



*Memorandum*

**To:** Ports and Harbors Advisory Committee and Planning Commission

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**Thru:** Brad Ryan, Director of Public Facilities, Haines Borough

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**From:** John Daley PE and Van Le, AICP - R&M Consultants, Inc.

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**Subject:** Ports and Harbors Advisory Committee and Planning Commission Joint Work Session – Lutak Dock Memo

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**Date:** January 11, 2017

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**Project #:** R&M 2443.01

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**Introduction**

The Lutak Dock is in need of repair or replacement as it is nearing the end of its useful life. The Haines Borough hired R&M Consultants, Inc. to provide professional engineering, geotechnical review, planning and public involvement services to outline feasible alternatives for the replacement or refurbishment of the dock, communicate project objectives and milestones with the Haines community and elected officials in determining the best alternative for the Lutak Dock Design and Development Concepts Project. This memo is intended to provide planning, public involvement, and engineering background for the project to assist Borough decision maker in selecting a preferred alternative.

**Project Goals and Objectives**

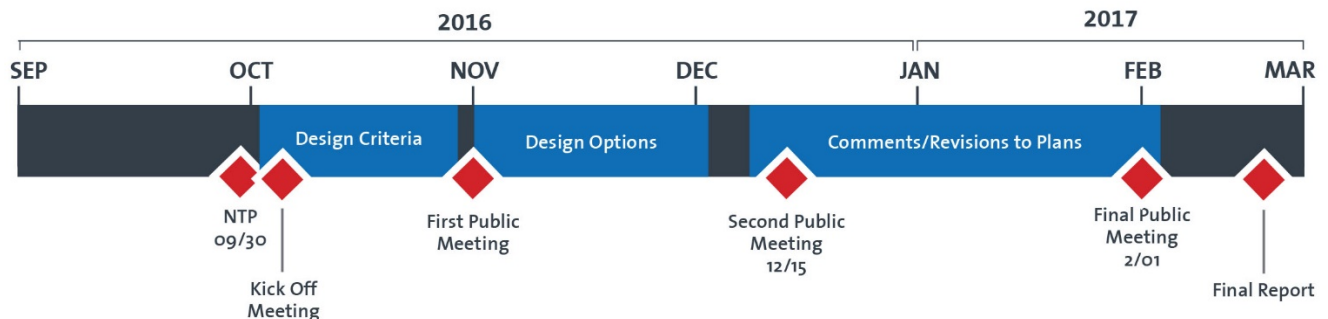
The Haines Borough is currently in the midst of an alternative evaluation study for replacing the dock. This study is providing preliminary engineering evaluation of several alternatives, cost estimates, and public involvement. After receiving input from stakeholders and the community the Borough intends to select a preferred alternative sometime during early 2017. Once a preferred alternative is selected, the Borough will advance a project for funding to begin the full planning, engineering, and permitting of the replacement dock.

Through this project, the Haines Borough is considering options for addressing the corroding, aging Lutak Dock with the purpose of:

- Securing the integrity of the existing facility;
- Maintaining existing working area and functionality;

- Maximizing life expectancy; and
- Providing a design that allows for expansion of the facility in the event for future demand.

## Project Timeline



## Lutak Dock Overview

Lutak Dock is located in Lutak Inlet near the northern end of Chilkoot Inlet, which is in turn near the northern end of Lynn Canal. The original Lutak Dock was constructed in 1953 by the United States Army Corps of Engineers (USACE). It consists of 15 full circle sheet pile cells connected by interconnecting sheet pile arcs. An L-shaped concrete cap, about 9' high sits on top of the front face of the cells. The depth along the 1000 ft dock is generally about -35'. There are timber fender pilings along the face. The Department of Transportation and Public Facilities (DOT&PF) Alaska Marine Highway System (AMHS) previously owned four of the cells (Cell #1-4) on the east end of this dock, which is used for the Ferry Terminal. The City and Borough of Haines owns the remaining cells and the ramp to the west. The Borough's dock is currently used by AML and Delta Western for freight and fuel loading/unloading operations. See Reference 1: Progress Concept Drawings Sheet G4.0.

