Gravina Access Project
Final Environmental Impact Statement







Agreement 36893013
DOT&PF Project 67698
Federal Project ACHP-0922(5)

Prepared for:

Federal Highway Administration
P.O. Box 21648
Juneau, AK 99802

Prepared by:

State of Alaska
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July 30, 2004

STATE OF ALASKA

DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

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July 30, 2004

Dear Reviewer:

The Alaska Department of Transportation and Public Facilities (DOT&PF) is pleased to release the Gravina Access Project Final Environmental Impact Statement (EIS) for review and comment. A notice of availability is anticipated in the *Federal Register* on August 6, 2004.

The Final EIS is available at no cost on the project web site www.gravina-access.com and on compact disc (CD). Printed and bound versions may be reviewed at the Ketchikan Library (629 Dock Street); Ketchikan Gateway Borough Planning Office (344 Front Street); and DOT&PF (6860 Glacier Highway, Juneau). You may obtain a bound color copy for the cost of reproduction, approximately $100 per copy. Appendices that have not changed since the draft EIS are not reprinted in the bound versions but are available on the web site and on the CD.

Comments made in writing will help us and the Federal Highway Administration (FHWA) arrive at a final decision regarding the project. The purpose of the Final EIS is to disclose the project's impacts, respond to comments made about the Draft EIS, identify a preferred alternative, and propose measures to mitigate impacts. The reviews and document revisions ensure that a decision is reached with full information. Substantive changes since the Draft EIS (published in August 2003) are marked in this Final EIS in bold text.

Send comments on the Final EIS **by September 7, 2004**. Please submit comments via mail on 8½x11 white or light-colored paper suitable for copying:

James A. Evensen, P.E., Project Manager
DOT&PF Southeast Region
6860 Glacier Highway
Juneau, AK 99801-7999

Or send comments via fax: (907) 465-3506; or via email to: james_evensen@dot.state.ak.us.

Appendix L of the Final EIS includes the U.S. Army Corps of Engineers' public notice of application for a permit under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. The comment period for the Corps public notice runs concurrently with the EIS comment period.

To obtain a copy of the Final EIS, or for additional information, please contact me at (907) 465-1851.

Sincerely,

James A. Evensen, P.E.
Project Manager

25A-T34LH

FHWA-AK-EIS-03-01-F

Gravina Access Project

Ketchikan, Alaska
Ketchikan Gateway Borough

Final Environmental Impact Statement

Submitted Pursuant to 42 U.S. C. 4332 (2) (c)
by the
U.S. Department of Transportation
Federal Highway Administration
and
State of Alaska
Department of Transportation and Public Facilities

Cooperating Agencies
U.S. Coast Guard
U.S Army Corps of Engineers
Ketchikan Gateway Borough
City of Ketchikan
City of Saxman

7/26/04
Date of Recommendation

Patrick J. Kemp, P.E. for DOT&PF

7/26/04
Date of Approval

David C. Miller for FHWA

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The Gravina Access Project would improve public access between Revillagigedo Island and Gravina Island. Nine build alternatives are evaluated, along with the No Action Alternative. This project is one of 17 high-priority infrastructure projects in the State of Alaska to be federally funded under the Federal Transportation Equity Act for the 21st Century (TEA-21), enacted in 1998. A Department of the Army, Corps of Engineers *Public Notice of Application for Permit* for the Gravina Access Project is attached to the EIS in Appendix L for concurrent public review and comment.

Comments on this final EIS are due by September 7, 2004 and should be sent to:

Jim Evensen, P.E., Project Manager
DOT&PF - Southeast Region
6860 Glacier Highway
Juneau, AK 99801-7999

SUMMARY

INTRODUCTION

PURPOSE OF THE EIS

The purpose of an environmental impact statement (EIS) is to satisfy the requirements of the National Environmental Policy Act (NEPA),[1] which requires preparation of an EIS for any proposed project that:

- Is not categorically excluded or otherwise exempt from NEPA
- Is a major federal action (i.e., requires a permit, regulatory decision, or funding from a federal agency)
- May have a significant adverse effect on the quality of the human environment

NEPA mandates that the EIS determine, characterize, analyze, and document the project's environmental impacts, as well as specify possible mitigation of adverse impacts.

An essential element of the NEPA process is interactive public participation, whereby a Draft EIS is published and comments are solicited from the general public and interested parties (including government entities, regulatory agencies, and Native organizations). These comments may range from simple statements of support or opposition to complex technical discussions of project alternatives, study methods, determination and characterization of impacts, and mitigation recommendations. The Final EIS documents and responds to all substantive comments. An additional 30-day review follows publication of this Final EIS, and responses to comments received will be documented in a Record of Decision.

ORGANIZATION OF THE EIS

The EIS is organized as follows:

- Summary
- Contents (including listings of all tables, figures, and appendices)
- Acronyms and Abbreviations
- Chapter 1: Purpose of and Need for Action
- Chapter 2: Alternatives
- Chapter 3: Affected Environment
- Chapter 4: Environmental Consequences
- Chapter 5: List of Preparers
- Chapter 6: EIS Distribution List
- Chapter 7: Comments and Coordination
- References
- Index

[1] National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190, U.S. Code 4321-4347, January 1, 1970, as amended).

- Appendices:
  - A Preliminary Quantities and Cost Estimate Technical Memorandum
  - B Pennock Island and Gravina Island/Clam Cove Public Outreach Summary
  - C Conceptual Stage Relocation Study
  - D Economic Impact Assessment
  - E Wind Climatology Technical Memorandum
  - F Consequences of Various Channel Closures to Large Shipping
  - G Reconnaissance of Vessel Navigation Requirements
  - H Monte Carlo Navigation Simulation Technical Memorandum
    Supplemental Monte Carlo Navigation Simulation Study Technical Memorandum
  - I RTM STAR Center Report
  - J Real Time Navigation Simulation Study (STAR Center) Technical Memorandum
  - K Effects on Cruise Ship Operations
  - L U.S. Army COE Section 10/404 Permit Application
    404 (b)(1) Evaluation
    DOT&PF and FHWA Wetlands Finding
    COE Permit Public Notice
  - M Wetlands Evaluation Technical Memorandum
  - N Marine Environment Impact Assessment Technical Memorandum
  - O Essential Fish Habitat Assessment
  - P Hazardous Materials Investigation Report
  - Q Estimate of Air Quality Impacts
  - R Public and Agency Comment
  - S Gravina Island Plan
  - T Biological Assessment for Informal Consultation Conducted Pursuant to Section 7 of the Endangered Species Act

The basis of this document is the Draft EIS text in its entirety, with changes made as appropriate throughout the document to reflect the selection of an alternative, modifications to the project, updated information on the affected environment, changes in the assessment of impacts, the selection of mitigation measures, the results of coordination, comments received on the Draft EIS, and responses to those comments. Important changes are marked in bold for easy identification by the reader. Appendices from the Draft EIS that have been revised are appended to this Final EIS. All other appendices (i.e., those that remain unchanged from what was presented in the Draft EIS) have not been reprinted, but all appendices can be viewed on the CD version of the EIS and on the project website (www.gravina-access.com).

PROPOSED ACTION

The proposed action is to improve surface transportation between Revillagigedo Island and Gravina Island in the Ketchikan Gateway Borough of Alaska. Known as the Gravina Access Project, this project is one of 17 high-priority infrastructure projects in the State of Alaska to be federally funded under the Federal Transportation Equity Act for the 21st Century (TEA-21), enacted in 1998. The TEA-21 authorizes approximately $20 million for construction of a bridge joining Gravina Island to the community of Ketchikan on Revillagigedo Island. Current federal funds for the project require a 20 percent state match. The Alaska Department of Transportation and Public Facilities (DOT&PF) currently has the Alaska State Legislature's authority to proceed with expenditure of up to $10 million for the Gravina Access Project; additional funding would be necessary to construct any of the build alternatives.

Currently, there is no "hard link" (surface) transportation between Gravina Island and Revillagigedo Island. Public access between the islands is available via a ferry that transports vehicles, bicyclists, and pedestrians from Ketchikan across Tongass Narrows to the Ketchikan International Airport terminal on Gravina Island. The proposed action addresses the need for improved access to developable land, improved access to the airport, and long-term economic development on Gravina Island. Chapter 1 provides a detailed
of the purpose of and need for the project.

The DOT&PF, in cooperation with the Federal Highway Administration (FHWA), has examined a range of alternatives for the Gravina Access Project: four bridge alternatives that cross Tongass Narrows near the airport, two bridge alternatives that cross Pennock Island, and three ferry alternatives that would supplement the existing airport ferry service. The terminus locations on Revillagigedo Island for each of the alternatives tie into Tongass Avenue at or near (from North to South) Peninsula Point, Signal Road, the existing airport ferry, Cambria Drive, Plaza Mall, the U.S. Coast Guard (USCG) Station, and the Forest Park subdivision. On Gravina Island, each alternative has a terminal location at Ketchikan International Airport and provides access to Borough and other developable land north of the airport. With the exception of one of the ferry alternatives (Alternative G2, see Figure 2.17), all build alternatives have a terminus on Gravina Island at the northern boundary between the airport property and Borough property. The ferry alternative that does not have a terminus at the airport-Borough property boundary originates north of that boundary at Lewis Point.

All of the build alternatives include a roadway around the southern end of the airport runway connecting the airport terminal to a spine road on the west side of the airport. Preliminary engineering and environmental studies, as well as input from state and federal agencies, indicated that this southern route around the airport was the only reasonable location of this roadway because a northern route around the airport would require extensive fill in Tongass Narrows, which would have unreasonable environmental impacts to intertidal areas and other sensitive habitat.

The roadway associated with each project alternative would consist of two lanes each 11.8 feet wide, with shoulders each 7.9 feet wide; the length of roadway varies from 16,670 feet to 43,080 feet, depending on the alternative; and the associated area of the road embankment fill varies from 40 acres to 107 acres.

The project's potential for significant impacts prompted DOT&PF and FHWA to prepare an EIS. A notice of intent to prepare an EIS was published in the Federal Register in February 1999.

RELATED ACTIONS AND PROJECTS

In addition to the Gravina Access Project, there are several major actions being led by local, state, and federal agencies in the Ketchikan Gateway Borough. These actions are independent of the Gravina Access Project, but are related to the project because they could affect the same areas and resources. The four major actions and their relationship to the Gravina Access Project are described as follows.

1. The Ketchikan Gateway Borough is engaged in a planning effort called *Ketchikan 2020* concurrent with the Gravina Access Project. This planning project includes an update of the *Comprehensive Plan*, a *Gravina Island Development Plan*, a *Coastal Management Program Update*, and a *Wetland Development Plan*. To date, the Borough has published a draft *Gravina Island Development Plan*, prepared an internal Borough draft of the *Coastal Management Program Update*, and developed a work plan for completing the *Wetland Development Plan.* The Borough has not started its update of the *Comprehensive Plan*.

   The final public review draft of *Gravina Island Development Plan* is intended to guide future development of Gravina Island in tandem with the selection of the preferred alternative for the Gravina Access Project identified by the local community as well as DOT&PF and FHWA; however, fulfillment of the plan is not dependent on the selection of any one alternative in particular. The plan identifies three areas as planning units based on land ownership, current land use, and accessibility (including existing and potential road corridors).

2. The DOT&PF updated its master plan in June 2003 for Ketchikan International Airport. The updated Ketchikan International Airport Master Plan includes recommendations for extension of the runway; improvements to the passenger terminal facility; development of a remote facility (i.e., on Revillagigedo Island), which would include key functional elements of a passenger terminal such as parking, ticketing, baggage check-in, and car rental; and a new general aviation apron. The selection of any of the build alternatives will require revisiting the master plan's recommendation for the development of a remote facility.

   Because the airport terminal is one of the termini of the Gravina Access Project, development of project alternatives was closely coordinated with the airport master planning effort. The master plan recommendations include options that provide for improved access to Gravina Island, but are not dependent on the development of any one of the Gravina Access Project build alternatives.

3. The U.S. Forest Service (USFS) has prepared a Draft EIS for the Gravina Island Timber Sale to evaluate the impacts of a timber sale and increased access for recreational pursuits. The *Gravina Island Timber Sale Draft Environmental Impact Statement* was released in January 2001. Following the comment period on the Draft EIS, preparation of the Final EIS was put on hold pending resolution of the USFS rulemaking on roadless area conservation. On December 23, 2003, it was announced that the Tongass National Forest would be granted a temporary exemption to the roadless rule. The USFS is

therefore now in the final stages of EIS preparation and it is anticipated that the Final EIS will be available to the public in late spring of this year. [2]

The preferred alternative presented in the Gravina Island Timber Sale Draft EIS involves construction of 22.6 miles of new road on Gravina Island to facilitate logging activities. The new logging road would tie into the Borough's proposed gravel road between the airport and the Pacific Log and Lumber timber processing facility north of the airport. After the logging, the main portion of the road (approximately 16 miles) would remain open for recreational purposes.

Note that all of the alternatives presented in the Gravina Island Timber Sale Draft EIS are independent of the Gravina Access Project. The Timber Sale Draft EIS does not address a future condition where access to Gravina Island would be improved through a bridge or additional ferry service. Although the Gravina Access Project EIS examines the potential cumulative effects of improving access to Gravina Island and developing new roads for the timber sale on the natural and human environments (Section 4.27), improved access for timber harvest is not a part of the purpose and need of the Gravina Access Project.

4. **Before and during the development of Gravina Access Project, the Ketchikan Gateway Borough was separately planning development of a new road around the west side of the airport to the Lewis Reef development area. All build alternatives include construction of a spine road around the west side of Ketchikan International Airport to serve many of the same general purposes the Borough had planned. The Borough continued planning for its road as the Gravina Access Project Draft EIS was produced, with the assumption that it would be built before the EIS was completed. As this Final EIS goes to press, the Borough has completed its road design and independently secured a Section 404 permit from the U.S. Army Corps of Engineers. The alignment in this document is slightly different than the Borough's alignment. If the Record of Decision for the Gravina Access Project selects any of the build alternatives for construction and if it is signed before construction begins on the Borough road, DOT&PF would work with the Borough to construct the alignment presented in this Final EIS. Should the Borough advance construction of its road prior to the Record of Decision, DOT&PF would construct the alternative selected in the Record of Decision to the point at which it would connect to the Borough's spine road alignment. The Borough's spine road would connect to other developable lands north of the airport consistent with the Gravina Access Project purpose and need.**

SUMMARY OF GRAVINA ACCESS PROJECT ALTERNATIVES CONSIDERED

The Gravina Access Project EIS presents and analyzes the following alternatives:

No Action Alternative—Existing Ferry Between Airport Ferry Terminals

Alternative C3(a)—200-foot Bridge Between Signal Road and South of Airport Terminal

[2] Robert Reeck, District Planning Staff Officer, Tongass National Forest, U.S. Forest Service, personal communication with K. Maines, Planner, HDR Inc. March 11, 2004.

Alternative C3(b)—120-foot Bridge Between Signal Road and Airport Terminal

Alternative C4—200-foot Bridge Between Tongass Avenue (North of Cambria Drive) and South of Airport Terminal

Alternative D1—120-foot Bridge Between Tongass Avenue (near Existing Ferry) and Airport Terminal

Alternative F1 (DOT&PF and FHWA Preferred Alternative)**—**Bridges (200-foot East and 120-foot West) Between Tongass Avenue and Airport, via Pennock Island

Alternative F3—Bridges (60-foot East and 200-foot West) Between Tongass Avenue and Airport, via Pennock Island

Alternative G2—Ferry Between Peninsula Point and Lewis Point

Alternative G3—Ferry Between Downtown and South of Airport

Alternative G4—Ferry with New Terminals Adjacent to Existing Terminals

Following are brief descriptions of the alternatives, with additional detail on the DOT&PF and FHWA Preferred Alternative: Alternative F1. Chapter 2 includes more detailed descriptions of each alternative. **Note that in the DEIS, "life-cycle costs" were characterized as 50-year life cycle costs, but in reality, are 20-year life-cycle costs.**

No Action Alternative

Under the No Action Alternative, no bridge would be constructed and no additional ferry service would be provided between Revillagigedo Island and Gravina Island (see Figure 2.5). The only public access between the two islands would continue to be provided by the existing airport ferry service across Tongass Narrows, private boats, and floatplanes. On Revillagigedo Island, the existing ferry terminal is located 2.8 miles north of downtown Ketchikan; on Gravina Island, the terminal is on the waterfront, just east of the airport terminal. The Borough operates the airport ferry service. The ferry service would continue to operate 16 hours per day and the frequency of service would remain the same, with departures every 30 minutes in winter and every 15 minutes in summer.

Alternative C3(a): 200-foot Bridge Between Signal Road and South of Airport Terminal

Alternative C3(a) includes a bridge across Tongass Narrows approximately 1,600 feet north of the airport terminal (see Figure 2.6). The bridge would be 5,690 feet long, and have a maximum height of approximately 250 feet. The main span of this bridge would have a vertical navigational clearance of 200 feet above high tide and a horizontal navigational clearance of approximately 550 feet.[3]

[3] Navigational clearances were determined based on consultation with the U.S. Coast Guard, discussions with cruise ship operators, review of current ship traffic in Tongass Narrows, International Navigation Association conceptual methods for channel widths, American Association of State Highway Transportation Officials (AASHTO) guidelines, computer simulations, and real-time simulations.

On Revillagigedo Island, the alternative would connect to Signal Road at North Tongass Avenue. From this terminus, the alternative alignment would traverse the hillside southward, gain elevation and turn southwestward to cross Tongass Avenue and Tongass Narrows, and then turn southward to parallel the airport runway and touch down (reach the ground surface) on Gravina Island south of the terminal. A 0.4-mile-long airport return loop road would connect the airport terminal and the bridge terminus. The main road would continue around the southern end of the airport runway and then arc northward, extending parallel to and west of the airport runway approximately 2.2 miles to the northern end of the Airport Reserve zone. At the southern end of the runway, the road would be constructed at a grade low enough to accommodate the planned future expansion of the runway, with the runway extended as an overpass of the road.

Alternative C3(b): 120-foot Bridge Between Signal Road and Airport Terminal

The Alternative C3(b) bridge would be approximately 4,250 feet long, and have a maximum height of approximately 195 feet. The main span of this bridge would have a vertical navigational clearance of 120 feet above high tide and a horizontal navigational clearance of approximately 500 feet. Horizontal clearances were determined pursuant to footnote 4.

Alternative C3(b) would have the same general alignment on Revillagigedo and Gravina Islands as Alternative C3(a); however, with a lower bridge profile, the position of the C3(b) bridge over Tongass Narrows and at its touchdown on Gravina Island (near the airport terminal) would be north of the C3(a) alignment (see Figure 2.7). This alternative would not need an airport return loop road because the bridge would touch down in front of the airport terminal.

Alternative C4: 200-foot Bridge Between Tongass Avenue North of Cambria Drive and South of Airport Terminal

The Alternative C4 bridge would be approximately 4,980 feet long and have a maximum height of approximately 250 feet. The main span of this bridge would have a vertical navigational clearance of 200 feet above high tide and a horizontal navigational clearance of approximately 550 feet. Horizontal clearances were determined pursuant to footnote 4.

On Revillagigedo Island, the alternative alignment would connect to Tongass Avenue north of Cambria Drive, across from the access to the existing ferry terminal (see Figure 2.8). From this terminus, it would extend northward and traverse the hillside around the quarry. The bridge would cross over Tongass Avenue and Tongass Narrows, turn southward to parallel the airport runway, and then touch down on Gravina Island south of the airport terminal. A 0.4-mile-long airport return loop road would connect the airport terminal and the bridge terminus. The main road would continue around the southern end of the airport runway and then arc northward, extending parallel to and west of the airport runway approximately 2.2 miles to the northern end of the Airport Reserve zone. At the southern end of the runway, the road would be constructed at a grade low enough to accommodate the planned future expansion of the runway, with the runway extended as an overpass of the road.

Alternative D1: 120-foot Bridge Between Tongass Avenue at Cambria Drive and Airport Terminal

The Alternative D1 bridge would cross Tongass Narrows directly east of the airport terminal. The bridge would be approximately 3,220 feet long and have a maximum height of

approximately 160 feet. The main span of this bridge would have a vertical navigational clearance of 120 feet above high tide and a horizontal navigational clearance of 500 feet. Horizontal clearances were determined pursuant to footnote 4.

On Revillagigedo Island, the alternative alignment would connect to Tongass Avenue at Cambria Drive near the existing airport ferry terminal and rise along the hillside (see Figure 2.9). The bridge would cross over Tongass Avenue and Tongass Narrows, and then turn southward to parallel the shoreline on Gravina Island and touch down south of the airport terminal. A 0.4-mile-long airport return loop road would connect the airport terminal and the bridge terminus. The main road would continue around the southern end of the airport runway and then arc northward, extending parallel to and west of the airport runway approximately 2.2 miles to the northern end of the Airport Reserve zone. At the southern end of the runway, the road would be constructed at a grade low enough to accommodate the planned future expansion of the runway, with the runway extended as an overpass of the road.

Alternative F1: (DOT&PF and FHWA Preferred): Bridges (200-foot East and 120-foot West) Between Tongass Avenue and Airport Terminal, via Pennock Island

Alternative F1 would cross Tongass Narrows via Pennock Island with two bridges (see Figure 2.10). One bridge would cross the East Channel and the other would cross the West Channel. The East Channel bridge would be approximately **3,610** feet long and have a maximum height of approximately 250 feet. The bridge would have a vertical navigational clearance of 200 feet above high tide and a horizontal navigational clearance of approximately 550 feet. The West Channel bridge would be approximately **2,690** feet long and have a maximum height of approximately 160 feet. The bridge would have a vertical navigational clearance of 120 feet above high tide and a horizontal navigational clearance of approximately 500 feet. Bridge heights over East and West Channels are designed to allow existing vessel traffic in Tongass Narrows to continue as it does today: cruise ships would use East Channel and other large vessels, such as Alaska Marine Highway System (AMHS) ferries and barge traffic, would continue to use the West Channel, predominantly. Horizontal clearances were determined pursuant to footnote 4.

On Revillagigedo Island, Alternative F1 would connect to Tongass Avenue south of Tatsuda's grocery store and near the southern end of the rock quarry. From this terminus, the alignment would rise to the southeast along the hillside (and east of the tank farm, the cemetery, and the above high tide Station), turn westward (skirting the southern end of the USCG Station property, north of the Forest Park Subdivision) and cross over Tongass Avenue approximately 1.4 miles south of downtown Ketchikan, then cross the East Channel to Pennock Island. The roadway would cross Pennock Island at grade. From Pennock Island, the West Channel bridge would cross to Gravina Island, touching down approximately 2.7 miles south of the airport runway. The road would continue northward approximately **5.4** miles to the northern end of the Airport Reserve zone. A 1.2-mile airport access road would be constructed at the southern end of the airport runway. The airport access roadway would be constructed at a grade low enough to accommodate the planned future expansion of the runway, with the runway extended as an overpass of the road.

Note that the alignment presented herein reflects a minor design modification from Alternative F1 as it was presented in the Draft EIS. The bridge crossings of East and West Channels have been shifted to be perpendicular to the main navigational channels (see Figure S.1). This design modification was made to Alternative F1 in response to

concerns and comments expressed by marine pilots with regard to the original alignment of Alternative F1. The analyses of impacts associated with Alternative F1 presented in Chapter 4 of this Final EIS, and all of the figures in the document, have been revised where necessary to reflect this design modification.

Alternative F3: Bridges (60-foot East and 200-foot West) Between Tongass Avenue and Airport, via Pennock Island

Similar to Alternative F1, Alternative F3 would have two bridges that cross Tongass Narrows via Pennock Island (see Figure 2.11). One bridge would cross East Channel and the other bridge would cross West Channel. The East Channel bridge would be approximately 2,065 feet long and have a maximum height of approximately 140 feet. The bridge would have a vertical navigational clearance of 60 feet above high tide (lower than any of the other bridges), and a horizontal clearance of approximately 500 feet. The East Channel bridge height is designed to approach Revillagigedo Island at the approximate grade of South Tongass Avenue (at a T-intersection) while allowing smaller vessels and USCG vessels to transit the East Channel. The West Channel bridge would be approximately 3,270 feet long and have a maximum height of approximately 250 feet. The bridge would have a vertical navigational clearance of 200 feet above high tide and a horizontal navigational clearance of approximately 550 feet. The East Channel bridge would require large vessels, those with an air draft of greater than 60 feet, to use the West Channel of Tongass Narrows. Thus, cruise ships, AMHS ferries, and other large vessels would use the West Channel to continue to make through transits of Tongass Narrows. **DOT&PF has committed to dredging approximately 184,000 cubic yards of material in the West Channel in order to improve navigational safety for large vessels.**

On Revillagigedo Island, the East Channel bridge would connect to Tongass Avenue, approximately 1.5 miles south of downtown Ketchikan between the USCG Station and the Forest Park subdivision. From this terminus, the bridge would cross the East Channel to Pennock Island. The roadway would cross Pennock Island at grade. From Pennock Island, the West Channel bridge would cross to Gravina Island, touching down approximately 2.7 miles south of the airport runway. The road would continue northward approximately **5.1** miles to the northern end of the Airport Reserve zone. A 1.2-mile airport access road would be constructed at the southern end of the airport runway. The airport access roadway would be constructed at a grade low enough to accommodate the planned future expansion of the runway, with the runway extended as an overpass of the road.

Alternative G2: Ferry Between Peninsula Point and Lewis Point

Alternative G2 would be a new ferry service for vehicles and passengers between Peninsula Point on Revillagigedo Island and Lewis Point on Gravina Island, crossing Tongass Narrows approximately 2 miles north of the airport (see Figure 2.17). The existing airport ferry would remain operational under Alternative G2.

This alternative would require construction of a new ferry terminal on each side of Tongass Narrows and two new ferry vessels. A 4.3-mile road would be constructed on Gravina Island that would extend from the ferry terminal southward approximately 2.6 miles, wrap around the southern end of the airport runway, and then turn northward to the airport terminal. The road at the southern end of the runway would be constructed at a grade low enough to allow for planned future expansion of the runway, with the runway extended as an overpass of the road.

Approximately 1,400 cubic yards of material would be removed from Tongass Narrows to provide proper navigational clearance for ferries.

The hours of operation (16 hours a day) and crossing frequency for the new ferry would be similar to the existing airport ferry schedule, with one vessel operating every 30 minutes in the winter months and two vessels operating in the summer (with crossings every 15 minutes).

Alternative G3: Ferry Between Downtown and South of Airport

Alternative G3 would be new ferry service for vehicles and passengers between Ketchikan (near the Plaza Mall at the intersection of Tongass Avenue and Jefferson Street) on Revillagigedo Island and a location approximately 0.6 miles south of the airport runway on Gravina Island (see Figure 2.18). The existing airport ferry would remain operational under Alternative G3.

This alternative would require construction of a new ferry terminal on each side of Tongass Narrows and two new ferry vessels. A road would be constructed on Gravina Island from the ferry terminal northward approximately 3.0 miles to the northern end of the Airport Reserve property. A 1.2-mile airport access road would be constructed around the southern end of the airport. The road at the southern end of the runway would be constructed at a grade low enough to allow for future planned expansion of the runway, with the runway extended as an overpass of the road. **Approximately 18,600 cubic yards of material would be removed from Tongass Narrows to provide proper navigational clearance for ferries.**

The hours of operation (16 hours a day) and crossing frequency for the new ferry would be similar to the existing airport ferry schedule, with one vessel operating every 30 minutes in the winter months and two vessels operating in the summer (with crossings every 15 minutes).

Alternative G4: Ferry Between New Terminals Adjacent to Existing Terminals

Alternative G4 would be new ferry service for vehicles and passengers adjacent to the existing airport ferry route, crossing Tongass Narrows 2.8 miles north of downtown (see Figure 2.19). The existing airport ferry would remain operational under Alternative G4.

This alternative would require construction of a new ferry terminal on each side of Tongass Narrows, adjacent to the existing airport ferry terminals, and two new ferry vessels. A 3.2-mile road would be constructed on Gravina Island that extends southward from the airport ferry terminals; the roadway would wrap around the southern end of the airport runway, and then turn northward, extending parallel to and west of the airport runway approximately 2.2 miles to the northern end of the Airport Reserve property. The road at the southern end of the runway would be constructed at a grade low enough to allow for future planned expansion of the runway, with the runway extended as an overpass of the road. **Approximately 15,200 cubic yards of material would be removed from Tongass Narrows to provide proper navigational clearance for ferries.**

The hours of operation (16 hours a day) and crossing frequency for the new ferry would be similar to the existing airport ferry schedule, with one vessel operating every 30 minutes in the winter months and two vessels operating in the summer (with crossings every 15 minutes).

DOT&PF and FHWA Selection of their Preferred Alternative

Based on the analyses in the EIS and public and agency input, the DOT&PF and FHWA determined Alternative F1 to be the Preferred Alternative. Of the alternatives carried forward for detailed evaluation, Alternative F1 best satisfies the purpose of and need for the project while minimizing impacts on aviation, navigation, marine habitat, and the local economy. Alternative F1 would:

- Meet the need for improved convenience and reliability of access to Ketchikan International Airport and developable and recreation lands on Gravina Island;
- Promote environmentally sound, planned, long-term development on Gravina Island in conformance with Borough plans;
- Allow the continued safe passage of large cruise ships northbound and southbound through Tongass Narrows and East Channel;
- Allow continued separation of cruise ship traffic (East Channel) from the AMHS ferries and other marine traffic (West Channel);
- Avoid impact on floatplane facilities at Ketchikan International Airport and waterways designated for floatplane take-offs and landings in Tongass Narrows;
- Not intrude into the airspace of Ketchikan International Airport; and
- Avoid impacts to Ketchikan's tourism economy and local revenues.

Alternative F1 provides the additional benefit of improved access to Pennock Island, which contains a substantial amount of the Borough land base.

The DOT&PF received considerable input from the Ketchikan community strongly supporting Alternative F1 and, in January 2003, the Borough Assembly and the Ketchikan City Council both passed resolutions endorsing this alternative.

The USCG has indicated that closing East Channel to large vessel traffic likely would not meet the reasonable needs of navigation in Tongass Narrows. Alternative F1 is preferable to the other alternatives from a navigation safety standpoint because it would not contribute to conflicts at the navigational choke point next to Ketchikan International Airport and Alaska Ship and Drydock (as would Alternatives C3[a], C3[b], C4, and D1) and it would not require additional ship maneuvers, or the increased risk of such maneuvers, for cruise ships transiting West Channel (as would Alternative F3). In addition, the National Oceanographic and Atmospheric Administration (NOAA), which is proposing to homeport the research vessel *Fairweather* in Ketchikan at the USCG base, has voiced strong support for an alternative that provides for large vessel transits in East Channel.

Alternative F1 would result in adverse impacts to wetlands and upland habitat; would change the character of Pennock Island, which has historically been a community that values its physical separation from the larger Ketchikan community; and would increase traffic through the downtown core. There are two cultural properties, one on Pennock Island and one on Gravina Island, near Alternative F1. The Pennock Island cultural property includes two cabins on the eastern side of the island. The cultural property on Gravina Island includes a large barge, a cabin, a large engine, and a boatway cleared of rocks. DOT&PF and FHWA have determined that these two cultural properties are eligible for placement in the National Register of Historic

Places under Criterion D because of their information potential, **that they are in the area of potential visual effects but not physical effects**, and that Alternative F1 would not affect these properties.

Alternative F1 is preferable to the other alternatives because it would not affect cruise ship access and operations nor would it affect Part 77 airspace. Alternative F1 also has beneficial impacts by creating a "hard link" (bridge) to Gravina Island and providing access to developable land there. Alternative F1 is the most expensive alternative.

All reasonable alternatives under consideration (including the No Action Alternative) have been developed to a comparable level of detail in this EIS and their comparative merits have been evaluated. **Based on the evaluation of impacts of the alternatives and comments on the EIS and from public hearings, DOT&PF and FHWA have identified Alternative F1 as the preferred alternative for improving access to Gravina Island.**

SUMMARY OF BENEFICIAL AND ADVERSE IMPACTS

The following table, "Summary of Impacts by Alternative," presents the major environmental impacts, both beneficial and adverse, associated with each alternative.

IMPACT CATEGORIES	GRAVINA ACCESS PROJECT ALTERNATIVES									
	No Action	C3(a)	C3(b)	C4	D1	F1	F3	G2	G3	G4
Cost Factors										
Construction and Project Development ($ million)[1]	0	200	170	195	135	230	205	60	70	60
O&M ($ million)[1]	2.09	0.15	0.16	0.15	0.13	0.11	0.11	4.98	4.98	4.97
Life-Cycle ($ million)[1]	10	160	135	160	105	190	170[2]	90	100	90
Purpose and Need Factors										
Reliability of Access										
-Hours of operation per day[2]	16	24	24	24	24	24	24	16	16	16
-Trips per hour (summer/winter)	4/2	unlimited	unlimited	unlimited	unlimited	unlimited	unlimited	8/4	8/4	8/4
-Hours of downtime per day[2]	8	0	0	0	0	0	0	8	8	8
-Restrictions to hazmat transport and oversized/overweight[3] vehicles? (Y/N)	Y	N	N	N	N	N	N	Y	Y	Y
Efficiency & Convenience of Access										
Vehicular travel time (in minutes) to airport from:										
-Downtown Ketchikan	27	14	12	11	11	13	13	42[4]	35[4]	25[4]
-Carlanna Creek	19	6	4	3	3	21	21	34[4]	34[4]	17[4]
-Ward Cove	25	8	6	9	7	27	27	34[4]	40[4]	23[4]
Vehicular travel time (in minutes) to developable land from:										
-Downtown Ketchikan	NA[5]	17	17	15	14	7	7	34[4]	29[4]	29[4]
-Carlanna Creek	NA[5]	9	9	7	6	15	15	26[4]	28[4]	21[4]
-Ward Cove	NA[5]	11	11	13	10	21	21	26[4]	34[4]	27[4]
Economic Development										
Projected development on Gravina Island (in acres)										
-Residential	15	287	287	287	287	383	383	50	50	50
-Industrial/commercial	5	22	22	22	22	22	22	22	22	22
Projected development on Pennock Island (in acres)										
-Residential	0	0	0	0	0	75	75	0	0	0
-Industrial/commercial	0	0	0	0	0	1	1	0	0	0
Social and Economic Impacts										
-Number of neighborhoods bisected	0	0	0	0	0	0	0	0	0	0
-Residential relocations	0	1	2	0	0	0	0	0	0	0

IMPACT CATEGORIES	GRAVINA ACCESS PROJECT ALTERNATIVES									
	No Action	C3(a)	C3(b)	C4	D1	F1	F3	G2	G3	G4
-Business relocations	0	0	0	1	1	0	0	1	6	0
-Estimated number of affected parcels	0	23	28	15	14	30	27	13	15	14
-Total construction jobs[6]	NA	360	310	390	290	470	460	250	270	250
-Annual O&M jobs[7]	16	2	2	2	1	1	1	51	51	51
-Reductions in cruise-related spending ($ million)	0	0	2.2	0	2.2	0	0	0	0	0
-User economic benefits ($ million)	0	55.2	62.3	64.2	70.0	27.1	22.6	-0.2	-0.2	2.0
Transportation Impacts										
Miles of new roadway	NA	3.8	4.0	3.7	3.4	8.2	6.9	3.6	3.8	3.2
Intrusion into Part 77 airspace (Y/N)	N	Y	Y	Y	Y	N	N	N	N	N
Number of floatplane flights per year potentially eliminated due to loss of the SVFR exemption (assuming 2,000 SVFR current operations annually)	0	**1,800**	**1,800**	**1,800**	**1,800**	**200[18]**	**100[8]**	0	0	0
Percentage of large ships diverted from Ketchikan	0	0	2	0	2	0	0	0	0	0
Natural Resources Impacts										
Number of waterbody crossings	0	8	8	8	8	14	14	8	10	8
Upland habitat losses (acres filled)	0.0	5.1	9.1	10.4	8.6	10.7	4.8	7.6	7.0	4.7
Wetland habitat losses (acres filled)	0.0	44.0	42.3	38.8	36.1	96.5	85.1	42.5	47.6	35.4
Essential Fish Habitat losses (acres)	**0.0**	**6.3**	**7.1**	**6.9**	**4.3**	**0.2**	**16.2**	**0.7**	**3.8**	**1.6**
Cultural Resources Impacts										
Eligible historic/archaeological properties in area of potential effect	0	0	0	0	0	2	2	0	0	0

[1] Rounded to nearest 5 million due to the variable and preliminary nature of engineering. **Note that in the DEIS, "life-cycle costs" were characterized as 50-year life cycle costs, but in reality, are 20-year life-cycle costs.**

[2] Hours of operation and downtimes would be the same for all ferries.

[3] Ferry service is typically limited to vehicles less than 20 feet in length. The weight limit is 30,000 pounds.

[4] Values provided represent travel times using new ferry facility only. Travel time for the existing airport ferry would the same as for the No Action alternative.

[5] Not applicable – the No Action Alternative does not include access to developable land.

[6] Assumes a three-year construction period. Jobs can be full-time, part-time, or seasonal.

[7] Number of jobs represents one full-time employee.

[8] The Federal Aviation Administration's preliminary analysis of Alternatives F1 and F3 indicated that, although the alternatives appear to be outside the Exemption 4760 boundaries, some modification of the boundaries may be required. The analysis also indicates that a Pennock Island crossing would be "less disruptive" to floatplane operations than the other bridge alternatives. For purposes of this analysis, HDR assumed 10 percent and 5 percent reductions in special visual flight rules (SVFR) operations for Alternatives F1 and F3, respectively.

SUMMARY OF PROPOSED MITIGATION COMMITMENTS

The following presents DOT&PF's and FHWA's commitments to mitigate impacts that would result from the development of Alternative F1. In many cases, the construction contractor would implement the mitigation measures. Other mitigation measures would be implemented during final design of Alternative F1. Mitigation measures related to the other alternatives evaluated in this EIS are described in each section of Chapter 4, and a complete compilation of mitigation measures appears at the end of Chapter 4 (Section 4.30).

Mitigation of Direct Impacts

Land Use—DOT&PF would build fencing along the roadway embankment adjacent to the USCG Station and enclose the firing range on the USCG property so that safe use of the range can continue. Further consultation with the USCG would take place to ensure no impact to the planned relocation of a magazine.

Water Quality—Water quality protection features and management practices would be incorporated into the design of the bridges and roadway, including measures to minimize the fill footprint and to prevent erosion over the long term by use of erosion-resistant materials and revegetation. Storm water treatment would be included in the road and bridge design. See also "Wetlands" and "Water Bodies and Wildlife" below for commitments related to water quality.

- **Where practicable, the angle of fill slopes would be increased to reduce encroachment into adjacent wetlands.**
- **The roadway would be designed and constructed with a low-profile embankment to minimize the fill footprint.**
- **Rock would be used to stabilize toes of slopes at pond and stream crossings to limit the erosion of fine-grained material into adjacent waters and wetlands.**
- **To protect the integrity of the natural plant communities, plant species indigenous to the area would be used for vegetating road slopes, except that nonnative, non-invasive annual grasses may be used to provide rapid, initial soil cover to prevent runoff of fine-grained material into adjacent wetlands. Topsoil would be applied to the surface of road slopes to aid in the reseeding process.**
- **Roadside swales would be designed to keep surface water within the natural drainage basins to allow sediment-laden water to clear before its discharge to adjacent wetlands and waters.**
- **At all stream crossings (both culverts and bridge crossings), stream banks would be re-contoured to approximate original conditions and re-seeded with native vegetation to minimize erosion.**

Wetlands—Wetlands were avoided to the extent practicable during preliminary design and such consideration would continue in final design. The design features and management practices outlined for "Water Quality" (above) also protect wetlands. DOT&PF proposes to compensate for unavoidable adverse impacts to wetlands by paying $248,400.00 as a fee in lieu of wetland restoration, enhancement, or preservation. The monetary value has been determined using historical values for DOT&PF Southeast Alaska projects. The per-acre costs used are $2,800 for forested, shrub/scrub, and

muskeg wetlands; $50,000 for bodies of fresh water; and $20,000 for marine waters. This fee will be provided to a land trust and is to be directed to wetland creation, restoration, enhancement, and preservation or land acquisition. It is important to note that the fee includes a reduction of $30,800 in anticipation that the Ketchikan Gateway Borough's proposed "Lewis Reef Road" will be realigned to match the alignment shown in this EIS. The borough has already resolved compensation for wetland impact and holds a permit, but has not begun construction. The borough, with support from DOT&PF, is applying to modify its permit to account for the alignment shift. Therefore, the 11 acres of impact anticipated under the borough's Lewis Reef Road project were removed from the 96.5 acres anticipated in this EIS.

Water Bodies and Wildlife—Clear-span bridges and fish passage culverts sized for expected flood flows would avoid and minimize impact to freshwater bodies and the fish within them. For essential fish habitat, including marine habitat and anadromous fish habitat, the following conservation measures would be implemented:

- **Stream banks would be re-contoured and re-seeded to minimize erosion.**
- **A Storm Water Pollution Prevention Plan (SWPPP) would be required of the construction contractor to define best management practices (BMPs) that would be employed to minimize the introduction of sediment and siltation during construction and fill placement. The contractor would be required to include the BMPs listed under "Water Quality" above, listed below (in this same list), and also listed below under construction impacts ("Water Quality"). The plan would follow DOT&PF's SWPPP Guide.**
- **All anadromous fish stream crossings would be designed to provide passage for the salmon present in any given stream, per DOT&PF's memorandum of agreement with the Alaska Department of Fish and Game.**
- **In-water work in Tongass Narrows would be restricted, as follows. General use of boats and barges could occur year round for general survey and work on bridge structures above water. Except for blasting, dredging, and pile driving, other work in marine waters could occur July 1-February 28. Blasting, dredging, and pile driving could occur only November 1-February 28, with the possible exception of mid-channel locations, based on further consultation with the Alaska Department of Natural Resources (DNR), NOAA Fisheries, U.S. Army Corps of Engineers (COE), and U.S. Fish and Wildlife Service (USFWS).**
- **A vibratory hammer would be used for pile driving.**
- **Construction at anadromous fish streams would take place June 15 to August 7 and would avoid the period from August 8 to June 14.**
- **Blasting would be performed such that ground vibration (particle velocity) would not exceed 2.0 inches per second and peak water overpressure (instantaneous pressure change) would not exceed 2.7 pounds per square inch.**
- **The contractor would be required to prepare a blasting plan prior to these activities. The plans would include a pre-blasting survey for fish schools and monitoring for fish kills. Measures will be used to dampen blast impact.**

- **Dredged debris would be disposed of on land. Only under Alternative F3, which could require substantial removal of sediment and rock, would ocean disposal be necessary. These operations for Alternative F3 would be consistent with the regulations of Clean Water Act, Section 404(b)(1) (disposal of dredged materials into waters of the U.S.) and Marine Protection, Research, and Sanctuaries Act, Sections 102 and 103. Dredging activities will avoid the entire months of March through October.**

Fueling and servicing operations would occur at least 100 feet from water bodies, and fuel storage would occur at least 100 feet from all water bodies.

- **All necessary permits and agency approvals will be obtained prior to construction, and any permit stipulations will be incorporated into the contract specifications.**
- **Perimeter staking would be required on the outside of the disturbance area prior to construction to ensure no additional impact from construction activities.**
- **Silt fences would be used adjacent to Essential Fish Habitat (EFH) stream channels, just beyond the estimated toe of fill.**
- **Gravels and streambed material would be used in the bottoms of fish-passage culverts, per Tier I design in a fish passage agreement between ADF&G and DOT&PF.**
- **Riprap and bioengineering would be used along stream banks to maintain stream bank integrity and improve habitat.**

Mitigation of Construction Impacts

Land Use—Affected private property and established land uses would be protected. This would include maintaining access during construction. Careful coordination with the USCG would occur throughout construction on and adjacent to USCG property.

Aviation Transportation—Access to the airport terminal would be maintained during construction, including construction of a new parking garage at the airport. Measures would be taken to minimize service disruption for helicopter and floatplane operators. Continued access to floatplane service would be provided for floatplane customers at the airport, even if it were to become necessary to temporarily relocate the floatplane dock (Alternatives C3[a], C3[b], C4, and D1).

Marine Transportation—Bridge construction would be timed to minimize disruption of marine traffic during the busy summer season and focus major activities in the off-season to the extent practical. Advance notice of temporary closures of portions of Tongass Narrows while placing bridge components would be provided.

Vehicular Transportation—Construction that might cause lane closures would be timed for low-traffic periods. Temporary roads and driveways would be employed where necessary to ensure continued mobility during construction.

Pedestrians and Bicyclists—A traffic maintenance and parking plan will include provisions for maintaining pedestrian and Bl traffic and safety through construction areas. To the maximum extent possible, access would remain available.

Geological Resources—An erosion and sediment control plan would be prepared to minimize erosion and prevent failure of disturbed slopes.

Air Quality—Measures such as watering would be implemented to control dust at construction sites, as needed.

Noise and Vibration—Construction activities near residences would be prohibited between 11:00 p.m. and 6:00 a.m. Some exceptions might be requested from the City of Ketchikan during special construction activities. Blasting, if required, would be controlled to avoid damage of nearby structures and to meet the requirements of the local noise ordinance. In-water blasting, pile driving, and/or drilling would be controlled to ensure that the pressure waves generated did not pose a consistent, adverse threat to fish and other marine resources.

Water Quality—The erosion and sediment control plan would minimize contamination via construction runoff. Runoff from the construction area would be controlled by BMPs to minimize erosion and transport of sediment, to prevent any accidental leaks of oil or fuel from equipment from contaminating creeks or Tongass Narrows, and to contain any such leaks. The storm water pollution prevention plan would incorporate BMPs, including limiting the construction staging area, using silt fences, fueling away from water, and ensuring spill cleanup material is readily available. Some of the BMPs that would be used include:

- **DOT&PF would hold meetings at the beginning of construction with the construction contractor and agencies to ensure implementation of mitigation commitments.**
- **Staking the planned outside limits of disturbance prior to construction to limit impacts to that area.**
- **Limiting clearing and grubbing outside of the fill footprint to the extent practicable to control physical disturbance of wetlands.**
- **Installing silt fences adjacent to waterways just beyond the estimated toe of fill to capture fine-grained material contained in runoff.**
- **Installing ditch checks to reduce bank erosion.**
- **Using sedimentation basins, as necessary (based on the potential volume of storm water runoff) to limit sedimentation of adjacent wetlands and other waters.**
- **Fueling and servicing of construction vehicles at least 100 feet away from water bodies. Staging and storage of fuel and related products would occur at least 100 feet from wetlands as well as water bodies.**
- **Having spill response equipment readily available and ensuring that construction personnel are trained in spill response to contain accidental leaks of oil or fuel from construction equipment.**

Wetlands—In addition to the measures listed above for "Water Quality," temporary impacts to wetlands would be minimized by placing equipment and temporary fill on mats.

Water Bodies and Wildlife—Construction activity in any water body would adhere to applicable state and federal permit conditions. In-water blasting, pile driving, and/or drilling would be controlled to ensure that the pressure waves generated would not pose a consistent, adverse threat to fish and other marine resources. Blasting within half a mile of an eagle nest, and other construction activity within 100 meters (approximately 328 feet), would not take place during nesting season. The USFWS would be consulted to review construction plans. For EFH, including marine habitat and anadromous fish habitat, and marine mammal habitat, the following conservation measures would be implemented:

- **The EFH work window for in-water work in Tongass Narrows would be followed for marine mammals as well.**
- **When blasting and dredging, the project would ensure use of trained and NOAA Fisheries-approved observers to indicate when mammals are within a 50 m zone.**
- **An in-water warning sound would be issued prior to blasting to allow any marine mammals to move to a comfortable distance.**
- **If design should change, an incidental harassment authorization might need to be obtained from NOAA Fisheries.**
- **Mitigation measures would be finalized during the permitting process with input from DNR, NOAA Fisheries, COE, and USFWS.**
- **See also the list of measures for Essential Fish Habitat, above.**

All migratory birds are protected under the Migratory Bird Treaty Act, which makes it unlawful for anyone to kill, capture, collect, possess, buy, sell, trade, ship, import, or export any migratory bird. Bald eagles are protected by the Bald Eagle Protection Act of 1940 as amended. In accordance with USFWS guidelines, DOT&PF would establish a construction activity buffer surrounding active bald eagle nests that could be affected by construction activities. USFWS will be consulted prior to construction to review and comment on the proposed buffer area(s) and to identify additional measures to prevent abandonment of a nest during the breeding season.

Historic and Archaeological Resources—Prior to construction, a qualified archaeologist would conduct a reconnaissance level survey of the alignment once it was staked to make sure no historic or archeological resources were overlooked. Consultation with the State Historic Preservation Officer and tribal entities would continue during design and construction as needed.

Hazardous Materials—A spill prevention and response plan would be prepared.

AREAS OF CONTROVERSY

Issues raised by the public and agencies are outlined in Chapter 7 of the EIS. The primary areas of controversy among the public have related to costs of project construction; effects on

marine navigation, the cruise ship industry, and the economy; encroachment into Part 77 airspace; impacts on floatplane facilities and operations; increased traffic through the downtown core; and impacts on cultural resources on Pennock Island.

MAJOR UNRESOLVED ISSUES

The Federal Aviation Administration (FAA) may adjust the Exemption 4760 airspace to include the area of Alternative F1, which would affect Special Visual Flight Rules (SVFR) operations there.[4]

FEDERAL ACTIONS NECESSARY

Alternative F1 would require a Section 404 permit from the U.S. Army Corps of Engineers (COE) for impacts to waters of the United States, including wetlands, subject to Section 404 jurisdiction. Alternative F1 **also would require a Section 10 permit from the COE for work in navigable waters. A Section 10/404 permit application is attached to the Final EIS in Appendix L, along with a COE public notice. The permit public review period is concurrent with the EIS review period.**

A Section 9 Bridge Permit from the USCG would be required for any bridge constructed over navigable waters, which includes Tongass Narrows.

The EPA would require a National Pollutant Discharge Elimination System (NPDES) construction permit for all construction activities that would result in ground disturbance of 1 acre or greater.

The EIS considers, and the project complies with, the following federal laws and executive orders, which are the primary federal laws that apply to the project:

- Clean Air Act
- Clean Water Act, Section 401
- Clean Water Act, Section 404
- Coastal Zone Management Act
- Endangered Species Act
- Fish & Wildlife Coordination Act
- Magnuson-Stevens Fishery Conservation & Management Act (Essential Fish Habitat)
- Marine Mammal Protection Act
- Marine Protection, Research, and Sanctuaries Act, Section 102/103
- Migratory Bird Treaty Act
- National Historic Preservation Act, Section 106
- Rivers and Harbors Act, Section 9
- Rivers and Harbors Act, Section 10
- Executive Order 11988 Floodplain Management
- Executive Order 11990 Protection of Wetlands
- Executive Order 12898 Environmental Justice
- Executive Order 13175 Consultation and Coordination with Tribes

[4] FAA Exemption 4760 permits commercial air taxi and commuter pilots to operate below a 500-foot minimum altitude in Ketchikan's Class E airspace (Class E airspace encompasses the area used by all aircraft departing from or arriving at Ketchikan International Airport and Ketchikan area floatplane facilities, and aircraft passing through Tongass Narrows airspace) when visibility and ceiling minimums drop below the minimum requirements for operating under normal visual flight rules. The SVFR of Exemption 4760 control the number of aircraft in the airspace when flying conditions are particularly challenging, ensure that pilots receive appropriate traffic advisories from the Ketchikan Flight Service Station, and separate aircraft flying under instrument flight rules (e.g., commercial aircraft) from those operating under visual flight rules.

Sections 3.13 and 4.13 provide additional information about the federal laws and regulations applicable to the Gravina Access Project.

EIS AVAILABILITY

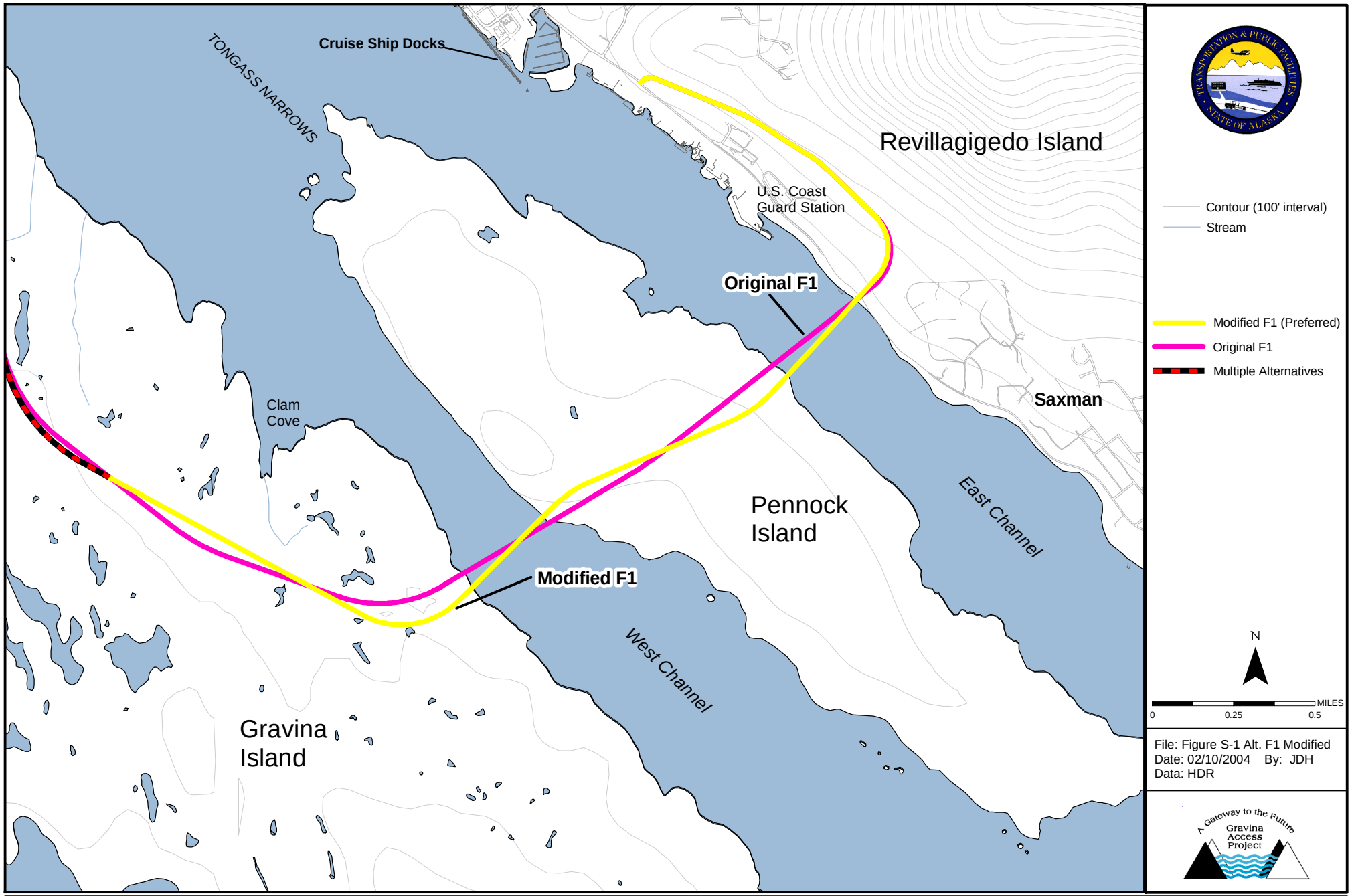
The entire EIS is available free of charge on compact disk (CD) for viewing electronically. The document is also available for viewing on the project web site at www.gravina-access.com. Bound versions of the document are available for public review at the following locations:

Ketchikan Public Library
629 Dock Street, Ketchikan, Alaska

Ketchikan Gateway Borough Department of Planning and Community Development
344 Front Street, Ketchikan, Alaska

DOT&PF Southeast Region
6860 Glacier Highway, Juneau, Alaska

For information on obtaining a CD or bound version of the EIS, contact Mark Dalton at HDR Alaska at (907) 644-2000, or visit the project website at http://www.gravina-access.com/.



