SOUTHEAST ALASKA MID-REGION ACCESS PLAN
TECHNICAL MEMORANDUMS

Prepared For:

Alaska Department of Transportation and Public Facilities and Federal Highway Administration

April 2011

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PREFACE

HISTORY

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 alternatives for residents. These public operations provide roll-on/roll-off highway links among communities and the continental highway system by operating ferries that carry vehicles and passengers on the waterways of the Inside Passage.

While the transportation system has improved significantly over the past 50 years, Southeast Alaska residents are limited to the transportation options described in the preceding paragraph. This means industries that rely on exporting experience limitations in transporting products to the lower 48 states.

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 could be used to connect communities to the regional transportation system, as well as establishing a regional power grid. Such links would consist of roads 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.

PROJECT BACKGROUND

Rivers in Southeast Alaska have been used as transportation corridors by Alaska Native and First Nations tribes as long as they have dwelled in the area. In the Treaty of Washington, as executed and proclaimed July 4, 1871, the United States and Britain stipulated that "the United States engage that the Rivers Yukon, Porcupine, and Stikine, in Alaska, ascending and descending from, to, and into the sea, shall forever remain free and open for the purpose of commerce to the subjects of Great Britain."

In the 1960s, the Alaska Department of Transportation and Public Facilities (DOT&PF) considered constructing a road linking Petersburg along the Stikine River to the Canadian Border.

In 1978, British Columbia (BC) completed a reconnaissance study examining linking Southeast Alaska to the Cassiar Highway, part of the continental highway system, by establishing a route along the Iskut River. In 1984, DOT&PF completed a reconnaissance study of multiple alternative routes. In 1998, the U.S. Forest Service considered a route linking Wrangell to Canada along the Bradfield Canal. In 2003, BC developed a long-range transportation plan, which included consideration of a link with Southeast Alaska. In 2004, Congress, under the authority of Section 1601(a) of the Transportation Equity Act for the 21st Century, set aside funding to address access issues facing the City of Wrangell. The funding was intended to produce a pre-NEPA scoping study on providing a land link transportation route from the City of Wrangell to the Cassiar Highway in British Columbia, Canada. A necessary part of the route is the Bradfield Transportation Corridor, which lies within the Tongass National Forest.

The State of Alaska, in its Draft Update for Public Review 2004 of the Southeast Transportation Plan, identified the Bradfield Transportation Corridor as a core access route for the Southeast, ranked behind Juneau Access and Sitka Access. This corridor would connect Southeast Alaska to the Cassiar Highway. To investigate this potential link further, DOT&PF and the Federal Highway Administration (FHWA) completed the Southeast Mid-Region Access Draft Study Delivery Plan (Study Plan) in April 2007. This document outlines the international delivery process, forecasts delivery time and cost, and strategizes potential funding sources.

Recent Activities

DOT&PF and FHWA further developed the Plan by defining the processes needed to examine a potential project linking mid-Southeast Alaska with the Cassiar Highway in BC via a new road. Discussions held with the Ministry of Transportation in BC led both governments to conclude that an economic study of potential effects of such a transportation link would be a necessary first step that might lead to an environmental impact statement (EIS) for the United States and an environmental assessment (EA) for BC. These documents would assess the implications of developing this new road. Conducting these studies would require equal participation by both governments. To date, Alaska and BC have not achieved the accord needed to move forward with an economic study.

The Plan identifies logical steps for delivery of an EIS under the National Environmental Policy Act (NEPA). It contains an outline of required work and an estimate of resources and funding commitments. It also highlights the significance of BC's participation and provides valuable information intended to contribute to a decision whether to proceed with an EIS.

Why not NEPA or a Notice of Intent Now?

Before an NOI can be issued, an international agreement between Alaska and BC must be executed, along with a financial plan for construction. To further Alaska's and BC's understanding of issues around the project's development and make informed decisions on whether to pursue the project jointly, technical memoranda were developed covering the following major topics:

- Traffic Projections
- Engineering Study
- Port and Ferry Terminal Study

As part of this process, several technical memoranda were developed. These memoranda were developed as the Southeast Alaska Mid-Region Access Plan Technical Memorandums (Technical Memoranda) and were completed in April, 2011. All technical memoranda are listed below:

- Southeast Alaska Mid-Region Access Plan Summary Technical Memorandum
- Southeast Alaska Mid-Region Access Traffic Projections Technical Memorandum
- Southeast Alaska Mid-Region Access Port and Ferry Terminal Technical Memorandum
- Southeast Alaska Mid-Region Access Air-cushion Vehicle Technical Memorandum
- Southeast Alaska Mid-Region Access Engineering Technical Memorandum
- Southeast Alaska Mid-Region Access Unit Cost Technical Memorandum
- Southeast Alaska Mid-Region Access Preliminary Snow Avalanche Assessment Technical Memorandum
- Southeast Alaska Mid-Region Access Southeast Alaska Mid-Region Access Operations and Maintenance Cost Technical Memorandum
- Southeast Alaska Mid-Region Access Independent Review Technical Memorandum

Corridors

The Study Plan and Technical Memoranda contained evaluations of the three potential corridors: the Bradfield Canal Corridor, the Stikine River Corridor, and the Aaron Creek Corridor. These corridors would all connect Wrangell and Petersburg to the Cassiar Highway in BC, although short ferry links would be needed to complete the corridors under certain alternatives. These corridors are described below and shown on Figure 1.

The Bradfield Canal Corridor –This route would include a road from the Cassiar Highway along the Iskut, Craig, and Bradfield River drainages to a deep-water conventional ferry terminal near the head of the Bradfield Canal. Via a ferry system, it would connect the city of Wrangell to a conventional ferry terminal built at Fools Inlet on Wrangell Island. A road would also be constructed as a link to the Zimovia Highway.

The Stikine River Corridor –This route would include a road from the Cassiar Highway down the Stikine and Iskut Rivers to a conventional ferry terminal at Crittenden Creek. A ferry to an opposing terminal on Wrangell Island near the airport would complete the connection to the city of Wrangell.

- A road across Dry Strait to the Mitkof Highway would connect Petersburg to the continental highway system.
- Ultimately, a road connection could be made to Wrangell by extending the road south and bridging The Narrows. The route would then continue to the Zimovia Highway and on to the city of Wrangell.

The Aaron Creek Corridor –This route would include a road down the Iskut River and Aaron Creek to a conventional ferry terminal on Berg Bay. A ferry to an opposing terminal at the Log Transfer Station on Wrangell Island and a new road to the Zimovia Highway would complete the connection to the city of Wrangell.

- Ultimately, a road connection could be made by completing a bridge across The Narrows to Wrangell Island.

As part of the Technical Memoranda, planning level lengths, traffic volumes, and costs were developed. These are shown in Table 1 on page 6.

Figure 1: Southeast Alaska Mid-Region Access Study Corridors

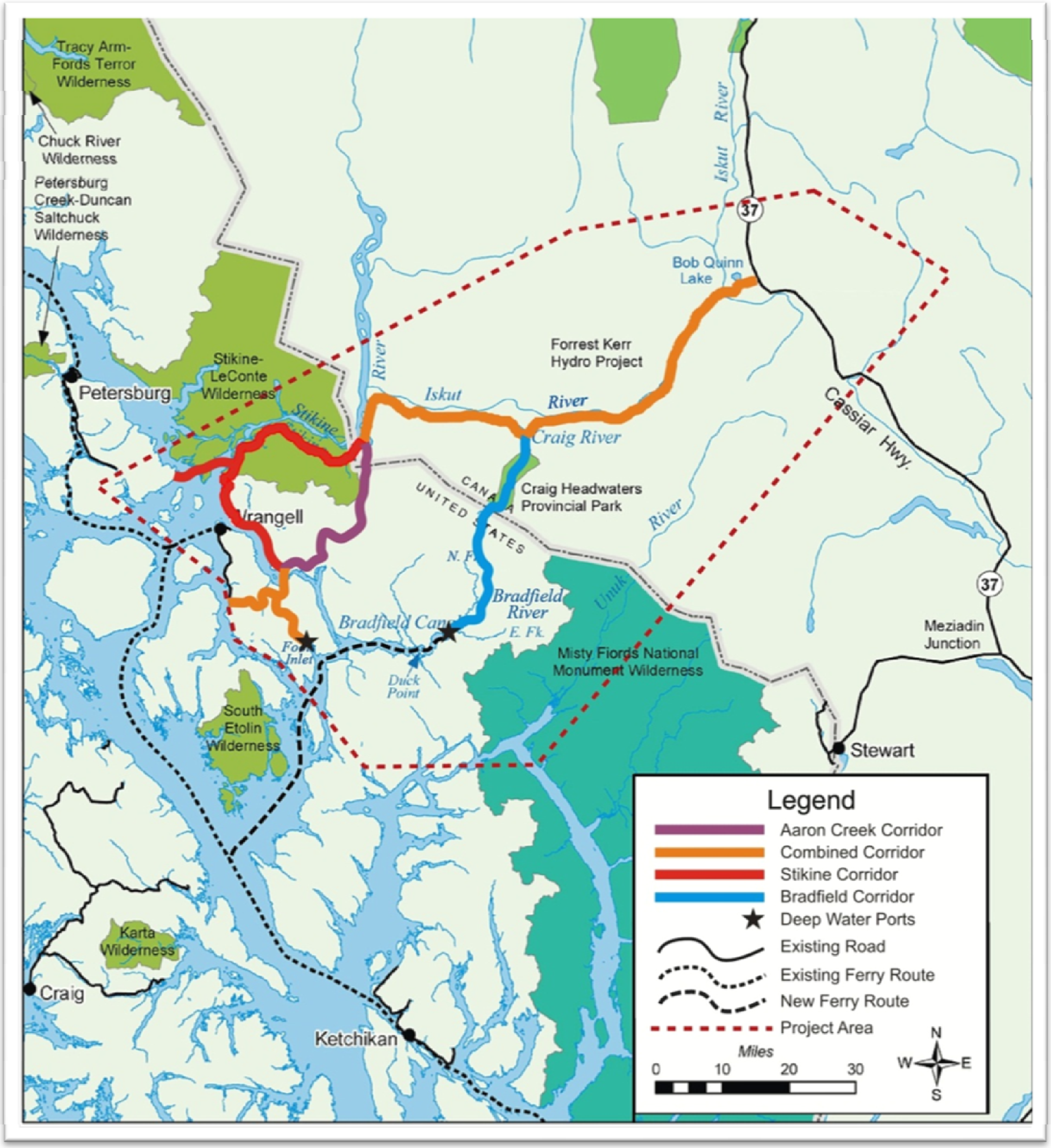

Table 1: Southeast Alaska Mid-Region Access Study Corridor Comparison

Corridor	AK Length (miles)	BC Length (miles)	Total Length (miles)	AADT (vpd)	AK Cost (approx.)	BC Cost (approx.)	Total Cost (approx.)	Cost Per Mile (approx.)
Bradfield Canal	50	60	110	180	$420 (million)	$350 (million)	$770 (million)	$7.0 (million)
Stikine River	95	80	175	230	$710 (million)	$530 (million)	$1.24 (billion)	$7.1 (million)
Aaron Creek	65	80	145	180	$580 (million)	$540 (million)	$1.12 (billion)	$7.7 (million)

What Next?

To move the projects ahead would require a concerted effort between Alaska and BC. Once agreement is reached, the delivery timeline is approximately seven years at a forecasted cost of approximately $20 million. The steps are listed below:

- Achieve an Intergovernmental Agreement (Alaska/BC).
- Take the actions listed below:
  - Draft a finance plan, including conducting a joint (AK/BC) economic study.
  - Develop a joint environmental process.
  - Conduct a U.S. EIS and a BC EA.

Should DOT&PF and BC proceed with the economic study, it would be designed to assess the potential effects of the project on both the BC and the U.S. sides of the border. The economic study would explore the effects of the project on different study corridors; future scenarios regarding low, mid, and high effects based on road use, resource development, economic development, and transportation modes and infrastructure development; Southeast Alaska benefits and costs for the mining, forest products, visitor, and seafood industries; electrical transmission power benefits and costs; and community, freight transportation, and passenger vehicle traffic benefits and costs. It would also address construction and maintenance costs, as well as economic impacts on Alaska, Canada, and BC, including an overall benefit-cost discussion.

CONCLUSION

The information presented above is a roadmap setting the framework for the Study Plan and Technical Memoranda. The first document is the Southeast Mid-Region Access Draft Study Plan, followed by the Southeast Alaska Mid-Region Access Plan Technical Memoranda. Questions about this introduction or the subsequent documents should be directed to Andy Hughes, Alaska Department of Transportation and Public Facilities, 6860 Glacier Highway, Juneau, AK 99801-7999, andy.hughes@dot.state.ak.us.

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Southeast Alaska Mid-Region Access Summary Technical Memorandum

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List of Acronyms and Abbreviations

AAA	American Automobile Association
AADT	annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
ACV	air-cushion vehicle
AMHS	Alaska Marine Highway System
ANILCA	Alaska National Interest Lands Conservation Act
B.C.	British Columbia
CE	cost-effectiveness
DOLWD	Alaska Department of Labor and Workforce Development
DOT&PF	Alaska Department of Transportation and Public Facilities
DWT	deadweight
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
GHS	Global Hovercraft Services, Ltd.
GPS	Global Positioning System
IFA	Inter-Island Ferry Authority
LIDAR	light detection and ranging
MHHW	mean higher high water
MLLW	mean lower low water
MRA	mid-region access
MSE	mechanically stabilized earth
nm	nautical miles
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration

List of Acronyms and Abbreviations (cont.)

NPV	net present value
O&M	operating and maintenance
Plan	study delivery plan
Ro-Ro	roll-on/roll-off
SATP	Southeast Alaska Transportation Plan
SVE	standard vehicle equivalent
USGS	United States Geological Survey
WFLHD	Western Federal Lands Highway Division

EXECUTIVE SUMMARY

The Alaska Department of Transportation and Public Facilities (DOT&PF) worked with the Federal Highway Administration (FHWA) to develop a study delivery plan (Plan) exploring potential routes to link Southeast Alaska with the Cassiar Highway in British Columbia (B.C.). Three potential mid-region access (MRA) transportation corridors were chosen: the Bradfield Canal Corridor, the Stikine River Corridor, and the Aaron Creek Corridor. Traffic projection, port, air-cushion vehicle (ACV), engineering, unit cost, snow avalanche assessment, and operating and maintenance (O&M) cost technical memoranda were drafted to augment the Plan. The technical memoranda are summarized in this document, and the full studies are attached as appendices.

