance of the LOP plan will continue to meet its design intent if it is properly maintained during normal (non-storm conditions) and properly operated during times of nor'easters and hurricane flooding events. The need for proper maintenance of the LOP is

critical given the potential damages to infrastructure in this urban area if deterioration or damage to structures due to lack of maintenance fail during the storm event. The operation and maintenance regiment is discussed in detail in the Engineering and Design Appendix and summarized below.

3.2 Emergency Operations

Emergency surveillance, communication and chain of responsibility for the LOP structures and associated infrastructure will fall under existing protocols agreed upon by the City of New York and the US Army Corps of Engineers, New York District. Particular attention should be given to monitoring the performance of the LOP structures during storm events in the first few years of operation, to ensure that they function as designed. Coordination and communication with the USACE, the National Weather Service and National Hurricane Center, and the City of New York will be required during storm events to initiate standard flood fighting techniques. Typical flood fighting methods will include the following:

- Storm event patrolling and reporting of trouble spots.
- Scour hole repair – buried seawall, floodwall, rock revetment, and levee.
- Wave wash protection of eroded levee slopes.
- Topping of low or eroding spots on levee crown using sandbags
- Flood barrier construction.
- Sandbagging to control boils that are issuing sediment.

3.3 Maintenance

Maintenance is defined as the upkeep and repair of structures to maintain the function of the structure after construction is complete.

3.3.1 Buried Seawall

The primary maintenance of this structure is the repositioning of armor and bedding stones that may be displaced during storm event. Additional maintenance on the buried seawall will also include repair and/or replacements the protective material cover, vegetation and associated reinforcing matting. Specific items of maintenance include:

- Displaced/Dislodged Stones
- Material Cover and Vegetation
- Recreational Trial and Access Ramps

3.3.2 Floodwall

Maintenance of the concrete T-shaped floodwall is based on maintaining the integrity of the structure, which may be reduced due to loss of material at the toe of the structure and/or

liquefaction of soil due to poor drainage. In addition, repair of the concrete shall be performed to minimize corrosion of the reinforcing steel within the concrete.

3.3.3 Earthen Levee

Earthen levees shall be maintained to remedy any adverse conditions threatening the integrity of the structure. Items or issues requiring maintenance include:

- Crown Roadway and Access Ramps
- Rodent Activity
- Vegetation Management
- Erosion Control and Repair
- Seepage
- Cracking, Settlement and Slips

3.4 O&M Costs

To address the items above, an annual O&M cost of $564,400 includes annual inspections and maintenance of the LOP including stop-log structure, gate chambers, access ramps, and sand/soil cover over the buried seawall. Annual LOP costs are shown in Table 2.

Table 2: Annual LOP O&M Costs

Item	O&M; Replacement Costs
Coastal Monitoring	$71,000
Sand Cover Maintenance	$84,000
Dune Grass Maintenance	$20,000
Levee Mowing/Veg. Removal	$3,000
Gate Structure Maintenance	$20,400
Total	**$198,400**

The O&M costs also include annual inspections and maintenance of the interior drainage features and include the annualized cost of replacement of interior drainage appurtenant structures (e.g., gates, backflow valves, sluice gates, etc.) at the end of their useful project life of approximately 25 years. Area-specific interior drainage O&M costs are shown in Table 3.

Table 3: Annual Interior Drainage O&M Costs

Interior Drainage Item	O&M; Replacement Costs
AREA A	$46,000
AREA B	$118,300

AREA C	$139,000
AREA D	$20,000
AREA E	$42,700
Total	**$366,000**

4.0 CONSTRUCTION SCHEDULE

The propose construction schedule is shown in Figure 1.

5.0 COST SHARING & PROJECT COSTS

The estimated Project Cost is $559,743,000. The expected cost share for the SSSI project is $363,833,000 Federal (65%) and $195,910,000 non-Federal (35%), as shown in Table 4.

Table 4: Cost Apportionment

Federal Project Cost (65%)	**$363,833,000**
Non-Federal Project Cost (35%)	**$195,910,000**
LERR	
LER	$40,319,000
Relocations	
Utilities	$355,000
Road Raisings	$2,965,000
Boardwalk	$31,818,000
Recreation Facilities	$7,163,000
Cash Balance	$113,290,000
Total Project Cost (100%)	**$559,743,000**

The Total Project Cost Summary (TPCS) is shown in Table 5. The costs for each contract are escalated to the midpoint of construction.