## Project Purpose and Need

The Lutak Dock, built in 1953, has exceeded its useful lifetime. Modifications, repairs and partial replacements to the dock have been incrementally occurring since 2003 in order to maintain the dock's working condition. It is likely that the dock will fail in within the next decade, and if that were to happen it would cause significant disruptions to freight and fuel supply chains in the region. Fuel and consumer goods would be diverted to less efficient transportation routes and modes and the costs associated with transporting goods to Haines would increase significantly. The increase in transportation costs is expected to impact the cost of goods and

services in Haines for both consumer and industrial end users. The replacement of Lutak Dock would reduce the likelihood of unplanned facility closures resulting from structural failures. The following further detail the project purpose and need:

### **1. Aging Infrastructure**

Inspections of the dock have revealed corrosion, including complete wall penetration of the thinner wall sections on the interconnecting arcs. In 2002 the interconnection arc sheet piles were found to have holes in them and a project was advanced to drive new sheets in the arc areas. In 2004 cell 4 at the Alaska Marine Highway section of the dock failed when sheets at the face split open spilling the fill into the bay. In 2007 a project was advanced to stabilize the pile cap in the area of cell #4. In 2010, sink holes appeared in the pavement along the length of the structure.

A 2014 inspection conducted by Echelon Engineering for PND Engineers reported thickness readings on the main sheet pile cells of significant losses in wall thickness, between 20% and 87%, with an average loss of 37% of the original 0.500 inch wall thickness. With this type of major (30 to 50% section loss at any location) and severe damage (greater than 50% section loss at any location), local failures and buckling are possible and loading restrictions may be necessary. PND Engineers report stated “it is the opinion of PND Engineers, Inc. that the structure has reached the end of its credible 60-year service life. Further utilization is effectively on ‘borrowed time.’” Repairs should be carried out with high priority basis and with urgency.

Based on the history and various reports it is unlikely that the existing dock will remain usable for another 10 years. Localized failure can be expected at any time.

### **2. Community and Economic Necessity**

Lutak Dock provides essential economic and transportation and services for the Haines Borough and Southeast Alaska. In addition to passenger ferry services, the dock serves the following purposes and uses:

- Import and shipment of containerized and roll-on/roll-off, pass/pass, and lift on/lift off general cargo
- Import of petroleum products
- Support of industrial maritime activity including exploration for mining
- Launch and retrieval of commercial and recreational boats

### 3. Marine Commerce

Lutak Dock is Haines' primary industrial facility; it is an ice-free dock that accommodates regularly scheduled shipments of fuel and freight for the borough and surrounding area. The Lutak Dock is responsible for most cargo and freight movement activity in Haines and currently operates year-round. The two primary users of Lutak Dock are Alaska Marine Lines (AML) and Delta Western, which move cargo and bulk fuel respectively. In fiscal year 2016, the dock generated approximately \$421,600 in dockage and wharfage revenues (Haines Borough, 2016). Recent activity includes:

- Oil Transferred - 12-13 million gallons annually
- General Cargo Transferred - 9,845 tons in 2010
- Hazardous Cargo Transferred - 2,368 tons in 2010
- Loaded Containers at Lutak Dock - 4,033 in 2009
- Total Revenue FY 2011 - \$238,757

Improvements to the Lutak Dock could allow for increased revenues from the transfer and transshipment of tankered fuel, liquid natural gas, ore, and other cargo and equipment associated with construction of a natural gas pipeline, Yukon energy needs, and future mining project in the region (Haines Borough 2025 Comprehensive Plan).

In addition to continuing to support the local consumer-based economy with general cargo and fuel, improvements to the Lutak Dock could allow for increased revenues from exploration and future mining activities, the transfer equipment associated with construction of a natural gas pipeline, and Yukon Energy needs (Haines Borough 2025 Comprehensive Plan).

### 4. Community Support

A 2011 Community Opinion Survey conducted as part of the Haines Borough 2025 Comprehensive Plan showed strong support for the expansion of the Lutak industrial dock to allow for more marine commerce. Improvements and expansion of the Lutak Dock and work area will position Haines Borough to capture revenue sufficient to sustain the facility and potentially provide additional jobs and economic opportunity (Haines Borough 2025 Comprehensive Plan).

Improvements to Lutak Dock are consistent with the following Goals and Objectives of the Haines Borough 2025 Comprehensive Plan:

- Goal 3: *Achieve a strong, diversified local economy that provides employment and income for all citizens that desire to work while protecting the health of the environment and quality of life. Build on local assets and competitive advantages to create economic opportunity.*

- Objective 3J/4A: *Capitalize on Haines’s position as a transportation hub to increase transfer and shipment of cargo, supplies, fuel, and other commodities with the Yukon, northern British Columbia, and Interior Alaska.*
- Goal 4: *Provide a safe, reliable, and connected transportation network to move goods and people to, from, and within Haines Borough. Aggressively maintain road, port, and harbor facilities to maximize public investment, enhance public safety and access, and provide economic opportunity.*
- Objective 4B: *Improve harbor and marine facilities for resident use and to support commercial fishing activity.*
- Objective 4C: *Support Alaska Marine Highway System ferry service to and from Haines.*

