

## Appendix C – Day Boat Schedules

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## **Methodology**

To support schedule calculations, all route navigation information was generated new and analyzed using Nobeltech® navigation software. This information is based on recent digital navigational data from AMHS navigation computers. See Appendix A for detailed route information. Of key importance is the length of maneuvering speed areas and the length of mooring operation areas, usually adjacent to terminals.

For the purpose of calculating schedules, mooring and loading operations (MLOPS) scenarios were developed. Previously measured Alaska Marine Highway System (AMHS) and Washington State Ferries (WSF) mooring and loading times were used as the basis to estimate the mooring and loading times for various day boat configurations. The MLOPS are further detailed in Appendix B.

Using the defined vessel routes and the MLOPS, sample vessel schedules were calculated. Basic scheduling assumptions were that a crew day was 12 hours, vessel speed was 15.5 knots, and maneuvering speed 5.0 knots. Mooring and Loading Operations (MLOPS) were optimized as necessary for each day boat schedule, however if time was available, schedules used the slightly more generous MLOPS 5 time of 30 minutes. Assuming an arbitrary crew start time, the arrival and departure times and the number of round trips were calculated for each port in the route. The effect of current was examined, but not included in the analysis due to limited impact.

## Notional Vessels

Based on the MLOPS detailed in Appendix B, the following notional vessel characteristics were developed. These notional vessels are used as input for the calculation of the schedules in order to define the vessel speed, startup time, shutdown time, loading time and unloading time. Not all the notional vessels shown below were used in the schedules.

Since the total MLOPS times developed in Appendix B are for a complete round trip between two terminals, the load and unload times are each assumed to be  $\frac{1}{4}$  of the total round trip MLOPS time shown in Appendix B.

Unless specifically noted, all notional vessels are assumed to have 15 minutes of crew time for vessel startup and 15 minutes for shutdown. The startup and shutdown times were removed from MLOPS 2a in order to be able to make the Juneau-Angoon route within the 12 hour crew day. It is assumed that the night crew can assist in the vessel startup and shutdown.

Notional Vessel	Vessel Type	Speed (knots)	Maneuvering Speed (knots)	Startup (minutes)	MLOPS (load) (minutes)	MLOPS (Unload) (minutes)	Shutdown (minutes)
MLOPS1	Day Boat	15.5	5	15	13.35	13.35	15
MLOPS2	Day Boat	15.5	5	15	15.1	15.1	15
MLOPS2a	Day Boat	15.5	5	0	15.1	15.1	0
MLOPS3	Day Boat	15.5	5	15	17.95	17.95	15
MLOPS4	Day Boat	15.5	5	15	21.9	21.9	15
MLOPS5	Day Boat	15.5	5	15	30	30	15
MLOPS6	Day Boat	17.5	5	15	30	30	15

Speed: Average vessel schedule speed

Maneuvering

Speed: Average vessel maneuvering speed.

Startup: Time required to startup vessel at beginning of operating day prior to loading the vessel.

Shutdown: Time required to shutdown vessel at end of operating day after the last unloading of the vessel.

MLOPS (Load): Average time required to load and undock the vessel

MLOPS (Unload): Average time required to dock and unload a vessel

## Routes

The Day Boat ACF design concept report identifies the following routes and route priorities.

### 1<sup>ST</sup> PRIORITY ROUTES – NEW NORTH LYNN CANAL SERVICE

Juneau-Haines-Juneau

Haines-Skagway-Haines

### 2<sup>ND</sup> PRIORITY – OTHER AMHS ESTABLISHED ROUTES

Juneau-Angoon-Juneau

Juneau-Gustavus-Juneau

Juneau-Hoonah-Juneau

Juneau-Tenakee-Juneau (Same approximate distance and operational features as Juneau-Angoon)

Ketchikan-Metlakatla-Ketchikan (Identical to *Lituya*)

### **3<sup>RD</sup> PRIORITY – JAI STATE PREFERRED ROUTES**

Haines-Katzehin-Haines  
Skagway-Katzehin-Skagway

### **4<sup>TH</sup> PRIORITY – OTHER JAI ALTERNATIVES ROUTES**

Haines-Sawmill Cove<sup>1</sup>-Haines  
Juneau-Skagway-Juneau  
Skagway-Sawmill Cove-Skagway  
Sawmill Cove-William Henry Bay-Sawmill Cove

### **5<sup>TH</sup> PRIORITY - OTHER POSSIBLE FUTURE ROUTES**

It is hard to forecast the long range growth of the AMHS. Many potential day boat routes exist that could be served by the Day Boat ACF, particularly with small road extension segments. Some of these routes are charted in Appendix A, but no official schedules were developed.