Figure 1: SSSI Construction Schedule

ID	Task Name	Duration	Start
1	**South Shore of Staten Island Phase 1**	**1392 days**	**Mon 2/27/17**
2	**FEASIBILITY REPORT APPROVAL**	**1 day**	**Mon 2/27/17**
3	Field Survey	89 days	Tue 2/28/17
4	**CONTRACT 1: Oakwood to Miller field**	**1300 days**	**Thu 3/30/17**
5	**Design Activities**	**517 days**	**Thu 3/30/17**
6	DDR - 30%	95 days	Thu 3/30/17
7	P&S - 30%	95 days	Thu 3/30/17
8	30% DQC review	20 days	Thu 8/10/17
9	VE Study	30 days	Thu 9/7/17
10	DDR - 90%	110 days	Thu 10/19/17
11	P&S - 90%	110 days	Thu 10/19/17
12	90% DQC, BCOES Reviews	30 days	Thu 3/22/18
13	Revised 90% for review	47 days	Thu 5/3/18
14	90% ATR & IEPR Reviews	60 days	Mon 7/9/18
15	100% DDR and P&S	60 days	Mon 10/1/18
16	Real Estate Acquisition	80 days	Mon 9/3/18
17	Contract Advertise and Award	65 days	Mon 12/24/18
18	**Construction Activities**	**783 days**	**Mon 3/25/19**
19	Reinforced Levee/ Seawall	783 days	Mon 3/25/19
20	Ponding Area B	222 days	Mon 3/25/19
21	Floodwall/ Levee	660 days	Mon 3/25/19
22	**CONTRACT 2: Miller Field To Fort Wadsworth**	**1369 days**	**Thu 3/30/17**
23	**Design Activities**	**517 days**	**Thu 3/30/17**
24	DDR - 30%	95 days	Thu 3/30/17
25	P&S - 30%	95 days	Thu 3/30/17
26	30% DQC review	20 days	Thu 8/10/17
27	VE Study	30 days	Thu 9/7/17
28	DDR - 90%	110 days	Thu 10/19/17
29	P&S - 90%	110 days	Thu 10/19/17
30	90% DQC, BCOES Reviews	30 days	Thu 3/22/18
31	Revised 90% for review	47 days	Thu 5/3/18
32	90% ATR & IEPR Reviews	60 days	Mon 7/9/18
33	100% DDR and P&S	60 days	Mon 10/1/18
34	Real Estate Acquisition	80 days	Mon 9/3/18
35	Contract Advertise and Award	65 days	Mon 12/24/18
36	**Construction Activities**	**914 days**	**Thu 12/27/18**
37	Reinforced Levee/ Seawall	852 days	Mon 3/25/19
38	Ponding Area C Construction	283 days	Mon 3/25/19
39	Ponding Area E Construction	283 days	Thu 4/23/20
40			

