Southeast Alaska Mid-Region Access Port and Ferry Terminal Technical Memorandum

Prepared for

Federal Highway Administration

Through

Robert Peccia and Associates, Inc.
825 Custer Avenue
Helena, Montana 59604
(406)447-5000
www.rpa-hln.com

Prepared by

The Glosten Associates, Inc.
1201 Western Avenue, Suite 200
Seattle, WA 98101
www.glosten.com

Parametrix, Inc.
700 NE Multnomah, Suite 1000
Portland, OR 97232-4110
T. 503.233.2400 F, 503.233.4825
www.parametrix.com

CITATION

The Glosten Associates, Inc., Parametrix, Inc. 2011.
Southeast Alaska Mid-Region Access
Port and Ferry Terminal Technical Memorandum.
Prepared by The Glosten Associates, Inc., Seattle, Washington,
Parametrix, Inc., Portland, Oregon. April 2011.

TABLE OF CONTENTS

List of Tables

List of Figures

List of Acronyms and Abbreviations

ACV	air-cushion vehicle
AEB	Aleutians East Borough
AMHS	Alaska Marine Highway System
B.C.	British Columbia
BHT	British Hovercraft Technology
DOT&PF	Alaska Department of Transportation and Public Facilities
DWT	deadweight
EA	Environmental Assessment
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
GIS	geographic information system
HP	horsepower
IFA	Inter-Island Ferry Authority
LCAC	landing craft, air-cushion
MHHW	mean higher high water
MLLW	mean lower low water
MRA	mid-region access
mt	metric tons
nm	nautical mile
NOAA	National Oceanic and Atmospheric Administration
Ro-Ro	roll-on/roll-off
RV	recreational vehicle
SATP	Southeast Alaska Transportation Plan
TM&LS	Textron Marine & Land Systems
WSF	Washington State Ferries

EXECUTIVE SUMMARY

This report concerns Preliminary Site Assessment for Ports and Ferry Terminals commissioned under the Southeast Alaska Mid-Region Access (MRA) Study Plan. The findings for this task are based on a preliminary field reconnaissance, project oblique aerial photography, available published information such as National Oceanic and Atmospheric Administration (NOAA) navigation charts and the U.S. Coast Pilot, and online resources such as Google Earth™.

This report is organized into six sections as follows:

1) Introduction and background
2) Potential conventional ferry terminal sites
3) Potential air-cushion vehicle (ACV) ferry terminal sites
4) Potential ferry routes
5) Ferry characteristics
6) Potential commercial ports

This task has identified potential conventional roll-on/roll-off (Ro-Ro) passenger ferry terminal sites serving Bradfield Canal, Stikine River, and Aaron Creek Corridors as defined by the Southeast Alaska MRA Study, and potential opposing conventional ferry terminal sites on Wrangell and (South) Mitkof Islands. Both conventional and ACV systems are discussed. Transition from ACV, otherwise known as hovercraft, to conventional ferries would occur at various stages depending on the route chosen and the number of passengers using the respective systems.

The MRA Study divides the Stikine River and the Aaron Creek Corridors into five and four stages respectively. Stage 1 for each option consists of an ACV or passenger ferry system to provide interim service before final road build out during the later stages. This report identifies potential ACV Ro-Ro/passenger ferry terminal sites in Canada on the lower Iskut River, on the Stikine River above the confluence with the Iskut, and opposing ACV ferry terminal sites on Wrangell and (South) Mitkof Islands.

The potential for commercial, deep-draft, ocean shipping to access possible ports that might develop at or near a future Southeast Alaska MRA road end is briefly assessed. This report indicates that it would be possible for ocean shipping to navigate the Bradfield Canal, at least to Duck Point, and perhaps a mile or so beyond. Ocean shipping vessels could likewise navigate the Eastern Passage.

The preliminary finding is that Blake Channel could be navigated by handysize ocean shipping, but probably not by anything larger due to restricted passages on either side of Blake Island.

Site practicality for conventional and ACV ferry terminuses and routes serving various corridors is summarized in the following tables.

Table ES-1. Site Summary Table for Conventional Service

Corridor Served	Route ID	Over-water Route Distance [nm]	Mainland Terminus			Wrangell Island or Mitkof Island Terminus		
			Location ID	**Upland Slope**	**Overall Terminus Appraisal**	**Location ID**	**Upland Slope**	**Overall Terminus Appraisal**
Aaron Creek	1a	6.25	Berg Bay	Moderate	Promising	Log Transfer Station	Low (accessed by existing road)	Promising
Stikine	1b	11.07	Crittenden Creek	Steep ≈50°	Promising	Log Transfer Station		
Stikine	2	2.58	Crittenden Creek	Steep ≈50°	Promising	Spur Road	≈18.4°	Possible
Stikine	3	5.98	Crittenden Creek	Steep ≈50°	Promising	AMHS Wrangell Ferry Terminal	Moderate (accessed by existing road)	Promising
Stikine	4	6.89	Crittenden Creek	Steep ≈50°	Promising	Wrangell Harbor at Peninsula Street	Suitable	Possible
Bradfield	5	19.79	Kapho	≈27°	Possible	Fools Inlet (East Side)	≈21.5°	Possible

Table ES-2. Site Summary Table for ACV Service

			Mainland Terminus			Wrangell Island or Mitkof Island Terminus		
Corridor Served	**Route ID**	**Over-water Route Distance [nm]**	**Location ID**	**Upland Slope**	**Overall Terminus Appraisal**	**Location ID**	**Upland Slope**	**Overall Terminus Appraisal**
Aaron Creek Stikine	6	39.74	Iskut (north)	Flat plain to toe of mountain	Possible	Wrangell airport (north)	Access to local roads	Promising
Aaron Creek Stikine	7	40.68	Iskut (south)	Suitable (rising)	Possible			
Aaron Creek Stikine	8	40.92	Stikine opposite Great Glacier	Flat plain to toe of mountain	Promising			
Aaron Creek Stikine	9	39.71	Iskut (north)	Flat plain to toe of mountain	Possible	Mud Beach at Dry Strait	Slope appropriate to ACV operations	Promising
Aaron Creek Stikine	10	40.65	Iskut (south)	Suitable (rising)	Possible			
Aaron Creek Stikine	11	40.89	Stikine opposite Great Glacier	Flat plain to toe of mountain	Promising			
Aaron Creek Stikine	12	41.33	Iskut (north)	Flat plain to toe of mountain	Possible	Sandy Beach at Dry Strait	Requires further evaluation	Promising
Aaron Creek Stikine	13	42.27	Iskut (south)	Suitable (rising)	Possible			
Aaron Creek Stikine	14	42.51	Stikine opposite Great Glacier	Flat plain to toe of mountain	Promising			
Aaron Creek Stikine	12	46.90	Iskut (north)	Flat plain to toe of mountain	Possible	AMHS South Mitkof ferry terminal	Suitable if vehicular access can be developed from ACV landing to existing vehicle holding area	Promising
Aaron Creek Stikine	13	47.84	Iskut (south)	Suitable (rising)	Possible			
Aaron Creek Stikine	14	48.08	Stikine opposite Great Glacier	Flat plain to toe of mountain	Promising			
Aaron Creek Stikine	12	47.52	Iskut (north)	Flat plain to toe of mountain	Possible	Olsen's Landing in Blind Slough	Accesses Mitkof Highway	Promising
Aaron Creek Stikine	13	48.46	Iskut (south)	Suitable (rising)	Possible			
Aaron Creek Stikine	14	48.70	Stikine opposite Great Glacier	Flat plain to toe of mountain	Promising			

This Page Intentionally Left Blank

1 INTRODUCTION

This document reports on the findings of Preliminary Site Assessment for Ports and Ferry Terminals commissioned under the Southeast Alaska Mid-Region Access (MRA) Study Plan. The purpose of this memorandum is to develop a preliminary site assessment regarding the potential suitability for coastal locations to support marine/highway access at the western terminus of a new Southeast Alaska MRA highway corridor connecting with the Cassiar Highway in British Columbia (B.C.), Canada. Additional assignments under this task include assessment of potential air-cushion vehicle (ACV) ferry terminal sites on the Stikine and/or Iskut Rivers in Canada and opposing ACV ferry terminal sites on South Mitkof Island and on Wrangell Island. The potential for road-end commercial ports is also addressed.

Section 1 is organized into the following three major subsections:

- Section 1.1: Purpose of the Mid-Region Access Study
- Section 1.2: Southeast Mid-Region Access Study Corridors
- Section 1.3: Characteristics of an Ideal Ferry Terminal

1.1 Purpose of the Mid-Region Access Study

The Alaska Department of Transportation and Public Facilities (DOT&PF), working with the Federal Highway Administration (FHWA), is leading a study of a proposed project linking the mid-region of Southeast Alaska with the Cassiar Highway in B.C. via a new road. Discussions held with the B.C. Ministry of Transportation have led both governments to conclude that an engineering economic study is a necessary first step that may lead to an environmental impact statement (EIS) for the United States and an environmental assessment (EA) for B.C. These documents would assess the implications of developing this new road.

The past half-century has seen substantial progress in linking Alaska’s panhandle with other parts of Alaska and the lower 48 states. The largest communities now enjoy daily jet service north and south for passengers and freight. Tour ship visitors arrive in Ketchikan, Sitka, Juneau, Skagway, and several other communities each summer. The private sector carries most of the freight to the region, with two regional operations ensuring competition at larger ports served by barge. The Alaska Marine Highway System (AMHS) and the Inter-Island Ferry Authority (IFA) also provide transportation options for residents. These public operations provide roll-on/roll-off (Ro-Ro) highway links among communities and the continental highway system by operating ferries that carry vehicles and passengers on the waterways of the Inside Passage. The Southeast Alaska region currently has access to the continental highway system at Haines and Skagway in the north and via Prince Rupert, B.C., and Bellingham, Washington to the south. All Southeast Alaska communities excepting Haines, Skagway, and Hyder must use ferries to access the continental road system.

The current situation limits Southeast Alaska residents to the transportation options described in the preceding paragraph. The fishing industry and mineral extraction companies experience limitations in transporting products to the lower 48 states. Other economic ventures, such as tourism, would benefit from a surface link to the Cassiar Highway.

Some of the limitations to the transportation system in Southeast Alaska have been described above. The Southeast Alaska Transportation Plan (SATP) identifies solutions to some of these issues. The intent of the SATP is to shift from limitations of long-distance ferry service to a robust network of regional roads, with road ends connected by the frequent service that can be delivered by short-run and cross-channel ferries. The Southeast MRA route is one component of the SATP.

In a region with the sometimes steep and varied topography of Southeast Alaska, valleys and mountain passes are logical corridors for highways and utility transmission lines. These corridors would connect communities to the regional transportation system and establish a regional power grid. They would consist of road links and connecting ferries, supplemented by long-distance ferries. They would improve the regional transportation system and its capabilities and establish an integrated network of land highway connections, ferry routes, and airports.

Transportation limitations faced by residents of and visitors to Southeast Alaska have been described above. Road access within Southeast Alaska is limited. To reach destinations, Alaskans and the traveling public use water or air, which is costly, as is moving products into or out of this area. The Southeast Alaska MRA Project would connect Wrangell, Petersburg, and (eventually) Ketchikan and Sitka to the continental highway system. It would reduce out-of-direction travel for several Southeast Alaska communities and might improve the regional economy. An objective of this Plan is developing and documenting the process required to create a new interregional highway connection between the Cassiar Highway in B.C. and a port and ferry terminal in Southeast Alaska.

1.2 Southeast Alaska Mid-Region Access Study Corridors

The Southeast Alaska MRA Project (Figure 1-1) encompasses a wide geographic area, allowing for many potential route locations to connect existing Southeast Alaska communities. The potential MRA corridors are shown on Figure 1-1. Routing options could range from the Bradfield River drainage to the south, to the Stikine River drainage to the north, to the Aaron Creek drainage, with all options connecting to Canada's Cassiar Highway. The study area covers several thousand square miles including the following:

- The Stikine/LeConte Wilderness to the north
- Wrangell and Petersburg to the west
- Tongass National Forest and Misty Fiords Wilderness to the south
- Just east of the Cassiar Highway in Canada

All corridors share the development of a road from the Cassiar Highway following the Iskut River.

1.2.1 Bradfield Canal Corridor

The Bradfield Canal Corridor, also known as the Bradfield Corridor with Deep-water Terminal, would include a road from the Cassiar Highway, down the Iskut River to near Bronson Creek, up the Craig River drainage to the Bradfield River, and down the Bradfield River to the Kapho Mountain conventional ferry terminal proposed near the head of the Bradfield Canal. To complete the connection to the city of Wrangell, a conventional ferry terminal would be built at Fools Inlet on Wrangell Island, and a road would be constructed from the Fools Inlet terminal to the Zimovia Highway.

AMHS would provide a new ferry connection between Fools Inlet and Ketchikan. AMHS mainline service would connect from Wrangell north to Petersburg and beyond. From 2006 through 2008, IFA provided seasonal service on a northern ferry route (not shown on Figure 1-1) that connected Wrangell, South Mitkof (at Blind Slough), and Prince of Wales Island. Beginning in 2009, however, that service was discontinued until further notice due to insufficient ridership and fare revenue.

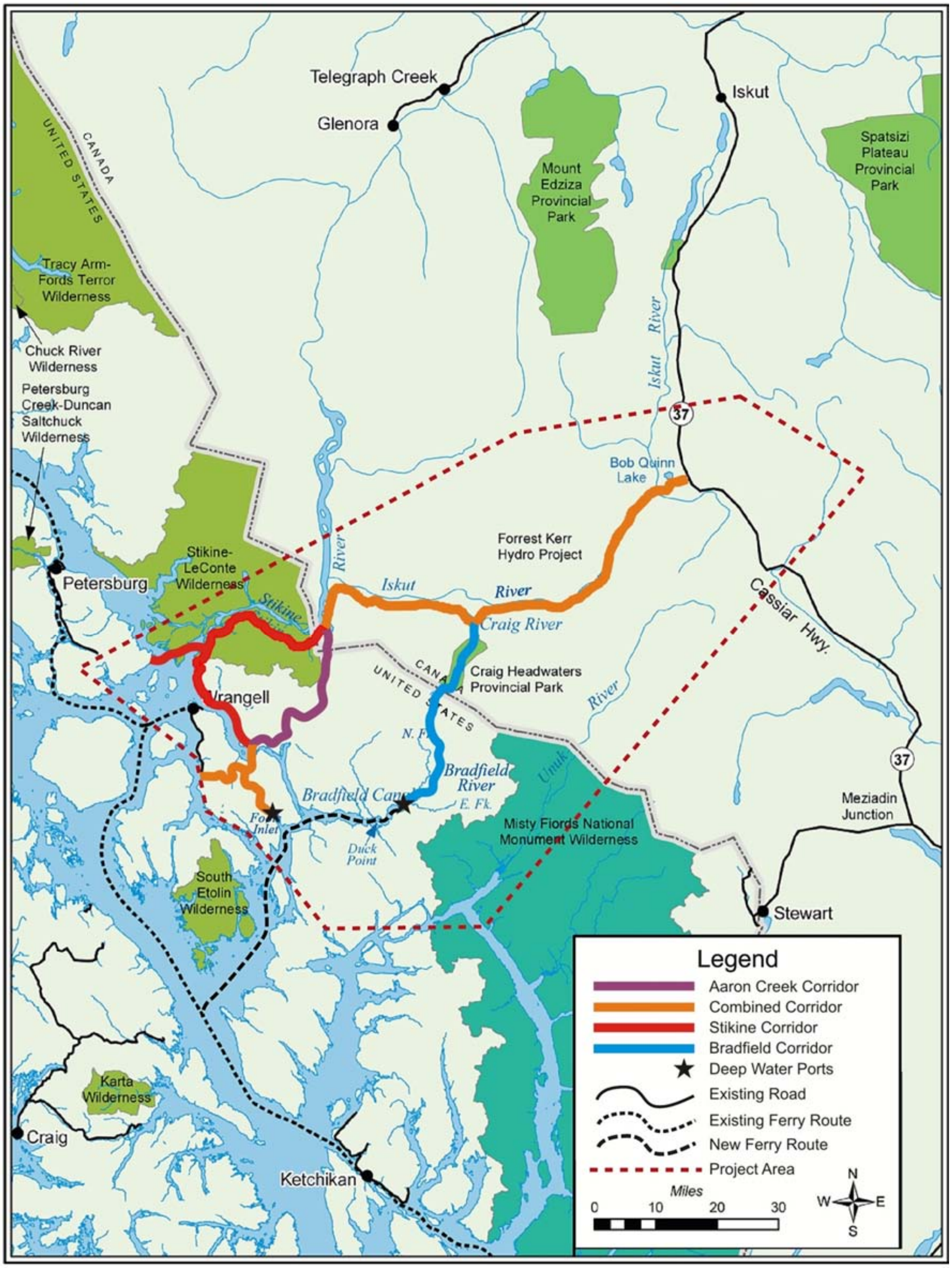


Figure 1-1. Southeast Alaska MRA Study Corridors

1.2.2 Stikine River Corridor

Located primarily within the Stikine River drainage, the Stikine River Corridor would begin at the Cassiar Highway, proceed down the Iskut River valley to the Stikine River, and follow the south side of the Stikine River to where it meets the Eastern Passage. Road corridors would be included both down the Eastern Passage and across Dry Strait. The corridors would connect Wrangell and Petersburg, respectively, to the continental highway system. The Stikine River Corridor would include ACV ferry service as an interim measure between Wrangell and Petersburg and a new ACV terminal near the confluence of the Stikine and Iskut Rivers in B.C.

AMHS currently provides service from Wrangell south to Ketchikan. AMHS mainline service would connect from Wrangell north to Petersburg and beyond. See the Bradfield Canal Corridor description above for a discussion of IFA seasonal service. Existing roads on Wrangell Island would be improved and extended to access a new conventional ferry terminal at Fools Inlet. AMHS could then provide a ferry connection between Fools Inlet and Ketchikan.

Also depicted on Figure 1-1 is an additional Mitkof access branch road, located north of the new road along the south side of the Stikine River, extending west towards South Mitkof Island. The branch road crosses Dry Strait and connects to the road system on Mitkof Island, thereby providing direct MRA service connecting Petersburg to the Cassiar Highway.

The ultimate completion of the Stikine River Corridor could include construction of a bridge across The Narrows. This would provide Wrangell Island with a direct connection to the MRA road system.

1.2.3 Aaron Creek Corridor

The over-land portion of the Aaron Creek Corridor would begin at the Cassiar Highway and proceed down the Iskut River valley to the Stikine River, up the Katete River to the Aaron Creek drainage, and down Aaron Creek to the Eastern Passage. Both a pass and a tunnel option were investigated for crossing the mountains separating the Aaron Creek and Katete River drainages. A bridge across the Eastern Passage at The Narrows and a connection across Wrangell Island to the Zimovia Highway would complete the corridor. Like the Stikine River Corridor, this corridor anticipates that an ACV ferry service would provide for early traffic to Wrangell and Petersburg from the road along the Iskut River in B.C.

The Aaron Creek Corridor would continue with further extension of the new road from the confluence of the Iskut and Stikine Rivers to Berg Bay. A new ferry terminal there would provide conventional vehicle/passenger ferry service connecting with the road system on Wrangell Island at a new ferry terminal to be located at or near the existing Log Transfer Station site. An existing

Wrangell Island road would be reconstructed and upgraded to access the new conventional ferry terminal on Wrangell Island.

AMHS provides service from Wrangell south to Ketchikan. AMHS mainline service would connect from Wrangell north to Petersburg and beyond. See the Bradfield Canal Corridor description above for a discussion of IFA seasonal service. Existing roads on Wrangell Island would be improved and extended to access a new conventional ferry terminal at Fools Inlet. AMHS could then provide a ferry connection between Fools Inlet and Ketchikan.

The ultimate completion of the Aaron Creek Corridor could include construction of a bridge across The Narrows. This would provide Wrangell Island with a direct connection to the MRA road system.

1.3 Characteristics of an Ideal Ferry Terminal

The characteristics of ideal ferry terminal sites vary according to the type of ferry to be served. The ferry terminal sites must be accessible by road, but the actual alignment and practicality of achieving road access to identified potential ferry terminal sites is outside the mandate of this port and ferry terminal task and will be accomplished by other members of the Southeast Alaska MRA Study team. Evaluation of potential ferry terminal sites under this task has focused, primarily, on marine elements to ensure that the site could be used by the intended vessel type and local characteristics that pertain to the ability to stage vehicles waiting for the ferry and provide necessary services (e.g., public restrooms, ticket sales, and basic shelter for foot passengers). It is possible that some (but not all) of the potential ferry terminal (and/or commercial port) sites identified in this report would ultimately be judged impractical to access by those responsible for road alignment.

1.3.1 Conventional Ferry Terminal

1.3.1.1 Shore Elevation and Bathymetry Characteristics

Elevation of shoreline: Ideally, this would be approximately 8 feet above mean higher high water (MHHW), which is roughly equivalent to 24 feet above mean lower low water (MLLW), to match freeboard of calling ferry vessel and to allow for superposed storm surge, waves, and extreme high water events.

Water depth at the end of a transfer ramp: Ideally, water depth (below extreme low water) should equal the draft of the calling ferry vessel plus either approximately 5 percent of the vessel overall length or 5 feet, whichever is greater. Greater water depth may be acceptable but would increase the cost and technical challenge of designing and constructing the terminal (e.g., would require longer pilings).

1.3.1.2 Wrangell Tides

The extreme low and high tide elevations in Table 1-1 are from 8 years (2000 to 2007) of tidal elevation data obtained using Tides & Currents, Version 2.5. According to Ports of Southeast Alaska (1995), however, the extreme tide range at Wrangell is 26.0 feet, which is 1.7 feet more than the range associated with the extreme low and high given in Table 1-1.

Table 1-1. Tidal variations at Wrangell

Extreme Low	4.5 feet below MLLW
Extreme High	19.8 feet above MLLW
MHHW	15.7 feet above MHHW
Mean Tide	8.2 feet above MLLW
Mean Range	13.3 feet

According to the 1997 DOT&PF Shore Facilities Condition Survey Report, the existing mainline AMHS terminal at Wrangell features a steel box girder transfer bridge 140 feet long by 16 feet wide. According to the Shore Facilities Condition Survey Report (1997), the bridge has an adjustable intermediate ramp which also supports the vessel loading apron. Ports of Southeast Alaska (1995) lists the dimensions of the AMHS transfer bridge at Wrangell as 140 by 22 feet. Scaling from available CAD drawings of the Wrangell AMHS terminal facility indicates that the distance from the shore-end heel pin to the center of the offshore hoist towers is approximately 200 feet.

Presuming that the 200 feet scaled from the CAD drawings also includes the apron, the change in slope of the Wrangell transfer span through a 13.3-foot mean tide range is 6.65 percent, and the change in slope through a 26-foot extreme tide range would be 13 percent. The actual slope at an extreme low tide of -4.5 feet would be 14.25 percent. A common practice in vehicle transfer span design is to try and limit slope to no more than 10 percent to avoid problems with break-over angles that may high-center recreational vehicles (RVs), ambulances, and some passenger vehicles. An extreme slope of 15 percent can be accommodated by large trucks and most passenger vehicles.

For the purposes of this technical memorandum, it is presumed that the offshore end of the transfer ramp would have to be 200 feet from the transfer ramp heel pin. For sites that are deep close to shore one possible means of limiting the offshore extension of the transfer ramp (and hence, presumably, limit the water depth at the offshore end of the transfer ramp) would be to excavate back into the shore underneath the transfer span and then locate the transfer span heel pin further onshore. For sites that are shallow close to shore, a fixed driving structure would have to be constructed to within 200 feet of adequate water depth (as, for instance, was done at Blind Slough on South Mitkof Island).

For purposes of this technical memorandum, it is presumed that the ferry would have a navigation draft no greater than 15 feet and an overall length of no more than 150 feet. Thus, at 5 percent, the ideal underkeel clearance at extreme low water would be approximately 7.5 feet. With an extreme low tide at approximately -4.5 feet, the nominal water depth at the end of the transfer span should be approximately 15 plus 7.5 plus 4.5, equaling 27 feet below MLLW.

1.3.1.3 Uplands

The ideal upland area would feature a contiguous and compact flat area at essentially 24-foot elevation above MLLW. In such an area, vehicles waiting to board the ferry could be staged, and other necessary services (e.g., restrooms, ticket sales, and shelter for passengers without vehicles) could be located along with the exit roadway for vehicles departing the ferry.

Less ideal, but within the realm of feasibility, would be to stage vehicles waiting to board the ferry linearly in a single (third) lane, or in a single lane inbound to the ferry (presumably next to the exit lane from the ferry). Such arrangements would not, however, afford convenient access to necessary services such as restrooms and would also result in slower loading of the ferry.

1.3.2 ACV Ferry Terminal

An attractive feature of ACV ferries is that they would require relatively modest terminal facilities to support landing, departure, and unloading/loading of passengers and vehicles. They would, however, require a hanger for maintenance and berthing most nights.

ACV landing pads would have to be located above extreme high water (tidewater locations) or above extreme flood stage (river locations). The slopes approaching the landing pads should be modest, in general less than 10 percent, though ACVs could surmount short sections of a 15 or 20 percent slope.

1.3.2.1 ACV Landing Pads

Landing pads should be essentially flat (other than slopes necessary for drainage of rainwater) and preferably measure at least two ACV lengths in every direction. Ideally, landing pads should be paved, though any rugged, compact, dust-free, impermeable to air, surface would work.

