US Army Corps of Engineers®

OAKLAND HARBOR TURNING BASINS WIDENING, CA

NAVIGATION STUDY

DRAFT INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL ASSESSMENT

APPENDIX B5:

Cost Engineering

Contents

1. Introduction

This cost appendix corresponds with the Oakland Harbor Turning Basins Widening Navigation feasibility study. The appendix provides a summary explanation of the project assumptions and other cost related aspects of the project. Greater detail on many project topics can be found in the other technical appendices.

Table 1: First Costs Table Tentatively Selected Plan

Oakland Harbor Turning Basins Widening Navigation Study							
01	**LANDS AND DAMAGES**	**1**	**LS**	**$149,047,000**	**0%**	**$0**	**$149,047,000**
01	**LANDS AND DAMAGES ADMIN COSTS**	**1**	**LS**	**$410,000**	**5.0%**	**$20,000**	**$430,000**
02	**RELOCATIONS**	**1**	**LS**	**$1,753,000**	**36.0%**	**$631,000**	**$2,384,000**
06	**FISH& WILDLIFE FACILITIES**	**1**	**LS**	**$3,240,000**	**36.0%**	**$1,166,000**	**$4,406,000**
12	**NAVIGATION PORTS & HARBORS**	**1**	**LS**	**$175,596,000**	**36.0%**	**$63,215,000**	**$238,811,000**
18	**CULTURAL RESOURCE PRESERVATION**	**1**	**LS**	**$0**	**0%**	**$0**	**$0**
30	**PLANNING, ENGINEERING AND DESIGN**	**1**	**LS**	**$35,053,000**	**36.0%**	**$12,619,000**	**$47,672,000**
31	**CONSTRUCTION MANAGEMENT**	**1**	**LS**	**$14,447,000**	**36.0%**	**$5,201,000**	**$19,648,000**
	TOTAL			**$379,546,000**	**21.8%**	**$82,853,000**	**$462,399,000**

2. Basis of Costs

2.1 Navigation Ports & Harbors

The basis of the majority of the cost estimate for the recommended plan rests with the workassociated with the excavation and removal of material to deepen and widen the harbor turning basins. These construction activities include concrete pavement removal, land excavation, bulkhead removal, bulkhead installation, dredging and hauling.

2.2 Sediment & Soil Assumptions

Howard Terminal:

• Top 15' (Below Ground Surface (BGS) to lowest level of groundwater contact); Assume 90% material will require disposal at a Class II Landfill; assume the remaining 10% of material requires Class 1 Landfill disposal.

• 15' BGS to contact with Old Bay Mud/Merritt Sand/Posey Formation (OBM/MS) Suitable for Wetland Non-Cover (Montezuma Wetlands).

• Below contact point with OBM/MS, suitable for any reuse (wetland cover, construction, ocean disposal)

• Groundwater can be released to the Bay during construction unless the historic sheetpile wall behind the wharf is breeched for construction. In that case, groundwater will require treatment prior to release to the Bay (or alternative disposal). Further, the new bulkhead will need to be constructed to prevent discharges to the Bay unless the groundwater is completely remediated.

Alameda:

• Top 15' BGS to lowest level of groundwater contact; Assume 95% material will require disposal at a Class II Landfill and 5% of the volume will require Class I landfill disposal.

• 15' BGS to contact with OBM/MS Suitable for Wetland Non-Cover (Montezuma Wetlands).

• Below contact point with OBM/MS, suitable for any reuse (wetland cover, construction, ocean disposal).

• Groundwater can be released to the Bay during construction.

Schnitzer Steel:

• Assume 75% of the volume of the soil down to 15' BGS requires Class II landfill disposal and 25% requires Class I disposal.

• Material from 15' BGS to contact with OBM/MS will need Class II landfill disposal.

• OBM/MS suitable for any reuse or disposal.

• Groundwater within the site liner will require treatment and offsite disposal. Groundwater below monitoring wells can be discharged to the Bay.

• Any bulkhead will need to be designed to meet environmental mitigation needs (contain and possibly treat groundwater).

All Exposed Inner Harbor Sediments (currently not under land):

• Young Bay Mud (and Recent Bay Mud) acceptable as Wetland Non-Cover at Montezuma Wetlands.

• OBM/MS Suitable for any reuse.