Gravina Access Project
Environmental Impact Statement

Figure S.1
Original and Modified Alternative F1

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Appendices included in the Final EIS (Under separate cover)

L Department of the Army, Corps of Engineers *Public Notice of Application for Permit* for the Gravina Access Project
U.S. Army COE Section 10/404 Permit Application
404 (b)(1) Evaluation
DOT&PF and FHWA Wetlands Finding
N Marine Environment Impact Assessment Technical Memorandum
O Essential Fish Habitat Assessment
R Public and Agency Comment
Notices of Availability of DEIS and Notices of Public Hearing
Agency Comment on DEIS
Section 7 Correspondence
Section 106 Correspondence
EFH Correspondence
Public Comment on DEIS
9-17-03 Public Hearing Transcript
9-18-03 Public Hearing Transcript
DOT&PF Responses to Comments
Other Agency Correspondence
S Gravina Island Plan
T Biological Assessment for Informal Consultation Conducted Pursuant to Section 7 of the Endangered Species Act

Appendices from the Draft EIS that have been subsequently revised are appended to this Final EIS. Appendix R includes public and agency comment on the DEIS and other recent correspondence relating to the project. All other appendices (i.e., those that remain unchanged from what was presented in the Draft EIS) have not been reprinted, but all of the appendices can be viewed on the CD version of the EIS and on the project website at *www.gravina-access.com*.

ACRONYMS AND ABBREVIATIONS

Acronym	*Definition*
A	
AASHTO	American Association of State Highway Transportation Officials
ACMP	Alaska Coastal Management Program
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AHRS	Alaska Heritage Resources Survey
AMHS	Alaska Marine Highway System
APE	Area of Potential Effect
ARFF	Airport Rescue and Firefighting
ASD	Alaska Ship and Drydock, Inc.
ASTM	American Society for Testing and Materials
B	
BMP	best management practice
Borough	Ketchikan Gateway Borough
C	
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMT	culturally modified tree
CO	carbon monoxide
COE	U.S. Army Corps of Engineers
CWA	Clean Water Act
D	
dB(A)	decibels, A-weighted scale
DCED	(Alaska) Department of Community and Economic Development
DEIS	Draft Environmental Impact Statement
DNR	(Alaska) Department of Natural Resources
DOT&PF	(Alaska) Department of Transportation and Public Facilities
E	
EIS	Environmental Impact Statement
EFH	Essential Fish Habitat
EPA	(U.S.) Environmental Protection Agency
F	
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FAR	Federal Aviation Regulation
FEMA	Federal Emergency Management Agency
FHWA	(U.S. Department of Transportation) Federal Highway Administration
FSS	flight service station
H	
HDR	HDR Alaska, Inc. (a subsidiary of HDR Engineering, Inc.)
I	
IFA	Inter-Island Ferry Authority
IFR	instrument flight rules
I-O	input-output

Acronym	*Definition*
ISC	Integrated Support Command
IWC	International Whaling Commission
K	
KPC	Ketchikan Pulp Company
KPU	Ketchikan Public Utilities
kWh	Kilowatt hour
L	
Leq(h)	average sound level over a one-hour period
LOS	level of service
LUST	leaking underground storage tank
M	
MLLW	mean lower low water
mph	miles per hour
MPRSA	Marine Protection, Research, and Sanctuaries Act
MSL	mean sea level
N	
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O	
OEDP	Overall Economic Development Plan
O&M	Operation and Maintenance
OPAF	Only Practicable Alternatives Finding
P	
PDT	project development team
PIANC	International Navigation Association (formerly: Permanent International Association of Navigation Congresses)
PM_{10}	particulate matter up to 10 microns in size
R	
RSA	Runway Safety Area
RCRA	Resource Conservation and Recovery Act
S	
SATP	Southeast Alaska Transportation Plan
SDZ	Surface Danger Zone
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SVFR	special visual flight rules
SWPPP	Storm Water Pollution Protection Plan

Acronym	*Definition*
T	
TAMS	Tippetts-Abbett-McCarthy-Stratton Engineers
TEA-21	Transportation Equity Act of the 21st Century
U	
USC	U.S. Code
USCG	U.S. Coast Guard
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
V	
VFR	visual flight rules

1.0 PURPOSE OF AND NEED FOR ACTION

1.1 DESCRIPTION OF THE PROJECT AREA

The Gravina Access Project area is in the Ketchikan Gateway Borough (Borough) in southeast Alaska, about 680 miles north of Seattle, Washington, and 235 miles south of Juneau, Alaska (see Figure 1.1). The Borough contains two major islands, Gravina Island and Revillagigedo Island. The two islands are separated by Tongass Narrows, a 13-mile-long waterway that varies in width from ¼ to 1 mile. Most of the Borough's 14,000 residents live on Revillagigedo Island (on the eastern side of Tongass Narrows), whose major communities are Ketchikan and Saxman.

On Gravina Island (on the western side of Tongass Narrows), the land is undeveloped except for the Ketchikan International Airport (on its eastern shore) and a timber processing plant to the north of the airport. A few private homes are in the northernmost portion of the island and in the Clam Cove area on the southeastern shore. The island also includes large parcels of land owned by the Borough, the Alaska Department of Natural Resources (DNR), the Alaska Mental Health Trust Authority, and the U.S. Forest Service (USFS).

At the southern end of Tongass Narrows, between Revillagigedo Island and Gravina Island, is a smaller island, Pennock Island. Pennock Island is undeveloped, except for some privately owned parcels with single-family homes along the northern shores of the island. The portion of Tongass Narrows east of Pennock Island is called East Channel, and the portion to the west is West Channel.

The principal modes of transportation to islands within the Borough are by airplane (including floatplane) and ship. There is no "hard link" (surface) transportation between the islands. The primary public access to Gravina Island from Revillagigedo Island is an airport ferry that transports vehicles, bicyclists, and pedestrians across Tongass Narrows directly to the airport terminal.

Terrain constraints, ownership patterns, and access limitations restrict the availability of developable parcels to the waterfront areas along Tongass Narrows. As a result, opportunities for development in these areas have become a major factor in land use planning and economic forecasting.

1.2 PROPOSED ACTION

The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the Federal Highway Administration (FHWA), has developed the Gravina Access Project to improve public access between Revillagigedo Island and Gravina Island. This project is one of 17 high-priority infrastructure projects in the State of Alaska to be federally funded under the Federal Transportation Equity Act for the 21st Century (TEA-21), enacted in 1998. The TEA-21 authorizes approximately $20 million for construction of a bridge joining Gravina Island to the community of Ketchikan on Revillagigedo Island[1].

[1] Public Law 105-178, Subtitle F (High-Priority Projects), Section 1602 (Project Authorizations).

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of and need for the Gravina Access Project are as follows:

> ***Purpose:*** The purpose of the Gravina Access Project is to improve surface transportation between Revillagigedo Island and Gravina Island.
>
> ***Need:*** The need for improving access is threefold:
>
> - To provide the Ketchikan Gateway Borough and its residents more reliable, efficient, convenient, and cost-effective access for vehicles, bicycles, and pedestrians to Borough lands and other developable or recreation lands on Gravina Island in support of the Borough's adopted land use plans;
> - To improve the convenience and reliability of access to Ketchikan International Airport for passengers, airport tenants, emergency personnel and equipment, and shipment of freight; and
> - To promote environmentally sound, planned long-term economic development on Gravina Island.

The following paragraphs further explain these needs.

1.3.1 Need for Access to Land

> ***To provide the Ketchikan Gateway Borough and its residents more reliable, efficient, convenient, and cost-effective access to Borough lands and other developable or recreation lands on Gravina Island in support of the Borough's adopted land use plans.***

Borough Land Grant. Under Title 29 of the Alaska Statutes,[2] a general grant of land was made to the Borough to help the Borough meet "its legitimate needs for public or private settlement or development." The lack of access to Title 29 entitlement lands on Gravina Island combined with the geographic constraints of the region have limited the base of developable land to a narrow strip along Tongass Narrows on Revillagigedo Island. Within this narrow strip, the scarcity of suitable vacant land for expansion has caused several problems:

- High land costs (due to low supply and high demand)
- Loss of business opportunities
- Increased pressure to develop lands that are environmentally marginal in terms of development potential (e.g., wetlands and steep slopes), which is an unsound land management practice
- High land development costs (because developing the environmentally marginal lands is extremely costly)
- Development patterns that result in inappropriate or incompatible land use for some geographic locations (e.g., waterfront development that excludes water access dependent industries)

[2] Title 29 (Municipal Government), Chapter 65 (General Grant Land), Alaska Statutes.

These are the very problems the Alaska State Legislature was trying to avoid when it enacted Title 29, and show that the purposes of the general grant of land have not been fulfilled. The land grant in itself is not enough because, without reasonable access to the land, the State cannot fulfill the purposes for which Title 29 was enacted—namely, to meet the legitimate needs of the Borough for settlement and development and to attain sound land management through rational ownership patterns[3].

Other Landowners. The undeveloped properties of several other Gravina Island landholders, including the Alaska Mental Health Trust Authority, USFS, DOT&PF, DNR, and Native corporations, could also be used to meet the needs of the property owners and the community for settlement and development. Road access to these properties would enhance the opportunity for the landowners to sell or lease them.

Accessibility Issues. Vehicles can currently access the Ketchikan International Airport via the existing airport ferry; however, no public road access is available to any other public or private property on Gravina Island. A private access road runs north from the airport to a timber processing plant near Lewis Reef. The Borough has acquired a provisional permit from the U.S. Army Corps of Engineers for construction of a new road around the west side of the airport to the Lewis Reef development area. At this time, funding has not been secured for construction of the road. Except for cars driven by employees of the timber processing plant on the existing private road, all vehicles ferried to the airport remain on airport property while on Gravina Island. Without road access to its entitlement lands on Gravina Island, the Borough's ability to make this land available to its residents is severely constrained.

Suitable Use of Developable Lands. Without access to expansion areas, development will continue to crowd the waterfronts of Revillagigedo and Gravina Islands simply because the waterfronts are accessible. Improved access to non-waterfront property on Gravina Island would provide greater opportunities for non-water-dependent development to locate inland, at more economical sites, thereby freeing up waterfront land for water-related and water-dependent uses.

1.3.2 Need for Improved Access to Airport

> ***To improve the convenience and reliability of access to Ketchikan International Airport for passengers, airport tenants, emergency personnel and equipment, and shipment of freight.***

Ketchikan International Airport is owned by the DOT&PF, but is operated and maintained by the Borough under a long-term lease. The airport is the primary transportation link into and out of the Borough, accommodating the air traffic of commercial air carriers, commuter carriers, air taxi and flightseeing (i.e., sightseeing by aircraft) operators, general aviation, cargo carriers, and the U.S. Coast Guard (USCG). Ketchikan, the largest city in the Borough, is the primary air and marine hub in the southern portion of southeast Alaska. As such, the airport serves as the air-connecting point for all of the Borough's approximately 14,000 residents and for the 8,500 residents in neighboring communities, such as Metlakatla, Klawock, Craig, and other Prince of Wales Island communities.

[3] Title 29 (Municipal Government), Chapter 65 (General Grant Land), Alaska Statutes.

The airport ferry provides the only access to the airport for passengers on foot and in vehicles. Passengers may also arrive at the airport by floatplane at the floatplane terminal, which is just north of the ferry terminal on Gravina Island.

The terminal for the airport ferry on Revillagigedo Island is about 2.8 miles northwest of downtown Ketchikan. Most of the year, the ferry leaves the terminal every half-hour, but during the summer (May/June through August/September, depending on need), a second ferry operates to handle the higher demand and service increases to every 15 minutes. The airport ferry schedule is limited, essentially serving the airport during the airport's hours of operation (opening at 6:00 a.m. and closing at 8:00 p.m. during the winter season and at 10:00 p.m. during the summer season).

1.3.2.1 Improved Convenience and Reliability of Access for Passengers

Restricting air passengers to travel by ferry between the airport and community is inconvenient in many respects:

- Negotiating the ramps and the distance between the airport terminal and ferry is difficult for the elderly and disabled.
- The average total travel time to the airport from the ferry terminal on Revillagigedo Island is 19 minutes, which includes waiting for, loading, and unloading the ferry.
- Embarking and disembarking from the ferry and the crossing travel time adds as much as 30 minutes to each end of a trip to/from Ketchikan.
- Mechanical problems with the ferry or shoreside facilities (occurring about once per year) can add further delays to travel and result in missed plane flights.
- During peak season, when full planeloads of passengers are deplaning, the ferry fills up quickly. Many passengers must then wait for the next ferry, adding even more time to their trip.
- The airport ferry limits the potential transport of planeloads of passengers from chartered aircraft to and from cruise ships whose itineraries might begin or end in Ketchikan.
- Travel to the airport is tied completely to the ferry schedule; missing a ferry can mean missing a plane flight. Coordinating an air travel schedule with the ferry schedule adds inconvenience and stress to travel.
- Plane flights missed in Ketchikan because of the ferry travel time and unanticipated delays often have a domino effect of missed connections or appointments at the other end of the trip, which frustrates passengers and raises costs to airlines, businesses, and the public.
- The average waiting time for ferry passengers during the winter months (i.e., when the ferry departs from both terminals every 30 minutes) is 9 minutes for foot passengers and 12 minutes for vehicle passengers.

All of these factors contribute to a decrease in the quality of travel into and out of Ketchikan.

1.3.2.2 Improved Convenience and Reliability of Access for Airport Tenants

In many cities, airports become generators of economic development in their own right. Air carriers, rental car operators, and other support services such as airplane repair, charter operators, hotels, restaurants, couriers, and light manufacturers often want to locate their

business next to an airport. However, operating these services at Ketchikan International Airport costs more because of the inconvenience, additional handling of materials, and extra time to work around the limitations of the ferry schedules. These costs and difficulties reduce the economic potential of the Ketchikan International Airport. There is a considerable disincentive to locating a business at the airport in terms of cost and inconvenience to both employees and customers. Because of the direct cost of access (the ferry fare is $6 per car and $4 per person) and the more difficult scheduling (to coordinate the timing of the trip with the ferry schedule), only essential services are located on airport property. This, in turn, reduces airport lease revenues, and makes the airport more expensive for the Borough to operate.

In addition to enhancing overall economic development of the Borough, improved access is needed to help airport tenants conduct their business competitively and efficiently:

- Employers at the airport often need to move parts, supplies, and personnel between town and the airport. The ferry trip adds up to an hour in lost productivity.
- The ferry service schedule prohibits after-hours access to the airport, which limits employers' ability to perform aircraft and building maintenance during off-peak hours.
- Deliveries of goods and services to the airport may be delayed as a result of ferry schedule or capacity, extreme tides that affect the ability of large vehicles to load onto and unload from the ferry, and mechanical problems. These delays lessen the ability of the airport tenants to promptly and efficiently provide services to their customers.
- The ferry imposes limitations on the services that airport tenants can provide because of its schedule, capacity, and restrictions on the type and weight of materials that can be transported.

1.3.2.3 Improved Convenience and Reliability of Access for Emergency Personnel and Equipment

Every year, Ketchikan's fire department and hospital personnel coordinate more than 160 medical evacuations (medevacs) using Ketchikan International Airport. The city's fire department is also responsible for responding to fires on Gravina Island that are not within the jurisdiction of the airport's Aircraft Rescue and Fire Fighting (ARFF) department. [Although ARFF can respond to fires on Gravina Island that are not related to the airport, such duties are beyond the ARFF's designated use.] Transporting emergency personnel and equipment between the airport and Ketchikan is inconvenient and limits the ability of emergency personnel to respond to emergencies quickly and efficiently. Emergency medical services staff must coordinate their activities with the airport administrator to ensure timely transport of personnel and equipment, specifically:

- In a typical medevac situation during off hours (when the ferry is not operating), the fire department first informs the airport administrator by telephone of the medevac operation. Then the airport administrator alerts the ferry crew; the ferry crew then goes to the ferry, starts the engine, and waits some time for the engine to warm up. Finally the ferry transports the emergency personnel and equipment to the airport.
- **Ferry maintenance activities, typically conducted during off-hours, can affect the ability of ferry operators to respond to emergencies.**

- During the day when the ferry is operating, emergencies also require coordinating with the airport administrator, and the ferry schedule is interrupted to respond immediately.
- Emergency equipment (ambulances and fire trucks) are physically prevented from boarding the ferry during extreme low tides or extreme high tides by the steep incline and angle between the ferry and the ramp.

1.3.2.4 Improved Convenience and Reliability of Access for Shipment of Freight

Numerous companies on Revillagigedo Island rely on the airport ferry to ship cargo, fuel, and other products to and/or from the airport. The restrictions of the ferry schedule and its capacity, unexpected mechanical difficulties, and extreme tides can limit the abilities of shipping services to move freight expediently. The main problems of using the ferry to transport freight to and/or from the airport are as follows:

- Couriers and others picking up packages must work around the ferry schedule, which can increase their delivery times. This system is not only inefficient and inconvenient, but it also adds to the cost of doing business in Ketchikan.
- Delays caused by the ferry system (e.g., by capacity issues, schedule and travel time, and mechanical difficulties) can be detrimental to the shipment of seafood products (especially fresh) by air. To a large extent, seafood processors take the ferry schedule into consideration when scheduling their packaging activities to ensure that the freshest possible product is delivered to the customers. If ferry delays cause a flight to be missed, the seafood products must be held in cold storage at the airport while waiting for the next available flight.
- The travel and waiting time associated with the ferry crossing reduces the amount of time a truck and driver can be actively making deliveries. A driver and truck can be tied up for an hour or more while waiting for the ferry, which adds to the cost of shipping.
- There is a limit on the amount of fuel that can be transported by ferry. Fuel shippers transporting fuel to the airport must use small tanker trucks (or only partially fill larger trucks) and make deliveries more often, which is inefficient and costly.
- Because the ferry operates only during the daytime, shipping services cannot transport freight late at night or in the early morning, when traffic congestion would be at a minimum and they could operate more efficiently.

1.3.3 Need for Economic Development

To promote environmentally sound, planned long-term economic development on Gravina Island.

Historically, the economy of the Borough has been driven by natural resources, and has thus suffered over the years from instability and economic downturns. Ketchikan began as a mining town in the late 1800s. When mineral prices declined, fishing and timber harvest became the dominant economic forces.

Ketchikan's forest products industry began in 1951, with a 50-year timber sale contract between the Ketchikan Pulp Company (KPC) and USFS. KPC built a $52,500,000 pulp mill, operated sawmills in Ketchikan and Metlakatla, and became the community's largest employer.

However, in the late 1980s, timber harvests began to decline significantly. Between 1988 and 1998, the total value of the industry's international exports from Alaska declined by 56 percent (from $475,000,000 to $208,000,000). These declines in the timber industry have caused a correspondingly sharp decline in the industry's employment in southeast Alaska. Consequently, it has become important that the Ketchikan area create specialized forest products that appeal to many markets.[4]

Economic Planning. Attempting to deal with the economic downturn, the Borough has aggressively planned for economic development as a way to stabilize its local economy. According to its 1996 Comprehensive Plan,[5] the goal for economic development is to "expand and diversify the local economy" and the primary mechanism for achieving this goal is "Gravina Island development." The plan also states that, because of the scarcity and high costs of developable land, it is "essential for the benefit of the entire community that the land use be carefully planned." The 1998 Overall Economic Development Program[6] identifies bridge access to Gravina Island as a priority for increased opportunities for development of additional ports, harbors, and industrial, commercial, and residential properties.

Role of Transportation. A key component of the project's purpose is to provide a transportation system that benefits the local economy. The lack of access to developable land on Gravina Island is a problem that limits development of the economy in the Borough. Businesses that currently operate from Gravina Island or otherwise rely on transportation to Gravina Island are limited by the inconvenience of the current access options (i.e., airport ferry, plane, floatplane, boat, or barge). Transporting employees and products on the airport ferry is costly and inefficient, and limits productivity. Improved access would give businesses opportunities to raise productivity levels and expand operations, which would enhance the local economy.

Recreational Use. Tourism would continue to be a major component of the economy for the Borough. Improving the transportation link between Ketchikan International Airport and Revillagigedo Island would create opportunities for independent travelers and for cruise and tour ships to use Ketchikan as a point of departure. Access to federal and state-owned lands on Gravina Island for recreational use and tourism would encourage the development of visitor facilities, which would broaden these sectors of the economy.

1.4 HISTORY AND BACKGROUND: PLANNING STUDIES

For many years, the Borough, which is the planning authority for the project area, has conducted several studies that characterize the availability and accessibility of developable land. A statement in the foreword to its Tongass Narrows Crossing Study[7] report (issued more than 20 years ago) asserts:

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[4] DOT&PF, *Gravina Access Project, Demographic and Socioeconomic Analysis*, April 2000.

[5] Ketchikan Gateway Borough Planning Department, *Comprehensive Plan*, 1996.

[6] Ketchikan Gateway Borough Planning Department, *Ketchikan Gateway Borough Overall Economic Development Program: Major Program Revision 1998*, September 1998.

[7] Ketchikan Gateway Borough Planning Department, Tongass Narrows Crossing Study reports, prepared by EMPS-Sverdrup: *Phase I–Site Selection Study,* November 1981; *Phase II—Alternative Corridor Investigation*, December 1981; *Alternative Corridors* and *Summary of Findings,* May 1982.

> "Hard access to Gravina Island has been the desire of the Ketchikan community for a number of years."

And the study's statement of purpose contends that:

> "Intermittent access, such as provided by the existing shuttle ferry, is not considered adequate to spur development upon Gravina Island, nor does it provide convenient accessibility for traffic to and from the airport and other points on the island."

Previous studies of crossing locations, costs, and local impacts[8] were cited in the Tongass Narrows Crossing Study report, some of which also explored the possibility of including access to Pennock Island as part of the crossing.

Problems with land use and accessibility, as supported in the Borough's studies and plans, are summarized as follows:

- Lack of access to Borough lands on Gravina Island has made it difficult for the Borough to provide the land needed to meet the needs of its citizens for reasonable growth and development.
- The scarcity and high cost of land on Revillagigedo Island severely limit opportunities for growth, development, and diversity of industrial, commercial, residential, and recreational pursuits.
- Access to the airport is inconvenient and inefficient for airport users and businesses. The airport ferry operates 16 hours per day with departures every 15 to 30 minutes, depending on the season, which requires travelers to consider the ferry schedule when making plans to meet a flight at the airport.

The history of land development and land planning in the Borough provides a background on the need for improving access to Gravina Island. Table 1-1 provides a list of Borough-sanctioned or adopted studies and plans that discuss land availability and provide the Borough's direction for addressing land availability issues. These documents assume and consistently express the Borough's explicit, long-standing intentions to promote and facilitate land settlement and development. The principal motivation of the Borough is to improve the economic health of the region by establishing residential, commercial, and industrial uses of its developable lands.

[8] City of Ketchikan, *Ketchikan Comprehensive Plan Policies*, September 1976; Ketchikan Gateway Borough, *Waterfront Development/Management Study, Phase One*, prepared by Charles Pool & Associates, December 1980; and Reid, Middleton and Associates, *Ketchikan International Airport Master Plan*, March 1981.

TABLE 1-1
PLANNING STUDIES ADDRESSING ACCESS TO GRAVINA ISLAND

STUDY	YEAR	PREPARED FOR
Waterfront Development Management Study	1982	Ketchikan Gateway Borough Planning Department
Land Use Inventory and Projections	1984	Ketchikan Gateway Borough Planning Department
Pennock and Gravina Island Neighborhood Plan	1985	Ketchikan Gateway Borough Planning Department
Ketchikan Gateway Borough Comprehensive Plan: Community Goals to 1990	1986	Ketchikan Gateway Borough Planning Department
Coastal Management Program	1984; Revised 1989	Ketchikan Gateway Borough Planning Department
Land Use Inventory	1991	Ketchikan Gateway Borough Planning Department
Ketchikan International Airport Industrial Development Plan	1993	Ketchikan Gateway Borough Planning Department
Overall Economic Development Plan	1994	Ketchikan Gateway Borough Planning Department
Land Use Surveys	1995 and 1996	Ketchikan Gateway Borough Planning Department
Ketchikan Gateway Borough Comprehensive Plan	1996	Ketchikan Gateway Borough Planning Department
Lewis Reef Development: Purpose, Needs, and Alternatives	1997	Ketchikan Gateway Borough Planning Department
Overall Economic Development Plan	1998	Ketchikan Gateway Borough Planning Department
Gravina Island Plan	In Progress 2002	Ketchikan Gateway Borough Planning Department

The descriptions provided in the following sections summarize the purpose, findings, and conclusions of these studies as they relate to the Gravina Access Project. Each of the listed documents was issued by the Borough. For more detailed information, refer to the original documents, which are available from the Borough for public reference.

1.4.1 Waterfront Development Management Study (1982)

This study analyzed existing waterfront uses within the Borough and predicted a need for road-accessible commercial and industrial waterfront land by the year 2000. The study's inventory of waterfront land uses showed that the available sites within the City of Ketchikan could meet the land needs of small commercial or industrial activities, but not those of larger enterprises. The study concluded that the Gravina Island airport area has the best short-term development potential because of its existing transportation links and utilities infrastructure. The eastern shoreline of Gravina Island was identified as one of the two best areas for long-term development, based on topography, existing land uses, and land availability.

1.4.2 Land Use Inventory and Projections (1984)

The Borough inventoried all private property and Borough land on the road system from Settlers Cove to Herring Cove (Revillagigedo Island) and projected land use needs to the year 2000. This inventory and projection became the baseline information for the 1986 update of the Borough's *Comprehensive Plan* (see Section 1.4.4).

1.4.3 Pennock and Gravina Island Neighborhood Plan (1985)

The *Pennock and Gravina Island Neighborhood Plan*, prepared in 1985, sets up a framework for the development of the lands on Gravina and Pennock Islands. One objective of the plan was to develop a transportation system that would provide access to interior land without compromising the qualities that attracted residents to the area. The plan clearly articulates a vision for future transportation access that would include a ferry. Regarding a bridge, the plan states: "Hard access by bridge or tunnel from Pennock to Gravina Island is not envisioned in the foreseeable future and, in light of the rural characteristics, should not be pursued. Hard access and its possible location is of concern to the community as a whole and should be determined by a borough-wide vote." The *Pennock and Gravina Island Neighborhood Plan* was written at a time when considerable economic and population growth was anticipated in Ketchikan as a result of mineral development. That mineral development did not occur and the growth of Ketchikan was not consistent with the assumptions of the plan.

1.4.4 Ketchikan Gateway Borough Comprehensive Plan: Community Goals to 1990 (1986)

In 1986, the Borough updated its *Comprehensive Plan*. The plan estimated that residential single-family development was at one-third capacity, and that it could double before new growth areas would be needed; the remaining one-third of capacity would provide adequate choice, supply, and flexibility in the housing market. The plan calculated that new growth areas would be needed in 2008, and that new areas for residential single-family development would be needed in 1995 if there were no further development of the Borough.

For commercial land, demand was projected to exceed supply in 1996, and for industrial land, in 2005. Despite estimating enough supply to generally meet demand in the short term, the plan indicated that the "Borough's roaded system may not be able to supply large industrial tracts or tracts with suitable waterfront," and that these land use needs "could require the opening up of new growth areas prior to residential expansion needs."

The plan set two specific goals for Gravina Island access:

> "We shall provide for a broad and secure economic base and orderly growth while preserving the health, safety, beauty, and essential character of the community." A policy that would help implement this goal states "Specific public projects with significant community wide economic benefits include: …improved access to the airport" [among others].
>
> "Air, water, and surface transportation systems within the borough that facilitate the development goals of the community will be provided." Objective 4 under this goal states, "Improve access to Gravina and Pennock Islands."

1.4.5 Coastal Management Program (1984; Revised, 1989)

This plan inventoried commercial and industrial waterfront, and found that the downtown area was one of the few areas in Ketchikan where waterfront use was balanced between water-dependent, water-related, and non-water-dependent uses. The plan attributed this balance to the adjoining tracts of level land that allow efficient use. At the other end of the spectrum was the "west end" commercial area, where only 3 percent of the waterfront use was water-related. The plan concluded that the west end's commercial center is an example of how the scarcity of large, level lots for commercial development impinged upon another scarce resource—prime waterfront property within city limits.

The inventory showed 32 miles of shoreline accessible from the road system, with about 2 miles of remaining shoreline considered to be available, suitable, and accessible for water-related commercial and industrial uses. To accommodate the need for more commercial and industrial waterfront property, the plan discussed a proposed hard link to Gravina Island. The plan noted that a bridge or a tunnel has been seriously considered for decades, and that the purposes of a hard link included airport development, access to commercial and industrial waterfront property, access to Borough land, and mutual aid for fire and police services.

1.4.6 Land Use Inventory (1991)

In 1991, the Borough Department of Planning and Community Development inventoried developed and vacant land in the urbanized portion of the Borough and reported that approximately 85 percent of the vacant (i.e., undeveloped) land was zoned for residential use. Half of the remaining acreage was designated for industrial use, one-quarter for commercial use, and one-quarter for public use. Of the 901 acres zoned for industrial use, only 256 acres were vacant in and around Ketchikan. The inventory reported that most of the vacant industrial land (157 acres) was held by DNR and Louisiana Pacific Corporation (i.e., Ketchikan Pulp Company).

1.4.7 Ketchikan International Airport Industrial Development Plan (1993)

In this report, the Borough estimated how long the remaining supply of industrial land would last, based upon the 1991 inventory. From 1980 to 1990, an average of 18 acres of commercial/industrial land had been used each year. Based on the absorption rates and the 1991 supply (i.e., 256 acres), the report estimated 10 to 20 years of supply, but, depending on rate of consumption, estimated that it could be as little as 5 years or as many as 30 years of

supply. The report did not take into account the developability of the remaining 256 acres of land zoned for industrial use.

According to the analysis, there may "eventually be a shortage of developable land in Ketchikan," and Ketchikan is surrounded by vacant land that is "severely limited by land ownership and mandated uses;" without changes to ownership of state and federal lands, the land "shortage is at least true in the short run." The market analysis concluded that the amount of land available for uses that would most likely locate at or near an airport was limited, and that land for future economic development was limited unless more land could be added to the inventory of developable or developed land.

The plan considered six sites for industrial development on Revillagigedo Island plus Pennock Island, but found none of them suitable. The study recommended that the Borough pursue strategies for developing industrial land adjacent to the airport on Gravina Island. According to the study, the one negative aspect of airport industrial development was that "access to the Ketchikan airport is problematic, requiring improvements in the auto and passenger ferry service and capacity or significant capital costs of bridges."

1.4.8 Overall Economic Development Plan (1994)

This *Overall Economic Development Plan* (OEDP) identified economic issues and developed strategies for addressing them. One of the main issues was "a shortage of industrial sites with infrastructure, roaded access, appropriate locations, and adequate size."

Although other areas were investigated as potential industrial sites, an industrial sites task force proposed that the Borough identify sites along the Tongass waterfront that would be suitable for wood products manufacturing and seafood processing, from the northern end of the airport to the northern end of Gravina Island, and assist potential developers in applying for the necessary permits. The task force reported that there were only seven undeveloped industrial sites (totaling 19 acres) in Ketchikan that had water, sewer, and power. The Borough issued a major revision of this plan in 1998 (see Section 1.4.12).

1.4.9 Land Use Surveys (1995 and 1996)

A fall 1995 survey of the roaded system from Settler's Cove on the North Tongass Highway to Herring Cove on the South Tongass Highway found approximately 1,250 vacant parcels of land. The Borough's *Comprehensive Plan* indicated that "topographical constraints might physically rule out development on many of these sites, or make them prohibitively expensive to develop." There appeared to be "sufficient land base to satisfy the community's short-term future needs for residentially zoned property." Commercial and industrial properties, particularly those with waterfront access, however, were "perceived to be in short supply."[9]

In the winter of 1996, the Borough surveyed the Tongass Highway corridor from Beaver Falls to Settlers Cove to determine actual land use. With few exceptions, commercial and industrial development occurred adjacent to the highway corridor, interspersed with residential development either immediately adjacent to it or directly opposite across the highway. The

[9] Ketchikan Gateway Borough Planning Department, *Comprehensive Plan*, 1996.

analysis concluded that, "In part, because of the scarcity of developable land for commercial and industrial purposes, adjacent conflicting land uses are prevalent in the Borough."[10]

1.4.10 Ketchikan Gateway Borough Comprehensive Plan (1996)

According to the plan's Land Use Element, industrial needs were projected to use at least half of the available 1991 supply of vacant industrial land and at least 80 percent of the commercial land would be consumed over the next 10 years (presumably by 2006). The plan indicated that:

> While the supply of vacant industrial and commercial lands can meet projected acreage needs, the supply is not sufficient for effective market competition. Type, location, and size of vacant land frequently lower their desirability. To optimize competition, it is generally recommended that a supply three times the amount of land needed should be available. Using this formula means demand would exceed supply of vacant commercial land [and] demand would equal 90 percent of the supply of vacant industrial land in the next ten years.

A Commercial and Industrial Land Committee was formed as part of the "Ketchikan 2004" process. The committee preferred the development of Lewis Reef on Gravina Island, but concluded that development there might require hard-link access to the airport. The Comprehensive Plan's Transportation Element indicated that "a bridge spanning Tongass Narrows has been a planning topic ever since the airport was opened," but that high construction costs have deterred planning from going forward.

The plan further indicated that the Borough could take advantage of the airport's waterfront location by using it for an aviation-related industrial park. The plan recommended zoning the area against competing uses; this has occurred to some extent, with industrial zoning being applied to portions of the Airport Reserve zone and private property north of the airport. The analysis indicated that, because of similar land use and the noise constraints to residential development, the areas around the airport are most suitable for industrial development. The plan continues, stating, "Industrially zoned land is in short supply, especially with saltwater access. Land on Gravina Island, both within the Airport Reserve (leased from the state), and elsewhere, is available for development but lacks access except by marine craft." The section concludes by stating that expanding the community's land base to any extent depends on providing roaded access to it—in this case, a hard link.

In the *Comprehensive Plan*, the Borough supports access to additional developable lands on Gravina Island as an economic development strategy; the goal for economic development is to "expand and diversify the local economy" and the primary mechanism for achieving this goal is "Gravina Island development." The plan's development strategies for Gravina Island included identification of ownership of lands on Gravina for transportation needs (building roads north and south of the airport), water-related uses on the waterfront, airport-related industrial uses, maintaining recreation and subsistence uses, Lewis Reef development, land for airport expansion, seafood industry facilities, residential development and large residential lots, public beaches, common waterfronts, greenbelts, moorage for small boats and small planes, and supporting commerce and industry with utilities infrastructure (power, roads, sewer, and water).

[10] Ibid.

1.4.11 Lewis Reef Development: Purpose, Needs, and Alternatives (1997)

Based on its past planning studies, and to implement its comprehensive plan goals, the Borough pursued a marine industrial park for marine-related commerce and industry operations north of the airport at Lewis Reef. The purpose was to "meet the fundamental need in the area of supporting industrial development that requires immediate access to both marine and air transportation support. It will also meet a need for additional areas to locate industrial facilities to resolve land use conflicts." Of the seven sites explored, only a site on Gravina Island (at Lewis Reef) was deemed to have the characteristics needed to support the industrial park; no suitable land on Revillagigedo Island was identified.

Development of a timber processing facility has since occurred near Lewis Reef. The development is accessible by a private road that runs north from the airport. The Borough has acquired a provisional permit from the U.S. Army Corps of Engineers for construction of a new road around the west side of the airport to the Lewis Reef development area. At this time, funding has not been secured for construction of the road.

1.4.12 Overall Economic Development Plan (1998)

In 1998, the Borough updated its 1994 *Overall Economic Development Program*. Among the top three OEDP priorities is bridge access to Gravina Island. The OEDP states:

> The Ralph M. Bartholomew Veterans Memorial Bridge addresses the need for roaded transport of goods and services between Revillagigedo Island and Gravina Island. This bridge will provide access to the Ketchikan International Airport and support regional air cargo growth for the region's emerging industries. This bridge is expected to significantly increase opportunities for development of additional ports, harbors, and industrial/commercial, and residential properties. Ketchikan has identified this project as a priority in its OEDP efforts since 1976.

1.4.13 Gravina Island Plan (in Preparation, 2004)

The Borough is preparing the Gravina Island Plan to map out development goals, policies, and strategies for Gravina Island. The plan is intended to ensure orderly change through devising separate but integrated plans for five geographic areas. Each area plan would identify road and trail corridors, streamline improvements by resolving conflicts, organize economic development initiatives, provide direction for land management, and protect the values important to citizens.

The plan will become an amendment to the Borough's 1996 Comprehensive Plan, and is intended to be used as a framework for making local planning decisions and enacting a new zoning ordinance. As outlined in the Borough's *Gravina Island Plan Citizen's Guide to Public and Private Decision-making* (April 2002)[11], the key issues facing planners are improving access from Ketchikan, building a new road system, promoting commerce and industry, accommodating tourism and recreational users, developing residential areas, providing services and infrastructure, supporting commercial resource harvesting, and sustaining subsistence uses.

[11] Ketchikan Gateway Borough, *Gravina Island Plan Citizen's Guide to Public and Private Decision-making*, April 2002.

Central to the Borough's planning perspective is that the relatively untouched landscape of Gravina Island demands and deserves careful management, and that protecting the natural setting that attracts tourists is the best long-term economic strategy. Four major types of development are already slated for the near term: timber harvesting, airport expansion, road construction, and industrial construction.

1.5 HISTORY AND BACKGROUND: ENGINEERING STUDIES

Since the early 1970s, numerous engineering studies have addressed various alternatives for providing access via a hard link (bridge or tunnel) across Tongass Narrows (see Table 1-2). These studies demonstrate a long-term commitment by the community and governmental entities to improve access to Gravina Island, beginning in 1973 with the opening of the Ketchikan International Airport and the start of the airport ferry shuttle service across Tongass Narrows. The State of Alaska responded that year by examining five proposed bridge crossings. Since then, several other engineering studies of bridges and tunnels have been conducted.

TABLE 1-2
ENGINEERING STUDIES ADDRESSING ACCESS TO GRAVINA ISLAND

STUDY	YEAR	PREPARED FOR
Gravina Island Crossing Reconnaissance Report	1973	Alaska Department of Highways Southeastern District Reconnaissance Section
Tongass Narrows Crossing Study	1981-1982	Ketchikan Gateway Borough Planning Department
Tongass Narrows Crossing Benefit/Cost Study	1985	Ketchikan Gateway Borough Planning Department
Gravina Road Corridor/Airport—Hard Link	1989	Ketchikan Gateway Borough Planning Department
Tongass Narrows Crossing Preliminary Scoping Study	1992	James M. Montgomery Consulting Engineers
Environmental Impact Statement	1994	DOT&PF

In 1981, the Borough examined eight bridges and three underwater tube crossings. In 1985, Tippetts-Abbett-McCarthy-Stratton (TAMS) analyzed the costs of proposed bridge, tube, and ferry crossings on behalf of the Borough.

In 1988, the Borough passed Resolution 794 supporting a hard-link crossing and the preparation of an Environmental Impact Statement (EIS). In 1989, the Borough studied road routes on Pennock and Gravina Islands to the airport.

In 1991, the Alaska Legislature authorized funding for the Ketchikan hard-link EIS. In 1994, the DOT&PF prepared a Draft EIS of three crossing options, as discussed in Section 1.5.4. Most recently, in 1998, $20,443,000 was allocated specifically for this project under TEA-21. Additional funding will be required to begin construction of a selected access alternative.

The reports of these studies are briefly described in this section (Section 1.5). The reports are available to the public for reference at the Ketchikan Project Office at 430 Dock Street.

1.5.1 Gravina Island Crossing Reconnaissance Report, 1973

The *Gravina Island Crossing Reconnaissance Report* study (Alaska Department of Highways; April 1973)[12], which was completed during the construction of the Ketchikan International Airport, evaluated five potential bridge routes across the Tongass Narrows:

A—From Mile 4.6 on North Tongass Highway (just south of Peninsula Point) to Lewis Point

B—From Mile 4 on North Tongass Highway to the northern end of the airfield

C—From Charcoal Point to the southern end of the airfield

D-North—From Mile 1.1 on South Tongass Highway (just south of the USCG Station) to just south of Clam Cove, via Pennock Island

D-South—From Mile 3 on South Tongass Highway (just south of Saxman) to just south of Clam Cove

All five alternatives were proposed with horizontal navigational clearances of 500 feet and vertical clearances of 130 feet, and two alternatives included less costly variations with vertical clearances of 50 or 75 feet. These lower clearances would prevent passage of larger vessels, such as state ferries, cruise ships, and oil tankers. Alternative C included a moveable (vertical lift) bridge as one variation.

The report recommended deferring bridge site selection and design until the effects of the new airport operations on development and traffic trends were more fully established.

1.5.2 Tongass Narrows Crossing Study, 1981-1982

In 1981 and 1982, the Borough undertook an extensive Tongass Narrows Crossing Study[13] regarding a hard-link route from Ketchikan to Gravina Island. The study as originally conceived had three phases: I—Site Selection; II—Investigation of Alternatives; and III—Feasibility (tube versus bridge).

1.5.2.1 Phase I—Site Selection

The study established institutional and physical crossing constraints, investigated 11 crossing corridors (eight bridges and three tunnels), and recommended corridors for further investigation in later phases of the study. Each of the eight bridge alternatives, two of which crossed Pennock Island, were proposed with horizontal navigational clearances of 500 feet and vertical clearances of 145 feet. For the Pennock Island alternatives, the West Channel bridges were proposed with horizontal and vertical navigational clearances of 500 feet and 145 feet,

[12] Alaska Department of Highways Southeastern District Reconnaissance Section, *Gravina Island Crossing Reconnaissance Report*, Project S-0922(1), April 1973.

[13] Ketchikan Gateway Borough Planning Department, *Tongass Narrows,* November 1981; *Phase II—Alternative Corridor Investigation*, December 1981; *Alternative Corridors* and *Summary of Findings,* May 1982.

respectively, whereas the East Channel bridges were proposed with horizontal navigational clearances of 300 feet and vertical navigational clearances of 55 feet. For corridor assessment, investigators used a full range of evaluation factors: traffic congestion, travel distance, marine navigation, airport activity, environmental effects, community development, right-of-way displacement, costs, geologic and soils concerns, air navigation risks, and geometric design.

The resulting assessment narrowed the focus of the next study phase to three bridge corridors and one tunnel corridor. These four corridors were judged the most favorable crossing locations because of their convenient connections; minimal impacts on development, environmental resources, and traffic modes; excellent foundation potentials; and shorter crossing lengths.

1.5.2.2 Phase II—Investigation of Alternatives

This report identifies the general considerations and constraints applicable to the four crossing corridors recommended in Phase I, as well as one new corridor, added by the Borough after its review of the report. The new crossing corridor was a tube tunnel from the intersection of Tongass Highway and Shoreline Drive either to the Lewis Reef area or near the medium-intensity approach lighting system of the airport runway.

The Phase II investigation reflected the constraints developed in Phase I, as well as information gathered from the public and government agencies, bathymetric data, and more detailed engineering analysis. For one of the bridge corridors (Corridor 7), the additional possibility was raised of constructing a causeway instead of a bridge, which would require thorough investigation of the effects on tidal movements. The report recommended two corridors for further feasibility evaluation in Phase III: Corridors 3 (bridge) and 11 (tube tunnel).

1.5.2.3 Phase III—Additional Studies

In the original project scope, Phase III was to be a feasibility study that would compare the most favorable bridge and tunnel options and recommend a preferred crossing type. However, in light of comments received at a public hearing in February 1982, the Phase III scope was redirected to address the specific concerns of the public, and consequently, was enlarged to further investigate five corridors instead of just the two corridors designated as most favorable in Phase II. The Phase III additional studies developed additional background information and details for both bridge and tube crossings, and provided additional studies of crossing alternatives for Corridors 3 and 7 (including a partial causeway). The Corridor 2 bridge crossing and the Corridor 12 tube crossings were included in the detailed studies.

The report concluded that a bridge crossing was the most feasible hard link across Tongass Narrows, and the most favorable crossing locations were Corridor 7 (south of the airport) and Corridor 2 (north of the airport). The final recommendation was for further studies of Corridors 2, 7, and 11 to obtain additional field data, prepare an environmental assessment, develop more technical information as a basis for preliminary design plans, and, ultimately, determine the most favorable crossing corridor.

1.5.3 Other Tongass Narrows Crossing Studies, 1985-1992

Tongass Narrows Crossing Benefit/Cost Study. This 1985 study for the Borough[14] emphasized the importance of access to Gravina Island with this statement: "One central fact underscored all of the discussions and meetings held to examine this topic: the citizens and leaders of Ketchikan unanimously support improved access between the islands and view it as essential to the growth of the community."

Nine access alternatives were compared, based on quantifiable benefits and costs. The hard-link alternatives assessed were the three corridors favored by the Tongass Narrows Crossing Study conducted in 1981 and 1982: Corridor 2 (bridge), Corridor 7 (bridges via Pennock Island), and Corridor 11 (tube tunnel). In addition, the study assessed a low-level bridge or causeway to Pennock Island, three ferry systems to access Gravina Island (existing service, remodeled ferries, and larger vehicular ferries), and two ferry systems to access Pennock Island (passenger and vehicular ferries).

Gravina Road Corridor/Airport—Hard Link. This 1989 study[15] defined an alignment for a two-lane access road to the Ketchikan International Airport, with 0.6 mile of roadway on Pennock Island and 3.4 miles on Gravina Island. The study considered topography, soils, property ownership, future development, and drainage. The roadway system was designed to serve the West Channel bridge crossing that was part of Corridor 7 recommended in the Tongass Narrows Crossing Study in 1982.

Tongass Narrows Crossing Preliminary Scoping Study. This scoping study[16] summarized previous crossing reports and briefly compared three crossing corridors from the Tongass Narrows Crossing Study in 1992 (i.e., Corridors 2, 7, and 11) and one new crossing, referred to as "PN&D 72/92" after the study preparers: Peratrovich, Nottingham & Drage, Inc. The scoping study included the following 1992 cost estimates:

Corridor 2 (bridge): $100,000,000

Corridor 7/7A (two bridges or a bridge/causeway): $100,000,000

Corridor 11 (tube tunnel): $180,000,000

PN&D 72/92 (bridge): approximately $60,000,000

These cost estimates were based on a vertical navigational clearance of 160 feet for the bridges, and introduced a new and costly element to project requirements—protection of bridge piers from ship collisions. The report also noted that, from 1962 to 1990, bridge costs in Alaska had escalated an average of 3.5 percent per year.

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[14] Ketchikan Gateway Borough Planning Department *Tongass Narrows Crossing Benefit/Cost Study*, prepared by TAMS Engineers (Tippetts-Abbett-McCarthy-Stratton, a Professional Corporation), (apparently published in 1985).

[15] Ketchikan Gateway Borough Planning Department, *Gravina Road Corridor/Airport—Hard Link*, prepared by PEI Consultants, 1989.

[16] James M. Montgomery Consulting Engineers, *Tongass Narrows Crossing Preliminary Scoping Study*, prepared by Peratrovich, Nottingham & Drage, Inc., April 15, 1992.

The study concluded that only Corridor 7/7A and the PN&D 72/92 crossing (all bridge alternatives) had merit, and recommended that they undergo future environmental studies and comparison with the existing airport ferry access system.

1.5.4 Environmental Impact Statement, 1994

In 1994, the DOT&PF evaluated the potential environmental impacts of three alternatives for a Tongass Narrows crossing and a No Action Alternative in an EIS.[17] The proposed action was developed to address future limitations on the capacity of the existing ferry service and to provide a more reliable direct link between the City of Ketchikan and the airport on Gravina Island. Scoping for this study evaluated five bridge alternatives, an underwater crossing, and a drawbridge.

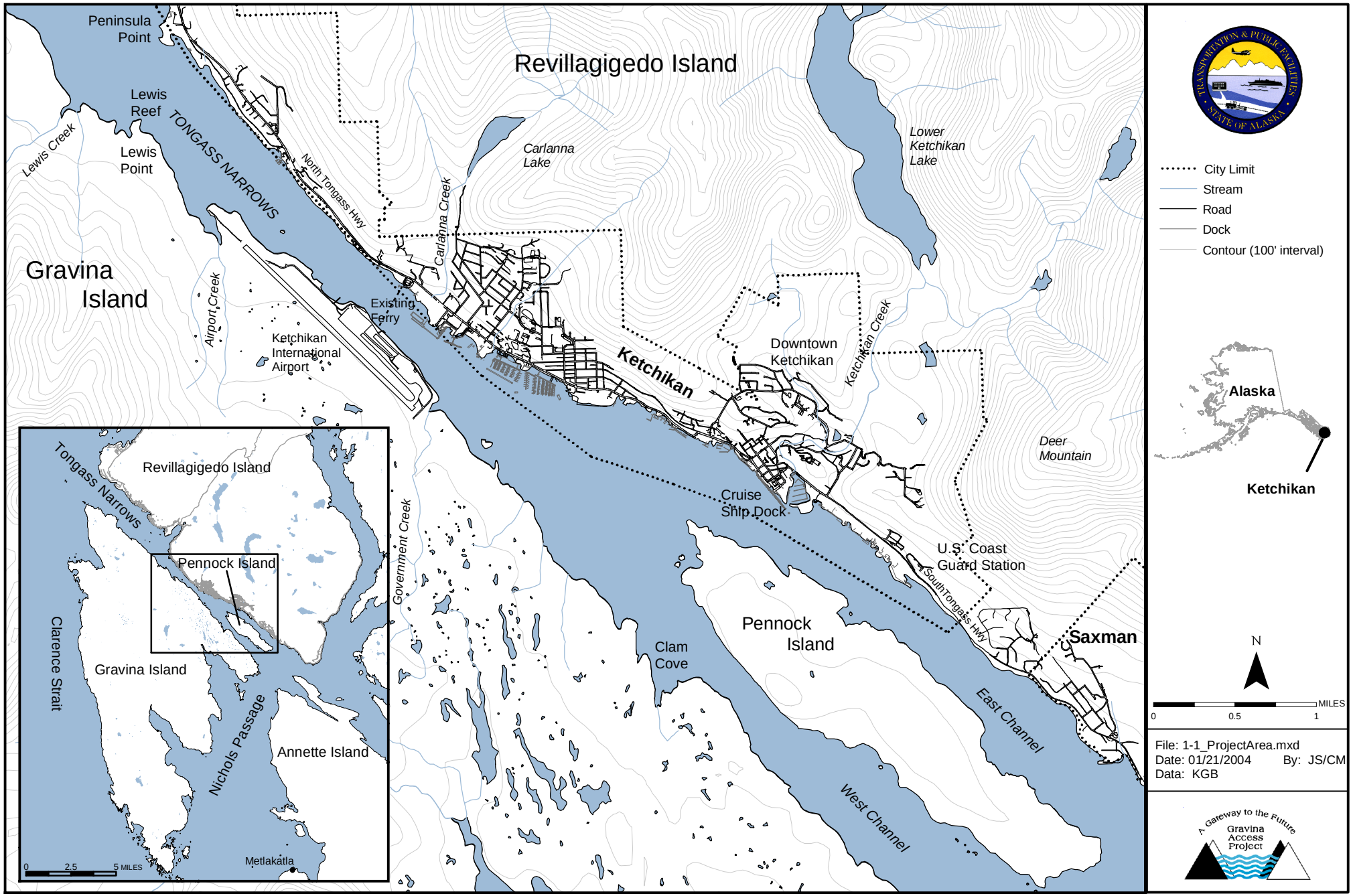
The three "action" alternatives selected as reasonable alternatives for evaluation in the EIS were:

> 1—A two-lane bridge from north of downtown Ketchikan on Revillagigedo Island to the north end of the airport on Gravina Island and 1.5 miles of access road ($61,000,000 to construct). This alternative included a horizontal navigational clearance of 500 feet and a vertical navigational clearance of 160 feet.
>
> 2—A two-lane bridge from south of downtown Ketchikan (near the USCG Station) to Pennock Island, a second bridge from Pennock Island to south of Clam Cove on Gravina Island, and 4 miles of access road ($74,000,000 to construct). Navigational clearances for the West Channel bridge were proposed at 500 feet horizontal and 160 feet vertical. The East Channel bridge navigational clearances were proposed at 300 feet horizontal and 60 feet vertical.
>
> 3—Improvements to the existing ferry system ($9,000,000 to $10,000,000), including replacement of the existing ferry vessel with a much larger (120-foot) vessel having capacity for 12 to 15 additional vehicles and 20 to 30 additional passengers, and redesign and replacement of the transfer bridge at the ferry terminal on Gravina Island.

Alternative 1 included a rock breakwater that might have impeded near-shore salmon migrations, but would have been mitigated by a 100-foot opening in the breakwater. The bridge pier supports (rock islands) would cover about 2.8 acres of marine habitat, but it was anticipated that these rock islands would create equally productive habitat for marine species. Alternative 2 would have taken 80 acres of wetlands, and would have the same impacts from rock islands as Alternative 1. Most residents of Pennock Island opposed Alternative 2. Alternative 3 would not have had any new major environmental impacts.

This EIS was a preliminary draft and did not recommend a preferred alternative. The state chose not to pursue the project due to lack of funding.

[17] DOT&PF, *Ketchikan, Alaska, Tongass Narrows Crossing Preliminary Draft Environmental Impact Statement,* prepared by Montgomery Watson, October 1994.



Gravina Access Project
Environmental Impact Statement

Figure 1.1
Project Area

2.0 ALTERNATIVES

The development of alternatives for the Gravina Access Project has been an evolving process to identify the location and type of crossing of Tongass Narrows that would best meet the purpose of and need for the project. The DOT&PF reviewed previous engineering studies, conducted detailed engineering and environmental studies, and obtained input from the Ketchikan community and local, state, and federal agencies, Tribal governments, and other Native organizations to develop the project alternatives (see also Chapter 7). This chapter describes the 10 project alternatives evaluated in this EIS and identifies the DOT&PF and FHWA preferred alternative for the project. It also identifies alternatives that were initially considered as conceptual build options and the reasons they were eliminated from further consideration.