All the proposed corridors would connect Wrangell and Petersburg to the Cassiar Highway in B.C., although short ferry links would be required to complete the corridors under certain alternatives. The proposed transportation corridors would be built in stages. Staged construction, with temporary travel means, would allow portions of the ultimate corridor to be completed as funding became available. Approval would be needed from both Congress and the Canadian government before a transportation corridor could be pursued along the Stikine River, as a portion would be located within the Stikine-LeConte Wilderness Area.

The Traffic Projections Technical Memorandum provides future traffic estimates for the three potential corridors. The projected traffic on the proposed corridors consists of diverted and induced vehicle travel. The memorandum also provides an estimate of the net present value (NPV) of the life-cycle costs net of salvage value for each of the three proposed MRA corridors. Combining the NPV of costs and the traffic estimates enabled calculation of cost-effectiveness measures for the three potential corridors.

The Port and Ferry Terminal Technical Memorandum contains information on potential ACV and conventional roll-on/roll-off (Ro-Ro) passenger ferry terminal sites serving the Bradfield Canal, Stikine River, and Aaron Creek Corridors. Opposing ACV and conventional ferry terminal sites on Wrangell and (South) Mitkof Islands are also identified. The potential for commercial, deep-draft, ocean shipping to access ports that might develop at or near a MRA road end is briefly assessed.

The Air-Cushion Vehicle Technical Memorandum contains an assessment of providing passenger and vehicle ACV ferry service along the Stikine River, including a preliminary cost assessment. ACV manufacturers were contacted to see if they have the technical ability to design and construct vessels that would operate successfully in arctic conditions along the Stikine River and meet potential traffic demands.

The Engineering Technical Memorandum assesses the practicality and preliminary costs of potential roadway alignments for a MRA surface transportation corridor. The memorandum includes preliminary alignments and order-of-magnitude cost estimates for each of the study corridors. High resolution orthophotography was used as a base map for determining roadway costs.

The Unit Cost Technical Memorandum provides further data and support for the pricing information used in the development of transportation corridor cost estimates within the Engineering Technical Memorandum. The expanded pricing information was used to develop new average costs that represent road construction within Southeast Alaska, based on both DOT&PF and FHWA projects.

The Preliminary Snow Avalanche Assessment Technical Memorandum identifies snow avalanche paths and associated risk and then outlines plans for mitigation strategies and implementation. This memorandum was limited to a preliminary assessment only, along with recommendations for the additional work to complete the risk assessment.

The Operating and Maintenance Cost Technical Memorandum provides information on O&M cost estimates for alignment options identified in the Engineering Technical Memorandum. Yearly and upfront O&M cost estimates were developed based on information provided by various state transportation departments, as well as internet research.

The Independent Review Technical Memorandum provides an independent look at a number of the memorandums that were completed as part of this study. It contains recommendations that were considered when finalizing the memorandums.

1 SOUTHEAST ALASKA MID-REGION ACCESS TECHNICAL STUDIES MEMORANDUM

1.1 Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF) worked with the Federal Highway Administration (FHWA) to develop a study delivery plan (Plan) exploring mid-region access (MRA) routes to link Southeast Alaska with the Cassiar Highway in British Columbia (B.C.). Three potential MRA transportation corridors were chosen: the Bradfield Canal Corridor, the Stikine River Corridor, and the Aaron Creek Corridor. All the proposed corridors would connect Wrangell and Petersburg to the Cassiar Highway in B.C., although short ferry links would be required to complete the corridors under certain alternatives.

The proposed transportation corridors would be built in stages. Staged construction, with temporary travel means, would allow portions of the ultimate corridor to be completed as funding became available. Approval would be needed from both Congress and the Canadian government before a transportation corridor could be pursued along the Stikine River, as a portion would be located within the Stikine-LeConte Wilderness Area.

The Alaska Marine Highway System (AMHS) and the Inter-Island Ferry Authority (IFA) currently provide transportation alternatives 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 private sector carries most of the freight to the region, by air or by barge. The fishing industry and mineral extraction companies experience limitations in transporting products to the lower 48 states. Other economic ventures such as tourism would profit from a surface link to the Cassiar Highway. The Southeast Alaska Transportation Plan (SATP) identifies solutions to some of these issues. The Plan is part of the SATP.

1.1.1 Technical Memoranda

Following the development of the draft Plan, DOT&PF and FHWA determined that traffic projection, port, air-cushion vehicle (ACV), engineering, unit cost, snow avalanche assessment, and operating and maintenance (O&M) cost technical memoranda should be completed to augment the Plan. The studies are summarized in this memorandum, and the full studies are attached as appendices.

The Traffic Projections Technical Memorandum provides future traffic estimates for the Bradfield Canal, Stikine River, and Aaron Creek Corridors. The projected traffic on the proposed corridors consists of diverted and induced vehicle travel. Diverted traffic is current traffic by existing modes that would shift to the new corridor due to savings in travel time or cost. Induced traffic is increased traffic volume that is new travel to or through the area. The proposed corridors are evaluated and projections made based on current traffic trends, travel cost, and time. The memorandum includes an estimate of the net present value (NPV) of the life-cycle costs net of salvage value for each of the three proposed MRA corridors. The life-cycle costs include the capital and operating costs for each corridor over the 2012 to 2030 study period, as well as over an extended period from 2012 to 2060 to capture the differences among the corridors should the proposed roads and ferries become operational. Combining the NPV of costs and the traffic estimates, the memorandum calculates cost-effectiveness (CE) measures for the three potential corridors.

The Port and Ferry Terminal Technical Memorandum contains information on potential ACV and conventional Ro-Ro passenger ferry terminal sites serving the Bradfield Canal, Stikine River, and Aaron Creek Corridors. Opposing ACV and conventional ferry terminal sites on Wrangell and (South) Mitkof Islands are also identified. The potential for commercial, deep-draft, ocean shipping to access ports that might develop at or near a Southeast Alaska MRA road end is briefly assessed.

The Air-Cushion Vehicle Technical Memorandum contains information on potential ACV traffic. The document examines using ACVs for passengers and vehicles along the Stikine River from the Iskut River to Wrangell and Mitkof Islands. ACV manufacturers were contacted to see if they have the technical ability to design and construct vessels that would operate successfully in arctic conditions along the Stikine River Corridor and meet potential traffic demands. Cold weather, strong winds, and sensitive environmental issues may pose challenges to ACV operations.

The Engineering Technical Memorandum assesses the practicality and preliminary costs of potential roadway alignments for an MRA surface transportation corridor connecting the communities of Wrangell and Petersburg in Southeast Alaska to the continental highway system in B.C. The memorandum includes preliminary alignments and order-of-magnitude cost estimates for each of the study corridors. High resolution orthophotography was used as a base map for determining roadway costs. Initially, the full build-out typical section for a two-lane paved roadway configuration was developed for cost estimating. A one-lane gravel roadway typical section (including turnouts) was added to the assessment for comparison, as funding for the MRA transportation corridor could be limited. To provide further options, a phased construction typical section was added, with a one-lane gravel roadway built on a subgrade wide enough to support potential future construction of the full two-lane paved section. Separate cost estimates were completed for each potential construction stage and roadway configuration.

The Unit Cost Technical Memorandum further assesses the unit cost pricing information contained in the Engineering Technical Memorandum. Additional pricing support information was desired from projects requiring some new roadway construction, work camps, and port development. An internet survey of available bid tabulation information was conducted to identify possible projects that could be used to refine the cost estimates. The expanded pricing information was ultimately used to develop new average costs that represent road construction within Southeast Alaska based on both DOT&PF and FHWA projects.

The Preliminary Snow Avalanche Assessment Technical Memorandum provides a preliminary assessment of the snow avalanche hazards and risk assessment for the MRA corridors. The information in this study was compiled by applying a risk-based method for terrain assessments based on visual information. This objective was limited to a preliminary assessment only, along with recommendations for the additional work to complete the risk assessment. The memorandum includes an overview of possible avalanche mitigation strategies and implementation.

The Operating and Maintenance Cost Technical Memorandum provided O&M cost estimates for the MRA alignment options. Yearly and upfront O&M cost estimates were developed based on information provided by various state transportation departments, as well as internet research.

The Independent Review Technical Memorandum provides a peer review of the various memorandums completed as part of this study. It provides recommendations that were considered when finalizing the memorandums.

1.1.2 Study Area Summary

The area discussed in the Plan lies along the Coast Mountains within Southeast Alaska and northwestern B.C. (Figure 1-1). The study area spans several thousand square miles. The area covers the Stikine/LeConte Wilderness to the north, Wrangell and Petersburg to the west, the Tongass National Forest and Misty Fiords Wilderness to the south, and the Cassiar Highway to the east in B.C. The Plan contains geologic descriptions, geography, economics, and climate and weather patterns. The potential transportation corridors of the study area fall largely within the following drainages: the Bradfield River, Craig River, Stikine River, Katete River, Iskut River, Unuk River, and Aaron Creek. The area experienced mineral exploration and extraction for many decades. Many mining and logging roads, both within the Stikine and Iskut River drainages and on Wrangell Island, could potentially be upgraded and altered as part of the MRA transportation corridor. However, the Stikine-LeConte Wilderness Area prohibits road building operations within the Stikine River drainage. Approval would be needed from both Congress and the Canadian government before a transportation corridor could be pursued along the Stikine River.

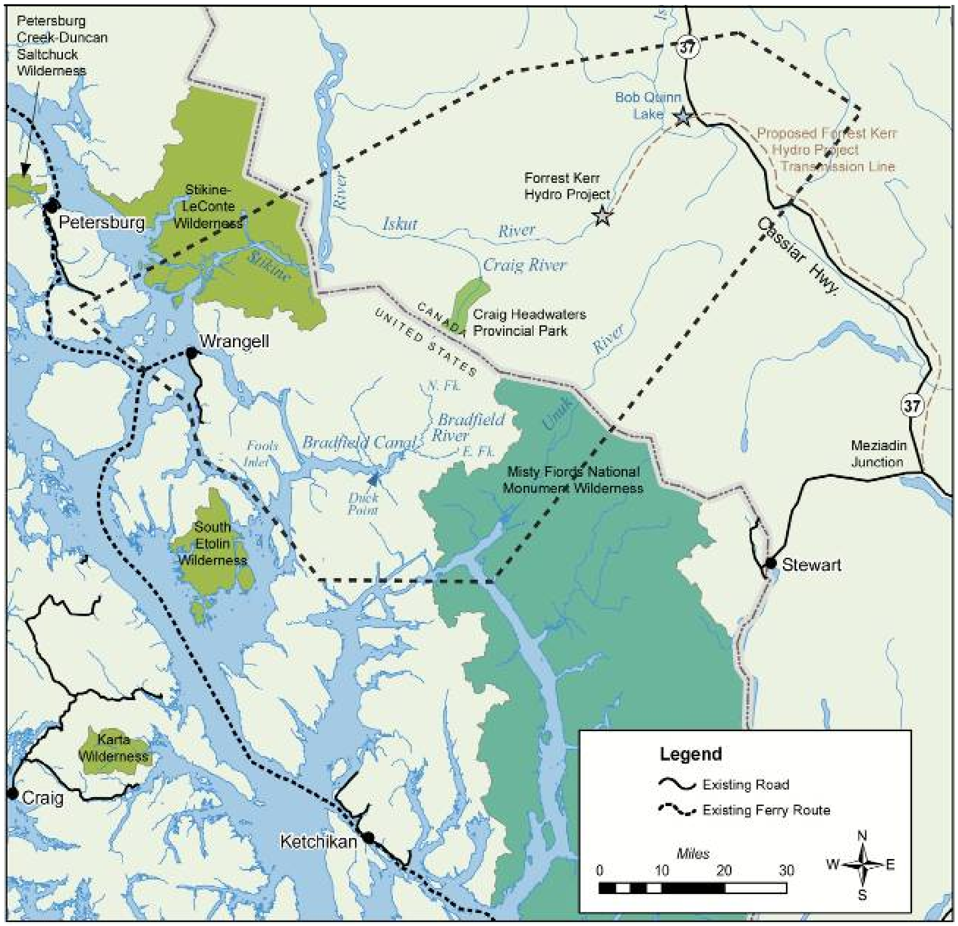

Figure 1-1. Project Study Area

1.2 Corridor Alignments and Stages of Development

Three potential MRA transportation corridors were chosen: the Bradfield Canal Corridor, the Stikine River Corridor, and the Aaron Creek Corridor. Figure 1-2 shows each corridor, along with existing transportation facilities. A fourth corridor, the Unuk River Corridor, was considered, but rejected due to environmental concerns and high potential costs. Conceptual plans for staged construction and temporary travel means would allow portions of the corridor to be completed and made functional as funding became available to complete the ultimate final access route.