There are three options for vehicle loading and discharge from an ACV:

1) The loading ramp is part of the ACV outfit.
2) The loading ramp has a fixed-landing-pad infrastructure at a fixed location.
3) The loading ramp has a mobile, landing pad service capability and can move to the landed location of the ACV each time it sets down on the pad.

Each approach has both merits and disadvantages.

Loading ramp incorporated into ACV outfit

Incorporating the loading ramp into the ACV outfit would add light ship weight to the ACV. This weight would be deducted from the ACV's overall payload carrying capability. Such a loading ramp would complicate the skirt design.

Another challenge for design of ACV-mounted loading ramps would be making such ramps long enough so that the ramp slope and associated break-over angles were suitable for vehicle loading and unloading. The elevation of the main deck of a landed ACV above the landing pad would virtually necessitate a two panel articulated loading ramp, which would be more expensive and complicated (hence, most likely less reliable in service).

One possible way to mitigate and reduce the requirement for a long, ACV-mounted ramp would be to provide a vertical bulwark bounding one side, or an L-shaped vertical bulwark bounding two sides of the landing pad. This bulwark would project almost to the elevation of the main deck of the landed ACV (main deck elevation minus the ramp thickness). Earth would be bulwark and would act as a low retaining wall and would be built up in a gentle grade on the far side of the bulwark. The arriving ACV would maneuver so that it was nestled into the corner formed by the L-shaped bulwark and then set down. A very short vessel mounted ramp could then bridge to the top of the bulwark, and vehicles could discharge and load with ease.

Shore-fixed loading ramp

A shore-fixed loading ramp would relieve all the problems and challenges associated with an ACV-mounted loading ramp, but would introduce the new problem that the ACV must be set down quite precisely in the same landing spot every time. Such landing precision is difficult for an ACV, though this problem, too, could be managed by providing the L-shaped landing bulwarks described in the preceding subsection.

Shore-based mobile loading ramp

This concept resembles the way that loading stairs, baggage handling conveyor belts, and air cargo container handling devices maneuver to mate with aircraft that have landed and parked. Such a mobile loading ramp would make it possible for the ACV to land almost anywhere on the landing pad. The mobile landing ramp would then maneuver to mate with the ACV.

1.3.2.2 Approaches to ACV Landing Pads

Approaches to the landing pad from extreme low water (tidewater locations) or extreme low stage (river locations) should likewise be rugged, compact, dust-free surfaces that are relatively impermeable to air. Natural surfaces such as compact mud or silty sand would work as approaches, as would gravel infiltrated with sand, but cobble beaches free of sand or silt would not work as they are too permeable to air.

Obviously approaches to ACV landing pads would have to be kept free of large obstacles such as boulders or stranded snags that might be deposited by storms (tidewater locations) or flood action (river locations). In support of this requirement, and depending on the exposure and vulnerability of the site, it may be desirable or necessary to have some approach maintenance capability. The required capabilities might include such things as a small front loader bobcat, chainsaws, or perhaps a mobile hydraulic crane. These might be permanently stored at the landing pad site, or transported by the ACV to the landing pad site on an as-needed basis. Some or all of these capabilities might be incorporated into the ACV itself as such capabilities might be desirable or necessary for route maintenance (depending on the characteristics of the route).

1.3.2.3 Road Access to ACV Landing Pads

The Bradfield, Stikine, Iskut, and Katete Rivers are all wild rivers subject to seasonal flooding. The Stikine River below the Iskut (especially on the south side) and the Katete River both feature very wide floodplains. This feature would bear strongly on the choice of potential ACV terminals as it would be undesirable to require lengthy road approaches across a floodplain. Roads across the floodplain would either have to be elevated above extreme flood stage on a pile-supported, trestle-like structure that allowed flood waters to pass underneath, or they would have to be built above extreme flood stage as armored, earthen causeways with plentiful culvert-like features to promote passage of flood waters.

Because of these considerations, favored river sites for ACV terminals would be those where the year-round main channel would closely approach natural geographic features located securely above extreme flood stage. The sites conceivably would be approachable by road alignments that could be maintained above extreme flood stage (or with a minimum of elevated or armored road structure).

1.3.2.4 ACV Hanger and Maintenance Facility

If ACV Ro-Ro/passenger ferries were used, an ACV hanger and maintenance facility would have to be provided, presumably at Wrangell. Such a facility would have a smooth, flat (presumably concrete) floor and inside dimensions suitably larger than the chosen ACV, with enough room to access and work on the ACV all around its perimeter when the ACV was at rest, and the hanger doors were closed. Horizontal and vertical clearances through the open hanger doors would have to permit passage of the ACV when on cushion. Provision must be made for spare parts storage and both mechanical and ACV skirt workshops.

This Page Intentionally Left Blank

2 POTENTIAL CONVENTIONAL FERRY TERMINAL SITES

Conventional ferries would be important to the success of the MRA project regardless of the study corridor. The ultimate configuration of all study corridors would require a conventional ferry terminal in Fools Inlet from which a ferry would provide service to Ketchikan. Final build-out of all corridors except the Stikine River Corridor would require a conventional ferry connecting Wrangell with South Mitkof at Blind Slough.

Section 2 of this report is organized into three major subsections:

- Section 2.1: Potential Mainland Conventional Ferry Terminal Sites
- Section 2.2: Potential Mitkof Island Conventional Ferry Terminal Sites
- Section 2.3: Potential Wrangell Island Conventional Ferry Terminal Sites

2.1 Potential Mainland Conventional Ferry Terminal Sites

This subsection addresses the various potential conventional ferry terminal sites located at MRA road ends on the mainland. All potential conventional ferry terminals would be used to provide ferry service access to Wrangell Island.

2.1.1 Crittenden Creek

Crittenden Creek is situated across Eastern Passage from Wrangell. It is a favorable potential road-end conventional ferry terminal site serving the Stikine River Corridor. Possible conventional ferry routes from Crittenden Creek to Wrangell are as short as 2.6 nautical miles (nm) (one-way crossing distance). The longest potential route is 6.9 nm. A potential conventional ferry terminal site was identified south of Crittenden Creek proper, as shown on Figure 2-1. The white arrow points to a location with coordinates, as given in Table 2-1.

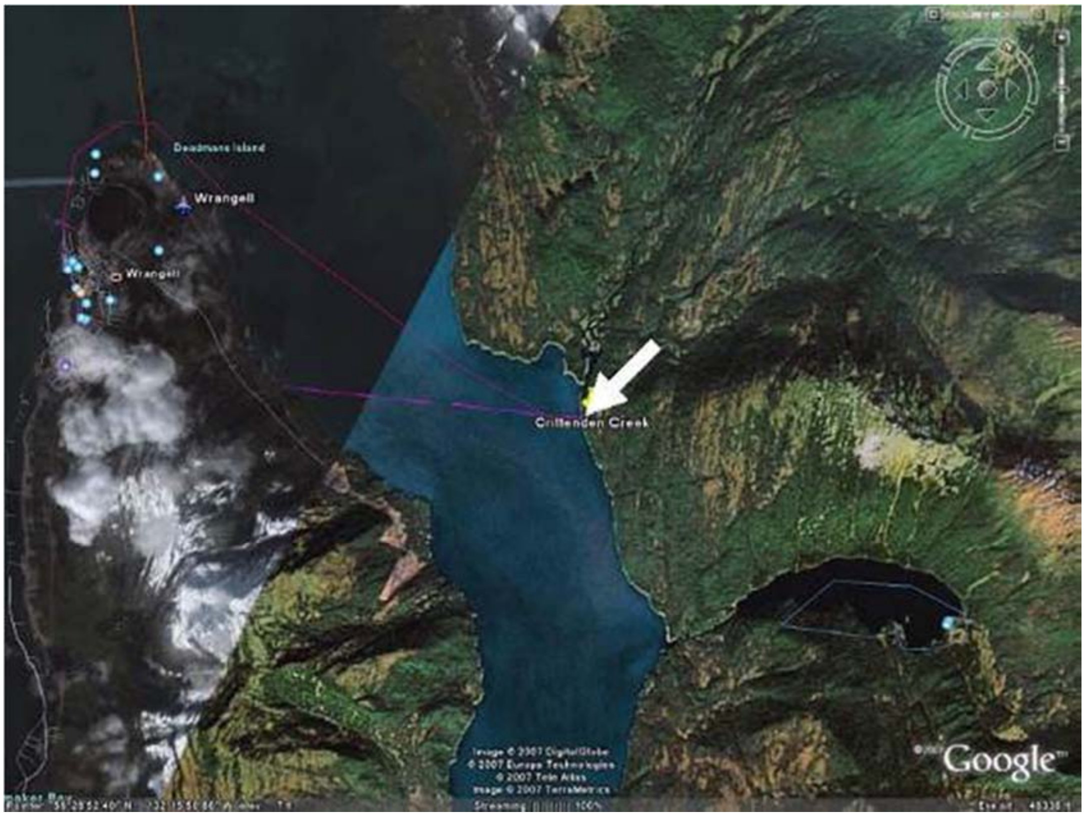


Figure 2-1. Aerial photo of Crittenden Creek potential conventional ferry terminal

Table 2-1. Crittenden Creek conventional ferry terminal site characteristics

Latitude	56°28.955' N
Longitude	132°15.145' W
Water depth [ref. MLLW]	≈14 feet ten feet offshore
Offshore approach	Good
Maneuvering room	Good
Exposure	Moderate
Shore elevation	Suitable
Uplands	Steep, on the order of 50% slope, potentially a challenge
Suitability	Conventional ferry
Evaluation/Rating	Promising

The bathymetry in Eastern Passage and near the identified location is shown on Figure 2-2. To the north of the identified potential terminal site, the delta of Crittenden Creek creates a shoal area extending out towards Babbler Point. This area should be avoided. The identified location corresponds to a transition from a sloping shore extending into the uplands to a low cliff extending into the water. That transition is visible on Figure 2-3, and the extent of the low cliffs is indicated the chart excerpt on Figure 2-2.

During the October 29, 2007, field reconnaissance, a water depth of 14.0 feet below MLLW was measured near the identified site. The area measured was approximately 10 feet offshore from the shale cliff face that appears in the right-hand side of the photo on Figure 2-3.

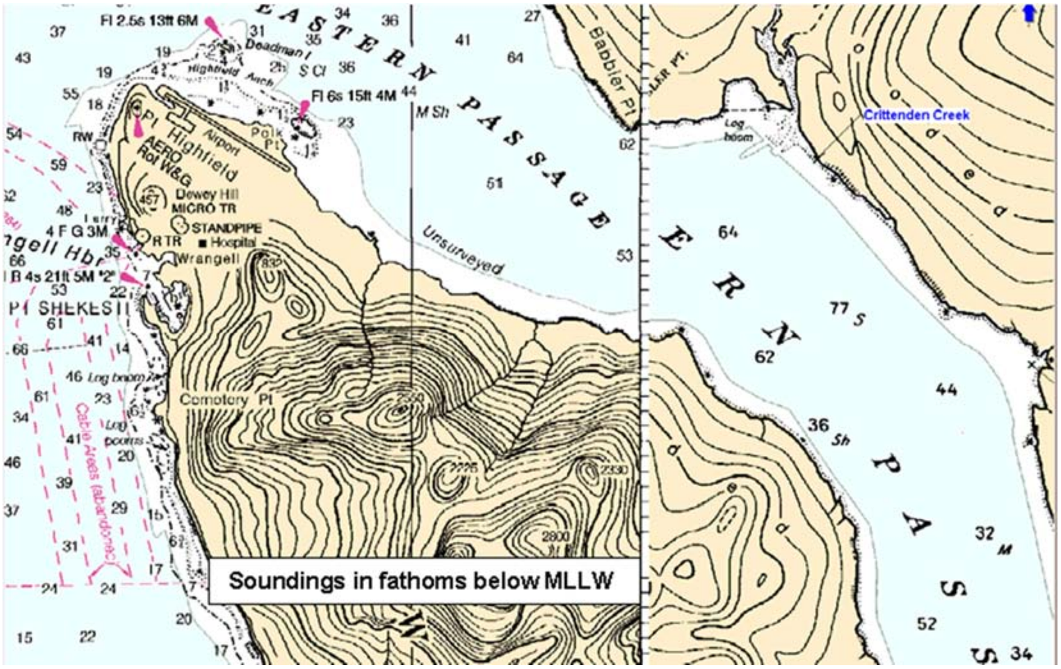


Figure 2-2. Bathymetry for Crittenden Creek potential conventional ferry terminal

Figure 2-3. Photo of shoreline at Crittenden Creek

Figure 2-4 shows three elevation transects at the identified Crittenden Creek site. These transects were developed using elevation information extracted from the Southeast Alaska MRA Project, 100-foot elevation contour geographic information system (GIS) data. The transects indicate that the average slope of the uplands over the first 100 feet of elevation from MLLW is approximately 48.6 percent at Transect No. 1, 51.2 percent at Transect No. 2, and 65.8 percent at Transect No. 3. These are extremely steep slopes and may pose obstacles to development of a vehicle holding area near the potential ferry terminal site.

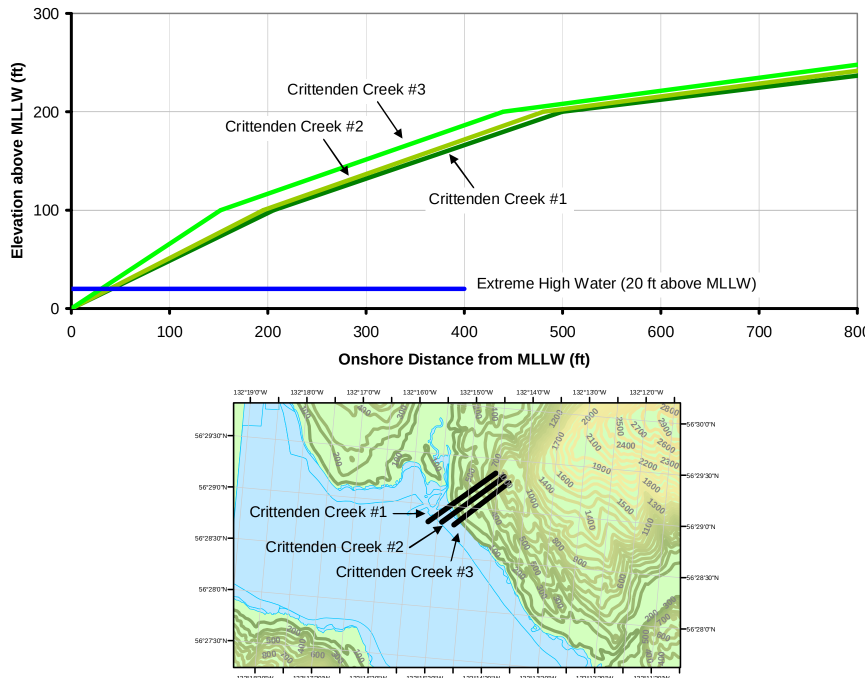


Figure 2-4. Transects at Crittenden Creek

Slopes were also obtained using Google Earth™. While reasonable order-of-magnitude agreement was found between the Southeast Alaska MRA Project GIS data and Google Earth™ on all other sites, the upland slopes at Crittenden Creek near the water's edge are considerably decreased (i.e., 8 to 16 percent) from Google Earth™. Transects from both project GIS data and Google Earth™ indicate that the slopes increase in a southerly direction. Actual slopes and elevations should be confirmed from other sources and, ultimately, by accurate field survey. The water depth observed in the field reconnaissance suggests that it should be possible to build the ferry terminal loading face within 200 feet or less offshore from the high water mark. The Crittenden Creek site is rated as "promising."

2.1.2 Berg Bay

Berg Bay is situated on Blake Channel, south of The Narrows and across from Wrangell Island. It is a favorable potential road-end conventional ferry terminal site serving either the Stikine River or Aaron Creek Corridors. A potential conventional ferry route from Berg Bay connecting to an improved road serving the Log Transfer Station on Wrangell Island is approximately 6.25 nm (one-way crossing distance). The potential conventional ferry terminal site is somewhere along the west boundary of Berg Bay, as shown on Figure 2-5. The white arrow points to a location with coordinates provided in Table 2-2.

Figure 2-5. Aerial photo of Berg Bay potential conventional ferry terminal

Table 2-2. Berg Bay conventional ferry terminal site characteristics

Latitude	56°21.773' N
Longitude	132°00.610' W
Water depth [ref. MLLW]	≥35 feet 100 feet offshore
Offshore approach	Good
Maneuvering room	Adequate
Exposure	Low
Shore elevation	Suitable
Uplands	Moderate slope (field judgment)
Suitability	Conventional ferry
Evaluation/Rating	Promising

The bathymetry of the southern end of Eastern Passage, The Narrows, and the northern end of Blake Channel, including Berg Bay, is shown on Figure 2-6. The U.S. Coast Pilot (1999) says of Berg Bay:

> "***Berg Bay***, *N of Neptune Island, has depths of 5 to 11 fathoms (9.1 to 21.1 meters) to near its head and affords the best anchorage in Blake Channel. Vessels can enter on either side of the island in the mouth, but should give the island a good berth, and avoid a reef that extends 0.1 mile N of the inner end of the island. A log storage area is along the E shore in the E entrance. A mooring float is on the E side of the bay, near the head.*"

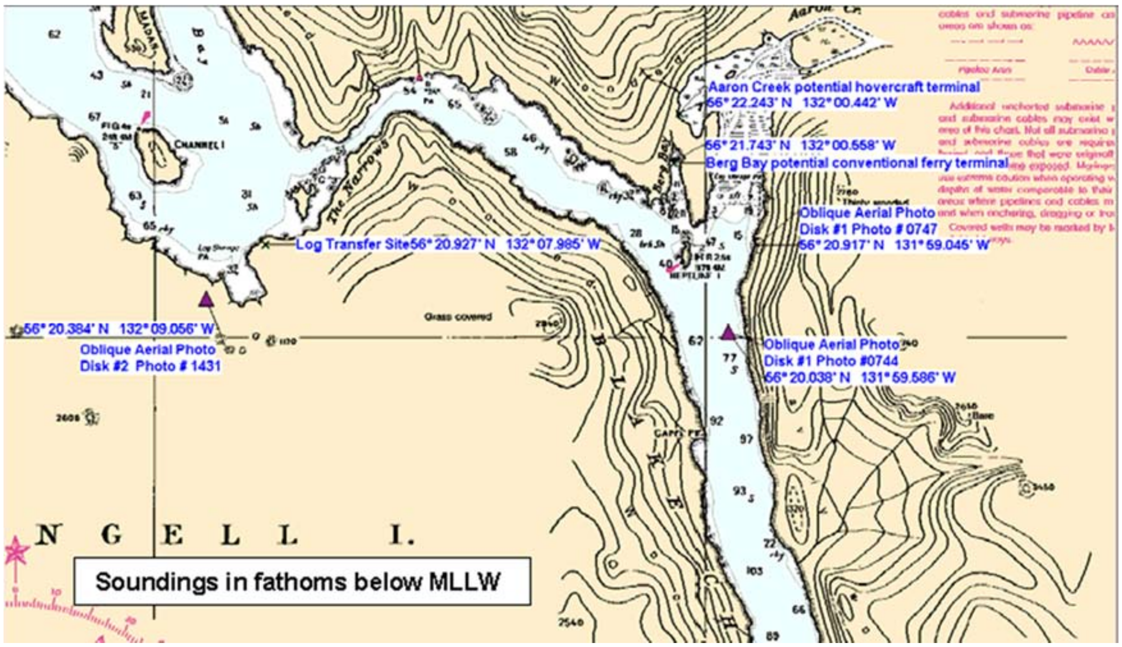


Figure 2-6. Bathymetry of Blake Channel, The Narrows, and approaches to Berg Bay

The mooring float appears to provide access to a Forest Service cabin. The October 30, 2007, field reconnaissance indicated that the head of Berg Bay shoaled rapidly north of a line approximately through the Forest Service cabin. Any conventional ferry terminal should be sited to access the western shore of Berg Bay south of this line and somewhat towards the entrance.

In these favored areas, water depths approximately 35 feet below MLLW were observed less than 100 feet off the shore. Overall, Berg Bay appears to be a nearly ideal site for a conventional ferry terminal and is rated as "promising."

Photos of Berg Bay from the October 30, 2007, field reconnaissance are shown on Figures 2-7 and 2-8. The photos were taken near high tide. Low-lying shore with moderate upland slope in a local area can be seen in several photos. The white arrow on Figure 2-7b points to one such area where it might be particularly easy to develop a holding area for vehicles.

Figure 2-7a. Looking north towards the head of Berg Bay

Figure 2-7b. West side of Berg Bay

Figure 2-7c. Nearing the west entrance point

Figure 2-8. Photo of Berg Bay

2.1.3 Kapho

Given the mountainous character of the terrain surrounding Bradfield Canal, a ferry terminal site suitable for conventional ferries as far east as possible is preferred. A potential conventional ferry terminal site serving the Bradfield Canal Corridor was identified near the head of Bradfield Canal at the foot of the Kapho Mountains in an area identified on Figure 2-9. The location pin has coordinates provided in Table 2-3.

Figure 2-9. Aerial photo of the head of Bradfield Canal

Table 2-3. Kapho conventional ferry terminal site characteristics

Latitude	56°13.328' N
Longitude	131°33.648' W
Water depth [ref. MLLW]	14 to 22 feet 300 ft. offshore from high water
Offshore approach	Good
Maneuvering room	Good
Exposure	Low
Shore elevation	Suitable
Uplands	27% slope at Transect No. 1
Suitability	Conventional ferry
Evaluation/Rating	Possible

Bathymetry is shown on Figure 2-10. During the field reconnaissance of October 30, 2007, a sounding of 36.9 feet was recorded at 11:30:17 hours (Alaska Standard Time) at location 56°12.963' N 131°33.519' W. Adjusting for the depth of the transducer and the tide, the sounding corresponds to approximately 30.1 feet referenced to MLLW, approximately 1,750 feet from the Kapho shore. That sounding is considerably less than the 15 fathoms (90 feet) indicated nearby on the chart (see chart excerpt on Figure 2-10), but still adequate for conventional ferry operations.

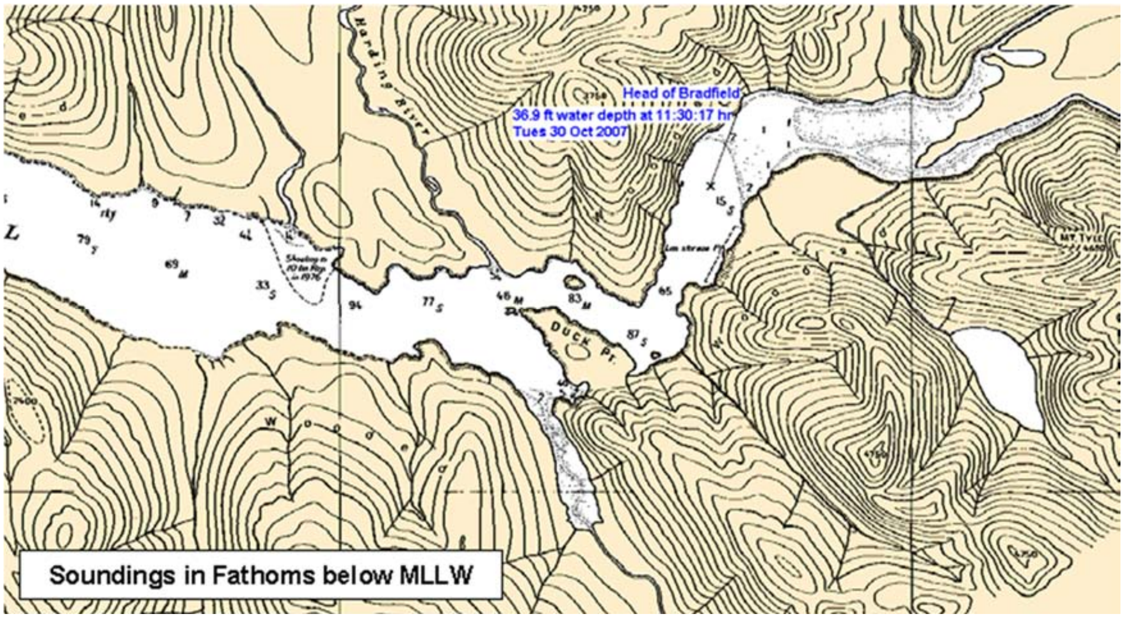


Figure 2-10. Bathymetry at the head of Bradfield Canal

Figure 2-11 shows two photos of the most promising Kapho shore region. These photos were taken during the October 30, 2007, field reconnaissance. The arrow in the upper photo points to the area seen in a closer view in the lower photo. There is some obvious low-lying upland terrain near the shoreline which might be used to develop a vehicle holding area.

Figure 2-12 shows two elevation transects at the identified Kapho site. These transects were developed using Southeast Alaska MRA Project, 100-foot elevation contour GIS data. Actual slopes and elevations should be confirmed from other sources and, ultimately, by accurate field surveys. These transects indicate that the average slope of the uplands over the first 100 feet of elevation above MLLW is approximately 53.5 percent at Transect No. 1 and 26.8 percent at Transect No. 2. It may be necessary to build the ferry terminal loading face out more than 300 feet offshore from the high water mark to achieve the water depth needed for vessel access at low water. The Kapho site is potentially “promising,” but has been rated “possible” due to steep uplands, insufficient validation of elevations and slopes, and lack of field verification of bathymetry.