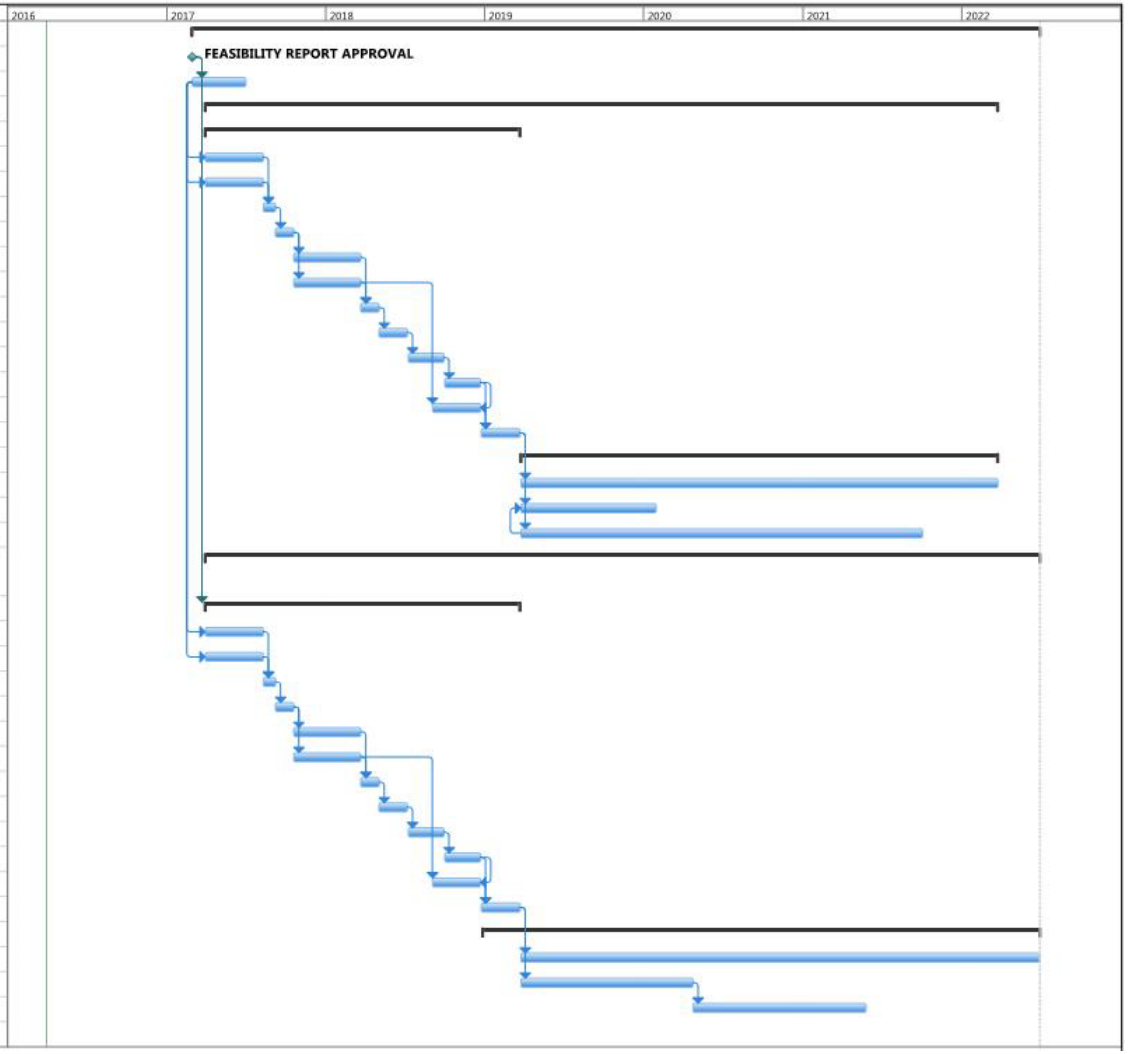

Table 5: Total Project Cost Summary

PROJECT: **Feasibility Study for the South Shore of Staten Island, New York**
PROJECT NO: 403365
LOCATION: Staten Island, New York

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

PREPARED: **9/1/2016**

This Estimate reflects the scope and schedule in report; This Estimate reflects the scope and schedule in SOUTH SHORE OF STATEN ISLAND, NY, COASTAL STORM RISK MANAGEMENT; INTERIM FEASIBILITY STUDY FOR FORT WADSWORTH TO OAKWOOD BEACH

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)			
						Program Year (Budget EC):			2016						
						Effective Price Level Date:			1 OCT 15						
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Spent Thru: 10/1/2015 ($K)	TOTAL FIRST COST ($K)	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J		K	L	M	N	O
02	RELOCATIONS	$31,828	$10,471	32.9%	$42,299	0.0%	$31,828	$10,471	$42,299	$0	$42,299	9.4%	$34,831	$11,460	$46,291
11	LEVEES & FLOODWALLS	$224,178	$73,754	32.9%	$297,932	0.0%	$224,178	$73,754	$297,932	$0	$297,932	9.4%	$245,334	$80,715	$326,049
15	FLOODWAY CONTROL & DIVERSION STRUCTURE	$66,905	$22,012	32.9%	$88,916	0.0%	$66,905	$22,012	$88,916	$0	$88,916	9.4%	$73,220	$24,089	$97,309
	CONSTRUCTION ESTIMATE TOTALS:	$322,910	$106,237		$429,148	0.0%	$322,910	$106,237	$429,148	$0	$429,148	9.4%	$353,385	$116,264	$469,649
01	LANDS AND DAMAGES	$32,066	$10,550	32.9%	$42,616	0.0%	$32,066	$10,550	$42,616	$0	$42,616	5.7%	$33,892	$11,150	$45,042
30	PLANNING, ENGINEERING & DESIGN	$43,595	$14,343	32.9%	$57,938	0.0%	$43,595	$14,343	$57,938	$0	$57,938	11.3%	$48,518	$15,963	$64,481
31	CONSTRUCTION MANAGEMENT	$22,605	$7,437	32.9%	$30,042	0.0%	$22,605	$7,437	$30,042	$0	$30,042	20.0%	$27,133	$8,927	$36,059
	PROJECT COST TOTALS:	$421,176	$138,567	32.9%	**$559,743**		$421,176	$138,567	**$559,743**	$0	**$559,743**	9.9%	$462,928	$152,303	**$615,231**

ESTIMATED FEDERAL COST:	**65%**	**$399,900**
ESTIMATED NON-FEDERAL COST:	**35%**	**$215,331**
ESTIMATED TOTAL PROJECT COST:		**$615,231**

Table 5: Total Project Cost Summary (cont.)