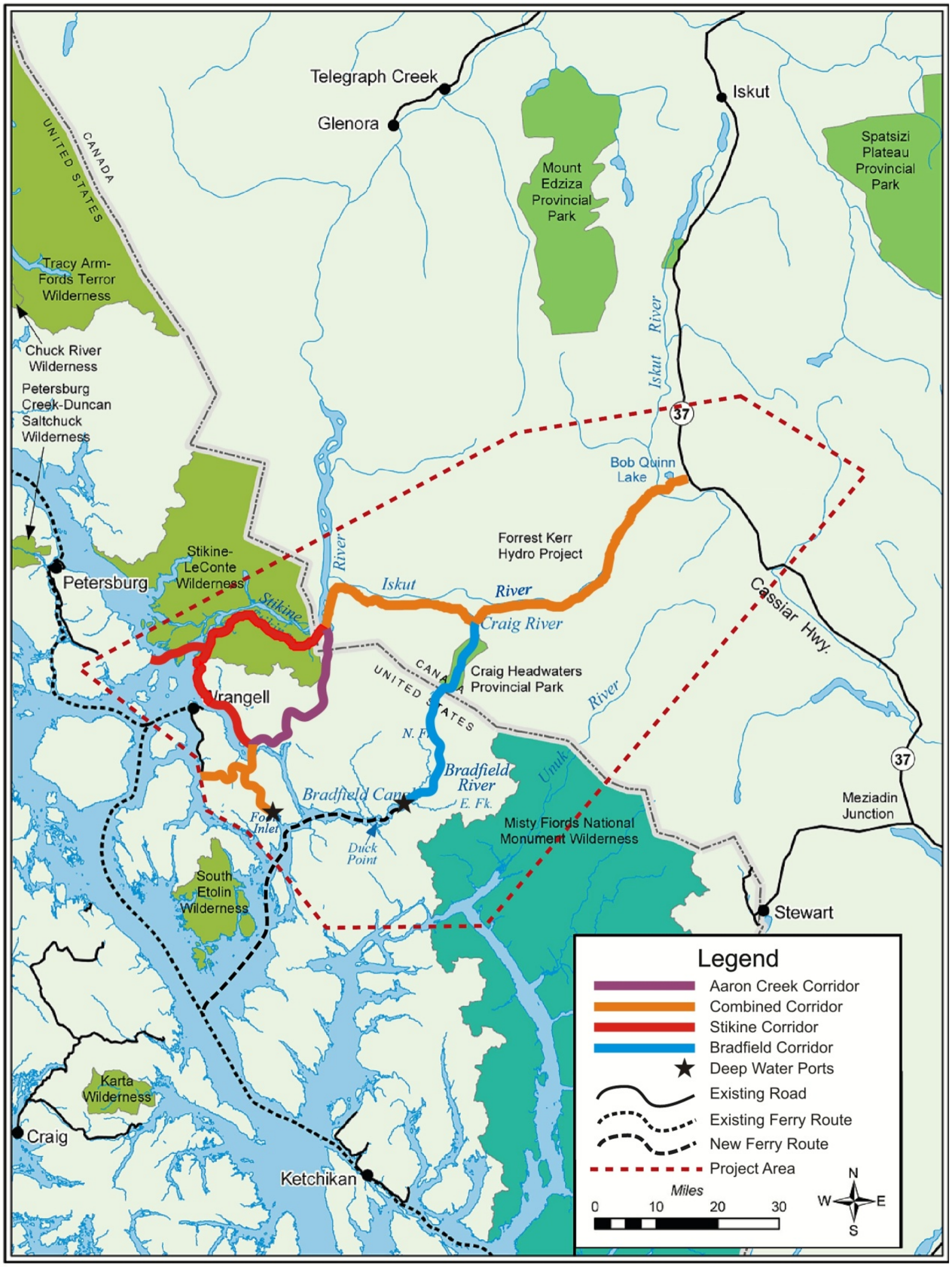

Figure 1-2. Southeast Alaska Mid-Region Study Corridors

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 drainage, up the Craig River drainage to the Bradfield River, and down the Bradfield River to the Kapho Mountain deep-water 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 in Fools Inlet on Wrangell Island, and a road would be constructed from the Fools Inlet terminal to the Zimovia Highway.

The completion of the Bradfield Canal Corridor would result in an over-land transportation network connecting the Bradfield Canal to the continental highway system with maritime connections to Wrangell, Petersburg, and Coffman Cove. The corridor would be completed in one stage and would include the elements described below:

- The Eskay Creek Mine road would be reconstructed from the Cassiar Highway southwest to where the existing road diverges from the Iskut River. A road would be built from the existing mining road to near the confluence of Bronson Creek and the Iskut River, south up the Craig River and across the International Boundary, through a tunnel to the North Fork of the Bradfield River, and down the Bradfield River to the new ferry terminal near Kapho Mountain on the Bradfield Canal.
- A conventional ferry terminal would be built on the east side of Fools Inlet at one of several potential deep-water locations, along with a road connecting the terminal to the city of Wrangell. A shuttle ferry would run between the Kapho Mountain terminal and the Fools Inlet terminal. The IFA and the AMHS mainline ferries could continue to provide conventional ferry service in the vicinity.

1.2.2 Stikine River Corridor

Located primarily within the Stikine River drainage, the Stikine River Corridor would connect the Cassiar Highway to the Stikine River via the Iskut River valley and then follow the south side of the Stikine River to where it meets the Eastern Passage. Included in this alternative would be additional road corridors down the Eastern Passage and across Dry Strait that would connect Wrangell and Petersburg, respectively, to the continental highway system. The Stikine River Corridor would include an 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.

Development of this corridor would likely happen in five stages. The road portion of this route would not be viable unless access was obtained via the Stikine River Corridor under treaties and provisions of the Alaska National Interest Lands Conservation Act (ANILCA), as a portion of the road would be within the Stikine-LeConte Wilderness Area. The stages of the Stikine River Corridor include the elements described below:

- Stage 1: The existing Eskay Creek Mine road would be reconstructed from the Cassiar Highway southwest to the point where it diverges from the Iskut River. A road would be built from the existing mine road to a suitable ACV ferry terminal site near the confluence of the Iskut River with the Stikine River. ACV ferry terminals would be built near Wrangell Airport and near the end of Mitkof Highway 7 at the southeastern tip of Mitkof Island.
- Stage 2: The road from the Iskut River ACV ferry terminal would be extended east along the south side of the Stikine River, to a suitable conventional ferry terminal site across from the Wrangell Airport near the mouth of Crittenden Creek on the east side of the Eastern Passage. Construction of an opposing conventional ferry terminal on Wrangell Island and a shuttle ferry to operate across the Eastern Passage would also be completed. AMHS and IFA ferry service could continue in the vicinity.
- Stage 3: A conventional ferry terminal would be constructed on the east side of Fools Inlet at one of several potential deep-water locations, along with a road to the city of Wrangell. IFA or AMHS ferries could call at the Fools Inlet terminal and Wrangell.
- Stage 4: A road would be constructed from the Stage 2 roadway near the mouth of Andrew Creek across the Stikine River, Farm and Dry Islands, and Dry Strait to the end of Mitkof Highway 7. Ferry service between Wrangell, Blind Slough, and Petersburg would cease with construction of this stage.
- Stage 5: The road would be extended from the mouth of Crittenden Creek to Wrangell Island. A bridge across The Narrows and construction of a road to the intersection with Stage 3 roads would complete the corridor, providing an over-land transportation network connecting Wrangell and Petersburg to the continental highway system, with maritime connections to Ketchikan and Coffman Cove.

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 West Fork of 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 mountain range 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 alternative 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. Development of this corridor would likely happen in the following four stages:

- Stage 1: This stage would be the same as Stikine River Corridor Stage 1.
- Stage 2: The road from the Iskut River ACV ferry terminal would continue up the West Fork of the Katete River, across the West Fork Pass via either a tunnel or a roadway pass, and down Aaron Creek to the Eastern Passage and a new conventional ferry terminal at Berg Bay. An opposing conventional ferry terminal would be built at the existing Log Transfer Station on Wrangell Island. The operation of a conventional shuttle ferry between the new terminals and reconstruction of existing road between the Zimovia Highway and the Log Transfer Station would also be included. AMHS and IFA ferry service could continue in the vicinity.
- Stage 3: A conventional ferry terminal would be built on the east side of Fools Inlet at one of several potential deep-water locations, along with a road connecting to the Stage 2 reconstructed roads on Wrangell Island. IFA and AMHS ferries could call at both the Fools Inlet terminal and Wrangell.
- Stage 4: A road would be built from the Berg Bay ferry terminal to the Log Transfer Station terminal, including a bridge across The Narrows to Wrangell Island. This stage would complete an over-land transportation corridor from Wrangell to the continental highway system with maritime connections to Ketchikan and Petersburg.

1.2.4 Unuk River Corridor

The Unuk River Corridor was one of the corridors suggested to connect Southeast Alaska to the continental highway system. Due to environmental concerns, this corridor was deemed impractical. The alignment was not included in any costing comparisons. The Unuk River Corridor would begin along the west side of the Unuk River within Burroughs Bay. The alignment would parallel the west side of the river to and across the International Boundary until nearing the Eskay Creek Mine in B.C. The alignment would connect to the existing gravel road serving the mine and follow the road northwest along a tributary of the Iskut River. Upon reaching the Iskut River drainage, the road would turn northeast and parallel the river before reaching the Cassiar Highway along the south side of the Nigunsaw River near Echo Lake.

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2 SOUTHEAST ALASKA MID-REGION ACCESS TRAFFIC PROJECTIONS TECHNICAL MEMORANDUM

2.1 Introduction

This memorandum evaluates the three proposed MRA corridors described above: the Bradfield Canal Corridor, the Stikine River Corridor, and the Aaron Creek Corridor. The memorandum includes traffic projections, estimates of the NPV of life cycle costs, and CE measures for the three corridors.

2.2 Summary of Traffic Estimates

The projected vehicle traffic on the proposed corridors consists of diverted and induced vehicle travel. Diverted traffic is current traffic by existing modes that would shift to the new corridor. The volume of diverted traffic would depend on travel time and cost of the new corridor compared to travel time and cost for other modes of transportation.

Induced traffic is increased traffic volume that is new travel to or through the area. This latter travel would not occur without the new traffic corridor. A new road would result in additional trips among communities and would make more areas accessible for recreation, sightseeing, and similar activities. A new road might also be a catalyst for mining development and resource extraction in the area and generate additional traffic from transport of these resources to tidewater.

As shown in Table 2-1, total diverted and induced passenger vehicle traffic could range from a 2030 annual average daily traffic (AADT) count of approximately 5 to 255 AADT with the Stikine River Corridor, and a count of approximately 5 to 189 AADT for the other corridors. Of the estimates for passenger vehicle traffic, approximately 4 to 20 AADT would be diverted traffic from other modes, and the remaining traffic would be new induced trips by residents of local communities and the broader region. Induced trips could range from 1 to 235 AADT for the Stikine River Corridor and from 1 to 169 AADT for the other corridors. Industrial induced traffic could range from 32 to 360 AADT associated with trucks traveling to and from potential mines in B.C. This truck traffic would be the equivalent of slightly more than 1,600 standard vehicle equivalents (SVE).

Table 2-1. Comparison of Corridor AADTs and SVEs in 2030

Trip Type (AADT)	Corridor Traffic Volumes								
	Bradfield Canal			Stikine River			Aaron Creek		
	Low	Mid	High	Low	Mid	High	Low	Mid	High
NON-INDUSTRIAL									
Diverted (from other mode)	4	12	20	4	12	20	4	12	20
Induced (new trips)									
Local [1]	0	73	102	0	123	168	0	73	102
Regional	0	28	55	0	28	55	0	28	55
Other	1	6	12	1	6	12	1	6	12
Subtotal Diverted & Induced	5	119	189	5	169	255	5	119	189
INDUSTRIAL									
Inbound	10	10	60	10	10	60	10	10	60
Outbound	22	54	300	22	54	300	22	54	300
Subtotal Industrial	32	64	360	32	64	360	32	64	360
Industrial SVE[2]	144	288	1,620	144	288	1,620	144	288	1,620
Total AADT[3]	37	183	549	37	233	615	37	183	549
Total SVE	149	407	1,809	149	457	1,875	149	407	1,809

Source: Northern Economics, Inc., estimates.

Note 1: For local induced traffic, the traffic volumes for the mid distance for Alaska communities are based on counts at 35 miles from the community; mid distance for Iskut, B.C., is 67 miles, which is the approximate distance to the intersection of MRA and the Cassiar Highway. The low traffic estimate for local induced trips uses 100 miles, and the high traffic estimate assumes 10 miles distance from Wrangell.

Note 2: SVE is standard vehicle equivalent.

Note 3: The AADTs reported in the table above reflect average conditions over a year. Summer months would have higher traffic volumes, and winter months would have lower traffic counts.

2.3 Diverted Traffic

Estimates of future diverted traffic were developed using data on current levels of traffic and trends from a number of sources including the AMHS annual reports, DOT&PF traffic data, and Federal Aviation Administration (FAA) data. The travel time and cost for each of the corridors were calculated and compared with the travel cost and time for current travel mode options. The travel time and cost were calculated for travel via ferry, vehicle, and air from selected cities in Southeast Alaska, including Wrangell, Petersburg, Ketchikan, Craig, Juneau, and Sitka, to Seattle, Washington, and Anchorage, Alaska, as the final destinations.

The comparative analysis of travel time and costs suggests that most of the traffic diversion would be expected from the AMHS system. Freight would not likely be diverted from the existing tug and barge operations due to their much lower cost structure, nor would significant numbers of travelers likely be diverted from air travel given aviation’s generally lower cost structure and time savings.

The estimated diverted traffic in 2030 could range from 4 to 20 AADT for all three corridors (Table 2-1). The estimated diverted traffic for the mid-case scenario would be approximately

12 AADT for the final stage of development for all the corridors. Travel time and travel cost would not vary enough between the corridors to change the volume of diverted traffic between corridors.

2.4 Induced Traffic

The construction of the MRA might induce new local, regional, and industrial traffic. For purposes of this study, local induced traffic was defined as recreation-oriented trips and trips from a community to “the end of the road” (not necessarily between communities). A regression model was developed based on the assumption that the number of local trips from a community would increase with its population size and would decrease at greater distances from the community.

Local induced travel by Wrangell residents was estimated at approximately 60 trips per day (AADT) assuming a distance of 35 miles from Wrangell, which is approximately where the closest new MRA road segments would begin. Slightly fewer trips (50 AADT) would be generated by Petersburg residents if that community were connected to the road system via the Stikine River Corridor. The residents of Iskut, B.C., could generate approximately 13 AADT on those segments of the MRA near the Cassiar Highway. Therefore, the total local induced traffic would be approximately 123 AADT under the Stikine River Corridor. The Bradfield Canal and Aaron Creek Corridors would not provide a direct connection to Petersburg and, therefore, the local induced traffic was estimated at approximately 73 AADT generated around the communities of Wrangell and Iskut (Table 2-1).