Figure 2-11. Photos at the head of Bradfield Canal

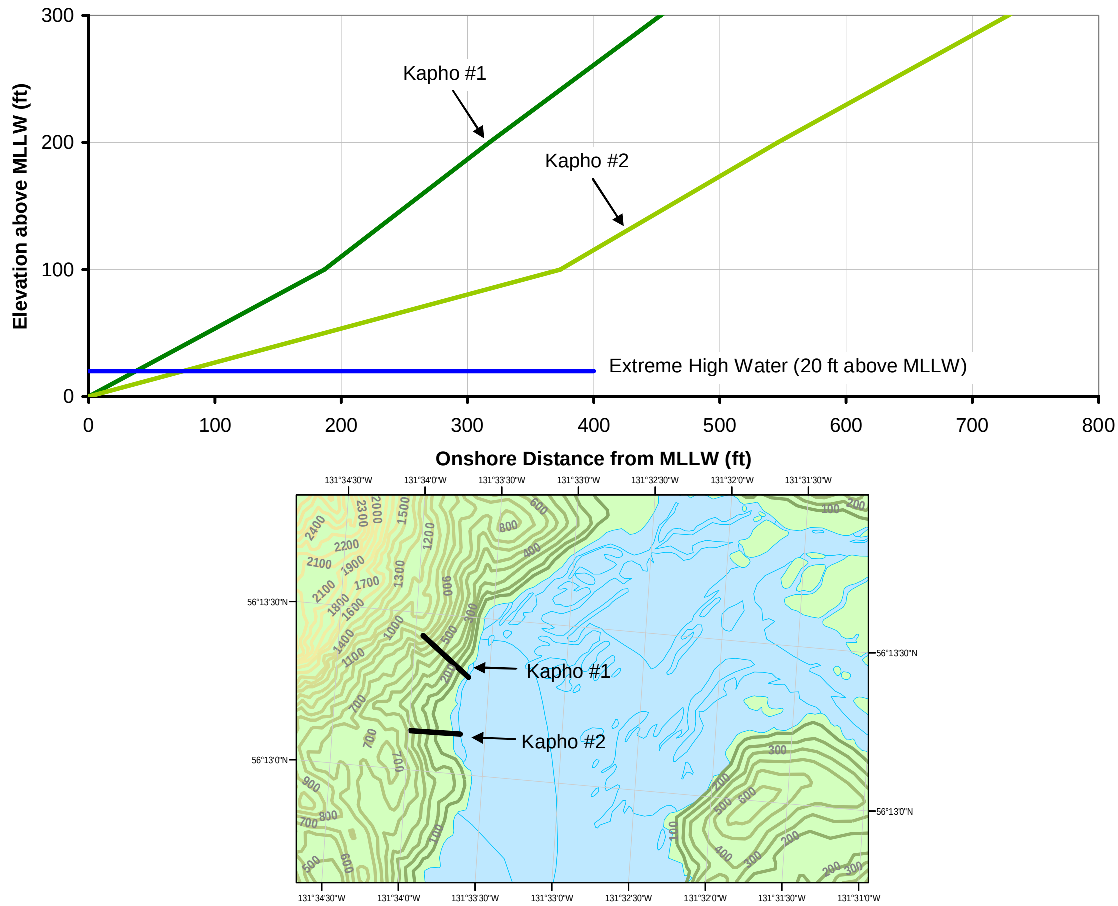


Figure 2-12. Transect at Kapho

2.2 Potential Mitkof Island Conventional Ferry Terminal Site

Several of the corridors include the use of a conventional South Mitkof ferry terminal, either in their final and/or intermediate stages of development. The IFA ferry operating on the IFA northern route used the existing AMHS terminal, located in Blind Slough, seasonally from 2006 to 2008. It would be the obvious conventional ferry terminal for the MRA development stages.

The AMHS terminal at Blind Slough is located at the south end of Mitkof Island. The IFA ferry operating on the IFA northern route serving Mitkof, Wrangell, and Prince of Wales Islands used the terminal seasonally from 2006 to 2008. Figure 2-13 shows an aerial view of Blind Slough and indicates the approximate location of the existing conventional ferry terminal. Approximate coordinates of this terminal are given in Table 2-4.

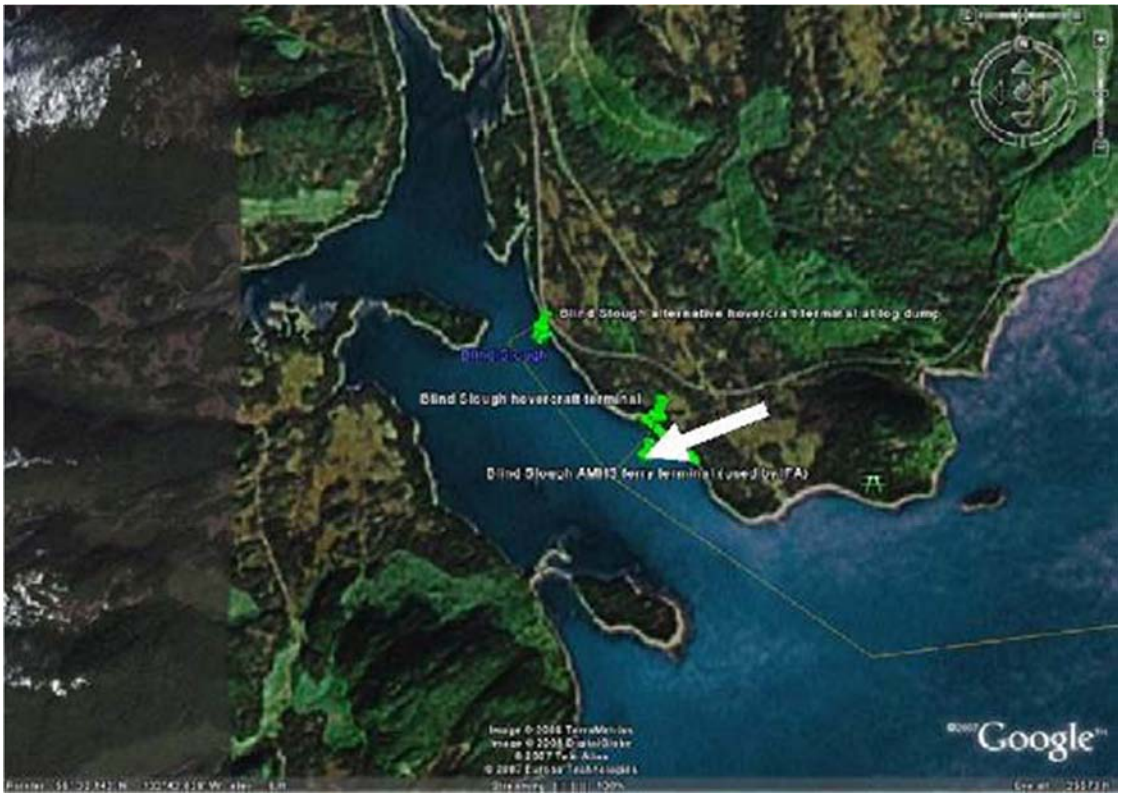


Figure 2-13. Aerial photo of the AMHS terminal in Blind Slough

Table 2-4. Blind Slough conventional ferry terminal site characteristics

Latitude	56°32.142' N
Longitude	132°42.837' W
Water depth [ref. MLLW]	23 feet at terminal loading face
Offshore approach	Good
Maneuvering room	Decent
Exposure	Moderate
Suitability	Conventional
Evaluation/Rating	Promising

Figure 2-14 shows an excerpt of the NOAA chart for Blind Slough and approaches. In general, Blind Slough is very shallow, with deep-water only towards the entrance where the existing ferry terminal is located. The AMHS terminal is located approximately where the log storage area is indicated on Figure 2-14. The loading face of the ferry terminal would have to be located well offshore (approximately 1,190 feet offshore from high water), as the beach gradient is so slight.

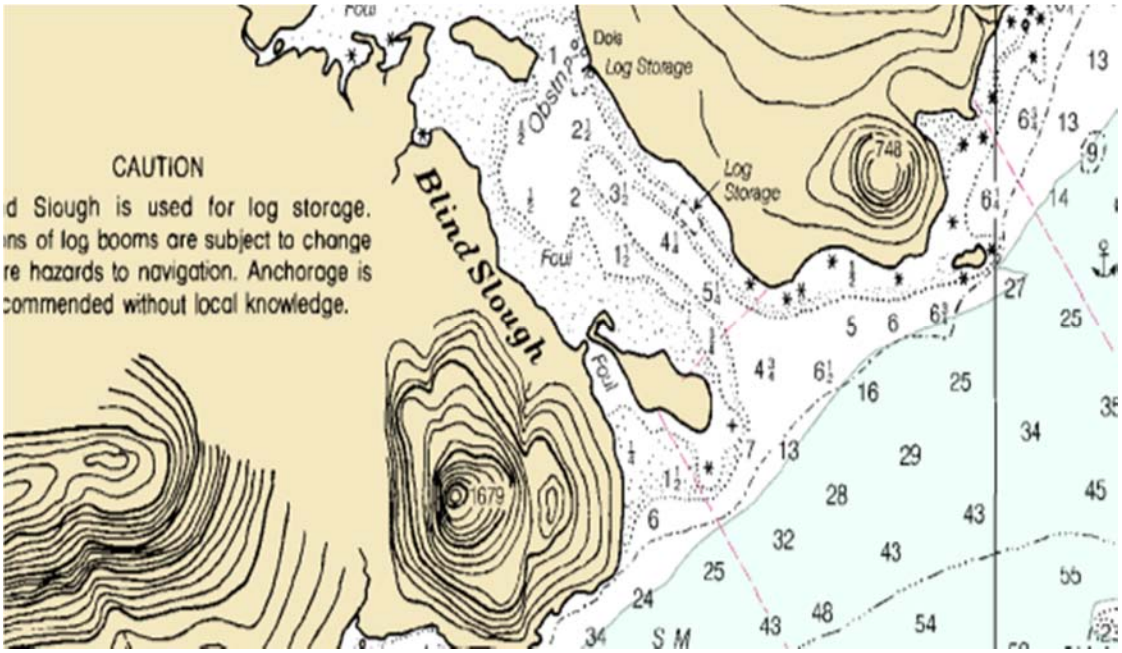
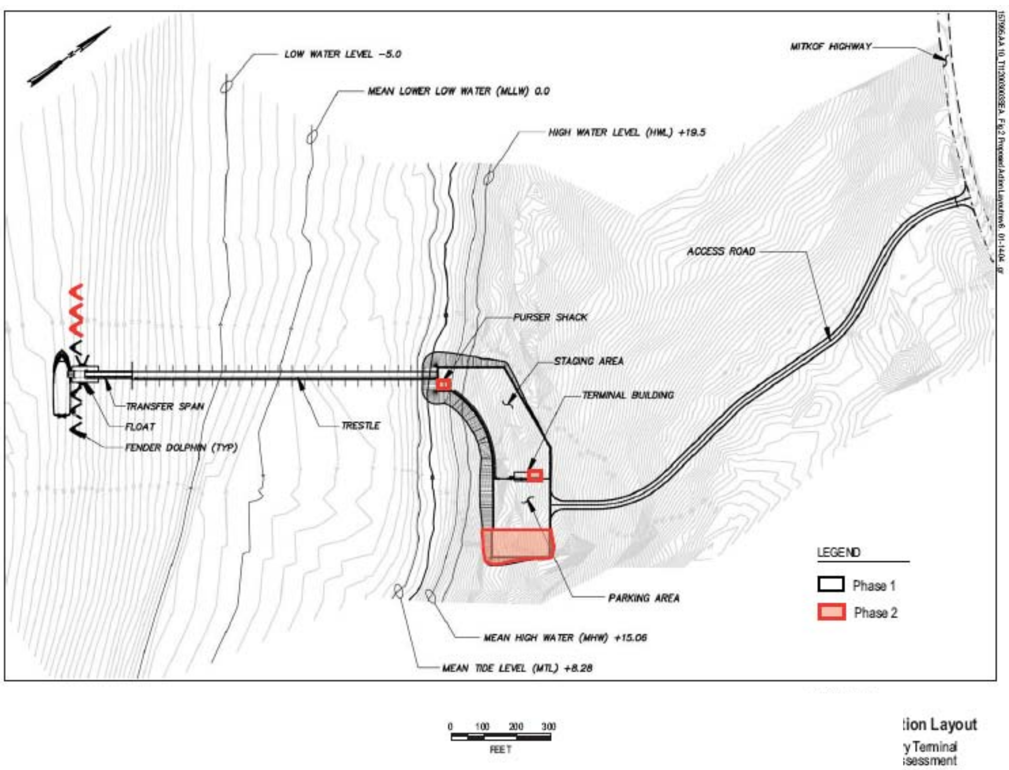


Figure 2-14. Bathymetry of Blind Slough

Figure 2-15 shows the general arrangement plan of the existing South Mitkof terminal, including upland topography contours and near-shore bathymetry.



[Source: South Mitkof Ferry Terminal Environmental Assessment, Figure 2, Proposed Action Layout]

Figure 2-15. Existing AMHS South Mitkof ferry terminal site plan

Figure 2-16 shows three photos of the existing AMHS terminal at South Mitkof. These photos were taken during the October 29, 2007, field reconnaissance. As shown on Figures 2-15 and 2-16, the existing terminal is configured for side loading and discharge by a conventional ferry. To the extent that development of a Southeast Alaska MRA route might result in a traffic demand for frequent service connecting Wrangell and Mitkof Islands, there could be advantages to using the more efficient short crossing service provided by a double-ended ferry. The existing terminal at South Mitkof would have to be augmented with bow/stern loading facilities without affecting the ability of the terminal to continue serving side-loading vessels. As an existing and proven conventional ferry terminal, the overall rating for this site is “promising.”

Figure 2-16a. AMHS ferry terminal at Blind Slough

Figure 2-16b. AMHS ferry terminal at Blind Slough

Figure 2-16c. AMHS ferry terminal at Blind Slough

2.3 Potential Wrangell Island Conventional Ferry Terminal Sites

Depending on the stage of development, each of the corridors would include the use of one or more conventional ferry terminals on Wrangell Island. Furthermore, all corridors would require continued use of the existing AMHS ferry terminal at Wrangell to serve mainline AMHS vessels and conventional ferry service connecting to Ketchikan from a new terminal in Fools Inlet at the south end of Wrangell Island.

2.3.1 Spur Road

A potential site for a conventional ferry terminal on Wrangell Island, suitable for use as the opposing ferry terminal to Crittenden Creek (Subsection 2.1.1), is shown on Figure 2-17 and designated “Spur Road.” The one-way crossing distance from this site to Crittenden Creek is approximately 2.6 nm. The white arrow points at the approximate location where a new conventional ferry terminal might be sited and connected to the existing Spur Road. Coordinates for this location are given in Table 2-5.

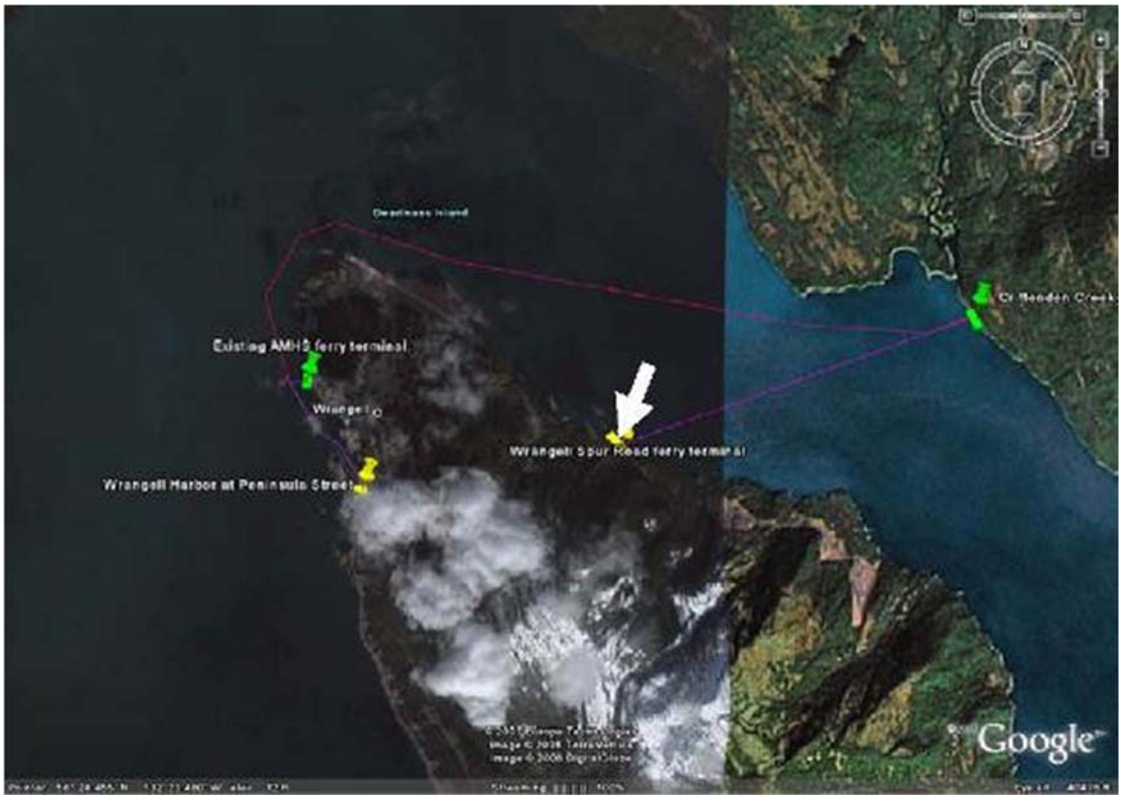


Figure 2-17. Aerial photo of Spur Road potential conventional ferry terminal

Table 2-5. Spur Road conventional ferry terminal site characteristics

Latitude	56°28.032' N
Longitude	132°19.561' W
Water depth [ref. MLLW]	Estimated at 27 feet approximately 80 to 100 feet offshore
Offshore approach	Good
Maneuvering room	Good
Exposure	Moderate
Shore elevation	Suitable
Uplands	Suitable with slope on the order of 18.4%
Suitability	Conventional ferry
Evaluation/Rating	Possible

Available NOAA bathymetry appropriate to the Spur Road site is shown on Figure 2-2. The near-shore bathymetry is not defined and is labeled as unsurveyed. The unsurveyed, near-shore zone extends approximately 930 feet offshore near the identified Spur Road site. Offshore depths are approximately 50 fathoms (300 feet). If the bottom slope remains near its average value, then soundings of approximately 27 feet should be available somewhere between 80 and 100 feet offshore.

Figure 2-18 shows an elevation transect at the Spur Road site. This transect was developed using the Southeast Alaska MRA 100-foot elevation contour GIS data. Actual slopes and elevations should be confirmed from other sources and ultimately by accurate field survey. This transect indicates that the average slope of the uplands over the first 100 feet of elevation from MLLW is approximately 18.4 percent and that the existing Spur Road is located approximately 200 feet inland from the high water mark. The Spur Road site is potentially “promising.” but has been rated as “possible” at this time due to insufficient field verification of upland conditions and bathymetry.

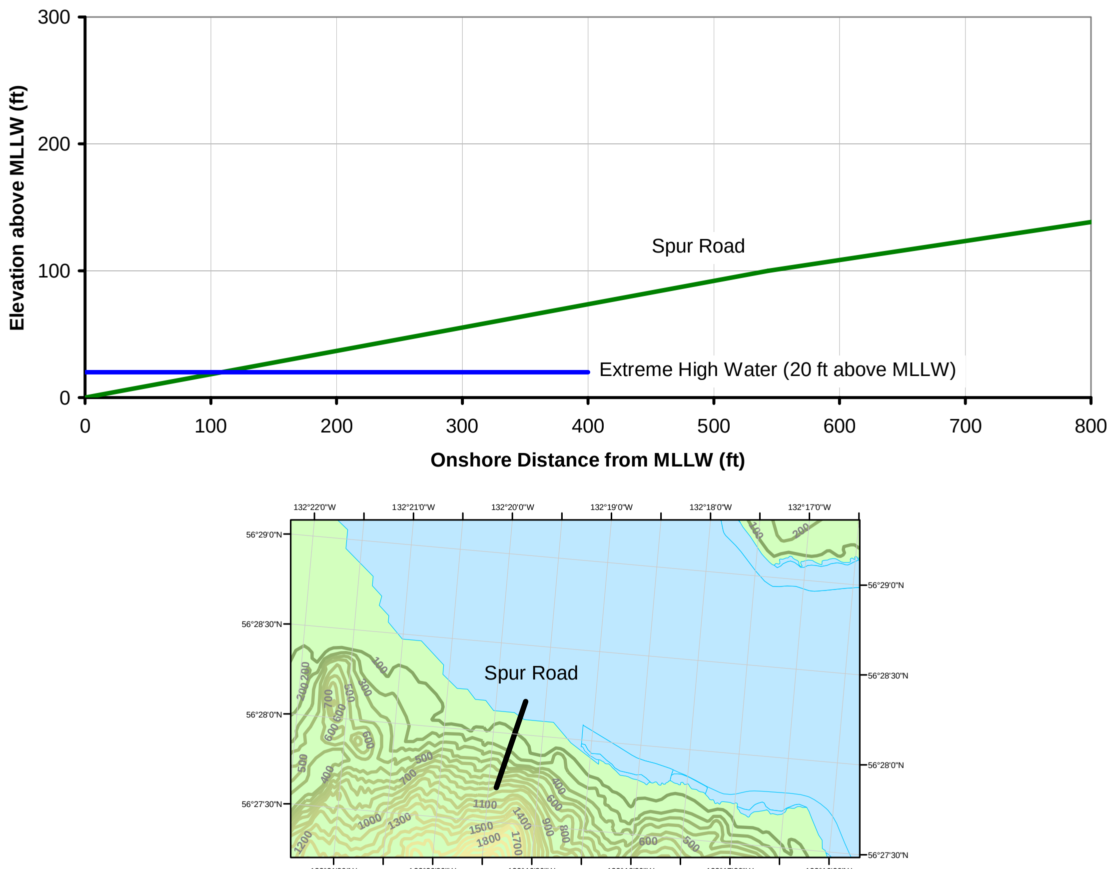


Figure 2-18. Transect at Spur Road

2.3.2 AMHS Terminal at Wrangell

If developing a conventional ferry terminal at or near the Spur Road to act as the opposing ferry terminal to Crittenden Creek were not selected as an option, then the existing AMHS ferry terminal at Wrangell would be an option. The route from Crittenden Creek to the current AMHS ferry terminal at Wrangell is approximately 6 nm (one-way crossing) navigating through the Highfield Anchorage inside Deadmans Island (Figure 2-19) and somewhat longer navigating through Eastern Passage outside Deadmans Island.

The location of the existing AMHS ferry terminal at Wrangell is indicated by the white arrow on Figure 2-19 and has the approximate coordinates given in Table 2-6. The terminal is arranged for side berthing, loading, and discharge of vehicles and passengers. To the extent that development of a Southeast Alaska MRA route might result in a traffic demand for frequent service connecting to Crittenden Creek (and potentially also to South Mitkof Island), there could be advantages to using a more efficient, short-crossing service by a double-ended ferry. The existing terminal at AMHS terminal at Wrangell could be augmented with bow/stern loading facilities without impacting the ability of the terminal to continue serving side-loading vessels.

A potential challenge for use of the AMHS ferry terminal site would be the need to share the current side load terminal with the AMHS mainline ferry and, if IFA resumed its northern route service, by IFA ferries as well. This would require coordination of schedules, which would be challenging as AMHS mainline vessel arrivals and departures are somewhat irregular. This problem could be alleviated somewhat if a bow/stern loading facility suitable for a double-ended ferry were integrated into the complex, but there might still be some potential for interference between operations sharing the same vehicle discharge and assembly space. As an existing and proven conventional ferry terminal the overall rating for this site is “promising.”