2.1 ALTERNATIVES EVALUATED IN THIS EIS

During the spring of 2000, the DOT&PF developed 18 build concepts for crossing Tongass Narrows. These concepts were based on previous studies, input from agencies and the public, engineering analysis, and the objectives in the purpose and need statement for the project (see Chapter 1). The build concepts consisted of 11 bridge options, 2 tunnel options, 1 tunnel-and-bridge option, and 4 supplemental ferry options (see Figure 2.1)[1]; a No Action Option was also under consideration from this initial phase. These initial options were reviewed with input from the Ketchikan community and local, state, and federal agencies, Tribes and other Native organizations, to identify reasonable alternatives for the Gravina Access Project (see Section 2.4). Factors related to the ability to meet the project purpose and need, cost, environmental impacts, impacts to 4(f) properties, and transportation impacts were examined for each of the initial options. Those options that were not considered practical or feasible from a technical and economic standpoint were eliminated from further consideration (see Section 2.3).

Additional technical studies and public and agency input resulted in the identification of nine reasonable build alternatives and the No Action Alternative for the Gravina Access Project. Sections 2.1.1 through 2.1.3 describe the reasonable alternatives that are evaluated in detail in this EIS: the No Action Alternative; six bridge alternatives, C3(a), C3(b), C4, D1, F1, and F3; and three ferry alternatives, G2, G3, and G4. The descriptive name of each alternative includes the crossing's "takeoff" point on Revillagigedo Island and/or the "touchdown" location on Gravina Island.

Table 2-1 provides a summary of the key features of the reasonable project alternatives and Figure 2.2 shows the alignments of the reasonable alternatives. Typical cross-sections of the proposed roadway and bridges are shown in Figure 2.3. Figure 2.4 shows the configuration of the Ketchikan International Airport access road and parking facilities, which are common to all build alternatives. All build alternatives (bridges and ferries) include a parking structure and access improvements to accommodate additional traffic to the airport resulting from improved access. **Each build alternative also includes a spine road to access other developable lands on Gravina Island (see Section 2.4.4). This spine road is consistent with Ketchikan Gateway Borough planning for future development on Gravina Island. Any improvements on airport property would be coordinated with Ketchikan International Airport's Airport Security Program, which was developed in compliance with**

[1] All referenced figures in this Chapter 2 are at the end of the chapter.

Transportation Security Regulations.[2] The total cost for this future airport development is estimated at $11 million—$3 million for program development costs and $8 million for construction costs. Other figures (as noted in the following descriptions of project alternatives) depict the alignment of each alternative individually. **Depending on the availability of funding, DOT&PF may phase construction of the proposed spine road and airport parking structure, and related airport access improvements.**

The current fund source for the project is high-priority project funding (approximately $20.4 million) appropriated in TEA-21. This funding is expected to cover much of the initial project development cost, including preparation of the environmental documentation and design effort. DOT&PF has committed to provide the required 20 percent matching funds for these initial phases. Funding for complete project construction cost, both federal and state funds, has not yet been identified. Any improvements constructed as a result of the Gravina Access Project would become a state facility that would be maintained and operated by DOT&PF. DOT&PF has committed to cover the annual costs of operation and maintenance (O&M).

TABLE 2-1
SUMMARY OF DESCRIPTIONS OF REASONABLE ALTERNATIVES

	No Action	*Bridge Alternatives*						*Ferry Alternatives*		
		C3(a)	C3(b)	C4	D1	F1	F3	G2	G3	G4
Crossing Location	2.8 mi. north of down-town	1,600' north of airport terminal	2,600' north of airport terminal	1,600' north of airport terminal	Due east of airport terminal	1.4 mi. south of down-town	1.5 mi. south of down-town	2 mi. north of airport terminal	1.3 mi. south of airport terminal	2.8 mi. north of down-town
Bridge Dimensions:										
Bridge Length (ft)	—	5,690	4,250	4,980	3,220	**6,300**	5,400	—	—	—
Maximum Height (ft)	—	250	195	250	160	E: 250 W:160	E: 140 W: 250	—	—	—
Vertical Clearance (ft)	—	200	120	200	120	E: 200 W:120	E: 60 W: 200	—	—	—
Horizontal Clearance (ft)	—	550	500	550	500	E: 550 W: 500	E: 500 W: 550	—	—	—
Road Dimensions										
Length, without bridge (ft)	**--**	20,070	20,970	19,660	18,210	**43,080**	35,370	18,920	20,300	16,670
Width (road top)	**--**	**11.9 ft lane / 7.9 ft shoulder / 39.4 ft total (same for all build alternatives)**								
Aviation Zone Intrusion?	No	Yes	No	Yes	No	No	No	No	No	No
Block Cruise Ships?	—	No	Yes	No	Yes	No	No	No	No	No
Additional Ferry Service:										
New Terminals (number)	—	—	—	—	—	—	—	2	2	2
New Vessels (number)	—	—	—	—	—	—	—	2	2	2
Travel Time to Airport from Downtown Ketchikan (minutes)	27	14	12	11	11	13	13	42	35	25
Estimated Costs ($ million):										
Construction	0	145	125	145	100	170	155	45	45	40
Program Development[1]	0	55	45	50	35	60	55	15	20	15
Totals	0	200	170	195	135	230	205	60	70[3]	60[2]

[2] Title 49 of the Code of Federal Regulations, administered by the Transportation Security Administration of the Department of Homeland Security; Subchapter C Civil Aviation Security, Part 1542 Airport Security.

	No Action	*Bridge Alternatives*						*Ferry Alternatives*		
		C3(a)	C3(b)	C4	D1	F1	F3	G2	G3	G4
Crossing Location	2.8 mi. north of down-town	1,600' north of airport terminal	2,600' north of airport terminal	1,600' north of airport terminal	Due east of airport terminal	1.4 mi. south of down-town	1.5 mi. south of down-town	2 mi. north of airport terminal	1.3 mi. south of airport terminal	2.8 mi. north of down-town
Average Annual Operation & Maintenance	2.09	0.15	0.16	0.15	0.13	0.11	0.11	4.98	4.98	4.97
Life-Cycle[3]	10	160	135	160	105	190	170	90	100	90
Quantity of fill—wetlands (cy)	0.0	213,00	250,000	189,900	176,000	500,000	412,000	206,000	230,000	171,000
Quantity of fill—marine (cy)	0.0	280,000	140,000	280,000	295,000	0.0	0.0	0.0	0.0	0.0
Quantity of marine dredging (cy)	0.0	0.0	0.0	0.0	0.0	0.0	184,000	1,400	15,200	18,600

[1] Includes right-of-way acquisition costs.
[2] Numbers have been rounded; totals are not a direct sum.
[3] Note that in the DEIS, life-cycle costs were characterized as 50-year life cycle costs, but in reality, are 20-year life-cycle costs.

2.1.1 No Action Alternative



Existing airport ferry service

The National Environmental Policy Act (NEPA) requires an EIS to describe and analyze the impacts of No Action, as a benchmark that enables comparison of the magnitude of the environmental effects of the various project alternatives.[3]

Under the No Action Alternative, no bridge would be constructed and no additional ferry service would be provided between Revillagigedo Island and Gravina Island. The only public access between the islands would continue to be provided by the existing airport ferry service across Tongass Narrows, private boats, and floatplanes. On Revillagigedo Island, the existing ferry terminal is located 2.8 miles north of downtown Ketchikan; on Gravina Island, the terminal is on the waterfront, just east of the airport terminal. The No Action Alternative is shown on Figure 2.5.

The Borough operates the airport ferry service. The ferry service would continue to operate 16 hours per day and the frequency of service would remain the same, with departures every 30 minutes in winter and every 15 minutes in summer. The Borough has acquired a provisional permit from the U.S. Army Corps of Engineers (COE) for construction of a new road around the west side of the airport to the Lewis Reef development area (i.e., Proposed Ketchikan Airport Access Road shown in Figure 2.2). At this time, funding has not been secured for construction of the road. If the road were constructed, the ferry schedule could change to accommodate passengers who land other than at the airport.

[3] Council on Environmental Quality, *Forty Most Asked Questions Concerning CEQ's NEPA Regulations*, 46 Fed. Reg. 18026 (March 23, 1981), as amended, 51 Fed. Reg. 15618 (April 25, 1986).

Cost. Although this alternative would have no new construction costs, the estimated life-cycle cost would be approximately $10 million, and the estimated average annual O&M cost for the life-cycle would be approximately $2.1 million (see Appendix A). The cost estimates assume that the ferries would have their engines replaced or significantly overhauled after 25 years and that the vessels would be replaced after 50 years.

2.1.2 Bridge Alternatives

The following sections describe the six bridge alternatives evaluated in this EIS. The alignments of these bridge alternatives are shown on Figures 2.6, 2.7, 2.8, 2.9, 2.10, and 2.11. Bridge profile sheets, showing cross-sectional views of the bridges, navigational openings, roadway gradients, and conceptual design, are provided in Figure 2.12 (for Alternatives C3[a] and C3[b]), Figure 2.13 (for Alternatives C4 and D1), and Figure 2.14 (for Alternatives F1 and F3). Note that the existing airport ferry service would be discontinued under all of the bridge alternatives.

2.1.2.1 Alternative C3(a): 200-foot Bridge Between Signal Road and South of Airport Terminal

Bridge Structure. Alternative C3(a) includes a bridge across Tongass Narrows approximately 1,600 feet north of the airport terminal. The bridge would be 5,690 feet long, and have a maximum height of approximately 250 feet. The main span of the bridge would have a vertical navigational clearance of 200 feet above high tide and a horizontal navigational clearance of approximately 550 feet (see Figure 2.12). The main span of the bridge would be centered on the cruise ship tracklines and would be over water with depths in excess of 40 feet (at low tide) to accommodate deep draft vessels. These clearances would accommodate one-way passage of cruise ships and two-way passage of most other ships (including Alaska Marine Highway System [AMHS] ferries).



Alternative C3(a) bridge from north of Wolff Point on Tongass Avenue, looking south

Alignment. The alignment of Alternative C3(a) is shown in Figure 2.6. On Revillagigedo Island, the alignment would connect to Signal Road at North Tongass Avenue. The connection at North Tongass Avenue would be the only access to this alternative alignment on Revillagigedo Island; no neighborhood streets would be used for cut-through access. From this terminus, the alignment would traverse the hillside southward, gain elevation, and turn southwestward. The bridge would cross Tongass Avenue and Tongass Narrows, and then turn southward to parallel the airport runway and touch down (reach the ground surface) on Gravina Island south of the terminal. A 0.4-mile-long airport return loop road would connect the airport terminal and the bridge terminus. The main road would continue around the southern end of the airport runway and then arc northward, extending parallel to and west of the airport runway approximately 2.2 miles to the northern end of the Airport Reserve zone. At the southern end of the runway, the road would be constructed at a grade low enough to accommodate the planned future expansion of the runway, with the runway extended as an overpass of the road.

Cost. The estimated life-cycle cost of this alternative is approximately $160 million. The estimated average annual O&M cost is approximately $150,000 (see Appendix A).

2.1.2.2 Alternative C3(b): 120-foot Bridge Between Signal Road and Airport Terminal

Bridge Structure. The Alternative C3(b) bridge would be approximately 4,250 feet long, and have a maximum height of approximately 195 feet. The main span of this bridge would have a vertical navigational clearance of 120 feet above high tide and a horizontal navigational clearance of approximately 500 feet (see Figure 2.12). The main span would be located over water with depths in excess of 40 feet at low tide. These clearances would accommodate passage of AMHS ferries, but not larger cruise ships.



Alternative C3(b) bridge from north of Wolff Point on Tongass Avenue, looking south

Alignment. The alignment of Alternative C3(b) is shown on Figure 2.7. Alternative C3(b) would have the same general alignment on Revillagigedo and Gravina Islands as Alternative C3(a), but with a lower bridge profile. The position of the C3(b) bridge over Tongass Narrows and at its touchdown on Gravina Island (near the airport terminal) would be north of the C3(a) alignment. This alternative would not need an airport return loop road because the bridge would touch down in front of the airport terminal. The main road would continue around the southern end of the airport runway and then arc northward, extending parallel to and west of the airport runway approximately 2.2 miles to the northern end of the Airport Reserve zone. At the southern end of the runway, the road would be constructed at a grade low enough to accommodate the planned future expansion of the runway, with the runway extended as an overpass of the road. The connection at North Tongass Avenue would be the only access to this alternative alignment on Revillagigedo Island; no neighborhood streets would be used for cut-through access.

Cost. The estimated life-cycle cost of this alternative is approximately $135 million. The estimated average annual O&M cost is approximately $160,000 (see Appendix A).

2.1.2.3 Alternative C4: 200-foot Bridge Between Tongass Avenue North of Cambria Drive and South of Airport Terminal

Bridge Structure. The Alternative C4 bridge would be approximately 4,980 feet long and have a maximum height of approximately 250 feet. The main span of this bridge would have a vertical navigational clearance of 200 feet and a horizontal navigational clearance of approximately 550 feet (see Figure 2.13). The main span of the bridge would be centered on the cruise ship tracklines and would be over water with depths in excess of 40 feet (at low tide) to accommodate deep draft vessels. These clearances would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries.



Alternative C4 bridge from north of Wolff Point on Tongass Avenue, looking south

Alignment. The alignment of Alternative C4 is shown on Figure 2.8. On Revillagigedo Island, the alignment would connect to Tongass Avenue north of Cambria Drive, across from the access to the existing ferry terminal. The connection at Tongass Avenue would be the only access to this alternative alignment on Revillagigedo Island; no neighborhood streets would be used for cut-through access. From this terminus, Alternative C4 would extend northward and traverse the hillside around the quarry; the bridge would cross over Tongass Avenue and Tongass Narrows, turn southward to parallel the airport runway, and then touch down on Gravina Island south of the airport terminal. A 0.4-mile-long airport return loop road would connect the airport terminal and the bridge terminus. The main road would continue around the southern end of the airport runway and then arc northward, extending parallel to and west of the airport runway approximately 2.2 miles to the northern end of the Airport Reserve zone. At the southern end of the runway, the road would be constructed at a grade low enough to accommodate the planned future expansion of the runway, with the runway extended as an overpass of the road.

Cost. The estimated life-cycle cost of this alternative is approximately $160 million. The estimated average annual O&M cost is approximately $150,000 (see Appendix A).

2.1.2.4 Alternative D1: 120-foot Bridge Between Tongass Avenue at Cambria Drive and Airport Terminals



Alternative D1 bridge from near Wolff Point on Tongass Avenue, looking south

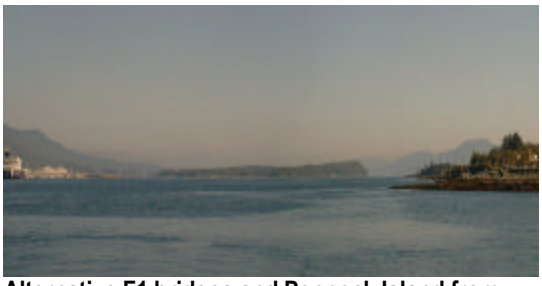
Bridge Structure. The Alternative D1 bridge would cross Tongass Narrows directly east of the airport terminal. The bridge would be approximately 3,220 feet long and have a maximum height of approximately 160 feet. The main span of this bridge would have a vertical clearance of 120 feet above high tide and a horizontal clearance of 500 feet (see Figure 2.13). The main span would be located over water with depths in excess of 40 feet at low tide. These clearances would accommodate passage of AMHS ferries, but not larger cruise ships.

Alignment. The alignment of Alternative D1 is shown on Figure 2.9. On Revillagigedo Island, the alignment would connect to Tongass Avenue at Cambria Drive near the existing airport ferry terminal. The connection at Tongass Avenue would be the only access to this alternative alignment on Revillagigedo Island; no neighborhood streets would be used for cut-through access. From this terminus, the alignment would rise along the hillside and turn westward; the bridge would cross over Tongass Avenue and Tongass Narrows, and then turn southward to parallel the shoreline on Gravina Island and touch down south of the airport terminal. A 0.4-mile-long airport return loop road would connect the airport terminal and the bridge terminus. The main road would continue around the southern end of the airport runway and then arc northward, extending parallel to and west of the airport runway approximately 2.2 miles to the northern end of the Airport Reserve zone. At the southern end of the runway, the road would be constructed at a grade low enough to accommodate the planned future expansion of the runway, with the runway extended as an overpass of the road.

Cost. The estimated life-cycle cost of this alternative is approximately $105 million. The estimated average annual O&M cost is $130,000 (see Appendix A).

2.1.2.5 Alternative F1 (DOT&PF and FHWA preferred): Bridges (200-foot East and 120-foot West) Between Tongass Avenue and Airport, via Pennock Island

Bridge Structures. Alternative F1 would cross Tongass Narrows via Pennock Island with two bridges. One bridge would cross the East Channel and the other would cross the West Channel. The East Channel bridge would be approximately **3,610** feet long and have a maximum height of approximately 250 feet. The bridge would have a vertical navigational clearance of 200 feet above high tide and a horizontal navigational clearance of approximately 550 feet (see Figure 2.14). The main span of the bridge would be centered on the cruise ship tracklines and would be over water with depths in excess of 40 feet (at low tide) to accommodate deep draft vessels. These clearances would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries. The West Channel bridge would be approximately **2,690** feet long and have a maximum height of approximately 160 feet. The bridge would have a vertical navigational clearance of 120 feet above high tide and a horizontal navigational clearance of approximately 500 feet (see Figure 2.14). The main span would be located over water with depths in excess of 40 feet at low tide. These clearances would accommodate passage of AMHS ferries, but not larger cruise ships.



Alternative F1 bridges and Pennock Island from mid-Tongass Narrows near the airport, looking south



Alternative F1 200-foot bridge from cruise ship dock, looking south

Alignment. The alignment of Alternative F1 is shown in Figure 2.10. **Note that the alignment presented herein reflects a minor design modification from Alternative F1 as it was presented in the Draft EIS (see Figure S.1 for a comparison of the original Alternative F1 and the modified Alternative F1). The bridge crossings of East and West Channels have been shifted to be perpendicular to the main navigational channels. This design modification was made to Alternative F1 in response to concerns and comments expressed by marine pilots and others with regard to the original alignment of Alternative F1. The analyses of impacts associated with Alternative F1 presented in Chapter 4 of this Final EIS have been revised where necessary to reflect this minor design modification. The figures in the document have also been revised accordingly.**

On Revillagigedo Island, Alternative F1 would connect to Tongass Avenue just south of Tatsuda's grocery store and near the southern end of the quarry. The connection at South Tongass Highway would be the only access to this alternative alignment on Revillagigedo Island; no neighborhood streets would be used for cut-through access. From this terminus, the alignment would rise to the southeast along the hillside (and east of the tank farm, the cemetery, and the USCG Station), turn westward (skirting the southern end of the USCG Station property,

and north of the Forest Park subdivision) and cross over Tongass Avenue approximately 1.4 miles south of downtown Ketchikan, then cross the East Channel to Pennock Island. The roadway would cross Pennock Island at grade. From Pennock Island, the West Channel bridge would cross to Gravina Island, touching down approximately 2.7 miles south of the airport runway. The road would continue northward approximately **5.4** miles to the northern end of the Airport Reserve zone. A 1.2-mile airport access road would be constructed at the southern end of the airport runway. The airport access roadway would be constructed at a grade low enough to accommodate the planned future expansion of the runway, with the runway extended as an overpass of the road.

Cost. The estimated life-cycle cost of this alternative is approximately $190 million. The estimated average annual O&M cost is approximately $110,000 (see Appendix A). **Note that the minor design modification made to Alternative F1 has not changed its total costs from what was presented in the Draft EIS; therefore, no change to Appendix A has been made since publication of the Draft EIS.**

2.1.2.6 Alternative F3: Bridges (60-foot East and 200-foot West) Between Tongass Avenue and Airport, via Pennock Island

Bridge Structures. Similar to Alternative F1, Alternative F3 would have two bridges that cross Tongass Narrows via Pennock Island. One bridge would cross East Channel and the other bridge would cross West Channel. The East Channel bridge would be approximately 2,065 feet long and have a maximum height of approximately 140 feet. The bridge would have a vertical navigational clearance of 60 feet above high tide, (lower than any of the other bridges), and a horizontal clearance of approximately 500 feet (see Figure 2.14). The main span would be located over water with depths in excess of 40 feet at low tide. These clearances would not accommodate passage of AMHS ferries or taller cruise ships that currently use the East Channel as their primary navigational route. The West Channel bridge would be approximately 3,270 feet long and have a maximum height of approximately 250 feet. The bridge would have a vertical navigational clearance of 200 feet above high tide and a horizontal navigational clearance of approximately 550 feet (see Figure 2.14). The main span would be located over water with depths in excess of 40 feet at low tide. These clearances would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries.



Alternative F3 60-foot bridge over East Channel from south of USCG Station on Tongass Avenue, looking north



Alternative F3 bridges and Pennock Island from mid-Tongass Narrows near the airport, looking south

Alignment. The alignment of Alternative F3 is shown in Figure 2.11. On Revillagigedo Island, the East Channel bridge would connect to South Tongass Highway, approximately 1.5 miles south of downtown Ketchikan between the USCG Station and the Forest Park subdivision. The connection at South Tongass Highway would be the only access to this alternative alignment on

Revillagigedo Island; no neighborhood streets would be used for cut-through access. From this terminus, the bridge would cross the East Channel to Pennock Island. The roadway would cross Pennock Island at grade. From Pennock Island, the West Channel bridge would cross to Gravina Island, touching down approximately 2.7 miles south of the airport runway. The road would continue northward approximately **5.1** miles to the northern end of the Airport Reserve zone. A 1.2-mile airport access road would be constructed at the southern end of the airport runway. The airport access roadway would be constructed at a grade low enough to accommodate the planned future expansion of the runway, with the runway extended as an overpass of the road.

Channel Widening. In response to concerns expressed by cruise ship pilots, DOT&PF **has committed to** widening a portion of the West Channel under Alternative F3 to improve its navigational characteristics and mitigate adverse impacts to cruise ships transiting the West Channel. The channel widening would occur in the narrowest part of the West Channel (see Figures 2.15 and 2.16). Currently, the width of the navigable portion of West Channel (i.e., with respect to large cruise ships) is approximately 400 feet at its narrowest point with a minimum depth of 40 feet below low water. With the channel modifications, this portion of the West Channel would have a channel width of 750 feet: the center 550 feet would have a minimum depth of 40 feet below low water and both sides of the channel would have a minimum depth of 30 feet below low water. The deepest part of the channel would be centered on the navigational opening of the West Channel bridge.

The bridge would be located at the southern end of the widened channel, which would extend approximately 2,000 feet north of the bridge. South of the bridge crossing, and north of the channel improvement area, the existing channel is wider and deeper than the improved channel would be.

Cost. The estimated life-cycle cost of this alternative is approximately $170 million. The estimated average annual O&M cost is approximately $110,000 (see Appendix A).

2.1.3 Ferry Alternatives

The alignments of the three ferry alternatives are shown on Figures 2.17, 2.18, and 2.19. Each of the ferry alternatives would augment the existing airport ferry service, with the existing ferry service continuing to operate at its current location and under its current schedule. Each ferry alternative would include two new ferry vessels (similar to the most recently constructed airport ferry vessel), a new ferry terminal on Revillagigedo Island, and a new ferry terminal on Gravina Island (similar to the existing ferry terminals). The schedule of the new ferry service under each alternative would be similar to that of the existing ferry service: one vessel would operate during the winter (16 hours per day, crossing every 30 minutes), and both vessels would operate during the summer (also 16 hours per day, crossing every 15 minutes). The cost estimates assume that the ferries would have their engines replaced or significantly overhauled after 25 years and that the vessels would be replaced after 50 years.

2.1.3.1 Alternative G2: Ferry Between Peninsula Point and Lewis Point

Alternative G2 would be a new ferry service for vehicles and passengers between Peninsula Point on Revillagigedo Island and Lewis Point on Gravina Island, crossing Tongass Narrows approximately 2 miles north of the airport (see Figure 2.17).



Alternative G2 ferry from Gravina Island shoreline near the northern end of the airport runway, looking north

Facilities and Roadway. This alternative would require construction of a new ferry terminal on each side of Tongass Narrows and two new ferry vessels. A 4.3-mile road would be constructed on Gravina Island that would extend from the ferry terminal southward approximately 2.6 miles, wrap around the southern end of the airport runway, and then turn northward to the airport terminal. The road at the southern end of the runway would be constructed at a grade low enough to allow for planned future expansion of the runway, with the runway extended as an overpass of the road.

Cost. The estimated life-cycle cost of this alternative is approximately $90 million, and its estimated average annual O&M cost is approximately $4.98 million (see Appendix A).

2.1.3.2 Alternative G3: Ferry Between Downtown and South of Airport



Alternative G3 ferry from the north parking area adjacent to Plaza Port West, looking northwest toward Gravina Island

Alternative G3 would be new ferry service for vehicles and passengers between Ketchikan (near the Plaza Mall at Bar Point) on Revillagigedo Island and a location approximately 0.6 miles south of the airport runway on Gravina Island (see Figure 2.18).

Facilities and Roadway. This alternative would require construction of a new ferry terminal on each side of Tongass Narrows and two new ferry vessels. Dredging may be required to provide adequate navigational depths for the ferry terminal on Revillagigedo Island. The existing breakwater could also be widened and extended for use as the ferry terminal pier. A road would be constructed on Gravina Island from the ferry terminal northward approximately 3.0 miles to the northern end of the Airport Reserve zone. A 1.2-mile airport access road would be constructed around the southern end of the airport. The road at the southern end of the runway would be constructed at a grade low enough to allow for future planned expansion of the runway, with the runway extended as an overpass of the road.

Cost. The estimated life-cycle cost of this alternative is approximately $100 million, and its estimated average annual O&M cost is approximately $4.98 million (see Appendix A).

2.1.3.3 Alternative G4: Ferry Between New Terminals Adjacent to Existing Terminals

Alternative G4 would be new ferry service for vehicles and passengers adjacent to the existing airport ferry route, crossing Tongass Narrows 2.8 miles north of downtown (see Figure 2.19).

Facilities and Roadway. This alternative would require construction of a new ferry terminal on each side of Tongass Narrows, adjacent to the existing airport ferry terminals, and two new ferry vessels. A 3.2-mile road would be constructed on Gravina Island that extends southward from the airport ferry terminals; the roadway would wrap around the southern end of the airport runway, and then turn northward, extending parallel to and west of the airport runway approximately 2.2 miles to the northern end of the Airport Reserve zone. The road at the southern end of the runway would be constructed at a grade low enough to allow for future planned expansion of the runway, with the runway extended as an overpass of the road.

Cost. The estimated life-cycle cost of this alternative is approximately $90 million, and its estimated average annual O&M cost is approximately $4.97 million (see Appendix A).

2.1.4 DOT&PF's and FHWA's Preferred Alternative

Based on the analyses of alternatives presented in this EIS and public and agency input, the DOT&PF **and FHWA have identified their own agency preferred alternative [40 CFR 1502.14(e)]. Considering all factors, including beneficial and adverse impacts and the natural, social, and economic environments, DOT&PF and FHWA have determined Alternative F1 to be their Preferred Alternative. These factors are detailed as follows.**

- **Improved Access to Gravina Island**: Alternative F1 improves convenience and reliability of access to Ketchikan International Airport and developable and recreation lands on Gravina Island by providing a hard link between Revillagigedo Island and Gravina Island. The travel time between the airport and downtown Ketchikan using Alternative F1 would be approximately 14 minutes faster than the travel time using the existing airport ferry. Although the travel times for the existing ferry and Alternative F1 between the airport and areas north of downtown Ketchikan are essentially the same, Alternative F1 would provide unlimited access for travel between the islands 24 hours per day, whereas ferry access is limited to a 16-hour-per-day schedule with two to four transits per hour, depending on the season.

- **Economic Impacts**: Because Alternative F1 would allow the continued safe passage of large cruise ships northbound and southbound through Tongass Narrows and East Channel, there would be no reduction in cruise ship port calls in Ketchikan and, therefore, no reductions in cruise-related spending, which is a major component of Ketchikan's economy.

- **Navigational Requirements for Tongass Narrows**: Alternative F1 would allow the continued passage of large cruise ships northbound and southbound through Tongass Narrows and East Channel, and the continued separation of cruise ship traffic (East Channel) from the AMHS and other marine traffic (West Channel). Alternative F1 is preferable to the other alternatives from a navigation safety standpoint because it would not contribute to conflicts at the navigational choke point next to Ketchikan International Airport and Alaska Ship and Drydock (as would Alternatives C3(a), C3(b), C4, and D1) and it would not require additional ship maneuvers for cruise ships transiting West Channel (as would Alternative F3).

- **Aviation Impacts**: Alternative F1 would not penetrate any airspace surfaces associated with Ketchikan International Airport. Alternative F1 would not hinder any future growth or improvements to the Ketchikan International Airport. Floatplane facilities at Ketchikan International Airport and waterways designated for floatplane take-offs and landings in Tongass Narrows would not be affected by Alternative F1.

- **Consistency with the Borough's Long-Term Plans for Gravina Island**: Alternative F1 would be consistent with the Borough's plans for long-term development on Gravina Island. Projections for development on Gravina Island are highest for Alternatives F1 and F3. Alternative F1 would promote development of Gravina Island, as well as Pennock Island, thereby enhancing economic development in the Borough.

- **Access to Borough Land on Pennock Island**: Alternative F1 provides the additional benefit of access to Pennock Island, which contains a substantial amount of the Ketchikan Gateway Borough's land base.

- **Marine Habitat Impacts**: Pier placement for Alternative F1 would potentially affect kelp and/or eelgrass beds at one pier location in West Channel; however, there would be no requirements for channel modification. Alternative F1 would have the least impact of all of the alternatives on Essential Fish Habitat (EFH).

All reasonable alternatives under consideration (including the No Action Alternative) have been developed to a comparable level of detail in the EIS, and their comparative merits have been evaluated. The final selection of an alternative will not be made until **after circulation of the Final EIS and consideration of the comments received**.

2.2 COMPARISON OF IMPACTS AMONG ALTERNATIVES[4]

This section summarizes and compares the key beneficial and adverse impacts of the No Action and action alternatives for the Gravina Access Project. Numerous issues were identified by the public and responsible agencies during scoping and during review of the Draft EIS (see Chapter 7). The primary concerns that have been voiced about the Gravina Access Project are:

- **Cost of construction**
- **Impacts to cruise ship schedules and visits, and potential negative economic effects on the community due to shortened or reduced numbers of port calls**
- **Changes to aviation patterns and uses, particularly for floatplanes**
- **Impacts to wetlands and other natural resources on Gravina Island**
- **Impacts of construction in Tongass Narrows, and in creeks and streams on Gravina Island**

[4] This section is not required by the FHWA (see FHWA Technical Advisory 6640.8A, *Guidance For Preparing and Processing Environmental and Section 4(F) Documents*), but has been included at the request of one of the project's cooperating agencies, the U.S. Army Corps of Engineers.

These types of adverse impacts must be weighed against the project's projected beneficial impacts, particularly those related to meeting the need for improved access. The project's Purpose and Need (Section 1.3) states that the project is needed:

- **To provide the Ketchikan Gateway Borough and its residents more reliable, efficient, convenient, and cost-effective access for vehicles, bicycles, and pedestrians to Borough lands and other developable or recreation lands on Gravina Island in support of the Borough's adopted land use plans.**
- **To improve the convenience and reliability of access to Ketchikan International Airport for passengers, airport tenants, emergency personnel and equipment, and shipment of freight.**
- **To promote environmentally sound, planned, long-term economic development on Gravina Island.**

Analysis of these and other positive and adverse impacts resulted in the selection of Alternative F1 as DOT&PF and FHWA's Preferred Alternative.

To provide a clear comparison of the No Action and build alternatives, Table 2-2 summarizes the impact information contained in Chapter 4 for the concerns and benefits noted above. The information contained in this table also draws on the purpose and need discussion from Chapter 1. Note that Table 2-2 compares the available quantitative data regarding each of these impacts and the purpose and need issues.

TABLE 2-2
SUMMARY OF IMPACTS

IMPACT CATEGORIES	GRAVINA ACCESS PROJECT ALTERNATIVES									
		BRIDGE ALTERNATIVES						FERRY ALTERNATIVES		
	No Action	C3(a)	C3(b)	C4	D1	F1	F3	G2	G3	G4
Cost Factors										
Construction and Project Development ($ million)[1]	0	200	170	195	135	230	205	60	70	60
Life-Cycle ($ million)[1]	10	160	135	160	105	190	170	90	100	90
Purpose and Need Factors										
Efficiency & Convenience of Access										
Vehicular travel time (in minutes) to airport from:										
-Downtown Ketchikan	27	14	12	11	11	13	13	42[2]	35[2]	25[2]
-Carlanna Creek	19	6	4	3	3	21	21	34[2]	34[2]	17[2]
-Ward Cove	25	8	6	9	7	27	27	34[2]	40[2]	23[3]
Vehicular travel time (in minutes) to developable land from:										
-Downtown Ketchikan	NA[3]	17	17	15	14	7	7	34[2]	29[2]	29[2]
-Carlanna Creek	NA[3]	9	9	7	6	15	15	26[2]	28[2]	21[2]
-Ward Cove	NA[3]	11	11	13	10	21	21	26[2]	34[2]	27[2]
Economic Development										
Projected development on Gravina Island (in acres):										
-Residential	15	287	287	287	287	383	383	50	50	50
-Industrial/commercial	5	22	22	22	22	22	22	22	22	22
Projected development on Pennock Island (in acres):										
-Residential	0	0	0	0	0	75	75	0	0	0
-Industrial/commercial	0	0	0	0	0	1	1	0	0	0
Social and Economic Impacts										
-Reductions in cruise-related spending ($ million)	0	0	2.2	0	2.2	0	0	0	0	0
-User economic benefits ($ million)[4]	0	55.2	62.3	64.2	70.0	27.1	22.6	-0.2	-0.2	2.0
Transportation Impacts										
Number of floatplane flights per year potentially eliminated (assuming 2,000 SVFR operations annually)	0	1,800	1,800	1,800	1,800	200[5]	100[5]	0	0	0
Percentage of large ships diverted from Ketchikan	0	0	2	0	2	0	0	0	0	0

IMPACT CATEGORIES	GRAVINA ACCESS PROJECT ALTERNATIVES									
		BRIDGE ALTERNATIVES						FERRY ALTERNATIVES		
	No Action	C3(a)	C3(b)	C4	D1	F1	F3	G2	G3	G4
Natural Resources Impacts										
Wetland vegetation removal for construction (acres)	0.0	15.1	14.8	14.0	13.4	35.8	30.1	15.5	18.9	13.2
Temporary fill in wetlands (acres)	0.0	3.4	1.7	0.7	0.0	11.3	11.6	0.0	0.0	0.0
Temporary fill in wetlands (cy)	0.0	16,500	8,300	3,400	0.0	54,700	56,200	0.0	0.0	0.0
Permanent wetland habitat losses (acres):										
Forested	*0.0*	*15.6*	*14.2*	*10.6*	*8.0*	*23.6*	*13.0*	*14.2*	*10.0*	*7.7*
Shrub/Scrub	*0.0*	*3.1*	*3.0*	*3.1*	*3.0*	*12.9*	*14.4*	*2.9*	*6.5*	*2.9*
Muskegs	*0.0*	*25.3*	*25.1*	*25.1*	*25.1*	*60.0*	*57.7*	*25.3*	*29.4*	*24.8*
Intertidal marshes/meadows	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.1*	*1.7*	*0.0*
TOTAL	0.0	44.0	42.3	38.8	36.1	96.5	85.1	42.5	47.6	35.4
Amount of permanent fill in wetlands (cubic yards)	0.0	213,000	250,000	189,900	176,000	500,000	412,000	206,000	230,000	171,000
Number of water body crossings	0	8	8	8	8	14	14	8	10	8
Number of anadromous fish streams crossed	0	2	2	2	2	5	5	2	3	2
Essential Fish Habitat losses (acres)	0.0	6.3	7.1	6.9	4.3	0.2	16.2[2]	0.7	3.8	1.6
Uplands impacts (acres)	0.0	5.1	9.1	10.4	8.6	10.7	4.8	7.6	7.0	4.7
Number of Piers in Tongass Narrows	0	5	7	5	6	6	6	0	0	0
Amount of material to be dredged from Tongass Narrows (cubic yards)	0.0	0.0	0.0	0.0	0.0	0.0	184,000	1,400	15,200	18,600
Amount of fill in Tongass Narrows (cubic yards)	0.0	280,000	140,000	280,000	295,000	0.0	0.0	0.0	0.0	0.0
Relationship to Select Federal Laws										
Section 10/404 of the Clean Water Act – permit required (y/n)?	n	y	y	y	y	y	y	y	y	y
Section 9 of the Rivers and Harbors Act - USCG bridge permit required (y/n)?	n	y	y	y	y	y	y	n	n	n
Section 103 of the Marine Protection, Research and Sanctuaries Act – permit required (y/n)?	n	n	n	n	n	n	y	y	y	y

IMPACT CATEGORIES	GRAVINA ACCESS PROJECT ALTERNATIVES									
		BRIDGE ALTERNATIVES						FERRY ALTERNATIVES		
	No Action	C3(a)	C3(b)	C4	D1	F1	F3	G2	G3	G4

[1] Rounded to nearest $5 million due to the variable and preliminary nature of engineering. Project development costs include mobilization costs, contingency costs, mitigation costs, design engineering costs, construction management costs, and right-of-way acquisition costs.

[2] Values provided represent travel times using new ferry facility only. Travel time for the existing airport ferry would be the same as for the No Action Alternative.

[3] Not applicable – the No Action Alternative does not include access to developable land.

[4] See Section 4.26.3.8, Table 4-33, for more details. Benefits are calculated for access costs only, based on the traffic projections discussed in Section 4.26.4.3, and compared to the No Action Alternative.

[5] The Federal Aviation Administration's preliminary analysis of Alternative F3 indicated that although the alternative appears to be outside the Exemption No. 4760 boundaries, some modification of the boundaries may be required. The analysis also indicated that a Pennock Island crossing would be "less disruptive" to floatplane operations than the other bridge alternatives. For purposes of this analysis, HDR assumed 10 percent and 5 percent reductions in special visual flight rules operations for Alternatives F1 and F3, respectively.

As can be seen in Table 2-2, there are similarities across several alternatives, based on their locations. The bridge alternatives that cross Pennock Island (Alternatives F1 and F3) affect relatively few floatplane operations when compared with the other bridge alternatives (which are all near Ketchikan International Airport and its floatplane dock). Because of their longer road lengths, however, Alternatives F1 and F3 have higher construction costs and greater wetland impacts. The longer road lengths associated with Alternatives F1 and F3, and the inclusion of Pennock Island, result in a greater potential for economic growth and recreational development by providing more access to Borough and other lands—which is a primary goal of the project. The ferry alternatives have the lowest cost and have relatively fewer impacts, but they also have fewer benefits. The ferry alternatives do not achieve the purpose and need objectives of the project to the same level as the bridge alternatives.

As a supplement to the impacts comparison table, the following sections provide more detail concerning the key issues associated with each alternative. Measures to mitigate adverse impacts are discussed throughout Chapter 4 and compiled into a complete list at the end of Chapter 4.

2.2.1 No Action Alternative

Under the No Action Alternative, service to Gravina Island would continue at the current schedule and hours of operation. Under this alternative, no bridge would be constructed, and no additional ferry service would be provided between Revillagigedo Island and Gravina Island. The only public access between the islands would continue to be provided by the existing airport ferry service across Tongass Narrows, private boats and water taxis, and floatplanes.

The No Action Alternative would not affect airport property, existing airport or floatplane facilities, or Part 77 airspace in the vicinity of Ketchikan International Airport. Existing problems associated with access, convenience and reliability for passengers, airport tenants, emergency personnel and equipment, and shipment of freight, would continue (Section 4.7.1.1). Also, the No Action Alternative would have no impact on cruise ship operations, on the Ketchikan docking and berthing areas and facilities used by the cruise ships, or on those used by the AMHS ferries. There would be no traffic improvements that would change vehicular access to Ketchikan International Airport. However, the use of trails would continue to provide access to other Borough and developable lands on Gravina Island. No wetlands or EFH would be lost to the construction of new facilities. Development would continue at the existing rate, with approximately 20 acres developed on Gravina Island by 2025.

2.2.2 Bridge Alternatives near Ketchikan International Airport

2.2.2.1 Alternative C3(a)

Alternative C3(a) is estimated to have a $200 million construction and project development cost and a $160 million life-cycle cost. Project development costs include mobilization costs, contingency costs, mitigation costs, design engineering costs, construction management costs, and right-of-way acquisition costs. The bridge associated with this alternative intrudes into the Part 77 airspace for Ketchikan International Airport and is projected to reduce floatplane operations under special

visual flight rules (SVFR) by approximately 1,800 flights (90 percent) per year (see Section 4.7.1.2). Cruise ship passage would continue unhindered (see Section 4.7.2.2). Wetland habitat loss is estimated as 44 acres (Table 4-12); 6.3 acres of EFH are expected to be lost (Table 4-14). Development on Gravina Island is projected to be about 300 acres by 2025, i.e., the same level of development as the other bridge alternatives near the airport, but greater than the ferry alternatives and less than the Pennock Island bridge alternatives (see Section 4.26.1).

2.2.2.2 Alternative C3(b)

Alternative C3(b) is estimated to have a $170 million construction and project development cost and a $135 million life-cycle cost. The bridge associated with this alternative intrudes into the Part 77 airspace for Ketchikan International Airport and is projected to reduce SVFR floatplane operations by approximately 1,800 flights (90 percent) per year (see Section 4.7.1.2). The Alternative C3(b) bridge would impede the passage of cruise ships, requiring them to approach and depart the cruise ship docks from the south end of Tongass Narrows (see Section 4.7.2.2). This rerouting is projected to result in a reduction in port calls by cruise ships, which, in turn, would result in a decrease in tourism-related expenditures in the Borough (see Section 4.26.3.4). Wetland habitat loss is estimated as 42.3 acres (Table 4-12); 7.1 acres of EFH are expected to be lost (Table 4-14). Development on Gravina Island is projected to be about 300 acres by 2025, i.e., the same level of development as the other bridge alternatives near the airport, but greater than the ferry alternatives and less than the Pennock Island bridge alternatives (see Section 4.26.1).

2.2.2.3 Alternative C4

Alternative C4 is estimated to have a $195 million construction and project development cost and a $160 million life-cycle cost. The bridge associated with this alternative intrudes into the Part 77 airspace for Ketchikan International Airport and is projected to reduce SVFR floatplane operations by approximately 1,800 flights (90 percent) per year (see Section 4.7.1.2). Cruise ship passage would continue unhindered (see Section 4.7.2.2). Wetland habitat loss is estimated as 38.9 acres (Table 4-12); 6.9 acres of EFH are expected to be lost (Table 4-14). Development on Gravina Island is projected to be about 300 acres by 2025, i.e., the same level of development as the other bridge alternatives near the airport, but greater than the ferry alternatives and less than the Pennock Island bridge alternatives (see Section 4.26.1).

2.2.2.4 Alternative D1

Alternative D1 is estimated to have a $135 million construction and project development cost and a $105 million life-cycle cost, which is the lowest cost of the bridge alternatives. The bridge associated with this alternative intrudes into the Part 77 airspace for Ketchikan International Airport and is projected to reduce SVFR floatplane operations by approximately 1,800 flights (90 percent) per year (see Section 4.7.1.2). The Alternative D1 bridge would impede the passage of cruise ships, requiring them to approach and depart the cruise ship docks from the south end of Tongass Narrows (see Section 4.7.2.3). This rerouting is projected to result in a reduction in the number of port calls by cruise ships, which, in turn, would result in a decrease in tourism-related expenditures in the Borough (see Section 4.26.3.4). Wetland habitat loss is estimated as 36.2 acres (Table 4-12); 4.3 acres of EFH are expected to be lost (Table 4-14). Development on Gravina Island is

projected to be about 300 acres by 2025; i.e., the same level of development as other bridge alternatives near the airport, but greater than the ferry alternatives and less than the Pennock Island bridge alternatives (see Section 4.26.1).

2.2.3 Bridge Alternatives that Cross Pennock Island

2.2.3.1 Alternative F1 (DOT&PF and FHWA preferred)

Alternative F1 is estimated to have a $230 million construction and project development cost and a $190 million life-cycle cost, which is the highest costs of the project alternatives. The bridges would not affect the Part 77 airspace associated with Ketchikan International Airport and is projected to reduce SVFR floatplane operations by approximately 200 flights per year (see Section 4.7.1.3). Cruise ships would continue to access Ketchikan via East Channel and navigate through Tongass Narrows unimpeded (see Section 4.7.2.4). With longer roads, this alternative would have greater wetland impacts (96.5 acres; 0.2 acres of EFH) than the bridge alternatives closer to the airport and the ferry alternatives (see Section 4.14). However, the greater length of road associated with this alternative would provide access to more developable land and recreation lands on Gravina Island than the bridge alternatives closer to the airport, as well as to developable and recreation lands on Pennock Island. Development on Gravina Island with this alternative is projected to be about 500 acres by 2025 (see Section 4.26.1).

2.2.3.2 Alternative F3

Alternative F3 is estimated to have a $205 million construction and project development cost and a $170 million life-cycle cost. This alternative would not affect the Part 77 airspace associated with Ketchikan International Airport and is projected to reduce SVFR floatplane operations by approximately 100 flights per year (see Section 4.7.1.3). Cruise ships would be impeded from transiting East Channel, and would therefore have to approach and depart the cruise ship dock using north Tongass Narrows or through the West Channel of Tongass Narrows to the south. However, marine pilots and others have expressed concern over navigational hazards associated with transiting West Channel, particularly with a bridge across the channel (see Section 4.7.2.5).

Because the West Channel would be widened if Alternative F3 were selected (see Section 2.1.2.6), no reduction in cruise ship stops is anticipated. However, channel widening would mean much greater in-water habitat impact (16.2 acres of EFH) than other alternatives (see Section 4.15.4.4). Also, with longer roads, this alternative would have greater wetland impacts (85.1 acres) than the bridge alternatives closer to the airport or the ferry alternatives (see Section 4.14). The greater length of road associated with this alternative would provide access to more developable land and recreation lands on Gravina Island, as well as to developable and recreation land on Pennock Island. Development on Gravina Island is projected to be about 500 acres by 2025 (see Section 4.26.1).

2.2.4 Ferry Alternatives

Alternatives G2, G3, and G4 would have lower construction and project development costs ($60 to $70 million) and lower life-cycle costs ($90 to $100 million) than the bridge alternatives, and no impacts to aviation or marine navigation, though they would

increase the amount of cross-channel traffic. These alternatives would not, however, provide the convenience and reliability of access to the airport and other lands on Gravina Island as well as the bridge alternatives would. Wetland habitat loss with these alternatives is estimated as 42.5, 47.5, and 35.3 acres, respectively (Table 4-12); 0.7, 3.8, and 1.6 acres of EFH, respectively, are expected to be lost (Table 4-14). Projected development on Gravina Island, at approximately 70 acres by 2025, is about three times the amount of development projected under the No Action Alternative, but less than one-fourth of what any of the bridge alternatives would provide.

2.3 ALTERNATIVES PREVIOUSLY CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

This section describes options for crossing Tongass Narrows that were originally considered as possible alternatives for the Gravina Access Project. These options were eliminated from further consideration based on cost and/or environmental factors. The costs for these preliminary options were developed in the late winter and early spring of 2000 and were based on preliminary engineering information (see Appendix A, page 2). These costs cannot be directly compared with the costs of the reasonable alternatives described in Section 2.1, which are based on additional engineering and environmental studies completed since the spring of 2000.

2.3.1 Bridge Options

The following paragraphs describe six bridge options that were initially developed for the Gravina Access Project, but were determined to be not reasonable and eliminated from further consideration based on cost factors. All of these bridge options assumed that the existing airport ferry service would be discontinued. Vertical and horizontal clearances indicate the dimensions of the primary navigational opening for each bridge, which would constrain the size of ships that could pass under the bridge.

2.3.1.1 Option A—High-Level Bridge from Refuge Cove Area

This bridge would start at Mile 8.5 of Tongass Avenue near Refuge Cove and touch down on Gravina Island 2.7 miles north of the airport. The bridge would be about 1.5 miles long, have a vertical clearance of 210 feet and a horizontal clearance of 750 feet, and connect to a roadway to the airport. This alternative was determined to be not reasonable based on its life-cycle cost, which was estimated to be approximately $260 million.

2.3.1.2 Option B—High-Level Bridge from Peninsula Point Area

This bridge would start at Mile 5.5 of Tongass Avenue near Murphy's Landing and touch down on Gravina Island north of the Seley Corporation timber processing plant (Pacific Log and Lumber). The bridge would be about 1.4 miles long, have a vertical clearance of 210 feet and a horizontal clearance of 750 feet, and connect to a roadway to the airport. This alternative was determined to be not reasonable based on its life-cycle cost, which was estimated to be approximately $370 million.

2.3.1.3 Option C1—High-Level Bridge to Airport Area North

This bridge would start at Tongass Avenue north of the existing airport ferry terminal, rise along the hillside behind the quarry, turn westward, cross over Tongass Avenue and Tongass

Narrows, and then turn northward just east of the airport to parallel the airport runway as it descends on Gravina Island. The bridge would be about 1.7 miles long, and have a vertical clearance of 210 feet and a horizontal clearance of 750 feet. The road would terminate north of the airport at the boundary between the Airport Reserve zone (the area immediately surrounding Ketchikan International Airport) and the Airport Development zone (the area around the Airport Reserve zone), and would include an exit to the airport terminal. This alternative was determined to be not reasonable based on its life-cycle cost, which was estimated to be approximately $235 million.

2.3.1.4 Option C2—High-Level Bridge to Airport Area South

This bridge would start at Tongass Avenue south of the existing airport ferry terminal, rise northward along the hillside behind the quarry, turn westward, cross Tongass Avenue and Tongass Narrows, and then turn southward just east of the airport to parallel the runway as it descends on Gravina Island. The bridge would be about 1.5 miles long, with a vertical clearance of 210 feet and a horizontal clearance of 750 feet. The road would terminate south of the airport, at the boundary between the Airport Reserve zone and the Airport Development zone, and would include an exit to the airport terminal. This alternative was determined to be not reasonable based on its life-cycle cost, which was estimated to be approximately $200 million (see Section 2.4.6 for the discussion regarding the increased cost ceiling).

2.3.1.5 Option D2—Low-Level Moveable Bridge to Airport Area

This bridge would start at Tongass Avenue near the existing airport ferry terminal, rise along the hillside behind the quarry, turn westward, cross over Tongass Avenue and Tongass Narrows, and then turn northward just east of the airport to parallel the airport runway as it descends on Gravina Island. The bridge would incorporate a lift span over the main channel, would be about 0.5 mile long, and would have a horizontal clearance of 750 feet. Its vertical clearance would be 120 feet in the closed position and 210 feet in the open position. The roadway would terminate at the boundary between the Airport Reserve zone and the Airport Development zone north of the airport, and would include an exit to the airport terminal. This alternative was determined to be not reasonable based on its life-cycle cost, which was estimated to be approximately $245 million.

2.3.1.6 Option F1 Cable-Stayed—High-Level, Cable-Stayed East Channel Bridge and Low-Level West Channel Bridge via Pennock Island

Under this option, the roadway would start at Tongass Avenue just north of the cemetery, rise along the hillside behind the cemetery and the USCG Station, turn westward, and cross over Tongass Avenue and the East Channel to Pennock Island. The roadway would cross Pennock Island at grade. A second bridge would then extend over the West Channel to Gravina Island. The roadway would extend northward to the airport, parallel the runway to the east of the runway, and terminate at the airport terminal. The East Channel bridge would be a high-level, cable-stayed bridge about 0.8 mile long, with a vertical clearance of 210 feet and a horizontal clearance of 750 feet. The West Channel bridge would be about 0.4 mile long, with a vertical clearance of 120 feet and a horizontal clearance of 525 feet. This alternative was determined to be not reasonable based on its life-cycle cost, which was estimated to be approximately $205 million (see Section 2.4.6 for the discussion regarding the increased cost ceiling). In addition, DOT&PF determined that the cable-stayed design is not reasonable because it would present extreme adverse risk to float plane operations in the vicinity of East Channel.

2.3.2 Tunnel Options

The following paragraphs describe the two tunnel options that were initially developed for the Gravina Access Project but were determined to be not reasonable and eliminated from further consideration based on cost factors. Both of these options assumed that the existing airport ferry service would be discontinued.

2.3.2.1 Option E—Tunnel from Jefferson Street

This option would start above ground at Tongass Avenue and Jefferson Street next to the Plaza Mall, descend below the water surface, cross Tongass Narrows via a sunken tube tunnel, resurface 0.8 mile south of the airport on Gravina Island, turn northward and parallel the airport runway on the east, and terminate at the airport terminal. The tunnel would include a pedestrian walkway and special monitoring and other safety features. The tunnel length would be about 1.3 miles; the ship channel above the tunnel would be 750 feet wide, and would provide a minimum draft of 40 feet. An airport access road would be constructed on Gravina Island from the airport terminal around the southern end of the runway, and connecting to the road north. It would be constructed at a grade low enough to allow for future planned expansion of the runway, with the runway extended as an overpass of the road. A road would be constructed from the airport terminal northward to the northern end of the Airport Reserve Zone. This alternative was determined not to be reasonable based on its life-cycle cost, which was estimated to be approximately $310 million.

After publication of the Draft EIS, DOT&PF reexamined Option E for a variation that would go underwater near the existing ferry terminal on Revillagigedo Island and resurface near the northern end of the airport runway. This variation examined the possibilities of reducing cost by using sheetpile walls and substantial fill embankments to extend the road approaches into Tongass Narrows and shorten the length of submerged precast tube tunnel to 0.5 miles. It was concluded that this variation would risk flooding of the portals, raise concerns about the ability of the portal structures to withstand a ship allision, and hinder navigation. Besides a narrower navigation channel (less than 500 feet), the navigation track line would be altered, and the constricted channel would substantially increase tidal velocity. Although the life-cycle cost of $290 million would likely be lower than the original Option E, the savings would be small. This variation was determined to be not reasonable based primarily on high life-cycle cost (initial capital cost and annual operations and maintenance expenses) and, secondarily, on the risks noted above.

2.3.2.2 Option E2—Tunnel to Airport Area North

This option would start above ground at Tongass Avenue north of the quarry, enter the hillside in a bored tunnel, curve under Tongass Avenue, and cross under Tongass Narrows via a sunken tube tunnel, curve northward, and resurface next to the runway north of the airport terminal on Gravina Island. The tunnel would include a pedestrian walkway and special monitoring and other safety features. The tunnel length would be about 0.86 mile, including a bored length of 0.45 mile. The ship channel above the tunnel would be 750 feet wide, and would provide a minimum draft of 40 feet. The roadway would terminate at the boundary between the Airport Reserve zone and the Airport Development zone north of the airport, and would include an exit (loop road) to the airport terminal. This alternative was determined to be not reasonable based on its life-cycle cost, which was estimated to be approximately $400 million.

2.3.3 Tunnel-and-Bridge Option

The following paragraph describes a tunnel-and-bridge option that was initially developed for the Gravina Access Project, but was determined to be not reasonable and eliminated from further consideration in the screening process based on cost factors. This option assumed that the existing airport ferry service would be discontinued. Vertical and horizontal clearances indicate the dimensions of the primary navigational opening for the bridge.

