



Juneau Access Improvements Project Final Supplemental Environmental Impact Statement

Appendix II Alternative 1B Optimized and Alternative 5 Evaluation

Prepared for:

**Alaska Department of Transportation
& Public Facilities
6860 Glacier Highway
Juneau, Alaska 99801-7999**

**State Project Number: 71100
Federal Project Number: STP-000S(131)**

Prepared by:

**HDR
2525 C Street, Suite 500
Anchorage, AK 99503**

2017

This page intentionally left blank.

Executive Summary

Comments on the Juneau Access Improvements Project 2014 Draft Supplemental Environmental Impact Statement (SEIS) included multiple suggestions related to alternatives, including suggestions to evaluate new alternatives, variations on reasonable alternatives, and variations on alternatives previously considered not reasonable. This appendix examines two proposed alternatives in detail to determine whether they are reasonable and whether they warranted full evaluation in the Final SEIS.

The two new alternatives were labeled by their proponent, the Skagway Marine Access Commission (SMAC), as “Alternative 1B Optimized” and “Alternative 5.” The Alaska Department of Transportation and Public Facilities (DOT&PF) has retained this labeling for convenience, but use of these labels should not be interpreted as conferring stature or reasonableness. Attachment A contains SMAC’s proposed alternatives and data that were submitted with their comment letter on the Draft SEIS.

DOT&PF and the Federal Highway Administration (FHWA) gave these two alternatives a hard look by forecasting anticipated travel demand and developing capital and operating costs for each. The SMAC-proposed alternatives were evaluated against the screening criteria used to evaluate other alternatives for reasonableness. The screening criteria are described in Section 1.2.

Alternative 1B Optimized

An alternative developed by SMAC and labeled as “Alternative 1B Optimized” was submitted in association with their comments on the 2014 Draft SEIS. This ferry alternative would use only existing AMHS ferries and terminals, with suggested modifications to vessels used and routes run to “optimize” (in SMAC’s opinion) Alternative 1B as presented in the 2014 Draft SEIS.

Under Alternative 1B Optimized, during summer, one Day Boat Alaska Class Ferry (ACF) would make a round trip between Auke Bay and Haines daily, and the second Day Boat ACF would make a round trip between Skagway and Auke Bay daily. The motor vessel (*M/V Malaspina*) would sail daily on the following route: Haines-Skagway-Haines-Auke Bay-Haines. In winter, one Day Boat ACF would sail between Auke Bay and Haines 5 days per week. The second Day Boat ACF would sail between Haines and Skagway 5 days per week, making two trips per day each day it sails. The *M/V Malaspina* would not sail in Lynn Canal in winter. Mainline ferry service would not continue in Lynn Canal.

In general, the suggested scenario has some benefits, such as providing additional capacity on the higher-demand Auke Bay-Haines run. However, this alternative has capacity issues on the days a mainliner vessel turns around in Auke Bay and disembarks travelers. It also has operational problems.

DOT&PF and FHWA determined that this proposal is not reasonable for three reasons. First, the Day Boat ACF could not make a daily Auke Bay-Skagway run and meet U.S. Coast Guard (USCG) work/rest requirements based on the reasonable operating parameters developed to evaluate Final SEIS marine segments. To meet the USCG requirements, the vessel or the loading

and unloading facility at the Skagway Ferry Terminal would have to be modified to decrease the Day Boat ACF operating day. Making up-front capital improvements would be inconsistent with the Court decision that was the basis for Alternative 1B, which instructed that FHWA examine an alternative using existing assets and not requiring capital expenditures. Without modification of the vessel or the loading and unloading facility at the Skagway Ferry Terminal to decrease the Day Boat ACF operating day, it would not be compliant with USCG requirements.

Second, discontinuing mainline service within Lynn Canal would create capacity problems at Auke Bay. During summer, on the 2 days per week that mainliner vessels arrive in Juneau, the amount of transferring traffic plus local Lynn Canal traffic demand would be greater than the capacity of the Auke Bay-Skagway run proposed in SMAC's alternative.

Third, there would be insufficient berth space and vehicle staging areas in Auke Bay to have the mainline vessel in port while accommodating all the transferring vehicles without vessel and vehicle congestion and delays. To fully clear northbound and southbound connecting travelers onto the mainline vessel, the mainliner would need to remain docked in Auke Bay long enough for the two Day Boat ACFs and the *M/V Malaspina* to come and go. Moreover, the staging area at Auke Bay would be insufficient to accommodate all the disembarking and embarking vehicles. The existing space is limited and was not designed or sized to handle the transfers of the volumes expected.

For these reasons, and in consideration of the screening criteria, Alternative 1B Optimized is not reasonable. Because it is not reasonable, it is not further evaluated in the Final SEIS. However, based on the positive effect one aspect of this alternative would have on addressing demand in Lynn Canal as compared to the Alternative 1B evaluated in the Draft SEIS, DOT&PF and FHWA have modified Alternative 1B for the Final SEIS: running the *M/V Malaspina* on a Skagway-Auke Bay-Haines-Skagway route and Skagway-Haines-Auke Bay-Skagway Bay routing on 2 days.

Alternative 5

An alternative developed by SMAC and labeled as "Alternative 5" was submitted in association with their comments on the 2014 Draft SEIS. Alternative 5 is a ferry alternative that builds upon Alternative 4C from the 2014 Draft SEIS. It relies on using three Day Boat ACF vessels in Lynn Canal (the two programmed vessels currently under construction and a new vessel that would be built under this scenario), plus the terminal improvements identified in Alternative 4C. This proposal would eliminate mainline ferry service in Lynn Canal.

Under Alternative 5, during summer, one Day Boat ACF would make a round trip between Haines and Auke Bay daily, a second Day Boat ACF would make a round trip between Skagway and Auke Bay daily, and a third Day Boat ACF would make a round trip between Auke Bay and Haines 4 days per week and between Auke Bay and Skagway 3 days per week. The Haines-Skagway shuttle would make two round trips per day. In winter, one Day Boat ACF would make a round trip between Haines and Auke Bay 5 days per week, and a second Day Boat ACF would make two round trips between Haines and Skagway on the days the first Day Boat ACF sails. The third Day Boat ACF and the Haines-Skagway shuttle would not sail in Lynn Canal in winter. Under this alternative, mainline ferry service would not continue in Lynn Canal.

DOT&PF and FHWA have examined this alternative and have determined that it is an unnecessary additional alternative. It would attract fewer trips than Alternative 1B, provides similar capacity to Haines (and less to Skagway), and would have similar travel time as other alternatives studied (Alternatives 1 – No Action, 1B, and 4C). It fits within the range of capital and operational costs (not the cheapest and not the most expensive of the ferry options). In short, it is not unique enough to constitute something outside the range of alternatives already studied. Further, sufficient information has been generated to confirm that it is inferior to other alternatives already in the SEIS.

Additionally, during the summer, discontinuing mainline ferry service within Lynn Canal could create capacity issues that may prevent some travelers from reaching their final destination via a direct ferry connection. Vehicles traveling through Juneau in either direction on mainline vessels would be required to transfer from the Lynn Canal vessels to the mainline vessel at Auke Bay. Mainline vessels hold between 88 and 134 vehicles. Depending on how many vehicles were passing through Juneau, there could be insufficient capacity on the days the mainliner arrives when local traffic would be added to the demand generated by these mainline vessels. Some Lynn Canal travelers would likely have to use the Haines/Skagway shuttle and travel via Haines or Skagway to reach their final destination, which increases their travel time and potentially their costs (if they need to stay overnight).

This alternative is a variation of the existing alternatives and therefore would be an unnecessary addition to the range of reasonable alternatives.

This page intentionally left blank.

Table of Contents

Executive Summary	i
1. Introduction.....	1
1.1 Purpose.....	1
1.2 Evaluation Methodology.....	1
2. Alternative 1B Optimized.....	3
2.1 Description of Alternative 1B Optimized.....	3
2.2 Analysis of Alternative 1B Optimized.....	3
Demand and Capacity Analysis	3
Travel Times	4
Travel Frequency	5
Cost Analysis	6
Operational Analysis.....	6
2.3 Findings and Conclusion.....	9
Criterion I – Cost/Technical Feasibility and Common Sense.....	9
Criterion II – Appropriateness and Unnecessary Variations.....	9
3. Alternative 5.....	10
3.1 Description of Alternative 5.....	10
3.2 Analysis of Alternative 5	10
Demand and Capacity Analysis	10
Travel Times	11
Frequency	12
Cost Analysis	13
Operational Analysis.....	13
3.3 Findings and Conclusion.....	14
Criterion II – Appropriateness and Unnecessary Variations.....	14

Tables

Table 2-1: 2025 Forecast Demand and Capacity - Juneau to/from Haines and Skagway - Alternative 1 – No Action, Alternative 1B, and Alternative 1B Optimized.....	3
Table 2-2: Daily Traffic Capacity - Alternative 1 – No Action, Alternative 1B, and Alternative 1B Optimized.....	4
Table 2-3: Summer Travel Times (hours) - Alternative 1 – No Action, Alternative 1B, and Alternative 1B Optimized.....	5
Table 2-4: Travel Frequency - Alternative 1 – No Action, Alternative 1B, and Alternative 1B Optimized.....	5
Table 2-5: Initial Capital and Annual Operating Costs - Alternative 1 – No Action, Alternative 1B, and Alternative 1B Optimized (millions).....	6
Table 3-1: 2025 Forecast Demand and Capacity - Juneau to/from Haines and Skagway for Alternative 1 – No Action and Alternatives 1B, 4C, and 5	11
Table 3-2: Daily Traffic Capacity - Alternative 1 – No Action and Alternatives 1B, 4C, and 5.....	11
Table 3-3: Summer Travel Times (hours) - Alternative 1 – No Action and Alternatives 1B, 4C, and 5	12

Table 3-4: Travel Frequency - Alternative 1 – No Action and Alternatives 1B, 4C, and 512
Table 3-5: Capital and Operating Costs (millions) - Alternative 1 – No Action and
Alternatives 1B, 4C, and 5.....13

Attachments

- Attachment A: Skagway Marine Access Commission Supplied Information
- Attachment B: Route Operation and Schedule Models and Route Cost Models; Coastwise Engineering
- Attachment C: Travel Demand Forecast; Fehr & Peers

List of Acronyms

ACF.....	Alaska Class Ferry
ADT	average daily traffic
AMHS	Alaska Marine Highway System
DOT&PF.....	Alaska Department of Transportation and Public Facilities
EIS.....	Environmental Impact Statement
FHWA.....	Federal Highway Administration
M&O	maintenance and operations
M/V	motor vessel
NEPA	National Environmental Policy Act
SEIS	Supplemental Environmental Impact Statement
SMAC	Skagway Marine Access Commission
USCG	U.S. Coast Guard

This page intentionally left blank

1. Introduction

1.1 Purpose

Comments on the Juneau Access Improvements Project 2014 Draft Supplemental Environmental Impact Statement (SEIS) included multiple suggestions related to alternatives, including suggestions to evaluate new alternatives, variations on reasonable alternatives, and variations on alternatives previously considered not reasonable. This appendix examines two proposed alternatives in detail to determine whether they are reasonable and warrant full evaluation in the Final SEIS.

The two new alternatives were labeled by their proponent, the Skagway Marine Access Commission (SMAC), as “Alternative 1B Optimized” and “Alternative 5.” The Alaska Department of Transportation and Public Facilities (DOT&PF) has retained this labeling for convenience, but use of these labels should not be interpreted as conferring stature or reasonableness. Attachment A contains SMAC’s proposed alternatives and data that were submitted with their comment letter on the Draft SEIS.

1.2 Evaluation Methodology

In the original alternatives development process, alternatives considered and evaluated in the Environmental Impact Statement (EIS) underwent a screening process described in Chapter 2 of the Final SEIS. The alternative screening process used specific criteria to evaluate alternatives to determine the range of reasonable alternatives. Alternatives 1B Optimized and 5 are evaluated in this report using these same criteria¹. The criteria are:

- **Criterion I – Cost/Technical Feasibility and Common Sense.** Using professional judgment and cost data from previous analyses, the alternatives were screened to determine if they would be economically and/or technically feasible or go against common sense.
- **Criterion II – Appropriateness and Unnecessary Variations.** Alternatives were screened to determine if certain variations were unnecessary to consider a full spectrum of alternatives.
- **Criterion III – Purpose and Need.** To be reasonable, an alternative must at least partially meet a majority (three or more) of the five Purpose and Need elements. Alternatives were screened with regard to the Purpose and Need elements as follows:
 - **Element 1 – Meet Future Capacity Needs.** An alternative should provide sufficient capacity to meet the projected traffic demand for that mode.
 - **Element 2 – Provide Flexibility and Opportunity for Travel.** An alternative should provide for more round trips per day from Juneau to Haines and Skagway than the number of round trips provided under Alternative 1 – No Action.
 - **Element 3 – Reduce Travel Time.** An alternative should have a quicker one-way travel time between Juneau and Haines/Skogway than the travel time of Alternative 1 – No Action.

¹ Note, Element 5 was not evaluated because both alternatives were already deemed to not be reasonable without the expense of performing the additional user cost analysis.

- **Element 4 – Reduce State Annual Costs for Transportation in Lynn Canal.** An alternative should have estimated annual maintenance and operations (M&O) costs that are less than the estimated M&O costs for Alternative 1 – No Action. (The 2004 No Action Alternative M&O cost estimates were unknown at the time of this original screening.)
- **Element 5 – Reduce User Cost.** An alternative should have a lower one-way travel cost between Juneau and Haines/Skagway than the current cost under Alternative 1 – No Action.
- **Criterion IV - Environmental Factors.** This screening process uses information on specific Social Environment, Physical Environment, and Biological Environment impacts to determine if an alternative has an impact so great that it should not be considered reasonable.

To conduct the screening analysis for this appendix, DOT&PF used the same approach and analysis that were employed in the original screening to identify the reasonable alternatives, and considered the results against the criteria. A tiered approach was used for the screening analysis. Alternatives were screened one criterion at a time. If an alternative satisfied the screening criterion for a given tier, it was carried forward for consideration under the next criterion of screening. If an alternative did not satisfy the screening criterion for a tier, it was dropped from further consideration. Coastwise Engineering refined the operational scenarios provided by SMAC, consistent with the level of detail developed for the reasonable alternatives. The analysis included developing a Route Operation and Schedule Model, which allowed cost estimates to be developed that considered crew needs, fuel, layup costs, maintenance, and overhead. Attachment B contains the Route Operation and Schedule Models and Route Cost Models for Alternative 1B Optimized and Alternative 5. Traffic modeling consultant Fehr & Peers used the same forecasting model for SMAC's alternatives that was used to evaluate demand for the reasonable alternatives. The service characteristics used to model SMAC's alternatives and the 2025 and 2055 forecasts for each are presented in Attachment C. A full description of the forecasting methodology is available in the Final SEIS *Traffic Forecast Report* (Revised Appendix AA).

2. Alternative 1B Optimized

2.1 Description of Alternative 1B Optimized

An alternative developed by SMAC and labeled as “Alternative 1B Optimized” was submitted in association with their comments on the 2014 Draft SEIS. This ferry alternative would use only existing AMHS ferries and terminals, with suggested modifications to vessels and routes to “optimize” (in SMAC’s opinion) Alternative 1B as presented in the 2014 Draft SEIS. Unlike Alternative 1B, SMAC’s alternative would eliminate the mainline ferry service in Lynn Canal. A detailed description of the alternative is provided in Attachment A.

In summer, Alternative 1B Optimized would consist of one Day Boat Alaska Class Ferry (ACF) sailing a round trip between Auke Bay and Haines daily. The second Day Boat ACF would sail round trip between Skagway and Auke Bay daily. The motor vessel (*M/V Malaspina*) would sail daily on the following route: Haines-Skagway-Haines-Auke Bay-Haines. In winter, one Day Boat ACF would sail a round trip between Auke Bay and Haines 5 days per week. The second Day Boat ACF would sail between Haines and Skagway 5 days per week, making two round trips each day it sails. The *M/V Malaspina* would not sail in Lynn Canal in winter. Under this scenario, mainline ferry service would not continue in Lynn Canal. Mainline passengers and vehicles traveling through Juneau to or from Haines or Skagway would have to transfer vessels in Juneau.

2.2 Analysis of Alternative 1B Optimized

This section summarizes the pertinent information generated from the traffic demand model and operational analysis, including demand and capacity, travel times, travel frequency, and capital and operating costs associated with Alternative 1B Optimized. Detailed inputs and assumptions are found in Attachments B and C.

Demand and Capacity Analysis

Table 2-1 presents a summary of the anticipated demand for Alternative 1B Optimized and compares it to the demand for Alternative 1 – No Action and Alternative 1B from the 2014 Draft SEIS and the Final SEIS. Alternative 1B Optimized does attract a higher number of trips than both Alternative 1 – No Action and Alternative 1B. It does this in part by providing more service to the Auke Bay-Haines link and less service on the Auke Bay-Skagway link.

Table 2-1: 2025 Forecast Demand and Capacity - Juneau to/from Haines and Skagway - Alternative 1 – No Action, Alternative 1B, and Alternative 1B Optimized

Alternative	Demand ADT	Demand Summer ADT	Demand Winter ADT	Summer Capacity (vehicles per day)
Alternative 1 – No Action (Draft and Final SEIS)	80 (50/30)	125 (80/45)	50 (30/20)	154 (91/63)
Alternative 1B (Draft SEIS)	115 (60/55)	190 (100/90)	50 (30/20)	330 (129/201)
Alternative 1B Optimized	150 (90/65)	235 (135/100)	50 (30/20)	388 (282/106)
Alternative 1B (Final SEIS)	135 (70/65)	210 (110/100)	50 (30/20)	331 (160/171)

Note: The first number is the total demand or capacity. Numbers in parentheses are the demand or capacity split between Haines and Skagway, respectively. Demand estimates have been rounded to the nearest 5.
ADT = Average Daily Traffic.

Table 2-2 depicts the capacity provided by Alternative 1B Optimized and compares it to the capacity provided by the No Action Alternative and Alternative 1B from the Draft SEIS and Final SEIS. SMAC’s proposed alternative more than doubles the capacity provided to Haines compared to the version of Alternative 1B evaluated in the Draft SEIS, and roughly cuts the capacity provided to Skagway in half. Table 2-2 shows the increase in capacity to Haines and reduction in capacity to Skagway for Alternative 1B between the Draft SEIS and Final SEIS resulting from DOT&PF’s proposed routing changes based on SMAC’s comment².

**Table 2-2: Daily Traffic Capacity -
Alternative 1 – No Action, Alternative 1B, and Alternative 1B Optimized**

	Alternative 1 – No Action (Final SEIS)	Alternative 1B (Draft SEIS)	Alternative 1B Optimized (SMAC)	Alternative 1B (Final SEIS)
Auke Bay-Haines				
Summer	93	129	282	160
Winter	42	42	45	42
Auke Bay-Skagway				
Summer	61	201	106	171
Winter	28	28	30	28

Travel Times

Alternative 1B and Alternative 1B Optimized each use the *M/V Malaspina* and the Day Boat ACFs and, therefore, would have the same travel times (see Table 2-3). Alternatives 1B and 1B Optimized make travel time improvements over Alternative 1 – No Action only on the Auke Bay-Skagway run because they would provide direct point-to-point service.

² Based on the comment and the results of this analysis, DOT&PF and FHWA did modify Alternative 1B for the Final SEIS; during summer, the *M/V Malaspina* would make one round trip per day 5 days per week on a Skagway-Auke Bay-Skagway route. On the sixth day, the *M/V Malaspina* would sail on the Skagway-Auke Bay-Haines-Skagway route, and on the seventh day, it would sail that route in reverse (Skagway-Haines-Auke Bay-Skagway). The resultant increase in demand on Alternative 1B between the Draft SEIS and Final SEIS is based largely on this change and can be seen in Table 2-2. Operational decisions year to year regarding the routing and scheduling of the *M/V Malaspina* would remain flexible. AMHS has the ability to modify routes and schedules without needing to complete additional National Environmental Policy Act evaluation. The Alaska Marine Highway System could make additional trips on this routing, on additional days, if demand were to develop and warrant it.

**Table 2-3: Summer Travel Times (hours) -
Alternative 1 – No Action, Alternative 1B, and Alternative 1B Optimized**

	Alternative 1 – No Action (Final SEIS)	Alternative 1B (Draft SEIS)	Alternative 1B Optimized (SMAC)	Alternative 1B (Final SEIS)
Auke Bay-Haines				
Day Boat ACF	6.2	5.9 ¹	6.2	6.2
Mainliner	7.2	7.2	N/A	7.2
<i>M/V Malaspina</i>	N/A	N/A	6.4	6.42
Auke Bay-Skagway				
Day Boat ACF	8.1 ²	7.6 ^{1, 3}	6.7	8.1 ²
Mainliner	9.1	9.1	N/A	9.1
<i>M/V Malaspina</i>	N/A	6.8	8.2	6.8

¹ Travel speeds for the Day Boat ACFs reported in Chapter 2 of the Draft SEIS have been revised to correct a discrepancy with the *Marine Segments Technical Report* (Revised Appendix GG). As a result, travel time for the Day Boat ACFs increased slightly, and travel time estimates have been corrected.

² Travel occurs via Haines.

³ Alternative 1B has been modified from the Draft SEIS to make a Skagway-Auke Bay-Haines-Skagway and Skagway-Haines-Auke Bay- Skagway run.

Travel Frequency

Table 2-4 depicts travel frequencies provided by Alternative 1B Optimized, and compares them to the frequencies provided by Alternative 1 – No Action and Alternative 1B from the Draft SEIS and Final SEIS. Alternative 1B Optimized would provide more service between Auke Bay and Haines than the other alternatives, but it would provide less service between Auke Bay and Skagway.

**Table 2-4: Travel Frequency -
Alternative 1 – No Action, Alternative 1B, and Alternative 1B Optimized**

Route	Alternative 1 – No Action (Final SEIS)		Alternative 1B (Draft SEIS)		Alternative 1B Optimized (SMAC)		Alternative 1B (Final SEIS)	
	per Day	per Week	per Day	per Week	per Day	per Week	per Day	per Week
Auke Bay-Haines								
Summer	1.2	8	1.2	8	2	14	1.4	10
Winter	0.7	4	0.7	4	0.7	5	0.7	4
Auke Bay-Skagway								
Summer	1.2	8	1.3	9	1 ¹	7 ¹	2.3	16
Winter	0.7	4	0.7	4	0	0	0.7	4

¹ Travelers can make a one-way trip from Skagway to Auke Bay on the *M/V Malaspina* by sailing via Haines. Northbound travelers cannot use the *M/V Malaspina* to make the trip to Skagway. Skagway-bound travelers using the *M/V Malaspina* out of Auke Bay would have to spend the night in Haines before continuing to Skagway on the *M/V Malaspina* the next day.

Cost Analysis

Table 2-5 depicts the capital and operating costs of Alternatives 1 – No Action, 1B Optimized, and 1B evaluated in the Draft SEIS and Final SEIS. Because these alternatives rely on existing or programmed assets, there are no capital costs associated with them. As can be seen in Table 2-5, each of the 1B alternatives has higher operating costs than Alternative 1 – No Action. Alternative 1B Optimized would cost approximately \$1.2 million dollars less per year to operate and maintain than Alternative 1B evaluated in the Draft SEIS, and \$3.9 million less annually than Alternative 1B evaluated in the Final SEIS. This savings comes from discontinuing mainliner vessels in Lynn Canal. M&O costs for Alternative 1B have increased from the time the Draft EIS was released. There are two primary reasons for this: first, mainline costs calculations were in error³; and second, an additional Day Boat ACF run⁴ was added to the alternative based on comments received on the Draft SEIS.

**Table 2-5: Initial Capital and Annual Operating Costs -
Alternative 1 – No Action, Alternative 1B, and Alternative 1B Optimized (millions)**

Type of Cost	Alternative 1 – No Action (Final SEIS)	Alternative 1B (Draft SEIS)	Alternative 1B Optimized (SMAC)	Alternative 1B (Final SEIS)
Capital	\$0	\$0	\$0	\$0
M&O	\$18.2	\$23.8	\$22.6	\$26.5

User costs are anticipated to be the same as under Alternative 1 – No Action.

Operational Analysis

Operationally, Alternative 1B Optimized is different from the Alternative 1B that was evaluated in the Draft SEIS in two key ways. First, it proposes running one of the Day Boat ACFs on the Auke Bay-Skagway run while shifting the *M/V Malaspina* onto a Haines-Skagway-Haines-Auke Bay-Haines run. Second, mainliners would no longer traverse Lynn Canal, but would turn around in Auke Bay. These changes result in three operational challenges: (1) insufficient rest for Day Boat ACF crew on the Auke Bay-Skagway run, which is contrary to U.S. Coast Guard (USCG) requirements, (2) Day Boat ACF capacity problems on the Auke Bay-Skagway run, and (3) scheduling/congestion problems at the Auke Bay Ferry Terminal (berths and vehicle staging area).