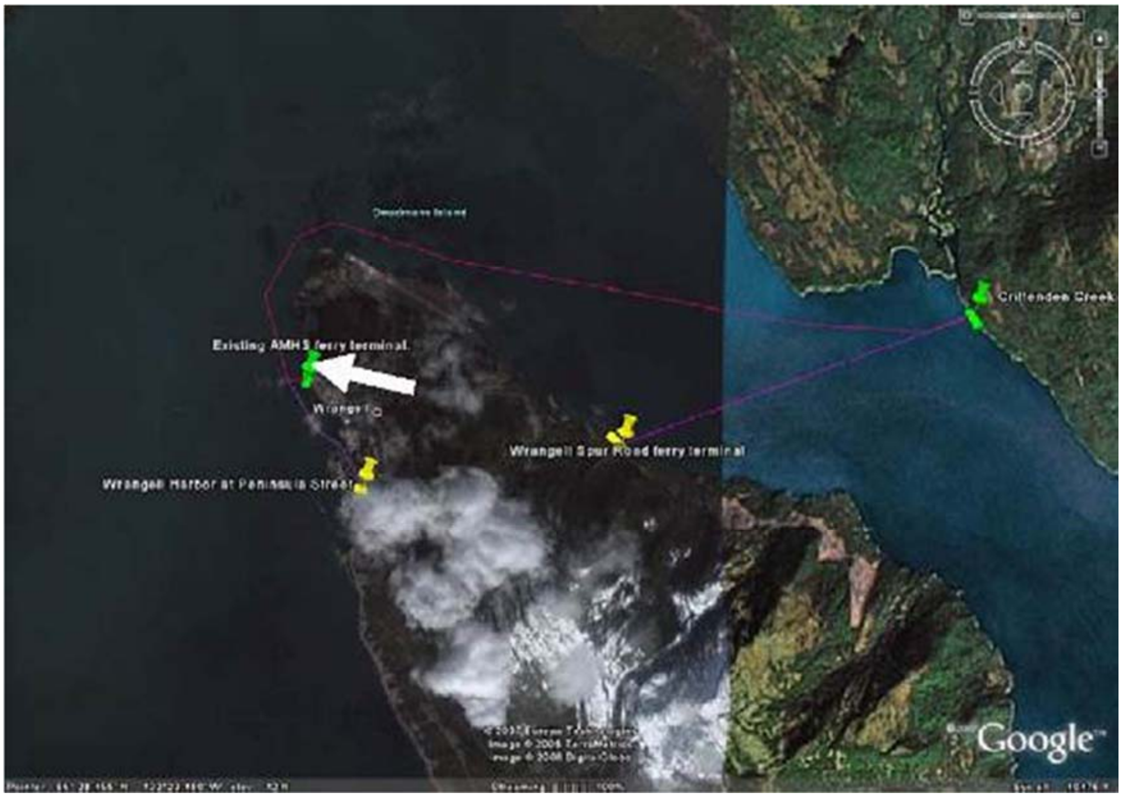


Figure 2-19. Aerial photo of existing AMHS ferry terminal at Wrangell

Table 2-6. AMHS Wrangell conventional ferry terminal site characteristics

Latitude	56°28.467' N
Longitude	132°23.504' W
Water depth [ref. MLLW]	Suitable (accommodates existing mainline ferries)
Offshore approach	Good
Maneuvering room	Good
Exposure	Moderate
Shore elevation	Suitable (existing and appropriately developed)
Uplands	Moderate slope and connected to existing roads
Suitability	Conventional ferry
Evaluation/Rating	Promising

2.3.3 Wrangell Harbor at Peninsula Street

If developing a conventional ferry terminal at or near the Spur Road or using the existing AMHS ferry terminal at Wrangell as the opposing ferry terminal to Crittenden Creek were not possible, then a third option might be to develop a conventional ferry terminal inside Wrangell Harbor where it closely adjoins Peninsula Street. There are at least two potential sites in this vicinity. One is currently configured as a boat launch, and the other is currently used to store sand and gravel materials.

The route from Crittenden Creek to Wrangell Harbor at Peninsula Street is approximately 6.9 nm (one-way crossing), navigating through the Highfield Anchorage inside Deadman Island (Figure 2-19) and somewhat longer moving through Eastern Passage outside Deadman Island. From the harbor entrance to Peninsula Street (approximately 0.4 nm), the ferry would have to transit each way at harbor (no wake) speed. Because it is a preferred operating procedure for ACV to land with somewhat higher forward speed, it is unlikely that an ACV terminal could be developed inside Wrangell Harbor. Thus, the Wrangell Harbor site at Peninsula Street is regarded as most appropriate as a conventional ferry terminal site.

The white arrow on Figure 2-20 points at the area in Wrangell Harbor at Peninsula Street where a conventional ferry terminal might be located. Approximate coordinates of this site are given in Table 2-7.

Figure 2-20. Aerial photo of Wrangell Harbor at Peninsula Street

Table 2-7. Wrangell Harbor conventional ferry terminal site characteristics

Latitude	56°27.733' N
Longitude	132°22.785' W
Water depth [ref. MLLW]	Marginal: 9 feet (1.5 fathom) in Wrangell Harbor
Offshore approach	Good
Maneuvering room	Suitable only for (draft restricted) double-ended ferry
Exposure	Low
Shore elevation	Suitable
Uplands	Suitable
Suitability	Conventional double-ended ferry (draft restricted)
Evaluation/Rating	Possible

The bathymetry of Wrangell Harbor is shown on Figure 2-21. In general, the harbor is not deep, and there is a shallow area at approximately 1.5 fathoms (9 feet) along the track towards Peninsula Street. Some dredging might be required to make the harbor suitable for conventional ferry operations. To minimize such dredging, any ferry designed for this service should have a restricted draft. Without dredging, the ferry would have to be restricted to less than a 4.5-foot draft to operate without restriction on extreme low tides.

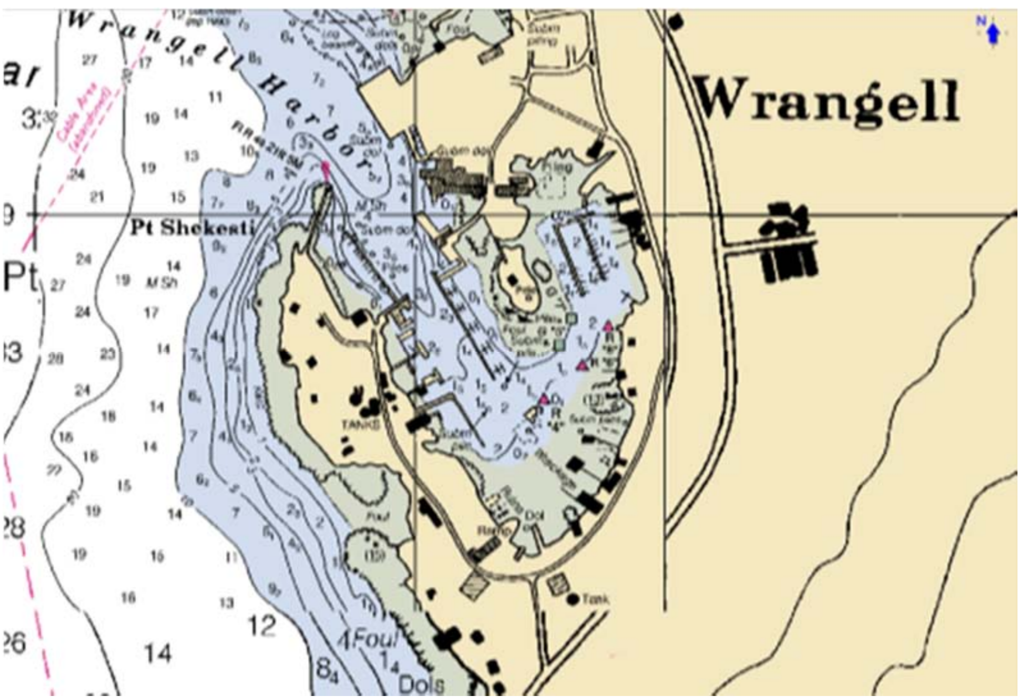


Figure 2-21. Bathymetry of Wrangell Harbor

Figure 2-22 shows various photos taken inside Wrangell Harbor on October 30, 2007. Figures 2-22a through 2-22c show the boat ramp at Peninsula Street, and Figures 2-22d through 2-22f show the area where sand is piled and stored. Because of the shallow water depths inside Wrangell Harbor and the need for some combination of draft restriction and/or dredging, this conventional ferry terminal site is rated as "possible."

Figure 2-22a

Figure 2-22b

Figure 2-22c Showing boat launching ramp

Figure 2-22d Showing sand piles

Figure 2-22e

Figure 2-22f

Figure 2-22. Photos of Wrangell Harbor at Peninsula Street

2.3.4 Log Transfer Station on Wrangell Island (near The Narrows)

The existing Log Transfer Station on Wrangell Island (Figures 2-23 through 2-26) is located on the Eastern Passage side of The Narrows, as shown on Figures 2-23 and 2-24, an approximately 1.38-nm (1.59-mile) straight-line distance from the narrowest point of The Narrows. The Log Transfer Station is the logical Wrangell Island conventional ferry terminal site to serve opposite Berg Bay and the Aaron Creek Corridor. The one-way route distance from the potential conventional ferry terminal in Berg Bay is approximately 6.25 nm.

Figure 2-23. Aerial photo of Log Transfer Station on Wrangell Island near The Narrows

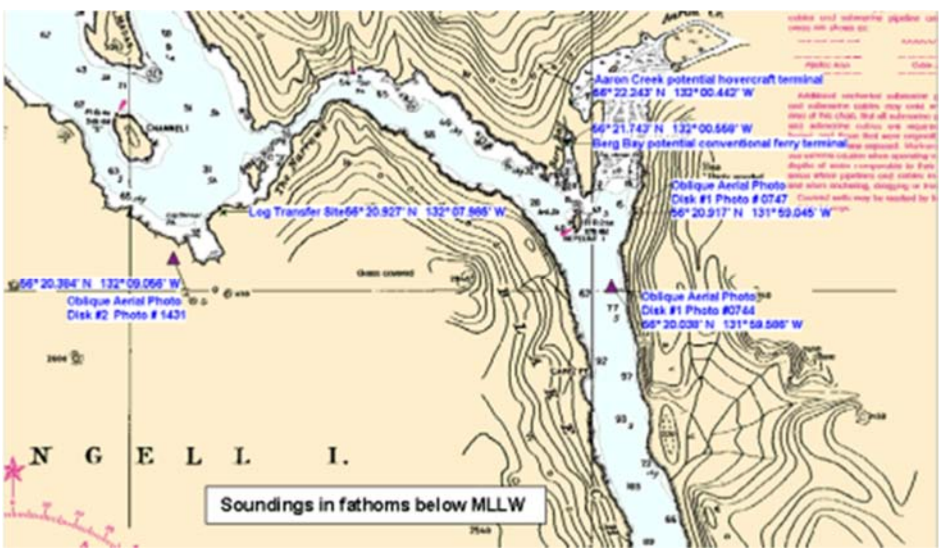


Figure 2-24. Bathymetry of Eastern Passage and approaches to the Log Transfer Station

 **Figure 2-25a**	 **Figure 2-25b**
 **Figure 2-25c**	 **Figure 2-25d**

Figure 2-25. Photos of the Log Transfer Station on Wrangell Island near The Narrows

Figure 2-26. Photo of the Log Transfer Station on Wrangell Island near The Narrows

The existing Log Transfer Station could be operated as a Wrangell Island ferry terminus serving Crittenden Creek as an option to the Spur Road, the existing AMHS Wrangell ferry terminal, or Wrangell Harbor at Peninsula Street. The one-way route distance between Crittenden Creek and the Log Transfer Station is approximately 11.07 nm. The distance of 11.07 nm is considerably longer than the corresponding ferry route distances associated with other identified Wrangell Island conventional ferry terminal sites that could serve Crittenden Creek, but the Log Transfer Station might be attractive in a staged development of the Stikine River Corridor where the ultimate build-out would be a bridge crossing The Narrows. Approximate coordinates of this site are given in Table 2-8.

Table 2-8. Log Transfer Station conventional ferry terminal site characteristics

Latitude	56°20.927' N
Longitude	132°07.985' W
Water depth [ref. MLLW]	Good
Offshore approach	Good(figures
Maneuvering room	Good
Exposure	Low
Shore elevation	Good
Uplands	Good (accessed by existing road)
Suitability	Conventional ferry
Evaluation/Rating	Promising

As the existing Log Transfer Station is a tidewater site that already connects to the existing road system on Wrangell Island, its upland suitability is well established. The water depth at the site, offshore approach, and maneuvering room are all good, and exposure is low. Hence, the Log Transfer Station is judged overall to be a “promising” site.

2.3.5 Fools Inlet (East Side)

Fools Inlet has been identified in previous studies as a likely northern terminus on south Wrangell Island for a regional ferry service extending south to Ketchikan, and it is here identified as the potential western terminus of a local ferry serving the Bradfield Canal MRA corridor from Kapho (Figure 2-27). The one-way ferry route distance between Kapho and Fools Inlet is approximately 19.79 nm. Figure 2-28 shows the Fools Inlet bathymetry.

Field reconnaissance carried out in the fall of 2007 focused on the west side of Fools Inlet, as logging roads connecting to the larger Wrangell road system are already located on the west side of Fools Inlet. However, the preferred sites for this project are on the east side of Fools Inlet; thus this summary addresses those sites without the benefit of close field inspection. Table 2-9 shows conventional ferry terminal characteristics for Fools Inlet.

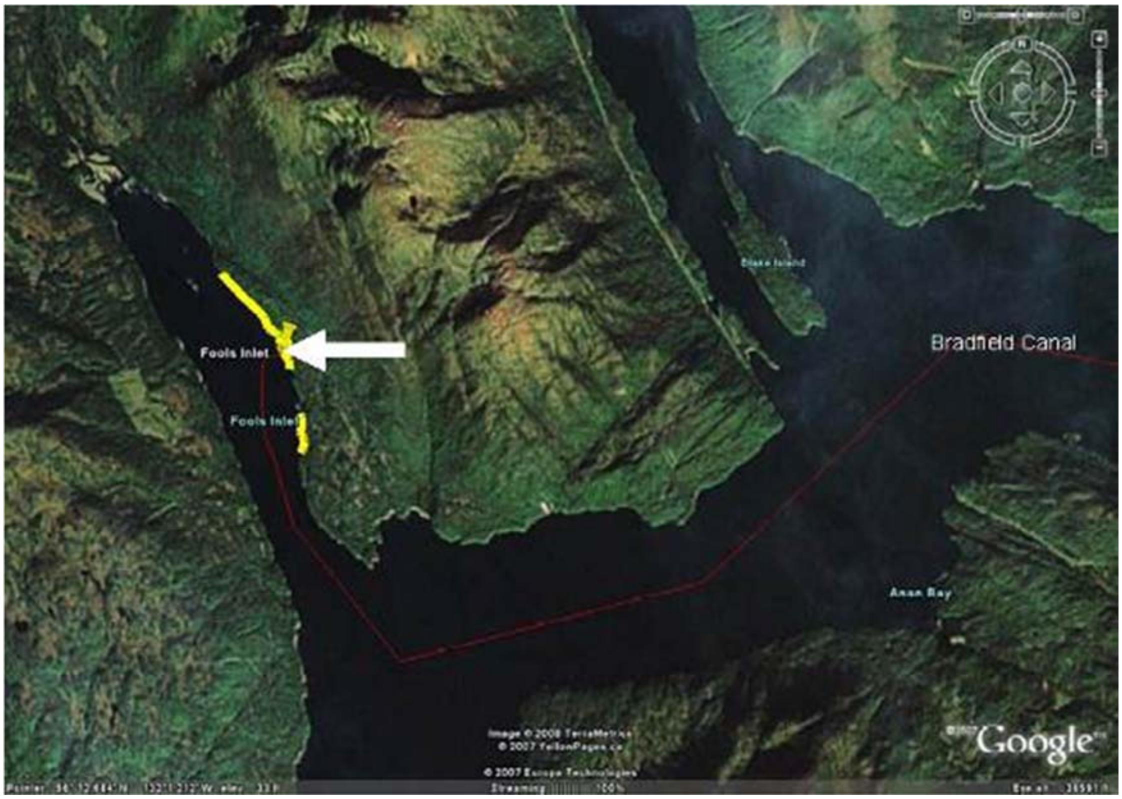


Figure 2-27. Aerial photo of Fools Inlet potential conventional ferry terminal site

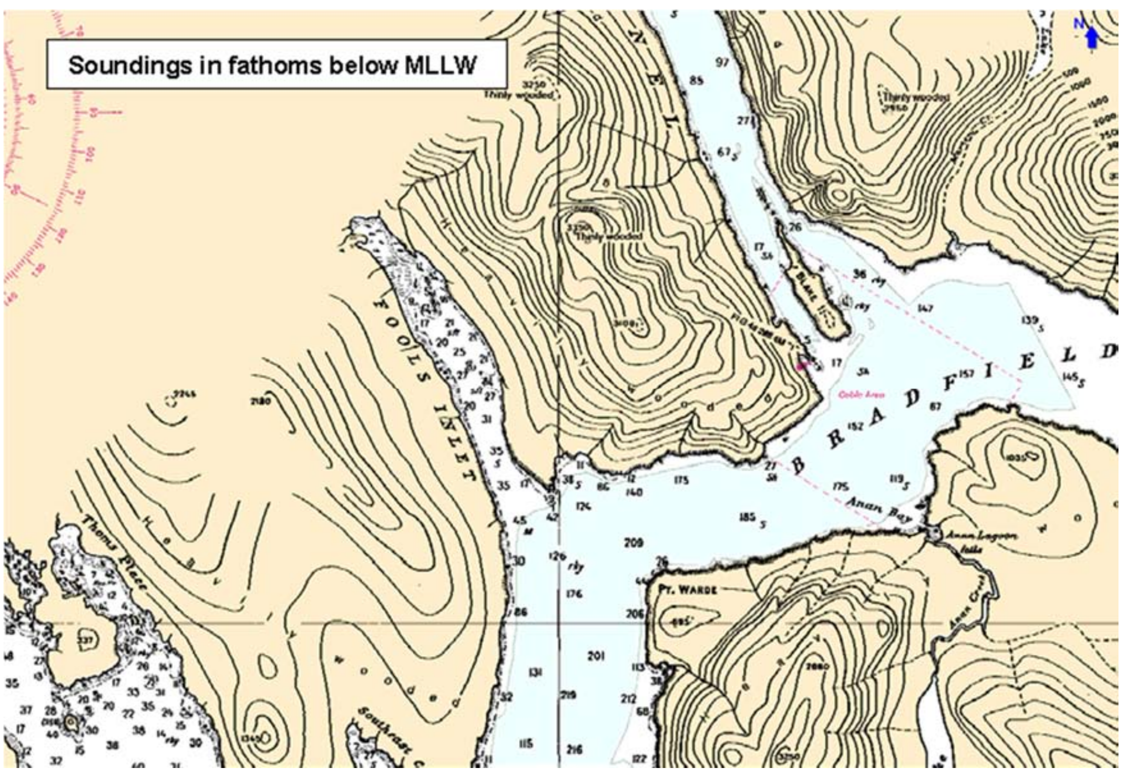


Figure 2-28. Bathymetry of Fools Inlet

Table 2-9. Fools Inlet conventional ferry terminal site characteristics

Latitude	56°12.675' N
Longitude	132°01.218' W
Water depth [ref. MLLW]	Adequate
Offshore approach	Good
Maneuvering room	Good
Exposure	Low
Shore elevation	Suitability not confirmed in the field, but appears reasonable from available photos and data
Uplands	Slope approximately 21.5%
Suitability	Conventional ferry
Evaluation/Rating	Possible

Figure 2-29 shows an elevation transect at the Fools Inlet site. This transect was developed using Southeast Alaska MRA 100-foot elevation contour GIS data. Actual slopes and elevations should be confirmed from other sources and, ultimately, by accurate field survey. This transect indicates that the average slope of the uplands over the first 100 feet of elevation from MLLW is approximately 21.5 percent. Figure 2-30, "a" through "d," shows oblique aerial photos of Fools Inlet. The Fools Inlet site is potentially "promising," but it has been rated as "possible" due to insufficient field verification of upland conditions and bathymetry.

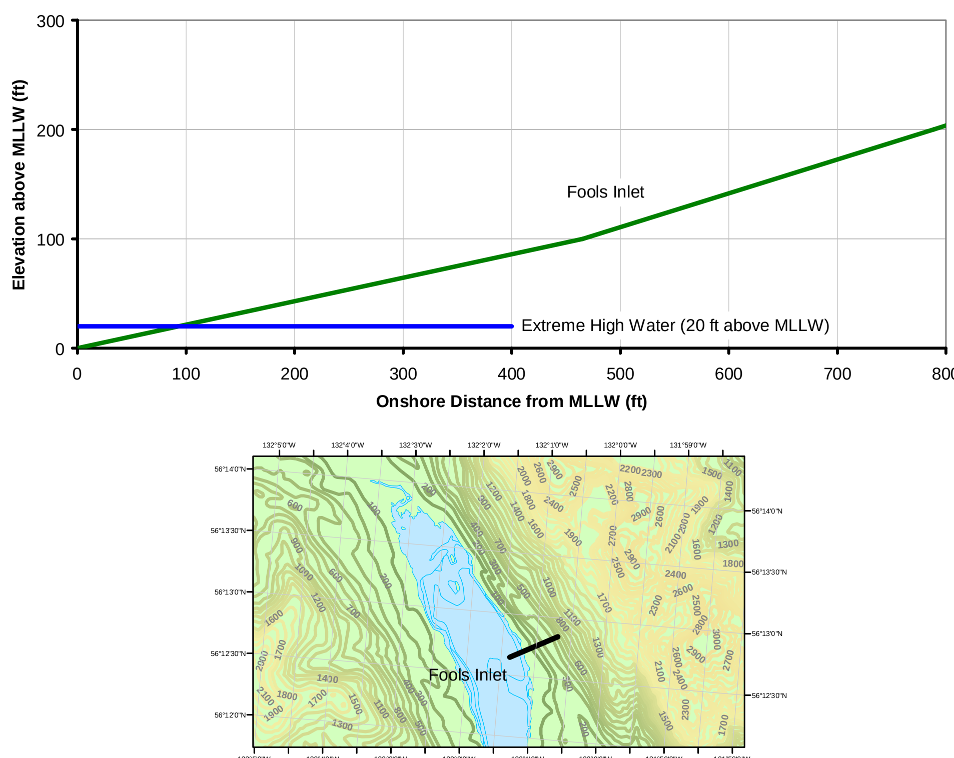


Figure 2-29. Transect at Fools Inlet

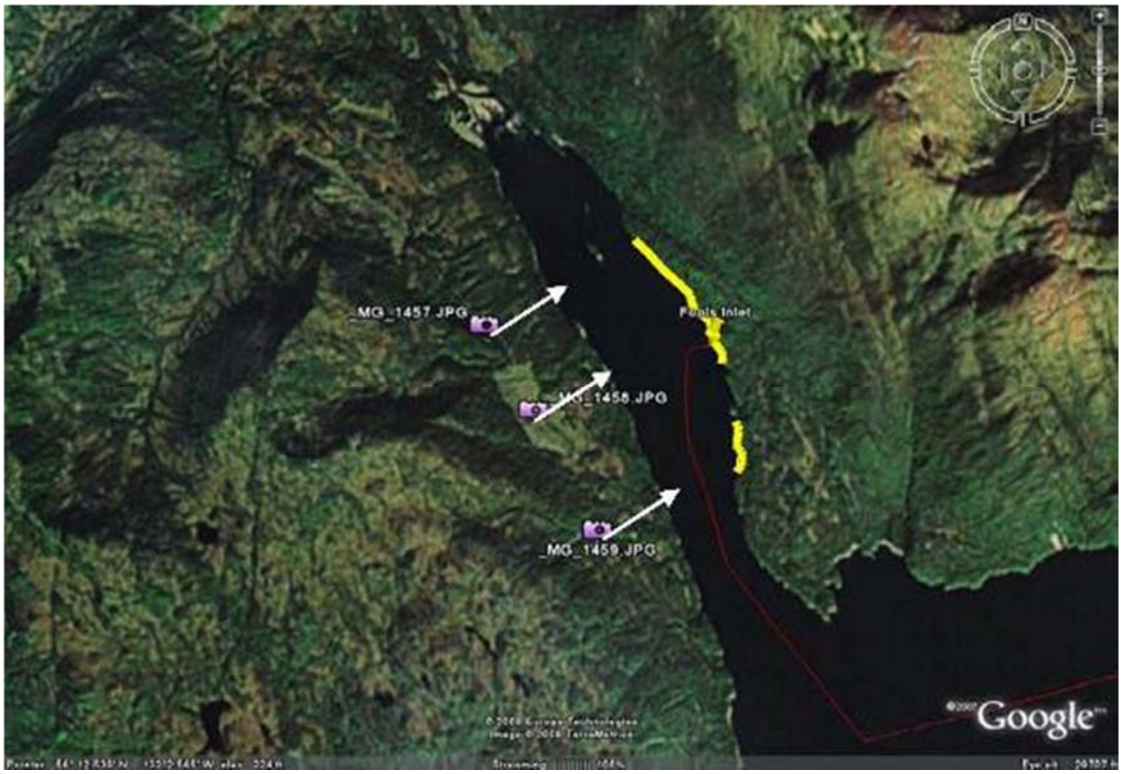


Figure 2-30a. Key to oblique aerial photos looking northeast across Fools Inlet

Figure 2-30b. Oblique photo MG_1457.JPG (see key above on Figure 2-30a)

Figure 2-30c. Oblique photo MG_1458.JPG (see key above on Figure 2-30a)

Figure 2-30d. Oblique photo MG_1459.JPG (see key above on Figure 2-30a)

3 POTENTIAL ACV FERRY TERMINAL SITES

With the extension of the new road from the Cassiar Highway down the Iskut River, the opportunity would develop to establish early traffic (before overall completion of the MRA road project) using ACV Ro-Ro/passenger ferries. The ferries would operate from a new ACV ferry terminal established in Canada near the confluence of the Stikine and Iskut Rivers. Such service would be subject to some seasonal interruptions, particularly during fall freeze-up, and perhaps again for a period during spring thaw.

Ideally, early ACV service would extend up the Iskut River to Bronson Creek. That route would also support early service for the Bradfield Canal Corridor. From 1992 through 1997, a modified AP1-88/100 (known after modification as a P AP1-88/100) ACV operated between Wrangell and Bronson Creek, providing seasonal service from April to early November. The ACV training master for the Stikine and Iskut Rivers service indicated that offering public ACV service to Bronson Creek would, however, be unreliable and unsafe.