## **Other Considerations for Dock Modification or Replacement**

### **1. Mine Exporting at Lutak dock**

As part of the Lutak Dock Design and Development Project R&M was directed to investigate the potential for including mineral export infrastructure at the Lutak Dock site. This memo outlines some of the basic components of a typical mineral export facility. Our study is based on a hypothetical/conceptual scenario of the development and operation of the Palmer Mine. Many of the conceptual design features are modeled after the terminal in Skagway and include a number of items resulting from lessons learned from the operation of that facility over time, particularly in regards to efficient operation and environmental regulation compliance.

#### **Key findings include:**

There is a requirement for a large concentrate storage building (CSB) and related support facilities near Lutak Dock. Due to environmental regulations all receiving, stockpiling, handling, and reclaiming of the mineral concentrates must be done indoors in a controlled environment. In order to accommodate the CSB and related operations, additional uplands near the Lutak Dock would need to be developed. The total size of this could be 7 to 10 acres. It will not fit at the current dock site which has just over 4 acres. The concentrate storage building and related operations would fit at the former US Army fuel tank farm site. Mineral export would require a ship loader and a berth sufficient for Handimax bulk cargo vessels. Such a berth could be provided at Lutak Dock with a series of mooring and berthing dolphins. With modifications to the existing facility, Lutak Dock is well situated to provide general cargo support for mining operations.

### **2. Benefit-Cost Analysis**

The benefit-cost analysis, conducted by Northern Economics, attempts to monetize the benefits associated with the replacement of Lutak Dock. The analysis considers three different sets of baseline assumptions and results are presented as the Net Present Value of the benefit or cost

over a 35 year study period (2016-2050). The benefits considered in this analysis are realized through the continuation of the current level of operations occurring at Lutak Dock, and do not assume an increase in the level or types of activities supported by Lutak Dock. The primary benefits analyzed are:

- Avoided transportation costs of freight resulting from a mode shift from barge to truck
- Avoided pavement maintenance costs resulting from increased truck traffic
- Avoided safety costs resulting from increased truck traffic
- A reduction in the likelihood of facility closures due to structural failures

When this analysis was conducted, the Lutak Dock project was still in the preliminary development phase and the three alternative designs and costs for the replacement of Lutak Dock are considered in this analysis. The ‘without project’, or baseline, scenario assumes that the existing dock will become nonoperational in three to ten years and that transportation activities will be diverted to other modes. Scenario A (low) has an operational closure year of 2027 and the replacement project is Alternative 3, Encapsulated Cell with Modified Diaphragm and Reclaimed Uplands. Scenario B (mid) has a closure year of 2022 and the replacement project is Alternative 2, Encapsulated Cells with Modified Diaphragm. Scenario C (high) has a closure year of 2019 and the replacement project is Alternative 1, Berthing Dolphins. The table below summarizes the findings of the benefit-cost analysis for the replacement of Lutak Dock, under three baseline scenarios.

**Benefit-Cost Analysis Summary Results (millions \$2015)**

Measure	Discounted at 3%			Discounted at 7%		
	Scenario A	Scenario B	Scenario C	Scenario A	Scenario B	Scenario C
<b>Benefit NPV</b>						
Transportation Costs	30.7	40.3	46.8	13.7	20.5	25.9
Maintenance	0.2	0.2	0.2	0.1	0.1	0.1
Safety	1.9	2.5	2.9	0.8	1.3	1.6
<b>Total Benefits</b>	<b>32.8</b>	<b>43.0</b>	<b>50.0</b>	<b>14.6</b>	<b>21.9</b>	<b>27.6</b>
<b>Cost NPV</b>						
Capital Costs	33.0	28.0	21.3	28.6	24.2	18.5
O&M Costs	7.3	6.2	4.7	3.8	3.2	2.5
<b>Total Costs</b>	<b>40.3</b>	<b>34.1</b>	<b>26.0</b>	<b>32.4</b>	<b>27.4</b>	<b>20.9</b>
<b>B/C Ratio</b>	<b>0.81</b>	<b>1.26</b>	<b>1.92</b>	<b>0.45</b>	<b>0.80</b>	<b>1.32</b>

Source: Northern Economics, Inc. 2016

The complete Benefit-Cost Analysis of the Lutak Dock Replacement is attached to this memo as Reference 2.