U.S. Coast Guard Regulations. The Day Boat ACF cannot make a daily Auke Bay-Skagway round trip and comply with USCG work/rest requirements. USCG regulations dictate that a typical sailing schedule can be completed in 12 hours, crew members must have 70 hours of rest within a 7-day period, and the crew cannot be scheduled to work more than 12 hours in a 24-

³ For the 2014 Draft SEIS, mainline operating costs were based on AHMS provided operating cost data for fiscal year 2012. After the Draft SEIS was issued, it was discovered the cost data supplied by AMHS was incorrect and did not include a full 12 months of information. For the Final SEIS, a different methodology was used to calculate the annual mainliner costs for northern Lynn Canal service. For additional information, please see Appendix GG of the Final SEIS.

⁴ For the Final SEIS the Day Boat ACF would operate 7 days per week instead of 6.

hour work day. Without modification of the vessel or the loading and unloading facility at the Skagway Ferry Terminal to decrease the Day Boat ACF's operating day, a daily Auke Bay-Skagway run would not be compliant with USCG requirements⁵. The *M/V Malaspina* is able to make this run even though it takes longer than 12 hours because it has crew quarters onboard (the Day Boat ACFs do not) and sufficient crew to run for 24 hours. This was one of the reasons the *M/V Malaspina* was assigned to the Auke Bay-Skagway run instead of the Auke Bay-Haines run for Alternative 1B as evaluated in the Draft SEIS.

To enable the Day Boat ACF to make the Auke Bay-Skagway run and be consistent with USCG regulations would require capital improvements to the Skagway Ferry Terminal to convert to drive-through loading and unloading procedures (thereby speeding up the loading and unloading processes)⁶. Such capital improvements would be counter to the Court's directive to develop an alternative to improve service without up-front capital costs. The necessary improvements to convert the terminals to allow drive-through loading and unloading are assumed in Alternative 4C, which is why the Day Boat ACFs under that alternative can make a daily Auke Bay-Skagway run and still comply with USCG regulations.

Auke Bay-Skagway Capacity Problems. Discontinuing mainline service in Lynn Canal creates Day Boat ACF capacity problems on the Auke Bay-Skagway run. Mainline vessels hold between 83 and 133 standard 19-foot vehicles and Day Boat ACFs hold 53. Under SMAC's proposed alternative, vehicles traveling through Juneau in either direction on mainline vessels would be required to transfer from the Lynn Canal vessels to the mainline vessel at Auke Bay. During summer, on the 2 days per week that the mainliner sails, the amount of transferring traffic plus local Lynn Canal traffic demand would be greater than the capacity of Auke Bay-Skagway run proposed under Alternative 1B Optimized. The situation would be at its worst when the *M/V Columbia* is transferring northbound and southbound vehicles in Auke Bay. On these days, it is estimated that, on average, 58⁷ vehicles would travel northbound, but the northbound capacity of the Day Boat ACF is only 53 (the same situation would occur in reverse for travelers headed southbound; the Day Boat ACF would not have sufficient capacity for through travelers and local travelers).

Insufficient capacity would adversely affect the opportunity to travel and the travel times for travelers who are unable to make their desired sailing because it is full. Analysis completed for the Final SEIS indicates that this would routinely be an issue on the Auke Bay-Skagway run during summer. Given that mainline passengers are likely to make reservations much further in

⁵ Vessel speed used in the project analysis is based on realistic and historic vessel scheduling speed for ferries in Southeast Alaska. For displacement vessels, a 15-knot scheduling speed and a 7-knot maneuvering speed is assumed. Scheduling speed is assumed to be at least 0.5 knot less than vessel maximum speed to allow the vessel leeway to make up for lost time and inclement weather. The Alternative 1B Optimized Skagway-Auke Bay route is proposed to be serviced by an ACF, which would require a 12.3-hour crew. The calculated 12.3 hours is the shortest it could be because it incorporates the night crew performing vessel startup and shutdown. It is not reasonable to schedule a daily round trip utilizing an ACF and expect to meet the USCG rest requirements and provide sufficient leeway to make up for potential delay.

⁶ Converting to end berths allows drive-through capability, so vehicles do not have to turn around on the ship or back onto the ship while loading.

⁷ While the summer average daily traffic is estimated at 100 and the capacity at 106, on days the mainliners disembark in Juneau, the surge of through travelers from the mainliner would cause the Auke Bay-Skagway run to be regularly over-capacity.

advance, local Lynn Canal travelers are likely to be unable to travel on insufficient capacity days. Furthermore, mainliner travelers making late reservations could also be unable to get a same-day reservation, and would have to stay overnight in Juneau, which is a substantial impact on travel time and cost. While it would be possible for northbound travelers to use the *M/V Malaspina* to travel to Skagway (transferring through Haines), this connection would require travelers to spend the night in Haines to catch a morning run between Haines and Skagway. This would be inconvenient, substantially increase the travel time, and likely increase user cost.

Auke Bay Terminal Congestion. To fully unload, transfer, and then load northbound and southbound connecting travelers onto the mainline vessel, the mainliner must remain docked in Auke Bay long enough for each of the three proposed Lynn Canal vessels to come and go. Unfortunately, there is limited berth space and vehicle staging areas to avoid causing vessel and vehicle congestion and delays. Essentially, transferring mainline passengers in Auke Bay means that one of the docks would be tied up by the mainliner until each of the Lynn Canal vessels has docked, unloaded, loaded, and cleared the area. Mainline passengers would have to disembark, stage, and wait while arriving passengers disembark from the arriving Lynn Canal vessels and transfer to the mainline ferry. Only then could they load. This would have to happen three times to clear each of the Lynn Canal ferries. The mainline passengers would be stuck in Auke Bay while these maneuvers occur over the course of the day. Mainline passengers could be required to wait to load onto the second or third ferry, depending on their final destination (dependent on whether there is room). This would occur at the same time that local Lynn Canal traffic is arriving to stage either onto the mainline vessel or the Lynn Canal ferries. The resulting vessel congestion and delay could also be exacerbated, as other vessels (destined for other Southeast ports) also compete for berths. This is not a problem under Alternative 1B (or other proposed ferry alternatives), because the mainline through-travelers would remain on the mainliner. If the mainliner did not have to load and unload transferring mainliner vehicles it could depart more quickly, freeing up dock space and not burdening through-travelers with travel time delay.

Moreover, the staging area at Auke Bay is insufficiently sized and configured to accommodate all disembarking and embarking vehicles. The space is limited, and was not designed or sized to handle the volumes of transferring vehicles expected with the large mainliners unloading and loading in a limited space. In fact, two berths actually share one staging area. The discontinuation of mainliners in Lynn Canal works for Alternatives 2B and 3 because the vehicle staging for the shuttle ferries would not occur in Auke Bay, but at a new location at Katzehin (Alternative 2B) or Sawmill Cove and William Henry Bay (Alternative 3) that would be designed to handle the anticipated demand.

The delays and congestion of having the mainline vessel in port during these transfers would adversely affect the schedules and travel times of the mainline passengers (waiting for these transfers to occur), and also could potentially affect other schedules and travel times (e.g., vessels arriving to and from Sitka and other destinations). Also, while travel times for Lynn Canal travelers (travelers going solely between Juneau-Haines-Skagway) are estimated to be the same for Alternative 1B Optimized and Alternative 1B evaluated in both the Draft and Final SEISs (because they use the same vessels), the travel times for through-travelers on the mainline vessels would increase substantially. Alternatives 4A and 4C did not consider terminating mainline vessels in Auke Bay because of these difficulties, the reduction in capacity in Lynn

Canal, and the inconvenience and extended travel time to through-travelers on the mainline vessels. These are contributing factors as to why AMHS plans to continue mainline service in Lynn Canal for the foreseeable future.

2.3 Findings and Conclusion

Criterion I – Cost/Technical Feasibility and Common Sense

The estimated operating cost of Alternative 1B Optimized is in line with other alternatives, and is less expensive than the estimated cost of Alternative 1B evaluated in the Draft and Final SEISs. However, issues still exist because the Day Boat ACF proposed to travel the Auke Bay-Skagway route cannot do so on a daily basis and still comply with USCG work/rest requirements. The routing and scheduling of Alternative 1B Optimized also presents challenges for Skagway-bound travelers because only the Day Boat ACF would allow travelers to make a same-day northbound trip to Skagway (the *M/V Malaspina* requires an overnight stay in Haines). Not all northbound travelers to Skagway can be accommodated on the summer days the mainliner arrives in Auke Bay. Alternative 1B Optimized would have unacceptable congestion at Auke Bay for berthing vessels and staging vehicles to facilitate the transfer of vehicles from mainline vessels to the Lynn Canal system. Based on professional judgment and USCG requirements, **Alternative 1B Optimized does not make common sense** to fully evaluate in the Final SEIS given its technical operational and capacity problems.

Criterion II – Appropriateness and Unnecessary Variations

To be conservative, DOT&PF and the Federal Highway Administration (FHWA) also evaluated Alternative 1B Optimized against the second screening criteria, rather than eliminating it based solely on the first level of screening. Alternative 1B Optimized uses the same vessels dedicated to Lynn Canal as Alternative 1B, which is fully evaluated in the Draft and Final SEISs, but with a slightly different operating scenario (note also that Alternative 1B keeps mainliners in Lynn Canal, whereas 1B Optimized does not). It is possible to create numerous operating scenarios using these three vessels. The Alaska Marine Highway System (AMHS) has the ability to change routes and schedules at any time to meet the needs of the traveling public (within their funding limitations), and these variations of routing and scheduling are not subject to the National Environmental Policy Act (NEPA). While NEPA requires that an EIS evaluate a full range of alternatives, it does not require an EIS to examine every possible variation in a theoretically infinite set of variations. One operational variation that SMAC wanted to test was the possibility of discontinuing mainline vessels in Lynn Canal. However, as discussed in Criterion I, discontinuing mainline vessels in Lynn Canal has capacity and operational issues and is therefore not an “appropriate” variation. For these reasons, it is **not appropriate or necessary to include Alternative 1B Optimized** in the Final SEIS to fulfill the NEPA requirement to consider a full range of alternatives; Alternative 1B already fulfills this requirement and Alternative 1B Optimized is an unnecessary variation.

Based on the consideration of the screening criteria, Alternative 1B Optimized is not reasonable because it fails to satisfy Criteria I or II.

3. Alternative 5

3.1 Description of Alternative 5

Alternative 5 was an alternative developed by SMAC and submitted in association with its comments on the 2014 Draft SEIS (see Attachment A). Alternative 5 is a ferry alternative that builds upon Alternative 4C from the 2014 Draft SEIS. It relies on using three Day Boat ACFs in Lynn Canal (the two programmed vessels under construction and a new vessel that would be built for this alternative) and the terminal improvements associated with Alternative 4C. Alternative 5 would eliminate mainline service in Lynn Canal.

In summer, SMAC's Alternative 5 would consist of (1) a Day Boat ACF making a round trip between Haines and Auke Bay daily, (2) a second Day Boat ACF making a round trip between Skagway and Auke Bay daily, and (3) a third Day Boat ACF making a round trip between Auke Bay and Haines 4 days per week and between Auke Bay and Skagway 3 days per week. The Haines-Skagway shuttle would make two round trips per day. In winter, one Day Boat ACF would sail between Haines and Auke Bay 5 days per week, and a second Day Boat ACF would make two round trips between Haines and Skagway on the days the first Day Boat ACF sails. The third Day Boat ACF and the Haines-Skagway shuttle would not sail in Lynn Canal in winter. Under this alternative, mainline ferry service would not continue in Lynn Canal.

3.2 Analysis of Alternative 5

This section summarizes the pertinent information generated from the traffic demand model and operational analysis, including demand and capacity, travel times, travel frequency, and capital and operating costs associated with Alternative 5. Detailed inputs and assumptions are found in Attachments B and C. This alternative is similar to Alternatives 1B and 4C from the Draft SEIS in that it operates monohull vessels in Lynn Canal to and from Auke Bay, Haines, and Skagway. The biggest difference is it discontinues mainline vessels in Lynn Canal. Because of the similarity, a comparison with Alternatives 1B and 4C is included in the following analysis.

Demand and Capacity Analysis

Table 3-1 presents a summary of the anticipated demand for Alternative 5 compared to the demands for Alternative 1 – No Action, Alternative 1B, and Alternative 4C from the Final SEIS. Alternative 5 attracts a higher number of trips than both Alternative 1 – No Action and Alternative 4C, but it attracts fewer trips than Alternative 1B, because Alternative 1B provides nearly as much capacity and includes a 20 percent reduction in fares.

Table 3-1: 2025 Forecast Demand and Capacity - Juneau to/from Haines and Skagway for Alternative 1 – No Action and Alternatives 1B, 4C, and 5

Alternative	Demand ADT	Demand Summer ADT	Demand Winter ADT	Summer Capacity (vehicles per day)
Alternative 1 – No Action	80 (50/30)	125 (80/45)	50 (30/20)	154 (93/61)
Alternative 1B	135 (70/65)	210 (110/100)	50 (30/20)	331 (160/171)
Alternative 4C	95 (55/40)	150 (85/65)	55 (30/25)	275 (144/131)
Alternative 5	125 (71/54)	196 (111/85)	48 (30/18)	308 (167/151)

Note: The first number is the total demand or capacity. Numbers in parentheses are the demand or capacity split between Haines and Skagway, respectively. Demand estimates have been rounded to the nearest 5.

Table 3-2 compares the capacity provided by Alternative 5 to the capacities provided by Alternative 1 – No Action, Alternative 1B, and Alternative 4C. By running three vessels north-south in Lynn Canal, Alternative 5 would provide a capacity improvement over Alternative 1 – No Action. Alternative 1B provides nearly the same capacity to Haines in both summer and winter as Alternative 5, and provides more capacity to Skagway during the busy summer season.

Table 3-2: Daily Traffic Capacity - Alternative 1 – No Action and Alternatives 1B, 4C, and 5

	Alternative 1 – No Action	Alternative 1B	Alternative 4C	Alternative 5
Auke Bay-Haines				
Summer	93	160	144	167
Winter	42	42	68	45
Auke Bay-Skagway				
Summer	61	171	131	151
Winter	28	28	63	30

Travel Times

Alternative 1 – No Action and Alternatives 1B, 4C, and 5 each use a Day Boat ACF for a direct Auke Bay-Haines trip and, therefore, have the same travel times for that route. On the Auke Bay-Skagway run, Alternative 5 makes an improvement over Alternative 1 – No Action, but has the same travel time as Alternative 4C (both have a direct Auke Bay-Skagway connection using a Day Boat ACF). Alternative 1B, which has a direct Auke Bay-Skagway connection using the *M/V Malaspina*, does nearly as well (6.8 hours, as opposed to 6.6 hours for Alternative 5; see Table 3-3).

**Table 3-3: Summer Travel Times (hours) -
Alternative 1 – No Action and Alternatives 1B, 4C, and 5**

	Alternative 1 – No Action	Alternative 1B (Final SEIS) ¹	Alternative 4C	Alternative 5 (SMAC) ²
Auke Bay-Haines				
Day Boat ACF	6.2	6.2	6.2	6.2
Mainliner	7.2	7.2	7.2	N/A
<i>M/V Malaspina</i>	N/A	6.4	N/A	N/A
Auke Bay-Skagway				
Day Boat ACF	8.1 ³	8.1 ³	6.6	6.6
Mainliner	9.1	9.1	9.1	N/A
<i>M/V Malaspina</i>	N/A	6.8	N/A	N/A

¹ Alternative 1B has been modified from the Draft SEIS in summer to have the *M/V Malaspina* make one round trip per day 5 days per week on a Skagway-Auke Bay-Skagway route. On the sixth day, the *M/V Malaspina* would sail on the Skagway-Auke Bay-Haines-Skagway route, and on the seventh day, it would sail that route in reverse (Skagway-Haines-Auke Bay-Skagway).

² The SMAC alternative includes the same terminal modifications included in Alternative 4C. The modifications at Skagway would allow for drive-through loading and unloading. This would allow the Day Boat ACF to make the Auke Bay-Skagway run without violating Coast Guard requirements. The same berthing and staging improvements at the Auke Bay terminal are included to provide sufficient capacity for vessel and vehicle staging, loading, and unloading.

³ Travel occurs via Haines.

Frequency

Table 3-4 summarizes the frequency of service to and from Auke Bay, from Haines and Skagway. Alternative 5 provides 11 trips to Haines per week, 1 more trip than Alternative 1B, but provides 6 fewer trips to Skagway. It is important to note that AMHS has the ability to adjust operating schedules to meet demand, and could adjust schedules under Alternative 1B in the future, providing additional service to Haines if demand projected in the SEIS were to be higher than anticipated.

**Table 3-4: Travel Frequency -
Alternative 1 – No Action and Alternatives 1B, 4C, and 5**

Route	Alternative 1 – No Action (Final SEIS)		Alternative 1B (Final SEIS)		Alternative 4C		Alternative 5	
	per Day	per Week	per Day	per Week	per Day	per Week	per Day	per Week
Auke Bay-Haines								
Summer	1.2	8	1.4	10	1.3	9	1.6	11
Winter	0.7	4	0.7	4	0.6	4.5	0.7	5
Auke Bay-Skagway								
Summer	1.2	8	2.3	16	1.3	9	1.4	10
Winter	0.7	4	0.7	4	0.6	4.5	0 ¹	0 ¹

¹There are no direct sailings between Auke Bay and Skagway in the winter. Travelers would have to transfer ferries in Haines.

Cost Analysis

Table 3-5 depicts the capital and operating costs of Alternatives 1 – No Action, 1B, 4C, and 5. Alternative 5 relies on two programmed ferries, but proposes purchasing a third Day Boat ACF (reflected in the initial capital cost increase of \$97.8 million). Alternative 5 would also require terminal upgrades to Auke Bay and Skagway ferry terminals (similar to Alternative 4C, but not proposed in Alternative 1B). As can be seen in Table 3-5, Alternative 5 would require an increase in M&O costs over Alternative 1 – No Action, similar to Alternative 4C. Capital costs would be nearly double that of Alternative 4C.

**Table 3-5: Capital and Operating Costs (millions) -
Alternative 1 – No Action and Alternatives 1B, 4C, and 5**

	Alternative 1 – No Action (Final SEIS)	Alternative 1B	Alternative 4C	Alternative 5 Optimized (SMAC)
Capital	\$0	\$0	\$78.6	\$151.5
M&O	\$18.2	\$26.5	\$22.7	\$22.2

User costs are anticipated to be the same as under Alternative 1 – No Action.

Operational Analysis

Operationally, this alternative is similar to Alternatives 1B and 4C from the Draft SEIS. (Alternative 5 runs conventional monohull ferries between Auke Bay, Haines, and Skagway). Its primary differences is the elimination of mainliner service in Lynn Canal. Thus, while Alternatives 1B and 4C would serve Lynn Canal with two Day Boat ACFs in combination with mainliners, Alternative 5 would serve Lynn Canal with two Day Boat ACFs in combination with a third, new Day Boat ACF.

Capacity Problems. Similar to SMAC’s proposed Alternative 1B Optimized, Alternative 5 has the similar, (although not as severe) capacity challenges on the days the mainliner arrives in Auke Bay. The discontinuation of mainline service in Lynn Canal is anticipated to create capacity problems that prevent some travelers from reaching their final destination via a direct ferry. Mainline vessels hold between 83 and 133 standard 19-foot vehicles and Day Boat ACFs hold 53. Under SMAC’s proposed alternative, vehicles traveling through Juneau in either direction on mainline vessels would be required to transfer to and from Lynn Canal vessels to the mainline vessel at Auke Bay. DOT&PF anticipates that there may be insufficient capacity on the route served by a single Day Boat ACF when the local Lynn Canal traffic is added to the through-trips from the mainline vessels. Travelers who cannot travel on the direct ferry would have to use the Haines/Skagway shuttle and travel via Haines or Skagway to reach their final destination, which increases their travel time. For example, if a northbound mainliner arrives on a day when there is one Day Boat ACF on the Juneau-Haines route and two Day Boat ACFs on the Juneau-Skagway route, some travelers would be able to take the direct Juneau-Haines Day Boat ACF (until it is full). Once it is full, the remaining Haines-bound passengers would need to take the Juneau-Skagway Day Boat ACF and then the Haines/Skagway shuttle to Haines. The increase in travel time would depend on the scheduling on the Day Boat ACFs and the Haines/Skagway shuttle.

Given that mainline travelers are likely to make reservations much further in advance means that local Lynn Canal travelers are more likely to have to take the indirect route on those days. Mainline travelers could also get bumped if there is insufficient capacity on the Haines/Skagway shuttle, however, requiring them to stay overnight in Lynn Canal. Mainline travelers unable to continue their trip due to insufficient capacity on the Day Boat ACF would experience a substantial impact on their travel time, convenience, and out-of-pocket costs (e.g., having to stay in a hotel). This problem would not occur under Alternatives 2B and 3 because the frequency of the shuttle ferries at Katzehin (Alternative 2B) and Sawmill Cove and William Henry Bay (Alternative 3) is sufficient to provide capacity to clear the additional mainline traffic within the same day.

Auke Bay Congestion. Similar to Alternative 1B Optimized, in order to fully clear northbound and southbound connecting travelers on and off the mainline vessel, the mainliner would have to remain docked in Auke Bay long enough for each of the three proposed Day Boat ACF vessels to come and go. The transfer of mainline passengers in Juneau would require the transferring passengers to wait until each of the Lynn Canal vessels has docked, unloaded, loaded, and cleared the area. Mainline vehicles would disembark and wait, while arriving vehicles would disembark from a Lynn Canal ferry and transfer and stage for the mainline ferry before they could load. This would happen three times in order to transfer vehicles to and from each of the Lynn Canal ferries. The Auke Bay Ferry Terminal has insufficient vehicle staging capacity for this amount of traffic.

The delays caused by the mainline vessel waiting in port during these transfers would adversely affect the schedules and travel times of the mainline passengers (waiting for these transfers to occur), and also could affect other schedules and travel times (e.g., vessels arriving to/from Sitka and other destinations). The time it takes for each of the Lynn Canal vessels to come and go would mean excessive delays for mainline passengers. Mainline passengers would be required to wait to load or unload onto the arriving Lynn Canal ferries.

Alternatives 4A and 4C did not include terminating mainline vessels in Auke Bay in part due to these operational difficulties, and due to the inconvenience and extended travel time imposed on through-travelers on the mainline vessels. For this reason and others, AMHS policy is to continue mainline service in Lynn Canal. Moreover, the mainline vessels provide considerable capacity, and continuing their operation in Lynn Canal is important for providing needed capacity and convenience for through travelers.

3.3 Findings and Conclusion

Criterion II – Appropriateness and Unnecessary Variations

Alternative 5 is essentially an operational variation of Alternatives 1B and 4C, which are already evaluated fully in the Final SEIS. NEPA requires that an EIS evaluate a full range of alternatives, but does not require the examination of every possible variation in a theoretically infinite set of variations. Alternative 5 runs conventional monohull ferries between Auke Bay, Haines, and Skagway similar to Alternatives 1, 1B, and 4C. Its primary differences are the purchase of a third Day Boat ACF and the elimination of mainliner service in Lynn Canal. Thus, while Alternatives 1B and 4C serve Lynn Canal with two Day Boat ACFs in combination with mainliners,

Alternative 5 serves Lynn Canal with two Day Boat ACFs in combination with a third, new Day Boat ACF.

Based on the analysis, Alternative 5 attracts fewer trips than Alternative 1B, provides about the same capacity to Haines (and less to Skagway), and has virtually the same travel time as other alternatives studied (Alternatives 1 – No Action, 1B, and 4C). It fits within the range of capital and operational costs (neither the least nor the most expensive of the ferry options). It is not distinctive enough to constitute something outside the range of alternatives already studied. Further, sufficient information has been generated to confirm that it is inferior to other alternatives already evaluated in the SEIS. Therefore, it is ***not necessary to include Alternative 5*** in the Final SEIS to fulfill the NEPA requirements to have considered a full spectrum of alternatives; it is an unnecessary variation.

This page intentionally left blank.

ATTACHMENT A

SKAGWAY MARINE ACCESS COMMISSION SUPPLIED INFORMATION

This page intentionally left blank

ALTERNATIVE 1B OPTIMIZED

A more efficient proposal for enhanced ferry
service than Alternative 1B in the Juneau Access
Draft SEIS

November 18, 2014



*Skagway Marine Access Commission
Box 1076
Skagway, Alaska 99840*

Evaluation of Alternative 1B

Based on the brief description and undeveloped discussion of Alternative 1 in the DEIS, the court cannot conclude that an alternative aimed at providing improved and more efficient ferry service was “rigorously explored” by the agencies. Judge Sedwick 105 Order and Opinion Granting SJM

The Alaska Department of Transportation and Public Facilities (AKDOT) proposed Alternative 1B in the Juneau Access Improvements Draft Supplemental Environmental Impact Statement (DSEIS) as a response to the Alaska District Court’s 2008 decision that the state did not adequately consider improving ferry service in Lynn Canal using existing assets. In other words, the state failed to provide an apples-to-apples comparison for the purpose of evaluating the costs and benefits of the various proposed Juneau Access improvements.