• For the basin area between Schnitzer and Howard Terminal assume 20% of the volume excavated between Schnitzer and Howard require Class II disposal. That is, this material will require placement at Berth 10 – dredge rehandling site – for drying prior to landfill disposal.

All Exposed Outer Harbor Sediments (currently not under land):

• Young Bay Mud (and Recent Bay Mud) acceptable as Wetland Non-Cover at Montezuma Wetlands.

• OBM/MS Suitable for any reuse.

2.3 Lands & Damages

Cost estimates for real estate activities associated with the recommended plan were provided bythe Real Estate specialists and appraisers of the PDT. Real Estate costs include all anticipated government labor, such as for property appraisers and attorneys, demolition and disposal of impacted private properties and estimated business impacts or required relocations (separate from utility relocations).

2.4 Environmental Mitigation

Costs associated with environmental mitigation (Fish & Wildlife Facilities, WBS Account 06) were provided by biologists from the study PDT. See the appropriate appendices for discussion of these costs.

2.5 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 the Oakland Harbor Turning Basins Widening Navigation, 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.

2.6 Construction Management

The cost was developed for all construction management activities from pre-award requirementsthrough 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 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 custodialpersonnel; 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 theproject.

3. Contingencies

An Abbreviated Risk Analysis (ARA) has been performed to generate risk based contingency rates for utility relocations, environmental mitigations, construction, PED (planning, engineering and design), and construction management.

4. Total Project Cost Summary (TPCS)

The TPCS was prepared using the latest TPCS excel spreadsheet provided by the USACE, Walla Walla District. The TPCS incorporates the construction cost developed in the MCACES (MII), the project markups, and the functional costs.

The TPCS presents the project first cost and the total project cost (fully funded with inflation).

The project first cost is the cost estimate used in feasibility reports for congressional funding requests.

The total project cost is the constant dollar cost fully funded with escalation to the estimated midpoint of construction. The total cost of construction of general navigation features is the cost estimate used in Project Partnership Agreements and integral determination reports. Total project cost is the cost estimate provided non-federal sponsors for their use in financial planning as it provides information regarding the overall non-federal cost sharing obligation.

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

PROJECT: **OAKLAND HARBOR TURNING BASIN WIDENING**
PROJECT NO P2# 476976
LOCATION: OAKLAND, CALIFORNIA

DISTRICT: **San Francisco District** **PREPARED:** **8/26/2021**
POC: **CHIEF, COST ENGINEERING, Warren Tan**

This Estimate reflects the scope and schedule in report; OAKLAND HARBOR TURNING BASIN WIDENING

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)			
						Program Year (Budget EC): 2021									
						Effective Price Level Date: 1 OCT 20									
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	**TOTAL ($K)**	Spent Thru: **1-Oct-20** ($K)	**TOTAL FIRST COST** ($K)	NFLATEI (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*		*K*	*L*	*M*	*N*	*O*
02	RELOCATIONS	$1,753	$631	36.0%	$2,384	0.0%	$1,753	$631	$2,384	$0	$2,384	18.6%	$2,078	$748	$2,827
04	DAMS	$0	$0	-	$0	-	$0	$0	$0	$0	$0	-	$0	$0	$0
05	LOCKS	$0	$0	-	$0	-	$0	$0	$0	$0	$0	-	$0	$0	$0
06	FISH & WILDLIFE FACILITIES	$3,240	$1,166	36.0%	$4,406	0.0%	$3,240	$1,166	$4,406	$0	$4,406	19.2%	$3,842	$1,412	$5,253
07	POWER PLANT	$0	$0	-	$0	-	$0	$0	$0	$0	$0	-	$0	$0	$0
12	NAVIGATION PORTS & HARBORS	$175,596	$63,215	36.0%	$238,811	0.0%	$175,596	$63,215	$238,811	$0	$238,811	18.6%	$208,196	$74,951	$283,147
18	CULTURAL RESOURCE PRESERVATION	$0	$0	-	$0	-	$0	$0	$0	$0	$0	-	$0	$0	$0
	#N/A	$0	$0	-	$0	-	$0	$0	$0	$0	$0	-	$0	$0	$0
	CONSTRUCTION ESTIMATE TOTALS:	$180,589	$65,012		$245,601	0.0%	$180,589	$65,012	$245,601	$0	$245,601	18.6%	$214,116	$77,111	$291,227
01	LANDS AND DAMAGES	$149,047	$0	0.0%	$149,047	0.0%	$149,047	$0	$149,047	$0	$149,047	18.6%	$176,718	$0	$176,718
01	NFS Admin Cost	$229	$11	5.0%	$240	0.0%	$229	$11	$240	$0	$240	18.6%	$272	$14	$285
01	FED Admin Cost	$181	$9	5.0%	$190	0.0%	$181	$9	$190	$0	$190	18.6%	$215	$11	$225
30	PLANNING, ENGINEERING & DESIGN	$35,053	$12,619	36.0%	$47,672	0.0%	$35,053	$12,619	$47,672	$0	$47,672	19.7%	$41,973	$15,110	$57,083
31	CONSTRUCTION MANAGEMENT	$14,447	$5,201	36.0%	$19,648	0.0%	$14,447	$5,201	$19,648	$0	$19,648	23.6%	$17,852	$6,427	$24,278
	PROJECT COST TOTALS:	$379,546	$82,853	21.8%	$462,399		$379,546	$82,853	**$462,399**	$0	**$462,399**	18.9%	$451,145	$98,672	$549,817