Regional induced traffic was defined as new travel between communities in Southeast Alaska and northwest B.C. To estimate regional induced trips on the proposed corridor, a gravity model was developed. The gravity model was based on the theory that the level of interaction between two communities increases with the size of the population in both communities and decreases with the distance between the two communities. The results indicated that regional induced travel could add from 0 to 55 AADT in 2030, depending on assumptions of population growth and the effect of distance on vehicle travel.

To estimate new industrial traffic that might be generated by potential future mines in B.C., telephone interviews were conducted with Canadian companies holding mineral claims in the region. Approximately 360 additional AADT could be associated with trucks traveling to and from potential mines in B.C. This truck traffic would be the equivalent of slightly more than 1,600 SVEs in terms of the deck space required on a ferry. None of these proposed mines are presently in production. Stewart, B.C. is an existing port with loading facilities that would compete with the MRA port. Therefore, it is possible that no industrial trips would occur in the future.

2.5 Current Transportation System Trends

This section reviews the current transportation system and projects future growth in travel activity assuming that the existing transportation system remains in place without development of a new MRA corridor connection to the Cassiar Highway. Simple linear regression models were used to forecast trends in the current transportation system.

The current passenger transportation system in the project area consists of air, cruise, and ferry travel. Most freight is transported by barge and air, and the remainder moves via the ferry system. There is no direct connection to the highway system south of Haines and Skagway or north of Hyder, Alaska, and Stewart, B.C.

2.5.1 Alaska Marine Highway System

The Alaska Marine Highway System transports passengers and vehicles between coastal communities in Alaska and serves Prince Rupert, B.C., and Bellingham, Washington. The scheduled ferry services are provided year-round in Southeast Alaska. The AMHS operates 11 vessels, with 7 in the Southeast Alaska system, from Bellingham north to Yakutat. In addition to transporting passengers and vehicles, the AMHS provides year-round shipment of container vans, including time-sensitive cargo such as fresh vegetables, meat, and dairy products, from Bellingham and regional Alaska centers to communities served by the system.

The Southeast Alaska system is divided into two subsystems: the mainline routes that typically take more than one day and the shorter day boat routes. In the summer, the mainline routes carry a high percentage of tourists, while the day boat routes primarily serve local residents in the smaller communities in Southeast Alaska.

2.5.2 Other Marine Industry

Cruise ships and freight represent other marine industry. Over 1 million cruise ship passengers visited Alaska in 2008. The number of cruise passengers would probably increase at a 3 percent rate from 2012 through the end of the study period, resulting in approximately 1.7 million passengers in 2030.

Some smaller communities have most of their freight transported by ferry from the larger communities. Wood products, seafood, and other products are shipped by barge to the lower 48 states and Canada, and ore concentrates and wood products are shipped to other countries. Freight volumes in the region generally increased from 2001 through 2007, except for Hoonah, where mill closures or harvest reductions resulted in lower freight volumes.

2.5.3 Aviation Industry

Air is the mode of choice for most residents and many non-residents traveling to and from Southeast Alaska. Overall, the number of passengers boarding flights at airports in selected communities increased from 2000 through 2007 and then decreased, affected by the national recession and higher fuel prices, reaching 450,000 passengers in 2009. By 2030, the number of boarding passengers (embarking) would likely reach about 660,000.

Air freight is the mode of choice for valuable and time-sensitive freight moving to or from the region. Air freight and air mail are used extensively in Southeast Alaska, which is reflected in an estimated volume of 847 pounds per capita for 2010. The results of a regression study suggest that the volume of airfreight and airmail is expected to have decreased to 490 pounds per capita, or a total annual volume of 32 million pounds by 2030, applying the mid-case scenario of the Alaska Department of Labor and Workforce Development (DOLWD) population estimates.

2.6 Implications from Traffic Projections

Seasonal variations in traffic volume on the MRA would likely be similar to current traffic trends on the AMHS and the state's highways. Winter travel, however, might be lower than anticipated due to the remoteness and limited public services available on the proposed corridors and the Cassiar Highway.

The highway could easily accommodate peak summer traffic. However, the Bradfield Canal Corridor and some of the earlier phases of the Stikine River and Aaron Creek Corridors have ferry links, and ferry capacity may not be sufficient if they have to accommodate large numbers of trucks from industrial users.

There would be limited MRA traffic using a road to Fools Inlet and a ferry terminal to connect with Ketchikan and Prince of Wales Island. Construction of the road to Fools Inlet and the ferry terminal (Stage 3 for Stikine River and Aaron Creek Corridors) may not be practical until the Cleveland Peninsula or the Revillagigedo Island roads are constructed per SATP recommendations.

The last stage (5) of the Stikine River Corridor would provide a time savings of approximately 13 minutes for Wrangell residents for approximately $89 million in capital cost. This stage would not likely have a positive benefit/cost ratio. If Stage 5 were built in conjunction with the road to Fools Inlet and the road connections to Ketchikan, however, it might be warranted.

Further investigation of the Bradfield Canal Corridor and Stages 2 and 4 of the Stikine River and Aaron Creek Corridors may be warranted. Benefits to Canadian residents and businesses from development of the MRA remain to be determined. Table 2-2 compares the various corridors that are evaluated in this report. It also summarizes some of the findings.

2.7 NPV of Life-cycle Costs

This section calculates the NPV of the life-cycle costs net of salvage value for each of the three proposed MRA corridors. ACVs may not be practical due to temperature and wind limitations, and Stage 3 (road to Fools Inlet and ferry terminal) of both the Stikine River and the Aaron Creek Corridors may not be practical until the Cleveland Peninsula or the Revillagigedo Island roads are constructed per SATP recommendations. Similarly, Stage 5 of the Stikine River Corridor would not likely have a positive benefit/cost ratio. Consistent with these recommendations, the cost assessment in this section includes the Bradfield Canal Corridor, Stage 2 of the Stikine River Corridor, and Stage 2 of the Aaron Creek Corridor.[1, 2] The Iskut River highway portion of Stage 1 is also included in the assessment for all corridors. It was assumed that Stage 4 of both the Stikine River and Aaron Creek Corridor would not be built within the study period.

For all three corridors analyzed in this technical memorandum, the preliminary design and permitting activities (including an EIS and supporting engineering) were assumed to begin in 2012 and extend through 2016. The final design, engineering, and administration activities were assumed to begin in 2017 and extend through 2028. The road/port/ferry construction activities were assumed to occur from 2019 to 2028. Capital investments for O&M of the road, port, and ferries were assumed to take place in 2028, and the annual O&M costs would occur during the remaining years of the study period. Figure 2-1 shows the discounted life-cycle costs of the three corridors over the 2012 to 2030 study period. The costs were discounted to their present values using a 2.7 percent real discount rate for projects that last 20 years or more as recommended by the Office of Management and Budget, Circular A-94.

The analysis for the extended period until 2060 included the cost of rehabilitating the road, which was assumed to take place from 2048 to 2052. The analysis also included the benefits that would occur

[1] The cost analysis for the Stikine River Corridor assumes a road connection from the Cassiar Highway down the Iskut River to the Stikine River and continuing down the Eastern Passage to Crittenden Creek where a ferry terminal would be located. A shuttle ferry would operate between Crittenden Creek and a terminal on Wrangell Island near the city.

[2] The cost analysis for the Aaron Creek Corridor assumes a corridor going from the Cassiar Highway down the Iskut River to the vicinity of the Stikine River. The corridor would follow the Katete River and Aaron Creek down to Berg Bay where a conventional ferry terminal would be located. A shuttle ferry would operate between Berg Bay and a ferry terminal at the Log Transfer Station on Wrangell Island, and a short road would connect the latter to the road system.

from the ferries' salvage value in 2060 and the remaining value of the road in 2060. Figure 2-2 shows the discounted life-cycle costs of the three corridors over the years 2012 to 2060.

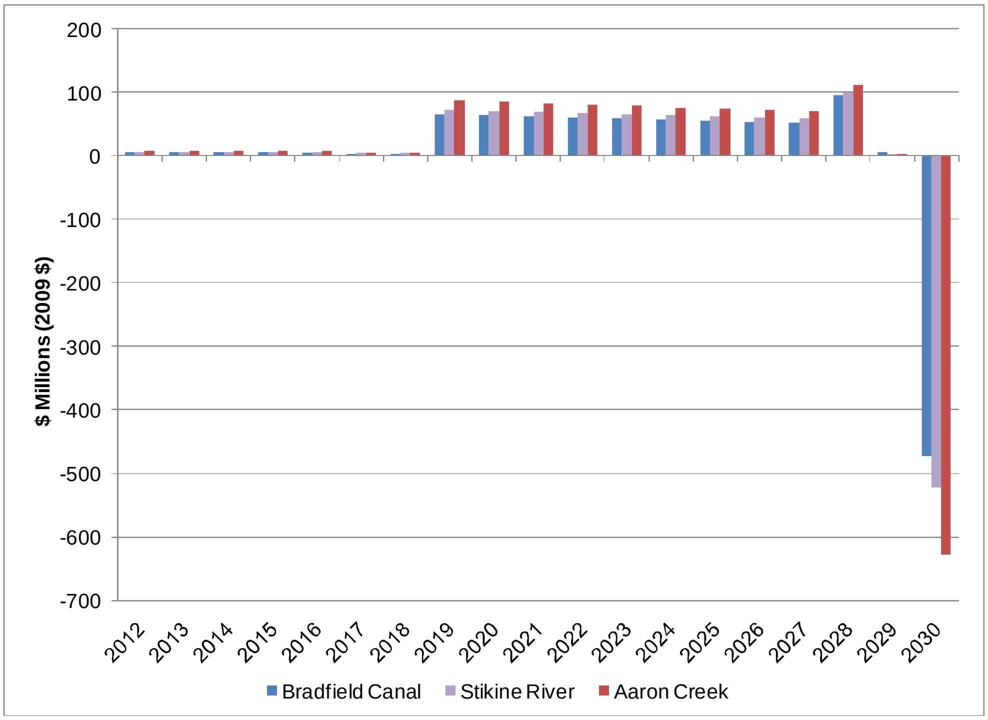

Figure 2-1. Discounted Life Cycle Costs of MRA Corridors, 2012 to 2030

Source: Estimated by Northern Economics, Inc.

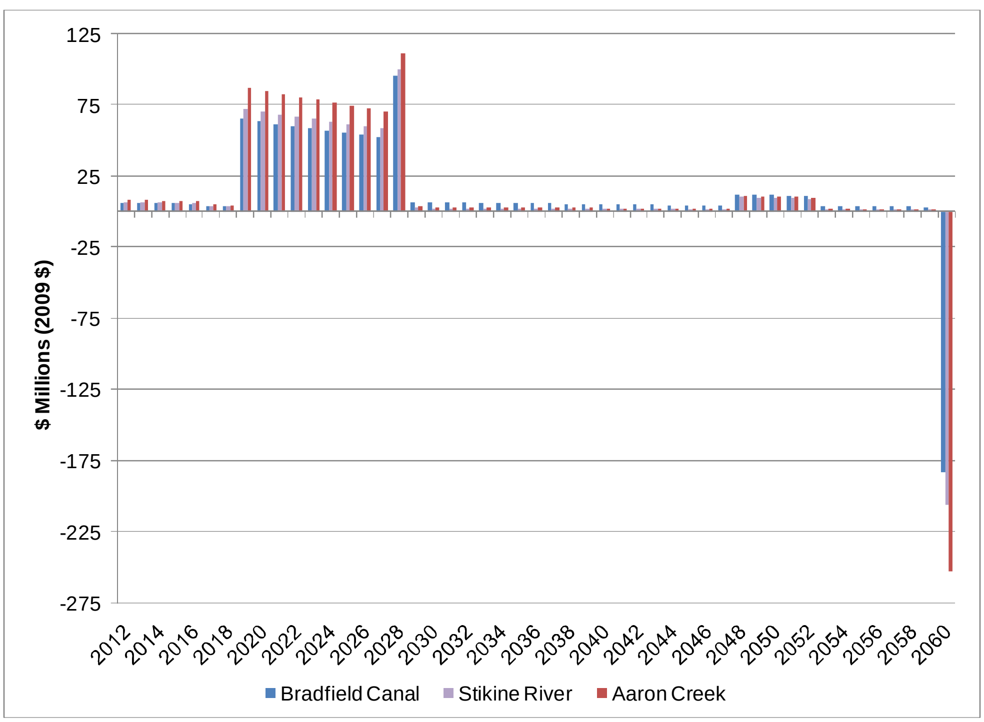

Figure 2-2. Discounted Life Cycle Costs of MRA Corridors, 2012 to 2060

Source: Estimated by Northern Economics, Inc.

The results indicate that the NPV of life-cycle costs net of salvage value between 2012 and 2030 would be the lowest for the Bradfield Canal Corridor ($192 million), followed by the Stikine River Corridor ($204 million) and the Aaron Creek Corridor ($240 million). This ranking changes when comparing the corridors during an extended period. The NPV of life-cycle costs net of salvage value from 2012 to 2060 for the Stikine River Corridor would be the lowest ($609 million), followed by the Bradfield Corridor ($656 million) and the Aaron Creek Corridor ($721 million).

2.8 Cost-Effectiveness

The CE of a project combines both a measure of its costs and an indirect measure of non-monetary benefits to establish effectiveness. For this study, it was assumed that the MRA would provide surface access to the region, and the number of vehicle trips (AADTs) generated by each corridor would be an indirect measure of the benefits of providing this access.

CE estimates for 2060 indicate that, across all scenarios, the Stikine River Corridor would have the lowest NPV of life-cycle cost per AADT, followed by the Bradfield Corridor and the Aaron Creek Corridor. For the mid-case scenario, in particular, the Stikine River Corridor would have the lowest cost per AADT ($239 per trip), followed by the Bradfield Corridor ($328 per trip) and the Aaron Creek Corridor ($360 per trip) (Table 2-2).