The state’s new proposal is called “Alternative 1B – Enhanced Service with Existing AMHS Assets,” described on the DSEIS website as follows:

“Alternative 1B includes all of the components of Alternative 1, No Action, but focuses on enhancing service using existing AMHS [Alaska Marine Highway System] assets without major initial capital expenditures. Similar to Alternative 1, Alternative 1B includes: a continuation of mainline ferry service in Lynn Canal; the AMHS would continue to be the NHS [National Highway System] route from Juneau to Haines and Skagway; no new roads or ferry terminals would be built; and in addition to the Day Boat ACFs [Alaska Class Ferries], programmed improvements include improved vehicle and passenger staging areas at the Auke Bay and Haines ferry terminals to optimize traffic flow on and off the Day Boat ACFs as well as expansion of the Haines Ferry Terminal to include a new double bow berth to accommodate the Day Boat ACFs. Service to other communities would remain the same as the No Action Alternative. Alternative 1B keeps the *M/V Malaspina* in service after the second Day Boat ACF is brought online to provide additional capacity in Lynn Canal. Enhanced services included as part of Alternative 1B are a 20 percent reduction in fares for trips in Lynn Canal and extended hours of operations for the reservation call center.

“Mainline service would include two round trips per week in the summer and one per week in the winter with Auke Bay-Haines-Skagway-Haines-Auke Bay routing. During the summer, the *M/V Malaspina* would make one round-trip per day seven days per week on a Skagway-Auke Bay-Skagway route, while one Day Boat ACF would make one round trip between Auke Bay and Haines six days per week, and one would make two round-trips per day between Haines and Skagway six days per week. The Day Boat ACFs would not sail on the seventh day because the mainliner would be on a similar schedule. In the winter, ferry service in Lynn Canal would be provided primarily by the Day Boat ACFs three times per week.”

The Skagway Marine Access Commission has reviewed Alternative 1B to determine whether AKDOT has met the judge’s mandate of “rigorously” exploring an alternative aimed at providing improved and more efficient ferry service. It is our opinion that while alternative 1B provides certain “enhancements” to the No-Build Alternative 1, it falls short of providing an optimized model that deploys existing assets in the most efficient way. Given the state’s choice of vessels,

their proposal fails to match capacity to demand. The planners focused on adding capacity but neglected to consider the efficiencies that can be gained by optimum routing configurations.

Throughout the following analysis we rely on AKDOT's figures in Appendix GG of the DSEIS: Marine Segments Technical Report.

Alternative 1B fails to match capacity to demand

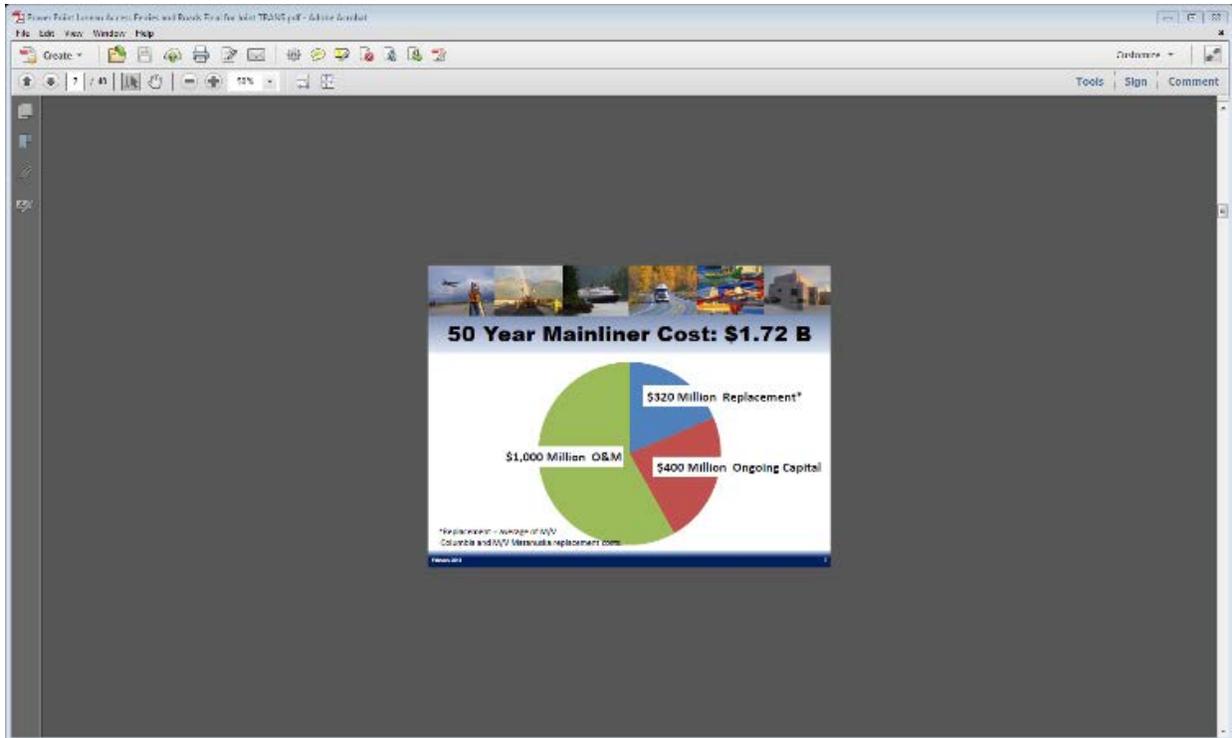
A key weakness of Alternative 1B is the deployment of the *M/V Malaspina* to the Auke Bay-Skagway route. Historically, this route experiences less traffic than the Auke Bay-Haines route. Yet Alternative 1B proposes to use the *Malaspina*, with its large vehicle capacity and high labor costs to service this less-traveled route, creating excess capacity between Auke Bay and Skagway at significant cost to the system. This scenario also fails to take advantage of the *Malaspina's* ability to run longer than 12 hours per day. The vessel's 24/7 crewing requirements allow it to follow its traditional Auke Bay-Haines-Skagway-Haines-Auke Bay route, thereby avoiding the 12 hour rule that limits the length of route segments that the ACF Day boat can service.

At the same time, 1B proposes to use the smaller ACF day boat, with its lower vehicle capacity, on the more popular Auke Bay-Haines, leaving little excess capacity.

Alternative 1B never considers the option of removing mainliners from Lynn Canal

A second weakness of Alternative 1B is the failure to consider eliminating "through" mainliners carrying traffic from points south of Auke Bay. Whether calculated by hour or miles, mainliners with their large crews and 24/7 crewing requirements, are very expensive to operate. The Southeast Alaska Transportation Plan (SATP) calls for retiring one or more of the aging mainline vessels in the next few years. By comparison, the new ACF day boats, which are included in Alternative 1B, present a more efficient transportation model for Lynn Canal, requiring one-fifth the crew of the larger ships.

In recent years at many public presentations, AKDOT officials have referenced the high cost of maintaining and replacing mainliners as a justification for the Juneau Access road project. For example, on March 6, 2014 Jeff Ottesen, Director of Program Development for AKDOT, gave a presentation to the Joint Transportation Committees of the Alaska Legislature entitled "Why Extending Roads and Shortening Ferry Links is a Sound Policy Choice." The pie chart below is from his presentation and shows the excess cost to the state of maintaining and replacing mainliners.



Given this concern on the part of AKDOT, it is curious to us that only the two road alternatives [Alternatives 2B and 3] have not been burdened with the costly mainliner through-service from Bellingham and Prince Rupert. In those alternatives, traffic arriving in Auke Bay from points south must offload in Auke Bay and transfer to the road system in order to drive to a ferry terminal located at either Berners Bay or Katzehin. None of the all-marine options considers offloading passengers and vehicles in Auke Bay and transferring them to a more efficient marine transportation system to reach Haines or Skagway. This scenario provides the best apples-to-apples comparison to a road link with regard to isolating the costs of providing efficient and enhanced service in Lynn Canal.

Our proposal: Alternative 1B Optimized

The optimization of 1B involves two key changes to AKDOT's Alternative 1B:

- Reconfiguration of route segments and homeporting the *Malaspina* in Haines
- Elimination of "through" mainline service north of Juneau

Homeporting the *M/V Malaspina* in Haines allows that vessel to be deployed on a Haines-Skagway-Haines-Auke Bay-Haines route. This routing accomplishes the following:

- Uses the large vehicle capacity of the *Malaspina* on the route with the most demand;
- Takes advantage of the *Malaspina's* ability to run longer than 12 hours a day;
- Allows the *Malaspina* to shuttle traffic between Haines and Skagway, freeing up an ACF day boat to run between Haines and Auke Bay;

- Matches the capacity of the smaller ACF vessel to the demand of the less frequently traveled route between Skagway and Auke Bay;
- Eliminates the need for the “through” mainliners and frees up a mainliner to be retired or deployed to other parts of the region such as Sitka; and
- Saves the AMHS more than \$1 million in annual operating costs. (We believe the savings may be significantly higher. Please see page 8 for discussion of possible errors in the DSEIS’ mainline data.)

Assumptions

Alternative 1B Optimized assumes the same vessel and terminal improvements as are proposed for Alternative 1B, and requires no new construction of ships or berths. Our analysis does not address the AMHS reservation system or reduction of fares. Our analysis also assumes an elimination of through-mainliner service north of Juneau. (AKDOT would have the option to use mainliners in case of schedule disruptions, on alternative routes such as those servicing Sitka, or left idle to save system costs.)

The purpose of this analysis is to demonstrate that service and capacity can be increased at reduced cost through better use of three vessels: two ACFs and the *Malaspina*. This scenario also allows for a more accurate apples-to-apples comparison with the two road alternatives.

Please note the following abbreviations: HNS = Haines; SGY = Skagway; ABY = Auke Bay

Route Configuration – Summer Schedule

- ACF 1 homeports in Auke Bay and runs ABY-HNS-ABY once a day, seven days a week
- ACF 2 homeports in Skagway and runs SGY-ABY-SGY once a day, seven days a week
- The *Malaspina* homeports in Haines and runs HNS-SGY-HNS once a day and HNS-ABY-HNS once a day, seven days a week

All departures are in the morning with the Skagway ACF departing early enough to free up the Skagway Terminal for the arrival of the *Malaspina*.

This proposed route configuration better matches capacity to demand. It increases the number of sailings per week and provides more departure time options.

Route Configuration – Winter Schedule

- ACF 1 homeports in Auke Bay and runs ABY-HNS-ABY once a day, five days a week
- ACF 2 homeports in Haines and runs HNS-SGY-HNS twice a day, five days a week
- The *Malaspina* is not used on this route and is available for use as AMHS sees fit

This provides slightly more capacity and more sailings per week than AKDOT’s Alternative 1B. When not in use on its Haines route, the ACF in Auke Bay would be available should AKDOT wish to provide additional sailings in Lynn Canal or surrounding communities such as Hoonah, Gustavus, Angoon, etc.

Alternative 1B Optimized Schedules

We have developed proposed schedules to verify number of round trips and determine crew times. Schedule start times are arbitrary. The schedules are notional and are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Transit times are based on AKDOT's estimated transit times in Alternative 4C (Conventional Monohull out of Auke Bay), found in the JAI Marine Segments Technical Report (DSEIS Attachment C). See Exhibit B.

Summer

ACF1

Depart	Arrive	Depart	Arrive
Auke Bay	Haines	Haines	Auke Bay
6:00 AM	10:46 AM	11:20 AM	4:06 PM

ACF2

Depart	Arrive	Depart	Arrive
Skagway	Auke Bay	Auke Bay	Skagway
6:00 AM	11:18 AM	11:50 AM	5:08 PM

Malaspina

Depart	Arrive	Depart	Arrive	Depart	Arrive	Depart	Arrive
Haines	Skagway	Skagway	Haines	Haines	Auke Bay	Auke Bay	Haines
9:00AM	10:00AM	11:00AM	12:00PM	1:00PM	5:30PM	6:30PM	11:00PM

Winter

ACF1

Depart	Arrive	Depart	Arrive
Auke Bay	Haines	Haines	Auke Bay
6:00 AM	10:46 PM	11:20 PM	4:06 PM

ACF2

Circuit No.	Depart	Arrive	Depart	Arrive
	Haines	Skagway	Skagway	Haines
1	8:00 AM	8:53 AM	9:25 AM	10:18 AM
2	11:10 AM	12:03 PM	12:35 PM	1:28 PM

Capacity-Demand Comparison of Alternatives 1B and 1B Optimized (Summer Schedule)¹

Purpose and Need Factors	1B	1B Optimized
Auke Bay-Skagway		
Forecasted demand (vehicles per day)	90	90
Capacity (vehicles per day)	176	106
Round-trip sailings per week	9 ²	7 ³
Auke Bay-Haines		
Forecasted demand (vehicles per day)	100	100
Capacity (vehicles per day)	154	282
Round-trip sailings per week	8	14
Haines-Skagway		
Forecasted demand (vehicles per day)	53	53
Capacity (vehicles per day)	260	176
Round-trip sailings per week	15	7

¹Data are derived from Appendix GG, Juneau Access DSEIS, Marine Segments Technical Report.

²An additional six trips per week could be made by taking the Day Boat ACF between Auke Bay and Haines and transferring ferries.

³An additional seven trips per week could be made from Skagway to Auke Bay by taking the *Malaspina* southbound or transferring in Haines to the ACF.

Cost Comparison

The table below compares estimated yearly fuel and crew costs under AKDOT's Alternative 1B and our proposal, Alternative 1B Optimized. As the table shows, Alternative 1B Optimized generates an estimated annual savings of more than \$1 million.

Cost comparison, Alternative 1B and Alternative 1B Optimized			
(total annual costs in millions)			
	Alternative 1B	Alt. 1B Optimized	Savings with 1B Opt.
Fuel costs	\$5.7	\$7.5	(\$1.8)
Crew costs	\$13.9	\$10.9	\$3.0
Total	\$19.6	\$18.4	\$1.2

Figures for Alternative 1B are from JAI DSEIS Appendix GG. Calculations for Alternative 1B Optimized can be found in Exhibit A.

We believe annual savings associated with Alternative 1B Optimized may be significantly more than this analysis indicates. On page 1 of Attachment A in the DSEIS, "AMHS Mainline Operating Costs," the methodology and results for the Comparison of Vessel Operating Days Chart appear to be incorrect. The chart lists a total of 40.9 Mainline Days for the number of days the mainliners operate in North Lynn Canal. It is difficult to see how this value was derived considering that under alternatives that use mainline ferries as a transportation component, the document states that two mainliners will run in summer and one in winter.

Summer is defined as approximately 22 weeks (44 mainline sailings) and winter is approximately 30 weeks (30 mainline sailings). These combine for a total of 74 mainline sailings a year. Even if you discount the running time in North Lynn Canal as not a full day (24 hours) and assume a run time of 18 hours (75 percent of a day), calculations render an operating days total of 55.5 days: 74 sailings x 0.75 days = 55.5 days. This is significantly higher than the 40.9 days listed in the DSEIS. This is important, as this number is used to calculate crew and fuel costs for the mainline component of a majority of the alternatives. This problem was brought to the attention of Gary Hogins, Project Manager. In an email exchange on November 3, 2014 he acknowledged that the document is in error and corrections would need to be made.

SUMMARY

Advantages of Alternative 1B Optimized compared to Alternative 1B

The cost analysis for Alternative 1B Optimized is contained in Exhibit A. Our preliminary work indicates that this proposal could save the state more than \$1million in annual operating costs while increasing capacity and travel options. We believe the savings could be significantly greater (see note on preceding page). Eliminating “through” mainliners from Lynn Canal allows the AMHS to redeploy those ships to increase service to other northern panhandle communities, provide back-up in case of service disruptions, or to retire an aging vessel.

Unlike Alternative 1B, our proposal scales capacity to demand, with room for growth. Our proposal increases capacity on the popular Auke Bay-Haines route while more closely matching capacity to demand on the Auke Bay-Skagway and Skagway-Haines routes. Other benefits include:

- Multiple deployment options, especially in the winter;
- More flexibility and travel options for passengers;
- Use of the *M/V Malaspina* in her traditional role of day boat in Lynn Canal. While this increases fuel costs slightly (owing to a longer route than the *Malaspina* route proposed under 1B), those costs are more than offset by more efficient use of labor (*Malaspina* crew is paid 24/7 whether it is tied up at the dock or sailing on a route); and
- Direct access from Skagway to Juneau seven days a week in the summer.

Our proposal is just one alternative. There may be even more optimal deployments of the ferry system’s existing vessels and crew. We believe our analysis demonstrates, at a minimum, that the state failed to do a rigorous analysis of the most efficient and effective use of existing assets to enhance service in northern Lynn Canal.

In addition, if the purpose of developing alternatives is to provide a sound, rational basis for comparing competing transportation proposals, consistent assumptions should be used regarding the use of mainline service north of Juneau.

To quote Judge Sedwick, we “cannot conclude that an alternative aimed at providing improved and more efficient ferry service was rigorously explored by the agencies.”

Exhibit A: Alternative 1B Optimized Crew and Fuel Costs

Alternative 1B Optimized is comprised of the following three vessels shown here with their respective routes and ASV's (Alaska Standard Vehicle) capacity:

- The MV Malaspina (HNS-SGY-ABY-HNS) with a vehicle capacity of 88 ASV (Alaska Standard Vehicles)
- ACF Day Boat 1 (ABY-HNS-ABY) 53 ASV
- ACF Day Boat 2 (SGY-ABY-SGY) 53 ASV

Below are calculations for crew and fuel costs that comprise approximately 87% of vessel operating costs. The data used in this analysis has been derived from Appendix GG of the Juneau Access DSEIS: Marine Segments Technical Report.

Malaspina

**Summer Season: 153 Days
(153 Operating Days)**

Crew cost:

Malaspina hourly crew cost: \$1321.57

153 days ÷ 7 days/week x 168 hr/week = 3,672 hrs/season
x \$1321.57 crew cost/hour = **\$4,852,800**

Fuel cost:

Malaspina fuel consumption: 436.26 gal/hour

HNS-SGY-HNS time underway per week: 12.37 hr
HNS-ABY-HNS time underway per week: 66.73 hr

12.37 + 66.73 = 79.1 hours underway per week

153 op/days ÷ 7 days/week x 79.1 hrs/week = 1728.90 hrs/season
x \$3.38 / gal x 436.26 = **\$2,549,365**

\$4,852,800 Malaspina crew costs
\$2,549,365 Malaspina fuel costs

\$7,402,165 Total Malaspina Summer costs

ACF 1

Summer season: 153 Days
(153 Operating Days)

Crew cost:

Day crew: \$698.74/hr
Night crew: \$156.55/hr

Day Crew:
 $153 \text{ days} \div 7 \text{ days/week} \times 84 \text{ hr/wk} = 1836 \text{ hrs/season}$
 $\times \$698.74 = \$1,282,881$

Night crew:

$153 \text{ days} \div 7 \text{ days/week} \times 84 \text{ hr/wk} = 1836 \text{ hrs / season}$
 $\times \$156.55 = \$287,418$

Summer Crew cost = **\$1,570,299**

Fuel cost:

ACF Fuel Consumption: 289.48 gal/hr

ABY-HNS-ABY time underway per week: 66.73 hr/wk

$153 \text{ op days} \div 7 \text{ days/wk} \times 66.73 \text{ hr/wk} = 1458.60 \text{ hr/season}$
 $\times \$3.38/\text{gal} \times 289.48 \text{ gal/hr} = \mathbf{\$1,427,156}$

\$1,570,229 ACF1 summer crew costs

\$1,427,156 ACF1 summer fuel costs

\$2,997,385 Total ACF1 Summer costs

ACF2

Summer season: 153 Days
(153 Operating Days)

Crew cost:

Day crew: \$698.74/hr
Night crew: \$156.55/hr

Day Crew:
153 days ÷ 7 days/week x 84 hr/wk = 1836 hrs/season
X \$698.74 = \$1,282,881

Night crew:

153 days ÷ 7 days/week x 84 hr/wk = 1836 hrs / season
x \$156.55 = \$287,418

Summer Crew cost = **\$1,570,299**

Fuel cost:

ACF Fuel Consumption: 289.48 gal/hr

SGY-ABY-SGY time underway per week: 74.20 hr/wk

153 op days ÷ 7 days/wk x 74.20 hr/wk = 1621.80 hr/season
x \$3.38/gal x 289.48 gal/hr = **\$1,586,838**

\$1,570,229 ACF1 summer crew costs
\$1,586,838 ACF1 summer fuel costs

\$ 3,157,067 Total ACF2 Summer costs

ALTERNATIVE COST SUMMARY (SUMMER)

Route / Vessel	Crew	Fuel
HNS-SGY-HNS-ABY-HNS MALASPINA	\$4,852,800	\$2,549,365
ABY-HNS-ABY ACF1	\$1,570,299	\$1,427,156
SGY-ABY-SGY ACF2	\$1,570,299	\$1,586,838
ALTERNATIVE TOTAL	\$7,993,398	\$5,563,359

ACF 1

Winter season: 212 Days
(152 Operating Days)

Crew cost:

Day crew: \$698.74/hr
Night crew: \$156.55/hr

Day Crew:
 $212 \text{ days} \div 7 \text{ days/week} \times 60 \text{ hr/wk} = 1817.14 \text{ hrs/season}$
 $\times \$698.74 = \$1,269,708$

Night crew:

$212 \text{ days} \div 7 \text{ days/week} \times 84 \text{ hr/wk} = 2544.00 \text{ hrs / season}$
 $\times \$156.55 = \$398,263$

Winter Crew cost = \$1,667,971

Fuel cost:

ACF Fuel Consumption: 289.48 gal/hr

ABY-HNS-ABY time underway per week: 47.67 hr/wk

$212 \text{ days} \div 7 \text{ days/wk} \times 47.67 \text{ hr/wk} = 1443.72 \text{ hr/season}$
 $\times \$3.38/\text{gal} \times 289.48 \text{ gal/hr} = \$1,412,597$

\$1,667,971 ACF1 winter crew costs

\$1,412,597 ACF1 winter fuel costs

\$3,080,568 Total ACF1 Winter costs

ACF 2

Winter season: 212 Days
(152 Operating Days)

Crew cost:

Day crew: \$698.74/hr
Night crew: \$156.55/hr

Day Crew:
212 days ÷ 7 days/week x 40 hr/wk = 1211.43 hrs/season
X \$698.74 = \$846,475

Night crew:

212 days ÷ 7 days/week x 84 hr/wk = 2544.00 hrs/season
x \$156.55 = \$398,263

Winter Crew cost = \$1,244,738

Fuel cost:

ACF Fuel Consumption: 289.48 gal/hr

HNS-SGY-HNS time underway per week: 17.67 hr/wk

212 days ÷ 7 days/wk x 17.67 hr/wk = 535.15 hr/season
x \$3.38/gal x 289.48 gal/hr = **\$523,613**

\$1,244,738 ACF2 winter crew costs
\$523,613 ACF2 winter fuel costs

\$1,768,351 Total ACF2 Winter costs

ALTERNATIVE COST SUMMARY (WINTER)

Route / Vessel	Crew	Fuel
ABY-HNS-ABY ACF1	\$1,667,971	\$1,412,597
HNS-SGY-HNS ACF2	\$1,244,738	\$523,613
ALTERNATIVE TOTAL	\$2,912,709	\$1,936,210

ALTERNATIVE 1B OPTIMIZED SUMMER

Route / Vessel	Crew	Fuel
HNS-SGY-HNS-ABY-HNS MALASPINA	\$4,852,800	\$2,549,365
ABY-HNS-ABY ACF1	\$1,570,299	\$1,427,156
SGY-ABY-SGY ACF2	\$1,570,299	\$1,586,838
ALTERNATIVE TOTAL	\$7,993,398	\$5,563,359

ALTERNATIVE 1B OPTIMIZED WINTER

Route / Vessel	Crew	Fuel
ABY-HNS-ABY ACF1	\$1,667,971	\$1,412,597
HNS-SGY-HNS ACF2	\$1,244,738	\$523,613
ALTERNATIVE TOTAL	\$2,912,709	\$1,936,210

Comparison of Fuel and Crew Costs for Alternatives 1B and 1B Optimized

ALTERNATIVE 1B OPTIMIZED ANNUAL CREW AND FUEL COST	\$10,906,107	\$7,499,569
-------------------------------------------------------------------	---------------------	--------------------

Route / Vessel	Crew	Fuel
HNS-SGY-HNS ACF2	\$2,387,395	\$805,275
ABY-HNS-ABY ACF1	\$2,984,316	\$2,070,784
SGY-ABY-SGY MALASPINA	\$4,852,800	\$2,391,443
ABY-HNS-SGY-HNS-ABY MAINLINERS	\$3,647,773	\$470,078
ALTERNATIVE 1B ANNUAL CREW AND FUEL COST	\$13,872,283	\$5,737,580

ALTERNATIVE 1B TOTAL **\$19,609,863**
ALTERNATIVE 1B OPTIMIZED TOTAL **\$18,405,676**

SAVINGS **\$1,204,187 ***

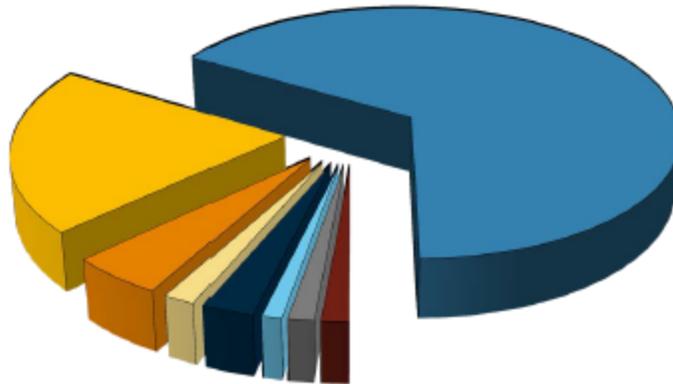
*We believe annual savings associated with Alternative 1B Optimized may be significantly more than this analysis indicates. On page 1 of Attachment A in the DSEIS, "AMHS Mainline Operating Costs," the methodology and results for the Comparison of Vessel Operating Days Chart appear to be incorrect. The chart lists a total of 40.9 Mainline Days for the number of days the mainliners operate in North Lynn Canal. It is difficult to see how this value was derived considering that under alternatives that use mainline ferries as a transportation component, the document states that two mainliners will run in summer and one in winter.