Section 3 of this report is organized into three major subsections:

- Section 3.1: Potential Mainland ACV Ferry Terminal Sites
- Section 3.2: Potential Mitkof Island ACV Ferry Terminal Sites
- Section 3.3: Potential Wrangell Island ACV Ferry Terminal Sites

3.1 Potential Mainland ACV Ferry Terminal Sites

Potential ACV terminal sites were sought on the mainland around the confluence of the Iskut and Stikine Rivers. An ACV terminal site up the Iskut River and on the south side would be preferred, as new roads developed to support either the Stikine River or Aaron Creek Corridors would run down the south side of the Iskut River. Given the uncertainties associated with offering ACV operations even a short distance up the Iskut River, however, potential sites were also identified on the north side of the Iskut River and on the Stikine River above the confluence with the Iskut River.

ACV terminal sites must be accessible at all river stages from extreme low water to flood. The ultimate landing pad and road end must be comfortably above flood elevation, and the end of the landing pad approach ramp must extend to extreme low water elevation. Furthermore, the approach ramp must be protected from erosion and heavy deposits of earthen materials, rock, and/or flood-borne debris.

The lower Iskut River and the Stikine River near the confluence with the Iskut are surrounded by broad floodplains. The lower Iskut River is not confined by the valley walls and shows evidence of considerable channel movement, especially over the last several miles.

In consideration of the broad and extensive floodplains surrounding both the Iskut and Stikine Rivers and the concern for channel movement, ACV terminal sites were sited relatively close to reliable and substantial geographic features that evolve into higher elevation and slopes. Even so, the selected sites could become isolated and stranded should the river channels shift away from these sites.

3.1.1 Iskut River (south)

The white arrow on Figure 3-1 points at the site identified as a possible location for an ACV ferry terminal on the south shore of the Iskut River. The approximate coordinates of the site are given in Table 3-1.

Low water during the October 31, 2007, field reconnaissance prevented exploration of this site by jet boat. The site was selected based on available aerial photography and review of MRA project elevation contours and elevation and other information available using Google Earth™.

Figure 3-1. Aerial photo showing Iskut River south potential ACV terminal

Table 3-1. Iskut River south ACV ferry terminal site characteristic

Latitude	56°44.617' N
Longitude	131°42.599' W
Approach	Iskut River portion subject to meander
Stranding/Isolation Risk	Some risk of Iskut River meandering to the north
Shore elevation	Not field surveyed
Uplands	Suitable, rising
Suitability	ACV
Evaluation/Rating	Possible

Figure 3-2a indicates four oblique aerial photos available from Southeast Alaska MRA Project archives. The white arrows indicate the general direction in which each photo was taken, and the camera icons indicate the approximate location of the aircraft when each photo was taken.

Oblique photo MG_980.JPG (Figure 3-2b) shows a substantial hill, the slopes of which extend near the identified Iskut River (south) site. The hill indicates that the Iskut River is unlikely to migrate further south near the identified site.

Oblique photo MG_981.JPG (Figure 3-2c) shows relatively good-size conifer trees on the south side of the Iskut River near the identified Iskut River (south) site and a general sense of higher elevations. The sense of elevations rising from the river bank south of the Iskut River (south) site may also be drawn from oblique photo MG_982.JPG (Figure 3-2d). The photo also indicates that the Iskut River is unlikely to migrate further south near the identified Iskut River (south) site.

Finally, oblique photo MG 983.JPG (Figure 3-2e) shows relatively less mature conifer trees and some deciduous trees (most likely cottonwood) on the island formed by the river oxbow opposite Iskut River (south). The island and oxbow belong to the Iskut River floodplain and demonstrate the tendency for the Iskut River channel to migrate in this area. The distance from the Iskut River (south) site to the opposite side of the ox bow is approximately 0.7 mile, while the distance to the margin of the floodplain on the north side of the river is approximately 1 mile. These distances frame the bounds of the isolation and stranding risk that could affect an ACV terminal located at the identified Iskut River (south) site.

The other challenge to placing an ACV terminal at this Iskut River (south) site would be navigating the changing channel morphology of the Iskut River delta as it approaches its confluence with the Stikine River. There may also be broken ice rubble jumbled in the delta region near the confluence with the Stikine. Such ice rubble can make ACV operations difficult, as the skirt will not properly seal against such an angular and uneven surface, resulting in loss of cushion.

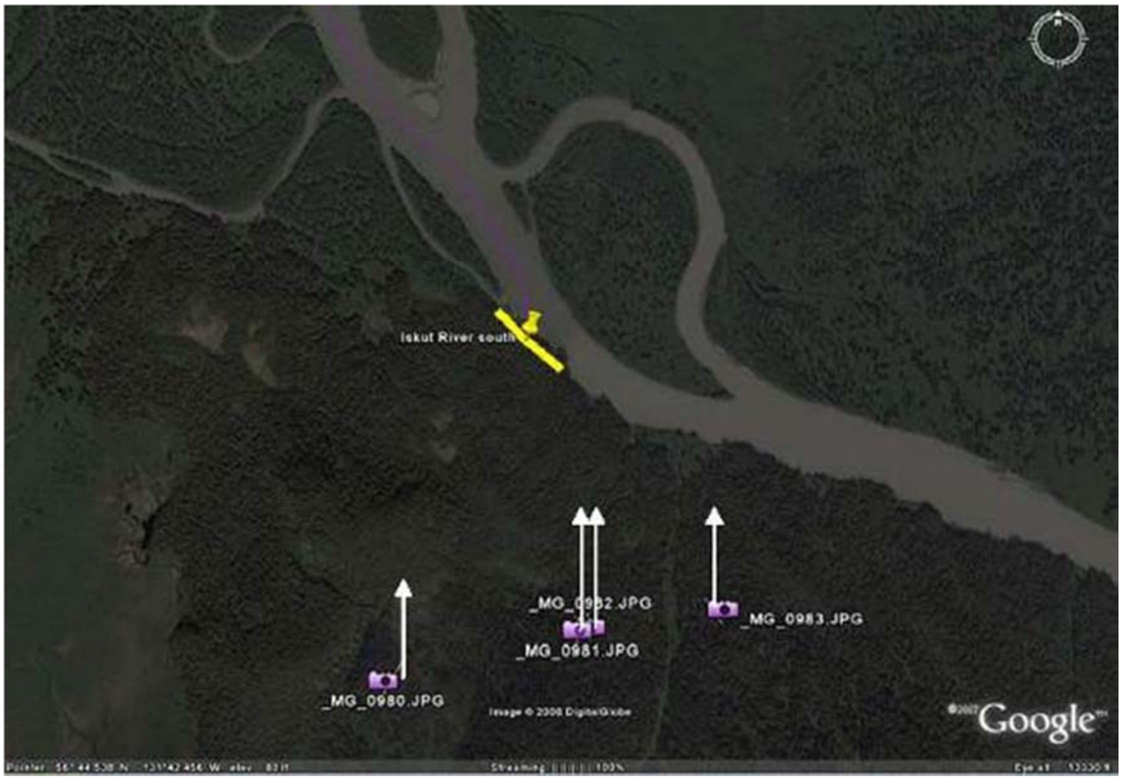


Figure 3-2a. Key to oblique aerial photos looking north at and across Iskut River

Figure 3-2b. Oblique photo MG_980.JPG (see key above on Figure 3-2a)

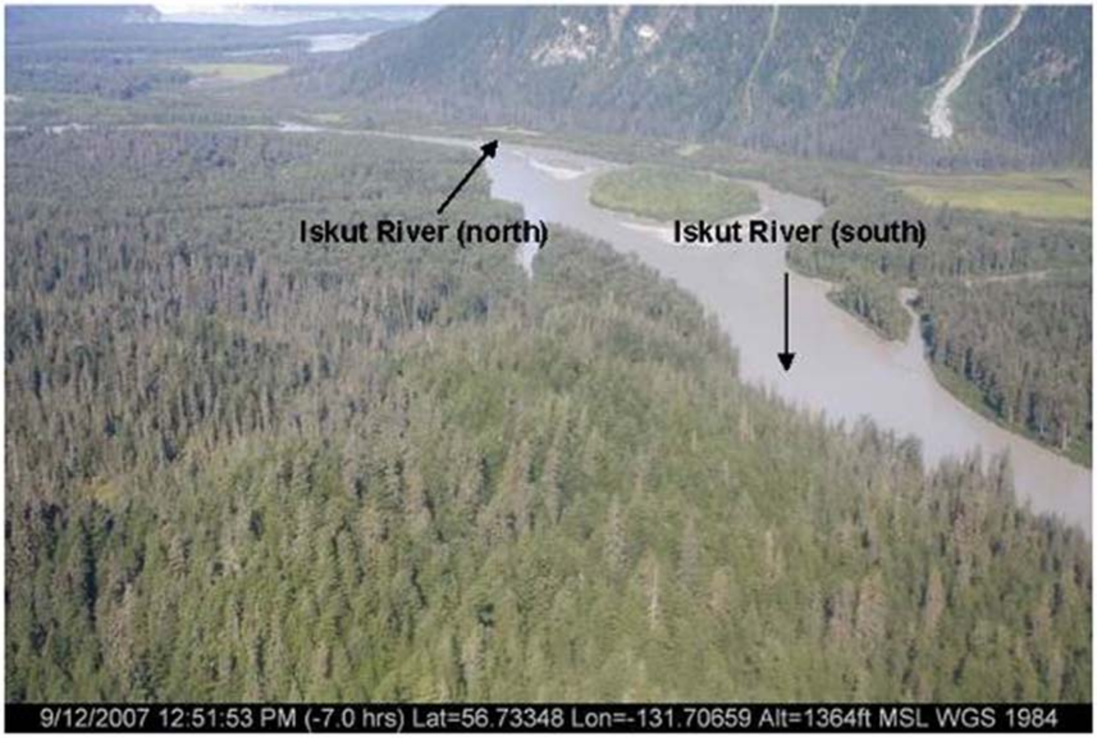


Figure 3-2c. Oblique photo MG_981.JPG (see key above on Figure 3-2a)

Figure 3-2d. Oblique photo MG_982.JPG (see key above on Figure 3-2a)

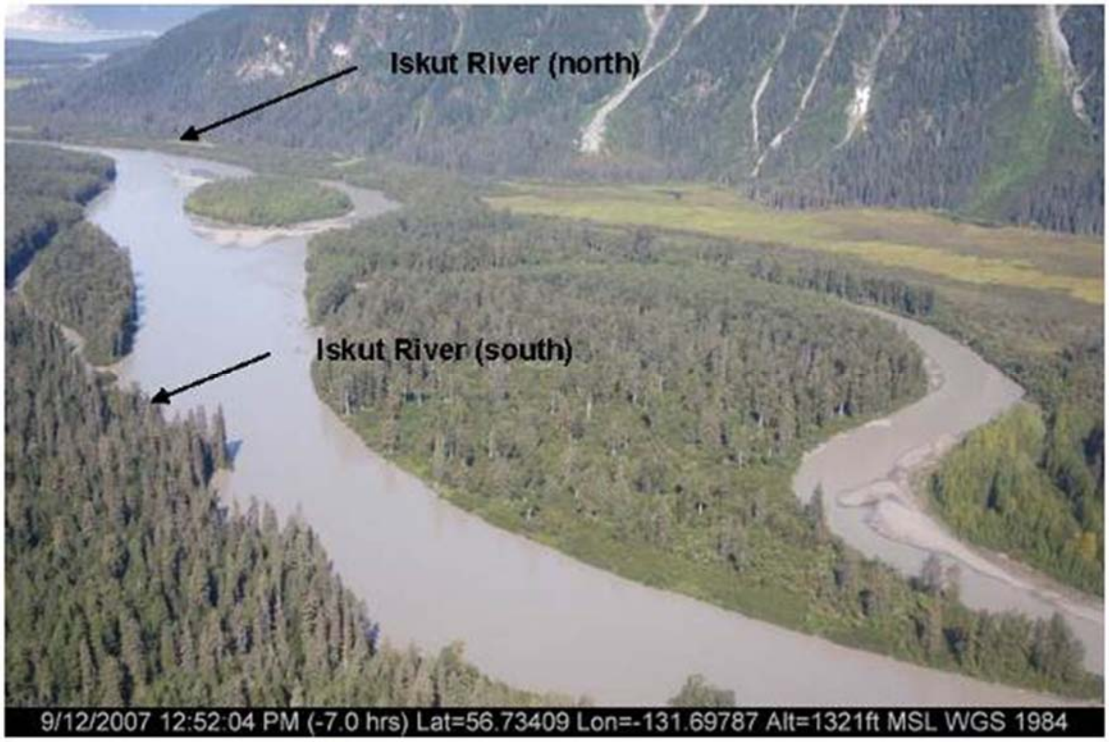


Figure 3-2e. Oblique photo MG_983.JPG (see key above on Figure 3-2a)

3.1.2 Iskut River (north)

Figures 3-2c and 3-2d include arrows pointing at the approximate location of the Iskut River (north) site. The site identified as Iskut River (north) is shown on Figure 3-3. The Iskut River (north) site is near the furthest extent of the October 31, 2007, field reconnaissance by jet boat.

The Iskut River (north) site is at or near the first close approach of the present Iskut River channel and the mountain to the north. The coordinates given in Table 3-2 and the site indicated by the white arrow on Figure 3-3 are near or at the toe of the mountain and approximately 670 feet back from the present location of the Iskut River channel. Rising elevations are available within a relatively short distance, and an ACV terminal located at or near the Iskut River (north) site would be relatively secure against river migration and encroachment.

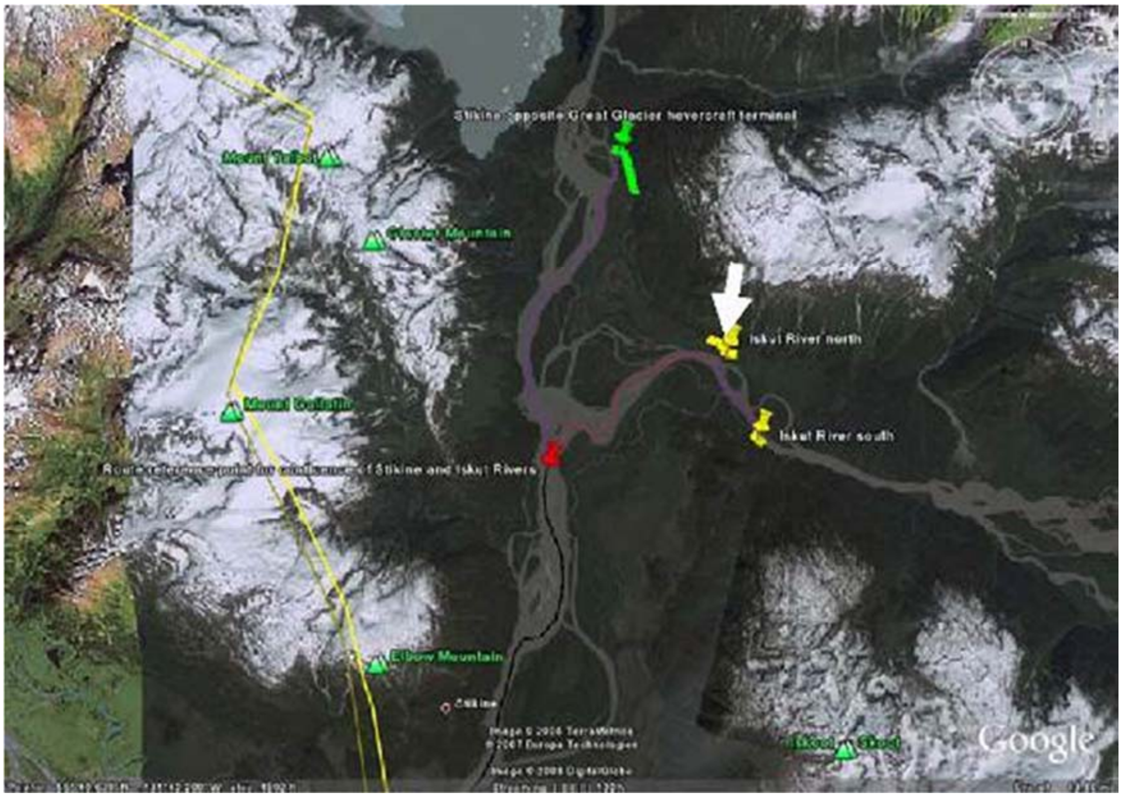


Figure 3-3. Aerial photo showing the Iskut River north potential ACV terminal

Table 3-2. Iskut River north ACV ferry terminal site characteristics

Latitude	56°45.676' N
Longitude	131°43.278' W
Approach	Iskut River portion subject to meander
Stranding/Isolation Risk	Some risk of Iskut River meandering to the south
Shore elevation	Nearly vertical, freshly eroded, river bank
Uplands	Flat floodplain to toe of mountain
Suitability	ACV
Evaluation/Rating	Possible

The photos on Figure 3-4 were taken during the October 31, 2007, field reconnaissance, looking towards Iskut River (north) from a vantage point approximately 0.3 mile west. The photos indicate that the local riverbank is steep and sharply eroded. Given the observed conditions, civil engineering measures could most likely be used to create a defensible ACV approach ramp, accessible at all river stages. This should be verified by a civil engineer with appropriate expertise.

Figure 3-4a. Photos at/near Iskut River north

Figure 3-4b. Photos at/near Iskut River north

Figure 3-4c. Photos at/near Iskut River north

3.1.3 Stikine River opposite Great Glacier

The Stikine River site opposite Great Glacier is shown on Figure 3-5, and approximate coordinates are given in Table 3-3. The Stikine River site opposite Great Glacier is another potential ACV terminal site that is accessible via the Stikine River alone. The ACV would have to pass the confluence of the Stikine and Iskut Rivers while navigating the main channel of the Stikine. The Stikine River channel appears to be crowded against a steep slope to the west where it passes the Iskut River delta, so this potential navigation challenge is thought to be manageable.

Figure 3-5. Aerial photo showing Stikine River opposite Great Glacier

Table 3-3. Stikine River opposite Great Glacier ACV ferry terminal site characteristics

Latitude	56°48.207' N
Longitude	131°45.693' W
Approach	Good, slight potential for ice jumble problems passing confluence of Iskut River in winter
Stranding/Isolation Risk	Minimal
Shore elevation	Steep, eroded, river bank
Uplands	Flat plain to toe of mountain
Suitability	ACV
Evaluation/Rating	Promising

The Figure 3-6 photos were taken during the October 31, 2007, field reconnaissance. The site closely approaches the slopes of the mountain to the east. For this reason, the site would be reasonably secure against river channel migration. It should be possible to develop ACV and road access at all Stikine River stages.

Figure 3-6a. Photos at/near Stikine River opposite Great Glacier

Figure 3-6b. Photos at/near Stikine River opposite Great Glacier

Figure 3-6c. Photos at/near Stikine River opposite Great Glacier

The Stikine River banks on Figure 3-6 are fairly steep and eroded. Given the observed conditions, civil engineering solutions could most likely be used to create a defensible ACV approach ramp, accessible at all river stages. This should be verified by a civil engineer with appropriate expertise.

3.2 Potential Mitkof Island ACV Ferry Terminal Sites

Mid-stages of down-river development of either the Stikine or Aaron Creek Corridors are common to the confluence of the Iskut and Stikine Rivers and even somewhat beyond. If early service by ACV were implemented, it might be desirable at either of these to provide ACV ferry service to South Mitkof Island. Four potential ACV ferry terminal sites on South Mitkof Island are identified in this section.

3.2.1 Blind Slough (adjacent to AMHS terminal)

An ACV ferry terminal could be developed on the beach on either side of the existing AMHS ferry terminal in Blind Slough, used by the IFA (conventional) ferry when providing seasonal northern route service from 2006 to 2008. The conventional ferry terminal is described in Subsection 2.2.1. Some of the figures and information presented in that section may apply to siting an ACV ferry terminal at this location.

Figure 3-7 shows the approximate location of an ACV ferry terminal at this site.

Table 3-4 gives approximate coordinates.

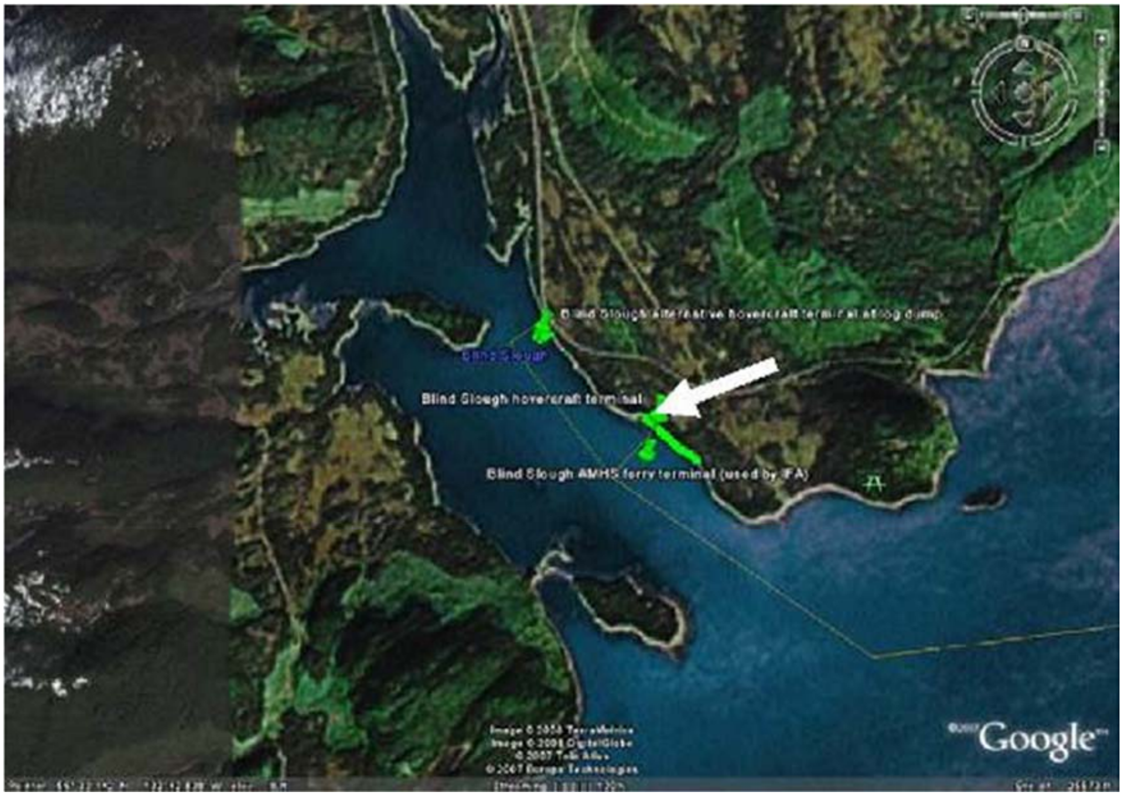


Figure 3-7. Aerial photo of Blind Slough potential ACV ferry terminal site

Table 3-4. Blind Slough ACV ferry terminal site characteristics

Latitude	56°32.142' N
Longitude	132°42.837' W
Offshore approach	Good
Maneuvering room	Good
Exposure	Low
Beach cover	Medium-size rocks that would require dressing or finish
Shore elevation	Sloping, appropriate for ACV operations
Uplands	Adjacent to developed ferry terminal holding area
Suitability	ACV
Evaluation/Rating	Promising

Figure 3-8 shows the bathymetry of Blind Slough. As described in Subsection 2.2.1, Blind Slough is quite shallow, but that would not affect ACV operations.

