

**APPENDIX E**  
**COST ENGINEERING**

**DUTCH HARBOR CHANNEL DREDGING**  
**CITY OF UNALASKA, ALASKA**

**COST APPENDIX**

**APPENDIX OVERVIEW**

This Cost Engineering Appendix will be consolidated into the decision document Feasibility Report for Unalaska, Alaska. The purpose of the feasibility study is to evaluate alternatives for a potential construction contract. This Appendix discusses the cost assumptions, methodology, materials, labor, and equipment, utilized in the contract construction cost estimates.

**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.

The name Dutch Harbor is often applied to the portion of the city on Amaknak Island, which is connected to Unalaska Island by a bridge. Dutch Harbor is actually within the boundaries of the City of Unalaska (Non-Federal Sponsor). Unalaska falls within the southwest maritime climate zone, characterized by persistently overcast skies, high winds, and frequent cyclonic storms.

The primary purpose for the study is to determine feasibility of navigation improvements that would increase the efficiency of navigation at Unalaska. The Port of Dutch Harbor is the only deep draft, year-round ice-free port from Unimak Pass west to Adak and north to the Bering Straits. It has the western-most container terminal in the United States and provides ground and warehouse storage and transshipment opportunities for the thousands of vessels that fish in the region or pass through while in transit between North America and Asia.

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. This limits the potential for economic development and can create inefficient and unsafe conditions during the delivery of fuel, durable goods, and exports.

The primary project feature is a WBS 09 dredged channel through the bar. Preliminary surveys indicate the virgin material may require drilling and blasting before dredging and disposal. 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. All alternatives had channel dimensions of 400 feet long, and the period of construction for all alternatives is 15 months. The project that maximizes net benefits is the 48-foot depth alternative.

## **MAJOR ASSUMPTIONS - COST ESTIMATE BASIS SUMMARY**

Documents Referenced for Cost Scope of Work: 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). Project conditions and construction costing were based upon the alternatives presented. Lands and Damages costs were provided by the Real Estate Branch, POA. PED, SIOH and the Cultural Resources costs were provided by the project PM/PF.

Labor rates are based on Alaska Laborers' & Mechanics' Minimum Rates of Pay, 1 Sep 2017. Equipment rates are based on MII Equipment 2017 Region 09. On-Road Diesel was assumed at \$2.82/Gal. Fuel price is volatile in Alaska.

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.

The State of Alaska has no Sales Tax. The City of Unalaska has a 3% Sales and 5% Bed Tax. However, the sales taxes would only apply to materials purchased in Unalaska which would only be rock for revetment if accomplished. It's anticipated the dredge/blast contractors will bring a fuel barge and import explosive materials. They will use as little land-based equipment as possible.

The dredging work is well understood, and access to the channel would be with marine floating equipment. Dredge quantities were developed by Alaska District H&H section. Drilling and blasting in-water has been accomplished a number of times in previous Alaska dredging contracts. 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 environmental windows to complete the work, and marine vessel traffic accessing Dutch Harbor is busy.

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

Contingency 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 2016. Please refer to the Total Project Cost Summary (TPCS) for cost breakdown.

The Construction Contractor will furnish all labor, equipment, supplies and materials to accomplish the work. Contract acquisition method is assumed to be IFB. Construction can occur throughout the year. Any exceptions when no in-water work will be performed is being coordinated with concerned agencies. Off-season dredge work may be required, but rock revetment construction in freezing weather is not satisfactory.

**COST ESTIMATE SUMMARY – ARA - TPCS**

The initial cost range of the project is \$15-\$30 million at the Contract Cost level. Total Project Cost of the Selected Plan is expected to be well under \$40 million. Initial Abbreviated Risk Analysis put the project cost Contingency high because of the lack of field data, and the uncertainty of the 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.

| ID | Task Name                               | Duration         | Start              | Finish             | Predecessors | 2018 |    |    | 2019 |    |    |    | 2020 |    |    |    | 2021 |    |    |    | 2022 |    |    |    |    |    |
|----|---|------------------|--------------------|--------------------|--------------|------|----|----|------|----|----|----|------|----|----|----|------|----|----|----|------|----|----|----|----|----|
|    |   |                  |                    |                    |              | Q3   | Q4 | Q1 | Q2   | Q3 | Q4 | Q1 | Q2   | Q3 | Q4 | Q1 | Q2   | Q3 | Q4 | Q1 | Q2   | Q3 | Q4 | Q1 | Q2 | Q3 |
| 0  | <b>Unalaska (Dutch Harbor) Channels</b> | <b>1165 days</b> | <b>Tue 8/1/17</b>  | <b>Mon 1/17/22</b> |              |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 1  | <b>Feasibility</b>                      | <b>513 days</b>  | <b>Tue 8/1/17</b>  | <b>Thu 7/18/19</b> |              |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 2  | TSP                                     | 123 days         | Tue 8/1/17         | Thu 1/18/18        |              |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 3  | ADM                                     | 150 days         | Fri 1/19/18        | Thu 8/16/18        | 2            |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 4  | Director Report Signed                  | 1 day            | Thu 7/18/19        | Thu 7/18/19        | 3            |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 5  | <b>PED</b>                              | <b>262 days</b>  | <b>Tue 10/1/19</b> | <b>Wed 9/30/20</b> |              |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 6  | <b>Procurement</b>                      | <b>105 days</b>  | <b>Thu 10/1/20</b> | <b>Wed 2/24/21</b> | <b>5</b>     |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 7  | Advertise                               | 60 days          | Thu 10/1/20        | Wed 12/23/20       |              |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 8  | Award                                   | 45 days          | Thu 12/24/20       | Wed 2/24/21        | 7            |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 9  | <b>Construction</b>                     | <b>233 days</b>  | <b>Thu 2/25/21</b> | <b>Mon 1/17/22</b> | <b>6</b>     |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 10 | Pre-Construction Plans                  | 45 days          | Thu 2/25/21        | Wed 4/28/21        | 8            |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 11 | Mobilize                                | 30 days          | Thu 4/29/21        | Wed 6/9/21         | 10           |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 12 | Drill and Blast                         | 88 days          | Thu 6/10/21        | Mon 10/11/21       | 11           |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 13 | Dredge and Dispose                      | 45 days          | Tue 8/17/21        | Mon 10/18/21       | 12FF+5 days  |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 14 | Survey                                  | 105 days?        | Tue 6/1/21         | Mon 10/25/21       |              |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 15 | Demobilization                          | 30 days          | Tue 10/26/21       | Mon 12/6/21        | 14           |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 16 | Construction Complete                   | 1 day            | Mon 10/25/21       | Tue 10/26/21       | 15SF         |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |
| 17 | Contract Close-Out/Project Complete     | 60 days          | Tue 10/26/21       | Mon 1/17/22        | 14           |      |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |    |    |

|   |                 |  |                    |  |                       |  |                |  |                 |  |
|---|-----------------|--|--------------------|--|-----------------------|--|----------------|--|-----------------|--|
| Project: Unalaska (Dutch Harbor)<br>Date: Wed 2/28/18 | Task            |  | External Tasks     |  | Manual Task           |  | Finish-only    |  | Manual Progress |  |
|   | Split           |  | External Milestone |  | Duration-only         |  | Deadline       |  |                 |  |
|   | Milestone       |  | Inactive Task      |  | Manual Summary Rollup |  | Critical       |  |                 |  |
|   | Summary         |  | Inactive Milestone |  | Manual Summary        |  | Critical Split |  |                 |  |
|   | Project Summary |  | Inactive Summary   |  | Start-only            |  | Progress       |  |                 |  |