Summer is defined as approximately 22 weeks (44 mainline sailings) and winter is approximately 30 weeks (30 mainline sailings). These combine for a total of 74 mainline sailings a year. Even if you discount the running time in North Lynn Canal as not a full day (24 hours) and assume a run time of 18 hours (75 percent of a day), calculations render an operating days total of 55.5 days: 74 sailings x 0.75 days = 55.5 days. This is significantly higher than the 40.9 days listed in the DSEIS. This is important, as this number is used to calculate crew and fuel costs for the mainline component of a majority of the alternatives. This problem was brought to the attention of Gary Hogins, Project Manager. In an email exchange on November 3, 2014 he acknowledged that the document is in error and corrections would need to be made.

 Operating Expenditures

 Alaska Marine Highway System Fund
OPERATING EXPENDITURES

For the fiscal year ended June 30, 2012

\$171.0 MILLION


	Marine Vessel Operations	65.4%		Operations Management	2.6%
	Marine Fuel	22.3%		Overhaul	0.9%
	Shore Operations	4.8%		Marine Engineering	1.2%
	Reservations and Marketing	1.4%		Support Services	1.4%

This chart from the 2012 Annual AMHS Fiscal Report shows that fuel and crew comprise more than 87% of total costs for the ferry system.

Exhibit B: Charts Showing ACF Route Transit Times for Alternative 4C*

JAI Marine Segments
 Technical Report
 Attachment C

Route Operation and Schedule Model

CWC Project 12019
 Page 4C-9

Route: AUK-SGY-AUK

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk		Vessel Description	
		Quantity	Type	Designation	
Summer	12.00	7.0	1	Displ	DayACF
Winter	12.00	7.0	1	Displ	DayACF

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Startup (mins)	Vessel Preparation Times			Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)		Load (mins)	Unload (mins)	Shutdown (mins)	
Summer	Vessel 1	12.00	-	-	15	15	-	12.00
Winter	Vessel 1	12.00	-	-	15	15	-	12.00

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		Load (hrs)	Manuv (hrs)		Manuv (hrs)	Unload (hrs)	(hrs)	(mins)	(hrs)	(mins)
AUK-SGY	15.00	0.25	0.47	4.81	0.03	0.25	5	18	5	48
SGY-AUK	15.00	0.25	0.03	4.81	0.47	0.25	5	18	5	48
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.50	0.50	9.62	0.50	0.50	10	36	11	36

¹ Transit time = Time Underway + Load + Unload

AUK-SGY-AUK Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

Vessel 1		1st Dep	6:00 AM	1st Load	5:45 AM
Total Crew Time	Circuit No.	Depart Auke Bay	Arrive Skagway	Depart Skagway	Arrive Auke Bay
11.63	1	6:00 AM	11:18 AM	11:50 AM	5:08 PM

Winter

Vessel 1		1st Dep	6:00 AM	1st Load	5:45 AM
Total Crew Time	Circuit No.	Depart Auke Bay	Arrive Skagway	Depart Skagway	Arrive Auke Bay
11.63	1	6:00 AM	11:18 AM	11:50 AM	5:08 PM

² This schedule requires both reduced startup and shutdown times and loading/unloading during startup/shutdown. Alternatively, the vessel speed can be increased to 16.5 knots resulting in increased fuel consumption and costs.

*“Route Operation and Schedule Model” in Attachment C of the Appendix GG Marine Segments Technical Report written by Coastwise Corporation Naval Architects Marine Engineers.

Route Operation and Schedule Model

Route: AUK-HNS-AUK

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer	12.00	7.0	1	Disp	DayACF
Winter	12.00	7.0	1	Disp	DayACF

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Vessel Preparation Times				Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)	Startup (mins)	Load (mins)	Unload (mins)	Shutdown (mins)	
Summer	Vessel 1	12.00	-	30	15	15	30	11.00
Winter	Vessel 1	12.00	-	30	15	15	30	11.00

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		Load (hrs)	Manuv (hrs)		Manuv (hrs)	Unload (hrs)	(hrs)	(mins)	(hrs)	(mins)
AUK-HNS	15.00	0.25	0.47	4.24	0.06	0.25	4	46	5	16
HNS-AUK	15.00	0.25	0.06	4.24	0.47	0.25	4	46	5	16
	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.50	0.53	8.48	0.53	0.50	9	32	10	32

¹⁾ Transit time = Time Underway + Load + Unload

AUK-HNS-AUK Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

		Vessel 1	1st Dep	6:00 AM	1st Load	5:45 AM
Total Crew Time	Crew 1	Circuit No.	Depart Auke Bay	Arrive Haines	Depart Haines	Arrive Auke Bay
	Crew 2	1	6:00 AM	10:46 AM	11:20 AM	4:06 PM

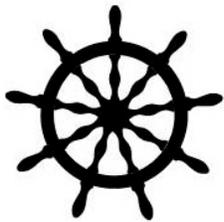
Winter

		Vessel 1	1st Dep	6:00 AM	1st Load	5:45 AM
Total Crew Time	Crew 1	Circuit No.	Depart Auke Bay	Arrive Haines	Depart Haines	Arrive Auke Bay
	Crew 2	1	6:00 AM	10:46 AM	11:20 AM	4:06 PM

“Route Operation and Schedule Model” in Attachment C of the Appendix GG Marine Segments Technical Report written by Coastwise Corporation Naval Architects Marine Engineers.

Alternative 5: The All Alaska Class Ferry Alternative

November 18 2014



*Skagway Marine Access Commission
Box 1076
Skagway, Alaska 99840*

An improved marine alternative proposed by the Skagway Marine Access Commission as comments on the Juneau Access Improvements Project Draft Supplemental Impact Statement.

Alternative 5: The All Alaska Class Alternative

The new Alaska Class Ferry (ACF) Day Boat design creates the opportunity for a paradigm shift in the efficient use of labor for marine transportation in Lynn Canal.

Mainliners with their large crews and 24/7 crewing requirements, are very expensive to operate whether you calculate by hour or by mile. The Southeast Alaska Transportation Plan (SATP) calls for retiring one or more of the aging mainline vessels in the next few years. Plans for the new ACF day boat will go a long way toward creating a more efficient transportation model for our region.

According to the Alaska Marine Highway System 2013 Financial Report, crew and fuel costs comprise 87% of ferry operational costs: crew costs make up roughly 66% of the operating expenditures and fuel amounts to 21%. Vessel crewing provides the biggest opportunity for cost savings. It is in its crewing requirements that the Alaska Class Ferry (ACF) Day Boat realizes significant efficiencies compared to other vessels in the region.

According to the Day Boat ACF Design Study Report, prepared for the Alaska Marine Highway System by Elliott Bay Design Group, the new ACF boats will require a crew of nine for operating in Lynn Canal. In comparison, the Malaspina, which has traditionally sailed the Lynn Canal day boat route, requires a crew of 51. In other words, the ACF will require less than 1/5th the number of crew members that the Malaspina requires. When you combine the crew savings with the efficiencies achieved through modern engine and vessel design technologies, the savings are significant on a cost per mile basis.

In the Draft Supplemental Environmental Impact Statement for Juneau Access (DSEIS), these new developments in vessel design, have been incorporated into the marine alternatives as “existing assets.” However upon further evaluation of these marine alternatives we found them to be burdened unnecessarily by the inclusion of mainline vessels.

Alternative 5 calls for construction of a third ACF and the retirement of one aging mainliner. Our analysis shows that the traffic demand in Lynn Canal can be satisfied at a much lower operation cost per mile through the addition of a third ACF. The following are the key components of the All Alaska Class Alternative:

- Acquiring a third ACF
- Eliminating mainliner service north of Auke Bay
- Implementing all capital improvements as outlined under Marine Alternative 4C:
 - Auke Bay expanded to include new double stern berth
 - Skagway expanded to include a new end berth
 - New conventional monohull shuttle ferry constructed to operate between Haines and Skagway.

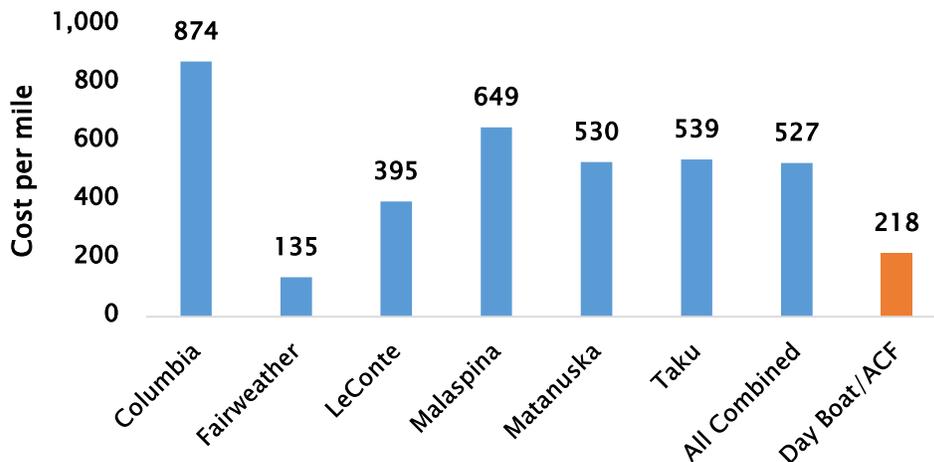
Savings

The construction cost of a new ACF day boat (approximately \$60 million) will be offset by the costs of road and terminal construction associated with other alternatives. Operating costs of this alternative will be offset by the savings associated with suspension of mainline service in Lynn Canal. The savings realized by the retirement of the aging mainliner are not quantified in this analysis but will be significant to AMHS and the State of Alaska.

The following quote and chart are excerpted from the North Lynn Canal Ferry Service Analysis prepared for the Municipality of Skagway by the McDowell Group in June 2014.

Deployment of the new AMHS day boat/ACF should result in an overall reduction in the cost of providing ferry service in Lynn Canal. Day boat/ACF costs are expected to average \$173 per-mile for Juneau-Haines service and \$336 per-mile for the Haines-Skagway service. In FY2012, all vessels serving Lynn Canal combined operated at an average per-mile cost of \$527. The Malaspina (providing 40 percent of all Lynn Canal service miles in FY2012) operated at a per-mile cost of \$649.

Figure 2. AMHS North Lynn Canal Vessel Per-Mile Costs, FY 2012
And anticipated Day Boat ACF Per-Mile Costs



Proposed Summer Schedule and Routes

- ACF One homeported in Haines and sails roundtrip from Haines to Auke Bay once a day seven days per week
- ACF Two homeported in Skagway and sails roundtrip from Skagway to Auke Bay once a day seven days per week
- ACF Three homeported in Auke Bay and sails roundtrip to Haines four days per week and Skagway three days per week.

This results in 11 roundtrips between Auke bay and Haines each week and ten sailings between Auke Bay and Skagway each week.

- Haines-Skagway Shuttle homeported in Haines and sails roundtrip to Skagway twice a day seven days a week

Proposed Winter Schedule and Routes

- ACF One is homeported in Auke Bay and sails roundtrip to Haines five days a week.
- ACF Two is homeported in Haines and sails to Skagway twice a day 5 days a week

Transit Times

The transit times for these routes and schedules are based on the transit times estimated for the projected ACF Day boat schedules proposed in Alternative 4C (Conventional Monohull out of Auke Bay) from the JAI Marine Segments Technical Report (Attachment C). See Exhibit B.

Capacity

The addition of a third ACF as outlined in Alternative 5 would produce an overall increase in summer and winter capacity between Auke Bay, Haines and Skagway compared to 4C. Alternative 5 would significantly increase the frequency of sailings between Auke Bay, Haines and Skagway.

Alternative 5 Schedules

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

ACF1

Depart	Arrive	Depart	Arrive
Haines	Auke Bay	Auke Bay	Haines
6:00 AM	10:46 AM	11:20 AM	4:06 PM

ACF2

Depart	Arrive	Depart	Arrive
Skagway	Auke Bay	Auke Bay	Skagway
6:00 AM	11:18 AM	11:50 AM	5:08 PM

ACF3

Depart	Arrive	Depart	Arrive
Auke Bay	Haines	Haines	Auke Bay
6:00 AM	10:46 AM	11:20 AM	4:06 PM

Depart	Arrive	Depart	Arrive
Auke Bay	Skagway	Skagway	Auke Bay
6:00 AM	11:18 AM	11:50 AM	5:08 PM

Haines-Skagway Shuttle (summer only)

Circuit	Depart	Arrive	Depart	Arrive
No.	Haines	Skagway	Skagway	Haines
1	8:00 AM	8:53 AM	9:25 AM	10:18 AM
2	11:10 AM	12:03 PM	12:35 PM	1:28 PM

Winter

ACF1

Depart	Arrive	Depart	Arrive
Auke Bay	Haines	Haines	Auke Bay
6:00 AM	10:46 AM	11:20 AM	4:06 PM

ACF2

Circuit	Depart	Arrive	Depart	Arrive
No.	Haines	Skagway	Skagway	Haines
1	8:00 AM	8:53 AM	9:25 AM	10:18 AM
2	11:10 AM	12:03 PM	12:35PM	1:28 PM

Summer Capacity/Demand Analysis and Comparison of Alternatives 4C ¹ and 5

Purpose and Need Factors	4C	5
ABY / SGY		
Forecasted Summer Demand between Auke Bay and Skagway (vehicles per day)	75	75
Summer Ferry Link Capacity between Auke Bay and Skagway (vehicles per day)	106	151
Number of Ferry Round trips/Week Auke Bay to Skagway (summer)	7	10 ^{2,3}
ABY / HNS		
Forecasted Summer Demand between Auke Bay and Haines (vehicles per day)	95	95
Summer Ferry Link Capacity between Auke Bay and Haines (vehicles per day)	106 (63) ⁴	166
Number of Ferry Round trips/Week Auke Bay to Haines (summer)	9 ⁵	11
HNS / SGY		
Forecasted Summer Demand between Haines and Skagway (vehicles per day)	53	53
Summer Ferry Link Capacity between Haines and Skagway (vehicles per day)	72 (63) ⁴	72
Number of Ferry Round trips/Week Haines to Skagway (summer)	15 ⁵	14

¹Data derived from Appendix AA and Appendix GG, Juneau Access DSEIS, Marine Segments Technical Report.

²An additional four trips per week could be made ABY-SGY by taking the Day Boat ACF between Auke Bay and Haines and transferring in HNS to the shuttle.

³An additional four trips per week could be made SGY-ABY by taking the Shuttle southbound (daily) or transferring in HNS to the ACF

⁴Mainliner capacity

⁵includes two mainliners

Cost Comparison

The table below compares estimated yearly fuel and crew costs under AKDOT's Alternative 4C and our proposal, Alternative 5. As the table shows, Alternative 5 generates an estimated annual savings of more than \$1 million.

Cost comparison, Alternative 4C and Alternative 5 (total annual costs in millions)			
	<u>Alternative 4C</u>	<u>Alternative 5</u>	<u>Savings with Alternative 5</u>
Fuel costs	\$5.8	\$6.6	(\$0.8)
Crew costs	\$10.1	\$8.2	\$1.9
Total	\$15.9	\$14.8	\$1.1

Figures for Alternative 4C are from JAI DSEIS Appendix GG. Calculations for Alternative 5 can be found in Exhibit A.

ADVANTAGES OF AN ALL ALASKA CLASS ALTERNATIVE

Alternative 5 proposes the exclusive use of Alaska Class Ferry (ACF) dayboats in Lynn Canal. Construction of two ACF dayboats is currently underway at the Ketchikan Boat Yard. The proposal would require the acquisition of a third vessel by the Alaska Marine Highway System (AMHS). All northbound AMHS traffic would disembark in Auke Bay and board the smaller more efficient ferries bound for Haines and Skagway.

Lynn Canal route length is ideally suited to dayboat service; travelers on 4 ½ to 5 ½ hour sailings do not require the staterooms and other amenities needed for longer voyages. Each summer since 2008, the AMHS has used the mainliner MV Malaspina to provide day boat service between Juneau, Skagway and Haines. The ACF dayboat requires less than 1/5th the number of crew members that the Malaspina requires. These crew savings combined with the efficiencies achieved through modern design make the ACF dayboat a better fit for Lynn Canal.

The elimination of expensive mainliners from Lynn Canal allows the AMHS to redeploy those ships and/or retire an aging vessel. This has the potential to increase service in the Northern Panhandle at reduced cost. Other advantages of the three ACF dayboat system are:

- Can be scaled to the demand in Lynn Canal and in the region
- Provides multiple and flexible deployment options
- Builds redundancy into the Marine Highway system
- Provides direct access to Juneau from Skagway (10 sailings a week in the summer)
- Maximizes service in Lynn Canal and exceeds predicted demand

Unlike Juneau Access, this proposal is not Juneau-centric. The utility of these vessels allows them to serve any route in Southeast that can best be optimized by the ACF dayboat concept. This benefits not only the communities of Lynn Canal but the entire AMHS and southeast region as a whole. Unlike a road, the ACF is transportation infrastructure that can be deployed in any direction where the traffic demand exists. Flexible deployment would allow an ACF homeported in Auke Bay to serve Skagway/Haines, Gustavus, Angoon/Hoonah, and Tenakee on successive days, tailoring the service to the demand. The fact that these boats can be built in Ketchikan provides additional economic benefit to the region.

In 1970, in an article about the Alaska Marine Highway System, Juneau economist George Rogers wrote: “The National Resources Committee reviewing Alaska’s natural resources development problems and potentials in 1937 stressed the importance of development of a highly flexible transportation system that would not involve heavy capital investment in fixed routes and would be able to overcome or go around the formidable land barriers separating Alaska’s several regions...” Alaska Review of Business and Economic Conditions, Vol. VII, No. 5

Exhibit A: Alternative 5 Crew and Fuel Costs

Alternative 5 Crew and Fuel Costs

Alternative 5 is comprised of 4 vessels:

ACF1 (HNS-ABY-HNS) 53 ASV

ACF2 (SGY-ABY-SGY) 53 ASV

ACF3 (4 days ABY-HNS-ABY and 3 days ABY-SGY-ABY) 53 ASV

SHUTTLE (HNS-SGY-HNS) 18 ASV

ACF1

Summer Season: 153 Days

(153 Operating Days)

Crew cost:

Day crew: \$698.74/hr

Night crew: \$156.55/hr

Day Crew:

153 days ÷ 7 days/week x 84 hr/wk = 1836 hrs/season

X \$698.74 = \$1,282,881

Night crew:

153 days ÷ 7 days/week x 84 hr/wk = 1836 hrs / season

x \$156.55 = \$287,418

Summer Crew cost = **\$1,570,299**

Fuel cost:

ACF Fuel Consumption: 289.48 gal/hr

HNS-ABY-HNS time underway per week: 66.73 hr

153 op/days ÷ 7 days/week x 66.73 hrs/week = 1458.60 hrs/season

x \$3.38 / gal x 289.48 = **\$1,427,156**

\$1,570,299 ACF1 crew costs

\$1,427,156 ACF1 fuel costs

\$2,997,452 Total ACF1 Summer costs

ACF2

Summer season: 153 Days

(153 Operating Days)

Crew cost:

Day crew: \$698.74/hr

Night crew: \$156.55/hr

Day Crew:

$153 \text{ days} \div 7 \text{ days/week} \times 84 \text{ hr/wk} = 1836 \text{ hrs/season}$

$\times \$698.74 = \$1,282,881$

Night crew:

$153 \text{ days} \div 7 \text{ days/week} \times 84 \text{ hr/wk} = 1836 \text{ hrs / season}$

$\times \$156.55 = \$287,418$

Summer Crew cost = **\$1,570,299**

Fuel cost:

ACF Fuel Consumption: 289.48 gal/hr

SGY-ABY-SGY time underway per week: 74.20 hr/wk

$153 \text{ op days} \div 7 \text{ days/wk} \times 74.20 \text{ hr/wk} = 1621.80 \text{ hr/season}$

$\times \$3.38/\text{gal} \times 289.48 \text{ gal/hr} = \mathbf{\$1,586,838}$

\$1,570,229 ACF2 summer crew costs

\$1,586,838 ACF2 summer fuel costs

\$3,157,137 Total ACF2 Summer costs

ACF3

Summer season: 153 Days

(153 Operating Days)

Crew cost:

Day crew: \$698.74/hr

Night crew: \$156.55/hr

Day Crew:

153 days ÷ 7 days/week x 84 hr/wk = 1836 hrs/season

X \$698.74 = \$1,282,881

Night crew:

153 days ÷ 7 days/week x 84 hr/wk = 1836 hrs / season

x \$156.55 = \$287,418

Summer Crew cost = **\$1,570,299**

Fuel cost:

ACF Fuel Consumption: 289.48 gal/hr

ABY-HNS-ABY time underway per week: 38.13 hr/wk

ABY-SGY-ABY time underway per week: 31.80 hr/wk

Weekly combined total 38.13 + 31.80 = 69.93 hr/wk

153 op days ÷ 7 days/wk x 69.93 hr/wk = 1528.47 hr/season

x \$3.38/gal x 289.48 gal/hr = **\$1,495,519**

\$1,570,299 ACF1 summer crew costs

\$1,495,519 ACF1 summer fuel costs

\$3,065,818 Total ACF3 Summer costs

Haines-Skagway Shuttle

Summer season: 153 Days

(153 Operating Days)

Crew cost:

Day crew: \$343.28/hr

Night crew: \$74.11/hr

Day Crew:

153 days ÷ 7 days/week x 56 hr/wk = 1224 hrs/season

X \$343.28 = \$420,175

Night crew:

153 days ÷ 7 days/week x 84 hr/wk = 1836 hrs / season

x \$74.11 = \$136,066

Summer Crew cost = **\$556,241**

Fuel cost:

ACF Fuel Consumption: 94.80 gal/hr

HNS-SGY-HNS-SGY-HNS time underway per week: 24.74 hr/wk

153 op days ÷ 7 days/wk x 24.74 hr/wk = 540.75 hr/season

x \$3.38/gal x 94.80 gal/hr = **\$173,269**

\$556,241 Haines-Skagway Shuttle summer crew costs

\$173,269 Haines-Skagway Shuttle summer fuel costs

\$729,510 Total Haines-Skagway Shuttle Summer costs

ALTERNATIVE 5 COST SUMMARY (SUMMER)

Route / Vessel	Crew	Fuel
(HNS-ABY-HNS) ACF1	1,570,299	\$1,427,156
(ABY-SGY-ABY) ACF2	\$1,570,299	\$1,586,838
(ABY-HNS-ABY) (ABY-SGY-ABY) ACF3	1,570,299	\$1,495,519
(HNS-SGY-HNS) Shuttle	\$556,241	\$173,269
ALTERNATIVE TOTAL	\$5,267,138	\$4,682,782

ACF 1

Winter season: 212 Days

(152 Operating Days)

Crew cost:

Day crew: \$698.74/hr

Night crew: \$156.55/hr

Day Crew:

212 days ÷ 7 days/week x 60 hr/wk = 1817.14 hrs/season

X \$698.74 = \$1,269,708

Night crew:

212 days ÷ 7 days/week x 84 hr/wk = 2544.00 hrs / season

x \$156.55 = \$398,263

Winter Crew cost = \$1,667,971

Fuel cost:

ACF Fuel Consumption: 289.48 gal/hr

ABY-HNS-ABY time underway per week: 47.67 hr/wk

212 days ÷ 7 days/wk x 47.67 hr/wk = 1443.72 hr/season

x \$3.38/gal x 289.48 gal/hr = **\$1,412,597**

\$1,667,971 ACF1 winter crew costs

\$1,412,597 ACF1 winter fuel costs

\$3,080,568 Total ACF1 Winter costs

ACF 2

Winter season: 212 Days

(152 Operating Days)