Option F2—Tunnel under East Channel and Low-Level West Channel Bridge via Pennock Island. This option would start at Tongass Avenue just south of the USCG Station, descend in an arc through the hillside east of Tongass Narrows, loop around to the west, and cross under the East Channel in a sunken tube. The alignment would resurface on Pennock Island, cross Pennock Island at grade, then cross West Channel with a low-level bridge to Gravina Island. The roadway would extend northward and terminate at the airport terminal. The tunnel would include a pedestrian walkway and special monitoring and other safety features. The tunnel length would be about 1.8 miles; the ship channel above the tunnel would be 750 feet wide, and would provide a minimum draft of 40 feet. The bridge would be about 0.4 mile long, with a vertical clearance of 120 feet and a horizontal clearance of 525 feet. This alternative was determined to be not reasonable based on its life-cycle cost, which was estimated to be approximately $595 million.

2.3.4 Ferry Option

The following paragraph describes a ferry option that was initially developed for the Gravina Access Project. This option assumed that the existing airport ferry service would continue to operate at its current location and under its current schedule.

Option G1—Ferry from Refuge Cove. This option would provide ferry service between Mile 8.5 of Tongass Avenue near Refuge Cove on Revillagigedo Island and about 2.8 miles north of the airport on Gravina Island. It would include two new ferry vessels, a new ferry terminal on Revillagigedo Island, and a new ferry terminal on Gravina Island. The schedule of the new ferry service would be similar to that of the existing ferry service: one vessel would operate during the winter (16 hours per day, crossing every 30 minutes), and both vessels would operate during the summer (also 16 hours per day, crossing every 15 minutes). This alternative was determined to be not reasonable based on land use constraints, potential environmental impacts, and its inability to address the need for improved access to the airport (see Section 2.3.1).

In addition to Option G1, DOT&PF considered stepwise development: a phased alternative that included the construction of a ferry option followed by—at some later date—the construction of a bridge option. Construction of any ferry option would require a substantial commitment of funds for both capital and ongoing O&M costs. The later construction of a bridge option would be effectively precluded by construction of a ferry option because of the overall magnitude of the cost of such an approach. This option is not reasonable and has not been further evaluated.

2.4 DETERMINATION OF REASONABLE ALTERNATIVES: A BRIEF HISTORY

According to the Council on Environmental Quality, the project alternatives considered reasonable under NEPA are those alternatives that are *practical or feasible from a technical and*

economic standpoint and using common sense.[5] The identification of the reasonable alternatives for the Gravina Access Project began with a screening process, developed in conjunction with state and federal resource agencies. The screening process resulted in a preliminary list of reasonable alternatives for the project. Additional technical studies and community and agency input resulted in the identification of other alternatives that were considered reasonable for the project.

2.4.1 Screening Process

During the summer and fall of 2000, the project team[6], with input from local, state, and federal agencies (including the broadly based Project Development Team [PDT]), established and conducted a screening process to evaluate the 18 initial build options (see Figure 2.1) for reasonableness. (The No Action option was to be carried forward as a project alternative in accordance with NEPA, regardless of its outcome in the screening process.) The screening process examined each option and evaluated it in terms of four categories of factors:

- Consistency with the purpose of and need for the project (as stated in Chapter 1)
- Potential environmental effects
- Potential transportation-related effects
- Estimated costs

The factors in each of these categories are listed in Table 2-3.

TABLE 2-3
FACTORS FOR SCREENING OF OPTIONS

Cost	*Purpose and Need*	*Environmental*	*Transportation*
Total project costs	Reliability of access (hours of operation, vehicle restrictions, closures)	Impacts on natural resources (subtidal habitat, anadromous streams, essential fish habitat, eelgrass beds, estuaries, wetlands) from project construction	Impacts on vehicular traffic during project construction and operation
Annual O&M costs	Efficiency and convenience of access to Gravina Island lands (travel time to developable land)	Impacts on natural resources from project operation	Impacts on marine navigation during project construction
Life-cycle costs	Convenience (travel distance)	Right-of-way within a Section 4(f) property	Impacts on marine navigation during project operation
	Convenience to airport (travel time)	Impacts on land use	Impacts on aviation during project construction
		Aesthetic impacts	Impacts on aviation during project operation
		Impacts on subsistence	

The project team used these categories of factors to quantitatively represent each option, based on the best available information, including the many extensive technical studies conducted for

[5] **Title 49 of the Code of Federal Regulations, administered by the Transportation Security Administration of the Department of Homeland Security; Subchapter C Civil Aviation Security, Part 1542 Airport Security.**

[6] **The Project Team consists of the DOT&PF, FHWA, and consultant team.**

the Gravina Access Project. The objective was to screen out those options that were not reasonable alternatives.

An important screening factor in this evaluation was cost. Based on a 50-year project life, the DOT&PF determined the original practical limit of project funding to be a life-cycle cost of $150,000,000.[7] The early cost estimates developed for the 18 initial build options are provided in Table 2-4[8].

TABLE 2-4
EARLY COST ESTIMATES FOR 18 INITIAL BUILD OPTIONS

Alternative	*Life-cycle Cost ($million)*
A	260
B	370
C1	235
C2	200
C3	140
C4	150
D1	85
D2	245
E	310
E2	400
F1	200
F1 Cable-Stayed	205
F2	595
F3	180
G1	155
G2	150
G3	130
G4	130

Eleven options were considered by DOT&PF to be not reasonable because they had life-cycle costs substantially beyond $150,000,000. The options screened out from the pool of potential reasonable alternatives based on this cost ceiling were:

- Four high-level bridges (Options A, B, C1, and C2)
- The moveable bridge (Option D2)
- The tunnels (Options E and E2)

[7] Joseph Perkins, P.E., DOT&PF Commissioner, August 29, 2000, concurrence on memorandum from Patrick Kemp, P.E., Preconstruction Engineer, DOT&PF Southeast Region, August 29, 2000. See Section 2.4.6 for revised cost ceiling.

[8] Note that in the DEIS, life-cycle costs were characterized as 50-year life cycle costs, but in reality, are 20-year life-cycle costs.

- The four alignments across Pennock Island (Options F1, F1 cable-stayed, F2, and F3)

Closer review of the seven remaining project options (i.e., Options C3, C4, D1, G1, G2, G3, and G4), using the environmental and transportation factors, revealed that Option G1 would not be practical or feasible from a technical standpoint. The Option G1 ferry terminal on Revillagigedo Island would be near Refuge Cove, which would require the taking of several homes and a Section 4(f) property (Refuge Cove State Park).[9] The DOT&PF investigated relocating the ferry terminal to avoid Refuge Cove State Park; however, a more acceptable location could not be identified because of land use constraints (residential, commercial, and industrial developments to the north and south), environmental constraints (reef and island areas off the Revillagigedo Island shoreline), or the impracticalities associated with increasing the over-water ferry travel time (i.e., by locating the terminal in Ward Cove). Because of the difficulties with the Option G1 ferry terminal location on Revillagigedo Island and because this option would not improve the travel time to the airport for any user, Option G1 was determined to be not a reasonable alternative and was not recommended for further study.

Following the elimination of Options A, B, C1, C2, D2, E1, E2, F1, F1 cable-stayed, F2, and F3 because they exceeded the cost ceiling, and the elimination of Option G1 because of its impacts to a Section 4(f) property, no other options were determined to be unreasonable in the screening process. Therefore, the DOT&PF recommended the following as reasonable alternatives for the Gravina Access Project: C3, C4, D1, G2, G3, G4, and No Action.

2.4.2 Local and Tribal Government and Community Input

Concurrent with the DOT&PF's screening process during the fall of 2000, the Borough and the cities of Ketchikan and Saxman were engaged in discussions pertaining to the identification of reasonable alternatives for the Gravina Access Project. The Borough's Department of Planning and Community Development (Planning Department) provided an independent evaluation of the alternatives based on the DOT&PF screening process, and based on the Planning Department's knowledge of local planning issues and constraints. The purpose of this effort was to assist the Borough Assembly and the city councils of Ketchikan and Saxman in making a recommendation (or independent recommendations) to the DOT&PF for the reasonable alternatives that should be studied further in the EIS. See also Chapter 7 regarding government to government coordination with tribal governments, and public involvement generally throughout the project.

The Planning Department's evaluation concluded that, in addition to No Action, the following options deserved further study: C3, C4, D1, a "revised" G4[10], and F3[11]. The Planning

[9] *Section 4(f) of the U.S. Department of Transportation Act of 1966 states:* The Administration may not approve the use of land from a significant publicly owned public park, recreation area or wildlife and waterfowl refuge, or any significant historic site unless a determination is made that: (1) there is no feasible and prudent alternative to the use of land from the property and (2) the action includes all possible planning to minimize harm to the property resulting from such use.

[10] Under this option, the community would expand and improve the existing ferry route as demand and availability of local financial resources made it appropriate. Improvements could include certain services such as baggage handling, improved terminal facilities and vessels, and expanded frequency of service.

[11] Stephen Reeve, Principal Planner, and John Hill, Associate Planner, Ketchikan Gateway Borough Planning Department, memorandum to Members of the Planning Commission, September 6, 2000.

Department included Option F3, even though its estimated life-cycle costs exceeded the DOT&PF's $150 million cost ceiling, because of its potential advantages:

- It would provide access to substantial amount of Borough and private lands on Gravina Island south of the airport and on Pennock Island;
- It would place bridge structures in locations that would have less of an impact on float plane and airport operations than other bridge options;
- It would enable large vessels to continue to traverse Tongass Narrows (via West Channel); and
- It would have less of an impact on the availability of developable lands adjacent to the airport than other bridge options.

[Note that Option F3 did not include modification of West Channel to improve navigational safety.]

The Planning Commission held two public work sessions in its effort to reach a recommendation to the Borough Assembly. Based on the Planning Department's evaluation, the testimonies of many individual citizens, and the contributions of the DOT&PF, the Planning Commission issued Resolution No. 2631, which recommended the following options for the Gravina Access Project: C3, C4, a "revised" G4, and No Action.[12] The Planning Commission chose not to recommend advancing Option F3 because of the possible impacts it might have on vehicular traffic through downtown Ketchikan and the resultant inconvenience of access to many Ketchikan residents. The Commission also considered the likely impacts Option F3 would cause the Pennock Island neighborhood, which has voiced opposition to roaded access.[13]

Members of the Borough Assembly, Ketchikan City Council, and Saxman City Council met at a joint work session on October 17, 2000, to discuss the Gravina Access Project options with Borough staff and representatives from the DOT&PF. The joint work session was an opportunity for these and other members of the public to participate in the local review process and provide input to the recommendations being developed by the three local governing bodies.

On November 6, 2000, the Ketchikan Gateway Borough Assembly passed Resolution No. 1578 supporting further investigation of the following options: C3, C4, D1, F3, and G4. This resolution was forwarded to the city councils of Ketchikan and Saxman for their approval. The City Council of Ketchikan concurred with the Assembly's resolution on November 16, 2000. The City Council of Saxman, in Resolution No. 01-11-232 (November 8, 2000) recommended the following options for further study: C3, C4, D1, F1, G4, and No Action. The resolution gave no explanation for the substitution of Option F1 for Option F3.

2.4.3 DOT&PF Identification of Alternatives

The DOT&PF considered the results of its screening process, as well as the input from the local governments and Ketchikan Gateway Borough community, in determining which options should be considered reasonable alternatives for the Gravina Access Project and studied further in the

[12] Stephen Reeve, Principal Planner, and John Hill, Associate Planner, through Susan Dickinson, Planning Director, and Georgianna Zimmerle, Borough Manager, Ketchikan Gateway Borough Planning Department, memorandum to Mayor Jack Shay and Members of the Borough Assembly, Mayor Dan Williams and Members of the Saxman City Council, and Mayor Bob Weinstein and Members of the Ketchikan City Council, October 10, 2000.

[13] Ibid.

EIS. Because the Borough Assembly felt strongly that Option F3 should be included, the DOT&PF increased the cost ceiling to $175 million to accommodate the Assembly and include Option F3.[14] The DOT&PF reviewed the costs of all previously considered build options that had been eliminated due to their costs and determined that, other than Option F3, none of those options would be considered reasonable with this revised cost ceiling. Therefore, the DOT&PF identified the following as reasonable project alternatives: C3, C4, D1, F3, G2, G3, and G4. The No Action option was also retained for further study as the No Action Alternative. **[Note that Alternative F3, as identified at this stage of the process, did not include modification of West Channel.]**

In December 2000, the project team presented these eight alternatives (i.e., Alternatives C3, C4, D1, F3, G2, G3, and G4, and the No Action Alternative) to the PDT as the recommended alternatives to be studied in detail in the NEPA document. In January 2001, these alternatives were forwarded to state and federal agencies for formal concurrence under the interagency NEPA and Section 404 merger agreement[15]. By March 2001, the DOT&PF received letters of concurrence from all participating agencies, with the exception of the Alaska Department of Environmental Conservation and the Alaska Division of Governmental Coordination, which selected "nonparticipation by choice." Based on the lack of any agency nonconcurrence, Alternatives C3, C4, D1, F3, G2, G3, and G4, and the No Action Alternative became the reasonable alternatives for the proposed action.

2.4.4 Additional Technical Studies

During the spring of 2001, the project team initiated a series of engineering analyses to further refine the preliminary engineering of the reasonable alternatives. These analyses were undertaken principally to:

- Refine roadway designs
- Evaluate structural requirements of bridges (including navigational clearances)
- Revise cost estimates to reflect design changes

As a result of the additional engineering work, the conceptual designs for several of the bridge alternatives were altered slightly, and a variation of one bridge alternative was added to the list of reasonable alternatives. These changes are described as follows:

[14] Patrick Kemp, P.E., Preconstruction Engineer, through Michael Dowling, P.E., Director of Design and Engineering Services, DOT&PF Southeast Region, memorandum to Joseph Perkins, P.E., DOT&PF Commissioner, November 29, 2000.

[15] In April 1997, the DOT&PF and FHWA Alaska Division entered into a "Interagency Working Agreement to Integrate Section 404 and Related Permit Requirements into the National Environmental Policy Act" with the Alaska Department of Fish and Game, Alaska Department of Environmental Conservation, Alaska Department of Natural Resources, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, National Marine Fisheries Service, and U.S. Fish and Wildlife Service. The agreement integrated the Clean Water Act Section 404(b)(1) Guidelines and other Section 404-related permitting and certification requirements with the NEPA process. Signatories of the agreement committed to ensure the earliest possible identification and consideration of environmental concerns to waters of the United States (including wetlands) in the planning, design, and construction of federal-aid highway projects.

The merged process for the Gravina Access Project was to have three concurrence points: purpose and need; reasonable alternatives to be carried forward for the NEPA document; and the preferred alternative. The agreement expired in May 2002 and was not renewed; therefore, the concurrence process is no longer applicable to the Gravina Access Project.

Vertical Clearance. The 210-foot vertical clearances of three bridges (in Alternatives C3, C4, and F3) were reconfigured as 200-foot vertical clearances. This reconfiguration is consistent with the vertical clearances of other major structures along the west coast, such as the Seymour Narrows cable crossing (185 feet) and Lion's Gate Bridge (200 feet) in Vancouver, British Columbia.

Horizontal Clearance. The horizontal clearances[16] used in early investigations were determined using the conceptual channel design methods published by the International Navigation Association (PIANC)[17]. For the initial 210-foot high bridge options, a horizontal clearance of 750 feet was assumed as a conservative width to provide for two-way traffic of the largest cruise ships potentially transiting Tongass Narrows. Further investigation of cruise ship traffic in Tongass Narrows determined that cruise ships coordinate the timing of their transits to avoid two-way traffic in Tongass Narrows. Accordingly, the horizontal clearances of the 200-foot high bridges associated with Alternatives C3, C4, and F3 were reconfigured to 550 feet, based on the PIANC conceptual method.

New Alternative—C3(b). A new bridge alternative with a vertical clearance of 120 feet was added in the same general location as Alternative C3. This alternative was added to provide a low-level bridge that, after crossing Tongass Narrows, would connect more directly to the airport terminal area than the 120-foot bridge of Alternative D1. Alternative C3 (with a 200-foot bridge) was redesignated C3(a), and the new 120-foot bridge alternative at that location was designated Alternative C3(b). The alignment of this alternative is shown in Figures 2.2 and 2.7.

D1 and G2 Changes. In their original configuration, Alternatives D1 and G2 wrapped around the northern end of the airport property. With the DOT&PF's plans to extend the airport's west taxiway to the north (which had been approved by federal and state natural resource agencies after extensive consultation and construction of the taxiway is now complete), the prism of the northern roadway alignment for Alternatives D1 and G2 would have to be pushed farther into Tongass Narrows. Preliminary engineering and environmental studies indicated that this would require placement of substantial amounts of fill in Tongass Narrows, which would result in unacceptable environmental impacts to intertidal areas and other sensitive habitat. These studies, together with input from federal and state agencies, indicated that a southern route around the airport was the only reasonable location of this roadway. Alternatives D1 and G2 were therefore reconfigured to wrap around the southern end of the airport runway, in the same alignment as the other build alternatives.

Spine Road Added to All Alternatives. In their original configuration, all build options provided access to developable land on Gravina Island either by making landfall outside of the Airport Reserve zone (i.e., access to developable land would be possible along the alignment in its approach to the airport), or with an additional road segment extending from the airport to the closest developable land. During the development of

[16] The conceptual channel width design is based upon a historical survey of ships that have passed through Tongass Narrows, projections of the type of ships anticipated to use the channel in the future, factors for channel bottom type and depth, visibility, and type of channel navigational aids.

[17] The International Navigation Association (PIANC) was formerly known as the Permanent International Association of Navigation Congresses.

Gravina Access Project alternatives, the Borough was separately planning development of a new road around the west side of the airport to the Lewis Reef development area (i.e., Proposed Ketchikan Airport Access Road identified on Figure 2.2). **However, the Borough had not yet identified an alignment.** After identification of the reasonable alternatives in preparation for this EIS, and after additional coordination with the Borough concerning their long-term plans for development on Gravina Island and the road to the Lewis Reef development area, the DOT&PF determined that all build alternatives should provide access to the developable land north of the Airport Reserve zone, consistent with the Borough's general plans for a road. Therefore, all build alternatives were revised to include construction of a road around the west side of Ketchikan International Airport. This road, located entirely on airport property, crosses Airport Reserve Land (land reserved for airport-specific uses) and ends at the intersection with Airport Development Land (land more generally available for all types of development, not necessarily airport related). The spine road provides uniform access among all build alternatives to developable property north of the airport, addressing the related portion of the purpose and need for the project.

It is important to note that the Borough continued planning for its road as the Gravina Access Project Draft EIS was produced, with the assumption that it would be built before the EIS was completed. As this Final EIS goes to press, the Borough has completed their road design and separately secured a Section 404 permit from the U.S. Army Corps of Engineers. The Gravina Access Project spine road alignment is slightly different than the Borough's alignment, which is an independent action that did not influence the development (including location) and evaluation of the Gravina Access Project alternatives.

If the Record of Decision for the Gravina Access Project selects any of the build alternatives for construction and if it were signed before construction began on the Borough road, DOT&PF would work with the Borough to construct the alignment presented in this Final EIS to avoid redundancy, consolidate costs, and minimize impact to wetlands. Should the Borough advance construction of their road prior to the Record of Decision, DOT&PF would construct the alternative selected in the Record of Decision to the point where it would connect to the Borough's spine road alignment. The Borough's spine road would connect to other developable lands north of the airport consistent with the Gravina Access Project purpose and need.

Figure 3.2 depicts the current zoning classification for lands within the project area and shows that the location of the spine road's terminus is at the Airport Development Land boundary.

The evaluation of each build alternative includes effects resulting from construction and operation of this road. The road is designed to provide vehicular and other access to the area of Gravina Island, north of the airport, where the Borough has encouraged land development such as the long-term lease to Pacific Log and Lumber.

Based on the refined engineering design of the alternatives, the project team conducted specialized technical studies of the reasonable alternatives (i.e., Alternatives C3[a], C3[b], C4, D1, F3, G2, G3, and G4) during the spring and fall of 2001 to characterize the potential environmental impacts associated with each. These studies were:

- Evaluation of Impacts to the Social Environment
- Assessment of Relocation Impacts
- Assessment of Economic Impacts
- Visual Quality Impact Assessment
- Assessment of Impacts to the Biological Environment
- Historic and Archaeological Resources Survey
- Aviation Impacts Analysis
- Assessment of Airport Impacts
- Marine Navigation Analysis
- Traffic Impact Assessment
- Hazardous Wastes Study
- Secondary and Cumulative Impacts Analysis

The results of the engineering and environmental technical studies were compiled into the *Alternatives Evaluation Summary Report.*[18] The principal impact issues identified in these analyses were navigation, aviation and the airport, project costs, economic conditions, and natural resources.

Navigation. Bridge clearances (both vertical and horizontal) and locations would affect ship passage under the bridge and maneuvers through Tongass Narrows. The bridge alternatives would introduce a greater probability of ship groundings and a higher risk of allisions (i.e., ship collisions with bridge piers).

Aviation and the Airport. Analysis indicated likely delays to floatplanes flying under SVFR, particularly for the bridge alternatives nearest the airport (C3[a], C3[b], C4, and D1). Ferry operations, bridge piers, and bridge construction would alter floatplane operations. The two highest bridge alternatives near the airport (C3[a] and C4) would penetrate the Part 77 airspace, a Federal Aviation Administration (FAA)-designated clear zone around the airport.

Costs. The life-cycle costs were estimated to be between $110,000,000 and $170,000,000 for the bridge alternatives (using a bridge life of 75 years), and between $105,000,000 and $110,000,000 for the ferry alternatives (using a ferry life of 50 years). The annual O&M costs were estimated to be between $116,000 and $270,000 for the bridge alternatives, and between $4,460,000 and $4,500,000 for the ferry alternatives.

Economics. Spending associated with project construction would raise employment in the Borough by an estimated 261 to 1,416 persons employed, depending upon the alternative. With the bridge alternatives, cruise ships may have to change their operations and might have to eliminate or shorten some port calls, which could reduce economic activity in the Borough, depending on the alternative.

Natural Resources. All build alternatives would adversely affect Tongass Narrows, streams, wetlands, and/or forests by altering or eliminating some fish and wildlife habitat.

[18] DOT&PF, prepared by HDR Alaska, January 2002.

2.4.5 Preliminary Identification of Recommended Alternative

Based on the results of the engineering and environmental technical studies, the DOT&PF identified Alternative F3, the two-bridge alternative that traverses Tongass Narrows via Pennock Island, as its recommended alternative for the Gravina Access Project. **[Note that Alternative F3, as identified at this stage of the process, did not include modification of West Channel.]** The principal reasons supporting DOT&PF's recommendation were that Alternative F3 would:

- meet the project's purpose and need
- meet the community's goal of bridge access to Gravina Island
- allow the passage of major cruise ships, thereby maintaining Ketchikan's tourism industry
- better serve Ketchikan's long-term needs for convenient and reliable transportation to the airport and developable land, compared to the ferry alternatives
- not intrude into Ketchikan International Airport airspace
- have a minimal impact on airport facilities, compared to the other bridge alternatives located at the airport
- have less potential impact on Ketchikan's floatplane industry than the other bridge alternatives (which are located at the airport)
- have bridge structures that are not as technically challenging as the other bridge alternatives
- have bridge structures that would be less visibly intrusive than the other bridge alternatives

Although DOT&PF viewed Alternative F3 as its recommended alternative, it recognized the particular challenges associated with this crossing:

- The crossing point would not be central to Ketchikan's population center.
- Traffic from north of Ketchikan would be routed through the downtown core.
- Cruise ships would be directed through the West Channel, where maneuvers to the city docks would be more inconvenient and would have more potential for risk than the current maneuvers in the East Channel.
- Some cruise lines expressed reservations about calling in Ketchikan through the West Channel. An evaluation of cruise ship operations (see Appendix K) determined that navigational safety concerns associated with West Channel could reduce cruise ship calls at Ketchikan, which would potentially reduce cruise-related spending (see Appendix D). DOT&PF determined that mitigation for this economic impact might involve moving the cruise ship docking locations. Community coordination with cruise line agencies would be essential for successfully maintaining and, if desired, growing Ketchikan's important tourist industry.
- Full funding for construction might be difficult to obtain.

2.4.6 Addition of Alternative F1 (DOT&PF and FHWA preferred)

On January 7, 2002, Governor Tony Knowles and DOT&PF Commissioner Joe Perkins publicly announced the recommendation for Alternative F3. **[Note that Alternative F3, as identified at this stage of the process, did not include modification of West Channel.]** The DOT&PF held public open house meetings in Ketchikan on February 11 and 27, 2002, to obtain public input regarding this decision. The DOT&PF also held meetings with federal, state, and local agencies and public officials in January, February, and March 2002. During this time, DOT&PF received considerable input from the community, elected officials, and representatives of local, state, and federal agencies concerning the reasonable alternatives.

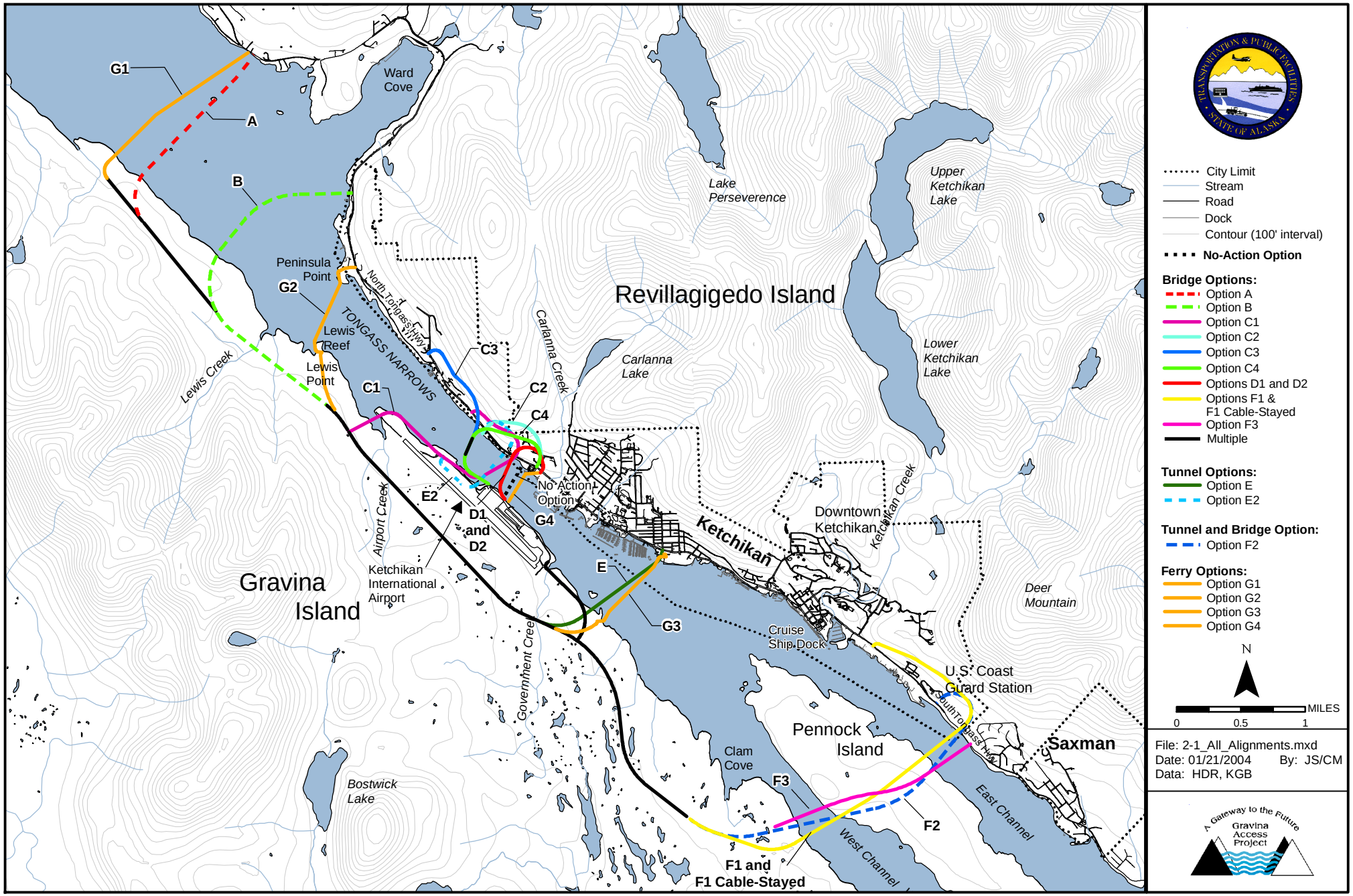
Many of the commenters supported a Pennock Island crossing (such as Alternative F3). However, there was a great deal of public interest in and preference for an alternative with a 200-foot high bridge over East Channel (instead of over West Channel) to allow passage of cruise ships and a lower (120-foot-high) bridge over West Channel. Such a configuration is essentially Option F1 from the initial set of options, as described in Section 2.3.1. In the screening of initial options, Option F1 had been determined to be unreasonable solely on the basis of its cost, which would have exceeded the DOT&PF's established cost ceiling. The community support of Option F1 was based primarily on concerns for restricting cruise ship travel to West Channel under Alternative F3 and the potential impacts to the local economy as a result of fewer and shorter cruise ship port calls.

In the spring of 2002, the DOT&PF received indication from the Alaska Congressional delegation that federal funding for the Gravina Access Project was feasible at a level above $190 million, and that the $175 million cost ceiling could be increased to allow the consideration of Option F1 as a reasonable alternative.

As stated in Section 2.3, the cost estimates of the initial 18 alternatives are not directly comparable with the current estimates of the reasonable alternatives. The DOT&PF again reviewed the costs of all previously considered build options that had been eliminated due to their costs and determined that Options A, B, C1, D2, E, and E2 still had costs above the reasonable range (i.e., total project costs in excess of $240 million); therefore, based on costs, DOT&PF determined that no further investigations of Options A, B, C1, D2, E, or E2 were required. Although Option C2 could now be considered reasonable from a cost standpoint, DOT&PF did not add it to the list of reasonable alternatives because it is almost identical to Alternative C4, the primary difference being its horizontal navigational opening, which is 750 feet. Since engineering studies conducted in Spring 2001 indicated that a navigational opening of 550 feet would be adequate (see Section 2.4.4), there was no need to add Option C2 to the list of reasonable alternatives. Although Option F1 cable-stayed could now be considered reasonable from a cost standpoint, DOT&PF did not add it to the list of reasonable alternatives because it would be the same footprint as Alternative F1 and the cable-stayed design would present extreme adverse risk to float plane operations in East Channel.

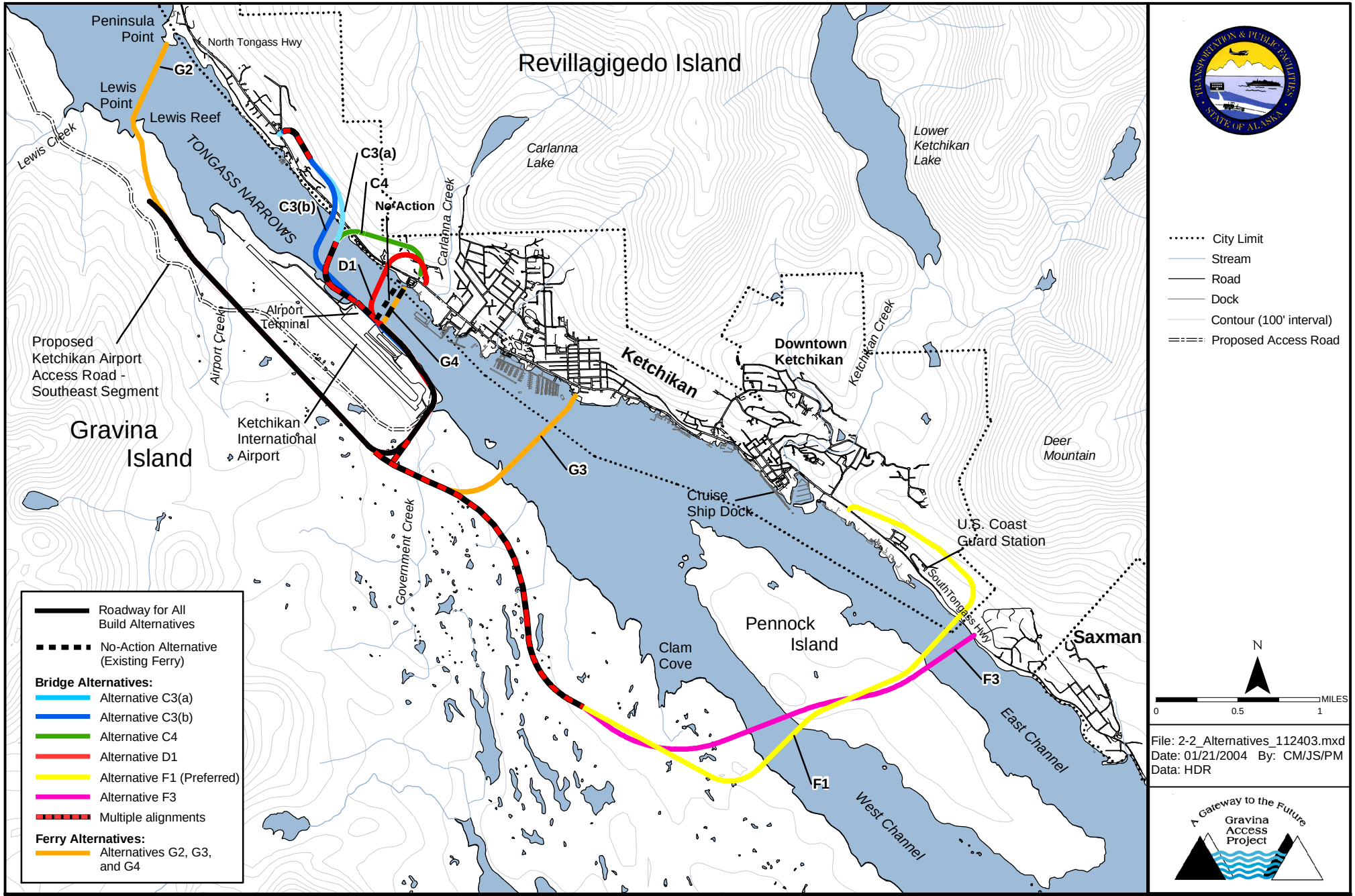
Based on strong local support for Option F1, combined with federal funding assurances, the DOT&PF decided to add Alternative F1 as a reasonable alternative to be evaluated in this EIS,[19] with modification of the vertical and horizontal navigational clearances of the East Channel bridge to 200 feet and 550 feet, respectively. This brought to nine the number of build alternatives being evaluated.

[19] Joseph Perkins, P.E., DOT&PF Commissioner, April 30, 2002. Concurrence on memorandum from Patrick Kemp, P.E., Preconstruction Engineer, through Bob Doll, Regional Director, DOT&PF Southeast Region, April 22, 2002.



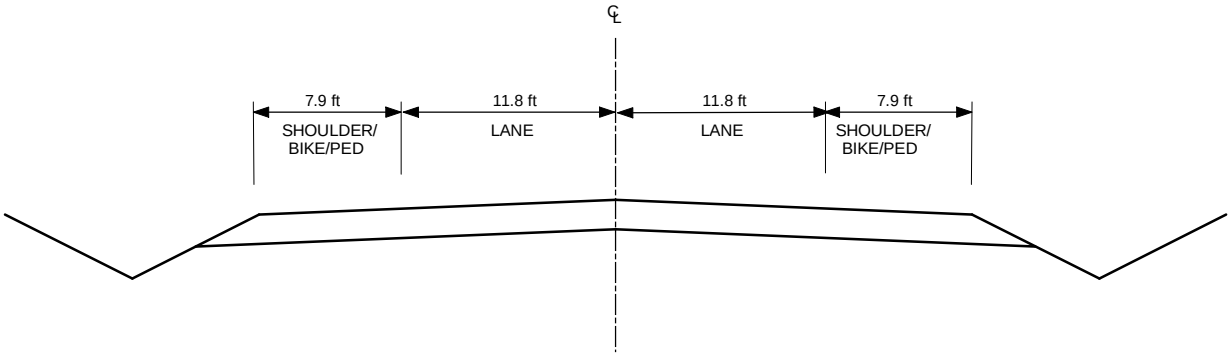
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Figure 2.1
Initial Project Options: Alignments



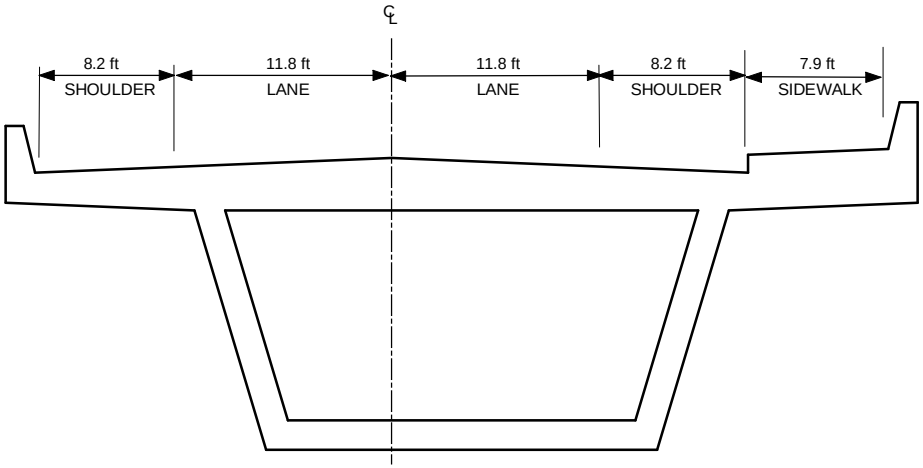
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Figure 2.2
EIS Alternatives: Alignments



TYPICAL ROADWAY SECTION

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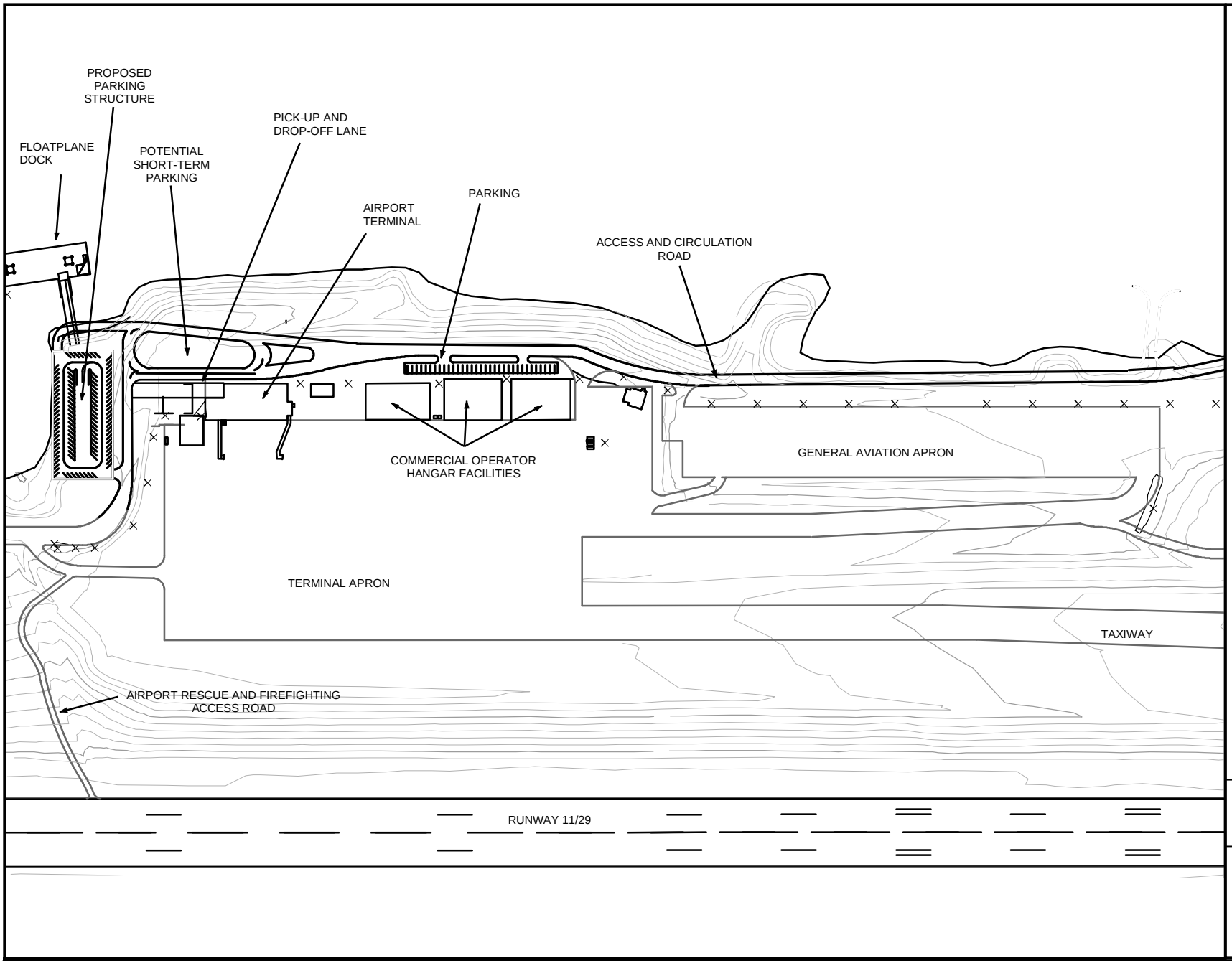
TYPICAL BRIDGE SECTION

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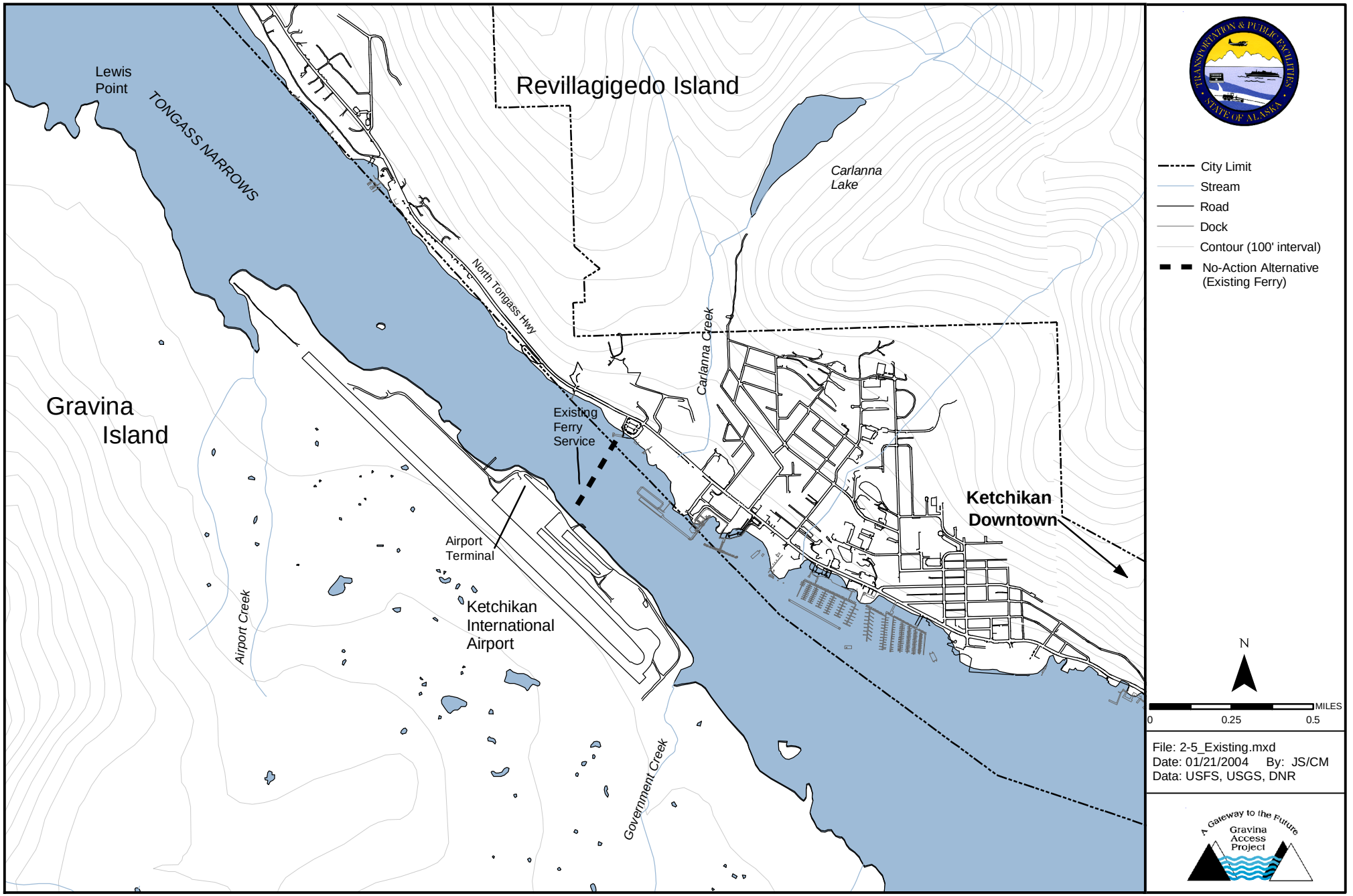
Figure 2.3
Typical Cross-Sectional Views of Proposed Roadways and Bridges



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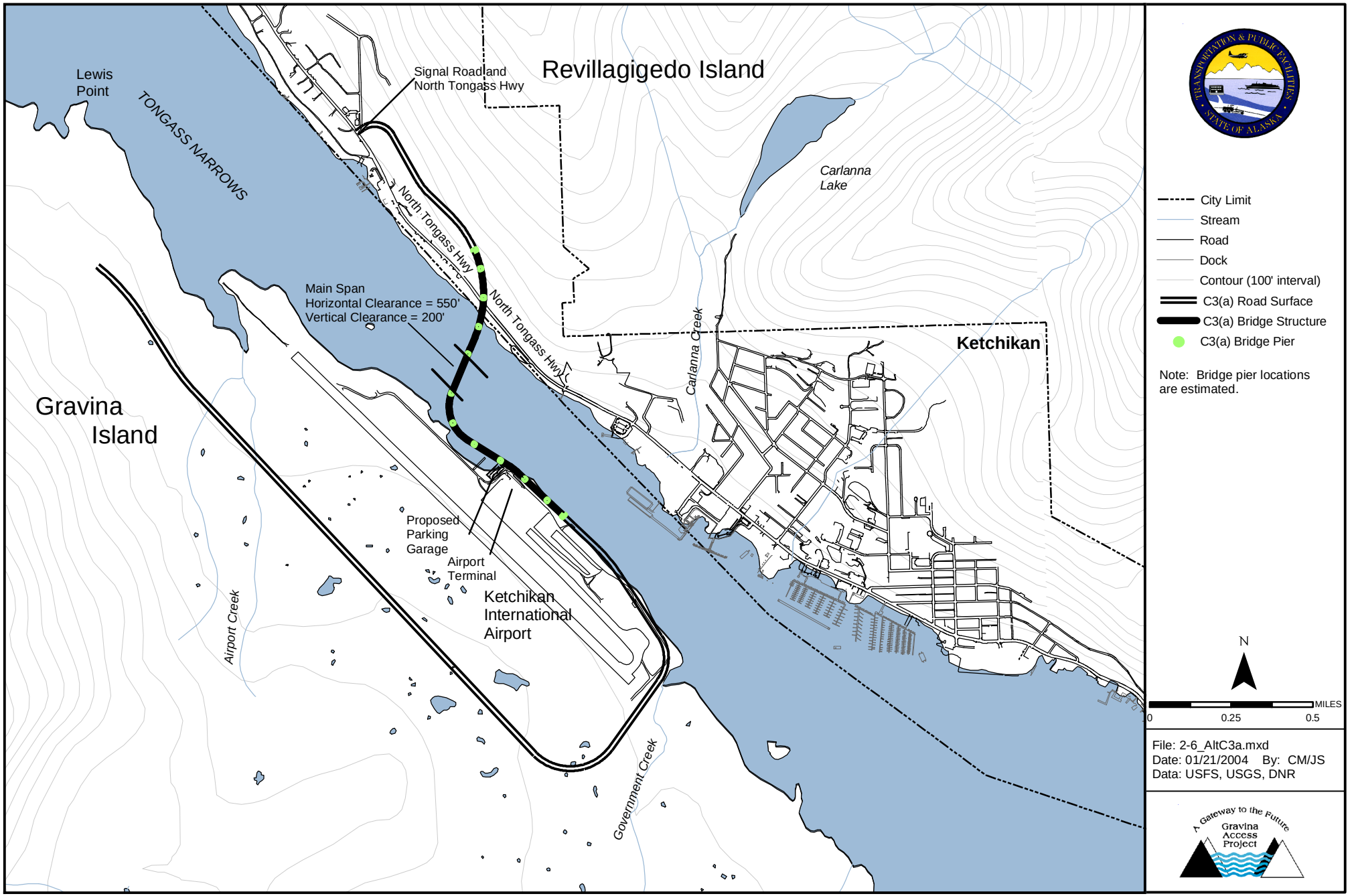
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Figure 2.4
Ketchikan International Airport: Circulation and Parking (for Build Alternatives)



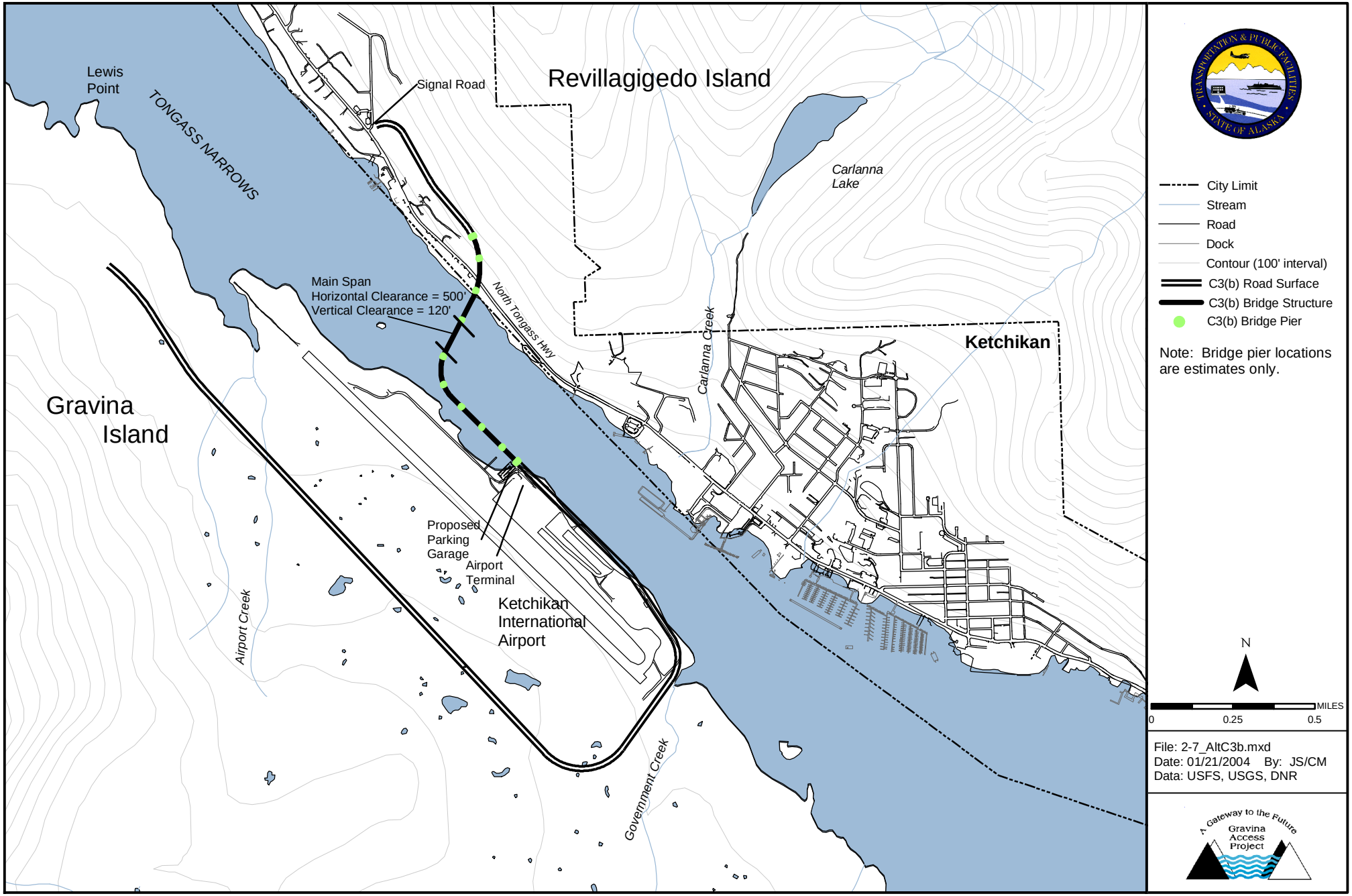
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Figure 2.5
No Action Alternative, Existing Ferry Between Airport Ferry Terminals: Alignment



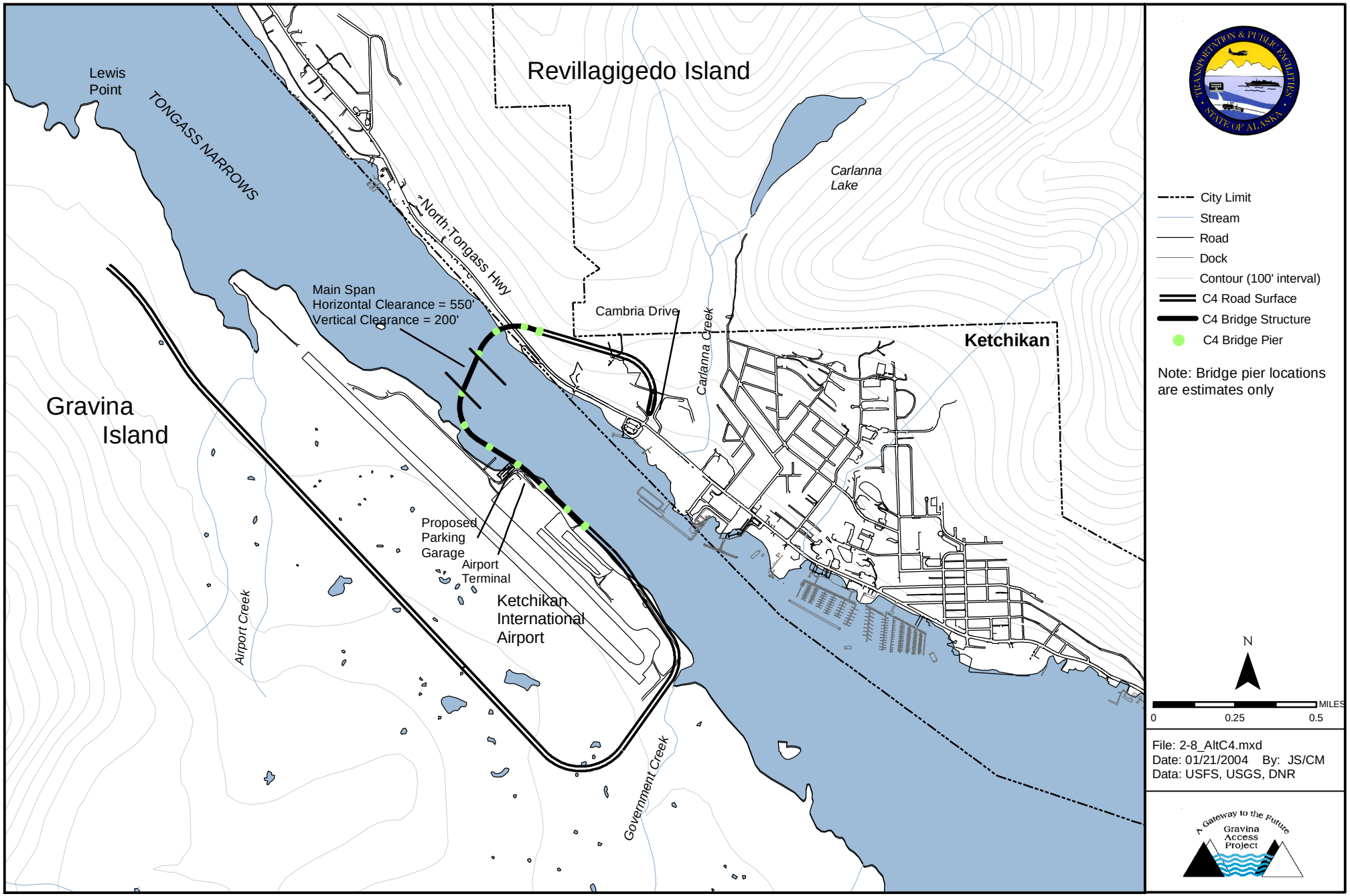
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Figure 2.6
Alternative C3(a), 200' Bridge Between Signal Road and South of Airport Terminal: Alignment