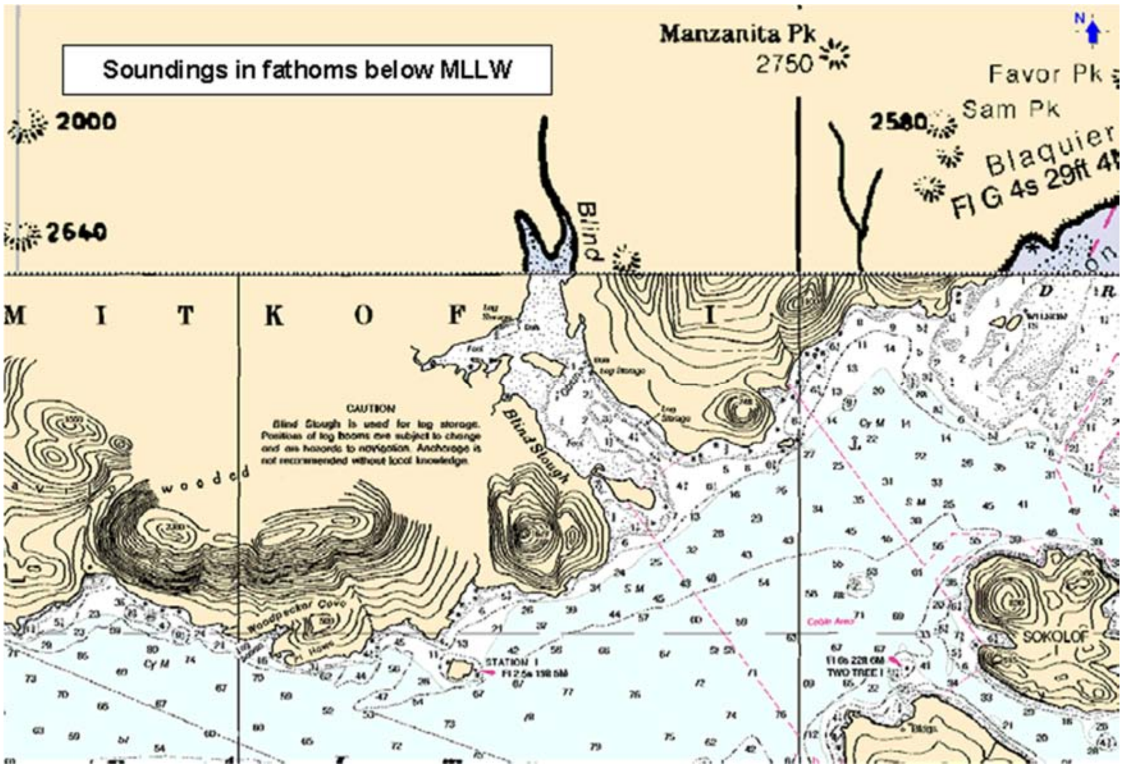
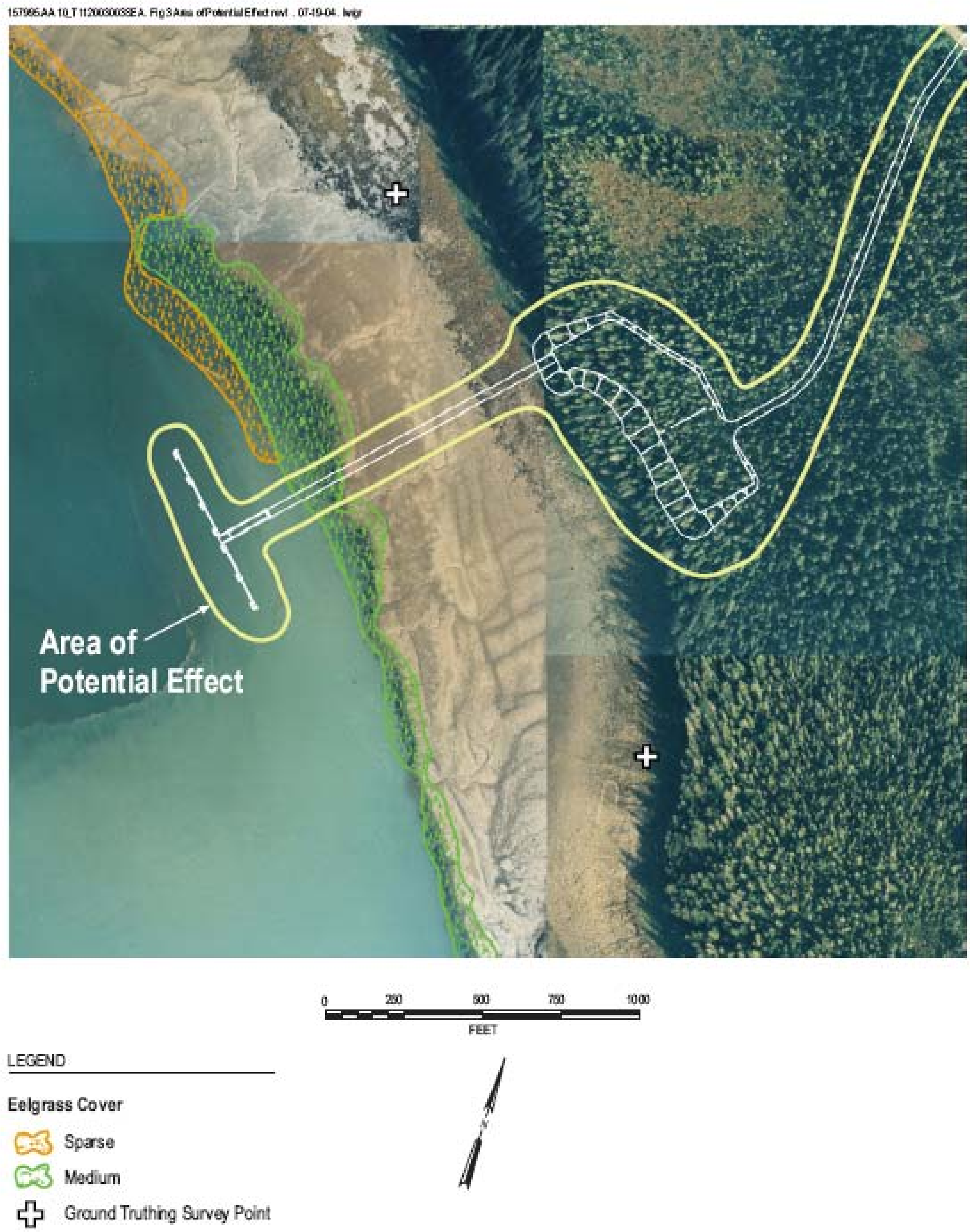


Figure 3-8. Bathymetry of Blind Slough

Figure 2-15 shows the planned site layout of the existing AMHS ferry terminal at Blind Slough. This figure is taken from the South Mitkof Ferry Terminal Environmental Assessment.

Figure 3-9, also taken from the South Mitkof Ferry Terminal Environmental Assessment, shows the planned site layout for the existing AMHS ferry terminal at Blind Slough overlaid on an aerial photograph taken at approximately MLLW. Figure 3-9 shows the approximate extent of eelgrass at the site. ACV operations would most likely not affect eelgrass. Furthermore, it should be possible to direct ACV landings and departures through the region on Figure 3-9 where eelgrass concentrations are described as "sparse."



[Source: South Mitkof Ferry Terminal Environmental Assessment, Figure 3, Proposed Action Layout]

Figure 3-9. Existing AMHS South Mitkof ferry terminal beach and eelgrass cover

The photos on Figure 3-10 were taken during the field reconnaissance of October 29, 2007. The native beach would be navigable by an ACV, though it would be preferable to develop an approach with fewer rocks and boulders, ideally a concrete approach ramp.

Figure 3-10. Photos of AMHS South Mitkof Terminal

3.2.2 Blind Slough – Olsen's Landing

If an ACV terminal in Blind Slough were desired, but impossible at or near the existing AMHS ferry terminal described in Subsection 3.2.1, a possible option for an ACV terminal would be Olsen's landing somewhat deeper in Blind Slough. Olsen's Landing is shown on Figures 3-11, 3-12, and 3-13; approximate coordinates are given in Table 3-5.

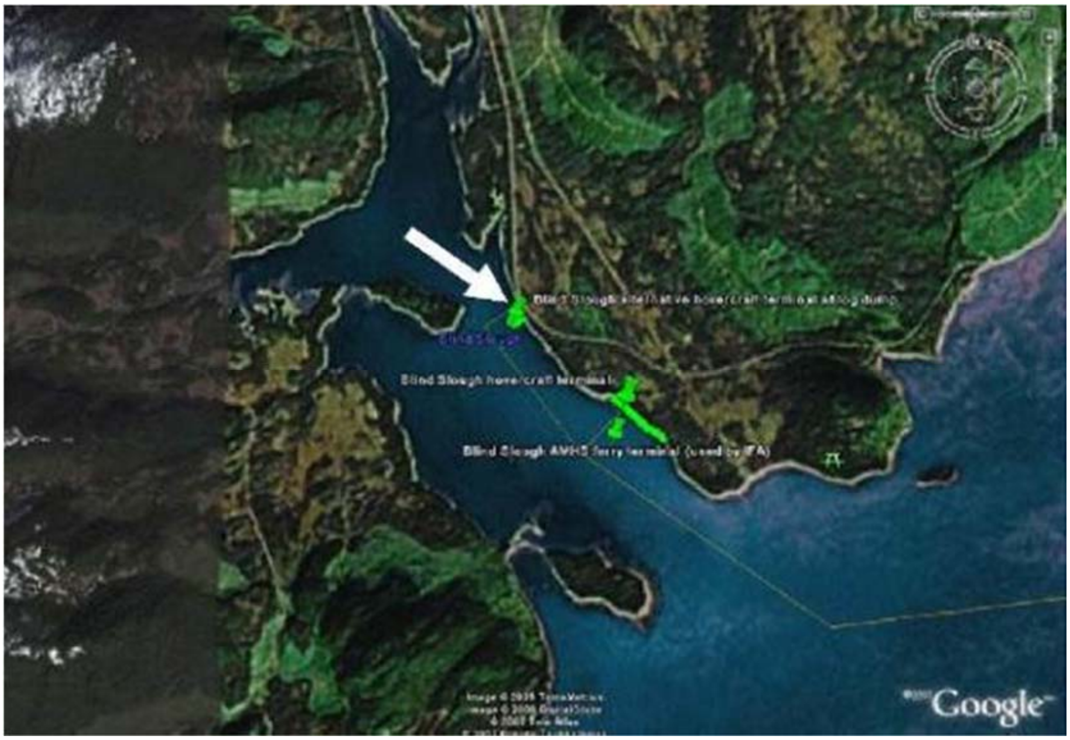


Figure 3-11. Aerial photo of Olsen's Landing in Blind Slough

[Source: South Mitkof Ferry Terminal Environmental Assessment, Figure 1, Proposed Action Layout]

Figure 3-12. Aerial photo of Olsen's Landing in Blind Slough

Figure 3-13. Photos of Olsen's Landing in Blind Slough

Table 3-5. Olsen's Landing ACV ferry terminal site characteristics

Latitude	56°32.534' N
Longitude	132°43.753' W
Offshore approach	Good
Maneuvering room	Good
Exposure	Low
Beach cover	Small rocks
Shore elevation	Sloping, appropriate for ACV operations
Uplands	Access to Mitkof Highway
Suitability	ACV
Evaluation/Rating	Promising

Olsen's Landing is connected to the existing road system on Mitkof Island. It appears to have some current use as a boat-launching site. It could easily be converted into an ACV ferry terminal.

3.2.3 Dry Strait (protected mud bay)

From Blind Slough, Mitkof Highway turns east and runs next to the shoreline at the south end of Mitkof Island, until it arrives at Dry Strait where the current highway ends. The white arrow on Figure 3-14 points at a protected mud beach overlooking Dry Strait, which is located at or very close to the current end of the Mitkof Highway. Approximate coordinates of this mud beach are given in Table 3-6.

Figure 3-14. Aerial photo of protected mud beach fronting onto Dry Strait

Table 3-6. Dry Strait mud beach ACV ferry terminal site characteristics

Latitude	56°35.831' N
Longitude	132°32.495' W
Offshore approach	Good
Maneuvering room	Adequate
Exposure	Low
Beach cover	Mud and sandy silt
Shore elevation	Sloping, appropriate for ACV operations
Uplands	Access to end of Mitkof Highway
Suitability	ACV
Evaluation/Rating	Promising

The bathymetry of Dry Strait is given on Figure 3-15. The approximate location of the identified protected mud beach north of Blaquiere Point is shown on Figure 3-16.

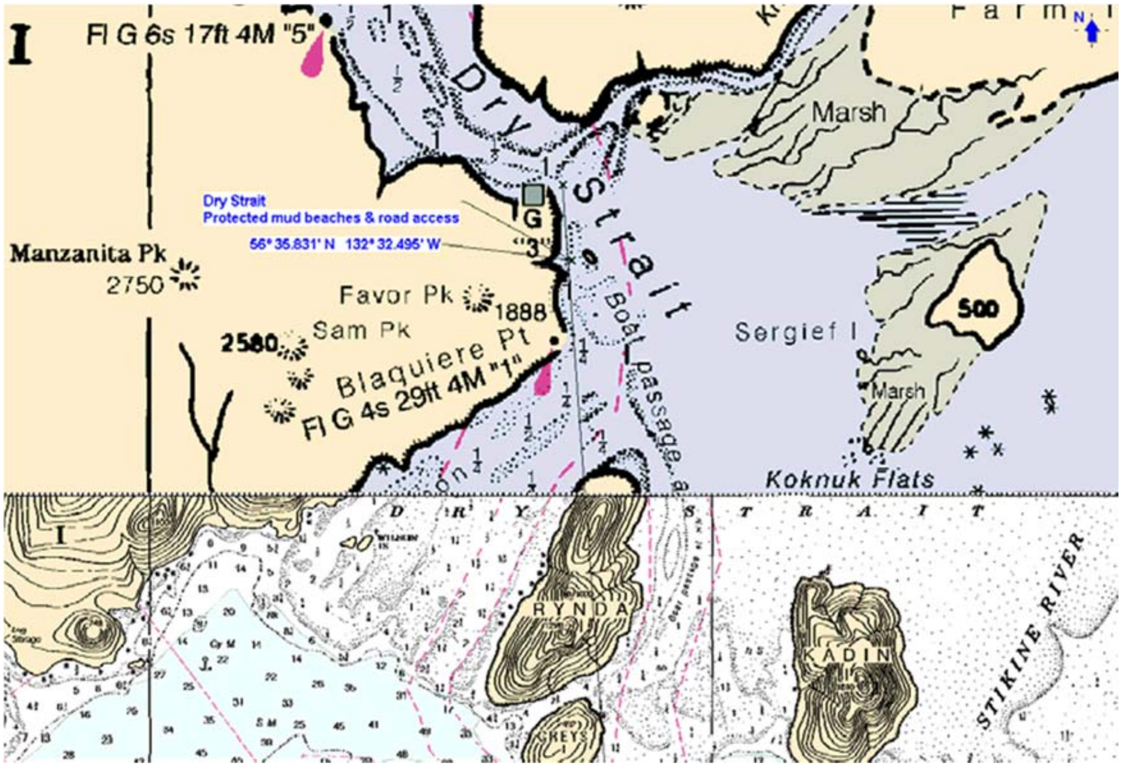


Figure 3-15. Bathymetry of Dry Strait

Figure 3-16. Photos of protected mud beach fronting onto Dry Strait

Figure 3-16 shows two photos of the protected mud beach taken during the field reconnaissance of October 29, 2007. Mitkof Highway is visible in the photo on the right.

3.2.4 Dry Strait (sandy beach)

Sandy beaches of moderate slope are found just beyond the end of the Mitkof Highway at Dry Strait. These beaches may be suitable for ACV ferry operations.

The white arrow on Figure 3-17 points at a sandy beach overlooking Dry Strait. The beach is approximately 0.8 mile beyond the current end of the Mitkof Highway. Approximate coordinates of this mud beach are given in Table 3-7.

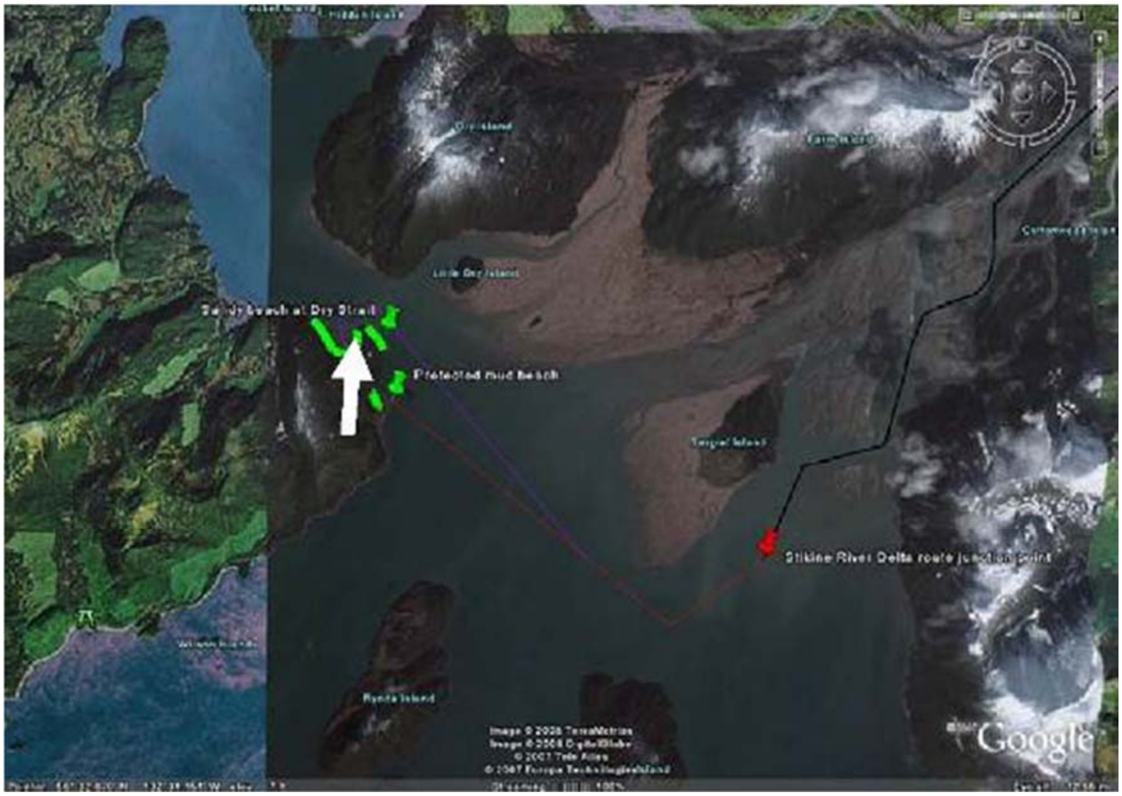


Figure 3-17. Aerial photo of sandy beach fronting onto Dry Strait

Table 3-7. Dry Strait sandy beach ACV ferry terminal site characteristics

Latitude	56°36.574' N
Longitude	132°32.650' W
Offshore approach	Good
Maneuvering room	Good
Exposure	Low
Beach cover	Sand
Shore elevation	Sloping, appropriate for ACV operations
Uplands	Requires further evaluation
Suitability	ACV
Evaluation/Rating	Promising

Figure 3-18 shows the sandy beach photographed during the October 29, 2007, field reconnaissance. The most promising sites for an ACV terminal would be in the cove just beyond the green navigation marker. No photo of that cove was taken during the field reconnaissance.

Figure 3-18. Photos of sandy beach fronting onto Dry Strait

3.3 Potential Wrangell Island ACV Ferry Terminal Sites

Mid-stages of down-river development of either the Stikine or Aaron Creek Corridors are common to the confluence of the Iskut and Stikine Rivers and even somewhat beyond. If early service by ACV were implemented, it might become desirable for either of these to provide ACV ferry service to Wrangell Island.

Wrangell Airport (north)

The north end of the Wrangell airport has been identified as a promising site for an ACV ferry terminal on Wrangell Island. Figure 3-19 shows the approximate location for such an ACV terminal. Approximate coordinates are given in Table 3-8.

During the October 29, 2007, field reconnaissance, an active project included excavating and reducing the hill immediately southwest of the northwest end of the runway. Much of the rock material from that hill was being used to extend the southeast end of the runway, though there appeared to have been some local filling near the northwest end of the runway. Some of this activity may be seen on Figures 3-20 and 3-21.

Figure 3-19. Aerial photo of Wrangell Airport potential ACV ferry terminal site

Table 3-8. Wrangell Airport (north) ACV ferry terminal site characteristic

Latitude	56°29.183' N
Longitude	132°22.956' W
Offshore approach	Good
Maneuvering room	Good, requires turn on land
Exposure	Moderate
Beach cover	Medium-size rocks would require dressing and finish
Shore elevation	Sloping, appropriate for ACV operations
Uplands	Access to local roads on Wrangell Island
Suitability	ACV
Evaluation/Rating	Promising

The greatest potential challenge to development of an ACV ferry terminal at the north end of the Wrangell Airport would be the need to operate in an FAA flight-controlled area. The ACV approaches and departures would occur close to the runway; therefore, the ACV might have to operate under FAA flight control when within the FAA flight-controlled area. The actual landing pad where vehicle and passenger loading and discharge would occur could be located 750 feet or more from the centerline of the runway, as shown on Figure 3-20. Such a location would be behind whatever might remain of Highfield Point (following current changes) and behind a line corresponding to the faces of the airport complex buildings that front the runway (white line on Figure-3-20).

Figure 3-20. Close-up of aerial photo showing setback of potential ACV terminal

Figure 3-21a

Figure 3-21b

Figure 3-21c

Figure 3-21d

Figure 3-21. Photos of Wrangell Airport

4 POTENTIAL FERRY ROUTES

The various potential terminals for conventional or ACV ferries result in 20 different potential ferry routes. Five potential conventional ferry routes are summarized in Table 4-1, and 15 potential ACV ferry routes are summarized in Table 4-2.

Table 4-1. Summary of potential conventional ferry routes

Route ID	Terminus on Mainland			Terminus on Wrangell Island			Route Distance
		Latitude	Longitude		Latitude	Longitude	(nm)
1	Berg Bay	56º 21.773'N	132º 0.610'W	Log Transfer Station	56º 20.927'N	132º 7.985'W	6.25
2	Crittenden Creek	56º 28.955'N	132º 15.145'W	Spur Road	56º 28.032'N	132º 19.561'W	2.58
3	Crittenden Creek	56º 28.955'N	132º 15.145'W	AMHS Ferry Terminal at Wrangell	56º 28.467'N	132º 23.504'W	5.98
4	Crittenden Creek	56º 28.955'N	132º 15.145'W	Wrangell Harbor at Peninsula Street	56º 27.733'N	132º 22.785'W	6.89
5	Head of Bradfield Canal at Kapho Mtn	56º 13.328'N	132º 33.648'W	Fools Inlet	56º 12.675'N	132º 1.218'W	19.79

Table 4-2. Summary of potential ACV ferry routes

Route ID	Terminus on Mainland			Terminus on Wrangell Island			Route Distance
		Latitude	Longitude		Latitude	Longitude	(nm)
6	Iskut (north)	56º 45.676'N	13º 43.278'W	Wrangell Airport (north)	56º 29.183'N	132º 22.956'W	39.74
7	Iskut (south)	56º 44.617'N	131º 42.599'W		56º 29.183'N	132º 22.956'W	40.68
8	Stikine Opposite Great Glacier	56º 48.207'N	131º 45.693'W		56º 29.183'N	132º 22.956'W	40.92
9	Iskut (north)	56º 45.676'N	13º 43.278'W	Mud Beach at Dry Strait	56º 35.831'N	132º 32.495'W	39.71
10	Iskut (south)	56º 44.617'N	131º 42.599'W		56º 35.831'N	132º 32.495'W	40.65
11	Stikine Opposite Great Glacier	56º 48.207'N	131º 45.693'W		56º 35.831'N	132º 32.495'W	40.89
12	Iskut (north)	56º 45.676'N	13º 43.278'W	Sandy Beach at Dry Strait	56º 36.574'N	132º 32.650'W	41.33
13	Iskut (south)	56º 44.617'N	131º 42.599'W		56º 36.574'N	132º 32.650'W	42.27
14	Stikine opposite Great Glacier	56º 48.207'N	131º 45.693'W		56º 36.574'N	132º 32.650'W	42.51

Table 4-2. Summary of potential ACV ferry routes (continued)

Route I.D.	Terminus on Mainland			Terminus on Wrangell Island			Route Distance
		Latitude	Longitude			Latitude	Longitude
15	Iskut (north)	56º 45.676'N	13º 43.278'W	AMHS South Mitkof Ferry Terminal	56º 32.142'N	132º 42.837'W	46.9
16	Iskut (south)	56º 44.617'N	131º 42.599'W		56º 32.142'N	132º 42.837'W	47.84
17	Stikine opposite Great Glacier	56º 48.207'N	131º 45.693'W		56º 32.142'N	132º 42.837'W	48.08
18	Iskut (north)	56º 45.676'N	13º 43.278'W	Olsen's Landing in Blind Slough	56º 32.534'N	132º 43.753'W	47.52
19	Iskut (south)	56º 44.617'N	131º 42.599'W		56º 32.534'N	132º 43.753'W	48.46
20	Stikine opposite Great Glacier	56º 48.207'N	131º 45.693'W		56º 32.534'N	132º 43.753'W	48.7

4.1 Bradfield Canal Ferry Route

Figure 4-1 shows the potential conventional ferry route along Bradfield Canal from Kapho to Fools Inlet (East). The route distance is approximately 19.8 nm. At a speed of 10 knots, that might be appropriate for a small conventional ferry, as a one-way passage would take approximately 2 hours. Two round trips could easily be accomplished in a 12-hour service day appropriate to one crew shift, but three round trips would require higher speed and power.

Figure 4-1. Kapho to Fools Inlet potential conventional ferry route

4.2 Stikine River Corridor Ferry Routes

Optional early ACV ferry route choices are possible during the mid-developmental stages of the Stikine River Corridor. Until a bridge could be constructed across The Narrows, conventional ferry service would be used pending final build-out of the Stikine River Corridor.

This subsection addresses the conventional ferry route options serving the Stikine River Corridor. It contains descriptions of all ACV ferry options serving either the Stikine River or the Aaron Creek Corridors during their respective stages of development.

4.2.1 Crittenden Creek Conventional Ferry Routes

Three potential conventional ferry routes would all start from Crittenden Creek. The shortest, and in many respects the best option, if practical, would be a route directly across Eastern Passage to Spur Road as shown on Figure 4-2. The one-way transit from Crittenden Creek to Spur Road is approximately 2.58 nm. At a speed of 10 knots, that might be appropriate for a small conventional ferry. One-way passage would take approximately 18 minutes. A double-ended conventional ferry should support an hourly round trip sailing schedule. Approximately 11 round trips could be accomplished easily in a 12-hour service day appropriate to one crew shift (including allowances for start-up and shut-down).