PROJECT: Feasibility Study for the South Shore of Staten Island, New York
LOCATION: Staten Island, New York
This Estimate reflects the scope and schedule in report: This Estimate reflects the scope and schedule in SOUTH SHORE OF STATEN ISLAND, NY, COASTAL STORM RISK MANAGEMENT; INTERIM FEASIBILITY STUDY FOR FORT WADSWORTH TO OAKWOOD BEACH
DISTRICT: New York District
POC: CHIEF, COST ENGINEERING, Mukesh Kumar
PREPARED: 9/1/2016

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: / Effective Price Level:			1-Sep-16 / 1-Oct-15	Program Year (Budget EC): / Effective Price Level Date:			2016 / 1 OCT 15					
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	RISK BASED CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	CONTRACT 1 Oakwood to Miller Field													
02	RELOCATIONS	$1,447	$476	32.9%	$1,923	0.0%	$1,447	$476	$1,923	2020Q4	9.4%	$1,583	$521	$2,104
11	LEVEES & FLOODWALLS	$103,618	$34,090	32.9%	$137,709	0.0%	$103,618	$34,090	$137,709	2020Q4	9.4%	$113,397	$37,308	$150,705
15	FLOODWAY CONTROL & DIVERSION STRUCTURE	$19,846	$6,529	32.9%	$26,376	0.0%	$19,846	$6,529	$26,376	2020Q4	9.4%	$21,719	$7,146	$28,865
	CONSTRUCTION ESTIMATE TOTALS:	$124,911	$41,096	32.9%	**$166,007**		$124,911	$41,096	$166,007			$136,700	$44,974	$181,674
01	LANDS AND DAMAGES	$12,687	$4,174	32.9%	$16,861	0.0%	$12,687	$4,174	$16,861	2019Q1	5.7%	$13,409	$4,412	$17,821
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	$625	$206	32.9%	$831	0.0%	$625	$206	$831	2018Q2	8.8%	$680	$224	$904
1.0%	Planning & Environmental Compliance	$1,249	$411	32.9%	$1,660	0.0%	$1,249	$411	$1,660	2018Q2	8.8%	$1,359	$447	$1,806
7.0%	Engineering & Design	$8,744	$2,877	32.9%	$11,621	0.0%	$8,744	$2,877	$11,621	2018Q2	8.8%	$9,513	$3,130	$12,643
0.5%	Reviews, ATRs, IEPRs, VE	$625	$206	32.9%	$831	0.0%	$625	$206	$831	2018Q2	8.8%	$680	$224	$904
0.5%	Life Cycle Updates (cost, schedule, risks)	$625	$206	32.9%	$831	0.0%	$625	$206	$831	2018Q2	8.8%	$680	$224	$904
0.5%	Contracting & Reprographics	$625	$206	32.9%	$831	0.0%	$625	$206	$831	2018Q2	8.8%	$680	$224	$904
2.0%	Engineering During Construction	$2,498	$822	32.9%	$3,320	0.0%	$2,498	$822	$3,320	2020Q4	20.0%	$2,998	$986	$3,985
1.0%	Planning During Construction	$1,249	$411	32.9%	$1,660	0.0%	$1,249	$411	$1,660	2020Q4	20.0%	$1,499	$493	$1,992
0.5%	Project Operations	$625	$206	32.9%	$831	0.0%	$625	$206	$831	2018Q2	8.8%	$680	$224	$904
31	CONSTRUCTION MANAGEMENT													
6.0%	Construction Management	$7,495	$2,466	32.9%	$9,961	0.0%	$7,495	$2,466	$9,961	2020Q4	20.0%	$8,996	$2,960	$11,956
0.5%	Project Operation:	$625	$206	32.9%	$831	0.0%	$625	$206	$831	2020Q4	20.0%	$750	$247	$997
0.5%	Project Management	$625	$206	32.9%	$831	0.0%	$625	$206	$831	2020Q4	20.0%	$750	$247	$997
	CONTRACT COST TOTALS:	$163,208	$53,695		$216,903		$163,208	$53,695	$216,903			$179,375	$59,014	$238,389

**** CONTRACT COST SUMMARY ****

Table 5: Total Project Cost Summary (cont.)