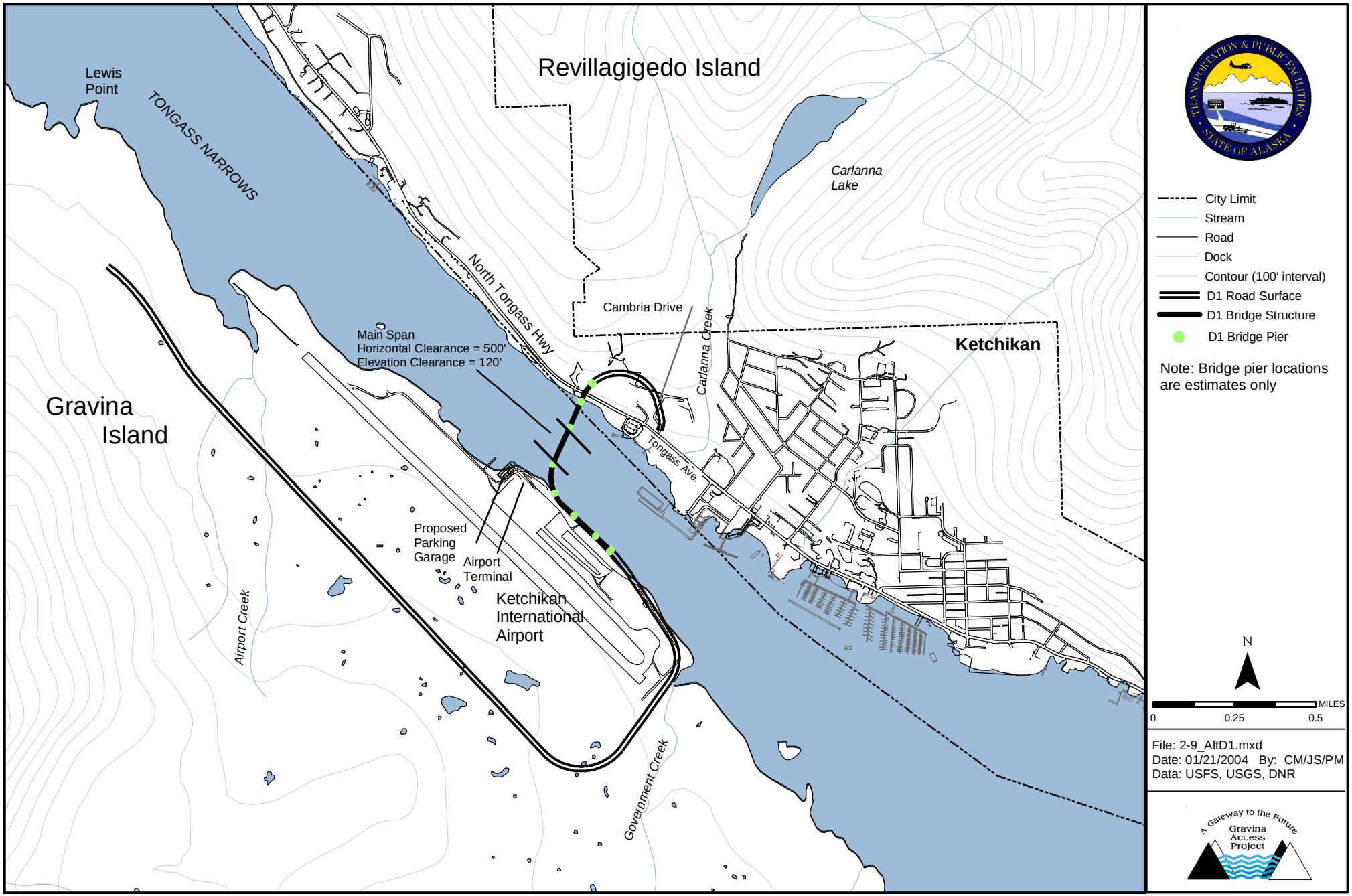
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Figure 2.7
Alternative C3(b), 120' Bridge Between Signal Road and Airport Terminal: Alignment



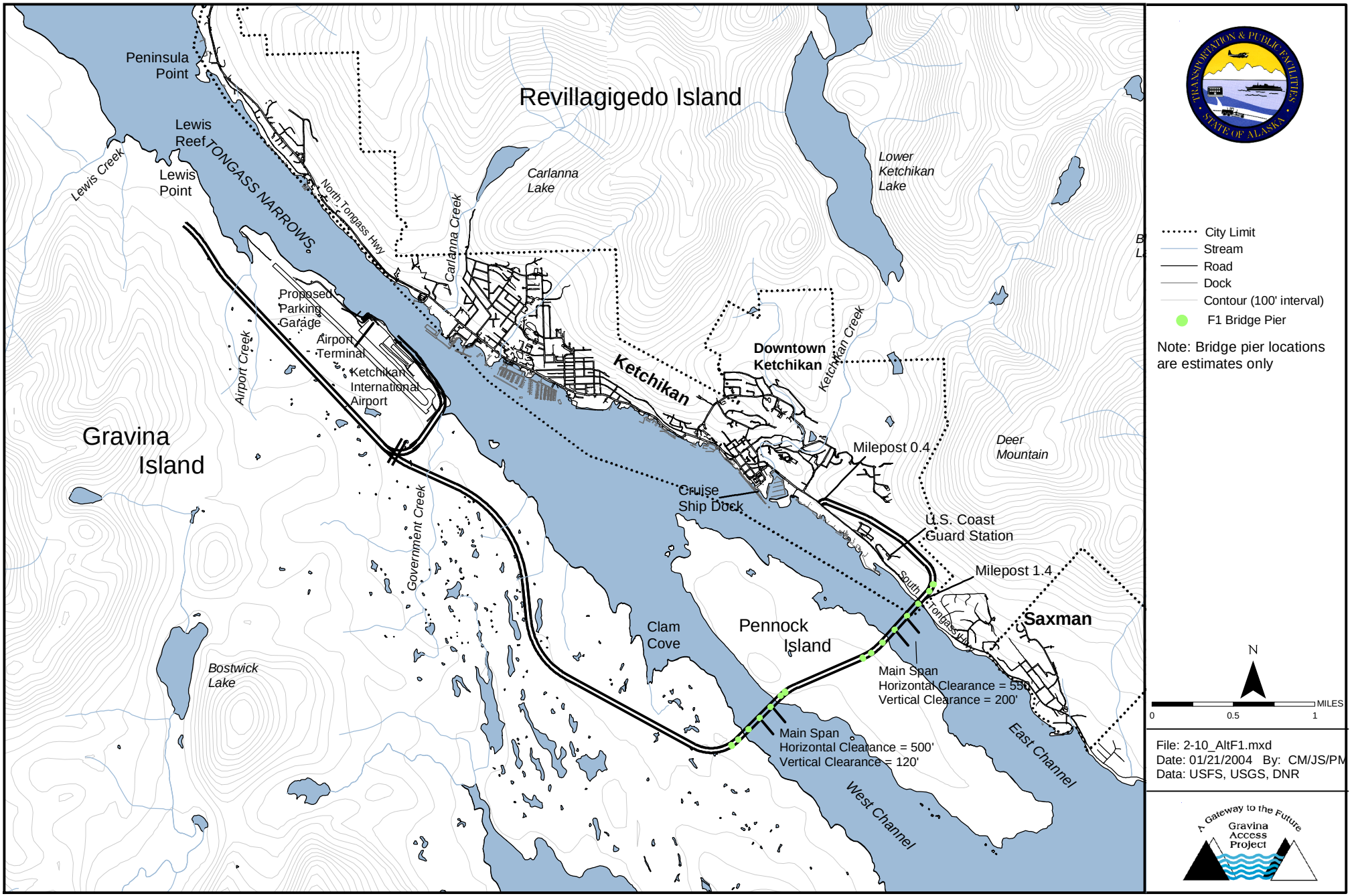
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Figure 2.8
Alternative C4, 200' Bridge Between Tongass Avenue (North of Cambria Drive) and South of Airport Terminal: Alignment



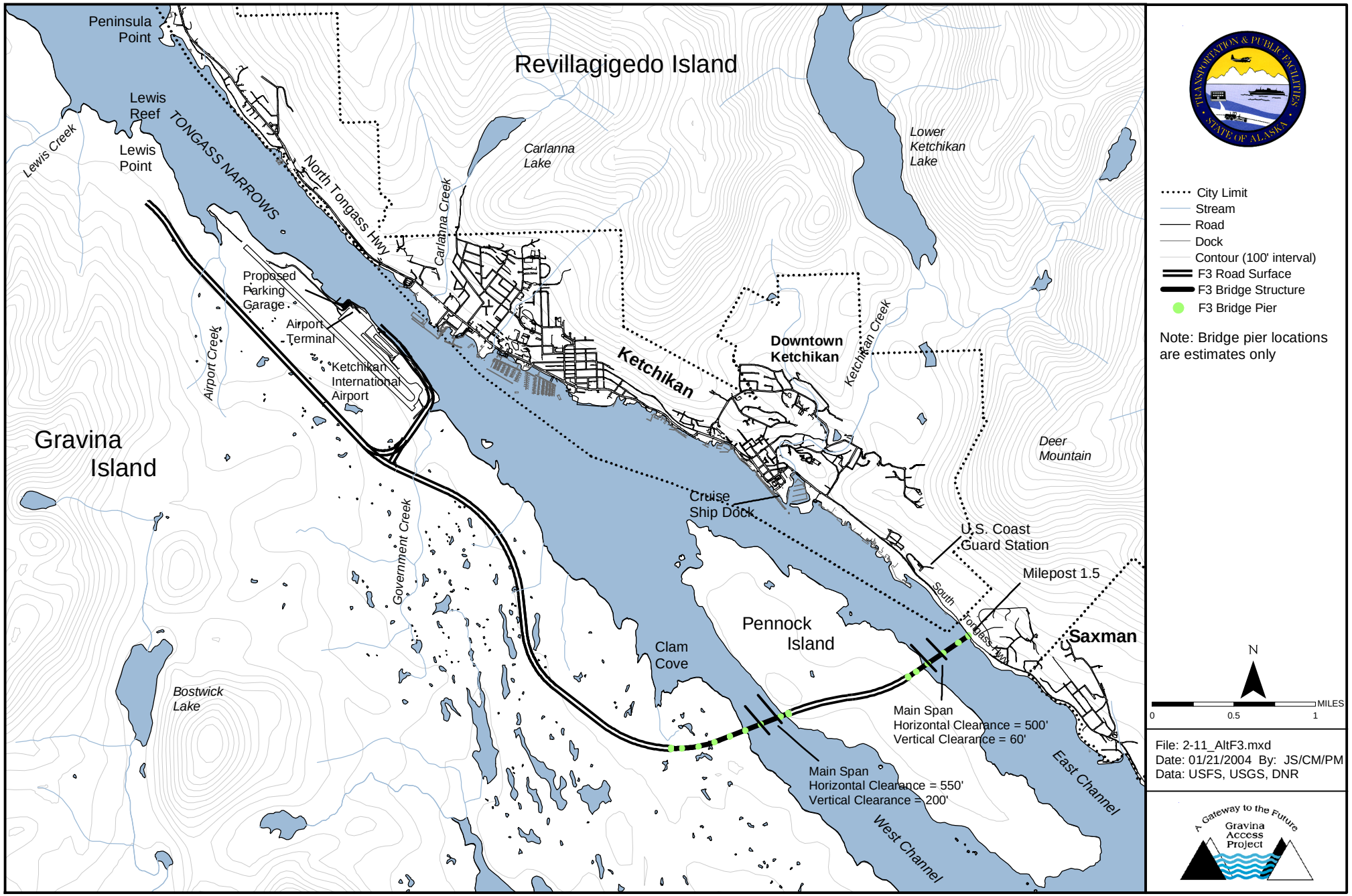
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Figure 2.9
Alternative D1, 120' Bridge Between Tongass Avenue (near Existing Ferry) and Airport Terminal: Alignment



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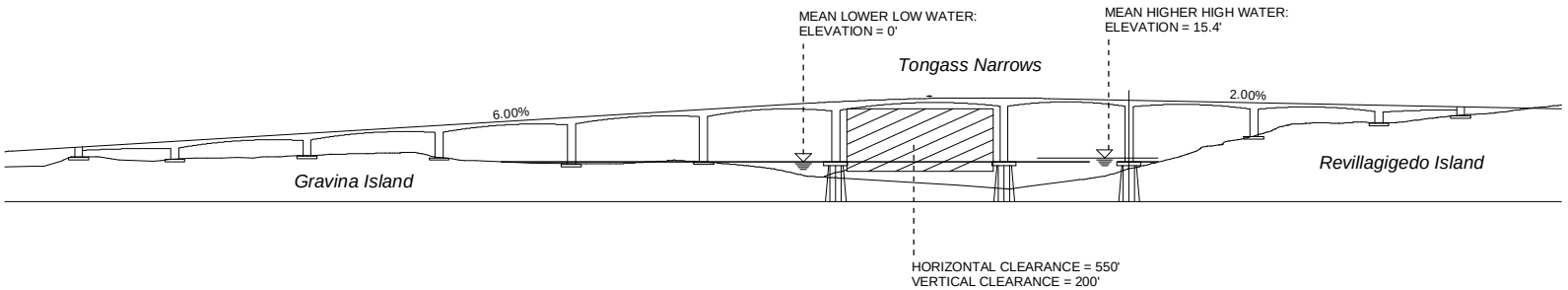
Figure 2.10
Alternative F1, Bridges (200' East and 120' West)
Between Tongass Avenue and Airport, via Pennock Island: Alignment



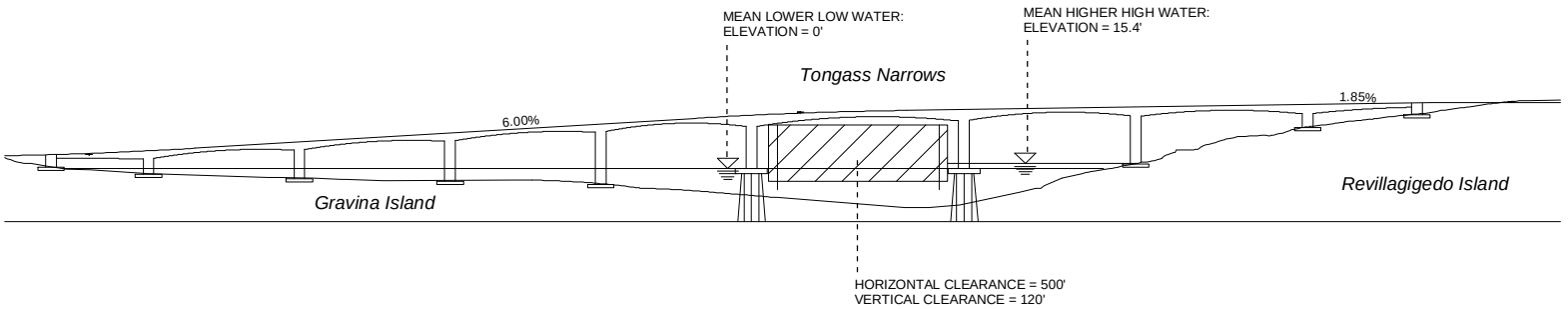
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Figure 2.11
Alternative F3, Bridges (60' East and 200' West)
Between Tongass Avenue and Airport, via Pennock Island: Alignment

C3(a): 200' Bridge Between Signal Road and South of Airport Terminal



C3(b): 120' Bridge Between Signal Road and Airport Terminal



Note: Scales vary between drawings.

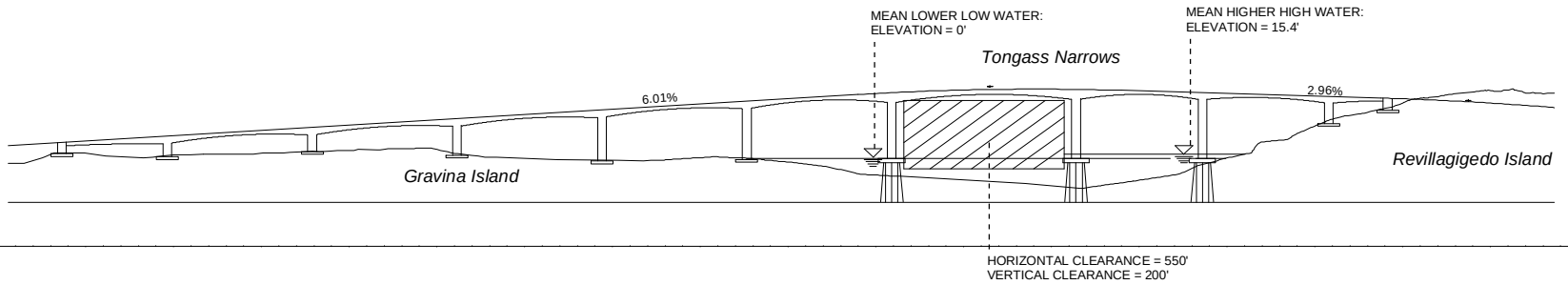
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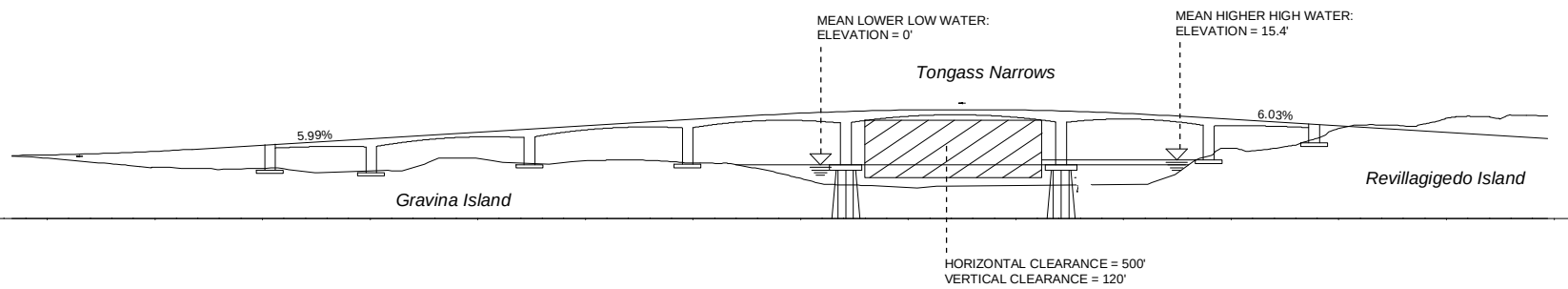
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Figure 2.12
Alternatives C3(a) and C3(b) Bridge Profiles

C4: 200' Bridge Between Tongass Avenue (North of Cambria Drive) and South of Airport Terminal



D1: 120' Bridge Between Tongass Avenue (near Existing Ferry) and Airport Terminal



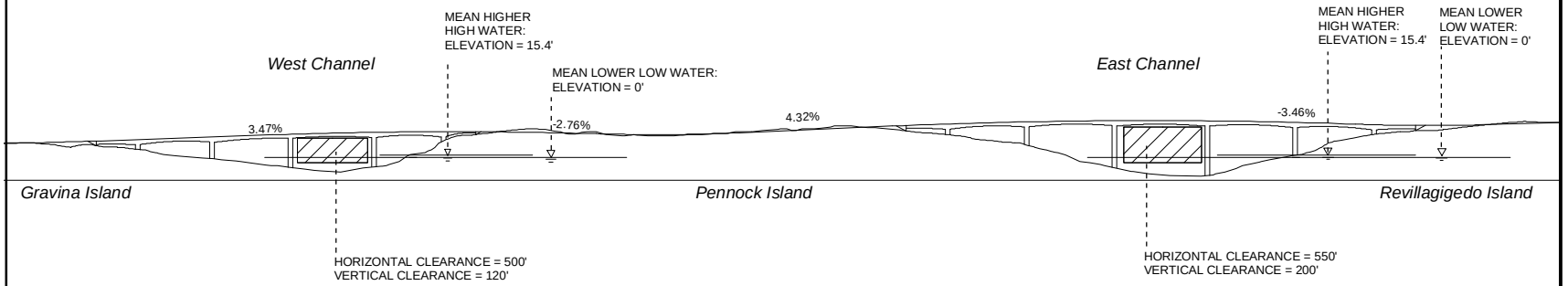
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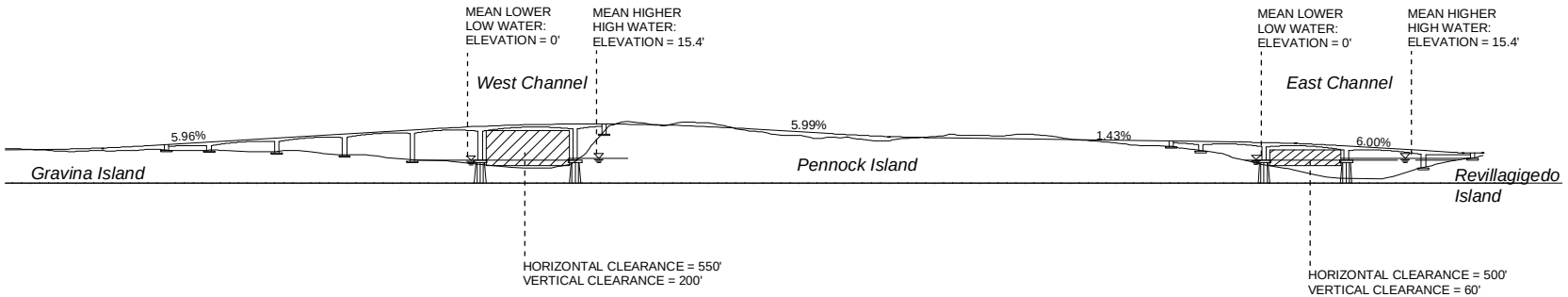
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Figure 2.13
Alternatives C4 and D1
Bridge Profiles

F1: Bridges (200' East and 120' West) Between Tongass Avenue and Airport, via Pennock Island



F3: Bridges (60' East and 200' West) Between Tongass Avenue and Airport, via Pennock Island

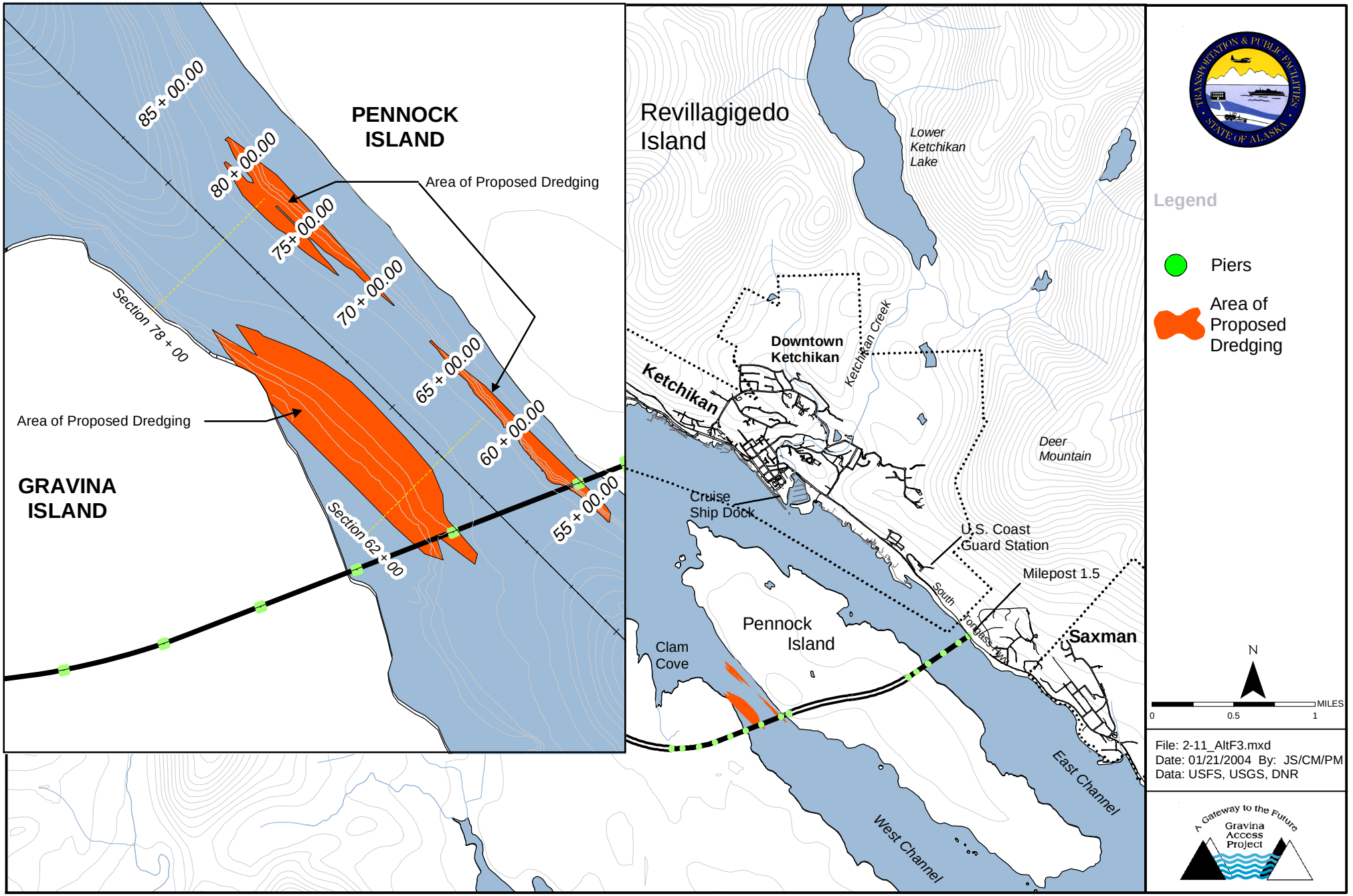


Note: Scales vary between drawings.

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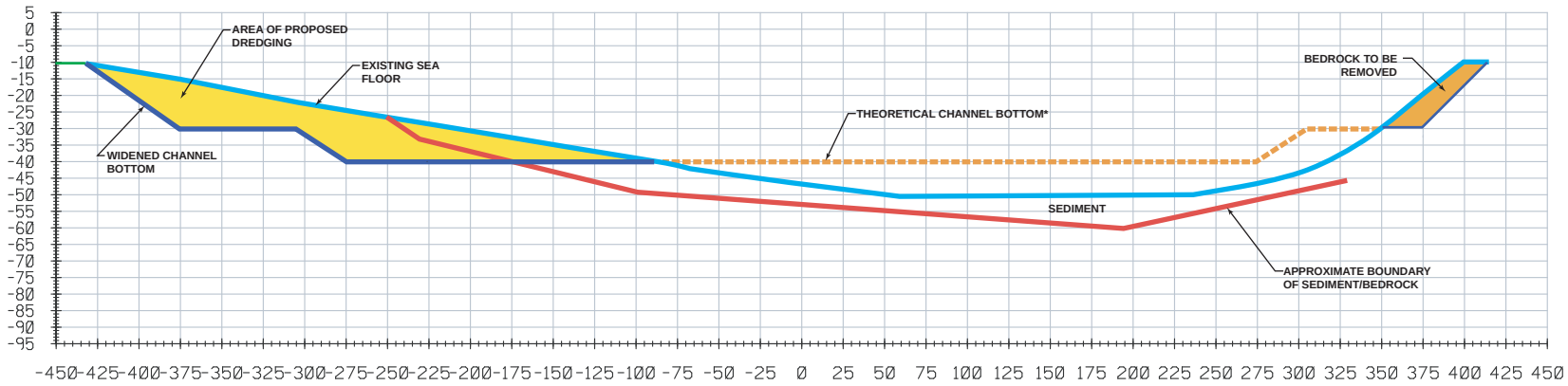
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Figure 2.14
Alternatives F1 and F3
Bridge Profiles

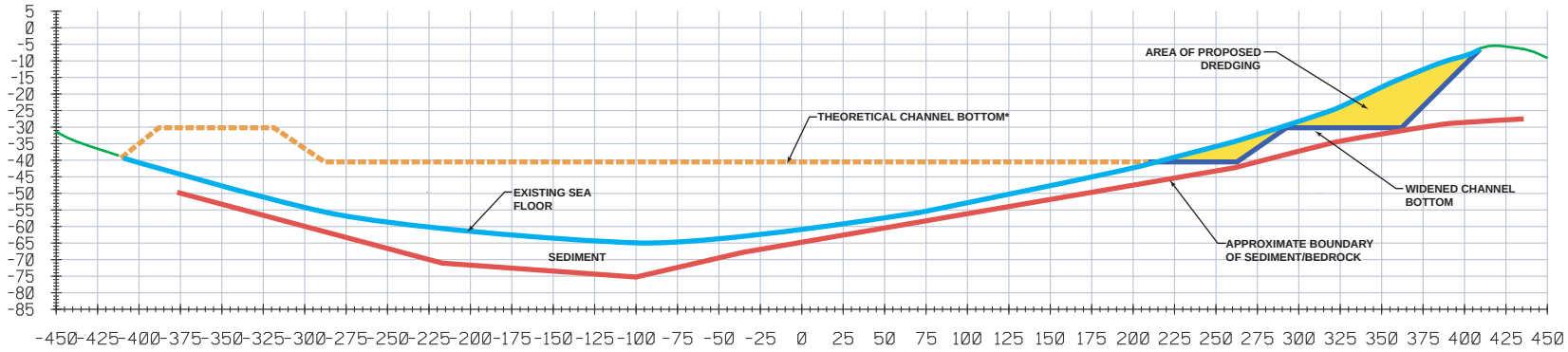


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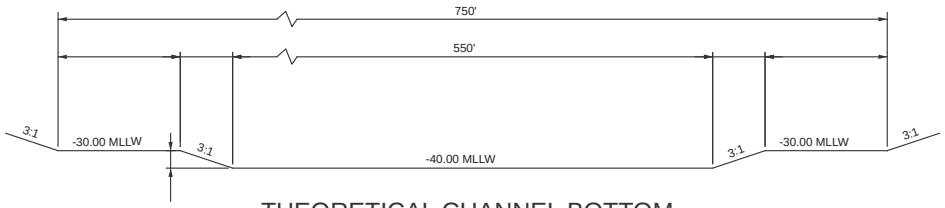
Figure 2.15
Alternative F3, West Channel Widening



62+00



78+00



THEORETICAL CHANNEL BOTTOM

NOT TO SCALE

*Theoretical channel bottom configuration is based on a modeled, minimum section which provides adequate draft for 2-way cruise ship traffic.

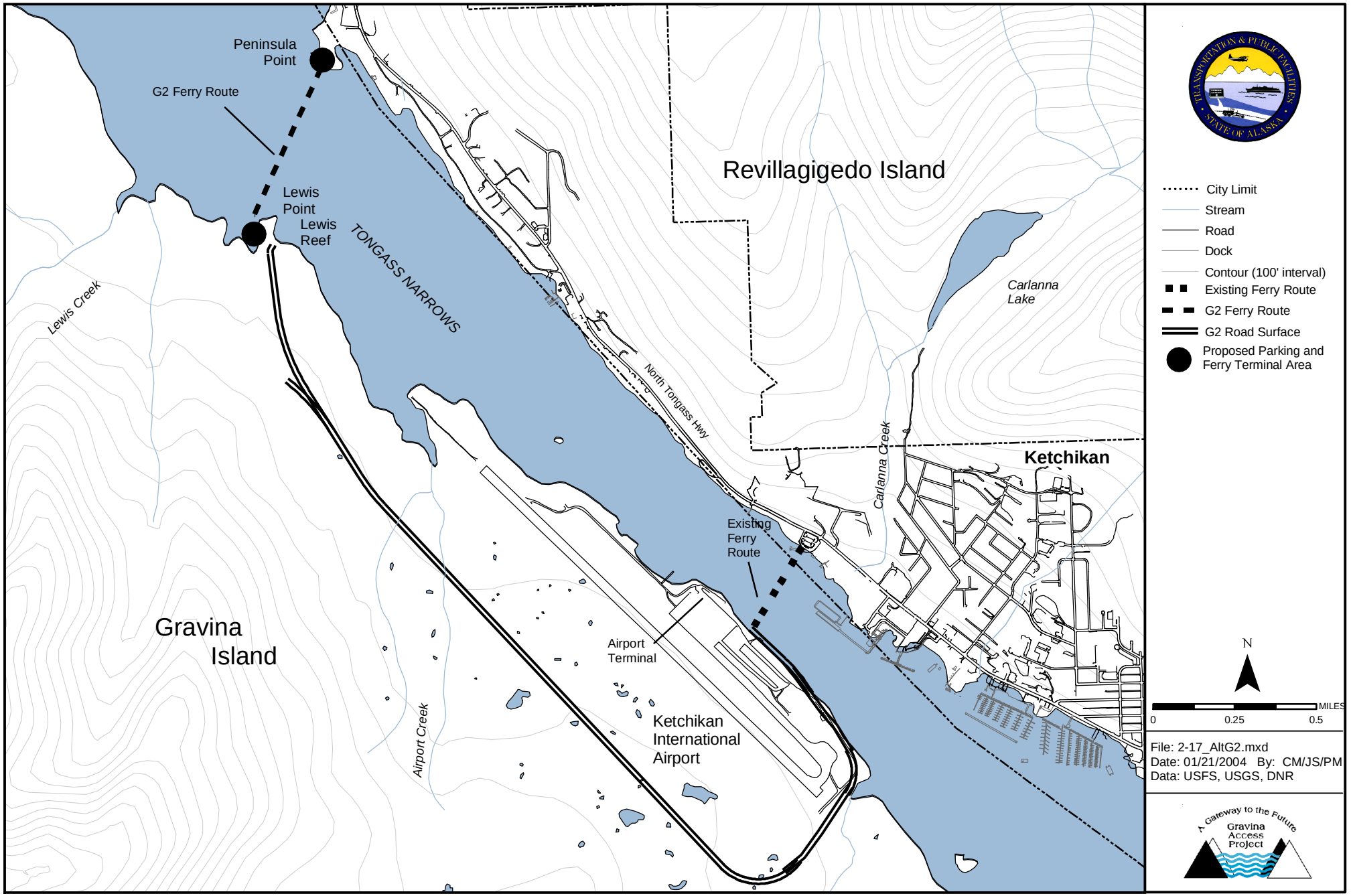
- Theoretical Channel Bottom
- Existing Sea Floor
- Approximate Boundary of Sediment/Bedrock
- Widened Channel Bottom
- Bedrock To Be Removed
- Area of Proposed Dredging

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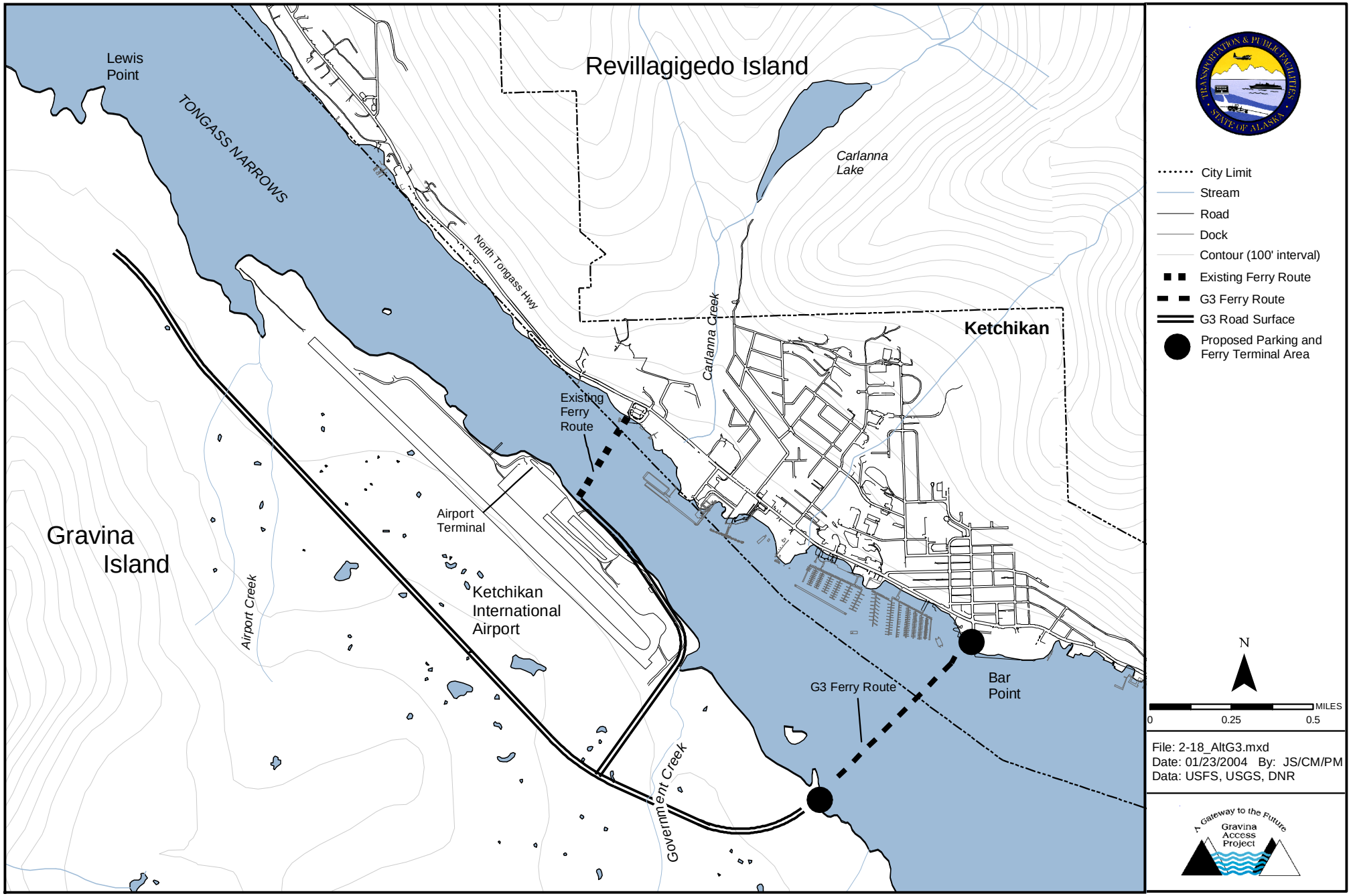
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Figure 2.16
Alternative F3, West Channel Widening Cross Sections



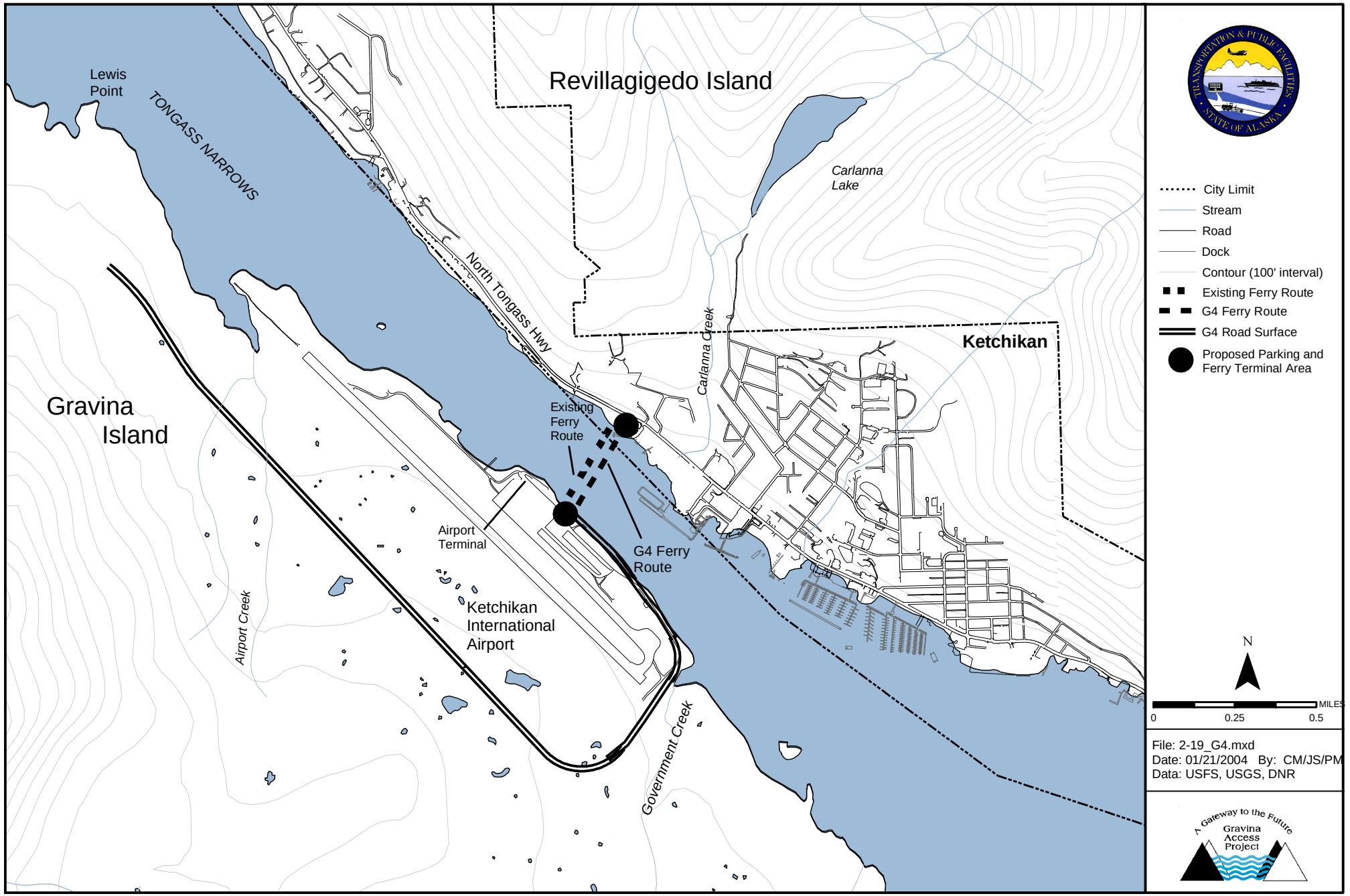
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Figure 2.17
Alternative G2, Ferry Between Peninsula Point and Lewis Point: Alignment



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Figure 2.18
Alternative G3, Ferry Between Jefferson Street and South of the Airport: Alignment



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Figure 2.19
Alternative G4, Ferry Between New Terminals Adjacent to Existing Terminals: Alignment

3.0 AFFECTED ENVIRONMENT

This chapter inventories and characterizes the economic, environmental, and cultural resources in the Gravina Access Project area that could be affected by the proposed project alternatives. This information is drawn from the technical studies for the project performed for DOT&PF by HDR Alaska, Inc., and its affiliates, as listed in the References section.

3.1 LAND USE

3.1.1 Current Land Use

Figure 3.1 (Land Ownership), Figure 3.2 (Zoning), and Figure 3.3 (Land Use) show current land ownership and uses in the project area, as discussed in this Section 3.1. The subsections below discuss these issues.

Note that Native lands in Alaska are typically held by regional and village Native corporations formed by the Alaska Native Claims Settlement Act. There are no Indian Reservations along Tongass Narrows. Native corporations have been making selections from federal lands over several decades, and some of these selections are still underway in Southeast Alaska. Native Corporations have also purchased commercial properties and run businesses in many communities, including Ketchikan. Some of the "private ownership" land noted below is held by Cape Fox Corporation, which owns hotels and restaurants, among other holdings. No large land areas generally selected by Native corporations are in the mapped project area.

3.1.1.1 Revillagigedo Island

Ownership. On Revillagigedo Island, most of the land in the project area is privately held or owned by the Ketchikan Gateway Borough (Borough). Areas outside the limits of the cities of Ketchikan and Saxman are largely a mix of state and federal[1] ownership.

Land Use. Ketchikan and Saxman are typical Southeast Alaska waterfront communities. Most of the developable land is densely developed, clustered along the shoreline, and the uses are mixed: commercial, industrial, residential, and institutional.

3.1.1.2 Pennock Island

Ownership. Most of Pennock Island is owned by the Borough, with private ownership occurring along parts of the shoreline.

Land Use. Pennock Island is primarily undeveloped, but there are residences along the shoreline. Some residences use small streams as a source of drinking water supply. The island contains registered archeological sites. Subsistence use of the island includes hunting and berry picking.

[1] Executive Order 1520 (April 20, 1912) officially reserves the USCG ISC property in Ketchikan for lighthouse purposes. According to USCG staff (personal communication from Robert Deering [USCG] to Jim Evensen [DOT&PF], November 14, 2003), this is what originally set aside the property for Coast Guard facility use.

3.1.1.3 Gravina Island

Ownership. On Gravina Island, most of the land (64 percent) is owned by the USFS. The remainder is owned by private interests (4 percent) and other public agencies, including the State of Alaska (16 percent), the Borough (7), University of Alaska (3 percent), and the Alaska Mental Health Trust Authority (6 percent).

Land Use. Most of Gravina Island is undeveloped. The existing development lies within the project area on the eastern side of the island. The principal developments include Ketchikan International Airport (the Airport Reserve zone), a timber processing plant north of the airport (directly across from Ward Cove), and private residences on the southeastern shore (Clam Cove area) and at the northernmost portion of the island. The zoning map (Figure 3.2) shows the currently allowable (planned) uses for private, state, and Borough-owned properties on Gravina Island.[2] As the map shows, intended uses for these areas include future development, airport development, general commercial activities, residential, and heavy and light industrial uses.

USFS. The USFS land, a mixture of alpine ridges, wetlands, and various types of forest, is managed for multiple uses under the 1997 Tongass National Forest Land and Resource Management Plan. The land provides wildlife and fish habitat, scenic viewsheds, and land held for potential timber production and mineral exploration. In 2002, the USFS prepared a Draft Supplemental EIS for its 1997 Tongass National Forest Land and Resource Management Plan that considers alternatives with new wilderness recommendations for Tongass National Forest. One of the eight alternatives included in the Draft Supplemental EIS recommends wilderness area on Gravina Island; however, the preferred alternative is No Action.

Alaska Department of Natural Resources. Most of the DNR land is in remote portions of the project area and near Bostwick Lake, Blank Inlet, and Vallenar Bay. The DNR areas and recommended land uses are:[3]

- *On the shoreline southeast of Clam Cove*: Reserved for state interests only.
- *On Vallenar Bay*: Commercial forestry, dispersed recreation areas, settlement, timber, anadromous streams, and important habitats and wildlife movement corridors.
- *Adjacent to and west of California Ridge (including the area around Bostwick Lake*): Dispersed recreation, timber harvest, wetlands, and wildlife habitat.
- *Small islands, beach, tidelands, and marine waters on the southern tip of Gravina Island*: Dispersed recreation, deer habitat, and scenic resources; recommended to be included in the state park system.

DOT&PF. Ketchikan International Airport (including floatplane facilities) is currently leased to the Borough. The area immediately outside the developed airport site is the Airport Reserve zone. The Airport Reserve zone is designated for future airport-related uses. Beyond the Airport Reserve zone is the Airport Development zone, which is designated for auxiliary airport facilities such as parking lots, hotels, rental car businesses, and other lands uses, although it

[2] Ketchikan Gateway Borough Planning Department. 1996. *Ketchikan Gateway Borough Comprehensive Plan*.

[3] Alaska Department of Natural Resources, November 2000. *Central and Southern Southeast Area Plan for State Lands*.

currently remains largely undeveloped. Use of Airport Development land is subject to Borough and State of Alaska review and approval.[4]

Ketchikan Gateway Borough. Borough-owned lands are located along the east side of Gravina Island on the north, west, and south sides of the Ketchikan International Airport lands. These areas are currently included in the Borough's comprehensive planning effort known as *Ketchikan 2020* (see Section 3.1.2.4). The Borough is developing specific development strategies for all of the east side of Gravina Island, exclusive of any USFS lands. A timber processing plant and related industrial sites are north of the airport on lands leased from the Borough.

Alaska Mental Health Trust Authority. The State of Alaska Mental Health Trust land within the project area is generally west of airport reserve land. Specific management plans have not yet been developed for this land; however, revenue generation is the main objective of Alaska Mental Health Trust land. A large portion of the Alaska Mental Health Trust land is located inland, extending west to California Ridge and east to the Airport Reserve land. Alaska Mental Health Trust land also includes smaller areas of land on the southern and northernmost portions of the project area on Gravina Island. The Alaska Mental Health Trust land is zoned by the Borough for "future development."[5]

University of Alaska. The University of Alaska lands are undeveloped parcels on the southwest side of Blank Inlet and on the west side of Vallenar Bay.[6]

Private. Private lands at Clam Cove are designated for residential use (approximately 38 parcels, both developed and undeveloped). Outside the immediate project area, at Vallenar Bay on the northwestern part of the island, and at Seal Cove in the southern portion of the island, there are other developed and undeveloped private lands. Developed private lands on Gravina Island are generally residences or recreation cabins.

3.1.1.4 Tidal and Submerged Lands

Tidal and submerged lands associated with Tongass Narrows are used for marine boat and floatplane operations. Tidelands and submerged lands are under a mix of DNR and Borough ownership. Many of the parcels have been leased for private development.

3.1.2 Land Use Plans and Policies

The Borough is the planning authority for the study area. The adopted plans with authority to govern land use decisions within the project area are the *Pennock and Gravina Island Neighborhood Plan,* 1985*;* the *Coastal Management Program,* 1984 (updated in 1989); and the *Ketchikan Gateway Borough Comprehensive Plan*, 1996.[7] The Borough is currently engaged in a comprehensive planning effort known as *Ketchikan 2020*, which consists of the *Gravina Island*

[4] Alaska Department of Transportation and Public Facilities. June 2003. *Ketchikan International Airport Master Plan*.

[5] Ketchikan Gateway Borough Planning Department. 1996. *Ketchikan Gateway Borough Comprehensive Plan*.

[6] Ketchikan Gateway Borough Assessment Department, 2001. *Tax Assessor's Database*.

[7] Ketchikan Gateway Borough Planning Department. *Pennock and Gravina Island Neighborhood Plan*, 1985; *Coastal Management Program*, 1984; and *Comprehensive Plan*, 1996.

Plan, updates of the 1996 *Comprehensive Plan* and 1989 *Coastal Management Program*, and a *Wetland Development Plan*. The *Ketchikan International Airport Master Plan* was adopted by the Borough on May 5, 2003. Descriptions of these plans and policies and their relevance to the Gravina Access Project are provided in the following sections.

3.1.2.1 Pennock and Gravina Island Neighborhood Plan

The *Pennock and Gravina Island Neighborhood Plan*, produced by the Borough in 1985, set up a framework for the development of the lands on Gravina and Pennock Islands. Although now outdated, it is the most recently adopted plan specific to Pennock and Gravina Islands. *The Gravina Island Plan* is expected to supersede the Gravina Island portion of that plan. The plan was written at a time when considerable economic and population growth was anticipated in Ketchikan as a result of nearby mineral development. That mineral development did not occur, and the growth of Ketchikan was not consistent with the assumptions of the plan, so the plan may not reflect current thinking of the planning department, elected officials, or residents. For this reason, public meetings for this project were held specifically to focus on Pennock and Gravina Island residents.

One objective of the *Pennock and Gravina Island Neighborhood Plan* was to develop a transportation system that would provide access to interior land without compromising the qualities that attracted residents to the area. The plan clearly articulated a vision for future transportation access that would include a ferry. Regarding a bridge, the plan states: "Hard access by bridge or tunnel from Pennock to Gravina Island is not envisioned in the foreseeable future and, in light of the rural characteristics, should not be pursued. Hard access and its possible location is of concern to the community as a whole and should be determined by a Borough-wide vote" (page 26). (Note that a Borough vote was taken October 1, 2002 regarding use of Borough land for a bridge to Gravina Island, but not specifically addressing Pennock Island).

3.1.2.2 Coastal Management Program

The *Coastal Management Program* was originally prepared in 1984 and was updated in 1989. The plan is part of the Alaska Coastal Management Program and contains policy guidance regarding the use and protection of coastal resources. The plan provides specific guidance regarding access to Gravina, discusses the need for improved access to Gravina Island, and identifies a hard link (bridge) as the solution supported by the plan. The purposes of the hard link, according to the plan, are:

- Airport development
- Access to commercial and industrial waterfront property
- Access to Borough land selections
- Access to developable land close to the city center
- Mutual aid opportunities for fire and police services
- Improved airfreight service to the business community

3.1.2.3 Ketchikan Gateway Borough Comprehensive Plan

The *Comprehensive Plan* lays out issues and strategies for development in the Borough. Under the topic of "Economic Development," the goal is to "expand and diversify the local economy" and the number 1 strategy is "Gravina Island Development." Under the topic of

"Transportation," the goal is "Ensure Adequate Access," and the number 1 strategy is "Bridge." The number 2 strategy is "Enhance Ferry Access." This plan also discusses a shortage of commercial and industrial land, and envisions that Borough holdings of land on Gravina and Pennock Islands would be used to meet the demand. The plan indicates that "expanding the community's land base to any extent, however, is dependent on providing roaded access to it, in this case, a hard link."

3.1.2.4 Ketchikan 2020

The Borough's *Ketchikan 2020* planning effort is an in-progress program to develop or update four planning documents in the Borough:

- *Gravina Island Plan* (develop)
- *Coastal Zone Management Plan* (update)
- *Wetland Development Plan* (develop)
- *Comprehensive Plan* (update)

The Borough has published a *Gravina Island Plan* (final public review draft). The Gravina island Plan consists of plans for three separate subareas on Gravina Island—Central Gravina and Airport Reserve, North Gravina, and Clam Cove and Blank Inlet. This plan allows residents to consider opportunities for developing Gravina Island in tandem with selection of Alternative F1, the alternative preferred by the Borough, DOT&PF, and FHWA for improving access to the island. The plan also provides a discussion of general issues and policies pertaining to the island. See Figure 3.4 for the Gravina Island Area Plan Map, Figure 4.2 for Gravina Island Plan details, and Appendix S for the Gravina Island Plan is its entirety.