Cascade Point<sup>2</sup>-Haines  
Cascade Point-Skagway  
Whittier-Valdez-Whittier  
Cordova-Valdez-Cordova  
Anton Larsen Bay-Ouzinkie-Port Lions. Requires terminal at Anton Larsen Bay  
Juneau-Warm Springs Bay (Sitka)-Juneau. Requires one road segment  
Whittier-Cordova-Whittier. Requires road extension.

### **6<sup>TH</sup> PRIORITY – OVERNIGHT ROUTES**

While day boat operation is defined as a vessel that returns to its home port every night, it is possible to run the vessel to a port, then put the crew in shore side accommodations overnight, then resume sailing the next day. This type of operation greatly extends the range of the vessel, but very long day trips can increase the desire for passenger services, such as meals and accommodations for the infirm. Although no official schedules have been created, some possible overnight routes are:

Juneau-Haines-Skagway-Haines  
Haines-Skagway-Haines-Juneau  
Juneau-Sitka-Juneau  
Juneau-Petersburg-Juneau  
Ketchikan-Petersburg-Ketchikan  
Ketchikan-Prince Rupert-Ketchikan. (Vessel would require SOLAS exemption.)

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<sup>1</sup> Sawmill Cove is labeled Berners Bay (BER) for the purpose of route characteristics and schedules.

<sup>2</sup> Cascade Point schedules are calculated the same as Sawmill Cove schedules and labeled as Berners Bay (BER) because these two routes are virtually equidistant.

## Route Characteristics

Based on the route details in Appendix A, the following route leg characteristics have been determined. These route leg characteristics are used as input to the calculation of the schedules in order to define the route length at cruising speed and the maneuvering speed. All route legs are shown in one direction only. If traveling in the reverse direction shown, the cruising and maneuvering speed lengths remain the same, with the departure and arrival terminal switched. Some routes shown in the table below are not included in the schedules since they were not listed as Day boat routes in the Day Boat ACF Design Concept Report.

Departure Terminal	Leg Name	Length Total Route	Terminal 1		Length Cruise	Terminal 2	
			Name 1	Manuv Dist 1		Name 2	Manuv Dist 2
Angoon	ANG-TKE	33.75	Angoon	1.24	31.67	Tenakee	0.84
Berners Bay	BER-HNS	41.83	Berners Bay	0.61	40.89	Haines	0.33
Berners Bay	BER-SGY	50.17	Berners Bay	0.61	49.43	Skagway	0.13
Berners Bay	BER-WHB	10.05	Berners Bay	0.61	9.32	William Henry Ba	0.12
Cordova	CDV-VDZ	73.10	Cordova	2.73	69.96	Valdez	0.41
Cordova	CDV-WTR	96.71	Cordova	2.73	93.71	Whittier	0.27
Haines	HNS-SGY	12.60	Haines	0.27	12.21	Skagway	0.12
Hoonah	HNH-GUS	22.99	Hoonah	1.10	20.36	Gustavus	1.53
Juneau	JNU-ANG	76.60	Juneau	2.35	73.01	Angoon	1.24
Juneau	JNU-GUS	59.73	Juneau	2.34	55.86	Gustavus	1.53
Juneau	JNU-HNS	66.24	Juneau	2.34	63.60	Haines	0.30
Juneau	JNU-HNH	46.95	Juneau	2.35	43.49	Hoonah	1.11
Juneau	JNU-SGY	74.68	Juneau	2.34	72.21	Skagway	0.13
Katzehin	KTZ-HNS	5.92	Katzehin	0.25	5.37	Haines	0.30
Katzehin	KTZ-SGY	14.25	Katzehin	0.25	13.87	Skagway	0.13
Tenakee	TKE-HNH	46.76	Tenakee	0.86	44.78	Hoonah	1.12
Valdez	VDZ-WTR	76.19	Valdez	0.42	75.50	Whittier	0.27

## Schedules

Using the above described supporting information and methodology day boat schedules have been calculated. In general the schedules are presented in order of the 1<sup>st</sup> priority through 4<sup>th</sup> priority established by the Design Concept Report. However additional schedules were calculated and are shown as necessary to investigate the impact of increased vessel speed, decreased MLOPS time, and other changes of interest. Not all calculated schedules are presented in this Appendix.

