

# SEATTLE HARBOR NAVIGATION IMPROVEMENT PROJECT

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## APPENDIX E

### Cost Engineering

#### Draft Integrated Feasibility Report and Environmental Assessment



**US Army Corps  
of Engineers®**  
Seattle District



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## Contract Package - Estimate & Scope Information

<b>District</b>	Seattle District
<b>Project Title &amp; Location:</b>	Seattle Harbor Navigation Improvement Project (SHNIP)
<b>Contract Scope Package:</b>	Channel Deepening
<b>Estimate Type:</b>	TSP, Class 4
<b>Date:</b>	1-Apr-2016
<b>FY:</b>	FY16
<b>Cost Engineer &amp; Phone:</b>	Kim Callan (509) 527-7511
<b>Cost Team Lead &amp; Phone:</b>	Kim Callan (509) 527-7511
<b>Cost QC Reviewer &amp; Phone:</b>	Rodriguez, Antonio NWS
<b>Technical Lead &amp; Phone:</b>	Michalsen, David R NWS
<b>Project Manager &amp; Phone:</b>	Wickstrom, Leah J NWS
<b>Project File Location:</b>	N:\SFO\NWS\SHNIP
<b>Product Date:</b>	1-Apr-2016



5-Nov-2015

<b>Contract Package:</b>	<b>Seattle Harbor Navigation Improvement Project (SHNIP) Channel Deepening</b>
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<b>Scope Narrative:</b>	<p>The Corps and Port of Seattle initiated a feasibility study evaluating navigation improvements to Seattle Harbor’s East and West Waterways. Navigational challenges were identified and current authorized depths, of 34 to 51 feet below mean lower low water, or MLLW, do not meet today’s larger container ship draft requirements.</p> <p>The project area includes the East and West waterways of Seattle Harbor, as they have been identified by the Corps and non-Federal sponsor, the Port of Seattle, as the areas of critical importance for navigation improvements.</p> <p>Elliott Bay: naturally deep; ships access waterways one way in and out; use Elliott Bay as a turning basin</p> <p>West Waterway: authorized depth -34’ MLLW; existing depths range between -50 to -60’ MLLW West Waterway was excavated deeper than authorized to construct Harbor Island.</p> <p>East Waterway: authorized depth -34’ MLLW to -51’ MLLW; existing depths range from -34’ to -60’</p> <p>TSP identified as 56’ depth</p>
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<b>Reference for Scope Basis:</b>	
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<b>Scope Assumptions:</b>	
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<b>Supporting Documentation: (by Cost Team)</b>	N/A
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<b>Class of Estimate</b>	Class 4 - Recon/Alt Study/Venture Level
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<b>Estimate Methodology:</b>	<p>Class 4 level estimates were developed using CEDEP. Detailed risk register was developed with the PDT team. Key dredging inputs were adjusted within the CSRA development. Spreadsheet format used for alternative level estimates. Once TSP has been selected class level 3 will be developed and utilize MII.</p> <p>Labor and equipment was brought to current price levels.</p> <p>Equipment comprised of smaller dredge (10 CY Clamshell plus support plant) for the smaller yardage alternatives. For larger quantities larger dredge was utilized (21 CY Clamshell plus support plant).</p> <p>For non-suitable material for open water place upland placement was used. Dump Scow were utilized for open water placement, material barges were used for upland place at transload facility.</p> <p>Typical Equipment List: Dredge, Work Tugs, Crew/Survey Boat, Derrick, Work Barge, Towing Vessel, Scow(s)</p> <p>For Additional details see "Cost Assumptions" document.</p>
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<b>Sequence of Work:</b>	
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<b>Key Challenges, Risks, and Opportunities</b>	1) Quantity of non-suitable material for open water disposal, 2) market competition and 3) fuel cost.
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<b>Key Outstanding Questions/Issues:</b>	None
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<b>Representative Drawings/Photos:</b>
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# Total Project Cost Summary

Project: **Seattle Harbor Navigation Improvement Project 57' (56' + 1'OD)**  
 Location: Seattle Harbor  
 District: NWS -Seattle District  
 POC: Callan

P2:  
 Report Type: **TSP**  
 Contingency Development: Crystal Ball  
 CWCCIS Issue: **9/1/2015**