For the other three planning documents, only an internal Borough draft of the *Coastal Zone Management Plan* update has been prepared to date. The Borough has developed a work plan for completing the *Wetland Development Plan*. The Borough has not started its update of the *Comprehensive Plan.*

3.1.2.5 Ketchikan International Airport Master Plan

The DOT&PF has recently revised the *Ketchikan International Airport Master Plan*. The master plan update considers how the airport will need to develop to accommodate future growth, and outlines changes in operations over a 20-year time period (through 2018). Key components of the master plan update most pertinent to the Gravina Access Project include parking additions and a terminal area, and apron and taxiway expansion and improvements. The two key projects in the plan call for completion of a parallel taxiway along the north side of Runway 11 and an upgrade of the runway safety area to be accomplished by shifting the runway 800 feet. This shift will create 1,000 feet of safety area at the northwest end without requiring significant in-water fill. The project would also build 1,000 feet of runway safety area beyond the shifted runway at the southeast end.

3.1.3 Section 4(f) Land (Parks, Recreation Areas, Historic Sites)

Where land uses include public parks, recreation areas, wildlife refuges, or historic sites, Section 4(f) law may apply (see Figure 3.3 [Land Use] and Figure 4.1 [Maintained Park Areas] for more information). Section 4(f) of the Department of Transportation Act of

1966 requires that "special effort be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites" (49 USC Section 303). The intent of Section 4(f) and the policy of the U.S. Department of Transportation are to avoid public parks, recreation areas, wildlife and waterfowl refuges, and historic sites of national, state, or local significance. If a proposed Department of Transportation project crosses such publicly owned lands, the Department requires a rigorous evaluation of alternatives that would avoid those lands. The Secretary of Transportation would approve the use of Section 4(f) property only if:

(1) There is no prudent and feasible alternative to using that land; and

(2) The project includes all possible planning to minimize harm to the park, recreation area, refuge, or historic site resulting from the project.[8]

In the project area, there are no wildlife refuge lands. There is an array of Borough and state park lands and National Forest recreation areas in and near Ketchikan and Saxman (the City of Ketchikan does not have its own park powers). State parks lie north and south of the project area and National Forest recreation sites are inland, well away from the edges of Tongass Narrows. Also, south of the project area is Totem Park in Saxman. Parks managed by the Borough are the only Section 4(f) lands in the project area. There are 17 Borough parks (including areas reserved for future parks) between the State Ferry Dock/Bryant Avenue (2.5 miles north of downtown) and the Thomas Basin boat harbor area (0.5 mile south of downtown). These are discussed more specifically in Section 4.1.3.

There are many Ketchikan and Saxman properties on the National Register of Historic Places, particularly in downtown Ketchikan. Other historic sites were discovered as part of this project near the alignments of some alternatives. Details of these sites are provided in Sections 3.21 and 4.21.

3.2 FARMLAND

There is no farmland in the project area that is considered prime or unique, or is of statewide or local importance.

3.3 SOCIAL ENVIRONMENT

3.3.1 Population and Social Groups

3.3.1.1 Ketchikan Gateway Borough

In the past few years, the economy of the Borough has undergone many changes that have affected growth and population in the community.[9] Figure 3.5 illustrates population fluctuations from 1990 to 2000. Population increased annually from 1990, reaching a peak of 14,764 in 1995, and then began to decrease until a slight increase occurred between 1999 and 2000. From 1990 to 2000, the overall population increase of the Borough was 1.8 percent—from 13,828 people in 1990 to 14,070 people in 2000. However, estimates by the Alaska

[8] FHWA, 2003. Section 4(f) Regulations. http://environment.fhwa.dot.gov/projdev/4fregs.htm

[9] DOT&PF, Gravina Access Project, *Social Environment Technical Memorandum*, prepared by HDR, November 2001.

Department of Labor and Workforce Development prepared in January 2003 indicate that the July 2002 population of the Borough had declined slightly to 13,670.

Currently, roughly 275 active duty and civilian employees work at the USCG facility in Ketchikan. Another nine active duty and civilian employees work off base in town. On average, the number of USCG personnel that actually live on base is 20[10].

3.3.1.2 Minority and Low-Income Populations

Based on 2000 U.S. Census Bureau race and income data, 26 percent of the population in the Borough is minority (more than one race or a single race other than white). Table 3-1 and Figure 3.6 show the minority population breakdown by areas of the Borough known as Census Block Groups. The block groups cover smaller areas in the populated Ketchikan-Saxman area and quite large areas elsewhere in the Borough. The block group with the greatest minority population is in Saxman and is 47 percent minority. The City of Saxman itself, a subset of this block group, is approximately 70 percent Alaska Native. Other minority populations in the Borough include Asian, black, Native Hawaiian, and Hispanic. The median household income in the Borough is $51,344 per year. Table 3-2 and Figure 3.7 provide a breakdown of median household income by block group. Field visits, discussion of these topics with Borough planning staff,[11] and public meetings held for the project confirm that there are no pockets of predominantly minority or low-income populations in the immediate vicinity of any of the alternatives.

TABLE 3-1
2000 U.S. CENSUS POPULATION IN ALASKA AND THE KETCHIKAN GATEWAY BOROUGH

Area	*Total Population*	*Minority or Mixed Race*	*Percent Minority or Mixed Race*
Alaska	**626,932**	**192,707**	**30.74%**
Ketchikan Gateway Borough	**14,070**	**3,676**	**26.13%**
Block Group 1, Census Tract 1	1,317	142	10.78%
Block Group 2, Census Tract 1	906	79	8.72%
Block Group 3, Census Tract 1	1,192	125	10.49%
Block Group 4, Census Tract 1	396	48	12.12%
Census Tract 1 Total	**3,811**	**394**	**10.34%**
Block Group 1, Census Tract 2	2,350	733	31.19%
Block Group 2, Census Tract 2	2,548	795	31.20%
Census Tract 2 Total	**4,898**	**1,528**	**31.20%**
Block Group 1, Census Tract 3	1,071	498	46.50%
Block Group 2, Census Tract 3	1,165	344	29.53%
Block Group 3, Census Tract 3	788	317	40.23%
Census Tract 3 Total	**3,024**	**1,159**	**38.33%**
Block Group 1, Census Tract 4	1,086	451	41.53%
Block Group 2, Census Tract 4	1,251	144	11.51%
Census Tract 4 Total	**2,337**	**595**	**25.46%**

[1] Minority or Mixed Race indicates census respondents who describe themselves as a race other than white, or indicating more than one race.
Source: U.S. Census Bureau (http://www.census.gov/), 2002.

[10] Commander Anthony Palazzetti, USCG in Ketchikan, e-mail to Kristen Maines, HDR, June 19, 2003.

[11] John Hill, Ketchikan Gateway Borough Planning Department, personal communication with Kristen Maines, HDR, 2001.

Median household income data is based on census data for household income and earnings for 1999. Household income is generally used as the basis for determining poverty. The "median" for a block group (or any area) is the household income for which there are as many households with a greater income as there are with a lower income. The data presented allows comparison of the median income in the census block groups to the median income in Alaska and in the Borough. Table 3-2 also illustrates the percentage of persons below the poverty level as determined by the U.S. Census Bureau.

TABLE 3-2
2000 U.S. CENSUS BUREAU MEDIAN HOUSEHOLD INCOME AND PERCENT BELOW POVERTY LEVEL

Area	*Median Household Income in 1999 ($)*	*Percent (for whom poverty status is determined) Below Poverty Level in 1999*
Alaska	**51,571**	**9.4%**
Ketchikan Gateway Borough	**51,344**	**6.5%**
Block Group 1, Census Tract 1	61,989	7.3%
Block Group 2, Census Tract 1	55,469	5.4%
Block Group 3, Census Tract 1	63,594	2.9%
Block Group 4, Census Tract 1	51,750	0.0%
Census Tract 1	**60,109**	**4.7%**
Block Group 1, Census Tract 2	47,250	6.1%
Block Group 2, Census Tract 2	55,865	6.0%
Census Tract 2	**50,214**	**6.0%**
Block Group 1, Census Tract 3	38,155	4.6%
Block Group 2, Census Tract 3	35,607	11.3%
Block Group 3, Census Tract 3	40,250	15.4%
Census Tract 3	**36,574**	**10.1%**
Block Group 1, Census Tract 4	60,455	7.8%
Block Group 2, Census Tract 4	59,271	4.3%
Census Tract 4	**59,750**	**5.9%**

Source: U.S. Census Bureau (http://www.census.gov/), 2002.

The lowest median household income of block groups in the Borough is $35,607 (Block Group 2, Census Tract 3). Considering the average household size in the Borough is 2.56 persons, this figure is nearly twice what the U.S. Department of Health and Human Services identifies as the poverty level for a family of three in Alaska (i.e., $17,690 or less in 2000; see Table 3-3). Poverty guidelines for all states are included in Table 3-3 to provide a comparison to Alaska poverty guidelines. The U.S. Department of Health and Human Services poverty guidelines are a simplified version of the U.S. Census Bureau's statistical poverty thresholds used to prepare its statistical estimates of the number of persons and families in poverty.

TABLE 3-3
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES POVERTY GUIDELINES FOR 2000

Size of Family Unit	*48 Contiguous States and D.C. ($)*	*Alaska ($)*	*Hawaii ($)*
1	8,350	10,430	9,590
2	11,250	14,060	12,930
3	14,150	**17,690**	16,270
4	17,050	21,320	19,610
5	19,950	24,950	22,950
6	22,850	28,580	26,290
7	25,750	32,210	29,630
8	28,650	35,840	32,970

Source: Federal Register, Vol. 65, No. 31, February 15, 2000, pp. 7555-7557

Note: Bold indicates data for approximate average household size in Ketchikan.

3.3.2 Community Character

In the Borough's 1996 *Comprehensive Plan*, the community design section states that:

> *The character of a community is a result of both the natural and manufactured environment. The natural setting, because of its vastness and public ownership, will probably not change significantly over time. However, the urban fabric is subject to constant change in response to market demands and public investment decisions.*

The 1996 plan indicated a need for preserving neighborhood characteristics—such as neighborhood cohesiveness, aesthetics and appearance, and historical importance—through design review guidelines. In Ketchikan, according to the plan, the defining community characteristics are open space and scenic views, pedestrian access and circulation, community art and beautification, and cultural features and historic preservation.

3.3.2.1 Revillagigedo Island

The City of Ketchikan is the largest collective community on Revillagigedo Island. Residents of the City of Ketchikan value the quality of life their community provides, and many residents especially value the qualities that make their community and neighborhoods unique. Ketchikan is a small city where many of the people know each other and where residents value the intimate feel of their hometown.

Revillagigedo Island neighborhoods within the immediate vicinity of the project alternatives include:

- A commercial area at Signal Road and a small residential neighborhood along Baker Street North and Bucey Avenue North (Alternatives C3[a/b] and C3[b]). Baker Street North and Bucey Avenue North are dead-end streets with single-family homes of varied construction on different sized lots.

- The Cambria Drive neighborhood (Alternatives C4 and D1), with large cul-de-sac lots and newly built, single-family homes of similar construction and style.
- The Forest Park neighborhood (Alternative F1) residential area, with single and multi-family housing units and a mixture of older and newer homes, located just south of the city limits of Ketchikan.

Saxman is incorporated as a second-class city and is located about 2 miles southeast of Ketchikan. It lies across the East Channel from Pennock Island. It was settled by Tlingit people in 1894 and today still has a high Alaska Native population. It functions as a part of greater Ketchikan, but is also the seat of the Organized Village of Saxman, a tribal government, and it is designated a rural community under federal subsistence management rules. Subsistence is an important socioeconomic element for Saxman. Among other community buildings, there is a totem pole carving center, which is culturally important and attracts tourists. The population of Saxman is approximately 400.

3.3.2.2 Pennock and Gravina Islands

The *Pennock and Gravina Island Neighborhood Plan*[12] illustrates that these residents value their sense of community and their existing way of life. Many residents of these islands are former residents of the City of Ketchikan. They were attracted to the islands by their rural and more self-sufficient lifestyle.

A special workshop for Pennock and Gravina Island residents was held May 23 and 24, 2001, to obtain input on the existing *Pennock and Gravina Island Neighborhood Plan* and current planning activities (i.e., *Ketchikan 2020*), particularly with respect to the bridge alternatives under consideration (see Appendix B). A summary of the 1985 *Pennock and Gravina Island Neighborhood Plan* was mailed to residents and they were asked to be prepared to discuss what has changed from the 1985 plan, what has stayed the same, and what development they would like to see in the future. A summary of the comments offered by participants is presented below:

- Comments were offered both in opposition to and support of a Pennock Island Alternative.
- Some residents said that they would like to have access from Pennock Island to Ketchikan and Gravina Island, with a ferry or bridge to provide access to/from Clam Cove.
- Comments were also offered by some Pennock Island and Clam Cove residents that there may not be a need now, but at some point in their lives they may want improved, relatively quick, and easy access to Ketchikan or the airport (by road). Interest was also expressed in providing access to north Gravina Island.
- Other residents expressed general opposition to a Pennock Island Alternative. They felt that a bridge and associated roads would change the rural and isolated nature of the island.

[12] Ketchikan Gateway Borough Planning Department, 1985.

- A comment was made that Pennock Island residents can already get to the airport in 15 minutes (by skiff), and that access to Ketchikan (and Revillagigedo Island) was a bigger concern to the residents.
- Residents of Clam Cove in attendance at the meetings were supportive of improved access, from either a Pennock Island Alternative or other improved-access alternative with a road extension to the south. There was general support from Clam Cove residents to move the proposed road closer to the waterfront property to make tying into the road easier from each of the lots.
- There was considerable discussion of how Pennock Island or Clam Cove residents would have access to a bridge. For example: Would there be a network of roads on Pennock Island? How many access points would there potentially be? Would this lead to secondary development on Pennock Island?

3.3.3 Community and Public Facilities

The Borough, City of Ketchikan, and City of Saxman provide an array of community services to the public.[13] These are summarized in the following paragraphs. Those facilities located within the project area are shown in Figure 3.8.

3.3.3.1 Libraries

The Borough has nine libraries: one public library, six school libraries, one college library, and one law library (for reference only). There are no libraries in Saxman.

3.3.3.2 Schools

There are five elementary schools in the Borough, one middle school, two high schools, and two other programs—a total of 2,372 students as of April 25, 2003. The University of Alaska, Southeast has an academic campus and a technical center, both in Ketchikan. There are no schools located directly in Saxman.

3.3.3.3 Police Services

The City of Ketchikan and City of Saxman each operate police departments to serve residents within their own city limits. The Alaska State Troopers are based on Revillagigedo Island approximately 2 miles north of the airport ferry terminal. They serve residents outside of the city limits.

3.3.3.4 Fire Protection and Emergency Response

Ketchikan staff and volunteers, along with local volunteer fire departments run by the Borough service areas, provide fire protection and emergency response services to businesses and residents living on the portion of Revillagigedo Island accessible by road. In addition, the City of Saxman has a fire unit. There are seven Borough fire stations located throughout the Borough. All are staffed by volunteers, except the fire station on Main Street in downtown Ketchikan. The average response time (for all service areas) by the city fire station and emergency medical service is approximately 4 minutes. The volunteer squads are used as needed.

[13] Alaska Department of Community and Economic Development (DCED) Community Information Database Online, <www.dced.state.ak.us/mra/CF_COMDB.htm>, 2001.

Emergency services are not provided to residents living beyond the road system or on Pennock and Gravina Islands, as they are outside the designated service areas. The airport has its own rescue and fire-fighting personnel. However, a cooperative emergency response system uses the ferry between Ketchikan and the airport (particularly for people brought by air [medevac] to the Ketchikan hospital). If there is a medevac during normal hours of ferry operations, the ferry schedule is interrupted. Emergency responders are given priority and ferried across Tongass Narrows as quickly as possible. After hours, the hospital or other emergency response team calls the ferry operator, and the ferry is put into operation to move emergency responders across Tongass Narrows. Other emergency marine response in Alaska generally falls to the USCG and Alaska State Troopers.

3.3.3.5 Health Care Facilities

Local hospitals and health clinics are the Ketchikan General Hospital, the Southeast Alaska Regional Health Consortium Clinic, the Gateway Center for Human Services, and the USCG Ketchikan Dispensary. The hospital is a qualified acute care facility and medevac facility. The USCG facility provides emergency support only and is a qualified emergency care center. Saxman uses the Ketchikan health care facilities.

3.3.4 Recreation Resources

The City of Ketchikan has numerous parks, trails, and recreation areas, as well as tennis courts, playing fields, and indoor recreation centers. Saxman has a gym in its community center. Fishing, hunting, hiking, and cycling are popular activities throughout Revillagigedo Island. Hiking trails (Figure 3.8) and USFS logging roads provide access to remote areas on Gravina Island. Tongass Narrows is popular for recreational boating and fishing. Gravina Island offers fishing, hunting, shellfish gathering, and hiking, with accessibility along the shoreline and on primitive trails. Dall Bay State Marine Park, a boat-accessible park, is located at the southern end of Gravina Island. A USFS public use recreational cabin is also on the southern end of the island. While there is no specific Borough trails plan, the *Gravina Island Plan* (final public review draft)[14] discusses the location of existing and development of new recreation resources, such as hiking and kayak trails, lodges and cabins, backcountry wilderness experiences, nature walks, and improved access to Bostwick Lake and Gravina Island streams for fishing (see Figure 3.4 for the Gravina Island Area Plan Map). Pennock Island is accessible by boat and is used for hunting and fishing, but there are no developed recreation facilities on the island. Section 3.8 provides more information on pedestrian and bicyclist corridors as transportation facilities.

From 1990 to 2000, the number of deer hunters in the greater Revillagigedo Island area (Game Management Unit 1A) decreased by 26 percent (from 1,009 hunters to 747 hunters), and the number of hunter days decreased by 29 percent (from 5,127 days to 3,644 days).[15] From 1990

[14] Ketchikan Gateway Borough Planning Department, November 2003.

[15] Porter, Boyd. 2001. Unit 1A Deer management report. Pages 1-19 in M. V. Hicks, editor. Deer management report of survey and inventory activities 1 July 1998–30 June 2000. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Grants W-27-2, W-27-3. Proj. 2.0. Juneau, Alaska.

to 2001, the total number of fishing (angler) days decreased by 11 percent (from 91,127 days to 80,916 days)[16,17].

3.3.5 Accessibility

Natural features and limited infrastructure constrain the accessibility and means of travel to various locations on Gravina Island within the project area. Currently, access to developable land is not possible because there is no road from the existing airport ferry to developable lands. The Borough is planning limited road access from the existing ferry to lands north of the airport.

A stated need for the Gravina Access Project is to improve access to Ketchikan International Airport and to other lands on Gravina Island. One measure of accessibility is the amount of time it takes to travel from one point to another. Existing travel times were calculated for travel between nine origin points on Revillagigedo Island and the airport terminal on Gravina Island. All of the routes were analyzed for vehicular travel times, and three of these routes were analyzed for trips taken by pedestrians and bicycles. Table 3-4 presents the travel times calculated for these nine routes under existing conditions.

TABLE 3-4
TRAVEL TIMES FROM REVILLAGIGEDO ISLAND TO KETCHIKAN INTERNATIONAL AIRPORT

Origin (on Revillagigedo Island)	*Travel Mode*	*Travel Time[1] (in minutes) to the airport terminal on Gravina Island*
Downtown Saxman (Fire Station)	Vehicles	32
Hospital	Emergency Vehicles	21
Peninsula Point Fire Station	Emergency Vehicles	22
Alaska Marine Highway Fire Station	Emergency Vehicles	23
Main Street Fire Station	Emergency Vehicles	25
Point Higgins	Vehicles	32
Downtown Ketchikan (Mile Post 0)	Vehicles	27
	Pedestrians	76
	Bicycles	37
Ward Cove (Post Office)	Vehicles	25
	Pedestrians	111
	Bicycles	47
Carlanna Creek	Vehicles	19
	Pedestrians	21
	Bicycles	20

[1] The calculation of travel times is based on the length of roadway traveled and the average speed of vehicles, pedestrians, and bicycles on that roadway. The average speed of vehicles was assumed to be 5 miles per hour (mph) slower than the posted speed limit (except for emergency response vehicles, for which the average speed was assumed to be the posted speed limit). The average speed for pedestrians was assumed to be 3 mph and for bicyclists 10 mph. Ferry time, based on scheduled summer ferry service every 15 minutes, was assumed to be 19 minutes, including 15 minutes for waiting/loading/unloading and 4 minutes for transit. Because of variations in ferry waiting time and traffic, actual travel times may vary.

[16] Walker R. J., et al. 2003. Participation, catch, and harvest in Alaska sport fisheries during 2000. Alaska Department of Fish and Game, Fishery Data Series No. 03-05, Anchorage on www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm.

[17] Hoffman, Steve. April 16, 2003. Personal communication. Telephone conversation between ADF&G Sport Fish Division and Kristen Maines, HDR Alaska, Inc. for 2001 data.

3.3.6 Environmental Justice

Executive Order 12898[18] states:

> *Each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.*

The Federal Highway Administration (FHWA) order "FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations"[19] contains the following definitions:

- Low-Income: A household income at or below the poverty guidelines of the U.S. Department of Health and Human Services
- Minorities:
  - Black (having origins in any of the black racial groups of Africa)
  - Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race)
  - Asian-American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands)
  - American Indian or Alaskan Native (having origins in any of the original people of North America and who maintain cultural identification through tribal affiliation or community recognition)

Given the importance of the Alaska Native population in Alaska, the project team analyzed the demographics of the study area (the demographic information for the project area is described above in Section 3.3.1) and consulted with Native groups to determine the impacts on these groups. The project team has met with representatives of the Metlakatla Indian Community (governing body for the Annette Island Reserve—the only Indian reservation in Alaska—located 15 miles south of Ketchikan), the Ketchikan Indian Corporation Tribal Council (governing body for Alaska Natives living on Revillagigedo Island), the Organized Village of Saxman (organized under the Indian Reorganization Act), and Cape Fox Corporation (the local Native corporation established by the Alaska Native Claims Settlement Act). Several meetings were joint meetings of these organizations. The summary of meetings held is presented in Table 7-1 of Chapter 7. More detailed information on population and social groups (including minority and low-income populations) can be found in Section 3.3.1.2.

Executive Order 12898 also defines a "disproportionately high and adverse effect on minority and low-income populations" as follows:

[18] *Federal Register*, February 11, 1994. Vol. 59 No. 32, p. 7629.

[19] FHWA, *Order on FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, December 2, 1980.

> *An adverse effect that is predominantly borne by a minority population and/or a low-income population; or will be suffered by the minority population and/or low-income population, and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population*.

Any disproportionately high and adverse effects on minority and low-income populations—environmental justice impacts—are discussed in Section 4.3.6.

3.3.7 Subsistence

Subsistence is defined in the Alaska National Interest Lands Conservation Act, Section 803, as "the customary and traditional uses by rural Alaska residents of wild, renewable resources" for non-commercial purposes. Hunting, fishing, trapping, and gathering natural resources are major elements of the cultural and economic life of many Ketchikan-area residents. However, federal law regulates subsistence on federal land, state law regulates subsistence on state land, and the regulations differ. Federal law defines rural and non-rural areas, and a person must be a rural Alaska resident to participate in subsistence on federally-owned lands under federal subsistence regulations[20]. Under state law however, all Alaska residents are eligible to participate in subsistence on state-owned lands, but only in state-defined subsistence use areas[21].

Ocean resources (such as fish, abalone, clams, and seaweed) and forest resources (such as berries, birds, eggs, and various land mammals) provide a rich and varied diet. Subsistence activities are also important to follow cultural customs and traditions (including handcrafts), and to supplement personal income. Pennock Island (in the project area) and the Bostwick Bay, Inlet, and Creek areas on southeastern Gravina Island (outside the project area) are popular subsistence areas, though are not designated as such by either state or federal agencies.

In 1999, 80 percent of the residents of Saxman engaged in subsistence harvesting in these areas and the surrounding region, and almost all of them (97 percent) used subsistence products. The per-capita subsistence harvest was estimated at 217 pounds per person, and included roughly 130 pounds of fish (84 pounds of salmon and 47 pounds of other fish), 29 pounds of land mammals, 12 pounds of marine mammals, 23 pounds of vegetation, and 23 pounds of marine invertebrates.[22]

The residents of Annette Island (see Figure 1.1 [Project Area]) also depend on subsistence resources. The most recent data available indicates that in 1987, 77 percent of the residents of Metlakatla engaged in subsistence harvesting in these areas and the surrounding region, and all of them (100 percent) used subsistence products. The per-

[20] The following sub-areas are considered not rural: Clover Pass, Herring Cove, Ketchikan City, Ketchikan East, Mountain Point, North Tongass Highway, Pennock Island, Saxman East, and parts of Gravina Island. This encompasses residents of the entire east side of Tongass Narrows from Behm Canal to George Inlet, except for Saxman itself, according to public information posted by the U.S. Fish and Wildlife Service on its web site in May 2003 (www.r7.fws.gov/asm/regs01/apply.pdf).

[21] The Ketchikan Nonsubsistence Area (as defined by the Joint Board of Fisheries and Game) includes: all drainages of the Cleveland Peninsula between Niblack Point and Bluff Point, Revillagigedo, Gravina, Pennock, Smeaton, Bold, Betton, and Hassler Islands…" (Fax from Mike Turek, ADF&G Division of Subsistence, to Kristen Maines, 12/8/03).

[22] Alaska Department of Fish and Game, Division of Subsistence, Household Survey, 2000.

capita subsistence harvest was estimated at 70 pounds per person, and included roughly 38 pounds of fish (20 pounds of salmon and 17 pounds of other fish), 11 pounds of land mammals, 1 pound of marine mammals, 5 pounds of vegetation, 15 pounds of marine invertebrates, and 1 pound of birds and eggs.[23]

3.3.8 Utilities

3.3.8.1 Water

Ketchikan, Airport, and Saxman

Ketchikan Public Utilities (KPU) provides potable water to almost all developed areas within the City of Ketchikan on Revillagigedo Island and to the airport on Gravina Island. The KPU's main water distribution system for the City of Ketchikan delivers up to 500 gallons per person per day. The system consists of three tanks and more than 21 miles of pipe ranging from 2 to 16 inches in diameter. KPU provides water to the airport on Gravina Island through an underground and submarine main line.

The primary sources of KPU water are Ketchikan and Carlanna Lakes; if additional water is needed, it is supplied from Whitman Lake and the Water Lake watershed. The KPU system has the capacity to provide water outside the city limits, but it does not have a distribution network to handle the volume and pressure loads that a regional system would require.

Saxman has a small piped water system for its residents. It includes a reservoir and treatment system.

Other water resources on Gravina Island include Bostwick Lake, which has a watershed of approximately 1.7 square miles. If needed, this and several smaller lakes on Gravina Island could serve as future water sources. These are now undeveloped.

Other Areas

Except for the airport, property owners are responsible for their own water systems in areas of the Borough outside of the City of Ketchikan and City of Saxman. Most homes and small businesses, including those on Pennock and Gravina Islands, depend on rooftop catchment systems for their water supply; during dry months, tanker trucks deliver water from KPU to customers in areas accessible by road. Some residents have wells.

3.3.8.2 Sewer

Ketchikan, Airport, and Saxman

Both the City of Ketchikan and the City of Saxman operate wastewater systems, including collector lines and treatment plants. Ketchikan's sewage treatment plant has a capacity of 7.0 million gallons per day, and currently treats about 1.5 million gallons in an average day and approximately 4.0 million gallons per day during peak flows in wet weather. This kind of increased flow is not uncommon in Southeast Alaska. Saxman's treatment system has a capacity of 115,000 gallons per day. The airport operates its own sewer system.

[23] **Alaska Department of Fish and Game, Division of Subsistence, Household Survey, 1988.**

Other Areas

Owners of properties on Pennock and Gravina Islands, and outside the service areas of Ketchikan and Saxman, are responsible for their own sewer systems. It is assumed that most have septic tanks and leach fields. In outlying areas, there may be some direct discharge to the ocean or use of pit toilets.

3.3.8.3 Electricity

The KPU also provides electricity to the Ketchikan area, including the City of Ketchikan, the City of Saxman, Gravina Island, and Pennock Island. Portions of Gravina and Pennock Islands are served by submarine cable. The KPU has an annual average energy generation of about 65 million kilowatt-hours (kWh) from several hydroelectric projects. It also purchases power produced at the Swan Lake Project, which produces about 76 million kWh per year. In addition, KPU owns diesel generators capable of generating an additional 100 million kWh per year.

The total power currently available to KPU is about 241 million kWh per year. Power usage from this system is currently about 55 percent of the generating capacity (about 133 million kWh per year).

3.3.8.4 Telephone

KPU Telecommunications (one of three divisions of KPU) currently has over 11,000 lines to subscribers on Revillagigedo Island and Gravina Island. The telephone system includes service to Ketchikan International Airport by submarine cable. There is no service to Pennock Island.

3.4 RELOCATION

As a means of providing uniform and equitable treatment for those persons displaced by federal or federal aid projects, the federal government passed the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," and the "Uniform Relocation Act Amendments of 1987." This legislation provides for uniform and equitable treatment of persons displaced from their homes, businesses, or farms by federal and federally assisted programs and establishes uniform and equitable land acquisition policies for federal and federally assisted programs. Whenever acquiring real property for a program or project by a federal agency results in displacing anyone, the agency is required to reimburse the displaced persons and provide relocation planning, assistance coordination, and advisory services.

Residents displaced by a federal program generally are relocated to existing housing in the community, although they may have to locate elsewhere in the community. Businesses generally are relocated to similar business settings. The cost of relocating is covered as part of the relocation process. In accordance with the law, all owners of acquired property, without discrimination, are compensated for their loss of property at fair market value and all displaced persons are moved at no expense to them.

There are homes and businesses that may be affected by the project, as further discussed below and in Chapter 4. All alternatives would affect airport property on Gravina Island. Vacant housing and business sites are generally available in Ketchikan, should relocation be required.

Alternatives C3(a) and C3(b) may affect the property of a bank and a car dealership at the intersection of Tongass Avenue and Signal Road. Along the hillside parallel to Tongass

Avenue, these alternatives may affect residential property along Baker Street North and Bucey Avenue North. At the location of the alignment crossing Tongass Avenue, a residence would likely be affected.

The proposed intersection of Alternative C4 and Tongass Avenue may affect residential property on Tongass Avenue. The right-of-way would traverse the hillside parallel to Tongass Avenue for approximately 0.5 mile, crossing through Ketchikan Ready Mix Quarry property and through the Dawson Construction Company property.

For Alternative D1, a small amount of land on the south side of Cambria Drive may be affected. The right-of-way would traverse the hillside parallel to Tongass Avenue, north of the Cambria neighborhood, for approximately 0.3 mile, crossing through the Dawson Construction Company property and west of the Carlanna Construction quarry operations.

Alternative F1 would connect with Tongass Avenue south of Tatsuda's grocery store in the vicinity of the existing rock quarry. The road would pass east of a tank farm, a cemetery, and the USCG Station, and north of Forest Park Subdivision. Alternative F1 may affect some commercial property on Revillagigedo Island and some vacant, private residential property on Gravina Island. It would also affect Alaska Mental Health Trust land and USCG land.

Alternative F3 would traverse undeveloped areas on Revillagigedo, Pennock, and Gravina Islands. The proposed alignment of Alternative F3 may affect vacant, private residential property on Gravina Island.

Alternative G2 would place the new ferry terminal and parking facilities on Peninsula Point at the existing location of a Pro Mech aircraft hangar. Access to the ferry terminal from Tongass Highway may affect commercial property adjacent to the highway.

Alternative G3 would involve construction of a ferry terminal and parking facilities on Bar Point at the current location of a gas station, a fast-food restaurant (Burger King), and the Gateway City Realty building, which currently has three businesses as tenants.

Alternative G4 would involve construction of a ferry terminal and parking facilities adjacent to the existing airport ferry terminals on both Revillagigedo and Gravina Islands.

3.5 ECONOMIC ENVIRONMENT

3.5.1 Employment and Earnings

The number of jobs in the Ketchikan Gateway Borough increased dramatically from 1980 to 1990, and then, after a decline in the number of jobs in the early 1990s, peaked at about 7,315 jobs in 1996. After the closure of the Ketchikan pulp mill in 1997, employment declined to about 7,000 jobs in 2001. Total earnings were $225,253,607 and annual average monthly earnings were $2,677 in 2001 (see Table 3-5). Growth in the tourism industry and the decline in the forest products industry have accounted for most of the changes in Ketchikan's economy over the last decade. The primary locations of major employers in the project area and their 2002 average monthly employment levels are illustrated in Figure 3.9.

TABLE 3-5
EMPLOYMENT AND EARNINGS IN THE KETCHIKAN GATEWAY BOROUGH, 2001

Industrial Classification	*Annual Average Monthly Employment (jobs)*	*Yearly Earnings ($)*	*Annual Average Monthly Earnings ($)*
Agriculture, Forestry, and Fishing (i.e., harvesting)	65	2,598,012	3,331
Construction	389	19,763,079	4,234
Manufacturing (includes seafood processing and forest products)	944	32,408,949	2,861
Industrial Classification	*Annual Average Monthly Employment (jobs)*	*Yearly Earnings ($)*	*Annual Average Monthly Earnings ($)*
Transportation, Communication, and Utilities	535	20,719,065	3,227
Wholesale Trade	149	4,805,719	2,688
Retail Trade	1,364	26,850,081	1,640
Finance, Insurance, and Real Estate	281	8,679,399	2,574
Services (includes hotels and restaurants)	1,388	37,086,124	2,227
Federal Government	255	12,702,847	4,151
State Government	567	21,847,340	3,211
Local Government	1,074	37,792,991	2,932
Total Industries	**7,011**	**225,253,607**	**2,677 (average)**

Source: Alaska Department of Labor and Workforce Development, 2003 (http://almis.labor.state.ak.us/).

3.5.2 Major Employment Industries

3.5.2.1 Forest Products

The forest products industry has been an important part of the Southeast Alaska (and Ketchikan) economy for more than half a century. The industry cuts and processes Sitka spruce, hemlock, and other species and sells them as whole logs, lumber, and other products. Historically, a large proportion was exported to Asian buyers.

Harvest areas near Ketchikan have included both Revillagigedo and Gravina Islands. No timber sales have been in the immediate project area. On Gravina Island, harvests of the closest areas have been managed by the state and USFS along Vallenar Creek and at Vallenar Bay at the northern end of the island. Smaller timber sales have taken place at Phocena Bay and Bostwick Inlet on the south and east sides of the island. Altogether, a little more than 1,000 acres has been harvested on Gravina Island.[24] The USFS recently proposed substantial timber sales on Gravina Island, but the project is currently not progressing.

The *Tongass National Forest Land and Resource Management Plan Revision: Final Impact Statement*[25] substantially reduced allowable harvest levels; at the same time, most Asian markets experienced downturns in price and demand for logs, cants, and woodchips. Current Tongass National Forest harvest levels are at the same level as those in 1945, while log supplies from private lands have declined as owners converted their forests to second-growth forests. Harvest levels from federal lands in Alaska continue to decline, while log supplies from

[24] USDA Forest Service. January 2000. *Gravina Island Timber Sale Draft Environmental Impact Statement*.

[25] USDA Forest Service. 1997. *Tongass National Forest Land and Resource Management Plan Revision: Final Impact Statement*.

state lands have risen. From 1988 to 1998, the value of the industry's total international exports declined by 56.3 percent (from $475 million to $208 million), and the value of international exports of softwood logs declined by 27.8 percent (from $262 million to $189 million). The combination of market downturns and reduced harvest levels led to closure of the Sitka pulp mill in 1993 and the Ketchikan pulp mill in 1997.[26] Currently, Pacific Log and Lumber operates a sawmill on Gravina Island, north of the airport.

3.5.2.2 Seafood

Seafood Processing

The longest period of seafood processing employment in Ketchikan is during the summer season, when millions of pounds of salmon are processed during a few months. From 1997 to 2000, gross annual earnings of the seafood processing industry (i.e., manufacturing of food and related products) in the Borough increased from approximately $10.4 million to $12.3 million, which constituted 4.4 to 5.4 percent, respectively, of the gross earnings of all industries in Ketchikan.[27]

Commercial Fisheries

Ketchikan commercial fisheries harvests consist largely of salmon and, to a lesser degree, halibut and sablefish. The relatively new sea cucumber and sea urchin dive fisheries have become a significant part of the commercial fisheries activity. Herring spawn on kelp remains a fairly large portion of the harvest, along with shrimp. Ketchikan commercial fisheries in 2000 accounted for approximately 9.5 percent of the employed labor force. Total gross earnings of Ketchikan residents involved in the commercial fish harvesting industry have declined since 1995, but with fewer permit holders, the average gross earnings per permit holder in 1999 and 2000 were comparable to those in 1995 and 1996. A large portion of the decline could be related to a diminishing per-pound value of salmon since the late 1980s.[28]

3.5.2.3 Tourism

The tourism industry in Alaska generates substantial income for the state and generates employment in a variety of industries such as transportation, retail trade, and services. Nonresident visitors spent approximately $1.4 billion in Alaska in summer 2001. The Ketchikan area has benefited from increased tourism in many ways, in terms of spending and employment. From 1988 to 1998, the number of summer visitors to Ketchikan increased 137 percent, to almost 600,000. Most of these visitors are attributable to the cruise industry.

Average cruise ship passenger spending was estimated at $95 per day in 1999. Data collected by Cruise Line Agencies of Alaska show that nearly 691,000 cruise passengers visited Ketchikan in summer 2001. Based on 1993 visitor spending data, local sales tax data, gross sales data, and other indicators, it was estimated that, in 1999, the cruise industry in Ketchikan accounted for approximately $54 million in spending by cruise passengers in Ketchikan, more

[26] DOT&PF. April 2002. *Existing Conditions Demographic and Socioeconomic Analysis*, and Gravina Access Project. Prepared by Northern Economics, Inc. and HDR Alaska, Inc.

[27] Ibid.

[28] Ibid.

than $3 million by cruise ship crews, and $8.5 million in direct spending by cruise lines in 1999.[29]

Tourism is the primary factor determining employment in the trade and services sectors in the area. Employment in these two industries depends on growth in the number of visitors and their level of spending.

3.5.2.4 Government

Government employment and spending play a major role in the Ketchikan area economy. In 2001, government jobs represented 27.0 percent of Borough employment—1,896 jobs: 255 of these jobs were Federal Government (3.6 percent), 567 were State Government (8.1 percent), and 1,074 were Local Government (15.3 percent).

3.5.2.5 Transportation

Ketchikan is a regional transportation center for southern Southeast Alaska, and transportation services between Ketchikan and communities inside and outside of the region are a significant economic factor in the Borough.

Ketchikan International Airport

There were approximately 136 employees (full- and part-time) at the airport in the winter of 2001-2002 (including 10 permanent ferry workers), and 159 in the summer of 2002 (including 10 permanent and four temporary ferry workers). The airport and airport-related businesses have consistently been important employers in Ketchikan over the years. In addition, increased security measures and the creation of the Transportation Security Administration have created additional jobs at the Ketchikan International Airport.[30]

Alaska Ship and Drydock, Inc.

The Ketchikan shipyard has been an important part of Ketchikan's economy since the late 1970s. Early operators of the shipyard encountered difficulties, but Alaska Ship and Drydock, Inc. (ASD) became the shipyard operator in 1994. Since then, ASD has successfully increased the vessel repair and construction business. From 1994 to 2001, annual ASD gross revenue increased from $2.4 million to $20.0 million, and ASD employment also increased, from 21 to 149 employees.[31]

Alaska Marine Highway System and Inter-Island Ferries

The AMHS is another transportation employer in the Ketchikan area. From 1990 to 1999, AMHS regular, winter full-time employment decreased 4.6 percent, from 564 employees to 538 employees system-wide. Regular summer full-time employment increased 13.4 percent, from 582 employees to 660 employees throughout the AMHS. The Inter-Island Ferry Authority (IFA) began commercial vessel operations in early 2002. In its first months of operation (during the

[29] The McDowell Group, Inc., 2000. *Cruise Industry Impacts on Local Governments in Southeast Alaska*.

[30] DOT&PF. April 2002. *Existing Conditions Demographic and Socioeconomic Analysis*, Ketchikan 2020 and Gravina Access Project. Prepared by Northern Economics, Inc. and HDR Alaska, Inc.

[31] Ibid.

winter), the IFA employed 24 persons; summer employment increased to 33.[32] Many of these jobs are in Ketchikan.

3.6 JOINT DEVELOPMENT

There are no joint development projects associated with the Gravina Access Project.

3.7 TRANSPORTATION

Because Ketchikan is on an island, transportation to and from the project area is based more on water and air transportation than on land-based transportation. Within the developed greater Ketchikan area, automobile and pedestrian facilities are important for day-to-day transportation.

As part of the Inside Passage, Tongass Narrows provides a major northwest-southeast corridor for both boats and aircraft. Tongass Narrows is approximately 13 miles long and, at its narrowest point, is about 0.25 mile wide; it is bounded by the steep mountains of Revillagigedo Island on the northeast and by Gravina Island on the southwest. These natural features funnel aircraft and sea-going vessels into a narrow corridor, and require them to operate in close quarters.

As discussed in the remainder of Section 3.7:

- Figure 3.10 (Aviation Transportation Facilities) shows the locations of facilities for wheeled airplanes, floatplanes, and helicopters, and the extent of the protected airspace around the airport.
- Figure 3.11 (Ketchikan International Airport: Existing Conditions) shows the runway layout and facilities at the airport.
- Figure 3.12 (Marine and Land Transportation Facilities) shows the docks and other facilities for boats, ferries, cruise ships, and other ships, as well as the routes of the ferries and cruise ships. Figure 3.12 also shows the surface transportation routes for vehicles, pedestrians, and bicyclists.

3.7.1 Aviation

Aviation operations in the Ketchikan and Tongass Narrows area are noteworthy because:

- The primary land-based aviation facility, Ketchikan International Airport, is on Gravina Island, across Tongass Narrows from the City of Ketchikan and the population base it serves.
- The generally steep topography of the islands bordering Tongass Narrows restricts aviation operations and facilities.
- Frequently, many aircraft (particularly floatplanes) operate concurrently in the relatively small and constrained airspace.
- Low-ceiling, low-visibility weather conditions often restrict aviation operations.

[32] Ibid.

In addition to these conditions, federal aviation regulations specific to Ketchikan govern aviation operations in the project area.

3.7.1.1 Ketchikan International Airport

The Ketchikan International Airport opened in 1974. It is owned by DOT&PF. Through a lease agreement with the state, the Borough has the authority to operate and maintain the airport.

Existing Airport Facilities and Operations

The airport has air and water access, but no land access. The main public access is via the airport ferry, which is operated by the Borough. The airport ferry crosses Tongass Narrows directly east of the airport terminal.

The airport has regularly scheduled commercial jet service and supports many air taxi operators serving the surrounding communities. In 1998, the airport had 16,331 operations of wheeled aircraft.[33] The airport also accommodates floatplanes, as described in Section 3.7.1.2 (Floatplane Facilities and Operations).

Airport facilities for wheeled aircraft comprise one paved and lighted 7,500-foot runway (Runway 11/29), two paved taxiways (A and B), and two aprons (one at the terminal area for commercial aircraft and another apron for general aviation aircraft). Taxiway A connects the terminal apron and Runway 11/29; Taxiway B connects the general aviation apron and the terminal apron. A third taxiway, to do away with the need to back-taxi on the main runway, was recently constructed (2003). The airport is constrained by mountains to the southwest and Tongass Narrows to the northeast. The northwest-southeast orientation of the runway is the only practical alignment, given the physical setting. There is no control tower; the Ketchikan Flight Service Station (FSS) staff monitors flight operations.

Airport support facilities include the airport terminal, an adjacent parking lot, and circulation roads. The airport parking lot, located adjacent to the terminal, has 62 spaces and is often filled to capacity. There are also 17 rental car spaces and 18 vehicle parking spaces at the transient floatplane dock, as well as 163 parking spaces at the airport ferry terminal on Revillagigedo Island. The pedestrian access between the ferry landing and the terminal is partially enclosed.

Airspace and Air Traffic Management

Federal Aviation Regulations (FAR) Part 93 Subpart M (Ketchikan International Airport Traffic Rule) prescribe specific protocols for operations at the airport and within Ketchikan airspace.[34] The FAR dictates specific communication and operational procedures in and around the airport, including communications requirements for all aircraft taking off, landing, and taxiing at the airport. An approaching aircraft must maintain a minimum altitude of 900 feet above mean sea level until it is within 3 miles of the airport, and a departing aircraft must maintain the runway heading until reaching an altitude of 900 feet above mean sea level.

[33] DOT&PF, Gravina Access Project, *Tongass Narrows Aviation Conditions Summary*, prepared by HDR, October 1999.

[34] 14 U.S. Code of Federal Regulations (CFR) 93.151-155 Subpart M - Ketchikan International Airport Traffic Rule.

FAR Part 77 (Objects Affecting Navigable Airspace) controls the height of every object in the vicinity of the airport that could reduce the safety and efficiency of airport operations and the surrounding airspace. The Part 77 airspace plan for Ketchikan International Airport (Figure 3.10) describes the surfaces that delineate the protected airspace and identifies the area where penetrations of this airspace occur. Most of the penetrating objects are natural features, such as trees and topographic high points. The Part 77 airspace surfaces at Ketchikan International Airport are described as follows:

Primary Surface. The primary surface is the surface longitudinally centered on the runway. The primary surface for Runway 11/29 extends 200 feet beyond each runway end and is 1,000 feet wide. According to the airport's most recent FAR Part 77 Airspace Drawing, completed in 1997, there are several obstructions, mostly trees and ground, located in the primary surface.

Transitional Surface. The transitional surface extends outward and upward at right angles to the runway centerline at a slope of 7 feet horizontally for each foot vertically (7:1) from the sides of the primary and approach surfaces. The transitional surfaces extend to where they intercept the horizontal surfaces at a height of 150 feet above the runway elevation. According to the 1997 FAR Part 77 Airspace Drawing, there are several obstructions, mostly trees and ground, located in the airport's transitional surface.

Horizontal Surface. The horizontal surface is a horizontal plane located 150 feet above the established airport elevation, covering an area from the transitional surface to the conical surface. The perimeter of the horizontal surface is constructed by swinging arcs from the center of each end of the primary surface and connecting the adjacent arcs by lines tangent to those arcs. The radius of the arcs is 10,000 feet for all runway ends designated for approaches that serve larger than utility-type aircraft. According to the airport's 1997 FAR Part 77 Airspace Drawing, there are several obstructions, mostly trees and ground, located in the airport's horizontal surface.

Conical Surface. The conical surface extends outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet. According to the airport's 1997 FAR Part 77 Airspace Drawing, there are several obstructions, mostly trees and ground, located in the conical surface.

Approach Surface. The approach surface is longitudinally centered on the extended runway centerline. The approach surface extends outward and upward from each end of the primary surface. The inner edge of the approach surface for Runway 29 is the same width as the primary surface (1,000 feet) and it expands uniformly in width for 3,500 feet to an outer width of 4,000 feet with an approach slope of 34:1. The approach surface for Runway 11 extends for a horizontal distance of 10,000 feet at 50:1 and then an additional 40,000 feet at 40:1, to an outer width of 16,000 feet. In order to allow for the heights of vehicles on roadways, the approach surface must clear interstate highways by 17 feet, and all other roads by 15 feet.

Airport Master Plan

The DOT&PF has recently revised the *Ketchikan International Airport Master Plan*.[35] The master plan update addresses development needs to accommodate future growth and changes in airport operations over a 20-year planning horizon. The planned upgrades most pertinent to the master plan are expansion of the terminal, aprons, taxiways, and parking capacity, as well as changes in traffic circulation on the airport roadway system. Two major projects are to build a taxiway parallel to and along the north side of Runway 11/29 (recently [2003] constructed) and to expand the runway safety area (the safety buffer around the runway that is generally free of structures) by shifting the runway 800 feet to the south. This shift would provide an additional 1,000 feet of safety area **beyond the threshold** at the northwest end (without requiring substantial in-water fill), as well as 1,000 feet of safety area beyond the shifted runway **threshold** at the south end. **The runway safety area expansion project has recently been scheduled to commence the environmental phase in 2004. Construction could occur in 2005 or later.**

3.7.1.2 Floatplane Facilities and Operations

The project area has very high levels of floatplane activity, especially in the summer. On an average summer day, traffic in Tongass Narrows consists of more than 500 floatplane landings and takeoffs.[36] These levels of boat and plane traffic, coupled with topographic and climatic constraints, create a challenging aviation environment.

Table 3-6 summarizes the approximate number of annual aviation operations of the major floatplane facilities in the project area.

TABLE 3-6
FLOATPLANE FACILITIES AND OPERATIONS, 1998

Facility	*Annual Operations*
Ketchikan Harbor Floatplane Base	88,000 – 100,000
Ketchikan International Airport	7,000
Murphy's Pullout Floatplane Base	100 – 200

Source: Tongass Narrows Aviation Conditions Summary, prepared by HDR, October 1999.

Ketchikan Harbor Floatplane Base

The Ketchikan Harbor Floatplane Base is located southeast of the airport, on the northeast side of Tongass Narrows and adjacent to downtown Ketchikan (Figure 3.10). This base is open to public floatplane use. Although it has no mooring facilities for floatplane storage, the base is located near numerous privately owned air taxi floatplane docks with mooring facilities. The base features a 10,000-foot by 1,500-foot water runway that is oriented northwest-to-southeast and is generally referred to as the "NW-SE Waterway." A 3,500-foot by 1,200-foot waterway

[35] DOT&PF. *Ketchikan International Airport Master Plan*. June 2003.

[36] U.S. Coast Guard, *Tongass Narrows Voluntary Waterway Guide*, 1999.

oriented roughly west-northwest to east-southeast is also located adjacent to this floatplane base (see Figure 3.10). Approximately 85 percent of the annual operations are by air taxis.[37]

Ketchikan International Airport Floatplane Facilities

The airport accommodates floatplanes at two floating docks and a concrete ramp east of the runway and north of the airport terminal (see Figure 3.11). One dock accommodates up to 12 Twin Otter aircraft and is used for loading and unloading passengers and freight; the other dock accommodates up to three transient floatplanes. The nearby concrete ramp is used for removing floatplanes from the water for maintenance and on-shore storage. A 9,500-foot by 1,500-foot water runway extends to the northwest from the airport, and is generally referred to as the "NWW-SEE Waterway" (see Figure 3.10).

Murphy's Pullout Floatplane Base

Murphy's Pullout Floatplane Base is located on Revillagigedo Island near Ward Cove, 5 miles northwest of Ketchikan. This base provides eight slips for transient floatplanes. Compared to the other floatplane facilities, this base has few operations.[38] Adjacent to Murphy's Pullout Floatplane Base is the 9,000-foot by 2,000-foot "NE-SW Waterway" that extends across Tongass Narrows and into Ward Cove (see Figure 3.10).

Private Floatplane Facilities

Numerous private charter floatplane businesses lie along the northern shore of Tongass Narrows in Ketchikan. Some of these operators have built large docks to accommodate floatplanes. Most operators using these facilities conduct floatplane operations out of Ketchikan Harbor Floatplane Base.

3.7.1.3 Helicopter Operations and Facilities

Several helicopter operators serve the project area, most of which are based north of Ketchikan. Generally, helicopters operate over land and avoid the congested airspace over Tongass Narrows.[39] Helicopter operations are at their highest levels during the summer, with approximately 50 operations per day from the Temsco Helicopters and Alpine Helicopters facilities near Ward Cove.[40]

The USCG plans to construct a helicopter pad on Revillagigedo Island at Wolff Point (i.e., just north of the airport ferry terminal) to improve emergency medevac access to Ketchikan General Hospital. Currently, the USCG helicopters land at the airport and patients rely on the airport ferry to cross Tongass Narrows. Approximately 27 such operations occur each year.[41] The USCG will construct the helicopter pad on property leased from DOT&PF. Construction is scheduled to begin in 2004, and the pad is expected to become operational by the middle of the summer 2004.[42]

[37] DOT&PF, Gravina Access Project, *Tongass Narrows Aviation Conditions Summary*, prepared by HDR, October 1999.

[38] Ibid.

[39] Joe Hicks, Temsco Helicopters, personal communication with HDR and DOT&PF staff, May 23, 2001.

[40] DOT&PF, Gravina Access Project, *Tongass Narrows Aviation Conditions Summary*, prepared by HDR, October 1999.

[41] Keith Oney, USCG, e-mail communication with Carol Snead, HDR, April 23, 2003.

[42] Frank Mielke, DOT&PF, facsimile communication with Kristen Maines, HDR, April 10, 2003.

3.7.1.4 Ketchikan Airspace and Operating Regulations

The Federal Aviation Administration (FAA) at the Anchorage Air Route Traffic Control Center (Anchorage Center) is the regional air traffic control center that separates and controls air traffic within its area of responsibility, including Ketchikan. The Ketchikan FSS provides aircraft pilots operating within Ketchikan airspace with air traffic and weather advisories, and information on water vessel activities to facilitate takeoffs and landings.

Class E Airspace

Controlled airspace is that airspace within which all aircraft operators are subject to certain requirements regarding pilot qualifications, operating rules, and equipment specifications, as prescribed by Title 14 CFR Part 91. All aircraft departing from or arriving at Ketchikan International Airport and the Ketchikan area floatplane facilities, as well as all aircraft passing through Tongass Narrows airspace, are subject to the Class E airspace requirements of 14 CFR Part 91. The Class E requirements permit operations under both visual flight rules (VFR) and instrument flight rules (IFR). The Ketchikan Class E airspace ceiling is at 18,000 feet above mean sea level. The Ketchikan Class E airspace floor is divided into two subclasses: Class E (700), with an airspace floor at 700 feet above mean sea level, and Class E (surface), with an airspace floor at the ground surface.

Visual Flight Rules for Ketchikan

Aircraft pilots flying under VFR must adhere to the special air traffic rules and communications requirements prescribed by FAR Part 93, Subpart M, Sections 93.153 and 93.155 when they are flying in the following areas:

- To, from, or in the vicinity of Ketchikan International Airport or Ketchikan Harbor
- Within the Ketchikan Class E airspace below 3,000 feet mean sea level and within the lateral boundary of the surface area of the Ketchikan Class E airspace

VFR operators in the project area are classified as 14 CFR Part 91 and Part 135 operators. Part 91 operators are general aviation operators, and Part 135 operators are commercial air taxi and commuter operators. The basic VFR minimums for the Class E (700) airspace are:

- Flight visibility of 3 statute miles
- 500 feet below, 1,000 feet above, and 2,000 feet horizontally from clouds
- 700 feet above mean sea level (except during takeoffs and landings)

While operating within the Class E (surface) airspace, Part 91 operators must maintain an altitude sufficient to allow a safe landing if the aircraft power unit fails (Section 119(a)); they must also maintain a distance of 500 feet from any person, vessel, vehicle, or inhabited structure (Section 119(c)). Part 135 operators must maintain a minimum altitude of 500 feet above mean sea level during the day, except when taking off and landing.

Part 91 and Part 135 pilots operating in the Class E (surface) airspace below the minimum altitude for the Class E (700) airspace are considered to be operating in uncontrolled airspace.