### Juneau - Haines

Ferry Speed: 15.5 kn

MLOPS5: 30 minute each, load and unload

Number of round trips: 1

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:45				0:00
Load		7:00			0:15	0:15
Depart	Juneau	7:30		0:30		0:45
Arrive	Haines	12:07	4:37			5:22
Depart		13:07		1:00		6:22
Arrive	Juneau	17:44	4:37			10:59
Unload		18:14		0:30		11:29
Crew End		18:29			0:15	11:44

Schedule Statistics		
Total Underway Time	9:14	
	76.9%	Of Day
Total MLOPS time	2:00	
	16.7%	Of Day
Total Operation Hours	11:44	
	97.8%	Of Day
Unassigned Time	0:16	

MLOPS: Maneuvering and Loading Operations. See Appendix B

### Juneau –Haines: Increased Speed

The vessel speed is increased from 15.5 knots to 17.5 knots in order to show the scheduling impact of increased operational speed. When compared to the prior Juneau-Haines schedule, it can be seen that the underway time has been reduced by 28 minutes, however there is no impact to the service frequency.

Ferry Speed: 17.5 kn

MLOPS6: 30 minute each, load and unload

Number of round trips: 1

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:45				0:00
Load		7:00			0:15	0:15
Depart	Juneau	7:30		0:30		0:45
Arrive	Haines	11:39	4:09			4:54
Depart		12:39		1:00		5:54
Arrive	Juneau	16:48	4:09			10:03
Unload		17:18		0:30		10:33
Crew End		17:33			0:15	10:48

Schedule Statistics		
Total Underway Time	8:18	
	69.2%	Of Day
Total MLOPS time	2:00	
	16.7%	Of Day
Total Operation Hours	10:48	
	90.0%	Of Day
Unassigned Time	1:12	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## Haines - Skagway

Ferry Speed: 15.5 kn

MLOPS5: 30 minute each, load and unload

Number of round trips: 3

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:45				0:00
Load		7:00			0:15	0:15
Depart	Haines	7:30		0:30		0:45
Arrive	Skagway	8:21	0:51			1:36
Depart		9:21		1:00		2:36
Arrive	Haines	10:12	0:51			3:27
Depart		11:12		1:00		4:27
Arrive	Skagway	12:03	0:51			5:18
Depart		13:03		1:00		6:18
Arrive	Haines	13:54	0:51			7:09
Depart		14:54		1:00		8:09
Arrive	Skagway	15:45	0:51			9:00
Depart		16:45		1:00		10:00
Arrive	Haines	17:36	0:51			10:51
Unload		18:06		0:30		11:21
Crew End		18:21			0:15	11:36

Schedule Statistics		
Total Underway Time	5:06	
	42.5%	Of Day
Total MLOPS time	6:00	
	50.0%	Of Day
Total Operation Hours	11:36	
	96.7%	Of Day
Unassigned Time	0:24	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## Haines-Skagway: Reduced Frequency

A schedule with reduced service frequency is shown below. This schedule is developed as a sample which matches one of the Haines terminal arrival and departure times to the Juneau-Haines schedule. Although the below schedule can be completed in an 8 hour day, the statistics are still based on a 12 hour day with the additional 4 hours labeled as unassigned.

Ferry Speed: 15.5 kn

MLOPS5: 30 minute each, load and unload

Number of round trips: 2

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		8:40				0:00
Load		8:55			0:15	0:15
Depart	Haines	9:25		0:30		0:45
Arrive	Skagway	10:16	0:51			1:36
Depart		11:16		1:00		2:36
Arrive	Haines	12:07	0:51			3:27
Depart		13:07		1:00		4:27
Arrive	Skagway	13:58	0:51			5:18
Depart		14:58		1:00		6:18
Arrive	Haines	15:49	0:51			7:09
Unload		16:19		0:30		7:39
Crew End		16:34			0:15	7:54

Schedule Statistics		
Total Underway Time	3:24	
	28.3%	Of Day
Total MLOPS time	4:00	
	33.3%	Of Day
Total Operation Hours	7:54	
	65.8%	Of Day
Unassigned Time	4:06	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## **Haines-Skagway: Increased Speed**

The vessel speed is increased from 15.5 knots to 17.5 knots in order to show the scheduling impact of increased operational speed. When compared to the initial Haines-Skagway schedule, it can be seen that the underway time has been reduced by 5 minutes, however there is no impact to the overall service frequency.