ESTIMATED TOTAL PROJECT COST: **$549,817**

_____ **CHIEF, COST ENGINEERING, Warren Tan**

_____ **PROJECT MANAGER, Erika Powell**

_____ **CHIEF, REAL ESTATE, Adam Olso**

_____ **CHIEF, PLANNING, Thomas Kendall**

_____ **CHIEF, ENGINEERING, Son Ha**

_____ **CHIEF, OPERATIONS, Nicholas Malasavage**

_____ **CHIEF, CONSTRUCTION, Jere Harper**

_____ **CHIEF, CONTRACTING, Mary Fronck**

_____ **CHIEF, PM-PB, xxxx**

_____ **CHIEF, DPM, xxx**

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

****** CONTRACT COST SUMMARY ******

PROJECT: OAKLAND HARBOR TURNING BASIN WIDENING
LOCATION: OAKLAND, CALIFORNIA
This Estimate reflects the scope and schedule in report; OAKLAND HARBOR TURNING BASIN WIDENING

DISTRICT: San Francisco District
POC: CHIEF, COST ENGINEERING, Warren Tan

PREPARED: 8/26/2021

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 26-Aug-21 Effective Price Level: 1-Oct-20				Program Year (Budget EC): 2021 Effective Price Level Date: 1 OCT 20								
				RISK BASED										
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST ($K) C	CNTG ($K) D	CNTG (%) E	TOTAL ($K) F	ESC (%) G	COST ($K) H	CNTG ($K) I	TOTAL ($K) J	Mid-Point Date P	INFLATED (%) L	COST ($K) M	CNTG ($K) N	FULL ($K) O
02	RELOCATIONS	$1,753	$631	36.0%	$2,384	0.0%	$1,753	$631	$2,384	2026Q4	18.6%	$2,078	$748	$2,827
	#N/A	$0	$0	0.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
	#N/A	$0	$0	0.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
06	FISH & WILDLIFE FACILITIES	$3,240	$1,166	36.0%	$4,406	0.0%	$3,240	$1,166	$4,406	2026Q4	18.6%	$3,842	$1,412	$5,253
07	POWER PLANT	$0	$0	0.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
12	NAVIGATION PORTS & HARBORS	$175,596	$63,215	36.0%	$238,811	0.0%	$175,596	$63,215	$238,811	2026Q4	18.6%	$208,196	$74,951	$283,147
18	CULTURAL RESOURCE PRESERVATION	$0	$0	0.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
	#N/A	$0	$0	0.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
	CONSTRUCTION ESTIMATE TOTALS:	$180,589	$65,012	36.0%	**$245,601**		$180,589	$65,012	$245,601			$214,116	$77,111	$291,227
01	LANDS AND DAMAGES	$149,047	$0	0.0%	$149,047	0.0%	$149,047	$0	$149,047	2026Q4	18.6%	$176,718	$0	$176,718
01	NFS Admin Cost	$229	$11	5.0%	$240	0.0%	$229	$11	$240	2026Q4	18.6%	$272	$14	$285
01	FED Admin Cost	$181	$9	5.0%	$190	0.0%	$181	$9	$190	2026Q4	18.6%	$215	$11	$225
30	PLANNING, ENGINEERING & DESIGN													
1.0%	Project Management	$1,806	$650	36.0%	$2,456	0.0%	$1,806	$650	$2,456	2025Q4	19.0%	$2,150	$774	$2,924
2.0%	Planning & Environmental Compliance	$3,612	$1,300	36.0%	$4,912	0.0%	$3,612	$1,300	$4,912	2025Q4	19.0%	$4,300	$1,548	$5,848