Special Visual Flight Rules

Until VFR visibility and ceiling minimums drop below the basic VFR minimums, pilots may perform VFR operations in accordance with the operating requirements of Class E (surface) airspace, described above. However, when visibility and ceiling conditions drop below VFR minimums, Part 91 and Part 135 pilots are required to receive an SVFR clearance from the Ketchikan FSS prior to entering Class E airspace. The purpose of these SVFR procedures is to ensure that pilots receive appropriate traffic advisories, to control the number of aircraft in the airspace when flying conditions are particularly challenging, and to separate aircraft operating under IFR from VFR aircraft. The Ketchikan FSS manager estimates that five to six SVFR aircraft can operate within the Class E (surface) airspace under SVFR conditions while maintaining visual contact; total SVFR operations for 2001 were estimated to be 1,984 operations, or approximately 1.8 percent of the 105,193 total annual floatplane operations[43].

Some Part 135 operators are exempt from the requirement to maintain a 500-foot minimum altitude while operating within Class E (surface) airspace. This FAA Exemption 4760 permits certain Part 135 pilots to operate floatplanes under an SVFR clearance from the Ketchikan FSS within Class E airspace below the 500-foot minimum altitude. The FAA applies additional conditions and limitations to this exemption, including:

- Operations are limited to floatplanes and amphibious aircraft being operated over water within an approved floatplane/amphibian SVFR corridor encompassing the Tongass Narrows and Ketchikan Harbor, and underlying the Ketchikan Class E airspace.
- Operations are authorized only during daylight hours or during the hours of Alaskan Civil Twilight when the sun is not more than 6 degrees below the horizon.
- Cloud cover must be greater than 50 percent and must preclude VFR flight at or above 500 feet above the surface before operations are authorized under the exemption.
- Aircraft may be operated below 500 feet above the surface down to an altitude of 400 feet above the surface only when the flight visibility is at least 2 miles, the surface wind velocity along the approved route is 12 knots or less, and the height of the sea is 1 foot or less.
- Aircraft may be operated below 400 feet above the surface down to an altitude of 200 feet above the surface only when the flight visibility is at least 3 miles, the surface wind velocity along the approved route is 12 knots or less, and the height of the sea is 1 foot or less.
- Operations are authorized only over open waterways, and operators must observe the minimum safe altitudes for emergency landings and separation clearance set forth in 14 CFR Part 91.119.
- Operations are authorized only when wind and sea conditions allow for the safe accomplishment of an unscheduled landing.

[43] DOT&PF, *Gravina Access Project Special Visual Flight Rules Analysis*, prepared by HDR, December 2001, and *Gravina Access Project Economic Impact Assessment*, prepared by Northern Economics, April 2003.

- Aircraft position and anti-collision lights must be on and functioning when operations are conducted under this exemption.
- No aircraft may be operated under this exemption at an altitude of less than 200 feet above the surface.

Additionally, by performing operations under Exemption 4760, certificate holders have entered into agreement with the manager of the Ketchikan FSS and the manager of Anchorage Center to allow simultaneous IFR and SVFR operations in the Ketchikan airspace, subject to specific conditions and limitations.

3.7.2 Marine Navigation

Figure 3.12 (Marine and Land Transportation Facilities) shows the locations of the marine facilities discussed in this Section 3.7.2.

Tongass Narrows is a continuation of Revillagigedo Channel that extends northwest to the Guard Islands in Clarence Strait. Tongass Narrows is divided at its lower end by Pennock Island. The channel northeast of the island is called East Channel, and the channel southwest of the island West Channel. According to the *United States Coast Pilot*,[44] both channels accommodate vessels of any draft. Marine vessels typically using Tongass Narrows include cruise ships, ferries, barges, USCG vessels, commercial and charter fishing boats, and small craft. In addition, the Tongass Narrows waterway is used by the numerous floatplanes that operate in the Ketchikan area.

Cruise ships bound for Ketchikan generally use East Channel, because it aligns better with the cruise ship docks. Barges and vessels of the Alaska Marine Highway System tend to use West Channel to avoid cruise ship traffic and because there is less shoreline development along West Channel to be affected by wake.

The following speed restriction for marine navigation in Tongass Narrows is prescribed in 33 CFR 162.240:

> *No vessel, except for public law enforcement and emergency response vessels, floatplanes during landings and take-offs, and vessels of 23 feet registered length or less, shall exceed a speed of 7 knots in the region of Tongass Narrows bounded to the north by Tongass Narrows Buoy 9 and to the south by Tongass Narrows East Channel Regulatory marker at position 55 deg. 19' 22.0" N, 131 deg. 36' 40.5" W and Tongass Narrows West Channel Regulatory marker at position 55 deg. 19' 28.5" N, 131 deg. 39' 09.7" W, respectively.*

Tongass Narrows experiences high levels of marine navigation activities within a relatively small area. According to the *Tongass Narrows Voluntary Waterway Guide*, "a typical summer day in Tongass Narrows may result in 500+ floatplane landings and takeoffs; 173 charter boat transits; 22 small passenger vessels; 4 to 6 large cruise ships with 1 to 2 at anchor; 150 fishing vessels; 3 to 5 barge/tug transits; 30 to 40 kayaks; and an unknown number of recreational and transient boat traffic."[45] Due to Tongass Narrows' high volume of marine traffic, constrained geography,

[44] U.S. Coast Pilot 8, *Pacific Coast Alaska: Dixon Entrance to Cape Spencer*, 23rd Edition, 1999.

[45] USCG, *Tongass Narrows Voluntary Waterway Guide*, 1999.

and multiple directions of travel, the *Tongass Narrows Voluntary Waterway Guide* was developed to provide guidelines for the safe operation of various craft in the area. Figure 3.13 illustrates the areas designated in the guide for use for cruise ship anchorage and lighterage, fishing vessel anchorage, kayaks, floatplanes, and sailboat races.

To illustrate the general levels of activity in Tongass Narrows, Table 3-7 presents the total numbers of annual commercial marine trips within Tongass Narrows for 1991 through 2000 by vessel type, as reported by the U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center. The maximum draft for each type of vessel is presented as well.

TABLE 3-7
TONGASS NARROWS
TOTAL TRIPS AND MAXIMUM DRAFTS, BY VESSEL TYPE, BY YEAR

Year	*Self-Propelled Passenger & Dry Cargo*		*Self-Propelled Tanker*		*Self-Propelled Tow or Tug*		*Non-Self-Propelled Dry Cargo*[1]		*Non-Self-Propelled Tanker*[1]		*Total*	
	Trips	*Max Draft*	*Trips*	*Max Draft*	*Trips*	*Max Draft*	*Trips*	*Max Draft*	*Trips*	*Max Draft*	*Trips*	*Max Draft*
1991	2511	20	18	34	2480	17	1372	15	172	14	6553	34
1992	2755	20	18	35	2129	18	1842	13	143	13	6887	35
1993	2818	20	16	28	2506	20	2243	16	43	13	7626	28
1994	4495	15	27	34	2831	18	2743	15	245	16	10341	34
1995	4288	32	24	35	3102	22	2692	25	295	17	10401	35
1996	4369	37	24	28	2903	16	2369	18	431	20	10096	37
1997	4591	36	5	22	2845	20	2074	25	471	16	9986	36
1998	4811	29	0	0	2066	18	2012	29	339	16	9228	29
1999	7940	29	0	0	2855	22	2660	29	534	15	13989	29
2000	6796	31	0	0	3267	21	2759	23	336	18	13158	31
Maximum	7940	37	27	35	3267	22	2759	29	534	20	13989	37
Average	4537	26.9	13	21.6	2698	19.2	2277	20.8	301	15.8	9827	32.8

[1] These categories refer to barges

Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center

The following subsections describe the existing marine navigation conditions in Tongass Narrows in the vicinity of the Gravina Access Project area. The *Gravina Access Project Marine Navigation Conditions Summary Technical Memorandum*[46] presents a detailed accounting of the existing marine navigation conditions in the study area.

3.7.2.1 Cruise Ships

The largest vessels that routinely use Tongass Narrows are cruise ships that call seasonally at Ketchikan, primarily during the summer (May through September). Each summer, cruise ships

[46] DOT&PF. *Gravina Access Project Marine Navigation Conditions Summary Technical Memorandum*. October 1999. Prepared by The Glosten Associates.

make hundreds of port calls in Ketchikan. With some annual variations, cruise ship calls in Ketchikan increased through the 1990s; 39 individual cruise ships made 514 port calls in Ketchikan in 2001 (Table 3-8)[47]. Cruise ships bound for Ketchikan or transiting through the area typically use East Channel. The cruise ship docks are located on Revillagigedo Island, at the north end of East Channel. Figure 3.12 illustrates the location of the cruise ship dock and the marine routes used by cruise ships; Figure 3.13 illustrates the location of the cruise ship anchorage and tender operation areas in Tongass Narrows. At any given time during the summer, as many as five large cruise ships may be moored and/or at anchor in the Ketchikan Harbor area.

During the summer cruise season, most of the large cruise ships operating in Alaska are home-ported in Vancouver, British Columbia; several are home-ported in Seattle. As a result, nearly all of them pass under Lion's Gate Bridge in Vancouver Harbor and/or the Seymour Narrows cable crossing (north of Vancouver between Vancouver Island and the mainland). Vertical clearances of these structures are 200 feet and 180 feet, respectively. The Lion's Gate 200-foot clearance has effectively limited the height of the cruise ships that serve Ketchikan.

Table 3-9 presents the characteristics of the large cruise ships that typically call at Ketchikan. The largest cruise ships that currently call at Ketchikan are 948 feet long, have drafts of up to 26.2 feet, and can accommodate more than 2,500 passengers (i.e., the Star Princess).[48]

Several of the cruise lines that currently serve Southeast Alaska have larger ships on order, but the very large, newer cruise ships are generally regarded as not well suited to cruising in Southeast Alaska. These newer cruise ships are better suited to other geographic markets (such as the Mediterranean) that are experiencing rapid growth and are not as physically restricted as Southeast Alaska waterways.

[47] Ketchikan Visitors Bureau, <www.visit-ketchikan.com/cruise_ship_info/shipinfo.html>. 2001.

[48] DOT&PF, *Gravina Access Project Technical Memorandum Marine Navigation Conditions Summary*, October 1999.

TABLE 3-8
CRUISE SHIP ARRIVAL DATA FOR KETCHIKAN 1990-2001

Year	*Calls*	*Ships*	*Passengers*
2001	514	39	665,221
2000	461	34	549,114
1999	452	32	565,005
1998	488	35	531,108
1997	472	35	480,688
1996	437	36	426,232
1995	329	32	355,784
1994	453	30	379,645
1993	421	28	321,780
1992	364	23	263,046
1991	362	27	242,755
1990	314	23	236,325

Source: Ketchikan Visitors Bureau, <www.visit-ketchikan.com/cruise_ship_info/shipinfo.html>. 2001.

TABLE 3-9
LARGE CRUISE SHIPS OPERATING IN SOUTHEAST ALASKA DURING 2002 CRUISE SEASON

Operator	*Ship*	*Passenger Capacity*[1]	*Gross Tonnage*	*LOA*[2] *(feet)*	*Register Length (feet)*	*Beam Max (feet)*	*Beam Register (feet)*	*Maximum Draft (feet)*	*Air Draft (feet)*
Carnival	*Carnival Spirit*	2,142	85,920	959.6	854.9	105.6		25.6	173.8
Celebrity	*Infinity*	2,038	90,228	964.5	862.6	105.6		26.9	180.4
	Mercury	2,114	77,713	865.8	740.0	105.6		25.3	
	Summit	2,038	90,228	964.5	862.6	105.6		26.9	180.4
Crystal Cruises	*Crystal Harmony*	940	48,621	790.6	672.5	105.0	97.1	24.6	143.0
Holland America	*Amsterdam*	1,460	60,874	780.0	674.2	111.5	105.6	25.6	178.8
	Ryndam	1,266	55,451	720.0	607.0	111.6	101.1	24.6	162.3
	Statendam	1,266	55,451	720.0	607.0	111.6	101.1	24.6	162.3
	Veendam	1,266	55,451	720.0	607.0	111.6	101.1	24.6	162.3
	Volendam	1,440	60,906	781.0		105.9		25.6	
	Zaandam	1,440	60,906	781.0		105.6		25.6	
Norwegian Cruise Line	*Norwegian Sky*	2,002	78,200	848.6		116.3	105.8	26.2	
	Norwegian Wind	1,748	50,764	754.0	655.8		93.5	23.0	172.4
Princess	*Dawn Princess*	2,022	77,441	856.3	762.0	110.2	105.8	26.1	162.0
	Ocean Princess	2,022	77,499	856.3	762.0	110.2	105.9	26.2	162.0
	Regal Princess	1,590	70,285	804.0	670.6	105.9		25.9	151.0
	Sea Princess	2,022	77,441	856.3	762.0	110.2	105.8	26.2	162.0
	Star Princess	2,592	108,806	948.0	814.9	131.9	118.1	26.2	199.4
	Sun Princess	2,022	77,441	856.3	762.0	110.2	105.8	26.2	162.0
Radisson Seven Seas	*Seven Seas Navigator*	504	28,550	560.0	492.1	81.4		22.3	119.4
Royal Caribbean Inc.	*Legend of the Seas*	1,804	70,950	867.0	726.6	105.0		23.9	
	Radiance of the Seas	2,100	90,090	961.0	864.5	131.2	105.6	26.7	173.2
	Vision of the Seas	1,998	78,491	915.3	770.0		105.6	25.6	171.0
World Explorer Cruises	*Universe Explorer*	737	23,500	617.0	570.0	88.0	84.0	27.3	130.0

[1] Passenger capacity lower berth [2] LOA = length overall

In addition to the large cruise ships operating in Southeast Alaska and calling at Ketchikan, there are a growing number of small cruise ships offering adventure and/or natural history oriented cruising opportunities. Table 3-10 provides a representative sample of these vessels.

TABLE 3-10
SMALL CRUISE VESSELS
OPERATING IN SOUTHEAST ALASKA

Operator	*Vessel*	*Passengers*	*LOA[1] (feet)*	*Beam (feet)*	*Draft (feet)*	*Tonnage*
Glacier Bay Tours	Executive Explorer	49	98.5	36.75		
	Wilderness Discoverer	88	169	38		95
Clipper Cruise Lines	Yorktown Clipper	138	257	43	8	99.5
Lindblad Special Expeditions	Sea Bird	70	152	31	8	99.7
	Sea Lion	70	152	31	8	99.7
Cruise West	Spirit of Discovery	84	166			94
	Sheltered Seas	90	90			95
	Spirit of Glacier Bay	58	125			97
	Spirit of Alaska	82	143			97
	Spirit of Columbia	78	143			98
	Spirit of '98	101	192			96
	Spirit of Endeavor	102	219			99

[1] LOA = length overall

3.7.2.2 Alaska Marine Highway System and Inter-Island Ferry Authority Ferries

Alaska Marine Highway System Operations

The AMHS operates five mainline and two feeder ferries for vehicles and passengers in Southeast Alaska, including Ketchikan. The AMHS dock is located immediately south of the ASD facility (Figure 3.12).

AMHS port calls at Ketchikan have varied for the period of 1991 through 2001, ranging from a high of 1,075 (in 1994 and 1995) to a low of 837 in 2001 and averaging approximately 990 port calls per year[49]. In recent years, AMHS calls at Ketchikan have declined from 1,007 in 1999 to 837 in 2001[50]. This decrease in AMHS traffic is due in part to the addition of IFA service (see below) between Hollis and Ketchikan in 2001 that was previously provided by AMHS. July is the peak traffic month in the annual cycle for AMHS.

AMHS vessels usually use the West Channel to avoid the cruise ship traffic and because there is less shoreline development and hence less need to control wakes.

[49] Alaska Marine Highway System, 1998. *Traffic Volume Report*. <www.dot.state.ak.us/amhs/info/general/stats/98tvr/atvr-1998.pdf>.

[50] Alaska Marine Highway System, *2001 Annual Traffic Volume Report*, January 1~December 31. Compiled July 2002.

Inter-Island Ferry Authority

The IFA provides regular service using a new ferry, the *Prince of Wales,* commissioned in 1999, from Prince of Wales communities to Ketchikan. Currently the IFA provides two daily round trips between Ketchikan and Hollis during summer months (June through August), and one daily round trip from September through May. The IFA ferry terminal is located adjacent to the AMHS terminal (see Figure 3.12), across Tongass Narrows from Ketchikan International Airport.

Southeast Alaska Transportation Plan

The DOT&PF *Southeast Alaska Transportation Plan* (SATP), issued in March 1999, calls for major changes in the way that public ferry services are delivered in Southeast Alaska. The SATP planning horizon is the period between the year 2000 and 2020. When fully implemented, the SATP may result in reduced port calls throughout Southeast Alaska by existing large "mainline" vessels. However, the AMHS Vessel Suitability Study mandated by the SATP calls for the introduction of shuttle ferries operating as point-to-point dayboats on several routes based from Ketchikan. The shuttle ferry operating north from Ketchikan is likely to be identical or similar to the ferries currently under construction for AMHS at the Derecktor Shipyard. The point-to-point dayboat operating south of Ketchikan to Prince Rupert under the SATP is likely to be either a slightly larger fast vehicle ferry or a new conventional monohull. With the introduction of these new dayboat services, and even with the possibility of modest reductions in existing AMHS "mainline" service, the number of AMHS port calls at Ketchikan are unlikely to decrease and may even increase under the SATP.

3.7.2.3 Tugs and Barges

Tug and barge transportation is the principal mode of delivery for both dry and liquid cargoes throughout Southeast Alaska. The waterborne commerce statistics indicate an average of 2,277 trips per year by dry cargo barges in Tongass Narrows (including Ketchikan) for 1991 through 2000, as shown in Table 3-7. Three major common carriers providing containerized barge service make a total of four scheduled calls per week to Ketchikan year-round, for a total of about 408 calls (corresponding to 816 transits) on an annual basis. Petroleum products are also delivered almost exclusively by barge. There was an average of 301 petroleum barge trips in Tongass Narrows (including Ketchikan) for 1991 through 2000.

Barges represent a substantial contribution to the total of the overall Tongass Narrows marine traffic volume. However, barges are not necessarily transiting Tongass Narrows during peak traffic periods. Barge operators interviewed for the *Gravina Access Project Marine Navigation Conditions Summary Technical Memorandum*[51] expressed a preference for transiting Tongass Narrows in the winter months, even if they have no port call in Ketchikan, as Tongass Narrows' conditions are preferable to other routes. In the summer months, the barge operators not calling at Ketchikan could use alternative routes to avoid the congestion in Tongass Narrows.

3.7.2.4 Airport Ferry Service

The airport ferry service is the primary mode of access for vehicles, bicyclists, and pedestrians to the airport on Gravina Island. The operating schedule is 7 days a week, 16 hours a day. In the winter, the two ferries operate every 30 minutes; in the summer (May through mid-August), the ferries operate every 15 minutes from approximately 10 a.m. to 5 p.m. on weekdays, and

[51] DOT&PF, 1999.

every 30 minutes at other times. When air carrier planes are active, usually during the summer, the ferry can exceed capacity.[52] The ferry terminal on Revillagigedo Island is located about 2.5 miles northwest of downtown Ketchikan, directly opposite the airport terminal on Gravina Island (see Figure 3.12).

3.7.2.5 USCG Facilities and Operations

The USCG operates three cutters from its station located between Ketchikan and Saxman (see Figure 3.12). These cutters range in length from 110 to 213 feet, with beams of between 22 and 41 feet, drafts of between 7.3 and 13.9 feet, and air drafts of 60 to 100 feet.[53]

USCG buoy tenders will also occasionally call at Ketchikan. The buoy tenders have a length of 225 feet, a beam of 43 feet, a draft of 13.5 feet, and an air draft of 90 feet. The largest vessels operated by the USCG are their 378-foot Hamilton Class cutters and their ice breakers: Polar Sea, Polar Star, and Healy. However, these USCG vessels rarely call at Ketchikan.

According to the USCG, there are no regular U.S. Navy operations in Tongass Narrows. However, the USCG Station is an emergency port for naval submarines using the Back Island acoustic range located in Behm Canal. U.S. Navy sub-surface ballistic missile submarines have a surface mode operating draft of 36.5 feet, making them the deepest draft vessel likely to call at Ketchikan, and a reported air draft of 91 feet.

3.7.2.6 National Oceanic and Atmospheric Administration Vessels

Survey vessels of the National Oceanic and Atmospheric Administration (NOAA) transit Tongass Narrows several times each year. NOAA plans to homeport its survey vessel Fairweather in Ketchikan beginning in 2003, mooring it just south of the pier at the USCG Station. The Fairweather has a 100-foot air draft.[54]

3.7.2.7 Commercial Fishing and Charter Vessels and Small Craft

Commercial and charter fishing vessels and recreational craft, such as powerboats and sailboats, operate in Tongass Narrows. Figure 3.13 shows the fishing vessel anchorage areas designated in the *Tongass Narrows Voluntary Waterway Guide*.[55] The Ketchikan area has seven small boat harbors. Their capacities are shown in Table 3-11.

[52] DOT&PF. *Ketchikan International Airport Master Plan*. June 2003.

[53] Mark Dalton, HDR, telephone call to Lt. Martin, U.S. Coast Guard, September 15, 1999.

[54] Lt. Cmdr. Doug Baird, National Oceanic and Atmospheric Administration, email to Mark Dalton, HDR. February 6, 2002.

[55] USCG, 1999.

TABLE 3-11
KETCHIKAN HARBOR CAPACITIES

Harbor	*Capacity by Boat Length*							
	<21'	*21'-30'*	*31'-40'*	*41'-50'*	*51'-70'*	*71'-100'*	*>100'*	*Total*
Bar Harbor North	53	109	61	34	7	2	0	266
Bar Harbor South	110	165	92	30	31	3	0	431
City Float	14	0	0	0	0	0	0	14
Thomas Basin	50	30	55	27	20	0	0	182
Ryus Dock	Transient and Lighterage Moorage Only							
Hole-in-the-Wall	17	9	2	0	0	0	0	28
Knudsen Cove	29	20	0	0	0	0	0	49
TOTAL	273	333	210	91	58	5	0	970

Source: DOT&PF, Ports & Harbors, Alaska Harbor Management System, Operations & Management Report*, 1994.*

Table 3-12 provides the 1998 levels of boat usage in the Ketchikan area, as recorded by the City of Ketchikan Port and Harbors Department.

TABLE 3-12
1998 BOAT USE IN KETCHIKAN

Transient Boats	3,000 to 4,000
Boat-Days of Transient Moorage	6,050
1-Month Transient Moorage Permits	158
3-Month Transient Moorage Permits	528
Charter Boats in Harbors	62
Commercial Fishing Boats in Harbors	800
Reserved Stalls Billed Out in July 1998	844

In addition to the recreational small craft, fishing charter boats, and commercial fishing boats in harbors, there are three very active boat-launching ramps in the Ketchikan area. These ramps are at Bar Harbor, Mountain Point, and Knudsen Cove. Launching permits, issued by the City of Ketchikan Port and Harbors Department in 2002 appear in Table 3-13.

TABLE 3-13
2002 KETCHIKAN BOAT LAUNCH PERMITS

Day Permits	
Bar Harbor	256
Mountain Point	268
Knudsen Cove	327
Total Day Permits	851
Annual and Semi-Annual Permits	
Commercial Permit	3
Annual Permits	401
Semi-Annual Permits	85
Free Annual Permits to Reserve Moorage Clients (Estimate)	~ 400
Total Annual and Semi-Annual Permits	889

Source: City of Ketchikan Harbor Masters Office, 2003.

On summer weekends, the boat launches are in nearly continuous use for at least 12 hours per day. Estimating that an average launch or retrieval takes approximately 5 minutes, the total number of launches and retrievals on a summer weekend day is approximately 432 for the 3 launch ramps in the Ketchikan area.

3.7.2.8 Kayaks

A large number of kayaks operate on the waters of Tongass Narrows. During the summer tourist season, several outfitter/guide operations offer kayak excursions originating in Ketchikan. In addition, local residents also operate in Tongass Narrows as individual kayakers. Kayaks are not easily observed by sight or on radar, and are therefore at risk from other vessels. Two kayak operating zones are identified in the *Tongass Narrows Voluntary Waterway Guide*[56]—one (north kayak zone) extending from Hansen Float to the North end of Pennock Island and the second (south kayak traffic area) extending from Thomas Basin to Pennock Island immediately north of Radenbough Cove (see Figure 3.13).

3.7.2.9 Personal Watercraft

Personal watercraft include vessels such as jet skis, which are small and able to achieve high speeds (approximately 50 knots). The *Tongass Narrows Voluntary Waterway Guide* states: "Although these craft are not restricted in Tongass Narrows, due to the high volume and variety of traffic in Tongass Narrows, mariners wishing to operate personal watercraft should not operate them in Tongass Narrows."[57] Few personal watercraft operate in Tongass Narrows.

3.7.2.10 Floatplanes

Floatplanes taxiing, landing, and taking off from Tongass Narrows are currently subject to the operational guidelines contained in the *Tongass Narrows Voluntary Waterway Guide*.[58] The guide identifies two narrow floatplane-operating zones (see Figure 3.13), one in front of the Ketchikan waterfront, and one hugging the Gravina Island shore, and extending northwest from the Ketchikan Airport terminal. A third floatplane operating area is located in the vicinity of Ward Cove. As described in the *Tongass Narrows Voluntary Waterway Guide*,[59] floatplane traffic on Tongass Narrows is seasonally quite heavy, comprising in excess of 500 takeoffs and landings on an average summer day, and as many as 100,000 annual floatplane operations occurring from the Ketchikan Harbor Seaplane Base located near downtown Ketchikan. Each floatplane operation involves taxiing, takeoff, or landing within Tongass Narrows. Floatplane aviation operations are discussed in Section 3.7.1.2.

3.7.2.11 Other Issues

Wreck Buoy #6 marks the location of a 327-foot barge that sank in 1954, offshore from the Plaza Mall area. In May 2003, the U.S. Army planned to raise and re-sink the barge in deeper

[56] Ibid.

[57] Ibid.

[58] Ibid.

[59] Ibid.

water; however, moving the barge proved problematic and the barge remains in the same location, still marked by Wreck Buoy #6.

3.7.3 Vehicular Travel

3.7.3.1 Revillagigedo Island

The road system on Revillagigedo Island is limited to downtown Ketchikan and the more populated surrounding areas. Tongass Avenue, the primary thoroughfare and the most traveled road, provides the primary access to most businesses, schools, shops, homes, and recreation facilities. Outside of the city, Tongass Avenue becomes Tongass Highway, extending north to North Point Higgins and south to Herring Cove, beyond Saxman. Tongass Avenue is predominantly a two-lane facility, with on-street parking that runs from the northwest to the southeast along Tongass Narrows. For some stretches of road, however, additional lanes have been added at the approaches to intersections to accommodate increased traffic. Traffic signals are provided at the intersections with Carlanna Lake Road, Jefferson Street, Washington Street, and Dock Street. Other intersections in the study area are controlled by stop signs.

Third Avenue currently runs from Tongass Avenue to Washington Street, and is scheduled for extension to the east at the Schoenbar Road intersection. Until this upgrade is completed, Tongass Avenue is the only cross-town road in the study area.

Traffic volumes for the project area during the peak hour range from approximately 1,000 vehicles on South Tongass Avenue (e.g., south of downtown Ketchikan at the intersection with Deermount Street) to approximately 2,000 vehicles in the downtown area (i.e., at the intersection of Tongass Avenue with Jefferson Street).[60] Annual traffic volume to the airport, via ferry, was 71,394 vehicles in 2002 (but as high as 91,884 as recently as 1999). However, many people access the airport as pedestrians, leaving their cars in Ketchikan. The total ferry passenger "traffic," including those with cars and those without, was 321,958 in 2002 (385,332 in 1999).

The project team identified 12 intersections on Tongass Avenue that would be potentially affected by the Gravina Access Project alternatives (see Figure 3.14). These intersections are:

- Deermount Street
- Bawden Street
- Main Street
- Mission Street
- Dock Street
- Schoenbar Road
- Washington Street
- Jefferson Street
- Third Avenue
- Carlanna Lake Road
- Bryant Street
- Existing Ferry Access

[60] DOT&PF, Gravina Access Project, *Final Traffic Assessment Technical Memorandum*, prepared by HDR, November 2002.

Existing traffic conditions at these intersections were measured with respect to Level of Service (LOS). Intersection LOS analysis was conducted using methodologies described in the 2000 *Highway Capacity Manual*.[61] The LOS describes the quality of traffic operations, ranging from A (least congested, least delay) to F (most congested, most delay). The relationship between LOS and delay is summarized in Table 3-14.

TABLE 3-14
LEVEL-OF-SERVICE CRITERIA FOR INTERSECTIONS

Level of Service	***Signalized Intersection Criteria*** *Average Total Delay (Seconds per Vehicle)*	***Unsignalized Intersection Criteria*** *Average Total Delay (Seconds per Vehicle)*
A	< 10.0	< 10.0
B	10.1 to 20.0	10.1 to 15.0
C	20.1 to 35.0	15.1 to 25.0
D	35.1 to 55.0	25.1 to 35.0
E	55.1 to 80	35.1 o 50.0
F	> 80	> 50

Source: Transportation Research Board, Highway Capacity Manual*; Washington, DC; 2000.*

The range of delay is lower for unsignalized intersections than for signalized intersections because drivers expect different performance levels for each type of intersection. That is, motorists expect to stop at signalized intersections more often than at unsignalized intersections. Intersections with a LOS E or F are considered to have traffic impacts deemed "unacceptable" from a traffic engineering perspective. Table 3-15 provides the existing LOS at the 12 project area intersections. Note that the *Highway Capacity Manual* methodology provides a composite LOS for signalized intersections and the LOS for each minor move (individual approaches) at unsignalized intersections.

[61] Transportation Research Board, *Highway Capacity Manual*, Washington DC, 2000.

TABLE 3-15
EXISTING LEVEL-OF-SERVICE AT PROJECT AREA INTERSECTIONS

Intersection with Tongass Avenue (Type of Control) *Direction of Movement: NB = Northbound, SB = southbound, EB = Eastbound, WB = Westbound, L = left turn movement, R = right turn movement, LR = left and right turn movements*	*Existing Condition*	
	LOS	*Delay (seconds)*
Deermount (Stop)		
EBL	A	8.3
SBL	C	21.5
SBR	B	11.3
Bawden (Stop)		
NBL	A	8.0
SBLR	A	8.3
WBLR	C	22.3
EBL	D	29.0
EBR	B	14.7
Main (Stop)		
NBL	A	8.2
SBLR	A	8.0
WBLR	B	14.8
EBLR	C	17.5
Mission (Stop)		
NBL	A	9.3
Dock (Signal)	A	4.4
Schoenbar (Stop)		
EBL	B	11.4
WBL	A	9.4
NBLR	F	288.8
SBL	F	140.9
SBR	D	25.3
Washington (Signal)	A	5.3
Jefferson (Signal)	B	11.1
Third (Stop)		
EBL	B	10.5
SBL	F	65.0
SBR	B	12.1
Carlanna (Signal)	B	14.6
Bryant (Stop)		
EBL	A	8.8
SBL	D	33.9
SBR	B	12.8
Airport Ferry Access Drive (Stop)		
WBL	A	9.2
NBLR	C	23.0

Source: DOT&PF, Gravina Access Project Final Traffic Assessment Technical Memorandum, *prepared by HDR Alaska, Inc. November 2002.*

At Schoenbar Road, southbound left turns from Schoenbar, and northbound traffic from Taquan Air Drive currently operate at LOS F, although each move represents fewer than 10 peak hour vehicles. At Third Avenue, southbound left turns operate at LOS F. The remaining moves on Tongass Highway operate at LOS D or better.

3.7.3.2 Gravina Island

There are no public roads on Gravina Island. A private access road runs north from the airport to a timber processing plant north of Lewis Creek. The Borough has acquired a provisional permit from the COE for construction of a new road around the west side of the airport to the development area north of Lewis Creek. At this time, funding has not been secured for construction of the road. Except for cars driven by employees of the timber processing plant on the existing private road, all vehicles ferried to the airport remain on airport property while on Gravina Island. Travel times via ferry from various locations on Revillagigedo Island to the airport on Gravina Island are shown in Table 3-16. Further discussion appears in Section 3.3.5, Accessibility.

TABLE 3-16
TRAVEL DISTANCES AND ESTIMATED VEHICULAR TRAVEL TIMES*

Origin and Destination	*Distance (miles)*	*Vehicular Travel Times* (minutes)*
From Downtown to Airport Terminal	3.29	27
From Ward Cove to Airport Terminal	5.04	25
From Carlanna Creek to Airport Terminal	0.53	19

* The calculation of travel times is based on the length of roadway traveled and the average speed of vehicles, pedestrians, and bicycles on that roadway. The average speed of vehicles was assumed to be 5 mph slower than the posted speed limit. Ferry time, based on scheduled summer ferry service every 15 minutes, was assumed to be 19 minutes, including 15 minutes for waiting/loading/unloading and 4 minutes for transit. Because of variations in ferry waiting time and traffic, actual travel times may vary.

3.7.3.3 Pennock Island

There are no roads on Pennock Island.

3.8 PEDESTRIANS AND BICYCLISTS

3.8.1 Pedestrians

Most pedestrians in the project area frequent the downtown area. Many tourists, principally from cruise ships, walk the area. Local residents and business people also walk in the downtown area, traveling between their parked car and their destination.

3.8.2 Bicyclists

The Borough and the City of Ketchikan commissioned a plan to develop bicycle trails and bike lanes. The *Comprehensive Pedestrian and Bikeways Plan*[62] characterized bicycle use in

[62] Ketchikan Gateway Borough and City of Ketchikan. July 1985. *Comprehensive Pedestrian and Bikeway Plan*, prepared by The ORB Organization and Carl Buttke, Inc.

Ketchikan based on trip purpose (e.g., commuting to work or school, recreation, and shopping), age of riders, terrain, bicycle accident, and demand for bicycle facilities. The plan recommended a bicycle and pedestrian plan involving bikeways, bike lanes, bike paths, and trails that would connect all parts of the community, from West End residential areas to Saxman. Portions of the plan have been implemented and continue to be implemented as opportunities arise, usually in conjunction with road projects. New trails are under construction north and south of downtown Ketchikan. During the summer, some travelers passing through Ketchikan on the ferry bring their bicycles for sightseeing and recreation.

3.9 GEOLOGY, TOPOGRAPHY, AND WIND

3.9.1 Geology and Topography

A Tongass Narrows Geophysical Survey[63] conducted for this project mapped the sea floor and described it in context of the regional geology and topography. The landforms in the project area were developed and shaped by tectonic activity, glacial ice, and erosion. Bedrock is overlain by unconsolidated deposits such as marine deposits, beach and stream deposits (including alluvial fan and fan-delta deposits), and colluvium deposits. The alluvial fan and fan-delta deposits are present at the mouths of many streams that flow into Tongass Narrows, such as at the mouths of Ketchikan, Carlanna, and Hoadley Creeks and of many streams on Gravina Island.

A network of faults dissects Southeast Alaska. Known faults near the project area are:

- Queen Charlotte-Fairweather fault, an active northwest-southeast fault about 100 to 110 miles southwest of Ketchikan
- Chatham Strait fault, a north-northwest to south-southeast fault intersecting the Queen Charlotte-Fairweather fault southwest of Ketchikan that was active 2 to 65 million years ago
- Clarence Strait fault, in Clarence Strait, just west of Gravina Island, which has about 9 miles of displacement

The area around Ketchikan on Revillagigedo Island is generally quite hilly, with steeply rising slopes starting at or near the shoreline. Pennock and Gravina Islands within the project area exhibit more rolling terrain, with some steep areas, particularly along the west side of Pennock Island. **Tongass Narrows below sea level is a steep-sided U-shaped valley with smooth walls typical of a sediment-floored glaciated valley. Depths rarely exceed 150 feet. At the south end of the study area, particularly in West Channel, the topography is more rocky, with more submerged bedrock outcrops and water depths dropping to 400 feet and beyond.**

[63] Fugro West, Inc. June 2002. Final Tongass Narrows Geophysical Survey. Prepared for Alaska Dept. of Transportation and Public Facilities and HDR Alaska, Inc.

3.9.2 Soils and Submerged Material

With little seasonal variation, the heavy precipitation and cool temperatures of the Ketchikan area make climate the most influential factor in soil formation. The region's soils are typically saturated. Because of the cool, wet climate, decomposition of organic matter is slow, and soils are highly acidic and generally low in available nutrients. Glacial till or bedrock is normally found beneath the soil, and is often responsible for the poorly drained soils on gentle slopes.

The region's soils are generally forested soils or muskegs high in organic matter. Forested soils occur in many areas, from lowlands to rocky side slopes to steep slopes; generally, these soils are moderately well drained, but in certain areas, they are well or poorly drained. Muskegs are commonly found on level or gently sloping landforms and have poor drainage. The depth to bedrock in both forested soils and muskegs ranges from less than 1 to more than 15 feet. Gravina Island is mainly made up of muskeg and poorly drained forested soils; the eastern portion of Gravina Island and most of Pennock Island are primarily muskeg. Revillagigedo Island soils in the project area are poorly drained forested soils.

Tongass Narrows below sea level is generally covered by unconsolidated sediments of a coarse nature. More specifically, a layer of shell fragments, soft silt, and medium dense sand and gravel is between 0 and 20 feet thick, mostly less than 10 feet thick and overlies most of the channel bottom, except outcrops of bedrock and outcrops of dense gravels. Dense gravels, including boulders and fractured bedrock, make up a layer generally between the surface sediments and bedrock. It is deep is some locations (up to 100 feet thick off the mouth of Carlanna Creek) but much thinner over large areas. Generally, gravels and sediments are somewhat thicker in West Channel than in East Channel or the northern portion of the study area. Bedrock is at the surface along much of the shorelines but buried in the sediments except for occasional outcroppings throughout most of the study area.

3.9.3 Wind

Wind speed and directional data appears in *Wind Climatology Technical Memorandum March 2000*[64] (see Appendix E). The data presented in this report were based on hourly data collected at the Ketchikan International Airport between 1973 and 1998. Wind speed measurements collected between 1973 to September 1996 were based on a 1-minute average wind speed and, thereafter, were based on a 2-minute average. The ratio of the 1-minute average to the 2-minute average is 1.06, and this correction factor was applied to the data subsequent to September 1996 to provide a consistent set of data based on a 1-minute average wind speed (see Table 3-17).

TABLE 3-17
KETCHIKAN AIRPORT WIND STATISTICS

Ketchikan Airport Wind Statistics	*1-minute average (mph)*	*Gust wind speed (mph)*
100-year return period	85	130
50-year return period	78	119
10-year return period	64	98
5-year return period	58	87

[64] DOT&PF, *Gravina Access Project: Wind Climatology Technical Memorandum*, prepared by HDR Alaska, Inc., 2000.

Wind speeds at the airport are measured within about 30 feet of the ground surface; speeds are higher at higher elevations. Estimates made for this project of the maximum gust over the waters of East Channel of Tongass Narrows at about 250 feet above water level are about 145 miles per hour (mph).

3.10 AIR QUALITY

3.10.1 Project Area Status

The Ketchikan area generally has good air quality, with no recorded exceedances of National Ambient Air Quality Standards (NAAQS) in the area. Based on the NAAQS, the project area is classified as an attainment area (i.e., its air quality meets the standards).

3.10.2 Air Pollutants

The Alaska Department of Environmental Conservation (ADEC) has conducted ambient air quality monitoring for particulate matter during the "smoke season"—December and January—to characterize the effects of the use of wood for heating fuel on ambient air quality. These monitoring activities showed that levels of particulates did not approach or exceed the NAAQS.[65]

Cruise ship boilers and generators produce a variety of air pollutants, including nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), and particulates. The *Alaska Air Quality Control Plan* restricts the density of smoke (opacity) that any marine vessel can emit from its smokestacks. In general, if a ship is stationary at dock, its opacity level cannot exceed 20 percent for more than 3 minutes in any 1-hour period.[66]

3.11 NOISE

3.11.1 Regulatory Overview

The FHWA established Noise Abatement Criteria (NAC) to help determine the noise impacts associated with highway development projects. The NAC are noise levels assigned to various land uses (e.g., picnic areas, churches, commercial land, and undeveloped land) grouped by their sensitivity to traffic noise levels. The NAC represent the maximum traffic noise levels that allow uninterrupted use within each activity category. Table 3-18 lists the land activity categories included in the FHWA-established NAC, and the average sound level (occurring over a 1-hour period, or $L_{eq}[h]$), associated with each activity category. Sound levels are reported in decibels using the A-weighted scale[67] (dB[A]).

[65] Alaska Department of Environmental Conservation, Division of Air and Water Quality, *Air Quality Monitoring in Ketchikan's Bear Valley*, December 1996.

[66] 18 AAC 50.070 Alaska Air Quality Control Plan.

[67] Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight". The A-weighted scale corresponds to the sensitivity range for human hearing.

TABLE 3-18
NOISE ABATEMENT CRITERIA

Activity Category	L_{eq} (h)	*Description of Activity Category*
A	57 dB(A) (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 dB(A) (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 dB(A) (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	No Limit	Undeveloped Lands
E	52 dB(A) (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: FHWA, Federal-Aid Highway Program Manual 7-7-3, "Procedures for Abatement of Highway Traffic Noise and Construction Noise," dated August 1982.

The DOT&PF states that "the commitment to minimize noise impacts and enhance the noise environment must be fulfilled through prudent application of FHWA's noise regulations - 23 CFR Part 772, which is the primary regulatory authority regarding noise abatement criteria." According to FHWA regulation and DOT&PF policy[68], traffic noise impact occurs when the predicted noise levels on new roadway corridors:

- approach (i.e., are within 1 dB[A] of) or exceed the NAC or,
- substantially exceed (by 10 dB[A] or more) the existing noise level.

If an adverse impact (i.e., approaching or exceeding the NAC) would occur, then FHWA's regulations indicate that abatement should be considered.

3.11.2 Sensitive Receptors

The only noise-sensitive receptors within the areas potentially affected by the project alternatives are residences and commercial areas; i.e., Activity Categories B and C in Table 3-18. There are no Category A areas. Large parts of Pennock and Gravina Islands are undeveloped (Category D).

Noise-sensitive receptors near the alignments of Alternatives C3(a) and C3(b) are the 10 residences located along Baker Street North and Bucey Avenue North in Ketchikan. Noise-sensitive receptors near the alignments of Alternatives C4 and D1 are the 10 to 15 residential properties located in the Cambria Drive neighborhood in Ketchikan. Noise-sensitive receptors near the alignments of Alternatives F1and F3 are the few residences on Pennock Island in the vicinity of the East Channel bridge touchdown, and the few residences in the Clam Cove neighborhood on Gravina Island in the vicinity of the West Channel bridge touchdown. There

[68] DOT&PF, Noise Abatement Policy, March 1996.

are also five to ten residences located in the Forest Park neighborhood in Ketchikan in proximity to the alignment of Alternative F1. There are no noise-sensitive receptors along the alignments of Alternative G2, G3, or G4.

3.11.3 Existing Noise Sources

Noise in the project area is generally attributed to transportation: airplanes, floatplanes, helicopters, ferries, private and commercial boats, and automobiles. While these noise sources are present year-round, noise in the project area generally increases during the summer because these transportation activities increase with additional tourism and outdoor recreation activities that occur in the summer. Other common sources of noise are cruise ships (in the summer), traffic on Tongass Avenue, and general industrial and commercial activities.

Existing traffic noise levels were monitored at the nearest sensitive receptors to the project alternatives and estimated for segments of Tongass Avenue, Mill Street, and Stedman Street using the latest FHWA Traffic Noise Model.

Noise measurements were collected near four residences in areas where the project alternatives have the greatest potential for causing impacts.[69] Table 3-19 presents the existing noise levels (L_{eq}) for each monitoring location, the alternative nearest to each location, and the noise impact threshold for activity Category B, which is designated for residences. No existing noise levels exceeded the noise impact thresholds.

TABLE 3-19
NOISE LEVELS AT SENSITIVE RECEPTORS

Monitoring Location	*Closest Alternative(s)*	*Existing Noise Levels in dB(A)* (L_{eq})	*Noise Impact Threshold for Activity Category B (dB[A])*
Residences located at Baker and Bucey Streets	C3(a) and C3(b)	58	66
Residence located at Cambria Drive and Vallenar Lane	C4 and D1	59	66
Residence located on Forest Park Drive approximately 325 feet east of South Tongass Highway	F1 and F3	55	66
Residence located on Pennock Island in the vicinity of the proposed East Channel Bridge touchdown	F1 and F3	49	66

[1] PHV = peak hourly volume
[2] Noise impact threshold is based on FHWA guidance and DOT&PF policy for determining noise impacts; i.e., when noise levels are within 1 dB(A) of NAC, which for Category B is 7 dB(A) and for Category C is 72 dB(A).

Input for the FHWA Traffic Noise Model included:

- Peak hour (PM Peak) traffic volumes for 2000.[70]

[69] The measurement was conducted on July 1, 2003, in accordance with *FHWA-PD-96-046 Measurement of Highway-Related Noise* (May 1996), using a Larson-Davis 712 Sound Level Meter.

[70] DOT&PF, *Gravina Access Project Final Traffic Assessment Technical Memorandum*, Prepared by HDR. November 2002.

- A proposed fleet mix for vehicle travel north of Dock Street of 92.0 percent Autos, 6.2 percent Medium Trucks, 0.4 percent Heavy Trucks, 1.3 percent Buses, and 0.13 percent Motorcycles.[71]
- A proposed fleet mix for vehicle travel south of Dock Street of 93.7 percent Autos, 4.0 percent Medium Trucks, 0.4 percent Heavy Trucks, 1.8 percent Buses, and 0.1 percent Motorcycles.[72]
- Operational speed of 25 mph for Tongass Avenue north of Schoenbar Road and 20 mph from Schoenbar Road to Deermount Avenue (same as posted speed limits).

The FHWA Traffic Noise Model defaults for options such as meteorological conditions and pavement type (i.e., 50 percent humidity, 68 degrees Fahrenheit, average pavement type).

The model output gives traffic noise levels at various distances from the centerline of the modeled roadway. Table 3-20 provides the distance along the modeled roadway segments at which the threshold for noise impacts for Activity Category B or C is met under existing conditions; i.e., within 1 dB(A) of the NAC for those activity categories, or 66 dB(A) and 71 dB(A), respectively. In general, at distances greater than 52 feet from the centerline north of Dock Street, and 33 feet from the centerline south of Dock Streets, sound levels are at acceptable levels for the existing land uses along the Tongass Avenue corridor. Modeled noise levels have not been confirmed with on-site measurements.

[71] Vehicle mix provided by Rick Purves, DOT&PF Traffic Engineer, to C. Snead, HDR, May 21, 2003.

[72] Ibid.

TABLE 3-20
DISTANCE TO IMPACT THRESHOLDS BASED ON EXISTING TRAFFIC

Segment of Tongass Avenue	*PHV[1] (Year 2000)*	*Distance to Traffic Noise Impact Threshold[2] (feet)*	
		Activity Category B 66 dB(A)	*Activity Category C 71 dB(A)*
North Tongass Ave. to Ferry Terminal Access Drive	1221	42	20
Ferry Terminal Access Drive to Bryant Street	1257	42	21
Bryant Street to Carlanna Lake Dr.	1231	42	20
Carlanna Lake Dr. to Third Ave.	1697	52	25
Third Ave. to Jefferson St.	1661	51	25
Jefferson St. to Washington St.	1551	48	24
Washington St. to Schoenbar Rd.	1614	50	25
Schoenbar Rd. to Dock St.	1591	42	20
Dock St. to Mission St.	1127	33	15
Mission St. to Main St.	752	29	14
Main Street to Bawden St.	746	25	12
Bawden Street to Deermount St.	884	28	13
Deermount Street to South Tongass Highway	802	26	12

[1] PHV = peak hourly volume

[2] Noise impact threshold is based on FHWA guidance and DOT&PF policy for determining noise impacts; i.e., when noise levels are within 1 dB(A) of NAC, which for Category B is 7 dB(A) and for Category C is 72 dB(A).

3.12 WATER QUALITY

Figure 3.15 shows the water resources in the project area. Marine water quality in the project area can be affected by discharges from seafood processing plants, timber industry activities, shipyard and other industrial activity, treated sewer system outflows, cruise ships and other vessels operating in marine waters, and sediment runoff from paved surfaces and disturbed areas. The water quality of freshwater lakes, streams, and creeks can be affected by logging activities and runoff from disturbed areas.

Seafood processing facilities in Ketchikan discharge fish waste via outfalls into deep waters in Tongass Narrows, under a National Pollutant Discharge Elimination System (NPDES) general permit for Alaskan shore-based seafood processors. As required by the permit, the discharge outfalls are situated in underwater areas that are continually flushed by strong tides.[73]

The vegetation clearing that is part of logging activities can degrade surface water by carrying sediment to nearby streams. Log transfer facilities and timber processing plants on the shoreline can also degrade water quality by discharging certain chemicals.

[73] Florence Carrol, Environmental Protection Agency National Pollutant Discharge Elimination System permitter, telephone conversation with Robin Reich, HDR, regarding seafood processor outfall permits in the Ketchikan area, April 19, 2000.

Cruise ships discharge treated sewage; effluent from properly functioning marine engines; and laundry, shower, and galley sink wastes (”greywater”) to marine waters. In July 2001, Alaska enacted a law (AS 46.03.460 – 46.03.490) establishing the Commercial Passenger Vessel Environmental Compliance Program (a.k.a. “Cruise Ship Program”) under ADEC to regulate cruise ship and ferry waste streams discharged to Alaska waters. The regulations to implement the program were effective as of November 15, 2002. Key components of the Cruise Ship Program include:

- Annual vessel registration
- Discharge limit for greywater (sink, shower, galley waters) and blackwater (treated sewage) of 200 fecal coliform colonies per 100 milliliters and 150 milligrams per liter of suspended solids
- Discharge limited to at least 1 mile from shore and 6 knots speed, unless more stringent effluent levels are demonstrated
- Sampling and testing of vessel greywater and blackwater that is discharged in Alaska marine waters
- ADEC ability to independently verify wastewater sampling and to take additional wastewater samples
- Annual environmental compliance fee
- Record keeping and reporting of vessel disposal of wastewater, hazardous waste, and garbage

Airport ferry operations in Tongass Narrows can also affect water quality as a result of engine discharge, runoff from vehicles sitting on the deck of the ferries, and runoff from the ferry terminal parking lots. These discharges are unregulated, and the existing effect on water quality is not quantified.

No major drainages on Revillagigedo Island would be crossed by any of the alternatives. Government Creek, Airport Creek, and other lesser creeks on Gravina Island may be affected. There is no upstream development along these Gravina Island creeks, and they drain wetland areas. As such, they generally are not turbid and have good water quality.

3.13 PERMITS, AND LAWS RELATED TO THE PROJECT

Federal and State laws authorize agencies to issue permits, review plans, or consult regarding potential project impacts. Several Federal, State, and local agencies require reviews or issue permits for development projects such as the Gravina Access Project. Interagency coordination is an important component of most of these process. To facilitate the coordination effort, DOT&PF and FHWA have followed the guidance presented in “Applying the Section 404 Permit Process to Federal-Aid Highway Project” (FHWA, 1988) for the Gravina Access Project. In addition, the U.S. Army Corps of Engineers (COE), FHWA, and DOT&PF operate under a December 17, 1992 agreement “to streamline the NEPA and permit review process.” Based on the agreement, DOT&PF has included a preliminary jurisdictional determination and a draft 404(b)(1) analysis in Appendix L, in addition to the draft Section 10/404 permit application.

Table 3-21 identifies the most pertinent State and Federal laws and executive orders that govern permits, consultation, and review requirements.

TABLE 3-21
APPLICABLE LAWS AND RELATIONSHIP TO THE PROJECT

(Required permits and reviews are highlighted in the right column)

Applicable Law or Order	Primary Agency(ies) -Citation-	Description	Relationship To Project
Clean Water Act Section 404	**COE & EPA** 33 USC 1344 et seq	Authorizes Dept of the Army to issue permits for discharge of dredged and fill material into water of the U.S., including wetlands, at specified sites. Selection of sites must be in accordance with guidelines [404(b)(1) guidelines]developed by EPA in conjunction with the Army.	Sections 4.12, 4.14, and 4.15 address potential impacts to waters of the U.S. A COE Section 404/10 ***permit*** application, and 404 (b)(1) Evaluation are attached-Appendix L.
Clean Water Act	**EPA** 33 USC 1344	Authorizes EPA to issue National Pollutant Discharge Elimination System (NPDES) permit that covers fuel storage and cleanup and a Spill Prevention, Containment, and Countermeasures Plan. Generally required for projects disturbing 1 acre or more. EPA also has over sight of the CWA 404 program.	Section 4.12 addresses potential water quality impact. The project is intended to be covered by the storm water NPDES general ***permit*** at time of construction.
Clean Water Act Section 401	**Alaska DEC** 33 USC 1341	Section 401 requires state review and authorization for issuance of a Certificate of Reasonable Assurance regarding protection of water quality when discharging dredged or fill material into waters of the U.S.	The COE permit application and the State's Coastal Project Questionnaire initiates the State's ***401 review*** for an evaluation of a Certificate of Reasonable Assurance.
Rivers & Harbors Act Section 10	**COE** 33 USC 401 et seq (esp.403)	The act prevents unauthorized obstruction or alteration of navigable waters of the U.S. Navigable waters are "those waters that are subject to the ebb and flow of the tide and/or…may…transport interstate or foreign commerce." Section 10 permits apply to any structure in or over navigable waters of the U.S. and to any dredging, disposal, excavation, drilling , re-channeling, or modification of the water body and to projects outside the water body if they affect the course, location, or condition of the water body.	Navigable Waters of the U.S. include Tongass Narrows. Section 10 concerns are addressed in Section 4.7.2 and in the Public Interest Determination to be made by the COE in a record of decision. A Section 10/404 ***permit*** application is attached in Appendix L.
Rivers & Harbors Act Section 9	**USCG**	See above description. Section 9 authorizes the Secretary of Transportation, through the U.S. Coast	Per USCG, an application for this ***permit*** would follow

Applicable Law or Order	Primary Agency(ies) -Citation-	Description	Relationship To Project
		Guard, to issue permits for bridges or structures that cross or could otherwise affect navigation on waters of the U.S.	the Record of Decision (ROD) on this EIS.
Marine Mammal Protection Act	**NOAA Fisheries & USFWS** 16 USC 1361	Prohibits the "take" of any marine mammal species is U.S. waters. "Take" includes harassment or attempt to harass, or annoyance that has potential to injure or disrupt behavior patterns. The agencies may list a species as "depleted" and then develop a conservation plan to restore the health of the species.	Seals, sea lions, and whales are in the project area. See Endangered Species Act. Consultation with both agencies is addressed in Section 4.15.4 and 4.20.
Endangered Species Act	**USFWS & NOAA Fisheries** 16 USC 1536	Provides for the conservation of species that could become extinct through all or a substantial portion of their range. Prohibits any action that results in "taking" a listed species, adversely affecting habitat, or trading in listed species. Section 7 requires all federal agencies to consult with USFWS and/ or NOAA Fisheries. NOAA Fisheries and USFWS can issue permits under Section 10 of the Act for incidental "taking" and scientific research and enhancement.	Section 7 Consultation with both agencies and potential for impacts are addressed in Section 4.20. A biological assessment is attached.
Magnuson-Stevens Fishery Conservation & Management Act / Sustainable Fisheries Act	**NOAA Fisheries** 16 USC 1801 et seq.	These acts establish national standards for fishery conservation and management and establish regional councils to develop fisheries management plans. The act provides for enforcement. The Sustainable Fisheries Act amendments provide for development of guidelines, which have been developed. A key guideline is delineation of essential fish habitat (EFH) by NOAA Fisheries. Federal agencies must assess the effects of their actions on EFH and consult with NOAA Fisheries.	EFH exists throughout Tongass Narrows and in all salmon streams in the project area. Consultation and potential for impact are addressed in Section 4.15.4. An EFH Assessment is attached.
Migratory Bird Treaty Act	**USFWS** 16 USC 703 et seq.	Prohibits the taking of migratory birds, unless specifically excepted or authorized. "Taking" can include losses from habitat.	Consultation and potential impacts to birds are addressed in Section 4.15.6.
National Historic Preservation Act Section 106 / Executive Order 11593 Protection & Enhancement of the Cultural	**Alaska DNR Office of History & Archaeology** 16 USC 470 et seq	Provides, through a State Historic Preservation Officer, for the identification and protection of historic properties. Requires federal agencies to avoid or minimize impacts to properties on or eligible for the National Register of Historic Places. Requires federal agencies to check for sites that may be eligible and determine eligibility.	Several eligible sites exist in the project area. Section 4.21 addresses potential impact and consultation with AK Office of History & Archaeology.