Ferry Speed: 17.5 kn

MLOPS6: 30 minute each, load and unload

Number of round trips: 3

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:45				0:00
Load		7:00			0:15	0:15
Depart	Haines	7:30		0:30		0:45
Arrive	Skagway	8:16	0:46			1:31
Depart		9:16		1:00		2:31
Arrive	Haines	10:02	0:46			3:17
Depart		11:02		1:00		4:17
Arrive	Skagway	11:48	0:46			5:03
Depart		12:48		1:00		6:03
Arrive	Haines	13:34	0:46			6:49
Depart		14:34		1:00		7:49
Arrive	Skagway	15:20	0:46			8:35
Depart		16:20		1:00		9:35
Arrive	Haines	17:06	0:46			10:21
Unload		17:36		0:30		10:51
Crew End		17:51			0:15	11:06

Schedule Statistics		
Total Underway Time	4:36	
	38.3%	Of Day
Total MLOPS time	6:00	
	50.0%	Of Day
Total Operation Hours	11:06	
	92.5%	Of Day
Unassigned Time	0:54	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## Haines-Skagway: Decreased MLOPS

The vessel MLOPS is decreased from 30 minutes to 15 minutes for each load or unload interval in order to show the scheduling impact of decreasing the MLOPS time. When compared to the initial Haines-Skagway schedule, it can be seen that the decrease in MLOPS time increases the service frequency from 3 round trips to 4 round trips (a 33% increase). In addition, the percentage of the 12 hour crew day used for MLOPS has decreased.

Ferry Speed: 15.5 kn

MLOPS2: 15.1 minute each, load and unload

Number of round trips: 4

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:59				0:00
Load		7:14			0:15	0:15
Depart	Haines	7:30		0:15		0:30
Arrive		8:21	0:51			1:21
Depart	Skagway	8:51		0:30		1:51
Arrive		9:42	0:51			2:42
Depart	Haines	10:12		0:30		3:12
Arrive		11:03	0:51			4:03
Depart	Skagway	11:33		0:30		4:33
Arrive		12:24	0:51			5:24
Depart	Haines	12:54		0:30		5:55
Arrive		13:45	0:51			6:46
Depart	Skagway	14:16		0:30		7:16
Arrive		15:07	0:51			8:07
Depart	Haines	15:37		0:30		8:37
Arrive		16:28	0:51			9:28
Depart	Skagway	16:58		0:30		9:58
Arrive		17:49	0:51			10:49
Unload		18:04		0:15		11:04
Crew End		18:19			0:15	11:19

Schedule Statistics		
Total Underway Time	6:48	
	56.7%	Of Day
Total MLOPS time	4:01	
	33.6%	Of Day
Total Operation Hours	11:19	
	94.4%	Of Day
Unassigned Time	0:40	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## Juneau – Angoon

Calculations indicate that the Juneau Angoon route is too long to allow the completion of a round trip within a 12 hour crew day, using the standard MLOPS 5 (30 minutes for each load or unload interval). In order to complete one full round trip, the MLOPS time must be reduced to 15 minutes for each load or unload interval and the startup and shutdown time must be removed. This means that the night crew would be required to perform vessel startup and shutdown.

Ferry Speed: 15.5 kn

MLOPS2a: 15.1 minute each, load and unload

Number of round trips: 1

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		7:14				0:00
Load		7:14			0:00	0:00
Depart	Juneau	7:30		0:15		0:15
Arrive		12:55	5:25			5:40
Depart	Angoon	13:25		0:30		6:10
Arrive		18:50	5:25			11:35
Unload		19:05		0:15		11:50
Crew End		19:05			0:00	11:50

Schedule Statistics		
Total Underway Time	10:50	
	90.3%	Of Day
Total MLOPS time	1:00	
	8.4%	Of Day
Total Operation Hours	11:50	
	98.7%	Of Day
Unassigned Time	0:09	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## Juneau – Gustavus