7.0%	Engineering & Design	$12,641	$4,551	36.0%	$17,192	0.0%	$12,641	$4,551	$17,192	2025Q4	19.0%	$15,048	$5,417	$20,465
1.4%	Reviews, ATRs, IEPRs, VE	$2,546	$917	36.0%	$3,463	0.0%	$2,546	$917	$3,463	2025Q4	19.0%	$3,031	$1,091	$4,122
1.0%	Life Cycle Updates (cost, schedule, risks)	$1,806	$650	36.0%	$2,456	0.0%	$1,806	$650	$2,456	2025Q4	19.0%	$2,150	$774	$2,924
2.0%	Contracting & Reprographics	$3,612	$1,300	36.0%	$4,912	0.0%	$3,612	$1,300	$4,912	2025Q4	19.0%	$4,300	$1,548	$5,848
1.0%	Engineering During Construction	$1,806	$650	36.0%	$2,456	0.0%	$1,806	$650	$2,456	2026Q4	23.6%	$2,232	$803	$3,035
2.0%	Planning During Construction	$3,612	$1,300	36.0%	$4,912	0.0%	$3,612	$1,300	$4,912	2026Q4	23.6%	$4,463	$1,607	$6,070
1.0%	Project Operations	$1,806	$650	36.0%	$2,456	0.0%	$1,806	$650	$2,456	2025Q4	19.0%	$2,150	$774	$2,924
1.0%	Adaptive Management and Monitoring	$1,806	$650	36.0%	$2,456	0.0%	$1,806	$650	$2,456	2026Q4	19.0%	$2,150	$774	$2,924
31	CONSTRUCTION MANAGEMENT													
7.0%	Construction Management	$12,641	$4,551	36.0%	$17,192	0.0%	$12,641	$4,551	$17,192	2026Q4	23.6%	$15,620	$5,623	$21,243
0.0%	Project Operation:	$0	$0	36.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
1.0%	Project Management	$1,806	$650	36.0%	$2,456	0.0%	$1,806	$650	$2,456	2026Q4	23.6%	$2,232	$803	$3,035
	CONTRACT COST TOTALS:	$379,546	$82,853		$462,399		$379,546	$82,853	$462,399			$451,145	$98,672	$549,817

Description	Quantity	UOM	ProjectCost
All Construction WBS Accounts			**180,589,261.04**
WBS Account Number 02 Relocations	**1.0000**	**LS**	**1,753,000.00**
WBS Account Number 06 Fish & Wildlife Facilities	**1.0000**	**LS**	**3,240,000.00**
WBS Account Number 12 Navigation Ports and Harbor	**1.0000**	**LS**	**175,596,261.04**
INNER HARBOR	**1.0000**	**LS**	**129,513,741.04**
OUTER HARBOR	**1.0000**	**LS**	**46,082,520.00**

Currency in US dollars

Howard Terminal

	Activity	QTY		Crew No.	Working Day(s)	Per Day: Backhoe/ Front Ldr	Concrete Saw	Crane	Dozer	Dump Truck	Drilling Rig	Barge Ship	Dive Vessel	Dredging Vessel	Diesel Hammer	Excavator	Vibratory Hammer	Tug Boat	Compressor	Generator	Torch	Equipment Operator	Labor	Driver
01H	Concrete Pavement Removal Area	12,780	SY	1	13	1	1		1	2												4	4	
02H	Sheetpile/ Bulkhead Installation	42,250	SF	1	121	1		1		1					1							3	5	
06H	Howard Pile Removal Activity	300	EA	1	33			1				1	1			1	1		1	1		5	8	
10H	Pile Hauling	300	EA	1	17											1						1	2	1
03H	Land Excavation	72,407	CY	1	48				0	2						2						4	6	
04H	Hauling	72,407	CY	1	48					75						2							4	75
05H	Anchor/ Tie back Installation	1,300	LF	1	4	1					1											2	6	
07H	Sheetpile/ Bulkhead Removal	58,500	SF	1	59			1				1	1			1			1	1	1	6	8	
08H	Dredging	191,667	CY	1	27			1				2		1				2				21	5	