Should the potential Spur Road conventional ferry terminal site not prove practical, then the two identified route options would be either to sail to the existing AMHS ferry terminal at Wrangell, with a one-way transit distance of approximately 5.98 nm, or to Wrangell Harbor at Peninsula Street, a one-way distance of approximately 6.89 nm. The transit time to the existing AMHS ferry terminal at Wrangell would be approximately 40 minutes. This option would support a 2-hour, round-trip schedule. With allowances for morning start up and evening shut down, a conventional ferry should be able to accomplish five round trips in a 12-hour service day appropriate to a single crew shift.

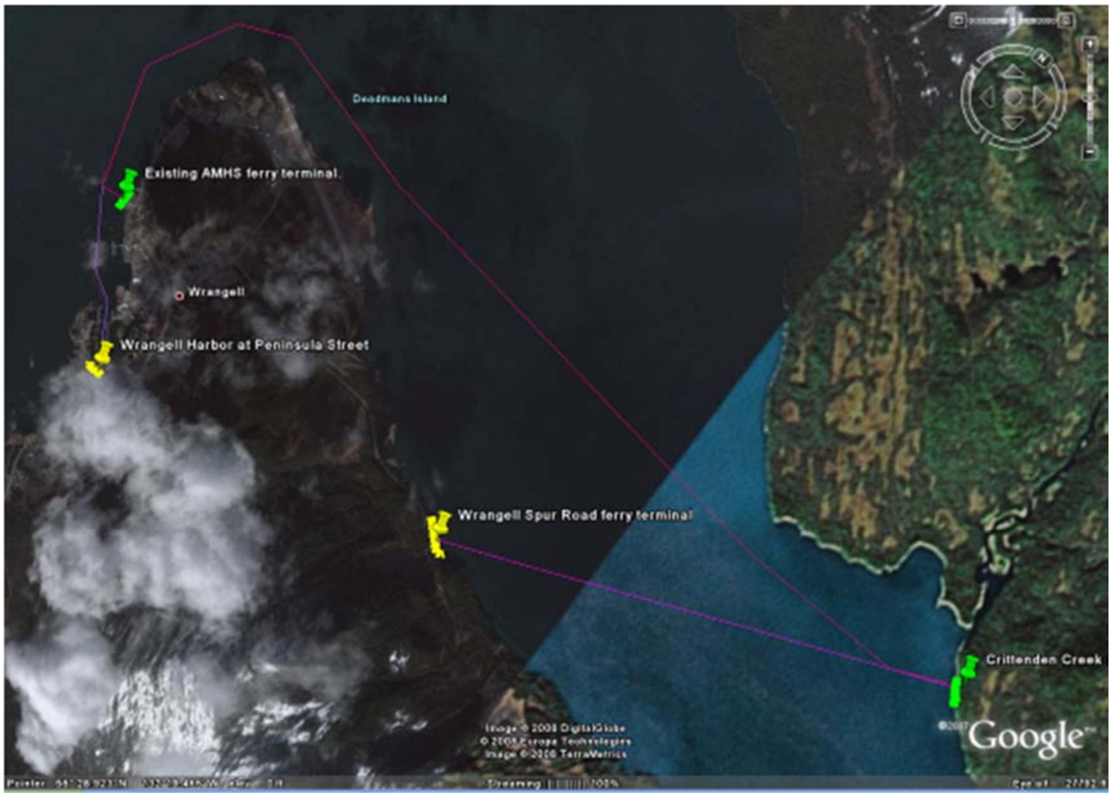


Figure 4-2. Crittenden Creek route options

Because of the requirement to transit Wrangell Harbor at harbor speeds (below 5 knots), the one-way transit between Crittenden Creek and Wrangell Harbor at Peninsula Street would require approximately 50 minutes. A round trip may require approximately 2 hours and 20 minutes. A 10-knot service speed ferry might enable only four round trips in a 12-hour service day. If five round trips were plausible, then a higher service speed, requiring greater installed power and fuel consumption, would be necessary.

4.2.2 Stikine River ACV Ferry Routes

All potential Stikine and Iskut River ACV ferry routes are shown on Figure 4-3. Two route junction points are shown by red pins. The red pin on the right is located at the junction of the Stikine and Iskut Rivers. The red pin on the left is located near the mouth of the Stikine River, where routes diverge south to Wrangell Airport (north), west to Blind Slough, and north to Dry Strait.

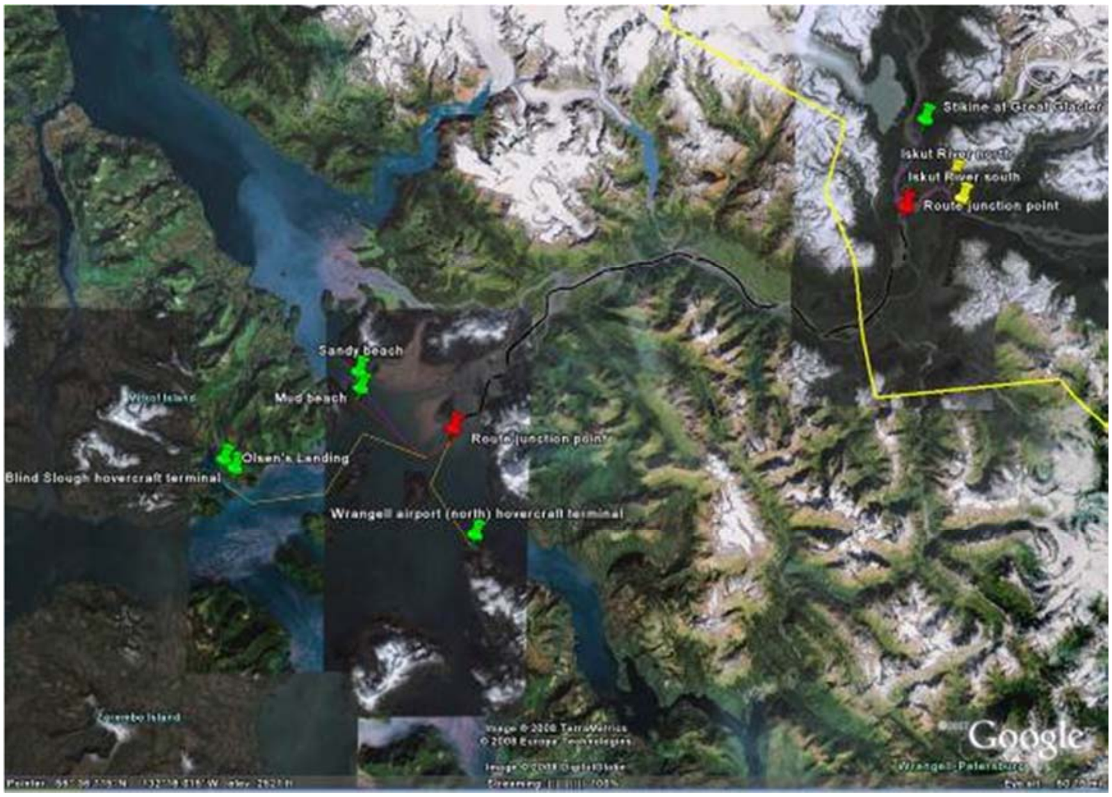


Figure 4-3. Potential Stikine and Iskut River ACV ferry routes

ACV ferry route distances are given in Table 4-2. They vary from a minimum of 39.7 nm from Iskut (north) to Mud Bay, to a maximum of 48.7 nm from the Stikine opposite Great Glacier to Olsen's Landing in Blind Slough.

For planning and scheduling purposes, an average ACV speed of 28 knots is recommended for operations from the route junction point at the mouth of the Stikine River to any of the upriver ACV terminals. Over the open water routes from the Stikine delta junction point to ACV termini on Mitkof or Wrangell Islands, an effective speed of 38 knots is recommended for planning and scheduling purposes.

The ACV would have greater speed capability than these values, which are recommended for scheduling and planning. Depending on the ACV design, make, and model actually acquired and placed in service, the loaded speed on flat open water would likely be more than 40 knots and perhaps as high as 50 knots. The sinuous character of the Stikine (and Iskut) River channels and objective hazards such as snags suggest, however, that lower average speeds would be achieved in service. The ACV training master who supported that speed the PAP1-88/100 operating on the Stikine and Iskut Rivers between 1992 and 1997 recommended for scheduling and planning should be between 28 and 30 knots, regardless of the trial speed capability of the chosen ACV.

Using these speeds, the one-way route transit times for the various routes are estimated in Table 4-3. The shortest one-way transit time is 1 hour and 23 minutes, and the longest transit time is 1 hour and 38 minutes. These transit times should permit scheduling two round trips per 12-hour crew shift during the summer season between the equinoxes (when 12-hour operations could be carried out in daylight). During the winter season, between equinoxes, only one trip per day (per ACV) would be possible. As observed elsewhere, ACV operations would have to be suspended for 3 to 4 weeks during fall freeze-up, and again for 2 to 3 weeks during spring thaw.

Table 4-3. Estimated ACV ferry route one-way transit times

Terminus on Wrangell Island or South Mitkof Island	Terminus on Mainland	Route Distance [n.m.]	One-way Transit
Wrangell airport (north)	Iskut (north)	39.74	1 hr 23 min
Wrangell airport (north)	Iskut (south)	40.68	1 hr 25 min
Wrangell airport (north)	Stikine opposite Great Glacier	40.92	1 hr 26 min
Mud Beach at Dry Strait	Iskut (north)	39.71	1 hr 23 min
Mud Beach at Dry Strait	Iskut (south)	40.65	1 hr 25 min
Mud Beach at Dry Strait	Stikine opposite Great Glacier	40.89	1 hr 26 min
Sandy Beach at Dry Strait	Iskut (north)	41.33	1 hr 26 min
Sandy Beach at Dry Strait	Iskut (south)	42.27	1 hr 28 min
Sandy Beach at Dry Strait	Stikine opposite Great Glacier	42.51	1 hr 28 min
AMHS (IFA) ferry terminal site at Blind Slough	Iskut (north)	46.9	1 hr 34 min
AMHS (IFA) ferry terminal site at Blind Slough	Iskut (south)	47.84	1 hr 36 min
AMHS (IFA) ferry terminal site at Blind Slough	Stikine opposite Great Glacier	48.08	1 hr 37 min
Olsen's Landing in Blind Slough	Iskut (north)	47.52	1 hr 35 min
Olsen's Landing in Blind Slough	Iskut (south)	48.46	1 hr 37 min
Olsen's Landing in Blind Slough	Stikine opposite Great Glacier	48.7	1 hr 38 min

4.3 Aaron Creek Corridor Ferry Route

Optional early service by ACV ferry is described in Subsection 1.2.4. The corridor road alignment for both the Stikine River and Aaron Creek Corridors is common, from the junction with the Cassiar Highway to a point on the Stikine River below the identified potential eastern ACV terminal sites. The potential ACV route options, described in Subsection 4.3.2, are, therefore, common between the Stikine River and Aaron Creek Corridors.

Aaron Creek Corridor service by conventional ferry is envisioned from Berg Bay. The conventional ferry route is summarized in Subsection 4.2.1. The 6.25-nm (one-way) route between Berg Bay on the mainland and the Log Transfer Station on Wrangell Island runs out through The Narrows, as shown on Figure 4-4. The U.S. Coast Pilot describes The Narrows as follows:

> *"The Narrows, …is about 1.5 miles long and about 250 yards (229 meters) wide at its narrowest part, and connects Blake Channel with Eastern Passage. The only dangers are a reef off the N point at the E entrance, and a rocky area with 3 to 4 feet (0.9 to 1.2 meters) over it at high water and marked by a light, on the S side of the channel just W of the narrowest part of the channel."*

At a speed of 10 knots that might be appropriate for a small conventional ferry, the 6.25-nm, one-way passage would take approximately 40 minutes. With a double-ended conventional ferry, this should support a two-hour, round trip sailing schedule. Five round trips could easily be accomplished in a 12-hour service day appropriate to one crew shift (including allowances for start-up and shut-down).

Figure 4-4. Berg Bay to Log Transfer Station

This Page Intentionally Left Blank

5 FERRY CHARACTERISTICS

This section contains information on the general size and character of vessels that might be suitable for potential conventional or ACV terminals. It also indicates which vessels could be used for particular routes identified in this report.

5.1 Conventional Ferry

Unless service by a conventional ferry is to an existing AMHS terminal (at either Wrangell or South Mitkof), the ideal ferry for the short routes identified in this report would be small; e.g., approximately 150 feet long overall, and double-ended. This configuration would promote the rapid vehicle loading and unloading associated with the drive-through capability of double-ended ferries.

If service by a conventional ferry is to an existing AMHS terminal, then either an end-loading terminal facility must be added to accommodate double ended ferries, or the ferry serving that terminal must have side-loading capability. The AMHS ferry Lituya (Figure 5-1) is an example of a ferry with side-loading capability. The B.C. Ministry of Transport inland ferry Francois Forrester (not shown) is an example of a true double-ended ferry that also has the ability to side load.

Figure 5-1. Side and stern loading AMHS ferry Lituya

The AMHS ferry Lituy, is 180 feet long with a 50-foot beam and a 10-foot draft. She is configured for stern and side loading and has a rated capacity of 18 vehicles and 149 passengers with 6 crewmembers. The Lituya has 2,000 horsepower (HP) main propulsion power and a speed capability between 10 and 12 knots. She was built at Crawford Shipyard in the U.S. Gulf Coast shipbuilding region and was delivered in 2004 for a cost of $9.4 million.

The double ended Oral Freeman is the newest Ketchikan Airport ferry (Figure 5-2). She was built by Alaska Ship and Drydock in Ketchikan and delivered in 2002. She is 116 feet long with a beam of 48 feet. The Oral Freeman has a rated capacity of 22 vehicles and 147 passengers with 2 crewmembers. A double-ended ferry similar to the Oral Freeman might be adequate for a very short crossing, such as that between Crittenden Creek and Spur Road.

The North Carolina Department of Transportation, Ferry Division, operates a fleet of double-ended conventional ferries. Its Hatteras-class ferries comprise nine vessels, eight of which are 150 feet long with a beam of 42 feet and a draft of 4 feet. The 4-foot draft of its Hatteras-class ferries would be suitable for operating to the Wrangell Harbor at Peninsula Street. The capacity of the North Carolina Hatteras-class ferries is 30 vehicles and 149 passengers. The standard vehicle used by North Carolina for this capacity rating is most likely not as long as an Alaska standard vehicle (i.e., 20 feet long and 5,000 pounds), so such a vessel in Alaska service would likely hold fewer vehicles.

Figure 5-2. Double-ended Ketchikan Airport ferry Oral Freeman

The North Carolina Department of Transportation, Ferry Division, also owns and operates two somewhat larger classes of double-ended ferries, the river-class and the sound-class (Figure 5-3). The river-class comprises eight vessels, seven of which are 180 feet long with a 44-foot beam and a 6-foot draft. North Carolina rates these river-class ferries as having a capacity of 42 vehicles and holding U.S. Coast Guard certificates for 300 passengers. As in the case of North Carolinas Hatteras-class ferries, it must be presumed that the river-class ferries would carry fewer Alaska standard vehicles.

Hatteras-class Vessel

Hatteras-class Vessel

River-class Vessel

Figure 5-3. Examples of North Carolina double-ended ferries

Pierce County, Washington, took delivery of its new double ended ferry, Steilacoom II (Figure 5-4) in January 2007. The Steilacoom II is 216 feet long, with a 68-foot beam and a 10-foot draft. She is rated for 50 cars and 300 passengers. The Steilacoom II has 2,100 HP main propulsion power and is reported to have a service speed of 11.4 knots, with a top speed more than 12 knots. It has been reported that the contract cost of the Steilacoom II was $11.2 million. Washington State Ferries (WSF) is, however, considering building some sisters to the Steilacoom II for use on its Port Townsend to Keystone route. WSF reportedly has budgeted approximately $20 million per vessel (presumably as a total acquisition project cost).

Figure 5-4. Pierce County, Washington, double-ended ferry Steilacoom II

Figure 5-5, below shows the general arrangement plans of the Steilacoom II.

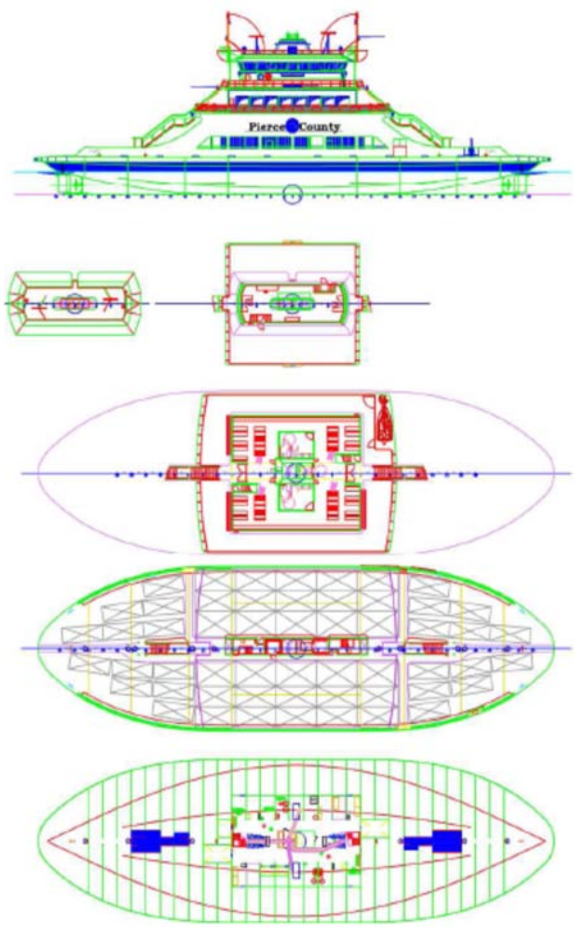


Figure 5-5. Plans of Steilacoom II

WSF Hiyu (Figure 5-6) is offered as a final example of a small double-ended ferry. The Hiyu is 162 feet long with a beam of 63 feet and a draft of 11 feet and 3 inches. She has a rated capacity of 34 vehicles and 200 passengers. The vehicle load may include up to 12 commercial vehicles, and the vertical clearance on the auto deck in the tunnel is 15 feet. The Hiyu has 860 HP installed propulsion power and a reported service speed of 10 knots.

Figure 5-6. Washington State double-ended ferry Hiyu

Figure 5-7 shows the statistical design lanes for small double-ended ferry vehicle capacity as a function of the product of length and beam. The data on which these design lanes are based are the double-ended ferries presented above. The associated definition of a vehicle is not standardized and is somewhat indistinct. In general, the various double-ended ferries in service locations outside Alaska most likely have somewhat smaller standard vehicles. Thus, they would have less capacity if rated for Alaska standard vehicles (i.e., 20 feet long and 5,000 pounds). As evidence of this, a point corresponding to the Lituya is shown on Figure 5-7. While the Lituya is not a double-ended ferry, much of the reduction in capacity is probably related to differences in definition of standard vehicle size.

5.2 ACV Ferry

ACVs have a long and successful record of diverse applications, including service in harsh environments. Large ACV ferries operated across the English Channel for 32 years (1968 to 2000), carrying passengers and vehicles of all descriptions at approximately 50 knots. ACVs have been, and currently are, used in the Alaska Arctic to support the oil and gas industry. They have been used in western Alaska to carry mail and passengers, and Aleutians East Borough (AEB) has recently been operating a Ro Ro/passenger ACV on Cold Bay to link King Cove with the airport at Cold Bay. In the 1990s, a PAP1-88/100 cargo ACV was operated from Wrangell up the Stikine and Iskut Rivers in support of mining operations.

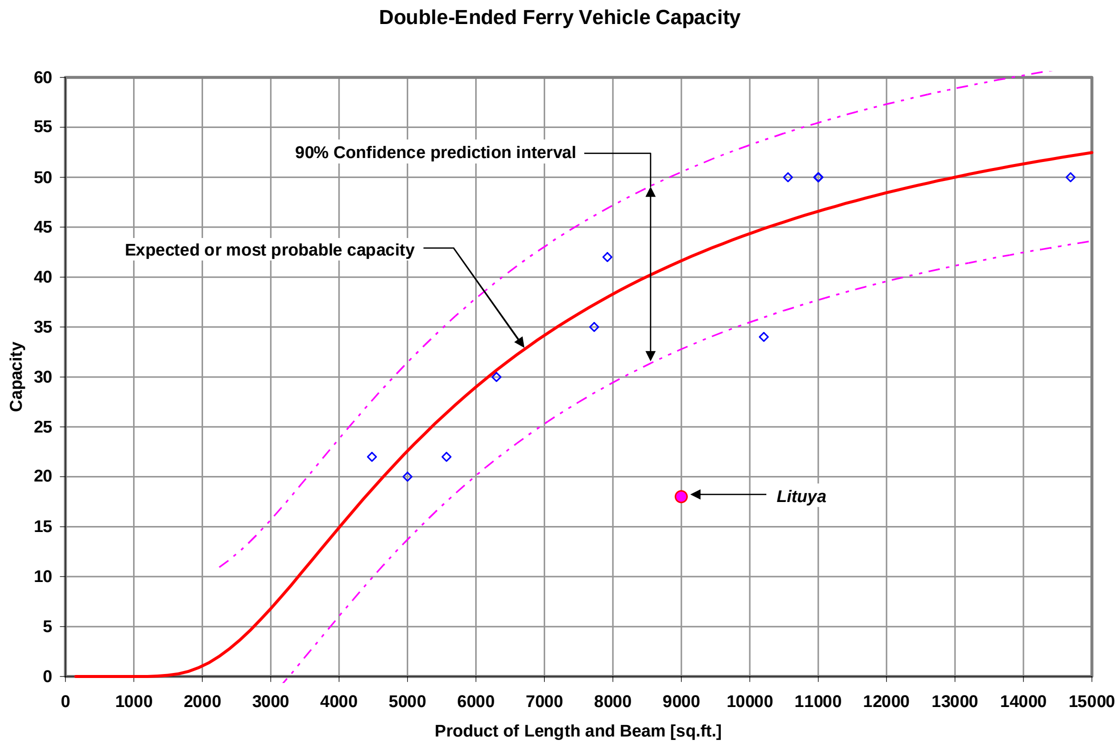


Figure 5-7. Capacity of small double-ended ferries

The projected traffic volume for a Southeast Alaska MRA ferry route is considerable when judged against the capacities of historical and current ACV vehicle ferry designs. It is somewhat peculiar, but the historical large ACV designs for the most part represent larger vehicle capacity when compared to most modern ACV. The SRN-4, Montbatten-class ACV was the largest ever in commercial service. It operated across the English Channel with a 60-knot cruising speed. The SRN-4 entered service in 1968 with a capacity of 30 cars and 254 passengers. It was lengthened twice during its 32-year career and ended service in 2000 at a length of 56.38 meters (185 feet). In its final configuration, the SRN-4 had a capacity of 60 cars and 418 passengers.

Among military ACV, the Russian Zubr-class landing craft air-cushion (LCAC), commissioned in 2001 at a length of 57.6 meters (189 feet), has a fully loaded weight of 535 tonnes (payload approximately 131 tonnes), a service speed of 63 knots, and is the largest ever constructed.

In theory, a prospective owner should be able to commission an ACV design to meet mission requirements and then bid the construction of that design among qualified and capable shipbuilders.

In reality, however, only a few design teams currently are in place with a combination of ACV design experience and the confidence needed to generate a new design.

Griffon Hovercraft Ltd. and Hoverwork Ltd. (a wholly owned subsidiary of Hovertravel Ltd.), both located on the Isle of Wight, United Kingdom, are civilian ACV designers that could produce such vessels. Textron Marine & Land Systems (TM&LS, a division of Textron, Inc.) built gas-turbine LCAC vehicles for the U.S. military, beginning in the mid-1980s, and delivered the final craft in 2001. TM&LS also built six LCACs for the Japan Defense Agency. Until its recent bankruptcy, Atlas Hovercraft, Inc., of Florida was developing two different, large, vehicle-passenger ACV vehicles. There are also individuals scattered throughout the marine industry on several continents with the necessary experience and confidence to respond to Alaska's design needs.

The largest non-military, self-propelled ACV designed and built since the LCAC and Russian Zubr-class is the BHT-130 ACV. The first vessel was delivered to AEB for use on Cold Bay, Alaska, and the second was delivered to the account of Hovertravel Ltd. for passenger-only ferry service to the Isle of Wight.

Non-self-propelled hoverbarges have been built and used successfully on the Alaska and Canadian North Slopes and in other frontier settings. Recently, BMT Nigel Gee designed a non-self-propelled hoverbarge that is currently under construction at Sundial Marine Construction and Repair. That 64.2 meter by 25.2 meter hoverbarge has a design payload of 450 tons and is intended for service to the Tulsequah Chief Mine located in Canada approximately 30 nm up the Taku River. Planned service speed for the hoverbarge is only 5 to 10 knots.

5.2.1 British Hoverwork's BHT-130

The British firm Hoverwork Ltd. designed a BHT-130 in a half-well configuration for operation by AEB across Cold Bay, Alaska. The vessel provides vehicle and passenger service connecting the community of King Cove with the airport at Cold Bay. Figure 5-8 shows the outboard, and Figure 5-9 shows the inboard arrangements of the AEB-owned BHT-130.