Ferry Speed: 15.5 kn

MLOPS5: 30 minute each, load and unload

Number of round trips: 1

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:45				0:00
Load		7:00			0:15	0:15
Depart	Juneau	7:30		0:30		0:45
Arrive	Gustavus	11:52	4:22			5:07
Depart		12:52		1:00		6:07
Arrive	Juneau	17:14	4:22			10:29
Unload		17:44		0:30		10:59
Crew End		17:59			0:15	11:14

Schedule Statistics		
Total Underway Time	8:44	
	72.8%	Of Day
Total MLOPS time	2:00	
	16.7%	Of Day
Total Operation Hours	11:14	
	93.6%	Of Day
Unassigned Time	0:46	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## Juneau – Hoonah

Ferry Speed: 15.5 kn

MLOPS5: 30 minute each, load and unload

Number of round trips: 1

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:45				0:00
Load		7:00			0:15	0:15
Depart	Juneau	7:30		0:30		0:45
Arrive	Hoonah	11:00	3:30			4:15
Depart		12:00		1:00		5:15
Arrive	Juneau	15:30	3:30			8:45
Unload		16:00		0:30		9:15
Crew End		16:15			0:15	9:30

Schedule Statistics		
Total Underway Time	7:00	
	58.3%	Of Day
Total MLOPS time	2:00	
	16.7%	Of Day
Total Operation Hours	9:30	
	79.2%	Of Day
Unassigned Time	2:30	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## Haines – Katzechin

Ferry Speed: 15.5 kn

MLOPS5: 30 minute each, load and unload

Number of round trips: 3

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:45				0:00
Load		7:00			0:15	0:15
Depart	Haines	7:30		0:30		0:45
Arrive	Katzechin	7:57	0:27			1:12
Depart		8:57		1:00		2:12
Arrive	Haines	9:24	0:27			2:39
Depart		10:24		1:00		3:39
Arrive	Katzechin	10:51	0:27			4:06
Depart		11:51		1:00		5:06
Arrive	Haines	12:18	0:27			5:33
Depart		13:18		1:00		6:33
Arrive	Katzechin	13:45	0:27			7:00
Depart		14:45		1:00		8:00
Arrive	Haines	15:12	0:27			8:27
Unload		15:42		0:30		8:57
Crew End		15:57			0:15	9:12

Schedule Statistics		
Total Underway Time	2:42	
	22.5%	Of Day
Total MLOPS time	6:00	
	50.0%	Of Day
Total Operation Hours	9:12	
	76.7%	Of Day
Unassigned Time	2:48	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## Haines – Katzechin: Reduced MLOPS

The vessel MLOPS is decreased to 15 minutes for each load or unload interval, in order to optimize the schedule. When compared to the initial Haines-Katzechin schedule, it can be seen that the decrease in MLOPS time increases the service frequency from 3 round trips to 6 round trips (a 100% increase). In addition to the increased frequency, the amount of unassigned time has been reduced to 3 minutes.

Ferry Speed: 15.5 kn

MLOPS2: 15.1 minute each, load and unload

Number of round trips: 6

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:59				0:00
Load		7:14			0:15	0:15
Depart	Haines	7:30		0:15		0:30
Arrive	Katzechin	7:57	0:27			0:57
Depart		8:27		0:30		1:27
Arrive	Haines	8:54	0:27			1:54
Depart		9:24		0:30		2:24
Arrive	Katzechin	9:51	0:27			2:51
Depart		10:21		0:30		3:21
Arrive	Haines	10:48	0:27			3:48
Depart		11:18		0:30		4:19
Arrive	Katzechin	11:45	0:27			4:46
Depart		12:16		0:30		5:16
Arrive	Haines	12:43	0:27			5:43
Depart		13:13		0:30		6:13
Arrive	Katzechin	13:40	0:27			6:40
Depart		14:10		0:30		7:10
Arrive	Haines	14:37	0:27			7:37
Depart		15:07		0:30		8:08
Arrive	Katzechin	15:34	0:27			8:35
Depart		16:05		0:30		9:05
Arrive	Haines	16:32	0:27			9:32
Depart		17:02		0:30		10:02
Arrive	Katzechin	17:29	0:27			10:29
Depart		17:59		0:30		10:59
Arrive	Haines	18:26	0:27			11:26
Unload		18:41		0:15		11:41
Crew End		18:56			0:15	11:56