Table 2-2. Comparison of Corridors

Corridor	Capital Cost (road and ferry system)				Corridor AADT & SVE in 2030 (low, mid, high)	Ferry ADT in 2030 (mid, winter, summer)	Ferry Daily Capacity (standard vehicle units)	Industrial port/traffic	Travel Time	Full Build Capital Cost Ranking
	AK Cost	B.C. Cost	Total	Cumulative Total						
Bradfield Canal	490	345	835	835	AADT: 37/183/549 SVE: 149/407/1809	119/82/171	Winter: 90(=3*30) Summer: 180(=6*30)	Yes to upper reach of Bradfield Canal	Slowest time to all communities	Lowest cost
Stikine River					AADT: 37/233/615 SVE: 149/457/1875	169/116/243	Winter: 90(=3*30) Summer: 270(=9*30)	Yes to Eastern Passage	Most time savings for Petersburg and north if linked to MRA	Highest cost
Stage 1	30	452	482	482						
Stage 2	381	92	473	955						
Stage 3	64	-	64	1,019						
Stage 4	243	-	243	1,262						
Stage 5	89	-	89	1,351						
Aaron Creek					AADT: 37/183/549 SVE: 149/407/1809	119/82/171	Winter: 90(=3*30) Summer: 180(=6*30)	Yes to Eastern Passage or Blake Channel	Fastest time to Wrangell	Slightly lower cost than Stikine River
Stage 1	30	452	482	482						
Stage 2	544	105	649	1,131						
Stage 3	46	-	46	1,178						
Stage 4	60	-	60	1,238						

Notes: 1) Capital costs would include road/port (ferry terminal) construction and engineering costs, ferry costs, and the capital costs related to road/ports/ferries operation and maintenance. More detail on capital costs can be found in the Southeast Alaska Mid-Region Access Engineering Technical Memorandum.

2) Ferry AADT in 2030 reflects total AADT for standard vehicles only. Industrial traffic would likely use the closest tidewater location and would not require ferry transport.

3) ADT reflects volumes at full build out; traffic volumes would be lower for early stages.

4) Capital costs are shown in millions of U.S. dollars.

5) The capital costs for the Stages 2 and 4 only option would include the cost of building the Iskut River roadway portion of Stage 1.

6) For local induced traffic, the mid distance for Alaska communities would be 35 miles; mid distance for Iskut, B.C. would be 67 miles, which is the approximate distance to the intersection of the MRA and the Cassiar Highway. The low traffic estimate for local induced trips uses 100 miles, and the high traffic estimate assumes a10-mile distance from Wrangell.

Table 2-3. Cost Effectiveness by MRA Corridor, 2060

	Corridor								
	Bradfield Canal			Stikine River			Aaron Creek		
	Low	**Mid**	**High**	**Low**	**Mid**	**High**	**Low**	**Mid**	**High**
(a) Costs (thousands of dollars)									
Cost less salvage value (NPV)	656,359	656,359	656,359	609,440	609,440	609,440	721,477	721,477	721,477
(b) Effectiveness (thousand trips)									
Non industrial traffic	55	1,303	2,070	55	1,851	2,792	55	1,303	2,070
Industrial traffic	350	701	3,942	350	701	3,942	350	701	3,942
Total traffic	405	2,004	6,012	405	2,551	6,734	405	2,004	6,012
(c = a/b) CE (dollars per trip)									
CE - non industrial	11,988	504	317	11,131	329	218	13,178	554	349
CE - industrial	1,873	937	167	1,739	870	155	2,059	1,030	183
CE - total	1,620	328	109	1,504	239	90	1,781	360	120

Note: Costs are expressed in 2009 U.S. dollars.

Source: Estimated by Northern Economics, Inc., based on Robert Peccia & Associates (2011) and DOT&PF (2011)

3 SOUTHEAST ALASKA MID-REGION ACCESS PORT AND FERRY TERMINAL TECHNICAL MEMORANDUM

3.1 Introduction

This memorandum contains an assessment of potential coastal locations that would support marine/highway access at the western terminus of a new MRA highway corridor connecting with the existing Cassiar Highway in Canada. Potential conventional and ACV roll-on/roll-off (Ro-Ro) passenger ferry terminal sites serving the Bradfield Canal, Stikine River, and Aaron Creek Corridors are identified. Additional analyses include assessing the practicality of potential ferry routes, the ideal conventional and ACV ferry characteristics, and the potential for road-end commercial ports.

3.2 Characteristics of Ideal Ferry Terminal

The ferry terminal sites must be accessible by road. Sites must be feasible for intended vessel types, enable staging vehicles waiting for the ferry, and provide necessary services (e.g., public restrooms, ticket sales, basic shelter for foot passengers, etc.). It is possible that some potential ferry terminal (and/or commercial port) sites identified in this report are ultimately deemed impractical due to access issues.

3.2.1 Conventional Ferry Terminal

The shoreline elevation at the ferry terminal should 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. Shore elevation should be about 15.7 feet above MLLW. Water depth (below extreme low water) at the end of the transfer ramp should equal the draft of the calling ferry vessel plus either about 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.

3.2.2 ACV Ferry Terminal

ACV ferries require a hangar in which maintenance can take place and where they can be berthed most nights and relatively modest terminal facilities to support landing, departure, and unloading/loading of passengers and vehicles. ACV landing pads must be above extreme high water (tidewater locations) or extreme flood stage (river locations) and have to be rugged, compact, dust-free surfaces such as compact mud, gravel infiltrated with sand, or silty sand. The slopes approaching the landing pads should generally be less than 10 percent, though ACV can surmount short sections of slope of 15 or even 20 percent. Landing pads should be essentially flat (other than slopes for drainage of rainwater) and should measure at least two ACV lengths in every direction. The end of the landing pad approach ramp must extend to extreme low water elevation and must be protected from erosion and heavy deposits of earthen materials, rock, and/or flood-borne debris.

3.3 Potential Conventional Ferry Terminal Sites

There are three potential conventional ferry terminal site areas. The mainland, Mitkof Island, and Wrangell Island terminal sites are described below.

3.3.1 Potential Mainland Conventional Ferry Terminal Sites

Potential conventional ferry terminal sites on the Alaskan mainland are Crittenden Creek, Berg Bay, and Kapho Mountain. Crittenden Creek is situated across the Eastern Passage from Wrangell Airport and is the favorable potential terminal site for the Stikine River Corridor. Berg Bay is situated on Blake Channel, south of The Narrows and across from Wrangell Island, and is the favorable terminal site for the Aaron Creek Corridor. Kapho Mountain is situated near the head of Bradfield Canal at the foot of the Kapho Mountains and is the identified terminal site serving the Bradfield Canal Corridor.

3.3.2 Potential Mitkof Island Conventional Ferry Terminal Sites

The Bradfield Canal, Stikine River, and Aaron Creek Corridors would include use of a conventional South Mitkof Island ferry terminal during some development stages. The existing AMHS terminal in Blind Slough would be the obvious conventional ferry terminal for these corridors.

3.3.3 Potential Wrangell Island Conventional Ferry Terminal Sites

Each corridor would include use of one or more conventional ferry terminals on Wrangell Island during some development stages. The potential conventional ferry terminal sites identified on Wrangell Island are the existing AMHS terminal, Fools Inlet, Spur Road, Peninsula Street, and Log Transfer Station.

All the corridors would require continued use of the existing AMHS ferry terminal at Wrangell to serve mainline AMHS vessels and construction of a new terminal on the east side of Fools Inlet to provide conventional ferry service to Ketchikan. The existing AMHS terminal could be used as an opposing ferry terminal to the Crittenden Creek terminal serving the Stikine River Corridor.

The Spur Road or Peninsula Street ferry terminal could also be used as an opposing terminal to Crittenden Creek. The Spur Road terminal is situated across the Eastern Passage from Crittenden Creek adjacent to the existing Spur Road. The Peninsula Street terminal is located within Wrangell Harbor adjoining Peninsula Street.

The Log Transfer Station ferry terminal site is situated on the Eastern Passage side of The Narrows at an existing log transfer facility. The Log Transfer Station terminal would be the opposing ferry terminal to the Berg Bay terminal proposed for the Aaron Creek Corridor.

3.4 Potential ACV Ferry Terminal Sites

Early stages of the Stikine River and Aaron Creek Corridors would provide an opportunity to use ACV Ro-Ro passenger ferries operating from a new ACV ferry terminal 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. Low temperatures and high winds could also extend this period of interrupted service.

3.4.1 Potential Mainland ACV Ferry Terminal Sites

Potential ACV terminal sites were sought on the mainland around the confluence of the Iskut River with the Stikine River. The lower Iskut River and the Stikine River near its 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. Therefore, ACV terminal sites were sited near reliable and substantial geographic features that evolve into higher elevation and slopes.

A site up the Iskut River 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. Alternative potential sites were identified on the north side of the Iskut River and on the Stikine River opposite Great Glacier. The selected sites could become isolated and stranded should the river channels shift away from these sites in the future.

3.4.2 Potential Mitkof Island ACV Ferry Terminal Sites

Four potential ACV ferry terminal sites on South Mitkof Island were identified. An ACV ferry terminal could be developed on the beach on either side of the existing AMHS ferry terminal in Blind Slough, as well as at Olsen’s Landing. There are also two alternative sites on Dry Strait: a protected mud beach at the end of the highway and sandy beaches just beyond the end of the Mitkof Highway.

3.4.3 Potential Wrangell Island ACV Ferry Terminal Sites

The north end of the Wrangell Airport was identified as a promising site for an ACV ferry terminal on Wrangell Island. The ACV may have to operate under FAA flight control due to the close proximity to the Wrangell Airport runway.

3.5 Potential Conventional Ferry Routes

3.5.1 Bradfield Canal Ferry Route

The potential conventional ferry route serving the Bradfield Canal Corridor would be from Kapho Mountain to Fools Inlet. The distance along Bradfield Canal from Kapho Mountain to Fools Inlet is approximately 19.8 nautical miles (nm). At a speed of 10 knots by a small conventional ferry, a one-way passage would take approximately 2 hours. Two round trips could be accomplished in a 12-hour service day appropriate to one crew shift, but three round trips would require higher speed and installed power.

3.5.2 Stikine River Corridor Ferry Routes

There are three potential conventional ferry routes serving the Stikine River Corridor all starting from Crittenden Creek. The shortest and best option, if practical, would be directly across Eastern Passage to Spur Road. The one-way transit from Crittenden Creek to Spur Road is approximately 2.58 nm. At 10 knots, that route 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 schedule. In a 12-hour service day, appropriate to one crew shift (including allowances for start-up and shut down), there could be approximately 11 round trips.

If the Spur Road conventional ferry terminal site were impractical, the two alternatives would either be 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 accomplish five round trips in a 12-hour service day appropriate to a single crew shift.

Because of the requirement to transit Wrangell Harbor at harbor speeds (below 5 knots) one-way transit between Crittenden Creek and Wrangell Harbor at Peninsula Street would require approximately 50 minutes. A round trip might require approximately 2 hours and 20 minutes. A 10-knot service speed ferry might accomplish 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.

3.5.3 Aaron Creek Corridor Ferry Routes

The potential conventional ferry route serving the Aaron Creek Corridor would be from Berg Bay on the mainland and the Log Transfer Station on Wrangell Island. At a speed of 10 knots for a small conventional ferry, the 6.25 nm, one-way passage would take approximately 40 minutes. A double ended conventional ferry should support a 2-hour, round trip sailing schedule. Five round trips could be accomplished in a 12-hour service day appropriate to one crew shift (including allowances for start-up and shut-down).

3.6 Potential ACV Ferry Routes

ACV ferry route distances vary from 39.7 nm (from North Iskut to Dry Strait mud beach) to 48.7 nm (from Stikine opposite Great Glacier to Olsen's Landing in Blind Slough). 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 open water routes from the Stikine delta junction point to ACV termini on Mitkof or Wrangell Islands, an effective speed of 38 to 50 knots would be possible. The shortest one-way transit time would be 1 hour and 23 minutes, and the longest transit time would be 1 hour and 38 minutes. These transit times should permit two round trips per 12-hour crew shift during summer (with 12 hours of daylight). During winter, only one trip per day (per ACV) would be feasible. As observed elsewhere, ACV operations would have to be suspended for several weeks during fall freeze up and during spring thaw and sometimes during low temperatures and high wind speeds.

3.7 Ferry Characteristics

3.7.1 Conventional Ferry

Unless conventional ferry service were provided to an existing AMHS terminal (at either Wrangell or South Mitkof), the ideal ferry for the short routes would be small, approximately 150 feet long, and double-ended. This configuration would promote the rapid vehicle loading and unloading associated with the drive-through capability of double-ended ferries.

3.7.2 ACV Ferry

While only a few design teams have a combination of ACV design experience and the confidence needed to generate a new design, ACVs have a long and successful record of diverse applications. ACVs have been and are being used in the Alaska Arctic to carry mail, transport passengers, and support the oil and gas industry. There are a number of ACV manufacturers that could possibly generate an acceptable ACV for arctic conditions and anticipated traffic demands. Current ACV designs in development could accommodate up to 25 standard vehicles and 150 passengers.

3.8 Commercial Port Characteristics

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

3.8.1 Commercial Vessel Characteristics

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:

Handysize: These vessels range from 10,000 to 35,000 deadweight (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.

3.8.2 Channel Navigability

Soundings on the National Oceanic and Atmospheric Administration (NOAA) chart for Bradfield Canal are sparse, but they suggest that 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. 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. 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.

4 SOUTHEAST ALASKA MID-REGION ACCESS AIR-CUSHION VEHICLE TECHNICAL MEMORANDUM

4.1 Introduction

The Southeast Alaska Mid-Region Access Port and Ferry Terminal Technical Memorandum (Port and Ferry Memorandum) was commissioned to indicate suitable port locations to support inter-modal access along the three MRA corridors. Part of the assignment under that task was assessing the potential ACV terminal sites on the Stikine and/or Iskut Rivers in Canada and opposing terminal sites on Wrangell Island and South Mitkof Island. This memorandum is intended to further evaluate the potential use of ACVs as part of the Stikine River and Aaron Creek Corridors.