Alameda

	Activity	QTY		Crew No.	Working Day(s)	Per Day: Backhoe/ Front Ldr	Concrete Saw	Crane	Dozer	Dump Truck	Drilling Rig	Barge Ship	Dive Vessel	Dredging Vessel	Diesel Hammer	Excavator	Vibratory Hammer	Tug Boat	Compressor	Generator	Torch	Equipment Operator	Labor	Driver
09A	Warehouse Demo Activity	260,000	SF	1	26		2			2						1			2		1	3	10	2
01A	Concrete Pavement Removal Area	24,000	SY	1	24	1	1		1	2												4	4	
02A	Sheetpile/ Bulkhead Installation	68,250	SF	1	195	1		1		1					1							3	5	
03A	Land Excavation	135,370	CY	1	90				0	2						2						4	6	
04A	Hauling	135,370	CY	1	90					75						2							4	75
06A	Alameda Pile Removal Activity	2,300	EA	1	128			1				1	1			1	1		1	1		5	8	
10A	Pile Hauling	2,300	EA	1	128											1						1	2	1
05A	Anchor/ Tie back Installation	2,100	LF	1	7	1					1											2	6	
08A	Sheetpile/ Bulkhead Removal	81,250	SF	1	81			1				1	1			1			1	1	1	6	8	
07A	Dredging	358,333	CY	1	51			1				2		1				2				21	5	

Schnitzer Steel

	Activity	QTY		Crew No.	Working Day(s)	Per Day: Backhoe/ Front Ldr	Concrete Saw	Crane	Dozer	Dump Truck	Drilling Rig	Barge Ship	Dive Vessel	Dredging Vessel	Diesel Hammer	Excavator	Vibratory Hammer	Tug Boat	Compressor	Generator	Torch	Equipment Operator	Labor	Driver
01S	Concrete Pavement Removal Area	1,200	SY	1	1	1	1		1	2												4	4	0
02S	Sheetpile/ Bulkhead Installation	20,150	SF	1	58	1		1		1					1							3	5	0
03S	Land Excavation	6,296	CY	1	4				0	2						2						4	6	0
04S	Hauling	6,296	CY	1	4					75						2							4	75
03S-A	Land Excavation OBM/MS (Class II)	7,407	CY	1	5				0	2						2						4	6	0
04S-A	Hauling OBM/MS (Class II)	7,407	CY	1	5					75						2							4	75
05S	Anchor/ Tie back Installation	700	LF	1	2	1					1											2	6	0
06S	Sheetpile/ Bulkhead Removal	20,800	SF	1	21			1				1	1			1			1	1	1	6	8	0
07S	Dredging	16,667	CY	1	2			1				2		1				2				21	5	0

Inner Harbor Sediments

07IN-II	Dredging - Class II	63,704	CY	1	9			1				2		1				2				21	5	
11+12IN	Berth 10 Class II Handling	63,704	CY	1				1	1	38		2		1		1		2				23	5	38
07IN	Dredging - YBM	254,815	CY	1	36			1				2		1				2				21	5	

Outer Harbor

07OH	Dredging - YBM	862,000	CY	1	123			1				2		1				2				21	5	

Weeks (5 Working Days)		
3	3	01H
25	26	02H
7	10	06H
4	10	10H
10	36	03H
10	36	04H
1	37	05H
12	49	08H
6	55	07H

Weeks (5 Working Days)		
6	6	09A
5	5	01A
39	40	02A
19	59	03A
19	59	04A
26	85	06A
26	85	10A
2	61	05A
17	78	08A
11	89	07A

Weeks (5 Working Days)		
1	1	01S
12	13	02S
1	14	03S
1	14	04S
1	15	03S-A
1	15	04S-A
1	15	05S
5	20	06S
1	21	07S
2	2	07IN 07IN 07IN 07IN 07IN
0	2	11+12IN
8	10	07IN
25	25	07S