Crew cost:

Day crew: \$698.74/hr

Night crew: \$156.55/hr

Day Crew:

212 days ÷ 7 days/week x 40 hr/wk = 1211.43 hrs/season

X \$698.74 = \$846,475

Night crew:

212 days ÷ 7 days/week x 84 hr/wk = 2544.00 hrs/season

x \$156.55 = \$398,263

Winter Crew cost = \$1,244,738

Fuel cost:

ACF Fuel Consumption: 289.48 gal/hr

HNS-SGY-HNS-SGY-HNS time underway per week: 17.67 hr/wk

212 days ÷ 7 days/wk x 17.67 hr/wk = 535.15 hr/season

x \$3.38/gal x 289.48 gal/hr = **\$523,613**

\$1,244,738 ACF2 winter crew costs

\$523,613 ACF2 winter fuel costs

\$1,768,351 Total ACF2 Winter costs

ALTERNATIVE 5 COST SUMMARY (WINTER)

Route / Vessel	Crew	Fuel
ABY-HNS-ABY ACF1	\$1,667,971	\$1,412,597
HNS-SGY-HNS ACF2	\$1,244,738	\$523,613
ALTERNATIVE TOTAL	\$2,912,709	\$1,936,210

ALTERNATIVE 5 (SUMMER)

Route / Vessel	Crew	Fuel
(HNS-ABY-HNS) ACF1	1,570,299	\$1,427,156
(ABY-SGY-ABY) ACF2	\$1,570,299	\$1,586,838
(ABY-HNS-ABY) (ABY-SGY-ABY) ACF3	1,570,299	\$1,495,519
(HNS-SGY-HNS) Shuttle	\$556,241	\$173,269
ALTERNATIVE TOTAL	\$5,267,138	\$4,682,782

ALTERNATIVE 5 WINTER

Route / Vessel	Crew	Fuel
ABY-HNS-ABY ACF1	\$1,667,971	\$1,412,597
HNS-SGY-HNS ACF2	\$1,244,738	\$523,613
ALTERNATIVE TOTAL	\$2,912,709	\$1,936,210

ALTERNATIVE 5 ANNUAL CREW AND FUEL COST	\$8,179,847	\$6,618,992
----------------------------------------------------	--------------------	--------------------

ALTERNATIVE 4C FUEL AND CREW COSTS

Route / Vessel	Crew	Fuel
HNS-SGY-HNS SHUTTLE	\$1,160,654	\$212,276
ABY-HNS-ABY ACF	\$2,658,219	\$2,415,915
ABY-SGY-ABY ACF	\$2,658,219	\$2,686,227
ABY-HNS-SGY-HNS-ABY MAINLINERS	\$3,647,773	\$470,078
ALTERNATIVE 4C ANNUAL CREW AND FUEL COST	\$10,124,865	\$5,784,496

ALTERNATIVE 4C TOTAL \$15,909,361

ALTERNATIVE 5 TOTAL \$14,798,839

ANNUAL SAVINGS \$1,110,522

Exhibit B: Charts Showing ACF Route Transit Times for Alternative 4C*

JAI Marine Segments
 Technical Report
 Attachment C

Route Operation and Schedule Model

CWC Project 12019
 Page 4C-9

Route: AUK-SGY-AUK

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer	12.00	7.0	1	Displ	DayACF
Winter	12.00	7.0	1	Displ	DayACF

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Vessel Preparation Times				Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)	Startup (mins)	Load (mins)	Unload (mins)	Shutdown (mins)	
Summer	Vessel 1	12.00	-	-	15	15	-	12.00
Winter	Vessel 1	12.00	-	-	15	15	-	12.00

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		Load (hrs)	Manuv (hrs)		Manuv (hrs)	Unload (hrs)	(hrs)	(mins)	(hrs)	(mins)
AUK-SGY	15.00	0.25	0.47	4.81	0.03	0.25	5	18	5	48
SGY-AUK	15.00	0.25	0.03	4.81	0.47	0.25	5	18	5	48
-	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.50	0.50	9.62	0.50	0.50	10	36	11	36

¹ Transit time = Time Underway + Load + Unload

AUK-SGY-AUK Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

Vessel 1					
	1st Dep	6:00 AM	1st Load	5:45 AM	
Total Crew Time	Circuit	Depart	Arrive	Depart	Arrive
Crew 1	Crew 2	No.	Auke Bay	Skagway	Auke Bay
11.63		1	6:00 AM	11:18 AM	5:08 PM

Winter

Vessel 1					
	1st Dep	6:00 AM	1st Load	5:45 AM	
Total Crew Time	Circuit	Depart	Arrive	Depart	Arrive
Crew 1	Crew 2	No.	Auke Bay	Skagway	Auke Bay
11.63		1	6:00 AM	11:18 AM	5:08 PM

² This schedule requires both reduced startup and shutdown times and loading/unloading during startup/shutdown. Alternatively, the vessel speed can be increased to 16.5 knots resulting in increased fuel consumption and costs.

*"Route Operation and Schedule Model" in Attachment C of the Appendix GG Marine Segments Technical Report written by Coastwise Corporation Naval Architects Marine Engineers.

Route Operation and Schedule Model

Route: AUK-HNS-AUK

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer	12.00	7.0	1	Disp	DayACF
Winter	12.00	7.0	1	Disp	DayACF

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Startup (mins)	Vessel Preparation Times			Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)		Load (mins)	Unload (mins)	Shutdown (mins)	
Summer	Vessel 1	12.00	-	30	15	15	30	11.00
Winter	Vessel 1	12.00	-	30	15	15	30	11.00

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		Load (hrs)	Manuv (hrs)		Manuv (hrs)	Unload (hrs)	(hrs)	(mins)	(hrs)	(mins)
AUK-HNS	15.00	0.25	0.47	4.24	0.06	0.25	4	46	5	16
HNS-AUK	15.00	0.25	0.06	4.24	0.47	0.25	4	46	5	16
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.50	0.53	8.48	0.53	0.50	9	32	10	32

¹⁾ Transit time = Time Underway + Load + Unload

AUK-HNS-AUK Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

Vessel 1	1st Dep	6:00 AM	1st Load	5:45 AM
----------	---------	---------	----------	---------

Total Crew Time		Circuit No.	Depart Auke Bay	Arrive Haines	Depart Haines	Arrive Auke Bay
11.60		1	6:00 AM	10:46 AM	11:20 AM	4:06 PM

Winter

Vessel 1	1st Dep	6:00 AM	1st Load	5:45 AM
----------	---------	---------	----------	---------

Total Crew Time		Circuit No.	Depart Auke Bay	Arrive Haines	Depart Haines	Arrive Auke Bay
11.60		1	6:00 AM	10:46 AM	11:20 AM	4:06 PM

Route Operation and Schedule Model

Route: HNS-SGY-HNS

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer	8.00	6.5	1	Displ	Disp-1
Winter	8.00	3.0	1	Displ	Disp-1

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Vessel Preparation Times				Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)	Startup (mins)	Load (mins)	Unload (mins)	Shutdown (mins)	
Summer	Vessel 1	8.00	-	30	15	15	30	7.00
Winter	Vessel 1	8.00	-	30	15	15	30	7.00

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		Load (hrs)	Manuv (hrs)		Manuv (hrs)	Unload (hrs)	(hrs)	(mins)	(hrs)	(mins)
HNS-SGY	15.00	0.25	0.05	0.81	0.03	0.25	-	53	1	23
SGY-HNS	15.00	0.25	0.03	0.81	0.05	0.25	-	53	1	23
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.50	0.08	1.62	0.08	0.50	1	46	2	46

¹ Transit time = Time Underway + Load + Unload

HNS-SGY-HNS Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

Total Crew Time		Vessel 1	1st Dep	8:00 AM	1st Load	7:45 AM
Crew 1	Crew 2	Circuit No.	Depart Haines	Arrive Skaqway	Depart Skaqway	Arrive Haines
3.30		1	8:00 AM	8:53 AM	9:25 AM	10:18 AM
6.63		2	10:50 AM	11:43 AM	12:15 PM	1:08 PM

Winter

Total Crew Time		Vessel 1	1st Dep	8:00 AM	1st Load	7:45 AM
Crew 1	Crew 2	Circuit No.	Depart Haines	Arrive Skaqway	Depart Skaqway	Arrive Haines
3.80		1	8:00 AM	8:53 AM	9:25 AM	10:18 AM

This page intentionally left blank.

ATTACHMENT B

ROUTE OPERATION AND SCHEDULE MODELS AND ROUTE COST MODELS

Coastwise Engineering

This page intentionally left blank

Alternative Summary

Alternative: 1B_Opt

Alt	Route	Season	Vessels			Crew Hrs		Op Schedule			
			No.	Type	# ASV	Vessel 1	Vessel 2	hrs/day	Days per Week	Round trips per day	
1. No Build											
Alt 1B_Opt - Optimized Service with Existing AMHS Assets											
	AUK-HNS-AUK	Summer	1	DayACF-c	53		12		11.73	7	1
		Winter	1	DayACF-c	53		12		11.73	5	1
	SGY-AUK-SGY	Summer	1	DayACF-b	53		12		13.27	7	1
		Winter									
	HNS-SGY-HNS HNS-AUK-HNS	Summer	1	MAL	83		12 + 12		16.43	7	1
		Winter									
	HNS-SGY-HNS	Summer									
		Winter	1	DayACF-b	53		8		7.87	5	2

Alternative Cost Summary

Route Name	Crew	Fuel	Annual Costs			Total Annual Costs	Capital Costs
			Lay-up	Maintenance	Overhead		
AUK-HNS-AUK	3.95 M \$	2.81 M \$	-	0.70 M \$	0.51 M \$	7.97 M \$	
SGY-AUK-SGY ^{6,7,8}	1.65 M \$	1.57 M \$	-	0.32 M \$	0.26 M \$	3.80 M \$	
HNS-SGY-HNS ^{4,5}	4.66 M \$	2.42 M \$	-	0.85 M \$	0.26 M \$	8.19 M \$	
HNS-AUK-HNS ⁶	1.53 M \$	0.52 M \$	-	0.37 M \$	0.25 M \$	2.67 M \$	
Configuration Total	11.79 M \$	7.32 M \$	-	2.24 M \$	1.28 M \$	22.63 M \$	-

Notes:

- 1) This No-build alternative does not include any mainline service beyond Auke Bay.
- 2) No capital costs are included for this alternative since all vessels are considered existing.
- 3) The M/V Malaspina (on summer HNS-SGY-HNS HNS-AUK-HNS route) operates in JAI service during summer months only. During winter months, it is assumed that the Malaspina operates on other AMHS routes. Therefore no layup costs are included for this vessel.
- 4) The Malaspina is an existing AMHS vessel for which crew complement and costs are known. In addition, this vessel has a 24 hour crew, regardless of the operating schedule. Therefore actual hourly crew costs are used instead of crew costs for Day Boat vessels.
- 5) Assuming the annual availability for the Malaspina is 40 weeks and the vessel operates in North Lynn Canal for 22 weeks, the North Lynn Canal portion of overhaul costs would be approximately 55%. Therefore the Malaspina overhaul cost is calculated by prorating a reasonable vessel overhaul cost from the AMHS financial data on the Malaspina.
- 6) The proposed DayACF #2 operates on two separate routes. For Modeling purposes this vessel has been split into two separate route schedules, one for summer operation (SGY-AUK) and one for winter operation (HNS-SGY). No layup costs are included for either route.
- 7) The SGY-AUK route proposed to be serviced by a DayACF requires a 12.3 hour crew, even with the night crew completing vessel startup and shutdown (see SGY_AUK schedule, page 1BV-6). The USCG limits crew availability to 12 hours, and the DayACF is designed for a single crew only with no crew berths. Therefore, this route cannot be completed using a DayACF and the existing AMHS terminals.
- 8) The SGY-AUK route is only possible in a 12 hour day if the Skagway terminal is improved, similar to Alternative 4C. For purposes of calculating the daily statistics and relative costs for the SGY-AUK route, it is assumed that the vessel completes one round trip per day during the summer months. Crew costs are based on a 12 hour crew shift with no overtime. As the same vessel operates on the SGY-AUK route and the HNS-SGY the overhaul costs are shared, based on the number of weeks in a season.

Route Operation and Schedule Model

Route: AUK-HNS-AUK

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer	12.00	7.0	1	Displ	DayACF-c
Winter	12.00	5.0	1	Displ	DayACF-c

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Startup (mins)	Vessel Preparation Times		Shutdown (mins)	Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)		avg MLOPS (mins)	avg MLOPS (mins)		
Summer	Vessel 1	12.00	-	30	18	18	30	11.00
		-	-	-	-	-	-	-
Winter	Vessel 1	12.00	-	30	18	18	30	11.00

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		avg MLOPS (hrs)	Approach (hrs)		Approach (hrs)	avg MLOPS (hrs)	(hrs)	(mins)	(hrs)	(mins)
AUK-HNS	15.00	0.30	0.47	4.24	0.06	0.30	4	46	5	22
HNS-AUK	15.00	0.30	0.06	4.24	0.47	0.30	4	46	5	22
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.60	0.53	8.48	0.53	0.60	9	32	10	44

¹⁾ Transit time = Time Underway + Load + Unload

AUK-HNS-AUK Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

Total Crew Time		Circuit	Depart	Arrive	Depart	Arrive
Crew 1	Crew 2	No.	Auke Bay	Haines	Haines	Auke Bay
11.78		1	6:00 AM	10:46 AM	11:25 AM	4:11 PM

Winter

Total Crew Time		Circuit	Depart	Arrive	Depart	Arrive
Crew 1	Crew 2	No.	Auke Bay	Haines	Haines	Auke Bay
11.78		1	8:00 AM	12:46 PM	1:25 PM	6:11 PM

Crew Schedule

Notional crew schedules are developed to verify the number of hours each crew operates and show notional crew sequencing. Notional crew schedule times are based on the notional vessel schedules

Summer: Vessel 1

	Begin Vessel Startup	Begin First Load	Vessel Underway	Complete Middle Unload	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	5:12 AM	5:42 AM	6:00 AM	-	4:11 PM	4:29 PM	4:59 PM	11.78	Vessel
Crew 1 Hrs	Start	0.50	0.80	-	10.98	11.28	11.78	11.78	Crew 1
Crew 2 Hrs								-	Crew 2
Night Hrs	12.22						Start	12.22	Night

Winter

	Begin Vessel Startup	Begin First Load	Vessel Underway	Complete Middle Unload	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	7:12 AM	7:42 AM	8:00 AM	-	6:11 PM	6:29 PM	6:59 PM	11.78	Vessel
Crew 1 Hrs	Start	0.50	0.80	-	10.98	11.28	11.78	11.78	Crew 1
Crew 2 Hrs								-	Crew 2
Night Hrs	12.22						Start	12.22	Night

Route Operation and Schedule Model

Route: AUK-HNS-AUK

Daily Schedule Statistics (per day)

Season	Round Trips		Daily Underway Time				Daily Operational Time ^{2,3}			
	Vessel 1 (# / day)	Vessel 2 (# / day)	Vessel 1		Vessel 2		Vessel 1		Vessel 2	
			(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day
Summer	1	-	9.53	39.7%	-	-	11.73	48.9%	0.00	0.0%
Winter	1	-	9.53	39.7%	-	-	11.73	48.9%	-	-

²⁾ Daily Operational Time = (Round Trip Transit Time * Number of Round Trips) + Startup + Shutdown

³⁾ Schedule operational time may be slightly greater due to departure time adjustments

Daily Crew Statistics (per day)

Season	Vessel No.	# of Crews (per day)	Crew Regular Time		Crew Overtime		Crew Usage			
			Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1		Crew 2	
			(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	% of Shift	(hrs / day)	% of Shift
Summer	Vessel 1	1	12	-	-	-	11.78	98.2%	-	-
Summer	-	-	-	-	-	-	-	-	-	-
Winter	Vessel 1	1	12	-	-	-	11.78	98.2%	-	-

AUK-HNS-AUK Weekly Service Summary (per week)

Season	Vessel No.	Crew (days/wk)	Crew Regular Time ⁴		Crew Overtime		Vessel Operation (days/wk)	Trips /Wk	Underway Time (hrs / wk)	Operating Hours (hrs / wk)
			Crew 1 (hrs / wk)	Crew 2 (hrs / wk)	Crew 1 (hrs / wk)	Crew 2 (hrs / wk)				
Summer	Vessel 1	7	84.00	-	-	-	7.0	7.0	66.73	82.13
Summer	-	-	-	-	-	-	-	-	-	-
Winter	Vessel 1	7	84.00	-	-	-	5.0	5.0	47.67	58.67

⁴⁾ Crew Regular Time = Crew Regular Time * Crew days per week

Route Cost Model

Route: AUK-HNS-AUK Vessel Sizing

Vessel Size and Selection

1. Traffic Forecast

Route Link		2038 Summer Average Daily Traffic - One Way			
No.	Name	PAX-ASV	RV	VAN	PAX
1B_Opt-3	AUK-HNS	65	4	2	228
1B_Opt-4	HNS-AUK	65	4	2	228
-		-	-	-	-
-		-	-	-	-
Largest One Way Traffic		65	4	2	228
Weekly One Way Traffic		455	28	14	1,596

2. Required Vessel Capacity per Sailing

Assuming **14** Trips per week

		PAX-ASV	RV	VAN	PAX	Total
Capacity		33	2	1	114	
Lane Length	(ft)	660	48	40	N/A	748
Payload	(lbs)	198,000	24,000	40,000	N/A	262,000

3. Required Vessel Characteristics

Type	ASV (#)	PAX (#)	Payload (ton)
Displ	38	114	117

This vessel sizing includes both the 7 trips per week completed by the Dayboat ACF and the 7 trips per week completed by the Malaspina.

4. Selected Vessel Characteristics

	ASV	PAX	Deadweight
Selection Basis	53		
Selected Characteristics		114	117

Route Cost Model

Route: AUK-HNS-AUK

Vessel Definition

Type	ASV
Displ	53

Season Definition

Season	#Days	# Weeks	# Op Days
Summer	153	21.9	153
Winter	212	30.3	151

Annual Operational Costs

1. Crew Costs (by week)

Season	# Weeks	Crew Time (hrs/week)		Total Crew (hrs / season)	Crew Cost (\$ / hr)	Total Cost (\$ / season)
		Vessel #1	Vessel #2			
Summer reg.	22	84.00	-	1,836.00	\$ 736.96	\$ 1,353,067
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		84.00	-	1,836.00	\$ 164.13	\$ 301,344
Winter reg.	30	84.00	-	2,544.00	\$ 736.96	\$ 1,874,838
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		84.00	-	2,544.00	\$ 164.13	\$ 417,548
Total	52					\$ 3,946,797

¹⁾ Night Crew may be re-assigned to watch vessel on non-operational days.

2. Fuel Consumption Costs (by week)

Season	# Weeks	Time Underway		Total Underway (hrs / season)	Fuel Cost (\$ / gal)	Fuel Consumption (gal / hr)	Total Cost (\$ / season)
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)				
Summer	22	66.73	-	1,458.60	\$ 3.34	289.48	\$ 1,410,272
Winter	30	47.67	-	1,443.62	\$ 3.34	289.48	\$ 1,395,788
Total	52			2,902.22			\$ 2,806,060

3. Winter Lay-up Cost (by day)

Season	# Days	# Vessels	Cost / Day	Total
winter	212	-	\$ -	\$ -

Annual Overhead Costs (by day)

Season	Annual Operating Days			(\$ / day)	Route Overhead Costs		
	Vessel #1	Vessel #2	Total		Vessel #1	Vessel #2	Total
Summer	153	-	153	\$ 1,669	\$ 255,357	\$ -	\$ 255,357
Winter	151	-	151	\$ 1,669	\$ 252,734	\$ -	\$ 252,734
Total	304	-	304		\$ 508,091	\$ -	\$ 508,091

Annual Maintenance Costs (by week)

Season	# weeks	Annual Operating Hours			Total (hrs / season)	
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)	Total (hrs / wk)		
Summer reg.	22	82.13	-	82.13	1,795	
Winter reg.	30	58.67	-	58.67	1,777	
Total	52				3,572	
		Vessel Operation		Vessel Overhaul	Total	
		(eng op hrs)	(\$ / hr)	(# Vessels)	(\$ / Vessel)	Cost
Operating		3,572	\$ 44.95			\$ 160,577
Overhaul				1.0	\$ 541,891	\$ 541,891
Total Vessel Maintenance Costs						\$ 702,468

Total Annual Route Costs

Total Annual Operational Costs	\$ 6,752,857
Total Annual Layup Costs	\$ -
Total Annual Overhead Costs	\$ 508,091
Total Annual Maintenance Costs	\$ 702,468
Total Annual Costs	\$ 7,963,416

Route Operation and Schedule Model

Route: SGY-AUK-SGY

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer	12.00	7.0	1	Displ	DayACF-b
Winter					

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Startup (mins)	Vessel Preparation Times		Shutdown (mins)	Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)		avg MLOPS (mins)	avg MLOPS (mins)		
Summer	Vessel 1	12.00	-	30	25	25	30	11.00
		-	-	-	-	-	-	-
		-	-	-	-	-	-	-

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		avg MLOPS (hrs)	Approach (hrs)		Approach (hrs)	avg MLOPS (hrs)	(hrs)	(mins)	(hrs)	(mins)
SGY-AUK	15.00	0.42	0.03	4.81	0.47	0.42	5	18	6	8
AUK-SGY	15.00	0.42	0.47	4.81	0.03	0.42	5	18	6	8
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.83	0.50	9.62	0.50	0.83	10	36	12	16

¹⁾ Transit time = Time Underway + Load + Unload

SGY-AUK-SGY Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

		Vessel 1	1st Dep	6:00 AM	1st Load	5:35 AM
Total Crew Time	Circuit	Depart	Arrive	Depart	Arrive	
Crew 1	Crew 2	No.	Skagway	Auke Bay	Auke Bay	Skagway
12.30		1	6:00 AM	11:18 AM	12:10 PM	5:28 PM

Crew Schedule

Notional crew schedules are developed to verify the number of hours each crew operates and show notional crew sequencing. Notional crew schedule times are based on the notional vessel schedules

Summer: Vessel 1

	Begin Vessel Startup	Begin First Load	Vessel Underway	Complete Middle Unload	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	5:05 AM	5:35 AM	6:00 AM	-	5:28 PM	5:53 PM	6:23 PM	13.30	Vessel
Crew 1 Hrs		Start	0.42	-	11.88	12.30		12.30	Crew 1
Crew 2 Hrs								-	Crew 2
Night Hrs	11.20	11.70				Start	0.5	11.70	Night

Route Operation and Schedule Model

Route: SGY-AUK-SGY

Daily Schedule Statistics (per day)

Season	Round Trips		Daily Underway Time				Daily Operational Time ^{2,3}			
	Vessel 1 (# / day)	Vessel 2 (# / day)	Vessel 1		Vessel 2		Vessel 1		Vessel 2	
			(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day
Summer	1	-	10.60	44.2%	-	-	13.27	55.3%	0.00	0.0%
Winter	0	-	0.00	N/A	-	-	0.00	N/A	-	-

²⁾ Daily Operational Time = (Round Trip Transit Time * Number of Round Trips) + Startup + Shutdown

³⁾ Schedule operational time may be slightly greater due to departure time adjustments

Daily Crew Statistics (per day)

Season	Vessel No.	# of Crews (per day)	Crew Regular Time		Crew Overtime		Crew Usage			
			Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1		Crew 2	
			(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	% of Shift	(hrs / day)	% of Shift
Summer	Vessel 1	1	12	-	-	-	12.30	102.5%	-	-
Summer		-	-	-	-	-	-	-	-	-
Winter		-	-	-	-	-	-	-	-	-

SGY-AUK-SGY Weekly Service Summary (per week)

Season	Vessel No.	Crew (days/wk)	Crew Regular Time ⁴		Crew Overtime		Vessel Operation (days/wk)	Trips /Wk	Underway Time (hrs / wk)	Operating Hours (hrs / wk)
			Crew 1 (hrs / wk)	Crew 2 (hrs / wk)	Crew 1 (hrs / wk)	Crew 2 (hrs / wk)				
Summer	Vessel 1	7	84.00	-	-	-	7.0	7.0	74.20	92.87
Summer		-	-	-	-	-	-	-	-	-
Winter		-	-	-	-	-	-	-	-	-

⁴⁾ Crew Regular Time = Crew Regular Time * Crew days per week

Route Cost Model

Route: SGY-AUK-SGY Vessel Sizing

Vessel Size and Selection

1. Traffic Forecast

Route Link		2038 Summer Average Daily Traffic - One Way			
No.	Name	PAX-ASV	RV	VAN	PAX
1B_Opt-5	SGY-AUK	47	3	1	165
1B_Opt-6	AUK-SGY	47	3	1	165
-		-	-	-	-
-		-	-	-	-
Largest One Way Traffic		47	3	1	165
Weekly One Way Traffic		329	21	7	1,155

2. Required Vessel Capacity per Sailing

Assuming 7 Trips per week

		PAX-ASV	RV	VAN	PAX	Total
Capacity		47	3	1	165	
Lane Length	(ft)	940	72	40	N/A	1,052
Payload	(lbs)	282,000	36,000	40,000	N/A	358,000

3. Required Vessel Characteristics

Type	ASV (#)	PAX (#)	Payload (lton)
Displ	53	165	160

4. Selected Vessel Characteristics

	ASV	PAX	Deadweight
Selection Basis	53		
Selected Characteristics		165	160

Route Cost Model

Route: SGY-AUK-SGY

Vessel Definition

Type	ASV
Displ	53

Season Definition

Season	#Days	# Weeks	# Op Days
Summer	153	21.9	153
Winter	212	30.3	0

Annual Operational Costs

1. Crew Costs (by week)

Season	# Weeks	Crew Time (hrs/week)		Total Crew (hrs / season)	Crew Cost (\$ / hr)	Total Cost (\$ / season)
		Vessel #1	Vessel #2			
Summer reg.	22	84.00	-	1,836.00	\$ 736.96	\$ 1,353,067
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		84.00	-	1,836.00	\$ 164.13	\$ 301,344
Winter reg.	30	-	-	-	\$ 736.96	\$ -
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		-	-	-	\$ 164.13	\$ -
Total	52					\$ 1,654,411

¹⁾ Night Crew may be re-assigned to watch vessel on non-operational days.