Schedule Statistics		
Total Underway Time	5:24	
	45.0%	Of Day
Total MLOPS time	6:02	
	50.4%	Of Day
Total Operation Hours	11:56	
	99.6%	Of Day
Unassigned Time	0:03	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## Skagway – Katzeihin

Ferry Speed: 15.5 kn

MLOPS5: 30 minute each, load and unload

Number of round trips: 2

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:45				0:00
Load		7:00			0:15	0:15
Depart	Skagway	7:30		0:30		0:45
Arrive	Katzeihin	8:28	0:58			1:43
Depart		9:28		1:00		2:43
Arrive	Skagway	10:26	0:58			3:41
Depart		11:26		1:00		4:41
Arrive	Katzeihin	12:24	0:58			5:39
Depart		13:24		1:00		6:39
Arrive	Skagway	14:22	0:58			7:37
Unload		14:52		0:30		8:07
Crew End		15:07			0:15	8:22

Schedule Statistics		
Total Underway Time	3:52	
	32.2%	Of Day
Total MLOPS time	4:00	
	33.3%	Of Day
Total Operation Hours	8:22	
	69.7%	Of Day
Unassigned Time	3:38	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## Skagway – Katzeihin: Reduced MLOPS

The vessel MLOPS is decreased from 30 minutes to 15 minutes for each load or unload interval, to show the scheduling impact of decreasing the MLOPS time. When compared to the initial Skagway-Katzeihin schedule, it can be seen that the decrease in MLOPS time increases the service frequency by one round trip to a total of 3 (a 50% increase). However, the below schedule still has a significant amount of unassigned time.

Ferry Speed: 15.5 kn

MLOPS2: 15.1 minute each, load and unload

Number of round trips: 3

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:59				0:00
Load		7:14			0:15	0:15
Depart	Skagway	7:30		0:15		0:30
Arrive	Katzeihin	8:28	0:58			1:28
Depart		8:58		0:30		1:58
Arrive	Skagway	9:56	0:58			2:56
Depart		10:26		0:30		3:26
Arrive	Katzeihin	11:24	0:58			4:24
Depart		11:54		0:30		4:54
Arrive	Skagway	12:52	0:58			5:52
Depart		13:22		0:30		6:23
Arrive	Katzeihin	14:20	0:58			7:21
Depart		14:51		0:30		7:51
Arrive	Skagway	15:49	0:58			8:49
Unload		16:04		0:15		9:04
Crew End		16:19			0:15	9:19

Schedule Statistics		
Total Underway Time	5:48	
	48.3%	Of Day
Total MLOPS time	3:01	
	25.2%	Of Day
Total Operation Hours	9:19	
	77.7%	Of Day
Unassigned Time	2:40	

MLOPS: Maneuvering and Loading Operations. See Appendix B

**Skagway – Katzeihin: Optimized**

In addition to decreasing vessel MLOPS to 15 minutes for each load or unload interval, the vessel startup and shutdown time were removed in an attempt to optimize the schedule. When compared to the initial Haines-Katzeihin schedule, it can be seen that this optimized schedule increases the service frequency from 2 round trips to 4 round trips (a 100% increase). In addition to the increased frequency, the amount of unassigned time has been reduced to 14 minutes.

Ferry Speed: 15.5 kn

MLOPS2a: 15.1 minute each, load and unload

Number of round trips: 4

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		7:14				0:00
Load		7:14			0:00	0:00
Depart	Skagway	7:30		0:15		0:15
Arrive	Katzeihin	8:28	0:58			1:13
Depart	Katzeihin	8:58		0:30		1:43
Arrive	Skagway	9:56	0:58			2:41
Depart	Skagway	10:26		0:30		3:11
Arrive	Katzeihin	11:24	0:58			4:09
Depart	Katzeihin	11:54		0:30		4:39
Arrive	Skagway	12:52	0:58			5:37
Depart	Skagway	13:22		0:30		6:08
Arrive	Katzeihin	14:20	0:58			7:06
Depart	Katzeihin	14:51		0:30		7:36
Arrive	Skagway	15:49	0:58			8:34
Depart	Skagway	16:19		0:30		9:04
Arrive	Katzeihin	17:17	0:58			10:02
Depart	Katzeihin	17:47		0:30		10:32
Arrive	Skagway	18:45	0:58			11:30
Unload		19:00		0:15		11:45
Crew End		19:00			0:00	11:45