### 3. Diverted Freight Routes

Lutak Dock is Haines’ primary industrial facility and plays a critical role in the importation of freight that is used to support local businesses in Haines as well as industrial activities—

primarily mines—in the surrounding region. Alaska Marine Lines (AML) is one of the primary users of Lutak Dock, providing weekly freight service between Seattle, Washington and Haines. If Lutak Dock were to become nonoperational, freight that is currently brought into Haines over the dock would most likely be transported via truck or a combination of barge and truck. Logistically, there are three feasible transportation route alternatives:

- Freight is trucked directly from Seattle to Haines (*approximately 1,805 road miles*)
- Freight is shipped from Seattle to Anchorage (weekly service provided by AML) and then trucked from Anchorage to Haines (*756 road miles*)
- Freight is shipped from Seattle to Valdez (weekly service provided by AML), and then trucked from Valdez to Haines (*691 road miles*)

All three freight transportation alternatives would involve a mode change from barge to truck for at least a portion of the route. It is likely that industry would seek out the most cost-effective means of transportation for the different types of freight that are currently being transported by AML, and all three routes would be used to some degree. The Benefit-Cost Analysis assumes that 45 percent of the forecasted freight volumes would be trucked directly from Seattle to Haines, 10 percent of freight would get barged to Anchorage and then trucked to Haines, and 45 percent of freight would be barged to Valdez and then trucked to Haines. The distribution of diverted freight over the three alternative routes is based on existing transportation networks, and the transportation services and facilities available along each route. Haines Borough residents and businesses could experience increased costs for goods and services based on the anticipated mode shift in freight transportation.

#### **Design Concept Options/Alternatives for Lutak Dock:**

Three conceptual alternatives were developed for consideration. The original 3 concepts were Alternatives 1, 2 and 3. Through the community and industry stakeholder outreach process, the 3 conceptual alternatives were expanded to include several step-down options of each original concept. Below is a summary of the Alternatives and Modified Alternatives.

#### **Alternative 1A: Encapsulated Cells with Modified Diaphragm and Reclaimed Uplands**

This alternative involves constructing a new sheet pile cell around the existing cells. The new cells would have semicircular front and backs with straight walls connecting these. The shape of this is termed a “modified diaphragm” and has been outlined in design manuals dating back to the 1980s and prior. The straight wall sections would go in between the existing cells where the closure arcs now stand. Alternative 1A includes the reclamation of several cells (#5, #6 and #7) that have been partially excavated and are owned by the Borough. The reclamation of these cells would result in approximately one-half of an acre of additional reclaimed uplands. Below are some important points regarding Alternative 1A:

- This alternative maintains the same general footprint and use as the existing dock. It supports existing users including general cargo and fuel transfer. It remains a general purpose dock.
- The total usable upland area is approximately 4.4 acres.
- Demolition is limited to the existing pile cap, closure arcs, and top section of existing fill. This saves cost.
- There are some challenges and risk associated with driving new sheets through the old closure arc area. Obstructions such as boulders would be difficult to remove in the tight space.

The estimated cost for design, permitting, and construction of Alternative 1A is \$37.4 million.

### **Alternative 1B: Encapsulated Cells with Modified Diaphragm**

Alternative 1B is almost identical to Alternative 1A, but does not include the reclamation of several cells that have been partially excavated and are owned by the Borough. Below are some important points regarding Alternative 1B:

- This alternative maintains the same general footprint and use as the existing dock. It supports existing users including general cargo and fuel transfer. It remains a general purpose dock.
- The total usable upland area is approximately 3.9 acres.
- Demolition is limited to the existing pile cap, closure arcs, and top section of existing fill. This saves cost.
- There are some challenges and risk associated with driving new sheets through the old closure arc area. Obstructions such as boulders would be difficult to remove in the tight space.

The estimated cost for design, permitting, and construction of Alternative 1B is \$32 million.

### **Alternative 2: Platform Dock**

The Platform Dock Alternative includes removing the existing dock and replacing it with all new facilities. The project would include laying the slopes back and armoring them at a 2:1 slope. The new dock would be a somewhat traditional modern pipe pile supported concrete deck dock. Below are some important points regarding Alternative 2:

- This alternative maintains the same general footprint and use as the existing dock. It supports existing users including general cargo and fuel transfer. It remains a general purpose dock.
- The total usable upland area is approximately 4.4 acres.
- This alternative provides all new facilities.



- This dock would provide a high degree of service and very good resistance to seismic loads.

The estimated cost for design, permitting and construction of Alternative 2 is \$61.8 Million.