PROJECT: Feasibility Study for the South Shore of Staten Island, New York
LOCATION: Staten Island, New York
This Estimate reflects the scope and schedule in report: This Estimate reflects the scope and schedule in SOUTH SHORE OF STATEN ISLAND, NY, COASTAL STORM RISK MANAGEMENT; INTERIM FEASIBILITY STUDY FOR FORT WADSWORTH TO OAKWOOD BEACH
DISTRICT: New York District
POC: CHIEF, COST ENGINEERING, Mukesh Kumar
PREPARED: 9/1/2016

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: / Effective Price Level:			1-Sep-16 / 1-Oct-15	Program Year (Budget EC): / Effective Price Level Date:			2016 / 1 OCT 15					
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	CONTRACT 2 Miller Field to Ft Wadsworth													
02	RELOCATIONS	$30,381	$9,995	32.9%	$40,376	0.0%	$30,381	$9,995	$40,376	2020Q4	9.4%	$33,248	$10,939	$44,187
11	LEVEES & FLOODWALLS	$120,559	$39,664	32.9%	$160,223	0.0%	$120,559	$39,664	$160,223	2020Q4	9.4%	$131,937	$43,407	$175,344
15	FLOODWAY CONTROL & DIVERSION STRUCTURE	$47,059	$15,482	32.9%	$62,541	0.0%	$47,059 $0	$15,482	$62,541	2020Q4	9.4%	$51,500	$16,944	$68,444
	CONSTRUCTION ESTIMATE TOTALS:	$197,999	$65,142	32.9%	**$263,140**		$197,999	$65,142	$263,140			$216,685	$71,289	$287,975
01	LANDS AND DAMAGES	$19,379	$6,376	32.9%	$25,755	0.0%	$19,379	$6,376	$25,755	2019Q1	5.7%	$20,483	$6,739	$27,221
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	$990	$326	32.9%	$1,316	0.0%	$990	$326	$1,316	2018Q2	8.8%	$1,077	$354	$1,431
1.0%	Planning & Environmental Compliance	$1,980	$651	32.9%	$2,631	0.0%	$1,980	$651	$2,631	2018Q2	8.8%	$2,154	$709	$2,863
7.0%	Engineering & Design	$13,860	$4,560	32.9%	$18,420	0.0%	$13,860	$4,560	$18,420	2018Q2	8.8%	$15,079	$4,961	$20,040
0.5%	Reviews, ATRs, IEPRs, VE	$990	$326	32.9%	$1,316	0.0%	$990	$326	$1,316	2018Q2	8.8%	$1,077	$354	$1,431
0.5%	Life Cycle Updates (cost, schedule, risks)	$990	$326	32.9%	$1,316	0.0%	$990	$326	$1,316	2018Q2	8.8%	$1,077	$354	$1,431
0.5%	Contracting & Reprographics	$990	$326	32.9%	$1,316	0.0%	$990	$326	$1,316	2018Q2	8.8%	$1,077	$354	$1,431
2.0%	Engineering During Construction	$3,960	$1,303	32.9%	$5,263	0.0%	$3,960	$1,303	$5,263	2020Q4	20.0%	$4,753	$1,564	$6,317
1.0%	Planning During Construction	$1,980	$651	32.9%	$2,631	0.0%	$1,980	$651	$2,631	2020Q4	20.0%	$2,377	$782	$3,158
0.5%	Project Operations	$990	$326	32.9%	$1,316	0.0%	$990	$326	$1,316	2018Q2	8.8%	$1,077	$354	$1,431
31	CONSTRUCTION MANAGEMENT													
6.0%	Construction Management	$11,880	$3,909	32.9%	$15,789	0.0%	$11,880	$3,909	$15,789	2020Q4	20.0%	$14,259	$4,691	$18,951
0.5%	Project Operation:	$990	$326	32.9%	$1,316	0.0%	$990	$326	$1,316	2020Q4	20.0%	$1,188	$391	$1,579
0.5%	Project Management	$990	$326	32.9%	$1,316	0.0%	$990	$326	$1,316	2020Q4	20.0%	$1,188	$391	$1,579
	CONTRACT COST TOTALS:	$257,968	$84,871		$342,839		$257,968	$84,871	$342,839			$283,553	$93,289	$376,841

ATTACHMENT A

CSRA

FOUO

ATTACHMENT B

MII

FOUO