2. Fuel Consumption Costs (by week)

Season	# Weeks	Time Underway		Total Underway (hrs / season)	Fuel Cost (\$ / gal)	Fuel Consumption (gal / hr)	Total Cost (\$ / season)
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)				
Summer	22	74.20	-	1,621.80	\$ 3.34	289.48	\$ 1,568,065
Winter	30	-	-	-	\$ 3.34	289.48	\$ -
Total	52			1,621.80			\$ 1,568,065

3. Winter Lay-up Cost (by day)

Season	# Days	# Vessels	Cost / Day	Total
winter	212		\$ -	\$ -

Annual Overhead Costs (by day)

Season	Annual Operating Days			(\$ / day)	Route Overhead Costs		
	Vessel #1	Vessel #2	Total		Vessel #1	Vessel #2	Total
Summer	153	-	153	\$ 1,669	\$ 255,357	\$ -	\$ 255,357
Winter	0	-	-	\$ 1,669	\$ -	\$ -	\$ -
Total	153	-	153		\$ 255,357	\$ -	\$ 255,357

Annual Maintenance Costs (by week)

Season	# weeks	Annual Operating Hours			Total (hrs / season)	
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)	Total (hrs / wk)		
Summer reg.	22	92.87	-	92.87	2,030	
Winter reg.	30	-	-	-	-	
Total	52				2,030	
		Vessel Operation		Vessel Overhaul	Total	
		(eng op hrs)	(\$ / hr)	(# Vessels)	(\$ / Vessel)	Cost
Operating		2,030	\$ 44.95			\$ 91,249
Overhaul				0.42	\$ 541,891	\$ 227,594
Total Vessel Maintenance Costs						\$ 318,844

Total Annual Route Costs

Total Annual Operational Costs	\$ 3,222,476
Total Annual Layup Costs	\$ -
Total Annual Overhead Costs	\$ 255,357
Total Annual Maintenance Costs	\$ 318,844
Total Annual Costs	\$ 3,796,676

Route Operation and Schedule Model

Route: HNS-SGY-HNS HNS-AUK-HNS

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer	24.00	7.0	1	Displ	MAL
Winter					

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Startup (mins)	Vessel Preparation Times		Shutdown (mins)	Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)		avg MLOPS (mins)	avg MLOPS (mins)		
Summer	Vessel 1	12.00	12.00	30	31	31	30	23.00
		-	-	-	-	-	-	-
		-	-	-	-	-	-	-

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		avg MLOPS (hrs)	Approach (hrs)		Approach (hrs)	avg MLOPS (hrs)	(hrs)	(mins)	(hrs)	(mins)
HNS-SGY	15.00	0.52	0.05	0.81	0.03	0.52	-	53	1	55
SGY-HNS	15.00	0.52	0.03	0.81	0.05	0.52	-	53	1	55
HNS-AUK	15.00	0.52	0.06	4.24	0.47	0.52	4	46	5	48
AUK-HNS	15.00	0.52	0.47	4.24	0.06	0.52	4	46	5	48
Total Route Time		2.07	0.61	10.10	0.61	2.07	11	18	15	26

¹⁾ Transit time = Time Underway + Load + Unload

HNS-SGY-HNS Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

		Vessel 1	1st Dep	6:00 AM	1st Load	5:29 AM				
Total Crew Time		Circuit	Depart	Arrive	Depart	Arrive	Depart	Arrive	Depart	Arrive
Crew 1	Crew 2	No.	Haines	Skagway	Skagway	Haines	Haines	Auke Bay	Auke Bay	Haines
12.00	4.47	1	6:00 AM	6:53 AM	7:55 AM	8:48 AM	9:50 AM	2:36 PM	3:40 PM	8:26 PM

Crew Schedule

Notional crew schedules are developed to verify the number of hours each crew operates and show notional crew sequencing. Notional crew schedule times are based on the notional vessel schedules

Summer: Vessel 1

	Begin Vessel Startup	Begin First Load	Vessel Underway	Crew Change	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	4:59 AM	5:29 AM	6:00 AM	8:48 AM	8:26 PM	8:57 PM	9:27 PM	16.47	Vessel
Crew 1 Hrs				Start	11.63	12.15		12.15	Crew 1
Crew 2 Hrs	8.03	8.53	9.05	11.85		Start	0.50	11.85	Crew 2
Night Hrs									Night

Route Operation and Schedule Model

Route: HNS-SGY-HNS HNS-AUK-HNS

Daily Schedule Statistics (per day)

Season	Round Trips		Daily Underway Time				Daily Operational Time ^{2,3}			
	Vessel 1 (# / day)	Vessel 2 (# / day)	Vessel 1		Vessel 2		Vessel 1		Vessel 2	
			(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day
Summer	1	-	11.30	47.1%	-	-	16.43	68.5%	0.00	0.0%
Winter	0	-	0.00	N/A	-	-	0.00	N/A	-	-

²⁾ Daily Operational Time = (Round Trip Transit Time * Number of Round Trips) + Startup + Shutdown

³⁾ Schedule operational time may be slightly greater due to departure time adjustments

Daily Crew Statistics (per day)

Season	Vessel No.	# of Crews (per day)	Crew Regular Time		Crew Overtime		Crew Usage			
			Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1		Crew 2	
			(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	% of Shift	(hrs / day)	% of Shift
Summer	Vessel 1	2	12	12	-	-	12.00	100.0%	4.47	37.2%
Summer		-	-	-	-	-				
Winter		-	-	-	-	-				

HNS-SGY-HNS Weekly Service Summary (per week)

Season	Vessel No.	Crew (days/wk)	Crew Regular Time ⁴		Crew Overtime		Vessel Operation (days/wk)	Trips /Wk	Underway Time (hrs / wk)	Operating Hours (hrs / wk)
			Crew 1 (hrs / wk)	Crew 2 (hrs / wk)	Crew 1 (hrs / wk)	Crew 2 (hrs / wk)				
Summer	Vessel 1	7	84.00	84.00	-	-	7.0	7.0	79.10	115.03
Summer			-	-	-	-	-	-	-	-
Winter			-	-	-	-	-	-	-	-

⁴⁾ Crew Regular Time = Crew Regular Time * Crew days per week

Route Cost Model

Route: HNS-SGY-HNS HNS-AUK-HNS Vessel Sizing

Vessel Size and Selection

1. Traffic Forecast

Route Link		2038 Summer Average Daily Traffic - One Way			
No.	Name	PAX-ASV	RV	VAN	PAX
1B_Opt-1	HNS-SGY	26	2	1	90
1B_Opt-2	SGY-HNS	26	2	1	90
		-	-	-	-
		-	-	-	-
Largest One Way Traffic		26	2	1	90
Weekly One Way Traffic		182	14	7	630

2. Required Vessel Capacity per Sailing

Assuming 7 Trips per week

		PAX-ASV	RV	VAN	PAX	Total
Capacity		26	2	1	90	
Lane Length	(ft)	520	48	40	N/A	608
Payload	(lbs)	156,000	24,000	40,000	N/A	220,000

3. Required Vessel Characteristics

Type	ASV (#)	PAX (#)	Payload (lton)
Displ	31	90	99

4. Selected Vessel Characteristics

	ASV	PAX	Deadweight
Selection Basis	83		
Selected Characteristics		90	99

AUK-HNS portion of the route is not included in sizing as the required vessel size is already calculated in the DayACF AUK-HNS route. AUK-HNS required vessel size = 38 ASV, which is more than 31 ASV required for HNS-SGY route. Therefore vessel size must be greater than 38 ASV

Route Cost Model

Route: HNS-SGY-HNS HNS-AUK-HNS

Vessel Definition

Type	ASV
Displ	83

Season Definition

Season	#Days	# Weeks	# Op Days
Summer	153	21.9	153
Winter	212	30.3	0

Annual Operational Costs

1. Crew Costs (by week)

Season	# Weeks	Crew Time (hrs/week)		Total Crew (hrs / season)	Crew Cost (\$ / hr)	Total Cost (\$ / season)
		Vessel #1	Vessel #2			
Summer reg.	22	168.00	-	3,672.00	\$ 1,268.45	\$ 4,657,761
Overtime		-	-			
Night ¹⁾		-	-			
Winter reg.	30	-	-	-	\$ 1,268.45	\$ -
Overtime		-	-			
Night ¹⁾		-	-			
Total	52					\$ 4,657,761

¹⁾ Night Crew may be re-assigned to watch vessel on non-operational days.

2. Fuel Consumption Costs (by week)

Season	# Weeks	Time Underway		Total Underway (hrs / season)	Fuel Cost (\$ / gal)	Fuel Consumption (gal / hr)	Total Cost (\$ / season)
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)				
Summer	22	79.10	-	1,728.90	\$ 3.34	418.23	\$ 2,415,051
Winter	30	-	-	-	\$ 3.34	418.23	\$ -
Total	52			1,728.90			\$ 2,415,051

3. Winter Lay-up Cost (by day)

Season	# Days	# Vessels	Cost / Day	Total
winter	212	-	\$ -	\$ -

Annual Overhead Costs (by day)

Season	Annual Operating Days			(\$ / day)	Route Overhead Costs		
	Vessel #1	Vessel #2	Total		Vessel #1	Vessel #2	Total
Summer	153	-	153	\$ 1,669	\$ 255,357	\$ -	\$ 255,357
Winter	0	-	-	\$ 1,669	\$ -	\$ -	\$ -
Total	153	-	153		\$ 255,357	\$ -	\$ 255,357

Annual Maintenance Costs (by week)

Season	# weeks	Annual Operating Hours			Total (hrs / season)	
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)	Total (hrs / wk)		
Summer reg.	22	115.03	-	115.03	2,514	
Winter reg.	30	-	-	-	-	
Total	52				2,514	
		Vessel Operation		Vessel Overhaul	Total	
		(eng op hrs)	(\$ / hr)	(# Vessels)	(\$ / Vessel)	Cost
Operating		2,514	\$ 65.05			\$ 163,556
Overhaul				55%	\$ 1,250,000	\$ 687,500
Total Vessel Maintenance Costs						\$ 851,056

Total Annual Route Costs

Total Annual Operational Costs	\$ 7,072,812
Total Annual Layup Costs	\$ -
Total Annual Overhead Costs	\$ 255,357
Total Annual Maintenance Costs	\$ 851,056
Total Annual Costs	\$ 8,179,225

Route Operation and Schedule Model

Route: HNS-SGY-HNS

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer					DayACF-b
Winter	8.00	5.0	1	Displ	DayACF-b

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Startup (mins)	Vessel Preparation Times			Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)		avg MLOPS (mins)	avg MLOPS (mins)	Shutdown (mins)	
				-	-	-	-	-
Winter	Vessel 1	8.00	-	30	25	25	30	7.00

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		avg MLOPS (hrs)	Approach (hrs)		Approach (hrs)	avg MLOPS (hrs)	(hrs)	(mins)	(hrs)	(mins)
HNS-SGY	15.00	0.42	0.05	0.81	0.03	0.42	-	53	1	43
SGY-HNS	15.00	0.42	0.03	0.81	0.05	0.42	-	53	1	43
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.83	0.08	1.62	0.08	0.83	1	46	3	26

¹⁾ Transit time = Time Underway + Load + Unload

HNS-SGY-HNS Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Winter						
		Vessel 1	1st Dep	8:00 AM	1st Load	7:35 AM
Total Crew Time		Circuit No.	Depart Haines	Arrive Skagway	Depart Skagway	Arrive Haines
Crew 1	3.97	1	8:00 AM	8:53 AM	9:45 AM	10:38 AM
Crew 2	7.97	2	11:30 AM	12:23 PM	1:15 PM	2:08 PM

Crew Schedule

Notional crew schedules are developed to verify the number of hours each crew operates and show notional crew sequencing. Notional crew schedule times are based on the notional vessel schedules

Winter									
	Begin Vessel Startup	Begin First Load	Vessel Underway	Complete Middle Unload	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	7:05 AM	7:35 AM	8:00 AM	-	2:08 PM	2:33 PM	3:03 PM	7.97	Vessel
Crew 1 Hrs	Start	0.50	0.92	-	7.05	7.47	7.97	7.97	Crew 1
Crew 2 Hrs								-	Crew 2
Night Hrs	16.03						Start	16.03	Night

Route Operation and Schedule Model

Route: HNS-SGY-HNS

Daily Schedule Statistics (per day)

Season	Round Trips		Daily Underway Time				Daily Operational Time ^{2,3}			
	Vessel 1 (# / day)	Vessel 2 (# / day)	Vessel 1		Vessel 2		Vessel 1		Vessel 2	
			(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day
Summer	0	-	0.00	N/A	-	-	0.00	N/A	0.00	0.0%
Winter	2	-	3.53	14.7%	-	-	7.87	32.8%	-	-

²⁾ Daily Operational Time = (Round Trip Transit Time * Number of Round Trips) + Startup + Shutdown

³⁾ Schedule operational time may be slightly greater due to departure time adjustments

Daily Crew Statistics (per day)

Season	Vessel No.	# of Crews (per day)	Crew Regular Time		Crew Overtime		Crew Usage			
			Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1		Crew 2	
			(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	% of Shift	(hrs / day)	% of Shift
Summer		-	-	-	-	-	-	#DIV/0!	-	-
Summer		-	-	-	-	-	-	-	-	-
Winter	Vessel 1	1	8	-	-	-	7.97	99.6%	-	-

HNS-SGY-HNS Weekly Service Summary (per week)

Season	Vessel No.	Crew (days/wk)	Crew Regular Time ⁴		Crew Overtime		Vessel Operation (days/wk)	Trips /Wk	Underway Time (hrs / wk)	Operating Hours (hrs / wk)
			Crew 1 (hrs / wk)	Crew 2 (hrs / wk)	Crew 1 (hrs / wk)	Crew 2 (hrs / wk)				
Summer			-	-	-	-	-	-	-	-
Summer			-	-	-	-	-	-	-	-
Winter	Vessel 1	5	40.00	-	-	-	5.0	10.0	17.67	39.33

⁴⁾ Crew Regular Time = Crew Regular Time * Crew days per week

Route Cost Model

Route: HNS-SGY-HNS Vessel Sizing

Vessel Size and Selection

1. Traffic Forecast

Route Link		2038 Summer Average Daily Traffic - One Way			
No.	Name	PAX-ASV	RV	VAN	PAX
1B_Opt-7	HNS-SGY	15	1	1	50
1B_Opt-8	SGY-HNS	15	1	1	50
-		-	-	-	-
-		-	-	-	-
Largest One Way Traffic		15	1	1	50
Weekly One Way Traffic		105	7	7	350

2. Required Vessel Capacity per Sailing

Assuming 10 Trips per week

		PAX-ASV	RV	VAN	PAX	Total
Capacity		11	1	1	35	
Lane Length	(ft)	220	24	40	N/A	284
Payload	(lbs)	66,000	12,000	40,000	N/A	118,000

3. Required Vessel Characteristics

Type	ASV (#)	PAX (#)	Payload (lton)
Displ	15	35	53

4. Selected Vessel Characteristics

	ASV	PAX	Deadweight
Selection Basis	53		
Selected Characteristics		35	53

Route Cost Model

Route: HNS-SGY-HNS

Vessel Definition

Type	ASV
Displ	53

Season Definition

Season	#Days	# Weeks	# Op Days
Summer	153	21.9	0
Winter	212	30.3	151

Annual Operational Costs

1. Crew Costs (by week)

Season	# Weeks	Crew Time (hrs/week)		Total Crew (hrs / season)	Crew Cost (\$ / hr)	Total Cost (\$ / season)
		Vessel #1	Vessel #2			
Summer reg.	22	-	-	-	\$ 736.96	\$ -
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		-	-	-	\$ 164.13	\$ -
Winter reg.	30	40.00	-	1,211.43	\$ 736.96	\$ 892,780
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		128.00	-	3,876.57	\$ 164.13	\$ 636,264
Total	52					\$ 1,529,044

¹⁾ Night Crew may be re-assigned to watch vessel on non-operational days.

2. Fuel Consumption Costs (by week)

Season	# Weeks	Time Underway		Total Underway (hrs / season)	Fuel Cost (\$ / gal)	Fuel Consumption (gal / hr)	Total Cost (\$ / season)
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)				
Summer	22	-	-	-	\$ 3.34	289.48	\$ -
Winter	30	17.67	-	535.05	\$ 3.34	289.48	\$ 517,320
Total	52			535.05			\$ 517,320

3. Winter Lay-up Cost (by day)

Season	# Days	# Vessels	Cost / Day	Total
winter	212	-	\$ -	\$ -

Annual Overhead Costs (by day)

Season	Annual Operating Days			(\$ / day)	Route Overhead Costs		
	Vessel #1	Vessel #2	Total		Vessel #1	Vessel #2	Total
Summer	0	-	-	\$ 1,669	\$ -	\$ -	\$ -
Winter	151	-	151	\$ 1,669	\$ 252,734	\$ -	\$ 252,734
Total	151	-	151		\$ 252,734	\$ -	\$ 252,734

Annual Maintenance Costs (by week)

Season	# weeks	Annual Operating Hours			Total (hrs / season)	
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)	Total (hrs / wk)		
Summer reg.	22	-	-	-	-	
Winter reg.	30	39.33	-	39.33	1,191	
Total	52				1,191	
		Vessel Operation		Vessel Overhaul	Total	
		(eng op hrs)	(\$ / hr)	(# Vessels)	(\$ / Vessel)	Cost
Operating		1,191	\$ 44.95			\$ 53,552
Overhaul				0.58	\$ 541,891	\$ 314,297
Total Vessel Maintenance Costs						\$ 367,849

Total Annual Route Costs

Total Annual Operational Costs	\$ 2,046,364
Total Annual Layup Costs	\$ -
Total Annual Overhead Costs	\$ 252,734
Total Annual Maintenance Costs	\$ 367,849
Total Annual Costs	\$ 2,666,947

This page intentionally left blank.

Alternative Summary Alternative: 5

Alt	Route	Season	Vessels			Crew Hrs		Op Schedule			
			No.	Type	# ASV	Vessel 1	Vessel 2	hrs/day	Days per Week	Round trips per day	
5. Marine Alternative											
Alt 5 - Third ACF Dayboat											
	HNS-AUK-HNS	Summer	1	DayACF-c	53		12		11.73	7	1
		Winter									
	HNS-SGY-HNS	Summer									
		Winter	1	DayACF-c	53		8		6.93	5	2
	SGY-AUK-SGY	Summer	1	DayACF-c	53		12		12.80	7	1
		Winter									
	AUK-HNS-AUK	Summer	1	DayACF-c	53		12		11.73	4	1
		Winter	1	DayACF-c	53		12		11.73	5	1
	AUK-SGY-AUK	Summer	1	DayACF-c	53		12		12.80	3	1
		Winter									
	HNS-SGY-HNS	Summer	1	Disp-b	18		8		6.27	7	2
		Winter									

Alternative Cost Summary

Route Name		Annual Costs				Total Annual Costs	Capital Costs	
		Crew	Fuel	Lay-up	Maintenance			
HNS-AUK-HNS	⁴	1.65 M \$	1.41 M \$	-	0.31 M \$	0.26 M \$	3.63 M \$	69.64 M \$
HNS-SGY-HNS	⁴	1.53 M \$	0.52 M \$	-	0.36 M \$	0.25 M \$	2.66 M \$	
SGY-AUK-SGY		1.65 M \$	1.57 M \$	0.19 M \$	0.63 M \$	0.26 M \$	4.30 M \$	
AUK-HNS-AUK	⁵	3.24 M \$	2.20 M \$	-	0.67 M \$	0.40 M \$	6.51 M \$	
AUK-SGY-AUK	⁵	0.71 M \$	0.67 M \$	-	0.04 M \$	0.11 M \$	1.53 M \$	
HNS-SGY-HNS		0.64 M \$	0.17 M \$	0.11 M \$	0.34 M \$	0.26 M \$	1.52 M \$	24.74 M \$
Configuration Total		9.42 M \$	6.54 M \$	0.30 M \$	2.35 M \$	1.54 M \$	20.15 M \$	94.38 M \$

Notes:

- 1) This alternative does not include any mainline service beyond Auke Bay.
- 2) To complete a round trip, the vessels on AUK-SGY-AUK or SGY-AUK-SGY routes require that the night crew start and shutdown the vessel.
- 3) This alternative assumes a third ACF Dayboat is acquired. However the existing two ACF Dayboats are considered existing vessels. Therefore the capital cost is included for only one of the three ACF Dayboats.
- 4) For modeling purposes, the ACF Dayboat homeported in Haines is assumed to operate on the HNS-AUK route during summer months and the HNS-SGY route during winter months. For modeling purposes, this vessel has separate schedule and cost sheets for each route. Since this vessel operates all year, no layup costs are included.
- 5) The ACF Dayboat homeported in Auke Bay includes trips on both the AUK-HNS and the AUK-SGY routes during the summer months and operates on the AUK-HNS route during the winter months. For modeling purposes this vessel has separate schedule and cost sheets for each route. Since the vessel operates all year, no layup costs are included and the annual overhaul cost is included in only one cost sheet.
- 6) Vessel size calculations for the HNS-AUK and SGY-AUK routes include all round trips in a given week, regardless of which vessel completes the trip. Therefore no sizing calculations are shown for the vessel homeported in Auke Bay.