4.1.1 Proposed Route

Both the Stikine River and the Aaron Creek Corridors would connect the Cassiar Highway to Wrangell and Mitkof Islands via the Stikine River as in interim connection. Stage 1 of both these corridors would require an ACV to provide interim service before final road build-out during the later construction stages. This alternative assumes extension of the road from the Cassiar Highway to a suitable terminal site on the Iskut River near the confluence with the Stikine River. ACV ferry operations between the Iskut River and Wrangell and Mitkof Islands would take place until a road alternative was provided.

4.1.2 River Environment

The 379-mile-long, glacially influenced Stikine River originates in northwestern B.C. The lower one-third of the river has relatively flat, broad floodplains and is navigable. The fall freeze and spring thaw render the river impassable for weeks. The Stikine River basin is also prone to high winds and cold temperatures.

4.1.3 Projected Traffic

An earlier version of the Southeast Alaska Mid-Region Access Traffic Projections Technical Memorandum indicated that the diverted and induced regional traffic would be 63 AADT for Stage 1 of the Stikine River Corridor in 2030 (22,812 vehicles per year).[3] July is the peak travel month, accounting for 16 percent of the annual travel in 2008 in Southeast Alaska. Applying the

[3] The current version of the Southeast Alaska Mid-Region Access Traffic Projections Technical Memorandum doesn't include projected traffic estimates for the ACV in Stage 1. ACV service would be adversely affected by freezing temperatures and high wind speeds. These issues with ACV service reliability could result in low traffic volumes. It was decided to not update the ACV traffic estimates in subsequent analyses.

16 percent peak to the projected traffic would result in 3,650 vehicles during the peak month, or 118 AADT during July.

4.2 ACV Background

ACVs have been used for more than 30 years in arctic climates for military and commercial service. Environmental and ecological considerations must, however, be addressed during the permitting process. Applicable ACV operations in arctic conditions include the following:

- Cominco Metals ACV – mining operations on the Stikine and Iskut Rivers, 1991 to 1996
- United States Postal Service ACV – mail and freight operations at Bethel, 1997 to present
- Aleutians East Borough Cold Bay and King Cove ACV – ferry service, 2007 to present
- Proposed Redfern Resources ACV – hoverbarge mining operations on the Taku River

4.3 ACV Requirements

An ACV is a craft designed to travel over any smooth surface supported by a cushion of slowly moving, high-pressure air, ejected downwards against the surface below and contained within a skirt. Pressurized air is captured in the skirt and causes the ACV to rise to a predetermined height. A hoverbarge is a load-lifting commercial ACV with a deck size similar to a conventional barge. ACV hoverbarges can be self-propelled with an air propulsion system or non-self-propelled, requiring either a ground contact propulsion system or being towed by boat, helicopter, or tractors.

The operating environment can significantly influence ACV performance and reliability. Factors include wind speed, extreme cold temperatures, surface roughness, ice thickness, sea conditions, and spray icing. Icing caused by the spray of freezing water is likely in thin ice conditions or over water in cold temperatures. Ice rubble can prevent the skirt from sealing properly and results in loss of cushion. Freezing temperatures pose a risk to ACVs due to icing from the spray generated by the craft. After a river freezes, ACVs can travel on the ice; however, travel in the open ocean is still a concern. For a few weeks at breakup and at freeze-up, ACVs cannot operate on rivers. Operations would likely be suspended for weeks during the fall freeze and spring thaw. Extremely low water conditions may also suspend operations.

When operating in freshwater, such as traveling up the Stikine River, the critical temperature is 32 degrees Fahrenheit (°F). When traveling in the open ocean, the critical temperature is 28°F. Wrangell had an average of 11.4 days in January with the average maximum temperature below 32°F between 1949 and 2007, 5.5 days in February, 1.6 days in March, 3.4 days in November, and 7.3 days in December (Western Regional Climate Center 2008). Temperatures at inland points would be colder than those reported at Wrangell, which is influenced by the marine environment.

The United States Coast Guard limits ACV operations to winds lower than 35 knots and/or 10-foot seas. Whether there would be 10-foot seas in the area is uncertain, but wind speeds affecting maneuverability are likely down the Stikine River. Even if ACVs could accommodate strong winds, they would likely travel at slower speeds during high winds, resulting in longer travel times.

The Port and Ferry Memorandum recommends an ACV traveling speed of 32 mph along the Stikine River and 44 mph for open ocean conditions. The total time for one round trip per ACV on the Stikine River would take approximately 6 hours. This transit time would permit two round trips per 12-hour crew shift during the summer season. During the winter season, only one round trip would be feasible. Operating speeds for an ACV hoverbarge range from 4 to 8 mph. The total time for one hoverbarge on the Stikine River would be approximately 26 hours. The ACV hoverbarge could not travel roundtrip in one day.

4.4 Qualified ACV Manufacturers

Two ACV manufacturers that meet the project requirements and Jones Act restrictions are Global Hovercraft Services, Ltd. (GHS) and Hovertrans. Both companies have the technical ability and past experience for arctic ACV design and construction.

GHS is an owner and operator of cargo and passenger ACVs. The GHS-100 model can accommodate 16 vehicles and 50 passengers and the GHS-160 model can accommodate 25 vehicles and 100 passengers. The Stikine River and Aaron Creek Corridors would require three GHS-100 ACVs or two GHS-160 ACVs to meet projected traffic in design year 2030.

Hovertrans has experience designing, constructing, and operating heavy-lift ACVs known as Hoverbarges throughout the world. Hovertrans could modify their ACV Hoverbarge base specifications to meet the project requirements. The Hovertrans Hoverbarge size would be adequate to carry design year traffic. The slow operating speed of a Hoverbarge would allow only a one-way trip per day on the Stikine River.

4.5 Costs

Developing accurate costs of an ACV system this early in the project's development is difficult without a detailed analysis of the proposed route. Exact ACV costs would vary based on project specific requirements, operating conditions, and environmental constraints. Contacts with ACV manufacturers were made to determine level-of-magnitude costs for this study. A detailed cost assessment with the ACV manufacturers must be conducted as the project scope becomes more defined in the subsequent planning stages.

GHS is a service provider that supplies and operates ACVs over 5-year periods. The service program consists of construction of a specifically tailored ACV to fit the proposed route, and operations and maintenance of the ACV program. The GHS service contract may be financed by full public financing, full GHS private financing, or a joint venture of public and private GHS financing. If 100 percent public financing were used, the system might be self-sustaining with no further capital or government subsidies required after the initial payment for service was made. GHS estimated the service contract to construct, operate, and maintain three arctic class ACVs to be approximately $85 million for a 5-year period.

Hovertrans offers lease programs for Hoverbarges. The cost of the Hoverbarge lease is for the Hoverbarge only and does not include O&M costs. Hovertrans estimated an 8-year lease for one Hoverbarge to be approximately $48 million.

Three terminal ports are needed on the Stikine River and Aaron Creek Corridors. One of the three ports would require a maintenance facility or hangar for the ACV. The Stikine River has extensive floodplains, and the Iskut terminal location may require civil engineering measures to ensure access during all stages of the river. Terminal ports would likely cost $1 to $10 million each, depending on the extent of the facilities and the engineering measures required.

4.6 Revenue

Passengers, vehicles, freight, and mail delivery would generate potential revenue. Most ferry and ACV systems in Alaska do not generate enough revenue to cover operating costs and require annual subsidies. ACV service contracts would be an option to conventional purchasing and may not require annual subsidies if 100 percent public financing were used.

If a service contract were pursued, typically the service provider would take a percentage of the profits. This percentage would be negotiated on a contract-by-contract basis. This percentage would vary based on the portion of public and private financing dollars used and on the number of years in the service contract.

4.7 Conclusion and Recommendations

Based on preliminary research, ACV manufacturers have the technical ability to design and construct vessels to operate successfully in arctic conditions along the Stikine River and to meet traffic demands. However, cold weather, strong winds, and sensitive environmental issues may pose challenges to ACV operations. These conditions may limit a vessel's reliability and full-time operation.

ACV service programs consist of construction of a specifically tailored vessel to fit the proposed route, operations, and maintenance of the ACV program. Service contracts are financed by public, private, or combined public and private dollars. Most ferry and ACV systems in Alaska do not generate enough revenue to cover operating costs and require annual subsidies.

Service provider GHS estimated that the service contract to construct, operate, and maintain three arctic-class ACVs would cost approximately $85 million for a 5-year period. Hovertrans estimated that an 8-year Hoverbarge lease would cost approximately $48 million. The lease cost does not include O&M costs.

Terminal ports would likely cost $1 million to $10 million each, depending on the extent of the facilities and engineering measures required. Three terminal ports would be needed for the Stikine River or Aaron Creek Corridor route.

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5 SOUTHEAST ALASKA MID-REGION ACCESS ENGINEERING TECHNICAL MEMORANDUM

5.1 Introduction

This memorandum examines engineering and cost data for the following three potential MRA transportation corridors: Bradfield Canal, Stikine River, and Aaron Creek. The information presented is intended to supplement previous MRA transportation corridor studies and to assist in determining the practicality of using these corridors to connect Southeast Alaska to the continental highway system. The memorandum includes conceptual alignment designs and order-of-magnitude cost estimates for each of the three potential MRA corridors.

5.2 Design Process

FHWA-Western Federal Lands Highway Division (WFLHD) completed an in-depth cost feasibility study for the Bradfield Canal Corridor in 2005. The Kapho Mountain conceptual alignment option of the Bradfield River Road Final Scoping and Pre-NEPA Feasibility Study (Bradfield River Road Study) was used for this study and was not altered during the design process. Horizontal alignments for the Stikine River and Aaron Creek Corridors were initially based on alignments in the 1984 DOT&PF report, Reconnaissance Study – Stikine River Highway Access (Stikine River Access Study). The horizontal alignments were revised to meet current design standards and to better fit a topographic-map-based terrain survey.

Design profiles and cross sections were created for each new alignment based on design standards and typical sections. Profiles and cross sections were not created for the alignments following current roads, as the ground information lacked accuracy to portray these roads. Full conceptual designs for any alignment across the International Boundary in B.C. were outside the scope of this project. Thus, only horizontal alignments were designed for these alignments. Conceptual design plans were not completed for the B.C. alignments, but the alignments were included in the corridor cost estimates. Placement of conceptual features, notably bridges, large culverts, mechanically stabilized earth (MSE) walls, and rock revetment walls, were estimated from aerial photos, cross sections, and United States Geological Survey (USGS) topographic maps.

After evaluating the initial designs, the horizontal and vertical alignments were revised until the resulting grading quantities were similar in magnitude to those in the Bradfield River Road Study. The alignments were also modified to account for any potential problems with terrain identified during the September 2007 field review of the alignments.

High-resolution aerial photographs of the conceptual alignments were obtained in August 2008. The aerial photographs were used to develop new ground elevation information, resulting in existing ground contours with a 5-foot contour interval. With the higher level of accuracy provided by the new ground survey, all aspects of the previous conceptual designs (horizontal alignment, design profile, bridges, MSE walls, etc.) could be revised to better match the existing ground. The new survey did not, however, accurately depict the existing roads to be rehabilitated. The earlier assumptions about the conceptual existing road alignments were retained, and design profiles and cross sections were not developed for these alignments. Detailed descriptions and plan and profile sheets were developed for each conceptual alignment. The conceptual designs presented are intended for corridor development only and would have to be refined based on detailed studies once an appropriate transportation corridor was chosen.

5.3 Design Assumptions

Design standards were developed to guide design of the typical sections, alignments, and profiles. The design standards were derived from the American Association of State Highway and Transportation Officials' (AASHTO's) document, A Policy on Geometric Design of Highways and Streets, and from the Bradfield River Road Study. The standards were based on the proposed roadway being classified as a rural minor collector.

Initially, the full build-out typical section for a two-lane paved roadway configuration was developed for cost estimating. A one-lane gravel roadway typical section (including turnouts) was added to the assessment for comparison, as funding for the MRA transportation corridor could be limited. To provide further options, a phased construction typical section was added, with a one-lane gravel roadway built on a subgrade wide enough to support potential future construction of the full paved two-lane section.

5.4 Field Review

In September 2007, an aerial field review of the conceptual alignments was conducted by floatplane. Personnel from DOT&PF, FHWA, and Robert Peccia and Associates participated in the aerial reconnaissance of the Bradfield River, Craig River, Unuk River, Iskut River, Stikine River, Katete River, and Aaron Creek drainages. Problematic terrain that the conceptual alignments would have to avoid was identified to be incorporated into the designs. Digital photos taken from the floatplane during the review were embedded with Global Positioning System (GPS) coordinates, and the photos were georeferenced to the design files and Google Earth™. The placement of conceptual features, such as bridges, was assessed using the photos.

5.5 Color Orthophotography

After being modified based on the 2007 field review observations, the conceptual alignments were provided to an aerial mapping company. High-resolution color orthophotography for the Stikine River and Aaron Creek Corridors was acquired in August 2008. The photographs were the same resolution as the aerial photos of the Bradfield River Road Study. The scale and accuracy of the aerial photos allowed for extraction of existing ground information. The aerial photographs were shown with the conceptual alignments on the plan and profile sheets.

5.6 Ground Survey Assumptions

The initial conceptual design was developed using existing ground information derived from USGS topographic maps. The ground survey based on the USGS maps was relatively inaccurate, with a contour interval of 50 feet. Existing ground information derived from color orthophotography resulted in ground survey data with a much higher level of accuracy: a 5-foot contour interval. The Bradfield River Road Study used light detection and ranging (LIDAR) mapping to produce a ground survey with an existing ground contour interval of 3 feet. As a result, the conceptual designs completed for the Stikine River and Aaron Creek Corridors were produced to the same relative level of accuracy as those for the Bradfield Canal Corridor. The conceptual designs and corresponding cost estimates could, thus, be directly compared to one another.

5.7 Cost Estimates

5.7.1 Approach

The three potential MRA transportation corridors (Bradfield Canal, Stikine River, and Aaron Creek) were divided into individual alignments and segments during the conceptual design process. The alignment segments correlated to the portion of roadway to be built with each construction stage. To increase usability, a separate cost estimate (using the assumptions described below) was completed for each segment of each alignment. The cost of each stage of construction for the three MRA corridors was established by combining the appropriate segment costs.