### **Alternative 3A: Berthing Dolphins and Transfer Bridge**

Alternative 3A includes removing the entire existing dock and laying the slopes back and armoring them at a 2:1 slope. Berthing dolphins would then be constructed and access provided via a transfer bridge. The berthing dolphins are a stand-alone, pile-supported structure that includes a fender system. Below are some important points regarding Alternative 3A:

- The entire existing cell structure is removed.
- This alternative reduces the amount of available uplands by about 1.7 acres leaving about 2.2 acres of uplands.
- This alternative eliminates the multi-purpose capabilities of the dock.
- This alternative limits cargo barge operations to only using the transfer bridge for roll-on roll-off.

The estimated cost for design, permitting, and construction of Alternative 3A is \$25.3 million.

### **Alternative 3B: Modified Berthing Dolphins and Transfer Bridge**

Alternative 3B is identical to Alternative 3A but is modified to reduce the number of berthing dolphins. Serviceability is limited to existing fuel and cargo barges only and no future expansion to include other potential users. This is the effective minimum structure that could be used to support existing users.

The estimated cost for design, permitting, and construction of Alternative 3A is \$21.1 Million.

An Alternatives Analysis Summary Matrix has been attached as Reference 3.

### **Community Input Summary**

Integral to the Lutak Dock study has been frequent and close coordination with the Haines community, including residents, businesses and industry stakeholders, elected officials, the local Ports and Harbors committee and Planning Commission from the very start of the project. Based on community input and feedback, the project team and Haines Borough updated the study concepts, clarified cost estimates and added refinements to the concepts to include future mining exploration as an added benefit of repairing or replacing the dock. All project documents including preliminary concept plan sets, community and industry meeting

summaries and feedback have been posted to the project website to further the inclusive and public transparency goals of the project. The project team has also coordinated with mining and fuel barge operators to ensure technical input has been captured and reflected in the preliminary concept plans. Discussions with stakeholders are occurring via public meetings (see above). Please also see the following website for additional information, including preliminary plan sets: <http://www.lutakdock.com/>. For full community and stakeholder engagement summaries, please see Reference 4. Community Input Summaries.

A summary of meetings since Project Start began in October 2016 include:

- Industry Stakeholder Coordination Meeting - November 1, 2016
  - As a result of the Stakeholder Coordination meeting, R&M included investigating the potential for mineral export infrastructure at the Lutak Dock site.
- Community Meeting #1 – November 1, 2016
  - Based on public input received, Alternative 1 was further developed to provide two modified Alternatives 1A and 1B.
- Community Meeting #2 – December 15, 2016
  - Due to public input received, Alternatives 3A and 3B were added to the study.
- Business Community Meeting – Chamber of Commerce Luncheon – December 16, 2016

On-going community feedback is important to future decisions on the preferred Alternative for the Lutak Dock. Community Meeting #3 is scheduled for February 1, 2017 as a Joint Work Session for the Ports and Harbors Advisory Committee and Planning Commission.

## Recommendations

The following table is a decision matrix outlining the alternatives, level of service and costs for comparison. Based on public input, industry and business stakeholder input, funding availability and meeting the purpose and need of replacing the Lutak Dock, the engineering recommendation is **Alternative 1B Encapsulate using Modified Diaphragm**. This alternative provides a high level of service, supports existing users, provides multi-use capabilities, and maintains existing upland area. It does this at a cost that is comparatively moderate.

ALTERNATIVE	SAFETY IMPROVEMENT	DESIGN YEAR LOS		COST
		Multi-Use Dock	Existing Users	
No-Action	✗	Medium	Medium	N/A
1A	✓	High	High	\$\$\$\$
1B	✓	High	High	\$\$\$
2	✓	High	High	\$\$\$\$\$\$
3A	✓	Low	Medium	\$\$\$
3B	✓	✗	Medium	\$\$

Legend: None ✗ Improved ✓

**Next Steps – Review and Approval Process**

The Haines Borough requests the Ports and Harbors Advisory Committee and Planning Commission to review the information before them and prepare to make a recommendation for a preferred Alternative to replace the existing Lutak Dock. The Planning Commission and Ports and Harbors Advisory Committee will make formal recommendations to move a Preferred Alternative forward at their respective regular meetings for a public hearing.

After the Planning Commission’s public hearing, the recommendation to move forward with the replacement of the Lutak Dock with the selected Preferred Alternative will go before the Haines Borough Assembly for a public hearing and decision.

**References:**

1. Lutak Dock Design and Development Concepts Progress Drawings 12/23/16
2. Benefit-Cost Analysis of the Lutak Dock Replacement December 2016
3. Alternatives Analysis Summary Matrix
4. Community Input Summaries