Authority: **CG**  
 TPCS Preparation Date: 01-Apr-16  
 FY: 2016

Scope Synopsis:

WBS			ESTIMATED COST				PROJECT FIRST COST CONSTANT DOLLAR BASIS				TOTAL PROJECT COST (FULLY FUNDED)			
Civil Works			Risk Based				Program Price Level Date: 2016-1Q							
WBS	Feature	Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	INFLATED (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)
12	NAVIGATION PORTS & HARBORS		44.601	13,256	30%	57,857		44,601	13,256	57,857	5%	46,676	13,873	60,549
		S/T	44,601	13,256	30%	57,857		44,601	13,256	57,857	5%	46,676	13,873	60,549
30	PLANNING ENGINEERING AND DESIGN		11.152	3,315	30%	14,467		11,152	3,315	14,467	10%	12,254	3,642	15,897
		S/T	11,152	3,315	30%	14,467		11,152	3,315	14,467	10%	12,254	3,642	15,897
31	CONSTRUCTION MANAGEMENT		4.462	1,326	30%	5,788		4,462	1,326	5,788	10%	4,903	1,457	6,360
		S/T	4,462	1,326	30%	5,788		4,462	1,326	5,788	10%	4,903	1,457	6,360
<b>Totals</b>			60,215	17,897	30%	78,112		60,215	17,897	78,112	6%	63,834	18,973	82,806

CHIEF, COST ENGINEERING

PROJECT MANAGER

CHIEF, REAL ESTATE

CHIEF, PLANNING

CHIEF, ENGINEERING

CHIEF, OPERATIONS

CHIEF, CONSTRUCTION

CHIEF, CONTRACTING

CHIEF, PM-PB

CHIEF, DPM

Project First Cost for Report:

Cost (\$k)      Contingency (\$k)      Totals (\$k)

\$60,215      \$17,897      \$78,112

Total Project Cost used to provide  
Sponsor information:

\$63,834      \$18,973      \$82,806

## Contract Summary

WBS	ESTIMATED COST Estimate Class Level: <b><u>Class 4</u></b>				PROJECT FIRST COST <b>CONSTANT DOLLAR BASIS</b>				TOTAL PROJECT COST (FULLY FUNDED)				
Contract: 57' Depth (56' + 1'OD)  Location: Seattle Harbor District: NWS -Seattle District	Est Preparation Date: <u>01-Apr-16</u>		Program Yr: <u>2016</u>		Est Price Level: <u>2016-1Q</u>		Prog Level Date: <u>2016-1Q</u>						
	Risk Based												
	COST	CNTG	CNTG	TOTAL	ESC	COST	CNTG	TOTAL	MID-PT	INFLATED	COST	CNTG	TOTAL
(\$K)	(\$K)	(%)	(\$K)	(%)	(\$K)	(\$K)	(\$K)	(DATE)	(%)	(\$K)	(\$K)	(\$K)	
<b>12 NAVIGATION PORTS &amp; HARBORS</b>	44,601	13,256	29.7%	57,857	.%	44,601	13,256	57,857	2018-3Q	4.7%	46,676	13,873	60,549
Construction Activities <span style="float: right;"><i>Total</i></span>	44,601	13,256		57,857		44,601	13,256	57,857			46,676	13,873	60,549
<b>30 Planning Engineering and Design</b> <span style="float: right;">25.0%</span>	11,152	3,315	29.7%	14,467	.%	11,152	3,315	14,467	2018-3Q	9.9%	12,254	3,642	15,897
Planning Engineering and Design <span style="float: right;"><i>Total</i></span>	11,152	3,315		14,467		11,152	3,315	14,467			12,254	3,642	15,897
<b>31 Construction Management (S&amp;A)</b> <span style="float: right;">10.0%</span>	4,462	1,326	29.7%	5,788	.%	4,462	1,326	5,788	2018-3Q	9.9%	4,903	1,457	6,360
Construction Management <span style="float: right;"><i>Total</i></span>	4,462	1,326		5,788		4,462	1,326	5,788			4,903	1,457	6,360
<b>57' Depth (56' + 1'OD)</b> <span style="float: right;"><i>Total</i></span>	60,215	17,897		78,112		60,215	17,897	78,112			63,834	18,973	82,806

# Basis of Estimate -Cost Assumptions

Assumptions may change as additional technical information is gained during design maturity.