5.7.2 Methods and Assumptions

Order-of-magnitude cost estimates were developed using calculated quantities and average bid prices, assumed percentages of total construction cost, or per-mile costs. The cost estimates were based on the methodology developed for the Bradfield River Road Study. Depending on the segment, the estimates included all aspects of roadway construction for either new roadway construction or existing road rehabilitation. Each alignment segment has four separate estimates due to the development of four different roadway configurations.

Each corridor contains sections within B.C. Because design concepts were not completed on portions of the corridor that are within B.C., representative sections of roadway in Alaska was used to develop a per-mile cost for new roadway construction and existing road rehabilitation. These costs were applied to the B.C. alignments to determine complete route costs.

The study assumes that the proposed transportation routes would operate year-round. The Southeast Alaska Mid-Region Access Operating and Maintenance Cost Technical Memorandum provided estimates for the upfront and annual costs for operation of the transportation corridors. Only the costs of installing permanent roadway operating features have been included in the cost estimates of this memorandum. This includes the upfront O&M costs, consisting of port of entry and maintenance facilities, and the costs for installing tunnels, utility lines, and ferry terminal facilities. Annual costs to operate and maintain these features have, however, not been included in the estimates. As such, the costs of acquiring and operating conventional or ACV ferries between new and existing terminal facilities have not been estimated. At this point in the corridor-planning process, avalanche mitigation measures have not been included in the cost estimates either.

The cost of port development would depend largely on individual site topography and construction logistics. It was assumed that a single cost per port terminal should be used for all terminals, both to simplify the cost estimates and to account for the limited knowledge regarding potential port locations and facilities.

The estimate for the Kapho Mountain alignment option from the Bradfield River Road Study was modified in this study to account for the inflated costs of construction since 2005 and to add the additional cost division items not included in the original estimate. The estimated costs for the B.C. portion of the alignment, the conceptual Kapho Mountain conventional ferry terminal, contractor construction camps, and upfront operating expenses were included in the new cost estimate. The quantities for the one-lane gravel and phased construction typical sections had to be estimated, since the conceptual design of this alignment was not a part of the study

5.7.3 Summary of Estimates

The estimated costs for the staged development of the Bradfield Canal, Stikine River, and Aaron Creek Corridors are summarized in Tables 5-1 through 5-4 on the following pages. Estimate summaries are presented for each roadway typical section developed in the conceptual design.

Table 5-1. Southeast Alaska MRA Corridors Summary, Two-Lane Paved

Corridor	Stage	Length (miles)	ACV Ferry Terminals	Conv. Ferry Terminals	AK Cost (Millions)	B.C. Cost (Millions)	Total Cost (Millions)	Cumulative Cost (Millions)
Bradfield Canal	1 (Ultimate)	112	0	2	$425	$345	$770	$770
Total	-	**112**	**0**	**2**	**$425**	**$345**	**$770**	**$770**
Stikine River	1	71	3	0	$30	$452	$482	$482
	2	49	0	2	$316	$92	$408	$890
	3	22	0	1	$64	$0	$64	$954
	4	14	0	0	$243	$0	$243	$1,197
	5 (Ultimate)	16	0	0	$89	$0	$89	$1,287
Total	-	**173**	**3**	**3**	**$742**	**$545**	**$1,287**	**$1,287**
Aaron Creek	1	71	3	0	$30	$452	$482	$482
	2 (Pass)	55	0	2	$508	$105	$613	$1,095
	2 (Tunnel)	54	0	2	$479	$105	$584	$1,066
	3	10	0	1	$46	$0	$46	$1,113
	4 (Ultimate)	7	0	0	$60	$0	$60	$1,173
Total (Pass)	-	**143**	**3**	**3**	**$644**	**$558**	**$1,201**	**$1,201**
Total (Tunnel)	-	**143**	**3**	**3**	**$615**	**$558**	**$1,173**	**$1,173**

Note: Estimates include capital costs for road construction, ferry terminal construction, and construction of operating and maintenance facilities. The costs do not include capital costs for conventional or ACV ferries.

Table 5-2. Southeast Alaska MRA Corridors Summary, One-Lane Gravel

Corridor	Stage	Length (miles)	ACV Ferry Terminals	Conv. Ferry Terminals	AK Cost (Millions)	B.C. Cost (Millions)	Total Cost (Millions)	Cumulative Cost (Millions)
Bradfield Canal	1 (Ultimate)	112	0	2	$346	$227	$573	$573
Total	-	**112**	**0**	**2**	**$346**	**$227**	**$573**	**$573**
Stikine River	1	71	3	0	$30	$295	$325	$325
	2	49	0	2	$226	$63	$289	$614
	3	22	0	1	$37	$0	$37	$651
	4	14	0	0	$162	$0	$162	$813
	5 (Ultimate)	16	0	0	$54	$0	$54	$867
Total	-	**173**	**3**	**3**	**$509**	**$358**	**$867**	**$867**
Aaron Creek	1	71	3	0	$30	$295	$325	$325
	2 (Pass)	55	0	2	$352	$71	$422	$747
	2 (Tunnel)	54	0	2	$361	$71	$432	$757
	3	10	0	1	$33	$0	$33	$790
	4 (Ultimate)	7	0	0	$40	$0	$40	$830
Total (Pass)	-	**143**	**3**	**3**	**$454**	**$366**	**$820**	**$820**
Total (Tunnel)	-	**143**	**3**	**3**	**$464**	**$366**	**$830**	**$830**

Note: Estimates include capital costs for road construction, ferry terminal construction, and construction of operating and maintenance facilities. The costs do not include capital costs for conventional or ACV ferries.

Table 5-3. Southeast Alaska MRA Corridors Summary, Phase 1

Corridor	Stage	Length (miles)	ACV Ferry Terminals	Conv. Ferry Terminals	AK Cost (Millions)	B.C. Cost (Millions)	Total Cost (Millions)	Cumulative Cost (Millions)
Bradfield Canal	1 (Ultimate)	112	0	2	$378	$283	$661	$661
Total	-	**112**	**0**	**2**	**$378**	**$283**	**$661**	**$661**
Stikine River	1	71	3	0	$30	$381	$411	$411
	2	49	0	2	$277	$83	$360	$771
	3	22	0	1	$40	$0	$40	$811
	4	14	0	0	$231	$0	$231	$1,042
	5 (Ultimate)	16	0	0	$74	$0	$74	$1,115
Total	-	**173**	**3**	**3**	**$651**	**$464**	**$1,115**	**$1,115**
Aaron Creek	1	71	3	0	$30	$381	$411	$411
	2 (Pass)	55	0	2	$465	$96	$562	$973
	2 (Tunnel)	54	0	2	$438	$96	$535	$946
	3	10	0	1	$35	$0	$35	$980
	4 (Ultimate)	7	0	0	$54	$0	$54	$1,034
Total (Pass)	-	**143**	**3**	**3**	**$584**	**$477**	**$1,061**	**$1,061**
Total (Tunnel)	-	**143**	**3**	**3**	**$557**	**$477**	**$1,034**	**$1,034**

Note: Estimates include capital costs for road construction, ferry terminal construction, and construction of operating and maintenance facilities. The costs do not include capital costs for conventional or ACV ferries.

Table 5-4. Southeast Alaska MRA Corridors Summary, Phase 2

Corridor	Stage	Length (miles)	ACV Ferry Terminals	Conv. Ferry Terminals	AK Cost (Millions)	B.C. Cost (Millions)	Total Cost (Millions)	Cumulative Cost (Millions)
Bradfield Canal	1 (Ultimate)	112	0	2	$51	$64	$114	$114
Total	-	**112**	**0**	**2**	**$51**	**$64**	**$114**	**$114**
Stikine River	1	71	3	0	$0	$74	$74	$74
	2	49	0	2	$42	$11	$54	$128
	3	22	0	1	$22	$0	$22	$150
	4	14	0	0	$14	$0	$14	$164
	5 (Ultimate)	16	0	0	$17	$0	$17	$181
Total	-	**173**	**3**	**3**	**$96**	**$85**	**$181**	**$181**
Aaron Creek	1	71	3	0	$0	$74	$74	$74
	2 (Pass)	55	0	2	$45	$10	$56	$130
	2 (Tunnel)	54	0	2	$43	$10	$54	$128
	3	10	0	1	$11	$0	$11	$139
	4 (Ultimate)	7	0	0	$7	$0	$7	$146
Total (Pass)	-	**143**	**3**	**3**	**$63**	**$85**	**$148**	**$148**
Total (Tunnel)	-	**143**	**3**	**3**	**$61**	**$85**	**$146**	**$146**

Note: Estimates include capital costs for road construction, ferry terminal construction, and construction of operating and maintenance facilities. The costs do not include capital costs for conventional or ACV ferries.

6 SOUTHEAST ALASKA MID-REGION ACCESS UNIT COST TECHNICAL MEMORANDUM

6.1 Introduction

This memorandum provides further data and support for the pricing information used in the development of transportation corridor cost estimates within the Southeast Alaska Mid-Region Access Engineering Technical Memorandum (MRA Engineering Memorandum). Additional pricing support information was desired for the cost estimates, preferably from projects requiring new roadway construction, work camps, and port development.

6.2 Methodology

An internet survey of available bid tabulation information was conducted to identify possible projects that could be used to refine the pricing information in the MRA Engineering Memorandum. FHWA-WFLHD provides bid tabulations for past Alaska projects on its website. Three additional FHWA projects from Southeast Alaska were selected to add to the assessment. DOT&PF's web site was reviewed, and bid tabulations for one project were added to the assessment. Since DOT&PF only provides bid tabulations for recently bid projects, there likely are unavailable projects that are more representative of the type of work involved in the MRA Engineering Memorandum.

A comparable project currently under development in the state of Alaska is the Juneau Access Improvements Project, otherwise known as the East Lynn Canal Highway. For the purpose of this memorandum, the project is referred to as the Juneau Access Highway. A 51-mile new roadway is proposed from Juneau north along Lynn Canal to a new conventional ferry terminal that would provide ferry service to the communities of Haines and Skagway. The new roadway would include complicated bridge structures and tunnel sections and would require substantial earthwork to build the road along the steep mountain slopes adjacent to Lynn Canal. Work camps would be necessary to complete the roadway. Numerous costing reports for the Juneau Access Highway were added to the unit cost assessment, including engineer's estimates, an independent contractor estimate, and previous unit cost analyses for the project.

6.3 Assumptions and Research Summary

Costing information from each of the sources was compiled and compared to the MRA Engineering Memorandum costing items. The costing information contained in the compiled bid tabulations and report estimates was converted into the same format used for each work item in the MRA Engineering Memorandum so that the costs could be directly compared. Since most of the comparable projects were bid or estimated in previous years, the prices were adjusted by 3 percent per year for inflation, as was done for the MRA Engineering Memorandum, to obtain 2009 prices.

6.4 Average Cost Comparison

The additional cost information was used to generate an average cost for each construction item. The average unit cost, percentage, or per-mile cost based on the information was compiled. For reference purposes, averages were compared to DOT&PF projects, FHWA-WFLHD projects, Juneau Access documents, the Bradfield River Road Study, and the MRA Engineering Memorandum.

6.5 Conclusions

When the pricing information used for the MRA Engineering Memorandum is compared to the average prices developed during this assessment, the costs generally appear to be reasonable. Most of the unit prices, percentages, and per-mile costs used in the MRA Engineering Memorandum are within 10 to 20 percent of the average prices calculated for this memorandum. The average per-mile costs for total construction are substantially different, but that is due to the inclusion of rehabilitation project per-mile costs. No costs for work camps were included in the MRA Engineering Memorandum; such costs would have to be added to the estimate at a percentage of total construction cost similar to that used for the Juneau Access Highway.

6.6 Recommendations

The average unit costs, percentages of total construction, and per-mile costs used to develop the MRA Engineering Memorandum transportation corridor cost estimates hold up reasonably well when compared to the average costs calculated for this assessment. Based on expanded pricing information, however, the decision was made to adjust the costs to fit the information compiled. The recommended changes are shown in Table 6-1 on the following page. The new average costs shown represent road construction costs within Southeast Alaska based on both DOT&PF and FHWA projects.

Table 6-1. Recommended Unit Cost Changes

Item		Average Unit Cost	MRA Eng. Study	Recommended
Project Requirements (%)		12%	16%	13%
Construction Camps (%)		7%	-	10%
Erosion Control (%)		2%	4%	3%
Clearing & Grubbing (per acre)		$4,695	$4,500	$5,500
Excavation (per cubic yard)		$8	$9	$9
Subexcavation (per cubic yard)		$7	$8	$8
Asphalt (per cubic yard)		$173	$197	$220
Aggregate Base (per cubic yard)		$43	$35	$40
Select Material (per cubic yard)		$24	$25	$25
Tunnel (per linear foot)		$10,102	$10,500	$10,000
Bridge (per square feet):	Low	$208	$205	$210
	Medium	$259	$235	$260
	High	$380	$320	$380
Large Culverts (>10') (per linear foot)		$1,489	$1,280	$2,000
Riprap (per cubic yard)		$40	$60	$30
Wetland Mitigation (per acre)		$24,701	$27,100	$25,000
MSE Walls (per square feet)		$46	$45	$45
Misc. Drainage (per mile)		$109,767	$115,000	$110,000
Landscape/Seeding (per acre)		$4,519	$6,300	$7,000
Guardrail (per linear foot)		$34	$47	$30
Signing (per mile)		$3,517	$3,200	$3,500
Striping (per mile)		$16,714	$13,500	$16,000
Port Development (each)		$13.5M	$10M	$15M
Design/Construction Engineering (%)		18%	21%	20%
Contingency (%)		15%	25%	25%
Average Per-mile Construction Cost:		$4,027,735	$6,221,477	$6,700,000

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7 SOUTHEAST ALASKA MID-REGION ACCESS PRELIMINARY SNOW AVALANCHE ASSESSMENT TECHNICAL MEMORANDUM

7.1 Introduction

The proposed road system from the Southeast Alaska Mid-Region Access Engineering Technical Memorandum (MRA Engineering Memorandum) would traverse mountainous areas in coastal Alaska and northwest B.C. This memorandum identifies and quantifies snow avalanche paths and associated risk, then outlines a plan for mitigation strategies and implementation. The memorandum was limited to a preliminary assessment only, along with recommendations for the additional work to complete the assessment.

