



**US Army Corps
of Engineers**

-Alaska District

**Appendix: E
Cost Engineering Appendix**

Unalaska (Dutch Harbor) Channels

Unalaska, Alaska



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DUTCH HARBOR CHANNEL DREDGING
CITY OF UNALASKA, ALASKA

COST APPENDIX

APPENDIX OVERVIEW

The Cost Engineering Appendix includes documents used to develop the estimated construction costs and scheduled timeline for the selected plan. The appendix consists of a narrative which discusses the cost assumptions and methodology, a Total Project Cost Summary Sheet (TPCS), a summary level report from the Corps of Engineers Estimating Software (MII) and a project schedule.

The documents that show detail on how the costs for labor, equipment, material and production rates were developed are considered For Official Use Only and are not included with this Appendix. These detailed calculation files are available for review by the study team and for the USACE Cost Center of Expertise. The costs and schedules developed are intended to be used for economic analysis and cost certification for the study.

SCOPE - PROJECT TYPE, FEATURES & ALTERNATIVES

This project for Unalaska, Alaska, is intended to construct shipping channel improvement measures. The City of Unalaska, Latitude 53.8728, Longitude -166.5301, overlooks Iliuliuk Bay and Dutch Harbor on Unalaska Island in the Aleutian Chain. It lies 800 air miles from Anchorage (a two- to three-hour flight) and 1,700 miles northwest of Seattle. Currently a bar shallower than the surrounding bathymetry limits the vessels that can safely access the port facilities and areas of refuge in Dutch Harbor.

The primary project feature is a dredged channel through the bar. Preliminary surveys indicate the virgin material may require drilling and blasting before dredging and disposal. The channel bottom has been described in the geophysical survey report as dense, consolidated, glacial moraine deposit overlying bedrock. Also, there are likely Unexploded Ordinance (UXO) items from WW2 within the dredged footprint. These items will require special handling and possibly disposal if they cannot be safely avoided. Several alternatives for dredging a channel through the bar at different depths and footprints were reviewed. The main report includes a table that summarizes the project costs at the different depths.

MAJOR ASSUMPTIONS - COST ESTIMATE BASIS SUMMARY

Documents Referenced for Cost Estimate Development: Alternatives Sketches, Geotechnical Survey Drawings, Quantities from Designers, and the Feasibility Report. Quantities and dimensions were provided by the project designers (see APPENDIX, HYDRAULIC DESIGN).

Labor & Equipment: Labor rates are based on Alaska Laborers' & Mechanics' Minimum Rates of Pay, 1 Sep 2018. Equipment rates are based on EP1110-1-1 Region 09. Marine Diesel was assumed at \$3.10/Gal, based on bulk marine fuel purchase in south-central Alaska. Fuel price is volatile across Alaska, and contractors often purchase bulk quantities and mobilize the majority of the fuel they expect to use to have a reliable supply and known price because third party deliveries to remote sites are uncertain and subject to rapid price increases.

Performance of Work: A Prime Contractor was assumed to execute the drilling and dredging, with a Sub-Contractor performing the blasting as this work can be specialized and hazardous. Also, Sub-Contractors would execute technical support such as Tug/Barge service; Hydrographic and Topographic Surveys. The need for support for identifying, and possibly removing, unexploded ordnances (UXOs) and discarded military munitions (DMMs) within the project area will be determined during PED.

It's anticipated the drill/dredge contractor will bring a fuel barge, and the blasting contractor will import explosive materials. They will use as little land-based equipment as possible since the current work scope is entirely in-water.

Drilling and Blasting: In-water has been accomplished a number of times in previous Alaska dredging contracts. Blasting areas were provided by Alaska District H&H section. Drilling and Blasting costs were developed in MCACES. Drilling was assumed using a hydraulic crawler rig mounted on a work barge, a tug, and the crews to man them. Blasting was assumed using a work barge, a tug, and the crews to man them, with support from divers, under direction of a Blaster-In-Charge. The blasting would employ a bubble curtain to minimize shock waves, and vibration monitoring to measure and refine blast strength. It could be optional for the contractor to employ ripping/excavating equipment if it's practical, as was done during the 2013 Kodiak Harbor work.

Dredging: The Dredging work is well understood, and access to the channel would be with marine floating equipment. Dredge quantities were provided by Alaska District H&H section. Dredging direct unit costs were developed in CEDEP assuming dense/blasted material, and input to MCACES. Disposal of dredge spoils is in open water at the designated location (see main report). Weather is a direct impact on working in the marine coastal environment with both land-based and floating equipment. There may be local ordinance constraints and environmental windows to complete the work, and marine vessel traffic accessing Dutch Harbor is busy.

Cost and Schedule Risk Analysis: Project risks include encountering UXOs and marine debris, mischaracterization of dredge materials, handling/storing explosive materials, risk to marine life, and increased beach erosion. The project dredge depth is over 40 feet below sea level and is not anticipated to contain scarce or unique cultural, historic, or tribal resources. This work has moderate to above average risk. Risk which could be mitigated with additional field exploration data and removal of UXO.

Contingencies for alternative selection was derived from the Abbreviated Risk Analysis. A Cost Abbreviated Risk Analysis (ARA) defined contingencies for the project budget. Construction Escalation is based on the Civil Works Construction Cost Index System (CWCCIS), EM 1110-2-

1304, dated 31 March 2018. Please refer to the Total Project Cost Summary (TPCS) for cost breakdown.

The Prime Construction Contractor will furnish all labor, equipment, supplies and materials to accomplish the work. As there are limited methodologies to in-water drill/blast/dredge, contract acquisition method is assumed to be competitive IFB, although RFP could be chosen.

Construction can occur throughout the year, but long nights, freezing weather and storms can increase hazards to people and equipment; and explosives are sensitive to extreme temperatures swings. Any exceptions when no in-water work would be performed is being coordinated with concerned agencies. Off-season dredge work may be required.

COST ESTIMATE SUMMARY – ARA – TPCS

The initial cost range of the project is \$15-\$30 million at the Current Contract Cost level. Total Project Cost of the Selected Plan will be certified by the Cost Center of Expertise and will be included in this appendix when it's obtained. Initial Abbreviated Risk Analysis put the project cost Contingency high because of the lack of field data, and the uncertainty of the costs and need to Drill/Blast. Also the degree of UXO removal cost impact is not known. These issues are being reviewed and it is anticipated the data will be refined before and during PED.