- **Estimate Level – Class #4. (Not used for budgeting or programming)**

- **TSP**

- **East Waterway Alternative 2**

Sta. 0+00 to 12+00	Sta. 12+00 to 60+00
Length: 1,200'	Length: 4,800'

Width: 700'	Width: 550'
Depth: 57' MLLW (Includes 1 ft OD)	Depth: 57' MLLW

- **West Waterway Alternative 2**

Sta. 0+00 to 25+00	Sta. 25+00 to 61+09
Length: 2,500'	Length: 3,609'

Width: 700'	Width: 550'
Depth: 57' MLLW (Includes 1 ft OD)	Depth: 57' MLLW



- **DEPTHS**

- Alternatives 51', 52', 53', 54', 55, 56' & 57'
- 2' allowed overdepth (Assume avg 1' taken)

- **Equipment**

- 10CY – 26CY Mechanical dredge(s) Use: 21CY
- Environmental Bucket (8CY, 20CY, 50CY) Use=20CY
- Flatdeck/Material barges for upland Disposal & dump scows for open water disposal

Material Barges (1200 CY (1500T) to 3000 CY (3900T) Use =2000 CYD Material Barge and 3000 CYD Dump Scow

- Assume Mechanical Dredge utilized for materials suitable for Open Water
- Assume Mechanical Dredge w/environmental bucket for materials un-suitable for Open Water



- **Labor**

- General Decision Number: WA150105 03/20/2015 WA105
- Superseded General Decision Number: WA20140105
- State: Washington
- Construction Type: Heavy Dredging
- Counties: Washington Statewide.
- DREDGING CONSTRUCTION PROJECTS (Excludes D.O.E. Hanford Site in Benton and Franklin Counties)

- **Work Window**

- Officially 16 July – 15 FEB;
- NMFS may shorten season to 1 Oct to 15 Feb: Rockfish listing.
- Chinook Salmon arriving in estuary earlier in JAN.
- Multiple Seasons
- 7 days/ week
- For the purposes of the conceptual costs, need separate/individual costs for each waterway; assume separate mob/de-mob
- Operating Before Nov/Dec may require tribal compensation

- **Production Rates**

- Trans Load Distance - West – 2 miles, East 2-4 Miles
- Speed Zone – No Wake Zone Assume 7 mph (5 -7 Knots or 5.75mph to 8mph)
- Historical Port production rates from New York Harbor using Environmental Bucket
- News article on LA River Deepening using Environmental Bucket

- **Quantities (for estimate totals quantity section)**

- When the unsuitable material is removed from West Waterway, a one-foot vertical buffer will need to be added to ensure that all unsuitable material has been removed prior to dredging the underlying suitable material. Since the unsuitable material is mostly in the top 4 feet, that means the top 5 feet would need to be dredged and taken to a landfill.

- In West Waterway, the surface 0-4 feet of material that is suitable for open-water disposal will likely need to be run through a 1-ft x 1-ft (2FT X 2FT ALLOWED AT TRANSLOAD) grizzly to remove debris. That will increase mobilization costs and reduce the dredging production rate. Disposal requirements for screened material. Additional Barge, taken to Transload

- **Disposal Sites**

- Upland Site (Transload)
- Deep water Disposal
  - Assume Elliott Bay Disposal for 100% deep water material.
  - Distance to disposal: Assume 2.5 mile one way
  - Placement requirements if any: Additional cost for large debris and the Separation of material,
  - Paint filter test not usually required when go by rail out of Roosevelt
  - Gravity de-watering

- **General**

- Overflow not allowed at dredging site
- Active de-water as barge continues to fill
- Sometimes have to slow down to allow de-water to catch up
- Large Duwamish project utilized sump pump with filter bag
- Flat deck barge—carries the contaminated materials upland; more stringent de-water procedures
- Bottom Dump Barge (won't require as stringent de-watering procedures)
- 24 hrs/day—city ordinance does allow
- The cost of a hydrographic survey following removal of the contaminated material will need to be included.