Route Operation and Schedule Model

Route: HNS-AUK-HNS

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer	12.00	7.0	1	Displ	DayACF-c
Winter					

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Startup (mins)	Vessel Preparation Times		Shutdown (mins)	Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)		avg MLOPS (mins)	avg MLOPS (mins)		
Summer	Vessel 1	12.00	-	30	18	18	30	11.00
		-	-	-	-	-	-	-
		-	-	-	-	-	-	-

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		avg MLOPS (hrs)	Approach (hrs)		Approach (hrs)	avg MLOPS (hrs)	(hrs)	(mins)	(hrs)	(mins)
HNS-AUK	15.00	0.30	0.06	4.24	0.47	0.30	4	46	5	22
AUK-HNS	15.00	0.30	0.47	4.24	0.06	0.30	4	46	5	22
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.60	0.53	8.48	0.53	0.60	9	32	10	44

¹⁾ Transit time = Time Underway + Load + Unload

HNS-AUK-HNS Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

Total Crew Time		Vessel 1	1st Dep	6:00 AM	1st Load	5:42 AM
Crew 1	Crew 2	Circuit No.	Depart Haines	Arrive Auke Bay	Depart Auke Bay	Arrive Haines
11.78		1	6:00 AM	10:46 AM	11:25 AM	4:11 PM

Crew Schedule

Notional crew schedules are developed to verify the number of hours each crew operates and show notional crew sequencing. Notional crew schedule times are based on the notional vessel schedules

Summer: Vessel 1

	Begin Vessel Startup	Begin First Load	Vessel Underway	Complete Middle Unload	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	5:12 AM	5:42 AM	6:00 AM	-	4:11 PM	4:29 PM	4:59 PM	11.78	Vessel
Crew 1 Hrs	Start	0.50	0.80	-	10.98	11.28	11.78	11.78	Crew 1
Crew 2 Hrs								-	Crew 2
Night Hrs	12.22						Start	12.22	Night

Route Operation and Schedule Model

Route: HNS-AUK-HNS

Daily Schedule Statistics (per day)

Season	Round Trips		Daily Underway Time				Daily Operational Time ^{2,3}			
	Vessel 1	Vessel 2	Vessel 1		Vessel 2		Vessel 1		Vessel 2	
	(# / day)	(# / day)	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day
Summer	1	-	9.53	39.7%	-	-	11.73	48.9%	0.00	0.0%
Winter	0	-	0.00	N/A	-	-	0.00	N/A	-	-

²⁾ Daily Operational Time = (Round Trip Transit Time * Number of Round Trips) + Startup + Shutdown

³⁾ Schedule operational time may be slightly greater due to departure time adjustments

Daily Crew Statistics (per day)

Season	Vessel No.	# of Crews (per day)	Crew Regular Time		Crew Overtime		Crew Usage			
			Crew 1	Crew 2	Crew 1	Crew 2	Crew 1		Crew 2	
			(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	% of Shift	(hrs / day)	% of Shift
Summer	Vessel 1	1	12	-	-	-	11.78	98.2%	-	-
Summer	-	-	-	-	-	-	-	-	-	-
Winter	-	-	-	-	-	-	-	-	-	-

HNS-AUK-HNS Weekly Service Summary (per week)

Season	Vessel No.	Crew (days/wk)	Crew Regular Time ⁴		Crew Overtime		Vessel Operation (days/wk)	Trips /Wk	Underway Time (hrs / wk)	Operating Hours (hrs / wk)
			Crew 1	Crew 2	Crew 1	Crew 2				
			(hrs / wk)	(hrs / wk)	(hrs / wk)	(hrs / wk)				
Summer	Vessel 1	7	84.00	-	-	-	7.0	66.73	82.13	
Summer	-	-	-	-	-	-	-	-	-	
Winter	-	-	-	-	-	-	-	-	-	

⁴⁾ Crew Regular Time = Crew Regular Time * Crew days per week

Route Cost Model

Route: HNS-AUK-HNS Vessel Sizing

Vessel Size and Selection

1. Traffic Forecast

Route Link		2038 Summer Average Daily Traffic - One Way			
No.	Name	PAX-ASV	RV	VAN	PAX
5-1	HNS-AUK	53	3	2	185
5-2	AUK-HNS	53	3	2	185
-		-	-	-	-
-		-	-	-	-
Largest One Way Traffic		53	3	2	185
Weekly One Way Traffic		371	21	14	1,295

2. Required Vessel Capacity per Sailing

Assuming 11 Trips per week

		PAX-ASV	RV	VAN	PAX	Total
Capacity		34	2	2	118	
Lane Length	(ft)	680	48	80	N/A	808
Payload	(lbs)	204,000	24,000	80,000	N/A	308,000

3. Required Vessel Characteristics

Type	ASV (#)	PAX (#)	Payload (lton)
Displ	41	118	138

Vessel sizing calculations include all round trips between Auke Bay and Haines, regardless of which vessel completes the trip or at which port the vessel starts.

4. Selected Vessel Characteristics

	ASV	PAX	Deadweight
Selection Basis	53		
Selected Characteristics		118	138

Route Cost Model

Route: HNS-AUK-HNS

Vessel Definition

Type	ASV
Displ	53

Season Definition

Season	#Days	# Weeks	# Op Days
Summer	153	21.9	153
Winter	212	30.3	0

Annual Operational Costs

1. Crew Costs (by week)

Season	# Weeks	Crew Time (hrs/week)		Total Crew (hrs / season)	Crew Cost (\$ / hr)	Total Cost (\$ / season)
		Vessel #1	Vessel #2			
Summer reg.	22	84.00	-	1,836.00	\$ 736.96	\$ 1,353,067
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		84.00	-	1,836.00	\$ 164.13	\$ 301,344
Winter reg.	30	-	-	-	\$ 736.96	\$ -
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		-	-	-	\$ 164.13	\$ -
Total	52					\$ 1,654,411

¹⁾ Night Crew may be re-assigned to watch vessel on non-operational days.

2. Fuel Consumption Costs (by week)

Season	# Weeks	Time Underway		Total Underway (hrs / season)	Fuel Cost (\$ / gal)	Fuel Consumption (gal / hr)	Total Cost (\$ / season)
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)				
Summer	22	66.73	-	1,458.60	\$ 3.34	289.48	\$ 1,410,272
Winter	30	-	-	-	\$ 3.34	289.48	\$ -
Total	52			1,458.60			\$ 1,410,272

3. Winter Lay-up Cost (by day)

Season	# Days	# Vessels	Cost / Day	Total
winter	212		\$ -	\$ -

Annual Overhead Costs (by day)

Season	Annual Operating Days			(\$ / day)	Route Overhead Costs		
	Vessel #1	Vessel #2	Total		Vessel #1	Vessel #2	Total
Summer	153	-	153	\$ 1,669	\$ 255,357	\$ -	\$ 255,357
Winter	0	-	-	\$ 1,669	\$ -	\$ -	\$ -
Total	153	-	153		\$ 255,357	\$ -	\$ 255,357

Annual Maintenance Costs (by week)

Season	# weeks	Annual Operating Hours			Total (hrs / season)	
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)	Total (hrs / wk)		
Summer reg.	22	82.13	-	82.13	1,795	
Winter reg.	30	-	-	-	-	
Total	52				1,795	
		Vessel Operation		Vessel Overhaul	Total	
		(eng op hrs)	(\$ / hr)	(# Vessels)	(\$ / Vessel)	Cost
Operating		1,795	\$ 44.95			\$ 80,703
Overhaul				0.42	\$ 541,891	\$ 227,594
Total Vessel Maintenance Costs						\$ 308,297

Total Annual Route Costs

Total Annual Operational Costs	\$ 3,064,683
Total Annual Layup Costs	\$ -
Total Annual Overhead Costs	\$ 255,357
Total Annual Maintenance Costs	\$ 308,297
Total Annual Costs	\$ 3,628,337

Vessel Capital Cost

	\$ / Vessel	# Vessels	Total
Vessel Acquisition Cost	\$ 69,635,874	1	
Total Vessel Capital Costs			\$ 69,635,874

Route Operation and Schedule Model

Route: HNS-SGY-HNS

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer					DayACF-c
Winter	12.00	5.0	1	Displ	DayACF-c

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Startup (mins)	Vessel Preparation Times		Shutdown (mins)	Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)		avg MLOPS (mins)	avg MLOPS (mins)		
		-	-	-	-	-	-	-
Winter	Vessel 1	8.00	-	30	18	18	30	7.00

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		avg MLOPS (hrs)	Approach (hrs)		Approach (hrs)	avg MLOPS (hrs)	(hrs)	(mins)	(hrs)	(mins)
HNS-SGY	15.00	0.30	0.05	0.81	0.03	0.30	-	53	1	29
SGY-HNS	15.00	0.30	0.03	0.81	0.05	0.30	-	53	1	29
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.60	0.08	1.62	0.08	0.60	1	46	2	58

¹⁾ Transit time = Time Underway + Load + Unload

HNS-SGY-HNS Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Winter

		Vessel 1	1st Dep	8:00 AM	1st Load	7:42 AM
Total Crew Time						
Crew 1		Circuit No.	Depart Haines	Arrive Skagway	Depart Skagway	Arrive Haines
3.98		1	8:00 AM	8:53 AM	9:30 AM	10:23 AM
6.98		2	11:00 AM	11:53 AM	12:30 PM	1:23 PM

Crew Schedule

Notional crew schedules are developed to verify the number of hours each crew operates and show notional crew sequencing. Notional crew schedule times are based on the notional vessel schedules

Winter

	Begin Vessel Startup	Begin First Load	Vessel Underway	Complete Middle Unload	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	7:12 AM	7:42 AM	8:00 AM	-	1:23 PM	1:41 PM	2:11 PM	6.98	Vessel
Crew 1 Hrs	Start	0.50	0.80	-	6.18	6.48	6.98	6.98	Crew 1
Crew 2 Hrs								-	Crew 2
Night Hrs	17.02						Start	17.02	Night

Route Operation and Schedule Model

Route: HNS-SGY-HNS

Daily Schedule Statistics (per day)

Season	Round Trips		Daily Underway Time				Daily Operational Time ^{2,3}			
	Vessel 1	Vessel 2	Vessel 1		Vessel 2		Vessel 1		Vessel 2	
	(# / day)	(# / day)	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day
Summer	0	-	0.00	N/A	-	-	0.00	N/A	0.00	0.0%
Winter	2		3.53	14.7%			6.93	28.9%		

²⁾ Daily Operational Time = (Round Trip Transit Time * Number of Round Trips) + Startup + Shutdown

³⁾ Schedule operational time may be slightly greater due to departure time adjustments

Daily Crew Statistics (per day)

Season	Vessel No.	# of Crews (per day)	Crew Regular Time		Crew Overtime		Crew Usage				
			Crew 1	Crew 2	Crew 1	Crew 2	Crew 1		Crew 2		
			(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	% of Shift	(hrs / day)	% of Shift	
Summer		-	-	-	-	-	-	-	-	-	-
Summer		-	-	-	-	-	-	-	-	-	-
Winter	Vessel 1	1	8		-		6.98	87.3%			

HNS-SGY-HNS Weekly Service Summary (per week)

Season	Vessel No.	Crew (days/wk)	Crew Regular Time ⁴		Crew Overtime		Vessel Operation (days/wk)	Trips /Wk	Underway Time (hrs / wk)	Operating Hours (hrs / wk)
			Crew 1	Crew 2	Crew 1	Crew 2				
			(hrs / wk)	(hrs / wk)	(hrs / wk)	(hrs / wk)				
Summer			-	-	-	-	-	-	-	-
Summer			-	-	-	-	-	-	-	-
Winter	Vessel 1	5	40.00		-		5.0	10.0	17.67	34.67

⁴⁾ Crew Regular Time = Crew Regular Time * Crew days per week

Route Cost Model

Route: HNS-SGY-HNS Vessel Sizing

Vessel Size and Selection

1. Traffic Forecast

Route Link		2038 Summer Average Daily Traffic - One Way			
No.	Name	PAX-ASV	RV	VAN	PAX
5-7	HNS-SGY	13	1	1	43
5-8	SGY-HNS	13	1	1	43
-		-	-	-	-
-		-	-	-	-
Largest One Way Traffic		13	1	1	43
Weekly One Way Traffic		91	7	7	301

2. Required Vessel Capacity per Sailing

Assuming 10 Trips per week

		PAX-ASV	RV	VAN	PAX	Total
Capacity		10	1	1	31	
Lane Length	(ft)	200	24	40	N/A	264
Payload	(lbs)	60,000	12,000	40,000	N/A	112,000

3. Required Vessel Characteristics

Type	ASV (#)	PAX (#)	Payload (lton)
Displ	14	31	50

4. Selected Vessel Characteristics

	ASV	PAX	Deadweight
Selection Basis	53		
Selected Characteristics		31	50

Route Cost Model

Route: HNS-SGY-HNS

Vessel Definition

Type	ASV
Displ	53

Season Definition

Season	#Days	# Weeks	# Op Days
Summer	153	21.9	0
Winter	212	30.3	151

Annual Operational Costs

1. Crew Costs (by week)

Season	# Weeks	Crew Time (hrs/week)		Total Crew (hrs / season)	Crew Cost (\$ / hr)	Total Cost (\$ / season)
		Vessel #1	Vessel #2			
Summer reg.	22	-	-	-	\$ 736.96	\$ -
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		-	-	-	\$ 164.13	\$ -
Winter reg.	30	40.00	-	1,211.43	\$ 736.96	\$ 892,780
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		128.00	-	3,876.57	\$ 164.13	\$ 636,264
Total	52					\$ 1,529,044

¹⁾ Night Crew may be re-assigned to watch vessel on non-operational days.

2. Fuel Consumption Costs (by week)

Season	# Weeks	Time Underway		Total Underway (hrs / season)	Fuel Cost (\$ / gal)	Fuel Consumption (gal / hr)	Total Cost (\$ / season)
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)				
Summer	22	-	-	-	\$ 3.34	289.48	\$ -
Winter	30	17.67	-	535.05	\$ 3.34	289.48	\$ 517,320
Total	52			535.05			\$ 517,320

3. Winter Lay-up Cost (by day)

Season	# Days	# Vessels	Cost / Day	Total
winter	212		\$ -	\$ -

Annual Overhead Costs (by day)

Season	Annual Operating Days			(\$ / day)	Route Overhead Costs		
	Vessel #1	Vessel #2	Total		Vessel #1	Vessel #2	Total
Summer	0	-	-	\$ 1,669	\$ -	\$ -	\$ -
Winter	151	-	151	\$ 1,669	\$ 252,734	\$ -	\$ 252,734
Total	151	-	151		\$ 252,734	\$ -	\$ 252,734

Annual Maintenance Costs (by week)

Season	# weeks	Annual Operating Hours			Total (hrs / season)	
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)	Total (hrs / wk)		
Summer reg.	22	-	-	-	-	
Winter reg.	30	34.67	-	34.67	1,050	
Total	52				1,050	
		Vessel Operation		Vessel Overhaul	Total	
		(eng op hrs)	(\$ / hr)	(# Vessels)	(\$ / Vessel)	Cost
Operating		1,050	\$ 44.95			\$ 47,198
Overhaul				0.58	\$ 541,891	\$ 314,297
Total Vessel Maintenance Costs						\$ 361,495

Total Annual Route Costs

Total Annual Operational Costs	\$ 2,046,364
Total Annual Layup Costs	\$ -
Total Annual Overhead Costs	\$ 252,734
Total Annual Maintenance Costs	\$ 361,495
Total Annual Costs	\$ 2,660,593

Route Operation and Schedule Model

Route: SGY-AUK-SGY

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer	12.00	7.0	1	Displ	DayACF-c

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Startup (mins)	Vessel Preparation Times		Shutdown (mins)	Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)		avg MLOPS (mins)	avg MLOPS (mins)		
Summer	Vessel 1	12.00	-	30	18	18	30	11.00
		-	-	-	-	-	-	-
		-	-	-	-	-	-	-

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		avg MLOPS (hrs)	Approach (hrs)		Approach (hrs)	avg MLOPS (hrs)	(hrs)	(mins)	(hrs)	(mins)
SGY-AUK	15.00	0.30	0.03	4.81	0.47	0.30	5	18	5	54
AUK-SGY	15.00	0.30	0.47	4.81	0.03	0.30	5	18	5	54
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.60	0.50	9.62	0.50	0.60	10	36	11	48

¹⁾ Transit time = Time Underway + Load + Unload

SGY-AUK-SGY Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

Total Crew Time		Circuit	Depart	Arrive	Depart	Arrive
Crew 1	Crew 2	No.	Skagway	Auke Bay	Auke Bay	Skagway
11.82		1	6:00 AM	11:18 AM	11:55 AM	5:13 PM

Winter

Total Crew Time		Circuit	Depart	Arrive	Depart	Arrive
Crew 1	Crew 2	No.	Skagway	Auke Bay	Auke Bay	Skagway
11.22		1	8:00 AM	1:18 PM	1:55 PM	7:13 PM

Crew Schedule

Notional crew schedules are developed to verify the number of hours each crew operates and show notional crew sequencing. Notional crew schedule times are based on the notional vessel schedules

Summer: Vessel 1

	Begin Vessel Startup	Begin First Load	Vessel Underway	Complete Middle Unload	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	5:12 AM	5:42 AM	6:00 AM	-	5:13 PM	5:31 PM	6:01 PM	12.82	Vessel
Crew 1 Hrs		Start	0.30	-	11.52	11.82		11.82	Crew 1
Crew 2 Hrs								-	Crew 2
Night Hrs	11.68	12.18				Start	0.50	12.18	Night

Winter

	Begin Vessel Startup	Begin First Load	Vessel Underway	Complete Middle Unload	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	8:00 AM	8:00 AM	8:00 AM	-	7:13 PM	7:13 PM	7:13 PM	11.22	Vessel
Crew 1 Hrs		Start	0.00	-	11.22	11.22		11.22	Crew 1
Crew 2 Hrs								-	Crew 2
Night Hrs	12.78	12.78				Start	0.00	12.78	Night

Route Operation and Schedule Model

Route: SGY-AUK-SGY

Daily Schedule Statistics (per day)

Season	Round Trips		Daily Underway Time				Daily Operational Time ^{2,3}			
	Vessel 1	Vessel 2	Vessel 1		Vessel 2		Vessel 1		Vessel 2	
	(# / day)	(# / day)	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day
Summer	1	-	10.60	44.2%	-	-	12.80	53.3%	0.00	0.0%
Winter	0	-	0.00	N/A	-	-	0.00	N/A	-	-

²⁾ Daily Operational Time = (Round Trip Transit Time * Number of Round Trips) + Startup + Shutdown

³⁾ Schedule operational time may be slightly greater due to departure time adjustments

Daily Crew Statistics (per day)

Season	Vessel No.	# of Crews (per day)	Crew Regular Time		Crew Overtime		Crew Usage			
			Crew 1	Crew 2	Crew 1	Crew 2	Crew 1		Crew 2	
			(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	% of Shift	(hrs / day)	% of Shift
Summer	Vessel 1	1	12	-	-	-	11.82	98.5%	-	-
Summer	-	-	-	-	-	-	-	-	-	-
Winter	-	-	-	-	-	-	-	-	-	-

SGY-AUK-SGY Weekly Service Summary (per week)

Season	Vessel No.	Crew (days/wk)	Crew Regular Time ⁴		Crew Overtime		Vessel Operation (days/wk)	Trips /Wk	Underway Time (hrs / wk)	Operating Hours (hrs / wk)
			Crew 1	Crew 2	Crew 1	Crew 2				
			(hrs / wk)	(hrs / wk)	(hrs / wk)	(hrs / wk)				
Summer	Vessel 1	7	84.00	-	-	-	7.0	74.20	89.60	
Summer	-	-	-	-	-	-	-	-	-	
Winter	-	-	-	-	-	-	-	-	-	

⁴⁾ Crew Regular Time = Crew Regular Time * Crew days per week

Route Cost Model

Route: SGY-AUK-SGY Vessel Sizing

Vessel Size and Selection

1. Traffic Forecast

Route Link		2038 Summer Average Daily Traffic - One Way			
No.	Name	PAX-ASV	RV	VAN	PAX
5-4	SGY-AUK	40	3	1	142
5-3	AUK-SGY	40	3	1	142
-		-	-	-	-
-		-	-	-	-
Largest One Way Traffic		40	3	1	142
Weekly One Way Traffic		280	21	7	994

2. Required Vessel Capacity per Sailing

Assuming **10** Trips per week

		PAX-ASV	RV	VAN	PAX	Total
Capacity		28	3	1	100	
Lane Length	(ft)	560	72	40	N/A	672
Payload	(lbs)	168,000	36,000	40,000	N/A	244,000

3. Required Vessel Characteristics

Type	ASV (#)	PAX (#)	Payload (lton)
Displ	34	100	109

Vessel sizing calculations include all round trips between Auke Bay and Skagway, regardless of which vessel completes the trip or at which port the vessel starts.

4. Selected Vessel Characteristics

	ASV	PAX	Deadweight
Selection Basis	53		
Selected Characteristics		100	109

Route Cost Model

Route: SGY-AUK-SGY

Vessel Definition

Type	ASV
Displ	53

Season Definition

Season	#Days	# Weeks	# Op Days
Summer	153	21.9	153
Winter	212	30.3	0

Annual Operational Costs

1. Crew Costs (by week)

Season	# Weeks	Crew Time (hrs/week)		Total Crew (hrs / season)	Crew Cost (\$ / hr)	Total Cost (\$ / season)
		Vessel #1	Vessel #2			
Summer reg.	22	84.00	-	1,836.00	\$ 736.96	\$ 1,353,067
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		84.00	-	1,836.00	\$ 164.13	\$ 301,344
Winter reg.	30	-	-	-	\$ 736.96	\$ -
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		-	-	-	\$ 164.13	\$ -
Total	52					\$ 1,654,411

¹⁾ Night Crew may be re-assigned to watch vessel on non-operational days.

2. Fuel Consumption Costs (by week)

Season	# Weeks	Time Underway		Total Underway (hrs / season)	Fuel Cost (\$ / gal)	Fuel Consumption (gal / hr)	Total Cost (\$ / season)
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)				
Summer	22	74.20	-	1,621.80	\$ 3.34	289.48	\$ 1,568,065
Winter	30	-	-	-	\$ 3.34	289.48	\$ -
Total	52			1,621.80			\$ 1,568,065

3. Winter Lay-up Cost (by day)

Season	# Days	# Vessels	Cost / Day	Total
winter	212	1.0	\$ 915.50	\$ 194,087

Annual Overhead Costs (by day)

Season	Annual Operating Days			(\$ / day)	Route Overhead Costs		
	Vessel #1	Vessel #2	Total		Vessel #1	Vessel #2	Total
Summer	153	-	153	\$ 1,669	\$ 255,357	\$ -	\$ 255,357
Winter	0	-	-	\$ 1,669	\$ -	\$ -	\$ -
Total	153	-	153		\$ 255,357	\$ -	\$ 255,357

Annual Maintenance Costs (by week)

Season	# weeks	Annual Operating Hours			Total (hrs / season)	
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)	Total (hrs / wk)		
Summer reg.	22	89.60	-	89.60	1,958	
Winter reg.	30	-	-	-	-	
Total	52				1,958	
		Vessel Operation		Vessel Overhaul	Total	
		(eng op hrs)	(\$ / hr)	(# Vessels)	(\$ / Vessel)	Cost
Operating	1,958	\$ 44.95				\$ 88,039
Overhaul				1.0	\$ 541,891	\$ 541,891
Total Vessel Maintenance Costs						\$ 629,931

Total Annual Route Costs

Total Annual Operational Costs	\$ 3,222,476
Total Annual Layup Costs	\$ 194,087
Total Annual Overhead Costs	\$ 255,357
Total Annual Maintenance Costs	\$ 629,931
Total Annual Costs	\$ 4,301,851

Route Operation and Schedule Model

Route: AUK-HNS-AUK

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Quantity	Vessel Description	
				Type	Designation
Summer	12.00	4.0	1	Displ	DayACF-c
Winter	12.00	5.0	1	Displ	DayACF-c

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Startup (mins)	Vessel Preparation Times		Shutdown (mins)	Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)		avg MLOPS (mins)	avg MLOPS (mins)		
Summer	Vessel 1	12.00	-	30	18	18	30	11.00
		-	-	-	-	-	-	-
Winter	Vessel 1	12.00	-	30	18	18	30	11.00

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		avg MLOPS (hrs)	Approach (hrs)		Approach (hrs)	avg MLOPS (hrs)	(hrs)	(mins)	(hrs)	(mins)
AUK-HNS	15.00	0.30	0.47	4.24	0.06	0.30	4	46	5	22
HNS-AUK	15.00	0.30	0.06	4.24	0.47	0.30	4	46	5	22
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.60	0.53	8.48	0.53	0.60	9	32	10	44

¹⁾ Transit time = Time Underway + Load + Unload

AUK-HNS-AUK Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

Total Crew Time		Circuit	Depart	Arrive	Depart	Arrive
Crew 1	Crew 2	No.	Auke Bay	Haines	Haines	Auke Bay
11.78		1	6:00 AM	10:46 AM	11:25 AM	4:11 PM

Winter

Total Crew Time		Circuit	Depart	Arrive	Depart	Arrive
Crew 1	Crew 2	No.	Auke Bay	Haines	Haines	Auke Bay
11.78		1	8:00 AM	12:46 PM	1:25 PM	6:11 PM

Crew Schedule

Notional crew schedules are developed to verify the number of hours each crew operates and show notional crew sequencing. Notional crew schedule times are based on the notional vessel schedules

Summer: Vessel 1

	Begin Vessel Startup	Begin First Load	Vessel Underway	Complete Middle Unload	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	5:12 AM	5:42 AM	6:00 AM	-	4:11 PM	4:29 PM	4:59 PM	11.78	Vessel
Crew 1 Hrs	Start	0.50	0.80	-	10.98	11.28	11.78	11.78	Crew 1
Crew 2 Hrs								-	Crew 2
Night Hrs	12.22						Start	12.22	Night

Winter

	Begin Vessel Startup	Begin First Load	Vessel Underway	Complete Middle Unload	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	7:12 AM	7:42 AM	8:00 AM	-	6:11 PM	6:29 PM	6:59 PM	11.78	Vessel
Crew 1 Hrs	Start	0.50	0.80	-	10.98	11.28	11.78	11.78	Crew 1
Crew 2 Hrs								-	Crew 2
Night Hrs	12.22						Start	12.22	Night

Route Operation and Schedule Model

Route: AUK-HNS-AUK

Daily Schedule Statistics (per day)

Season	Round Trips		Daily Underway Time				Daily Operational Time ^{2,3}			
	Vessel 1 (# / day)	Vessel 2 (# / day)	Vessel 1		Vessel 2		Vessel 1		Vessel 2	
			(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day
Summer	1	-	9.53	39.7%	-	-	11.73	48.9%	0.00	0.0%
Winter	1	-	9.53	39.7%	-	-	11.73	48.9%	-	-

²⁾ Daily Operational Time = (Round Trip Transit Time * Number of Round Trips) + Startup + Shutdown

³⁾ Schedule operational time may be slightly greater due to departure time adjustments

Daily Crew Statistics (per day)

Season	Vessel No.	# of Crews (per day)	Crew Regular Time		Crew Overtime		Crew Usage			
			Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1		Crew 2	
			(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	% of Shift	(hrs / day)	% of Shift
Summer	Vessel 1	1	12	-	-	-	11.78	98.2%	-	-
Summer	-	-	-	-	-	-	-	-	-	-
Winter	Vessel 1	1	12	-	-	-	11.78	98.2%	-	-

AUK-HNS-AUK Weekly Service Summary (per week)

Season	Vessel No.	Crew (days/wk)	Crew Regular Time ⁴		Crew Overtime		Vessel Operation (days/wk)	Trips /Wk	Underway Time (hrs / wk)	Operating Hours (hrs / wk)
			Crew 1 (hrs / wk)	Crew 2 (hrs / wk)	Crew 1 (hrs / wk)	Crew 2 (hrs / wk)				
Summer	Vessel 1	4	48.00	-	-	-	4.0	4.0	38.13	46.93
Summer	-	-	-	-	-	-	-	-	-	-
Winter	Vessel 1	7	84.00	-	-	-	5.0	5.0	47.67	58.67

⁴⁾ Crew Regular Time = Crew Regular Time * Crew days per week

Route Cost Model

Route: AUK-HNS-AUK

Vessel Definition

Type	ASV
Displ	53

Season Definition

Season	#Days	# Weeks	# Op Days
Summer	153	21.9	87
Winter	212	30.3	151

Annual Operational Costs

1. Crew Costs (by week)

Season	# Weeks	Crew Time (hrs/week)		Total Crew (hrs / season)	Crew Cost (\$ / hr)	Total Cost (\$ / season)
		Vessel #1	Vessel #2			
Summer reg.	22	48.00	-	1,049.14	\$ 736.96	\$ 773,181
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		48.00	-	1,049.14	\$ 164.13	\$ 172,196
Winter reg.	30	84.00	-	2,544.00	\$ 736.96	\$ 1,874,838
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		84.00	-	2,544.00	\$ 164.13	\$ 417,548
Total	52					\$ 3,237,764

¹⁾ Night Crew may be re-assigned to watch vessel on non-operational days.