7.2 Assessment Methods

The information compiled in this study was developed by applying on a risk-based method using visual information from terrain assessments conducted by Robert Peccia and Associates. Two kinds of imagery were used for this assessment: 1) Google Earth™ images and 2) air photos. Of these, the Google Earth™ images, when of good quality, enabled estimates of all three risk parameters: magnitude, frequency, and exposure. For many sections, the Google Earth™ images were not good enough to be used. For those sections, only the frequency and exposure could be extracted from the air photos and used in the risk assessment.

In all cases, the risk was calculated in a relative sense as the product of the available factors. For those areas where Google Earth™ images were of good quality, relative risk was calculated from the product of frequency, magnitude, and exposure. For areas where only air photos had to be used, relative risk was calculated by the product of frequency and exposure. Because the information from air photos is less comprehensive, there is a reduced amount of confidence in the assessment of these results than for the areas with Google Earth™ images.

7.3 Avalanche Assessment

Results are broken down by route segments: Wrangell Island, Limb Island, Fools Inlet, Bradfield Canal, Stikine River, Iskut River, Aaron Creek Tunnel, and Aaron Creek Pass. Summaries for each are included in Table 7-1 on the following page.

7.4 Summary of Results

For Bradfield Canal, Google Earth™ images and air photos were not useable for most of the alignment. Nominal snow avalanche risk was found for those areas that could be assessed, but most of the alignment could not be evaluated.

For Stikine River, approximately 70 avalanche prone areas were found. Most of the paths appear to be in the low to moderate risk range. For Iskut River, approximately 51 avalanche prone areas were found. Most paths appear to be in the low to moderate risk range.

For Aaron Creek Tunnel and Aaron Creek Pass, approximately 76 avalanche prone areas were found. For this sector, the risk is much higher than for the Stikine River or Iskut River. This is due to the proposed road crossing large sections of big avalanche paths or groups of avalanche paths. For some of the route, the proposed road crosses above the runout zone and into the track where expected speeds are high, and avalanche frequency increases. The high risk for either routes suggests that either this is a summer route only (closed approximately November 1 to May 1), or it would be very expensive to protect if open during winter.

Table 7-1. Avalanche Assessment Results

Route Segments	Assessment Results
Wrangell Island	Nominal risk; nothing of concern was found.
Limb Island	Nominal risk; nothing of concern was found.
Fools Inlet	Nominal risk; nothing of concern was found.
Bradfield Canal	No useable air photos available; most could not be assessed.
Stations 10 – 85	Nominal risk; nothing of concern was found.
Stations 85 – 2085	Google Earth™ images unusable.
Stations 2085 – 2405	Nominal risk; nothing of concern was found.
Stikine River	
Segment 1	
Stations 0 – 2550	Google Earth™ images unusable; no air photos.
Stations 2550 – 3385	Google Earth™ images unusable; air photos were used.
Stations 3437 – 4212	Google Earth™ images were used; qualitative risk map was made.
Segment 2	Nominal risk; nothing of concern was found.
Segment 3	Nominal risk; nothing of concern was found.
Iskut River	
Stations 5000 – 6465	Google Earth™ images were used; quantitative risk map was made.
Station 6465 +	Google Earth™ images unusable; no air photos.
Aaron Creek Tunnel	Numerous places of high risk.
Stations 1005 – 1870	Google Earth™ images unusable; air photos were used. Nominal risk.
Stations 1870 – 2755	Google Earth™ images unusable; air photos were used.
Stations 2800 – 3390	Google Earth™ images were used; quantitative risk map was made.
Aaron Creek Pass	Multiple avalanche paths over large sections of the proposed roadway.
Stations 2093 – 2736	Google Earth™ images unusable; air photos were used.

In total, approximately 200 avalanche prone areas are expected. The scale of the paths ranges from about a 400-foot vertical drop to approximately a 5,900-foot vertical drop with many exceeding a 3,000-foot vertical drop. A summary of results is provided in Table 7-2.

Table 7-2. Summary of Avalanche Assessment Results

	Risk								
	Low			Moderate			High		
Corridor	Air	Google	Total	Air	Google	Total	Air	Google	Total
Stikine River	30	11	**41**	11	8	**19**	6	4	**10**
Aaron Creek Tunnel	17	2	**19**	7	3	**10**	18	4	**22**
Aaron Creek Pass[1]	10	0	**10**	3	0	**3**	13	0	**13**
Iskut River Valley	0	20	**20**	0	14	**14**	0	17	**17**

Note 1: The Aaron Creek Pass risk assessment was only for areas differing from Aaron Creek Tunnel.

7.5 Risk Assessment Limitations

This study can only be used as a rough guide for expected avalanche conditions along the routes checked. There are no avalanche records for the areas, and the assessment is done only with terrain parameters. There is a high degree of uncertainty when assessing avalanche frequency from air photos or Google Earth™ images. A site visit would probably eliminate some of the paths, such as narrow gullies, and would provide a better idea of avalanche frequency and the overall avalanche risk.

7.6 Avalanche Risk Mitigation Options

A number of options are available for dealing with the problems along the proposed routes. These are listed below in order of likelihood:

1. Road Realignment: There are some places where the road could be realigned slightly to reduce or eliminate the hazards. However, there appear to be very few of these opportunities, since the avalanche paths, in most cases, would reach the valley bottoms.

2. Forecast and Control: In regard to the vast areas involved, the most practical method, overall, would be a program of avalanche forecasting, closures, and explosive control. The most likely option would be helicopter bombing due to the remoteness and large geographical area involved. A disadvantage of this method is that it is weather-dependent and cannot be done in storms when most avalanches occur.

Another option for explosive control would be to set up a series of gun towers and use explosive shells. This method would not be very suitable for the vast terrain that must be considered. The cost for an avalanche forecasting and control program in this remote area would be in the range of $350,000 to $400,000 per winter season.

3. Structural Protection: Structural protection, including earthen deflection beams and dams, might be used in some cases to eliminate smaller avalanches. This method would, however, have to be used in conjunction with an avalanche forecasting and control program.

   For the present proposed road system, snow sheds would have to be used in some places. For the Aaron Creek Tunnel and Aaron Creek Pass routes, there are places for which the proposed road alignment would cross above the runout zone in portions of the path, called the track, where avalanche speeds would be near maximum. Snow sheds costs can range from $10,000 to $20,000 per yard of exposure.

4. Winter Road Closures: Designating some or all the routes as summer-only would be another option. Due to the large number of avalanche paths, this would still involve snow clearing to open the roads in the spring.

7.7 Recommendations

This study provides a preliminary assessment of snow avalanche hazards and risk assessment for the MRA Engineering Memorandum. Normally, the next step would be to conduct field investigations to more accurately define the terrain parameters and obtain any available historical information on observations of avalanche activity. For this area, field visits would be essential and would best be conducted in the early spring.

A concerted effort should be made to compile any observations of past snow avalanche activity along the MRA Engineering Memorandum alignments. This would involve contacting avalanche professionals in the area, as well as personnel working on the various mining projects in the area, pilots having flown the area, and any other sources.

8 SOUTHEAST ALASKA MID-REGION ACCESS OPERATING AND MAINTENANCE COST TECHNICAL MEMORANDUM

8.1 Introduction

This memorandum provides information on O&M cost estimates for alignment options identified in the Southeast Alaska Mid-Region Access Engineering Technical Memorandum (MRA Engineering Memorandum). The alignment cost estimates completed in the MRA Engineering Memorandum do not include yearly O&M activities. Therefore, a memorandum was developed to identify year-round and upfront O&M costs for the identified alignment options.

8.2 Methodology

O&M cost information was obtained from various maintenance and planning personnel at the Montana Department of Transportation, Idaho Transportation Department, and DOT&PF for corridors similar to those in the MRA Engineering Memorandum. Internet research, actual DOT&PF cost expenditures, various planning documents for Alaska, and snow and avalanche estimates were used to supplement the information provided by the transportation departments. The O&M cost information was used to develop cost per-lane-mile estimates based on roadway terrain, estimated annual snowfall, location, and other factors. Upfront cost estimates were developed based on assumed vehicle, equipment, and building needs associated with each corridor. Costs for vehicles and buildings were developed based on 2009 Alaska maintenance expenditures and internet research for comparable areas.

8.3 Alignment Descriptions

The three potential transportation corridors identified in the MRA Engineering Memorandum were divided into eight conceptual roadway alignments to facilitate design and cost estimating: Bradfield Canal, Stikine River, Aaron Creek Pass, Aaron Creek Tunnel, Iskut River, Limb Island, Fools Inlet, and Wrangell Island. These alignments were further divided into segments to correlate with development stages for each transportation corridor. O&M cost estimates were developed for each of these conceptual alignments and their respective segments. This information, along with the cost estimates, is summarized in Table 8-1.

8.4 Summary and Conclusions

Information provided by various state transportation departments, in addition to internet research, was used to develop upfront and yearly O&M cost estimates for alignment options contained in the MRA Engineering Memorandum. The cost-per-lane-mile estimates were compared to actual O&M costs for similar roads in other areas. The cost estimates in this technical memorandum ranged from $5,750 per lane-mile for flat island areas expected to receive moderate snowfall to $21,500 per lane-mile for high snowfall mountain passes prone to avalanche and rockslides. Upfront costs for vehicles and buildings were developed based on 2009 Alaska maintenance expenditures and internet research. The upfront O&M costs depended mainly on the location of each stage and ranged from $290,000 to $8,380,000 per stage. Table 8-1 summarizes the yearly and upfront O&M cost estimates for each corridor.

The Southeast Alaska Mid-Region Access Preliminary Snow Avalanche Assessment Technical Memorandum identified road realignment, forecasting and control, structural protection, and winter road closures as potential avalanche mitigation options. Potential forecasting and control programs are estimated to cost $350,000 to $400,000 per year, while structural protection could cost between $10,000 and $20,000 per yard of exposure.

Table 8-1. MRA Transportation Corridors O&M Cost Estimates

Corridor	Length (miles)	Yearly Costs		Upfront
		Total	Cost per Lane-Mile	
Bradfield Canal	**112**	**$2,200,000**	**$9,786**	**$8,380,000**
Stage 1 (ultimate)	112	$2,200,000	$9,786	$8,380,000
Stikine River	**173**	**$2,750,000**	**$7,960**	**$8,670,000**
Stage 1	71	$1,280,000	$9,032	$2,500,000
Stage 2	49	$820,000	$8,286	$3,375,000
Stage 3	22	$250,000	$5,798	$2,505,000
Stage 4	14	$170,000	$5,907	$290,000
Stage 5 (ultimate)	16	$230,000	$6,991	$0
Aaron Creek Pass	**143**	**$3,420,000**	**$11,947**	**$8,505,000**
Stage 1	71	$1,280,000	$9,032	$2,500,000
Stage 2	55	$1,930,000	$17,590	$3,500,000
Stage 3	10	$120,000	$5,725	$290,000
Stage 4 (ultimate)	7	$90,000	$6,494	$2,215,000
Aaron Creek Tunnel	**143**	**$3,500,000**	**$12,278**	**$8,505,000**
Stage 1	71	$1,280,000	$9,032	$2,500,000
Stage 2	54	$2,010,000	$18,522	$3,500,000
Stage 3	10	$120,000	$5,725	$290,000
Stage 4 (ultimate)	7	$90,000	$6,494	$2,215,000

9 SOUTHEAST ALASKA MID-REGION ACCESS INDEPENDENT REVIEW TECHNICAL MEMORANDUM

9.1 Introduction

As part of the review process for the various memorandums developed as part of this project, the FHWA tasked Robert Peccia and Associates with finding experts to complete an independent review of the following five documents:

- Southeast Alaska Mid-Region Access Summary Technical Memorandum
- Southeast Alaska Mid-Region Access Traffic Projections Technical Memorandum
- Southeast Alaska Mid-Region Access Port and Ferry Terminal Technical Memorandum
- Southeast Alaska Mid-Region Access Air-Cushion Vehicle Technical Memorandum
- Southeast Alaska Mid-Region Access Engineering Technical Memorandum

9.2 Independent Reviewers

Five individuals reviewed the documents. The individuals and their area of expertise are as follows:

- Economics—John H. Leeper (Independent)
- Ports and ACVs—Bradley P. Erickson, PE, SE (AECOM)
- Engineering and Traffic—John Perlic, PE (Parametrix)
- Engineering—Mark Burrus, PE (Parametrix)
- Traffic—Ryan Abbotts, AICP (Parametrix)

9.3 Independent Review Process

The review process started with a kickoff meeting that included all of the reviewers and preparers of each of the documents. Reviewers received a brief project history and some of the background used to develop the individual memorandums. Participants discussed the purpose of the review, and the philosophy of an independent review was emphasized. The meeting provided an opportunity for the reviewers to ask questions about the individual reports that they would review.

9.4 Independent Review Summary

The intent of the independent review was to provide peer review of each of the documents. These reviews have provided an opportunity to take an independent look at and recommend changes in the documents. Recommendations from the reviews were taken into consideration and, where applicable, incorporated as the documents were finalized.

10 REFERENCES

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11 APPENDICES SUMMARY

TRAFFIC PROJECTIONS TECHNICAL MEMORANDUM

PORT AND FERRY TERMINAL TECHNICAL MEMORANDUM

AIR-CUSHION VEHICLE TECHNICAL MEMORANDUM

ENGINEERING TECHNICAL MEMORANDUM

UNIT COST TECHNICAL MEMORANDUM

PRELIMINARY SNOW AVALANCHE ASSESSMENT TECHNICAL MEMORANDUM

OPERATING AND MAINTENANCE COST TECHNICAL MEMORANDUM

INDEPENDENT REVIEW TECHNICAL MEMORANDUM

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