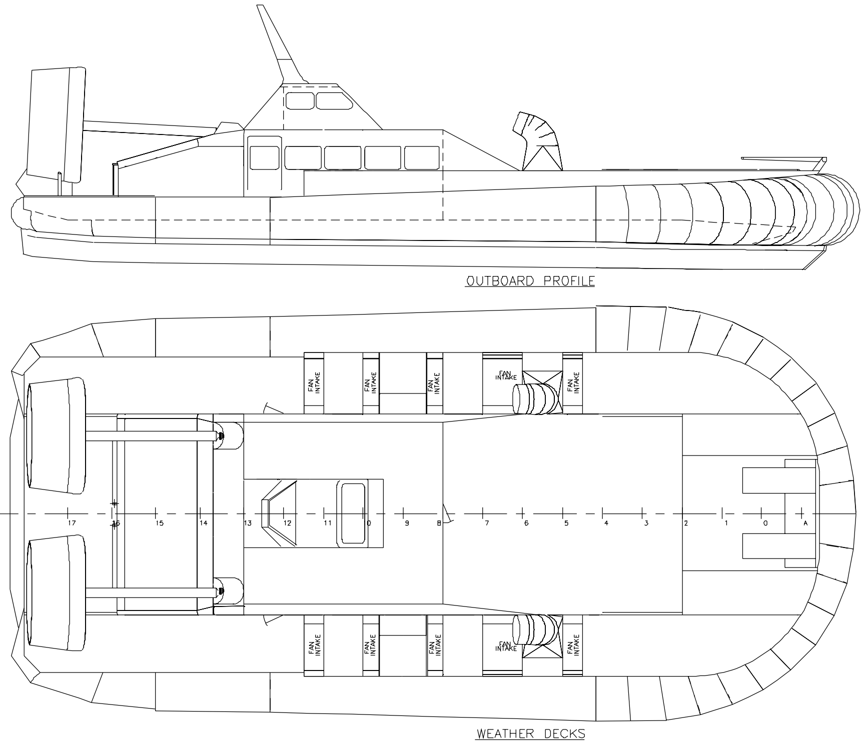


Figure 5-8. Outboard arrangements of Aleutians East Borough's BHT-130 ACV

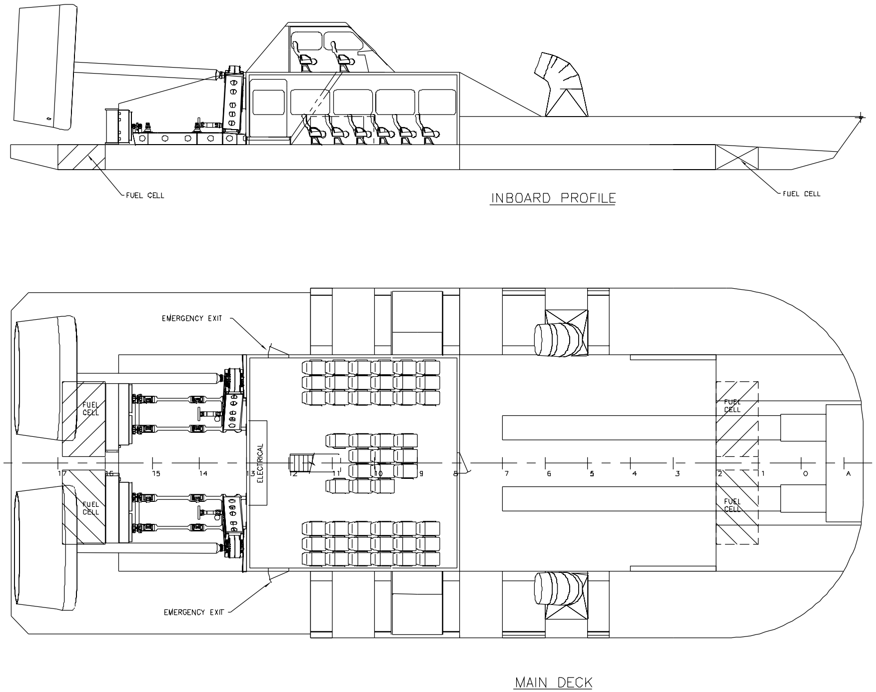


Figure 5-9. Inboard arrangements of Aleutians East Borough's BHT-130 ACV

Table 5-1 shows the principal characteristics of Aleutian East Borough's BHT-130 ACV.

Table 5-1. Principal characteristics of Aleutians East Borough's BHT-130 ACV

Passenger Capacity	50
Vehicle Capacity	4
Lightship Weight	51 tonnes
Maximum Operating Weight	70 tonnes
Total Deadweight Capacity	19 tonnes
Length	95 ft
Beam	46 ft
Skirt Depth	5.4 ft
Propellers	11.5 ft
Maximum Speed	Up to 60 knots in calm conditions
Design Service Speed	40 knots
Propulsion Power	2 x 1,300 = 2,600 HP
Lift Fan Power	2 x 1,300 = 2,600 HP

Figures 5-10 and 5-11 present artists' portrayals of the BHT-130. Figure 5-12 shows a collage of photos taken when the Suna X was delivered to Alaska.

Figure 5-10. Artist's portrayal of the Aleutians East Borough's BHT-130 ACV

Figure 5-11. Artist's portrayal of the Aleutians East Borough's BHT-130 ACV

Figure 5-12. Delivery photos of Aleutians East Borough's BHT-130 ACV Suna X

Aleutian East Borough's BHT-130 was constructed at Kvichak Marine in Seattle, Washington. The May 6, 2005, Daily Journal of Commerce reported the construction contract as having a value of $8.8 million. Adjusting for inflation, the total vessel acquisition cost for a BHT-130 ACV is estimated to range from $10 to $11 million. This includes the cost of sea trials, three months of training (an estimated $100,000), and the delivery voyage ($270,000).

5.2.2 Designs under Development by the now Bankrupt Atlas ACV

As evidence of current technology, two designs under development by now bankrupt Atlas Hovercraft, Inc., of Florida, are of interest. These are the AH-100 (Figures 5-13 and 5-14) and the AH-120.

Figure 5-13. Bow quarter artist's concept view of an AH-100 ACV

Figure 5-14. Stern quarter artist's concept view of an AH-100 ACV

Based on conversations with Atlas Hovercraft designers in 2007, an AH-100 with a combination of passengers and vehicles on the main deck could handle from 8 to 12 Alaska standard vehicles and hold from 75 to 100 passengers. If the main deck was devoted exclusively to vehicles, and passengers were located on the second deck, then the vehicle capacity would be approximately 16 Alaska standard vehicles, but the passenger capacity would decrease to approximately 50 people. Atlas Hovercraft's next largest standard size, the AH-120, would likely carry approximately 20 to 25 Alaska standard vehicles and from 100 to 150 passengers.

Because the intended voyage would be international, it would be possible to flag the ACV under some flag of convenience. Atlas Hovercraft's designers recommended that the ACV sail under Canada's flag with a SOLAS Certificate using IMO's High Speed Craft Code. Atlas uses composite materials such as fiberglass in its ACV designs. Marine authorities in many other nations have been more progressive and accepting of composite material technologies than the U.S. Coast Guard. For this reason, Atlas Hovercraft's designers believe that an ACV constructed from composite materials could be more easily certified in Canada than in the United States. In their opinion, sailing under a foreign flag should neither prevent manning the ACV with a U.S. crew, nor routinely berthing the ACV overnight at Wrangell.

6 POTENTIAL FOR COMMERCIAL PORTS

This section includes a high-level evaluation of the potential for locating commercial port activities at (or near) the proposed road end at tidewater.

6.1 Characteristics of a Commercial Port

A commercial port requires safely navigable waters extending from the port to deep ocean. Ideally, 'safely navigable' means that the water is deep enough and wide enough so that course turns are moderate and infrequent; also, the exposure to wind, wave, and current is moderate enough so that passage can be routinely accomplished by a commercial vessel of a given class without tug assistance except in berthing, unberthing, and rotating in the turning basin of the harbor.

6.1.1 Commercial Vessel Characteristics

Commercial cargo ships may be broadly classified as dry bulk carriers, tankers, and containerships based on what they typically transport. Dry bulk carriers usually carry commodities in bulk; examples are grain, coal, ore, or dry chemicals. Dry bulk carriers outfitted with deck stanchions are also used to transport raw logs.

A number of dry bulk carrier size classes could meet the navigability demands on the waters potentially accessed in the Southeast Alaska MRA Project (i.e., Eastern Passage, Blake Channel, and Bradfield Canal). These bulk carrier classes are as follows:

Small—These vessels are less than 10,000 deadweight (DWT). This category includes mini bulkers that can carry from 500 to 2,500 tons, have a single hold, and are designed mainly for river transport. Although common in Europe, they are not common in North America where barges are typically used in this size range.

Handysize—These vessels range from 10,000 to 35,000 DWT.

Handymax—These vessels range from 45,000 to 59,000 DWT.

Panamax—These vessels range from 60,000 to 80,000 DWT, with principal dimensions determined by the Panama Canal's lock chambers.

Capesize—These vessels range from 100,000 to 200,000 DWT, and as they are too large to traverse the Suez or Panama Canals, Capesize vessels must round the Cape of Good Hope or Cape Horn to travel between oceans.

6.1.1.1 Handysize

The cargo deadweight capacity of handysize bulk carriers is typically from approximately 15,000 to 35,000 tons. Handysize bulk carriers are one of the most common ship sizes, comprising more than 2,000 ships worldwide with 43 million tons of deadweight capacity (Figure 6-1). Handysize ships usually are outfitted with their own deck gear (i.e., cranes and other cargo handling systems), making them suitable for service to less developed out-ports. The most common industry-standard, handysize, bulk carrier has a cargo deadweight capacity of approximately 32,000 metric tons (mt) at a full load draft of approximately 10 meters and features five cargo holds.

Figure 6-1. A typical handysize bulk carrier

Because of the range of deadweight capacities included among handysize vessels, principal dimensions vary widely. For example, a typical 32,000-mt, deadweight, handysize bulk carrier has an overall length of 606.6 feet (184.9 meters), a breadth of 93.2 feet (28.403 meters), a hull depth (keel to main deck) of 51.2 feet (15.598 meters), design and scantling draft of 32.81 feet (10.0 meters), and a mast-above-keel height (used to calculate air draft under bridges) of 143.2 feet (43.65 meters). The example handysize vessel has 8,500-BHP installed power and operates at transit speeds of approximately 12 knots.

6.1.1.2 Handymax

Slightly larger than a handysize vessel, a handymax bulk carrier (also called supramax) typically has an overall length from 150 to 200 meters (492 to 656 feet) and a beam equal to or less than 32.26 meters (105.83 feet), the maximum permitted in the navigation locks of the Panama Canal. Modern handymax designs typically have cargo deadweight capacity from 52,000 to 58,000 DWT, with five cargo holds and four cranes with a 30-mt lifting capacity. Design full load draft ranges from 11.0 to approximately 12.8 meters (less than 42 feet). Propulsion power is approximately 10,000 BHP, and speed is between 14 and 15 knots.

6.1.1.3 Panamax

Ships classified as Panamax, regardless of cargo, have maximum principal dimensions corresponding to that permitted in the navigation locks of the Panama Canal. The Panama Canal Authority restricts length to 294.1 meters (965 feet). The maximum permitted ship beam is 32.3 meters (106 feet), and the maximum draft is set as 12 meters (39.5 feet) by the south sill of the Pedro Miguel Locks. Air draft is limited to 57.91 meters (190 feet) by the Bridge of the Americas at Balboa. Panamax bulk carriers typically have deadweight capacities from 60,000 to 80,000 mt.

6.2 Bradfield Canal Potential for Commercial Port

As shown on Figure 6-2, soundings on the NOAA chart for Bradfield Canal are sparse, but they suggest that the Bradfield Canal proper would be navigable by oceangoing shipping to at least Duck Point, and possibly at least another mile further east than Duck Point. The U.S. Coast Pilot describes Bradfield Canal as follows:

> *"**Bradfield Canal** is apparently free of dangers, although in 1976, a shoal about 10.8 miles above Point Warde with a depth of 10 fathoms (18.3 meters) near the end was reported to extend towards the middle of the canal from the N shore. About 12 miles from Point Warde, the canal is almost closed by **Duck Point** which is wooded…"*
>
> *"The navigable channel of Bradfield Canal above Duck Point follows the N shore of the point, being restricted in one place to a width of 0.2 mile by a small islet which is passed on its S side. Beyond this point the canal continues 2 miles, where it ends in a broad flat off the mouths of two large streams."*

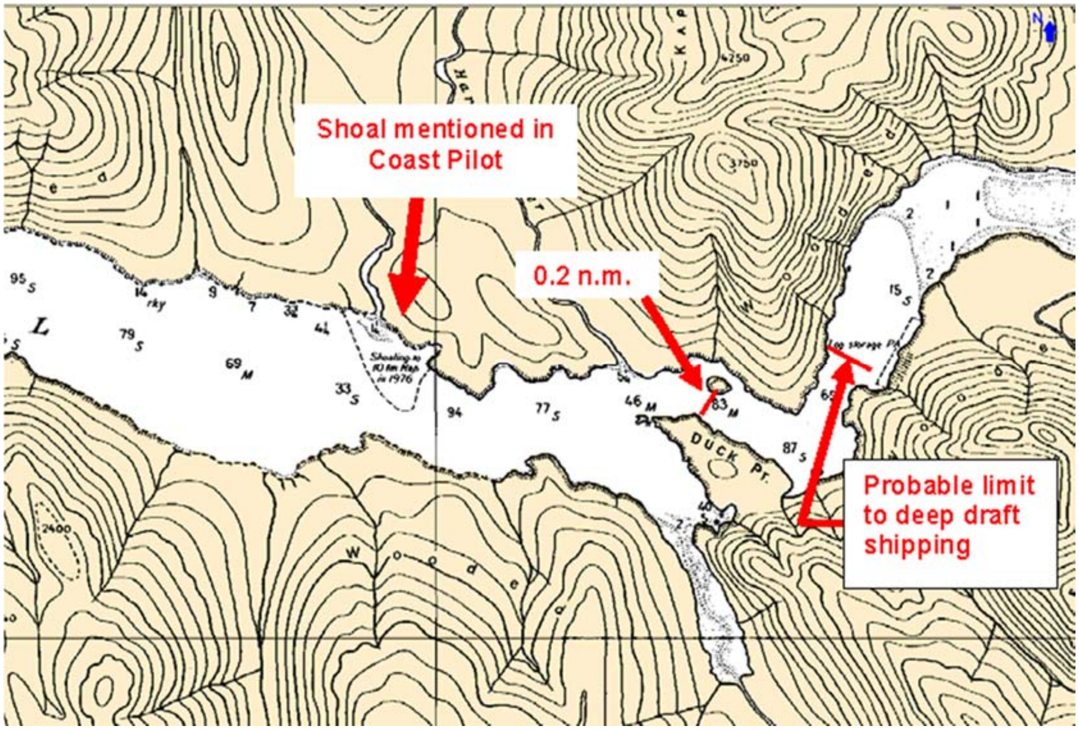


Figure 6-2. Bradfield Canal showing limits to ocean shipping

Figure 6-2 shows the eastern end of Bradfield Canal, including two of the features discussed in the Coast Pilot:

1) The shoal extending from the north shore at a location approximately 1.8 nm east of Duck Point and the mouth of the Harding River
2) The constriction of the channel to approximately 0.2 nm width between Duck Point and the islet

A red line shown on Figure 6-2 marks the eastern extent of that portion of Bradfield Canal that might practically be navigated in deep-draft ocean shipping. Thus, most of Bradfield Canal proper would be accessible for deep-draft ocean shipping, provided that the western end of Bradfield Canal would be navigable. The channels providing access to Bradfield Canal are as follows:

1) Ernest Sound
2) Zemovia Strait
3) Eastern Passage, thence through The Narrows into Blake Channel

Of these three channels, Ernest Sound is navigable to deep-draft ocean shipping. It connects Bradfield Canal to Clarence Strait and ocean routes. Zemovia Strait is not suitable for deep-draft ocean shipping. The extent of Eastern Passage throughThe Narrows and continuing on through

Blake Channel to the western end of Bradfield Canal is theoretically navigable at high tide for a handysize bulk carrier, but it would not be suitable for larger shipping. The accessibility of Bradfield Canal through Ernest Sound makes deep-draft ship passage along the east side of Wrangell Island moot. The potential for deep-draft, oceangoing shipping to operate in Eastern Passage to access commercial ports that might be developed for the Stikine River Corridor and the potential for deep-draft shipping to operate in Blake Channel to access potential commercial ports developed for the Aaron Creek Corridor are discussed in the following subsections.

6.3 Eastern Passage

The NOAA chart (Figure 6-3) indicates that Eastern Passage is navigable by deep-draft, oceangoing ships from Sumner Strait all the way to The Narrows. Thus, deep-draft shipping could gain access to any potential commercial ports on the mainland pursuant to development of the Stikine River Corridor.

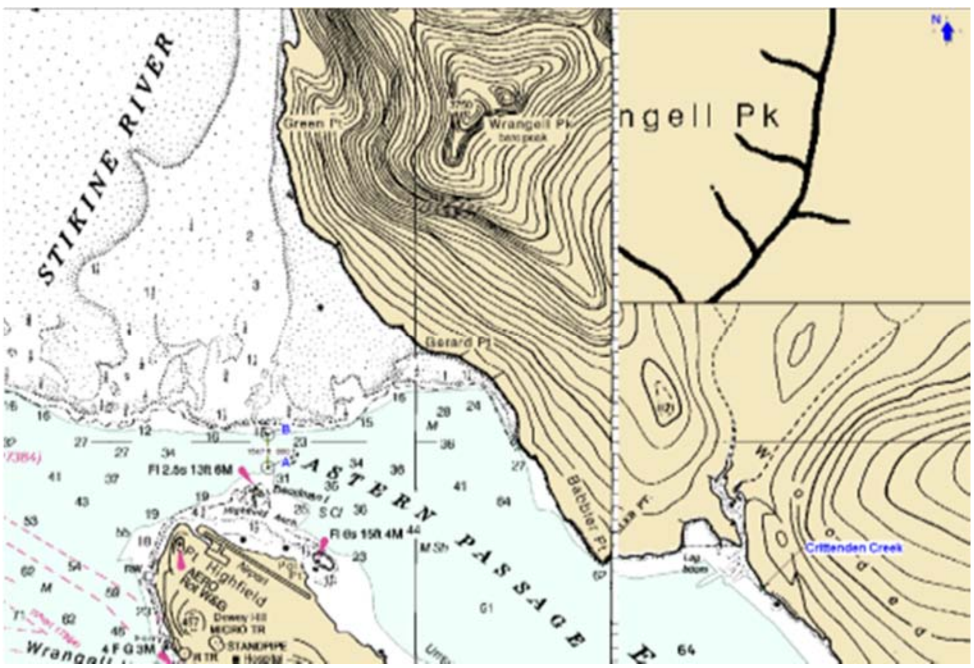


Figure 6-3. Eastern Passage showing passage between Deadman Island and Stikine River delta

The passage from Sumner Strait to Eastern Passage moves north of Deadman Island and the Stikine River delta, north of the Wrangell airport. That passage is approximately 0.25 nm (scaled from the chart), which is adequate provided that the bathymetric features are reasonably stable. The U.S. Coast Pilot states as follows:

> *"Because of deposits from the Stikine River, shoaling at the N end of Eastern Passage has progressed S. From Gerard Point (56 30.8' N, 132 19.6' W) the shoal extends Southeast from*

about 0.5 mile to and beyond the next small creek. The current from the South Arm of the Stikine River is diverted through the channel off Green Point (56° 32.5' N, 132° 21.5' W; chart 17360). The deepwater passage N of Highfield Anchorage, 1.7 miles SW of Gerard Point, has been narrowed to a width of less than 0.5 mile be the encroachment of the shoaling from sedimentation on its N side. It is recommended that ships using Eastern Passage favor Simonof Island that is on the N side of Highfield Anchorage, passing a safe distance off. A light is shown from the N side of Simonof Island."

Simonof Island appears to be another name for Deadman Island, which is shown on the chart. Once the passage between Deadman Island and the Stikine River delta has been achieved, the remainder of Eastern Passage to The Narrows is suitable for deep-draft, oceangoing shipping.

6.4 Blake Channel

The NOAA chart (Figure 64) indicates that Blake Channel may be navigable by handysize, deep-draft, oceangoing ships from Bradfield Canal all the way to The Narrows. Thus, deep-draft shipping could gain access to any commercial ports developed on the mainland for use on the Aaron Creek Corridor.

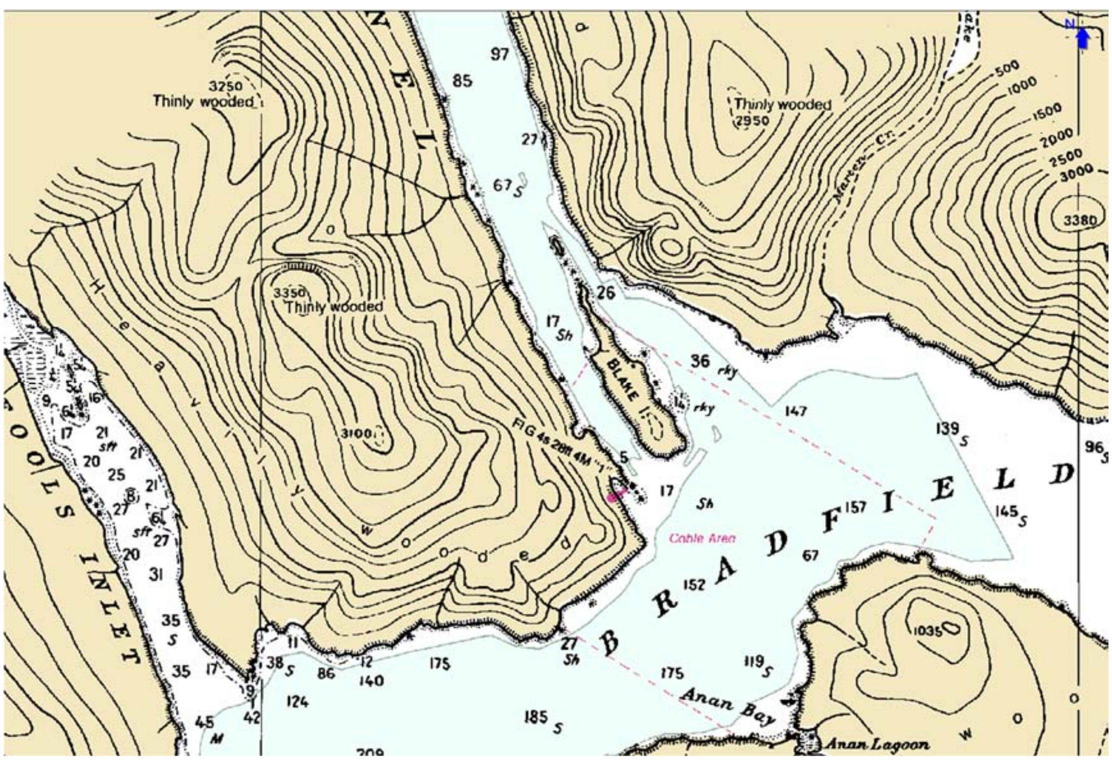


Figure 6-4. Entrance to Blake Channel from Bradfield Canal, on either side of Blake Island

The course from Bradfield Canal to Blake Channel passes on either side of Blake Island (locally known as Ham Island). The west channel passing Blake Island narrows to approximately 300 feet (scaled from chart) at its north end. While the channel is narrow, there are numerous examples of other ports with equally narrow restrictions where handysize ships routinely call. The east channel passing Blake Island is somewhat wider (approximately 640 feet or more), but there is one 5-fathom sounding shown on the chart near the south end. If the depth below MLLW is 5 fathoms or greater, then a handysize ship should be able to use the east channel passing Blake Island at or near high tide.

The U.S. Coast Pilot states the following:

> ***Blake Channel*** *(Chart 17385): "**Blake Island**, locally called **Ham Island**, is at the S entrance, with a narrow channel on each side. A pinnacle rock, not marked by kelp, with a depth of 1 ¼ fathoms (23 meters), is about 0.3 mile N of the Southeast end of Blake Island. A 5 fathom (9.1 meter) spot is SW of Blake Island near the entrance about 150 yards (137 meters) from the Wrangell Island shore. If the W channel is used, avoid the rocks off the point of the cove on the W side of the channel when turning in from Bradfield Canal."*
>
> *"The channel E of Blake Island passes E of a reef that extends NW from the NW end of Blake Island and terminates in a wooded islet at the narrowest part of the channel. A midchannel course will avoid the rocks along the E side of Blake Island. The tidal currents have considerable velocity in this vicinity, and a midchannel course should be followed through either channel."*

Once the passage of Blake Island has been made, the remainder of Blake Channel to The Narrows is suitable for handysize deep-draft, oceangoing shipping.

This Page Intentionally Left Blank

7 REFERENCES

Alaska Department of Transportation and Public Facilities (DOT&PF) (1997). "1997 Shore Facilities Condition Survey Report."

Alaska Department of Transportation and Public Facilities (DOT&PF). "South Mitkof Ferry Terminal Environmental Assessment."

National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce (1999). "United States Coast Pilot, Volume 8, Pacific Coast Alaska: Dixon Entrance to Cape Spencer," 23rd Edition, NOAA, 1999.

Tides & Currents version 2.5, computer program by Nautical Software, Inc.

U.S. Army Corps of Engineers (1995). "Ports of Southeast Alaska," Port Series No. 38, Revised 1995.

This Page Intentionally Left Blank