Schedule Statistics		
Total Underway Time	7:44	
	64.4%	Of Day
Total MLOPS time	4:01	
	33.6%	Of Day
Total Operation Hours	11:45	
	98.0%	Of Day
Unassigned Time	0:14	

MLOPS: Maneuvering and Loading Operations. See Appendix B

**Haines – Berners Bay**

Ferry Speed: 15.5 kn

MLOPS5: 30 minute each, load and unload

Number of round trips: 1

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:45				0:00
Load		7:00			0:15	0:15
Depart	Haines	7:30		0:30		0:45
Arrive	Berners Bay	10:19	2:49			3:34
Depart	Berners Bay	11:19		1:00		4:34
Arrive	Haines	14:08	2:49			7:23
Unload		14:38		0:30		7:53
Crew End		14:53			0:15	8:08

Schedule Statistics		
Total Underway Time	5:38	
	46.9%	Of Day
Total MLOPS time	2:00	
	16.7%	Of Day
Total Operation Hours	8:08	
	67.8%	Of Day
Unassigned Time	3:52	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## **Juneau – Skagway**

Calculations indicate that the Juneau-Skogway route is too long to allow the completion of a round trip within a 12 hour crew day, using the standard MLOPS 5 (30 minutes for each load or unload interval). In order to complete one full round trip, the MLOPS time must be reduced to 15 minutes each, load and unload.

Ferry Speed: 15.5 kn

MLOPS2: 15.1 minute each, load and unload

Number of round trips: 1

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:59				0:00
Load		7:14			0:15	0:15
Depart	Juneau	7:30		0:15		0:30
Arrive	Skagway	12:39	5:09			5:39
Depart		13:09		0:30		6:09
Arrive	Juneau	18:18	5:09			11:18
Unload		18:33		0:15		11:33
Crew End		18:48			0:15	11:48

Schedule Statistics		
Total Underway Time	10:18	
	85.8%	Of Day
Total MLOPS time	1:00	
	8.4%	Of Day
Total Operation Hours	11:48	
	98.4%	Of Day
Unassigned Time	0:11	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## **Skagway – Berners Bay**

Ferry Speed: 15.5 kn

MLOPS5: 30 minute each, load and unload

Number of round trips: 1

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:45				0:00
Load		7:00			0:15	0:15
Depart	Skagway	7:30		0:30		0:45
Arrive	Berners Bay	10:50	3:20			4:05
Depart		11:50		1:00		5:05
Arrive	Skagway	15:10	3:20			8:25
Unload		15:40		0:30		8:55
Crew End		15:55			0:15	9:10

Schedule Statistics		
Total Underway Time	6:40	
	55.6%	Of Day
Total MLOPS time	2:00	
	16.7%	Of Day
Total Operation Hours	9:10	
	76.4%	Of Day
Unassigned Time	2:50	

MLOPS: Maneuvering and Loading Operations. See Appendix B

## **Berners Bay – William Henry Bay**

Ferry Speed: 15.5 kn

MLOPS5: 30 minute each, load and unload

Number of round trips: 3

	Terminal	Time	Underway Time	Load / Unload	Startup / Shutdown	Cumulative Time
Crew Start		6:45				0:00
Load		7:00			0:15	0:15
Depart	Berners Bay	7:30		0:30		0:45
Arrive	William	8:14	0:44			1:29
Depart	Henry Bay	9:14		1:00		2:29
Arrive	Berners Bay	9:58	0:44			3:13
Depart		10:58		1:00		4:13
Arrive	William	11:42	0:44			4:57
Depart	Henry Bay	12:42		1:00		5:57
Arrive	Berners Bay	13:26	0:44			6:41
Depart		14:26		1:00		7:41
Arrive	William	15:10	0:44			8:25
Depart	Henry Bay	16:10		1:00		9:25
Arrive	Berners Bay	16:54	0:44			10:09
Unload		17:24		0:30		10:39
Crew End		17:39			0:15	10:54

Schedule Statistics		
Total Underway Time	4:24	
	36.7%	Of Day
Total MLOPS time	6:00	
	50.0%	Of Day
Total Operation Hours	10:54	
	90.8%	Of Day
Unassigned Time	1:06	

MLOPS: Maneuvering and Loading Operations. See Appendix B