2. Fuel Consumption Costs (by week)

Season	# Weeks	Time Underway		Total Underway (hrs / season)	Fuel Cost (\$ / gal)	Fuel Consumption (gal / hr)	Total Cost (\$ / season)
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)				
Summer	22	38.13	-	833.49	\$ 3.34	289.48	\$ 805,870
Winter	30	47.67	-	1,443.62	\$ 3.34	289.48	\$ 1,395,788
Total	52			2,277.10			\$ 2,201,658

3. Winter Lay-up Cost (by day)

Season	# Days	# Vessels	Cost / Day	Total
winter	212	-	\$ -	\$ -

Annual Overhead Costs (by day)

Season	Annual Operating Days			(\$ / day)	Route Overhead Costs		
	Vessel #1	Vessel #2	Total		Vessel #1	Vessel #2	Total
Summer	87	-	87	\$ 1,669	\$ 145,918	\$ -	\$ 145,918
Winter	151	-	151	\$ 1,669	\$ 252,734	\$ -	\$ 252,734
Total	239	-	239		\$ 398,653	\$ -	\$ 398,653

Annual Maintenance Costs (by week)

Season	# weeks	Annual Operating Hours			Total (hrs / season)	
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)	Total (hrs / wk)		
Summer reg.	22	46.93	-	46.93	1,026	
Winter reg.	30	58.67	-	58.67	1,777	
Total	52				2,803	
		Vessel Operation		Vessel Overhaul	Total	
		(eng op hrs)	(\$ / hr)	(# Vessels)	(\$ / Vessel)	Cost
Operating		2,803	\$ 44.95			\$ 125,990
Overhaul				1.0	\$ 541,891	\$ 541,891
Total Vessel Maintenance Costs						\$ 667,881

Total Annual Route Costs

Total Annual Operational Costs	\$ 5,439,421
Total Annual Layup Costs	\$ -
Total Annual Overhead Costs	\$ 398,653
Total Annual Maintenance Costs	\$ 667,881
Total Annual Costs	\$ 6,505,955

Route Operation and Schedule Model

Route: AUK-SGY-AUK

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer	12.00	3.0	1	Displ	DayACF-c
Winter					

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Startup (mins)	Vessel Preparation Times		Shutdown (mins)	Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)		avg MLOPS (mins)	avg MLOPS (mins)		
Summer	Vessel 1	12.00	-	30	18	18	30	11.00
		-	-	-	-	-	-	-
		-	-	-	-	-	-	-

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		avg MLOPS (hrs)	Approach (hrs)		Approach (hrs)	avg MLOPS (hrs)	(hrs)	(mins)	(hrs)	(mins)
AUK-SGY	15.00	0.30	0.47	4.81	0.03	0.30	5	18	5	54
SGY-AUK	15.00	0.30	0.03	4.81	0.47	0.30	5	18	5	54
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.60	0.50	9.62	0.50	0.60	10	36	11	48

¹⁾ Transit time = Time Underway + Load + Unload

AUK-SGY-AUK Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

		Vessel 1	1st Dep	6:00 AM	1st Load	5:42 AM
Total Crew Time		Circuit	Depart	Arrive	Depart	Arrive
Crew 1	Crew 2	No.	Auke Bay	Skagway	Skagway	Auke Bay
11.82		1	6:00 AM	11:18 AM	11:55 AM	5:13 PM

Crew Schedule

Notional crew schedules are developed to verify the number of hours each crew operates and show notional crew sequencing. Notional crew schedule times are based on the notional vessel schedules

Summer: Vessel 1

	Begin Vessel Startup	Begin First Load	Vessel Underway	Complete Middle Unload	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	5:12 AM	5:42 AM	6:00 AM	-	5:13 PM	5:31 PM	6:01 PM	12.82	Vessel
Crew 1 Hrs		Start	0.30	-	11.52	11.82		11.82	Crew 1
Crew 2 Hrs								-	Crew 2
Night Hrs	11.68	12.18				Start	0.50	12.18	Night

Route Operation and Schedule Model

Route: AUK-SGY-AUK

Daily Schedule Statistics (per day)

Season	Round Trips		Daily Underway Time				Daily Operational Time ^{2,3}			
	Vessel 1 (# / day)	Vessel 2 (# / day)	Vessel 1		Vessel 2		Vessel 1		Vessel 2	
			(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day
Summer	1	-	10.60	44.2%	-	-	12.80	53.3%	0.00	0.0%
Winter	0	-	0.00	N/A	-	-	0.00	N/A	-	-

²⁾ Daily Operational Time = (Round Trip Transit Time * Number of Round Trips) + Startup + Shutdown

³⁾ Schedule operational time may be slightly greater due to departure time adjustments

Daily Crew Statistics (per day)

Season	Vessel No.	# of Crews (per day)	Crew Regular Time		Crew Overtime		Crew Usage			
			Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1		Crew 2	
			(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	% of Shift	(hrs / day)	% of Shift
Summer	Vessel 1	1	12	-	-	-	11.82	98.5%	-	-
Summer		-	-	-	-	-	-	-	-	-
Winter		-	-	-	-	-	-	-	-	-

AUK-SGY-AUK Weekly Service Summary (per week)

Season	Vessel No.	Crew (days/wk)	Crew Regular Time ⁴		Crew Overtime		Vessel Operation (days/wk)	Trips /Wk	Underway Time (hrs / wk)	Operating Hours (hrs / wk)
			Crew 1 (hrs / wk)	Crew 2 (hrs / wk)	Crew 1 (hrs / wk)	Crew 2 (hrs / wk)				
Summer	Vessel 1	3	36.00	-	-	-	3.0	3.0	31.80	38.40
Summer		-	-	-	-	-	-	-	-	-
Winter		-	-	-	-	-	-	-	-	-

⁴⁾ Crew Regular Time = Crew Regular Time * Crew days per week

Route Cost Model

Route: AUK-SGY-AUK

Vessel Definition

Type	ASV
Displ	53

Season Definition

Season	#Days	# Weeks	# Op Days
Summer	153	21.9	66
Winter	212	30.3	0

Annual Operational Costs

1. Crew Costs (by week)

Season	# Weeks	Crew Time (hrs/week)		Total Crew (hrs / season)	Crew Cost (\$ / hr)	Total Cost (\$ / season)
		Vessel #1	Vessel #2			
Summer reg.	22	36.00	-	786.86	\$ 736.96	\$ 579,886
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		36.00	-	786.86	\$ 164.13	\$ 129,147
Winter reg.	30	-	-	-	\$ 736.96	\$ -
Overtime		-	-	-	\$ 519.09	\$ -
Night ¹⁾		-	-	-	\$ 164.13	\$ -
Total	52					\$ 709,033

¹⁾ Night Crew may be re-assigned to watch vessel on non-operational days.

2. Fuel Consumption Costs (by week)

Season	# Weeks	Time Underway		Total Underway (hrs / season)	Fuel Cost (\$ / gal)	Fuel Consumption (gal / hr)	Total Cost (\$ / season)
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)				
Summer	22	31.80	-	695.06	\$ 3.34	289.48	\$ 672,028
Winter	30	-	-	-	\$ 3.34	289.48	\$ -
Total	52			695.06			\$ 672,028

3. Winter Lay-up Cost (by day)

Season	# Days	# Vessels	Cost / Day	Total
winter	212		\$ -	\$ -

Annual Overhead Costs (by day)

Season	Annual Operating Days			(\$ / day)	Route Overhead Costs		
	Vessel #1	Vessel #2	Total		Vessel #1	Vessel #2	Total
Summer	66	-	66	\$ 1,669	\$ 109,439	\$ -	\$ 109,439
Winter	0	-	-	\$ 1,669	\$ -	\$ -	\$ -
Total	66	-	66		\$ 109,439	\$ -	\$ 109,439

Annual Maintenance Costs (by week)

Season	# weeks	Annual Operating Hours			Total (hrs / season)	
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)	Total (hrs / wk)		
Summer reg.	22	38.40	-	38.40	839	
Winter reg.	30	-	-	-	-	
Total	52				839	
		Vessel Operation		Vessel Overhaul	Total	
		(eng op hrs)	(\$ / hr)	(# Vessels)	(\$ / Vessel)	Cost
Operating	839	\$ 44.95				\$ 37,731
Overhaul				\$ 541,891		\$ -
Total Vessel Maintenance Costs						\$ 37,731

Total Annual Route Costs

Total Annual Operational Costs	\$ 1,381,061
Total Annual Layup Costs	\$ -
Total Annual Overhead Costs	\$ 109,439
Total Annual Maintenance Costs	\$ 37,731
Total Annual Costs	\$ 1,528,231

Route Operation and Schedule Model

Route: HNS-SGY-HNS

Route Service Input (Management Plan Appendix A)

Season	Operation hrs / day	Vsl Days/ Wk	Vessel Description		
			Quantity	Type	Designation
Summer	8.00	7.0	1	Displ	Disp-b
Winter					Disp-b

Crew / Vessel Availability

Season	Vessel No.	Crew Shift		Startup (mins)	Vessel Preparation Times		Shutdown (mins)	Vessel Availability (hrs)
		Crew 1 (hrs)	Crew 2 (hrs)		avg MLOPS (mins)	avg MLOPS (mins)		
Summer	Vessel 1	8.00	-	30	13	13	30	7.00
		-	-	-	-	-	-	-
		-	-	-	-	-	-	-

Route Transit Time

Leg No.	Speed (knots)	Outbound		Cruise At Speed (hrs)	Inbound		Round Trip Time Underway		Round Trip Total Transit Time ¹	
		avg MLOPS (hrs)	Approach (hrs)		Approach (hrs)	avg MLOPS (hrs)	(hrs)	(mins)	(hrs)	(mins)
HNS-SGY	15.00	0.22	0.05	0.81	0.03	0.22	-	53	1	19
SGY-HNS	15.00	0.22	0.03	0.81	0.05	0.22	-	53	1	19
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
Total Route Time		0.43	0.08	1.62	0.08	0.43	1	46	2	38

¹⁾ Transit time = Time Underway + Load + Unload

HNS-SGY-HNS Daily Schedules

Model Schedule

Notional schedules are developed to verify number of round trips and determine crew times. Schedule start times are arbitrary. Notional schedules are not intended to show route connections or homeport locations. Final schedules and homeport locations will be based on system implementation.

Summer

		Vessel 1	1st Dep	6:00 AM	1st Load	5:47 AM
Total Crew Time		Circuit No.	Depart Haines	Arrive Skagway	Depart Skagway	Arrive Haines
Crew 1	Crew 2	1	6:00 AM	6:53 AM	7:20 AM	8:13 AM
3.15		2	8:40 AM	9:33 AM	10:00 AM	10:53 AM
6.32						

Crew Schedule

Notional crew schedules are developed to verify the number of hours each crew operates and show notional crew sequencing. Notional crew schedule times are based on the notional vessel schedules

Summer: Vessel 1

	Begin Vessel Startup	Begin First Load	Vessel Underway	Complete Middle Unload	Last Arrival	Complete Last Unload	Complete Vessel Shutdown	Total Required Hours	
Schedule	5:17 AM	5:47 AM	6:00 AM	-	10:53 AM	11:06 AM	11:36 AM	6.32	Vessel
Crew 1 Hrs	Start	0.50	0.72	-	5.60	5.82	6.32	6.32	Crew 1
Crew 2 Hrs								-	Crew 2
Night Hrs	17.68						Start	17.68	Night

Route Operation and Schedule Model

Route: HNS-SGY-HNS

Daily Schedule Statistics (per day)

Season	Round Trips		Daily Underway Time				Daily Operational Time ^{2,3}			
	Vessel 1 (# / day)	Vessel 2 (# / day)	Vessel 1		Vessel 2		Vessel 1		Vessel 2	
			(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day	(hrs / day)	% of Day
Summer	2	-	3.53	14.7%	-	-	6.27	26.1%	0.00	0.0%
Winter	0	-	0.00	N/A	-	-	0.00	N/A	-	-

²⁾ Daily Operational Time = (Round Trip Transit Time * Number of Round Trips) + Startup + Shutdown

³⁾ Schedule operational time may be slightly greater due to departure time adjustments

Daily Crew Statistics (per day)

Season	Vessel No.	# of Crews (per day)	Crew Regular Time		Crew Overtime		Crew Usage			
			Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1 (hrs / day)	Crew 2 (hrs / day)	Crew 1		Crew 2	
			(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	(hrs / day)	% of Shift	(hrs / day)	% of Shift
Summer	Vessel 1	1	8	-	-	-	6.32	79.0%	-	-
Summer		-	-	-	-	-	-	-	-	-
Winter		-	-	-	-	-	-	-	-	-

HNS-SGY-HNS Weekly Service Summary (per week)

Season	Vessel No.	Crew (days/wk)	Crew Regular Time ⁴		Crew Overtime		Vessel Operation (days/wk)	Trips /Wk	Underway Time (hrs / wk)	Operating Hours (hrs / wk)
			Crew 1 (hrs / wk)	Crew 2 (hrs / wk)	Crew 1 (hrs / wk)	Crew 2 (hrs / wk)				
Summer	Vessel 1	7	56.00	-	-	-	7.0	14.0	24.73	43.87
Summer		-	-	-	-	-	-	-	-	-
Winter		-	-	-	-	-	-	-	-	-

⁴⁾ Crew Regular Time = Crew Regular Time * Crew days per week

Route Cost Model

Route: HNS-SGY-HNS Vessel Sizing

Vessel Size and Selection

1. Traffic Forecast

Route Link		2038 Summer Average Daily Traffic - One Way			
No.	Name	PAX-ASV	RV	VAN	PAX
5-5	HNS-SGY	26	2	1	90
5-6	SGY-HNS	26	2	1	90
-		-	-	-	-
-		-	-	-	-
Largest One Way Traffic		26	2	1	90
Weekly One Way Traffic		182	14	7	630

2. Required Vessel Capacity per Sailing

Assuming 14 Trips per week

		PAX-ASV	RV	VAN	PAX	Total
Capacity		13	1	1	45	
Lane Length	(ft)	260	24	40	N/A	324
Payload	(lbs)	78,000	12,000	40,000	N/A	130,000

3. Required Vessel Characteristics

Type	ASV (#)	PAX (#)	Payload (lton)
Displ	17	45	59

4. Selected Vessel Characteristics

	ASV	PAX	Deadweight
Selection Basis	18		
Selected Characteristics		45	59

Route Cost Model

Route: HNS-SGY-HNS

Vessel Definition

Type	ASV
Displ	18

Season Definition

Season	#Days	# Weeks	# Op Days
Summer	153	21.9	153
Winter	212	30.3	0

Annual Operational Costs

1. Crew Costs (by week)

Season	# Weeks	Crew Time (hrs/week)		Total Crew (hrs / season)	Crew Cost (\$ / hr)	Total Cost (\$ / season)
		Vessel #1	Vessel #2			
Summer reg.	22	56.00	-	1,224.00	\$ 361.43	\$ 442,396
Overtime		-	-	-	\$ 254.58	\$ -
Night ¹⁾		112.00	-	2,448.00	\$ 81.68	\$ 199,961
Winter reg.	30	-	-	-	\$ 361.43	\$ -
Overtime		-	-	-	\$ 254.58	\$ -
Night ¹⁾		-	-	-	\$ 81.68	\$ -
Total	52					\$ 642,357

¹⁾ Night Crew may be re-assigned to watch vessel on non-operational days.

2. Fuel Consumption Costs (by week)

Season	# Weeks	Time Underway		Total Underway (hrs / season)	Fuel Cost (\$ / gal)	Fuel Consumption (gal / hr)	Total Cost (\$ / season)
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)				
Summer	22	24.73	-	540.60	\$ 3.34	94.80	\$ 171,168
Winter	30	-	-	-	\$ 3.34	94.80	\$ -
Total	52			540.60			\$ 171,168

3. Winter Lay-up Cost (by day)

Season	# Days	# Vessels	Cost / Day	Total
winter	212	1.0	\$ 529.57	\$ 112,269

Annual Overhead Costs (by day)

Season	Annual Operating Days			(\$ / day)	Route Overhead Costs		
	Vessel #1	Vessel #2	Total		Vessel #1	Vessel #2	Total
Summer	153	-	153	\$ 1,669	\$ 255,357	\$ -	\$ 255,357
Winter	0	-	-	\$ 1,669	\$ -	\$ -	\$ -
Total	153	-	153		\$ 255,357	\$ -	\$ 255,357

Annual Maintenance Costs (by week)

Season	# weeks	Annual Operating Hours			Total (hrs / season)	
		Vessel #1 (hrs / wk)	Vessel #2 (hrs / wk)	Total (hrs / wk)		
Summer reg.	22	43.87	-	43.87	959	
Winter reg.	30	-	-	-	-	
Total	52				959	
		Vessel Operation		Vessel Overhaul	Total	
		(eng op hrs)	(\$ / hr)	(# Vessels)	(\$ / Vessel)	Cost
Operating	959	\$ 14.45				\$ 13,855
Overhaul				1.0	\$ 328,885	\$ 328,885
Total Vessel Maintenance Costs						\$ 342,740

Total Annual Route Costs

Total Annual Operational Costs	\$ 813,525
Total Annual Layup Costs	\$ 112,269
Total Annual Overhead Costs	\$ 255,357
Total Annual Maintenance Costs	\$ 342,740
Total Annual Costs	\$ 1,523,891

Vessel Capital Cost

	\$ / Vessel	# Vessels	Total
Vessel Acquisition Cost	\$ 24,743,161	1	
Total Vessel Capital Costs			\$ 24,743,161

This page intentionally left blank.

ATTACHMENT C

TRAVEL DEMAND FORECAST

Fehr & Peers

This page intentionally left blank



MEMORANDUM

Date: January 9, 2017

To: Laurie Cummings and Kevin Doyle, HDR

From: Donald Samdahl and Daniel Dye, Fehr & Peers

**Subject: *Juneau Access Improvements
Alternative 1B Optimized and Alternative Five***

SE12-0266

INTRODUCTION

In addition to the previously studied alternatives, two other access alternatives that were evaluated are Alternative 1B Optimized and Alternative 5. The forecasting approach for these alternatives is consistent with the other Juneau Access Improvement alternatives. This memo describes the service characteristics and presents the 2025 and 2055 forecasts for each. A full description of the forecasting methodology is available in the Final Supplemental Environmental Impact Statement, Revised Traffic Forecast Report (Appendix AA).

DESCRIPTION OF ALTERNATIVES

Alternative 1B Optimized – Enhanced Service with Existing AMHS Assets

In Alternative 1B Optimized, during the summer, one Day Boat ACF would make a round trip between Auke Bay and Haines daily and the second Day Boat ACF would make a round trip between Skagway and Auke Bay daily. The *M/V Malaspina* would sail daily on the following route: Haines-Skagway-Haines-Auke Bay-Haines. In winter, one Day Boat ACF would sail between Auke Bay and Haines five days per week. The second Day Boat ACF would sail between Haines and Skagway five days per week, making two trips per day each day it sails. The *M/V Malaspina* would not sail in Lynn Canal in the winter. Mainline ferry service would not continue in Lynn Canal.

Alternative 5 – Conventional Monohull Service from Auke Bay

In Alternative 5, during summer, one Day Boat ACF would make a round trip between Haines and Auke Bay daily, a second Day Boat ACF would make a round trip between Skagway and Auke Bay daily, and a third Day Boat ACF would make a round trip between Auke Bay and Haines 4 days per week and between Auke Bay and Skagway 3 days per week. The Haines-Skagway shuttle would make two round trips per day. In winter, one Day Boat ACF would make a round trip between Haines and Auke Bay 5 days per week, and a second Day Boat ACF would make two round trips between Haines and Skagway on the days the first Day Boat ACF sails. The third Day Boat ACF and the Haines-Skagway shuttle would not sail in Lynn Canal in winter. Under this alternative, mainline ferry service would not continue in Lynn Canal.

TRAVEL CHOICE MODEL INPUT VARIABLES

Table 1 shows the input values for each of the alternatives for Haines and Skagway travelers. The inputs to the choice model are the weighted average of all travel options in each alternative.

Table 1: Travel Choice Model Input Variable Values

Haines	Auto Travel Time (minutes)	Auto Cost (dollars)	Ferry Travel Time (minutes)	Ferry Cost (dollars)	Ferry Delay (minutes)	Service Index
Alt 1B Opt.	6	\$1.11	286	\$52.82	85	5.8
Alt 5	6	\$1.11	286	\$66.27	78	4.3
Skagway	Auto Travel Time (minutes)	Auto Cost (dollars)	Ferry Travel Time (minutes)	Ferry Cost (dollars)	Ferry Delay (minutes)	Service Index
Alt 1B Opt.	0	\$0.00	332	\$70.68	86	3.6
Alt 5	0	\$0.00	318	\$88.15	78	3.9

Calculated by Fehr & Peers, 2016.

Note: Data reflect summer travel conditions.

APPLYING THE TRAVEL CHOICE MODEL

The travel choice model was applied to the new JAI alternatives. Table 2 shows the percentage of trips that each alternative captures relative to the All-Road Alternative. The percentages in this table reflect the percent of total passenger travel in Lynn Canal for each alternative before modes are assigned or the number of vehicles is calculated.

Table 2: Percentage of Travel Captured

	Alternative 1B Optimized	Alternative 5
Haines	21%	18%
Skagway	16%	14%

Calculated by Fehr & Peers, 2016.

APPLYING THE MODE CHOICE MODEL

The results of the mode choice model are shown in Table 3 as the percentage of existing conditions air travel demand captured under each alternative.

Table 3: Percentage of Air Travel Captured

	Alternative 1B Optimized	Alternative 5
Haines	89%	91%
Skagway	78%	84%

Calculated by Fehr & Peers, 2016.

CHOICE MODEL RESULTS

Table 4 shows the results of combining the travel choice and mode choice models.

Table 4: Travel Choice Model Results

Alternative	Total Daily Passengers	Daily Air Passengers	AADT	SADT	WADT	PWADT	Haines Share*	Skagway Share*
1B Opt.	547	71	145	225	88	551	58%	42%
5	471	72	120	187	72	456	57%	43%

Calculated by Fehr & Peers, 2016.

** For all alternatives the share percentage is based on AADT volumes.*

LONG-TERM TRAFFIC FORECASTS

The results from the choice models can be used to forecast opening year and thirty year volumes for each alternative. Using the forecasted population growth rates, the 2025 and 2055 volume forecasts are shown in Table 5.

Table 5: Lynn Canal Long-Term Traffic Forecasts

Juneau-Haines	2015		2025			2055			
	AADT	AADT	SADT	WADT	PWADT	AADT	SADT	WADT	PWADT
Alt 1B Opt.	84	88	136	30	334	88	137	30	334
Alt 5	68	71	111	30	270	71	111	30	270

Juneau-Skagway	2015		2025			2055			
	AADT	AADT	SADT	WADT	PWADT	AADT	SADT	WADT	PWADT
Alt 1B Opt.	61	64	99	18	243	64	100	18	243
Alt 5	52	54	85	18	205	55	85	18	209

Calculated by Fehr & Peers, 2016.

Note: Volumes in this table were taken directly from the model.