Applicable Law or Order	Primary Agency(ies) -Citation-	Description	Relationship To Project
Environment			
Clean Air Act	**EPA**	EPA regulates airborne pollutants.	Section 4.10 addresses potential for air quality impact.
Executive Order 13175 Consultation /Coordination with Tribes	**FHWA**	Requires agencies to develop consultation process for use with American Indian/Alaska Native tribes and organizations during the making of regulations that affect tribes.	Consultation with Alaska Native organizations is addressed in Chapter 7.
Executive Order 12898 Environmental Justice	**FHWA**	Requires that federal agencies ensure that there are no disproportionately high and adverse effects on minority and low-income populations for their agency actions.	Evaluation of environmental justice issues is addressed in Section 4.3.6
Fish & Wildlife Coordination Act	**USFWS, NOAA Fisheries, FHWA** 16 USC 662	Authorizes the Secretaries of Agriculture and Commerce to provide assistance to agencies to protect and increase the supply of animals, as well as study the effects of polluting substances on wildlife. Requires federal agencies to consult with wildlife agencies regarding effects to fish and wildlife.	Chapter 7 and Sections 4.15 & 4.20 address consultation with federal and state wildlife agencies.
Alaska Fishway Act and Anadromous Fish Act	**Alaska DNR OHMP** AS 16.05.840 and .870	Requires individuals and agencies proposing work in fish streams to submit plans; requires fish passage in fish streams; and authorizes issuance of permits for work in a river, lake, or stream.	A Fish Habitat ***Permit*** application has been submitted to OHMP. Fish protection measures are addressed in Section 4.15.4.
Coastal Zone Management Act	**Alaska DNR OPMP and KGB** 16 USC 1451 et seq	Sets national policy for protection of the coastal zone. The State and the local coastal district define the coastal zone and determine consistency of the project with enforceable policies of the state and local coastal management plans.	A Coastal Policy Questionnaire has been submitted to OPMP for ***consistency review***. The topic is addressed in Section 4.19
Alaska Land Act	**Alaska DNR MLW** AS 38.05.850	Provides for easements on state land, including submerged lands.	***Easement application*** has been submitted for bridge pier footings on the Tongass Narrows sea bed.
Executive Order 11990 Protection of Wetlands	**FHWA,**	Prohibits federal agencies from participating in construction located in wetlands unless they find there is no practicable alternative and the action includes all practicable measures to minimize harm to wetlands.	An FHWA and DOT&PF wetland finding and a 404(b)(1) Evaluation and Determination are in Appendix L.
Executive Order 11988 Floodplain	**FHWA, COE, USCG**	Requires federal agencies to evaluate the potential effects of their actions on floodplains with the aim of reducing the	Section 4.16 addresses floodplain issues and provides

Applicable Law or Order	Primary Agency(ies) -Citation-	Description	Relationship To Project
Management		risk of flood loss and restoring and preserving "the natural and beneficial values" of floodplains.	public notice of the necessity of building a bridge within a floodplain.
Uniform Relocation & Real Property Acquisition Act	**FHWA** 42 USC 4601	Requires agencies that must use private property to acquire it at fair market value and assist in any necessary relocation of residences or business.	Section 4.4 addresses relocation issues.
Department of Transportation Act, Section 4(f)	**FHWA** 49 USC 303	Forbids Dept. of Transportation agencies' use of public parks, recreation areas, wildlife/waterfowl refuges, or historic sites unless there is no "prudent and feasible" alternative and the agency employs "all possible planning to minimize harm."	Parks and historic sites exist near the project. Section 4.1.3 addresses all the protected lands.

NOTE: Where Chapter 4 is cited, see also the corresponding section in Chapter 3 for background.

COE=Dept of the Army, Corps of Engineers
DEC=Alaska Dept of Environmental Conservation
DNR=Alaska Dept of Natural Resources
DNR OPMP=Office of Project Management & Permitting
DNR OHMP=Office of Habitat Management & Permitting
EPA=U.S. Environmental Protection Agency
FHWA=Federal Highway Administration
KGB=Ketchikan Gateway Borough
NOAA Fisheries=U.S. Dept of Commerce, National Oceanic & Atmospheric Administration, National Marine Fisheries Service.
USCG=U.S. Coast Guard
USFWS=U.S. Fish and Wildlife Service

Ketchikan Gateway Borough zoning, conditional use, and/or site development permits may be required. Changes to existing land uses (even if temporary, such as development of construction staging areas), often require Borough review and approval of a zoning permit. Planned structures could also require a conditional use permit or variance, and modification of platted parcels would require a site development permit.

3.14 WETLANDS AND VEGETATION

Figure 3.16 (Biological Resources [Wetlands and Uplands]) shows the locations of the upland and wetland areas in the project area.

3.14.1 Wetlands

Executive Order 11990, "Protection of Wetlands," **and Section 404 of the Clean Water Act, as amended,** require FHWA to avoid and minimize harm to wetlands. The project must avoid wetlands unless there is "no practicable alternative," and if it uses wetlands, it must undergo "all possible planning to minimize harm" to wetlands.

Southeast Alaska is a wet maritime climate, and wetlands are common even in forested areas. National Wetland Inventory (NWI) mapping completed on a broad scale across the state indicates that the areas that drain directly to Tongass Narrows (excluding the large upper watershed of Ward Creek, which extends well inland) amounts to a total of 39,882 acres. This includes west-facing lands on Revillagigedo Island, all of Pennock Island, and east-facing lands on Gravina Island. Of this total, 16,958 acres, or 43% of the total, is

vegetated wetland and another 1,014 acres is either lake or pond. Most of the lower elevations of Gravina Island and virtually all of Pennock Island are wetland. There are also extensive wetlands on Revillagigedo Island. It is in this context that the project is set.

For this project, wetlands in the vicinity of proposed construction were mapped following the NWI classification system based on Cowardin et al. (1979). Project mapping, covering 107 acres, was based on field surveys conducted by the project team in January and June of 2000.[74] The project area has four types of wetlands: forested wetlands, shrub/scrub wetlands, open "muskeg"-type wetlands, and intertidal marshes and meadows. **The mapping completed in the project vicinity was done at greater precision than the NWI mapping and indicated some differences—most notably indicating scrub-shrub wetlands where the NWI mapping showed none, and indicating greater forested wetland than the NWI mapping. However, the relative proportions were similar, with muskegs most common, followed by forested wetlands, scrub-shrub wetlands, and intertidal meadows and marshes. Each type is further described below.**

3.14.1.1 Forested Wetlands

Forested wetlands, **which the NWI indicated cover some 8,200 acres within the Tongass Narrows drainage basins,** are prominent northwest of the airport and on the forested slopes of Revillagigedo Island**.** They are generally drier than other wetlands, either because they are on topographically higher or steeper sites, or because their substrates drain better internally. They are found on moderately sloping lands on Revillagigedo Island, along larger creeks, and as a fringe along the beaches of Gravina and Pennock Islands. They are also interspersed with the muskeg wetlands. A mix of conifer species (including shore pine, red and yellow cedar, western hemlock, and Sitka spruce) characterize forested wetlands. The trees appear stunted relative to those that are found in a better-drained forest. The understory supports a dense growth of blueberry, huckleberry, rusty menziesia, salal, and an herb ground cover. The functions of forested wetlands largely depend on their location. They serve as important wildlife habitat along beaches and streams, may help to moderate stream flows, and help sustain the habitat functions of streams. **The NWI classifies these as palustrine, open forested wetlands with deciduous shrub understory, saturated (PFO4/SS1B); palustrine, open forested wetlands with evergreen shrub understory, saturated (PFO4/SS4B); and palustrine, needle-leaved evergreen forest, saturated (PFO4B). These are shown on Figure 3.16.**

3.14.1.2 Shrub/Scrub Wetlands

Shrub/scrub wetlands, **which the NWI indicated cover some 230 acres within the Tongass Narrows drainage basins,** dominate areas adjacent to muskeg wetlands (see below) and other areas where tree growth is limited by soil saturation. The tree canopy is sparse enough to allow light to penetrate, promoting a dense shrub and scrub tree understory. Scrub/shrub wetlands often form slightly drier "islands" within the muskegs. They also tend to occur on the slightly better-drained (sloping) ground along the streams that run through muskegs. This wetland type has an open canopy of western or mountain hemlock. Shore pine, small Sitka spruce, and red and yellow cedar may also be present. Tall blueberry and rusty menziesia form a dense shrub layer, with a ground cover of bunchberry, deer cabbage, skunk cabbage, fernleaf goldthread, and sphagnum moss. As with forested wetlands, shrub/scrub wetlands may moderate stream

[74] DOT&PF, *Gravina Access Project Biology Report* (Draft), prepared by HDR and Pentec Environmental, October 2001.

flows, stabilize stream banks, and provide important wildlife habitat. **The NWI classifies these as palustrine, evergreen needle-leaved shrub/scrub dominated, saturated (PSS4B)**. **These are shown on Figure 3.16.**

3.14.1.3 Muskegs

Open, muskeg-type wetlands, **which the NWI indicated cover some 8,400 acres within the Tongass Narrows drainage basins,** are the dominant wetland type on Pennock Island and in the areas west and south of the airport on Gravina Island. These open wetlands are intricately interspersed with small patches of forested or shrub wetland. Most of the open wetlands can be loosely described as short sedge fens, which are expected to be moderately nutrient rich and productive. Some richer, tall sedge-dominated wetlands also exist in limited areas, as do more acidic and nutrient-poor bog-type wetlands. The dominant low sedge fens are characterized by low shrub and herb vegetation, such as sweetgale, blueberry, crowberry, and short sedges, and by water pooled on the surface. Many of the wetlands are moderately sloped and have water flowing through them. Flowing water, as well as contact between that water and mineral soil, usually leads to a biological community that is more nutrient-rich and productive. Because they tend to have water flowing through them, muskegs may export organic material that supports downstream ecosystems and helps maintain natural chemistry and low flows in the creeks. The muskeg areas nearest creeks are important for maintaining base flows to those creeks. Little is known about wildlife use of these extensive habitats. Deer and black bear feed in them seasonally, and some water birds, including sandhill cranes, passerine species, and blue grouse are known to use these areas. Waterfowl often use intermixed open freshwater ponds as resting and nesting habitat. Humans use these areas for berry-harvesting. **The NWI classifies these as palustrine, saturated herbaceous meadows (PEM1B) and palustrine, evergreen needle-leaved shrub/grass-like saturated herbaceous meadows (PSS4/EM1B). These are shown on Figure 3.16.**

3.14.1.4 Intertidal Marshes and Meadows

Although relatively scarce in Southeast Alaska, estuarine meadows exist along the shoreline of Gravina Island (see *Gravina Access Project Biology Report Draft*[75]). **The NWI mapping indicated that these intertidal meadows cover some 200 acres of shoreline along Tongass Narrows.** At elevations near the highest tides, grasses dominate these meadows, and sedges and herbs are prominent near the more average high-tide elevations. These meadows may be supported by seepage of freshwater out of the beach gravels. They are highly productive habitats, and organic matter produced within them washes into the marine ecosystem, where it supports food webs. The beach meadows are important feeding areas for many terrestrial and aquatic species of wildlife, including deer, black bear, river otter, mink, shorebirds, waterfowl, and songbirds. They provide succulent forage in spring, when other habitat types may be snow-covered. They also serve as nurseries for young fish. **The NWI classifies these as estuarine intertidal areas vegetated with erect shrubs and regularly flooded by tidal waters (E2EM1N). These are shown on Figure 3.16. Additional details about intertidal marsh areas are provided in Appendix N.**

[75] DOT&PF, *Gravina Access Project Biology Report* (Draft), prepared by HDR and Pentec Environmental, October 2001.

3.14.2 Vegetation

The project area uplands are dominated by coniferous forests and the major climax forest type is western hemlock and Sitka spruce. Other tree species in the forest include western red cedar, yellow cedar, mountain hemlock, red alder, and lodgepole pine. The understory includes skunk cabbage, salal, devil's club, rusty menziesia, Sitka alder, salmonberry, thimbleberry, blueberry, huckleberry, ferns, mosses, and lichens.[76]

3.15 WATER BODIES AND WILDLIFE

Figure 3.15 (Water Resources) shows the lakes, creeks, and watersheds in the project area. Figure 3.17 (Other Biological Resources) shows the areas of particular importance to the wildlife in the project area, including eelgrass beds, anadromous streams, herring spawning areas, and bald eagle nesting sites.

3.15.1 Major Water Bodies

Surface water in the project area flows into Tongass Narrows, through streams, in direct sheetflow runoff, and as shallow subsurface flow. Major streams in the project area are Airport Creek and Government Creek on Gravina Island; and Hoadley Creek, Ketchikan Creek, and Carlanna Creek on Revillagigedo Island. There are no major water bodies on Pennock Island.

No major water body or watershed on Revillagigedo or Pennock Island would be traversed by any of the project alternatives. In the areas on Revillagigedo and Pennock Islands where the alternatives would be located, surface runoff is not collected in creeks and is likely to flow directly into Tongass Narrows as sheet flow or in small channels that discharge via the storm drain system, or as shallow subsurface flow. The major watersheds traversed by the proposed alternatives on Gravina Island are Airport Creek and Government Creek. There are no flow data available for any of the streams that would be crossed by the project alternatives.

3.15.1.1 Tongass Narrows

Tongass Narrows is characterized by shorelines of steep bedrock or coarse gravel, cobble, and boulders; strong tidal currents; and unusually large tidal ranges (25 feet or more). **See Appendix O, Section 3.0, and Section 3.2 of the *Phase II Marine Reconnaissance* report[77] for more information**. Many of the lower intertidal and shallow subtidal areas are sandy or mixed gravel, sand, and shell, with varied amounts of silt. Several small natural coves and areas behind constructed breakwaters provide wave and current protection for anchorages and marine habitats.

3.15.1.2 Airport Creek

The Airport Creek watershed encompasses approximately 1,835 acres. The creek flows northward and discharges into a protected cove north of the airport.

[76] Ketchikan Gateway Borough Planning Department, *Ketchikan District Coastal Management Program*, prepared by Susan A. Dickinson, 1994.

[77] DOT&PF, *Gravina Access Project Biology Report (Draft)*, October 2001, prepared by HDR Alaska. *Phase II Marine Reconnaissance* report is Attachment B.

3.15.1.3 Government Creek

The Government Creek watershed encompasses approximately 1,870 acres. The creek flows northward and discharges into a protected cove south of the airport.

3.15.1.4 Clam Cove Watershed

The Clam Cove watershed encompasses approximately 3,533 acres. The watershed is characterized by numerous lakes and small streams.

3.15.2 Ponds

There are many small ponds on Gravina Island. These ponds tend to have no outlets, and therefore, do not provide a source of nutrients to any downgradient water bodies; however, they do provide wildlife habitat.

3.15.3 Marine Habitats

3.15.3.1 Intertidal Zone

Field investigations have identified 136 plant and 151 animal taxa in the intertidal zone in the project area (**see Section 3.2 of the *Phase II Marine Reconnaissance* report**[78]). In areas where natural coarse gravel/cobble/boulder shorelines occur, the dominant species are rockweed, barnacles, snails, and crab. In areas where sea stars are limited, the intertidal habitat areas support abundant mussel populations. Where somewhat sheltered beaches exist, hard-shelled littleneck and butter clams are often abundant.

The USFWS considers the Lewis Reef area to be particularly rich. Such estuaries are biologically important and productive habitat in Southeast Alaska, and few are located along Tongass Narrows. The Lewis Cove and Point area (including Lewis Reef) contain areas protected from wave action that have some of the richest infauna (sea life living in substrates and especially in a soft sea bottom) of any site surveyed in Tongass Narrows[79]. The northern end of the area has a silty sand lower beach (near mean lower low water [MLLW]) with abundant eelgrass that extends for some distance into the subtidal depths. A large variety of littleneck clams, butter clams, and cockles were observed. Higher on the beach, where there are more cobbles on the surface, the typical rockweed, barnacle, limpet, and littorines, with the typical under-cobble species, were found. Mussels were embedded in the mid-tide range beach sediments over much of the area. The abundance of infauna was patchy, with less rich fauna in the less organic and fine-grained sediments higher on the beach. Very high densities of littleneck clams were found in the siltier parts of the southern portion of this area.

At the south end of the cove, the lower beach is subject to wave-driven gravel-sand berms that migrate up the beach. As these berms are moved by the waves, they progressively bury the existing marine life and provide new sediment for colonization by others. The abundance of littleneck clams varied greatly due to these moving berms.

[78] Ibid.

[79] Ibid.

Lewis Point, at the northern end of this area, supports patches of eelgrass, kelp, and alga. The mixed-fine sandy areas have high densities of butter clams, horse clams, and soft-shell clams, three species of sea star, and a local moon snail. The rocks support rockweed, two types of barnacle, and green and red alga. Kelp provides a low-tide fringe around the rocky areas. Bald eagles, waterfowl and marine birds, deer and black bear, and marine mammals all depend on this intertidal area and other similar but smaller areas along the Gravina Island shoreline.

3.15.3.2 Subtidal Zone

The subtidal margins of Tongass Narrows are characterized by steeply sloping bedrock or coarse gravel/cobble bottoms extending from the lower intertidal zone to the deeper, flatter center of the channel at depths of –80 to –150 feet MLLW **(see Appendix O, Section 3.0, and the *Phase II Marine Reconnaissance* report, Section 3.3[80])**.

For the most part, these subtidal slopes are swept by strong tidal currents and support a number of kelp and other algal species down to depths of about –40 feet MLLW. In spring and summer, many of these rocky areas support a canopy of bull kelp. At depths below minus 40 feet MLLW, the bottom becomes nearly barren sand and gravel. The most abundant subtidal organism observed in the project area in the winter was sea cucumber.

Shallow subtidal areas that are protected from direct impact of the currents, in small coves or behind breakwaters, have gradually sloping sandy bottoms that often support healthy eelgrass beds. Locations of known eelgrass beds are shown on Figure 3.17.

3.15.4 Wildlife—Aquatic Species

3.15.4.1 Marine Mammals

Eight species of marine mammals are commonly found in the project area. These are harbor seals, Steller sea lions, humpback whales, killer whales, Dall's porpoises, Pacific white-sided dolphins, minke whales, and harbor porpoises. Grey whales are sometimes observed in the area off Vallenar Point.

Steller sea lions are listed as "threatened" and humpback whales are listed as "endangered" under the Endangered Species Act. Steller sea lions and humpback whales are discussed in Section 3.20, Threatened or Endangered Species. None of the other marine mammals in the project area are included on the threatened and endangered list, and none of them are designated as "depleted" under the Marine Mammal Protection Act.

The whales common to Tongass Narrows are the humpback, minke, and killer whales. Humpback and minke whales are rorqual whales that use baleen to feed. Their diet consists of plankton, krill, and small fish, such as herring, mackerel, capelin, sardines, and anchovies. Killer whales are toothed whales and have a diverse diet of fish, squid, seals, sea lions, penguins, dolphins, porpoises, and large whales such as the blue

[80] Ibid.

whale.[81] Currently, there are no reliable data concerning the population trends of minke and killer whales in the region.[82]

The Dall's porpoise, harbor porpoise, and the Pacific white-sided dolphin are common in Southeast Alaska, although no reliable data currently exist concerning population trends[82]. Porpoises and dolphins have a varied diet consisting of hake, squid, lantern fish, anchovy, sardines and small schooling fish. They are vulnerable to predation by killer whales and sharks[81].

The harbor seal is listed by the State of Alaska as a Species of Special Concern. In the Gulf of Alaska and Prince William Sound, harbor seal numbers declined substantially from the late 1970s through the early 1990s. However, based on aerial surveys of terrestrial haulouts near Ketchikan and Sitka, and in Glacier Bay, the population of harbor seals in Southeast Alaska appears to be increasing or stable in recent years, and seals are thought to be relatively abundant. The Ketchikan survey showed that from 1983 to 1996, harbor seal populations in the Ketchikan area increased at a rate of 9.3 percent annually[11]. Harbor seals are generally non-migratory, inhabiting Tongass Narrows including the waterfront area adjacent to the City of Ketchikan year-round. Local movements of harbor seals are associated with tides, weather, season, food availability, and reproduction. They haul out on rocks, reefs, beaches, and drifting glacial ice, and feed in marine, estuarine, and occasionally fresh waters. Their diet consists of pelagic and bottom dwelling fishes, crustaceans, and octopi.

3.15.4.2 Anadromous Fish

Anadromous fish (fish that return to fresh water to spawn) flourish in Southeast Alaska. The project area contains several streams that support anadromous fish: Airport Creek, Government Creek, and several other small, unnamed creeks. In the project area, large populations of anadromous fish such as salmon (five species), cutthroat and steelhead trout, and Dolly Varden provide food for bears, wolves, bald eagles, and other animals, and are valuable to commercial and sport fishers. The *Essential Fish Habitat Assessment Technical Memorandum* (Appendix O) provides information on the habitat requirements for salmonid and ground fish species.

3.15.4.3 Marine Fish

While Southeast Alaska rivers and streams have relatively few species of resident fish, marine waters contain hundreds of fish species. Flatfish, Pacific cod, rockfish, sculpin, halibut, skate, and sablefish are abundant, and huge schools of herring, smelt, capelin, and Pacific sand lance collectively provide the food base for salmon, trout, and char[83] (see also Appendix O, Section 3.0). **No site-specific surveys of fish likely to be present in the immediate vicinity of each alternative are available. However, fish types that are likely be present in Tongass Narrows include demersal (e.g., flatfish, cottids, rockfish, gadids) and pelagic**

[81] National Marine Fisheries Service. 2003. Protected Species Information accessed at http://www.fakr.noaa.gov/protectedresources/default.htm on November 20, 2003.

[82] Angliss, R.P., and K.L. Lodge. 2002. *Alaska Marine Mammal Stock Assessments*, 2002. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-133, 224 p.

[83] R.M. O'Clair, Armstrong, R.H., and Carstensen, R., *The Nature of Southeast Alaska: A Guide to Plants, Animals, and Habitats*, Seattle, WA: Alaska Northwest Books, 1997.

(salmonids, clupeids, embiotocids, greenling) species. Of these, some fish have closed swim bladders (physoclistous species, e.g., rockfish, gadids), some have open swim bladders (physostomous species, e.g., salmonids), and some lack a swim bladder (e.g., cottids, flatfish). This distinction is important in determining impacts of some construction activities, such as blasting. Other fish species that live in the marine waters of the project area are yelloweye, shortraker, rougheye, and dusky rockfish, walleye pollock, lingcod, Pacific Ocean perch, and arrowtooth flounder.[84] **DNR** and NOAA Fisheries have identified Pacific herring and Pacific halibut as important in the project area.

Pacific Herring. Pacific herring spawn during the spring in eelgrass or rockweed beds at the north end of Gravina Island.[85]

Pacific Halibut. Halibut eat a large variety of fishes (including cod, turbot, and pollock) and some invertebrates such as crab and shrimp. They sometimes leave the ocean bottom to feed on pelagic fish, such as sand lance and herring. The fish spawn in the winter months. Eggs and larvae float for up to six months until they are carried to shallower waters by prevailing currents to begin life as bottom-dwellers. Older fish often use both shallow and deep waters over the annual cycle.[86]

3.15.4.4 Essential Fish Habitat

The Magnuson-Stevens Fishery and Conservation Management Act requires analysis of "Essential Fish Habitat". The NOAA Fisheries is responsible for delineating EFH. In the case of anadromous fish streams (principally salmon), NOAA Fisheries has designated the anadromous fish maps prepared by ADF&G[87] as the definition of EFH.

In the project area, Tongass Narrows is designated EFH for 11 species of ground fish and 5 species of salmon. Anadromous fish streams designated as EFH for salmon that could be affected by the project are Government Creek, Airport Creek, and two unnamed streams on Gravina Island, both of them southeast of Government Creek and the airport, as shown in Figure 3.15. See the project's EFH technical report in Appendix O for additional details and discussion of EFH resources in the project area.

The shorelines of Tongass Narrows provide excellent rearing habitat for juvenile salmonids migrating out of area streams during the spring. Low gradient gravel and sand beaches produce an abundance of epibenthic zooplankton that provides a key prey base for juvenile pink, chum, and chinook salmon[88] At low tides, extensive eelgrass beds along the narrows also produce large numbers of prey items and provide refuge for juvenile salmonids against predation by birds and larger fish. As they grow, young salmon tend to move offshore into deeper waters while remaining in the upper portion of the water column. Diets of subadult and adult salmon vary among species, but generally

[84] Linda Shaw, NOAA FISHERIES Juneau, personal communication with Darcy Richards, HDR, regarding essential fish habitat, 1999.

[85] Scott Walker, ADF&G Assistant Area Management Biologist, email to Robin Reich, HDR, regarding herring, April 4, 2000.

[86] Alaska Department of Fish and Game, Division of Wildlife Conservation, *Wildlife Notebook Series*, 1999.

[87] **The Division of Habitat Restoration has been transferred from ADF&G to DNR and is now known as the Office of Habitat Management and Permitting.**

[88] Groot and Margolis, Editors. *Pacific Salmon Life Histories*. 1991.

are dominated by forage fish (herring, smelt, and sand lance) and larger pelagic and planktonic invertebrates.

Specific descriptions of the salmonid and non-salmonid species, some of which may be found within Tongass Narrows, and their life stages are included in Appendix O. No specific surveys have been identified that document the use of project area waters by ground fish species. However, several species of salmonids are known to use the Narrows for all or most of their life stages. Unconsolidated bottom areas of silt, sand, and gravelly sand along the slopes of Tongass Narrows are expected to support a variety of ground fish such as arrowtooth flounder, skates, cottids, walleye pollock, and Pacific cod. Ground fish prey includes a variety of epibenthic crustaceans, especially amphipods and several crab and shrimp species, as well as infaunal clams, gastropods, and polychaete worms. Rocky outcrops along the shorelines of Tongass Narrows are expected to support several species of rockfish. Pelagic waters within the Narrows support sub-adult and adult salmon as well as sablefish. These species feed primarily on epibenthic and pelagic small fish and invertebrates.

Most fish occur in Tongass Narrows primarily as late juveniles and adults and may use Tongass Narrows as a migratory corridor to other rearing areas in nearby bays and intertidal areas. Table 3-22 and Table 3-23 show the species (and their life stages) that occur in Tongass Narrows, Government Creek, Airport Creek, and two other unnamed anadromous fish streams.

TABLE 3-22
ESSENTIAL FISH HABITAT GROUNDFISH SPECIES IN PROJECT AREA

Species	*Egg*	*Late Juvenile*	*Adult*
Pacific Ocean Perch		X	X
Yelloweye Rockfish		X	X
Shortraker		X	X
Rougheye Rockfish		X	X
Dusky Rockfish		X	X
Walleye Pollock	X		X
Sablefish		X	X
Pacific Cod		X	X
Arrowtooth Flounder		X	X
Sculpin spp.		X	X
Skates spp.		X	X

TABLE 3-23
ESSENTIAL FISH HABITAT SALMON SPECIES IN PROJECT AREA

Species	*Egg and Larvae – fresh water*	*Juvenile – fresh water*	*Juvenile – estuarine*	*Juvenile – marine*	*Adult – marine waters*	*Spawning – fresh water only*
Coho salmon	X	X	X	X	X	X
Chum salmon	X	X	X	X	X	X
Pink salmon	X	X	X	X	X	X
Chinook salmon*			X	X	X	
Sockeye salmon*				X	X	

* Only juveniles and adults of these species are found in Tongass Narrows within the project area.

3.15.5 Wildlife—Amphibians

Two amphibian species likely inhabit the project area: rough-skinned newt and the western toad.[89] Rough-skinned newt salamanders may inhabit creeks and wet areas.[90] Western toads breed in freshwater wetlands and move to terrestrial, nonforested areas to feed on insects and other small animals during adulthood.

3.15.6 Wildlife—Birds

General consultation with USFWS and ADF&G has occurred. Few specific concerns were raised but some are noted in the following paragraphs. About 160 species of birds nest in or near Ketchikan.[91] Around Revillagigedo and Gravina Islands and the surrounding waters, local birdwatchers have observed approximately 225 species of birds.[92] In the project area, birds dwell in a variety of habitats, including marine waters, intertidal areas, freshwater wetlands, and forests**.**

Waterfowl, including long tailed duck, bufflehead, common goldeneye, Barrow's goldeneye, harlequin duck, white-winged scoter, surf scoter, common merganser, and red-breasted merganser, forage in the rocky intertidal zone of Tongass Narrows during high tide.[93] They feed primarily on invertebrates and small fish in the ice-free waters along the coastline during the winter and breed in more northern areas of Alaska during the summer. **The Lewis Reef and related estuary area is considered by ADF&G to be especially rich for wildlife of all kinds, including birds.**

Other species, primarily gulls, northwestern crows, and common ravens, feed on invertebrates and opportunistically scavenge in the rocky intertidal areas during low tide. In the early spring, surf scoters and gulls, along with other species, gather and feed upon herring spawn on

[89] Mike Brown, USFS, Ketchikan, personal communication with Robin Reich, HDR, on February 16, 2000; Reich, Robin, HDR, Amphibians in the Gravina Access Project Area, memorandum to file, 2000.

[90] D.B. Wake, Jockosch, E.J., and Papenfuss, T.J., "Does Batrachoseps Occur in Alaska?" *Herpetological Review* 29(1): 12-14, 1998.

[91] O'Clair et al., 1997.

[92] Steve Heinl and Goucher, Teri, *Checklist of Birds of the Ketchikan Area*, Alaska, March 2000.

[93] R.M. O'Clair, and C.E. O'Clair, *Southeast Alaska's Rocky Shores: Animals*. Plant Press, Auke Bay, Alaska, 1998; and Heinl, Steve. *Some Peak Seasonal Counts of Waterbirds on the Ketchikan Road System.* Ketchikan, Alaska, 2000.

eelgrass and rockweed. The Totem Bight area and the northern end of Gravina Island are popular feeding areas. Gulls follow herring as they move northward along the coastline.[94]

Some migratory waterfowl and summer seabirds concentrate just north of Pennock Island adjacent to downtown Ketchikan and at the head of Ward Cove.[95] Sandhill cranes have been observed on Gravina Island on airport property south of Government Creek. **Herons use the shoreline and estuarine areas near Lewis Reef and Canada geese use the beach grass in this area.** Shorebird species, including western sandpipers and red-necked phalarope, feed and stage in estuarine areas within the project area during the spring and fall migrations. However, larger estuaries outside the project area on Gravina Island provide more important habitat to birds migrating northward.[96] No seabird colonies exist within the project area.[97]

Rock doves, chestnut-backed chickadees, winter wren, and varied thrush breed and inhabit forests of the project area year-round. Other passerines, including Swainson's thrush, orange-crowned warbler, and Townsend's warbler, breed in the area forests in the summer. American robin, dark-eyed junco, golden-crowned kinglet, Steller jay, and several warblers use beach-fringe forests and scrub-shrub communities. Greater yellowlegs may nest in the freshwater fens.[98] Shorebirds, passerine species, and blue grouse are known to use muskeg habitats. Waterfowl often use freshwater ponds within the muskegs as resting and nesting habitat.

The northern goshawk is an uncommon forest-dwelling raptor that is likely to occur on Gravina Island. Goshawks can be found foraging in dense deciduous and coniferous forests. They nest exclusively in old growth and mature forest habitat. Northern goshawks may use the project area as foraging habitat.

Bald eagles are protected under the Bald and Golden Eagle Protection Act and any impacts from proposed project activities must consider impacts to eagles. **Protection of bald eagles has included definition of zones around nest trees that are guidelines for disturbance. The primary zone extends 330 feet from the nest tree, and land clearing or construction may be discouraged year round. Human disturbance is discouraged particularly during the spring-summer nesting season. A secondary zone ranges to a distance of 660 feet from the nest, and human disturbance is minimized during the breeding season, but construction may be possible outside the nesting season. A third zone that extends up to 1/4 - 1/2 miles from the nest, depending on topography and line of sight to nest, permits most activities, timber clearing, construction blasting, and similar major disturbances outside the breeding season.**

The bald eagle population in Southeast Alaska is stable.[99] The Audubon Christmas Bird Count identified 53 bald eagles in the Ketchikan area in December 1999. There are 16 documented

[94] Ibid.

[95] Ketchikan Gateway Borough Planning Department, *Coastal Management Plan*.

[96] Steve Heinl, *Some Peak Seasonal Counts of Waterbirds on the Ketchikan Road System*, Ketchikan, Alaska, 2000.

[97] USFWS, Beringian Seabird Colony Catalog website, <http://164.159.151.5/seabird/index.html> Brockman, Steve (USFWS, Ketchikan), personal communication, Robin Reich, January 13, 2000; Brown, Mike (USFS, Ketchikan), personal communication, Robin Reich, February 16, 2000; Heinl, Steve, *Some Peak Seasonal Counts of Waterbirds on the Ketchikan Road System*, Ketchikan, Alaska, 2000.

[98] Jon Nickles, USFWS, Anchorage, letter to Colonel Peter A. Topp regarding Tongass Narrows 504 2-9700001, May 22, 1997.

[99] Ketchikan Gateway Borough Planning Department, *Coastal Management Plan*.

bald eagle nests within the project area (see Figure 3.17). Bald eagles and their nests are common along the shorelines of Tongass Narrows, where the eagles scavenge and prey on fish in the intertidal areas.

3.15.7 Wildlife—Land Mammals

The project area is home to approximately 50 species of land mammals. While much information exists on larger land mammals, the distribution and numbers of many small mammals remain unknown. The USFWS and the ADF&G identify Sitka black-tailed deer, Alexander Archipelago wolf, and black bear as important species in the project area.

Sitka Black-Tailed Deer. The Sitka black-tailed deer is native to coastal rain forests of Southeast Alaska. During the winter, deer inhabit south- and west-facing slopes up to 800 feet elevation, and dense timber stands.[100] **In the project area, the old-growth forest and forested wetlands along the shoreline at and north of Lewis Point are important deer winter habitat (see Figure 3.17).** Alaska deer populations are dynamic and usually fluctuate with the severity of the winters. However, the Ketchikan area rarely experiences severe winters and high winter deer mortality.[101] Since the 1980s, the deer population estimates for Gravina Island have fluctuated between 350 and 915; populations on Gravina Island and southern Revillagigedo Island are 14 to 43 deer per square mile, respectively.[102]

The deer population on Gravina Island provides food for wolves and bear. The island is also a popular deer hunting area for humans; however, the middle of the island provides a refuge for deer from hunters because it is not easily accessible.[103] ADF&G manages deer hunting on the island, and considers the size of its resident deer population to be healthy.[104]

Alexander Archipelago Wolf. **The Alexander Archipelago Wolf is a species of concern for the USFWS.** In Southeast Alaska, the wolf population varies closely with the deer population. According to the ADF&G, one pack of Alexander Archipelago wolves with 10 to 12 individuals inhabited Gravina Island in the fall of 1999, and four wolves were shot or trapped during the following season.[105] These numbers have remained stable to April 2003. The wolves hunt prey in a variety of habitats, including open wetlands and forests. Deer comprise 80 percent of their diet on Gravina Island, and the pack is healthy because the deer population is stable. **Sufficient deer habitat, particularly low-elevation winter habitat such as the habitat in the Lewis Point to Vallenar Bay, is important to maintaining this stability.** The wolves also feed on beaver and salmon, and occasionally scavenge or hunt marine mammals.[106]

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[100] Dave Person, (ADF&G Division of Wildlife Conservation, Ketchikan), telephone conversation with Robin Reich, HDR, regarding wolves and deer on Gravina Island, 2000.

[101] Ibid.

[102] ADF&G, Division of Wildlife Conservation, *Sitka Black-tailed Deer Management Report for 1 July 1996 to 30 June 1998 for Game Management Unit 1A*, 1998.

[103] Person, telephone conversation Robin Reich, 2000.

[104] ADF&G, Division of Wildlife Conservation, 1998.

[105] Person, telephone conversation Robin Reich, 2000.

[106] Ibid.

Black Bear. Black bears inhabit most of forested Alaska. They feed on freshly sprouted green vegetation in the spring and on salmon during the summer and fall during fish runs. Berries, especially blueberries, are an important food in the late summer and fall. Breeding takes place from June through July. The cubs, usually two, are born in winter or early spring. The bears hibernate during the winter in rock cavities, hollow trees, and self-made excavations located from sea level to alpine elevations.[107] The bear population in and around Gravina Island is approximately 1.4 bears per square mile. This number has not fluctuated much in the last 10 years, and the bear population overall has remained relatively low but stable. Gravina and Revillagigedo Islands do not contain many salmon streams or berries to support large populations of black bears.[108] **Salmon streams in the project area, such as Government Creek and Airport Creek and their associated productive estuaries and coastlines such as those near Lewis Point, likely are important for black bears.**

The population of black bears in the Borough is approximately 1.5 per square mile.[109] The ADF&G commonly relocates black bears from the Borough to the southern part of Southeast Alaska to reduce the danger to residents.[110] Humans hunt black bear on Gravina and Revillagigedo Islands. From 1984 through 1992, the average bear harvest was 66 per season; from 1993 through 1995, it was 43 per season.

3.16 FLOODPLAINS

Executive Order 11988, "Floodplain Management," requires FHWA to follow procedures for assessing and avoiding potential flood impacts. The Federal Emergency Management Agency (FEMA) has mapped the expected 100-year floodplain for a small portion of the Ketchikan Gateway Borough (i.e., primary population areas).[111] This floodplain is the extent of a flood that, statistically, can be expected to occur once every 100 years. The area included in the FEMA study extends from 0.5 mile north of Carlanna Creek to the USCG Station in Ketchikan. According to the FEMA maps, much of the Ketchikan waterfront lies within the floodplain of a 100-year flood (see Figure 3.15 [Water Resources]).

3.17 WILD AND SCENIC RIVERS

There are no national or state-designated wild or scenic rivers in the project area.

3.18 COASTAL BARRIERS

There are no coastal barriers, as identified in the Coastal Barriers Resources Act, in the project area.

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[107] ADF&G, Division of Wildlife Conservation, *Wildlife Notebook Series*, 1999.

[108] Porter, Boyd, ADF&G Ketchikan Area Biologist, telephone conversation with Sirena Brownlee, HDR Alaska. April 30, 2003.

[109] ADF&G, Division of Wildlife Conservation, *Black Bear Survey—Inventory Management Report for 1 July 1992 to 30 June 1995 for Game Management Unit 1A*, 1995.

[110] Porter, Boyd, ADF&G, Division of Wildlife Conservation, meeting in Ketchikan with Robin Reich, HDR, regarding wildlife in the Ketchikan area, April 12, 2000.

[111] FEMA, Flood Insurance Rate Maps for the City of Ketchikan, Ketchikan Gateway Borough, Community Panel Number 020003 0001 A and B, 1990.

3.19 COASTAL ZONE

In 1972, the U.S. Congress passed the federal Coastal Zone Management Act to create a "partnership between state and local governments in the planning and management of coastal resources." In 1977, the State of Alaska passed the Alaska Coastal Management Act. The ACMP provides statewide policy and guidance to projects proposed within the Alaska Coastal Boundary.

District coastal management programs include a locally approved Coastal Management Plan consistent with the ACMP statewide development standards. Once approved, the local plan becomes part of the ACMP and mandates that state and federal agencies take actions on local permits consistent with the policies of the local plan and the statewide standards. These standards address coastal development; recreation; energy facilities; transportation; utilities; fish and seafood processing; timber harvesting and processing; mining and mineral processing; subsistence; coastal habitats; air, land, and water quality; and historic, prehistoric, and archaeological resources.

The Borough initiated its Coastal Management Plan in 1978 and approved its first plan in 1984. A minor revision to the plan was made in 1989. According to the existing 1984 plan,[112] the key advantages of participating in the program are:

- An opportunity for increased local control; all federal and state agencies exercising authority within the local planning area must do so in a manner consistent with local coastal management policies.
- Coordination of comprehensive resource planning and management with state and federal agencies.
- The opportunity to form special agreements among various levels of government on issues regarding the management of coastal resources, such as permit simplification.
- Funding for planning and implementation.

In 2002, the Borough prepared an update of the Coastal Management Plan. The document is an internal draft that has yet to be finalized.

The adopted 1984 plan includes a policy specifically addressing elements of the Gravina Access Project. Policy C6 states:

> **Adequate public access (improved ferry service or a hard link) to future commercial/industrial development on the Airport Reserve shall be encouraged, ensured, and/or provided.**

Most other policies do not pertain directly to the project. Policies on bald eagles and visual aesthetics that may affect the project are discussed in Section 4.19.

[112] Ketchikan Gateway Borough Planning Department, *Coastal Management Plan*.

3.20 THREATENED OR ENDANGERED SPECIES

Currently, there are no species under the jurisdiction of the USFWS listed as threatened and endangered under the Endangered Species Act in the project area. However, NOAA Fisheries lists two species within the project area as endangered or threatened: the Steller sea lion and the humpback whale. Both species are additionally protected under the Marine Mammal Protection Act of 1972. **A stand-alone biological assessment for these species appears in Appendix T and was transmitted to NOAA Fisheries in January 2004.**

3.20.1 Humpback Whale

The humpback whale (*Megaptera novaeangliae*) was federally listed as endangered in 1966. Before the mechanization of commercial whaling, the population of humpback whales was about 15,000. The International Whaling Commission (IWC) first protected humpback whales from commercial whaling in 1965, and such whaling ceased in the North Pacific. The whales were listed as endangered under the Endangered Species Act in 1973. The humpback whale is listed as "depleted" under the Marine Mammal Protection Act.

The Central North Pacific Stock, currently estimated at about 4,000 animals, is the group in question for this project. This stock of humpback whales generally winters in Hawaiian waters and summers along the North Pacific coast. Humpback whale distribution in summer is continuous from British Columbia to the Russian Far East, and humpbacks are present offshore in the Gulf of Alaska. The whales appear to return to the feeding areas where their mothers first brought them as calves, with evidence of some crossover to other areas, but only at a rate of approximately 1 percent.

More than 500 humpback whales inhabit the waters near Southeast Alaska during the summer.[113] A NOAA Fisheries stock report[114] indicates 404 individual whales have been documented in the portion of Southeast Alaska that includes Chatham Strait and waterways to the north, and 275 have been documented in northern British Columbia (primarily near Langara Island). No counts have been completed specific to southern Southeast Alaska and the project area. There is no designated critical habitat for humpback whales.

According to the NOAA Fisheries stock report, the Central North Pacific stock of humpbacks is the focus of a large whale-watching industry in Hawaii and a growing whale-watching industry in Alaska and British Columbia. Regulations concerning the minimum distance to keep from whales and how to operate vessels when in the vicinity of whales have been developed for Hawaiian waters in an attempt to minimize the impact of whale watching. In 2001, NOAA Fisheries issued regulations to prohibit most approaches to humpback whales in Alaska to 100 yards (66 FR 29502; May 31, 2001). The growth of the whale-watching industry is a concern to NOAA Fisheries, because preferred habitats could be abandoned if disturbance levels become too high. Noise is another, related concern. Continual noise appears to the primary concern, with noise from an Acoustic Thermometry of Ocean Climate program, the U.S. Navy's Low

[113] MacDonald, S.O., and J.A. Cook, *The Mammal Fauna of Southeast Alaska*, University of Alaska Fairbanks, 1999.

[114] NOAA Fisheries. 2002. *Stock Assessment Report: Humpback Whale (Megaptera novaeangliae): Central North Pacific Stock.*

Frequency Active sonar program, shipping, and whale watching cited by NOAA Fisheries. Incidental or short-term noises are not mentioned.

Humpback whales commonly feed and breed over shallow banks, but traverse the open ocean during migration. They prey on small schooling fish such as herring and swarms of krill by using bubbles that concentrate prey. They also feed in formation, herd prey, and practice lunge feeding as a group.[115] Most of the Alaska summer whale population leaves by about October or November for Hawaii. Calving takes place in the wintering grounds. A few humpback whales stay in Alaska and may be seen in winter.

NOAA Fisheries has documented human-caused injury or mortality to this stock of whales. Entanglement or other injury caused by fishing gear and nets appears to be the primary issue. Two incidents were noted in the general Ketchikan area. There is documentation of apparent injury to and death of humpback whale related to repeated underwater blasting in Newfoundland.

There are no data about seasonal abundance and distribution of humpback whales specific to Tongass Narrows. However, there is informed anecdotal information from a member of the marine mammal stranding network,[116] an ADF&G biologist,[117] and a spotter pilot,[118] all based in Ketchikan, to indicate use of the area. Humpback whales may be found in Tongass Narrows year-round, although the numbers are small much of the year, and they are seen only perhaps once or twice per month. There is a peak in activity in April and May, corresponding to the herring spawning season, when daily sightings are common. Whales do not appear to use Tongass Narrows specifically as a migration route, and there is no evidence that Tongass Narrows is a favored location for critical activities, although the whales presumably may feed in the Narrows.

3.20.2 Steller Sea Lion

Steller sea lions (*Eumetopias jubatus*) number between 100,000 and 140,000 worldwide.[119] Approximately half of the population live in Alaska. The western Alaska population of Steller sea lions, inhabiting the western Gulf of Alaska and Bering Sea, has declined substantially and is endangered. The eastern stock is the population of interest for this project, extending through the eastern Gulf of Alaska and along the coastal areas of Alaska, Canada, Washington, Oregon, and California. This stock was listed as threatened in 1990. According to a NOAA Fisheries stock report,[120] the eastern stock is stable or increasing in the northern portion of its range (Southeast Alaska and British Columbia). For the Southeast Alaska population, the trend is growth, from 6,898 animals in 1982 to 9,862 in 2000.

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115 Wynne, Kate. *Guide to Marine Mammals of Alaska*, University of Alaska Fairbanks, 1997.

116 Frietag, Gary. NOAA FISHERIES. Personal communication with HDR Alaska, February 23, 2000.

117 Porter, Boyd. 11/20/2003. Personal communication between Boyd, Alaska Department of Fish and Game wildlife management biologist, Ketchikan, and John Wolfe, HDR Alaska Inc. Prior to his current position, Boyd was a Steller sea lion research biologist for ADF&G at Forrester Island and other Southeast Alaska sea lion rookeries.

118 Masden, Michelle, Owner of Island Wings Air Service. 11/20/2003. Personal communication with John Wolfe, HDR Alaska.

119 Ibid.

120 NOAA Fisheries. 2002. *Stock Assessment Report: Steller Sea Lion (Eumetopias jubatus): Eastern U.S. Stock*.

Steller sea lions feed on a wide variety of prey, such as pollock, flounder, herring, crab, rockfish, cod, salmon, squid, and octopus. Feeding occurs from the intertidal zone to the continental shelf.[121] Critical habitat has been defined in Southeast Alaska at major haulouts and major rookeries (50 CFR 226.202). The nearest rookery to Ketchikan is Forrester Island, and the nearest major haulouts are at Timbered Island and Cape Addington. All three sites are about 80 miles west of Tongass Narrows.

There are no established haulout sites (i.e., on-shore areas where sea lions gather) in Tongass Narrows. Grindall Island, 12 miles west of the northern tip of Gravina Island, is a year round sea lion haulout but not a rookery. This appears to be the nearest haulout area. ADF&G has done aerial surveys of this site over a number of years (1982 through 1996) and has never recorded animals there in summer (June/July) but has counted more than 200 animals each on the only two non-summer counts: March 1993 and December 1994.[122] The sea lions have been observed in Tongass Narrows around the fish hatchery, where large numbers of salmon congregate in late summer. In Ketchikan harbor itself, daily sighting of sea lions are not unusual in winter—more than in summer, when the harbor is busiest.

Steller sea lions have not been specifically studied or counted in Tongass Narrows. However, there is informed anecdotal information from a member of the marine mammal stranding network,[123] an ADF&G biologist,[124] and a spotter pilot,[125] all based in Ketchikan, to indicate use of the area. Sea lions may be found in Tongass Narrows year round, although the numbers are small much of the year. There is a peak in activity in March-early May, corresponding to the herring spawning season. At this time, it is reported that large pods of sea lions may occur the area (20 to 80 animals are possible). In summer, most sea lions move to large rookeries (such as Forrester Island) for pupping and the next mating cycle. Small numbers of non-mating animals remain in the Tongass Narrows area, but are seen infrequently. There is another small peak in activity in later summer, associated with salmon. There are not large numbers in winter.

NOAA Fisheries reports concerns about fishing-related injury and mortality, such as entanglement in fishing gear. Other causes of mortality are also reported (subsistence hunting, illegal shooting, elimination of sea lions for protection of aquaculture in British Columbia, etc.). There is no indication of substantial problems related to construction.

[121] ADF&G, September 5, 2002. *Wildlife Notebook Series*: Steller Sea Lions, http://www.state.ak.us/adfg/notebook/marine/sealion.htm.

[122] Gerke, Brandee. November 19, 2003. Personal communication between Gerke, National Marine Fisheries biologist, Juneau, and John Wolfe, HDR Alaska, Inc.

[123] Frietag, Gary, NOAA Fisheries. 2000.

[124] Porter, Boyd. November 20, 2003. Personal communication.

[125] Masden, Michelle. November 19, 2003. Personal communication between Masden, owner and pilot for Island Wings Air Service, Ketchikan, and John Wolfe of HDR Alaska, Inc.

3.21 HISTORIC AND ARCHEOLOGICAL RESOURCES

3.21.1 Resources in the Project Area

In accordance with Section 106 of the National Historic Preservation Act,[126] the Gravina Access Project team initiated the Section 106 process in 1999 to characterize the potential impacts of the project alternatives on historic and archeological resources. This effort included consultation with the Alaska State Historic Preservation Office (SHPO); literature review; field reconnaissance; consultation with the Ketchikan city and borough governments (the City of Ketchikan is the certified local government), and consultation with Tribal entities, including the Organized Village of Saxman, the Ketchikan Indian Corporation Tribal Council, **the Native Community of Metlakatla**, and the Cape Fox Corporation. Cultural Resource Consultants produced documents and memoranda in March 2000, November 2001, July 2002, October 2002, and May 2003, each providing additional information as project planning progressed and alternatives were changed. The primary on-the-ground reconnaissance surveys were completed in the summers of 2001 and 2002. The literature review and field reconnaissance efforts are summarized in the following section.

The early historic Native peoples of the Ketchikan area were principally the Tongass (Tan-ta kwan) Tlingit, who used portions of Revillagigedo and Gravina Islands. More generally, Native peoples are thought to have used Southeast Alaska coastal areas for at least 9,000 years.

Captain George Vancouver sailed along the western shore of Gravina Island in 1793, but did not explore farther east. Ketchikan began with three Tlingit houses near Ketchikan Creek, and a fish saltery was built there in 1884. Cape Fox Natives founded Saxman in 1894. A trading post was established in 1890, and Ketchikan incorporated as a city in 1900. The population grew with the gold rush and continued to grow with the mining, fishing, and timber industries.

3.21.1.1 Resource Inventory: NRHP and AHRS Sites

This section describes results of a general literature review. The properties specifically associated with the Area of Potential Effect (APE) for Gravina Access alternatives are described in the following section.

Nineteen properties in Ketchikan and Saxman are listed on the National Register of Historic Places (NRHP), and another 30 properties have been determined to be eligible for NRHP listing. The Alaska Heritage Resources Survey (AHRS) lists approximately 250 archeological and historical properties in the general project area, of which the vast majority are historic buildings concentrated in Ketchikan. Very few of these are within the APE (see Section 3.21.2 below).

3.21.1.2 Prehistoric Sites

Ethnographic accounts mention a number of localities used by the Tlingit in the Ketchikan area. Four prehistoric archaeological sites have been officially recorded on the AHRS. However, much of the project area has not been intensively inventoried, and the possibility of locating additional sites should not be ruled out. The few known prehistoric sites in the Ketchikan area are along the coast.

[126] National Historic Preservation Act, as amended (16 USC 470) and associated regulations (36 CFR 800).

3.21.1.3 Historic Sites

In addition to the properties listed in the AHRS, there are numerous historic sites along the shores of Tongass Narrows mentioned in Roppel's geographical and historical guide to Revillagigedo and Gravina Islands.[127] Other sites are depicted on various federal surveys, which are invaluable sources of detailed information on the early settlement of Gravina and Pennock Islands.

On Pennock Island, opposite Saxman, there is a late nineteenth century and early twentieth century cemetery.[128] This was originally a burial ground of the Saxman Tlingit, although the people of Ketchikan also used it.[129] The cemetery is south of the project alternatives. **Tribal contacts for this project indicated the possibility of other graves along the eastern side of Pennock Island.**

3.21.1.4 Sites Found During Field Visits

Field visits for this project near the potential alignments resulted in the discovery of several previously unknown sites. These are further described in the following section.

3.21.2 Area of Potential Effect and Resources near Alternative Alignments

An APE is "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR § 800.16[d]). The APE for the Gravina Access Project is generally linear, but is influenced by the scale and nature of the undertaking, and it varies in width for different kinds of potential impacts. For construction-related (temporary) impacts and permanent direct impacts, the APE encompasses the project footprint and a 100-foot wide buffer zone around project facilities and to either side of the road cut or fill limits (or to either side of a bridge).

For direct (permanent) visual impacts, the APE includes a zone 0.25 mile wide along bridge structures. The natural scenic quality of Ketchikan and Tongass Narrows and the juxtaposition of generally compatible urban and natural landscape elements define the overall visual quality of the area. Some of the build alternatives under consideration in the Gravina Access Project would change existing views at key viewpoints throughout the project area. In general, the bridge alternatives (Alternatives C3[a], C3[b], C4, D1, F1, and F3) have greater potential for visual impacts than the ferry alternatives (Alternatives G2, G3, and G4). These impacts may be most notable in close proximity to the bridge structures, which, to varying degrees, would represent new visual elements in most viewsheds.[130] For this reason, each of the bridge alternatives includes a visual impact zone extending 0.25 mile around bridge structures. The potential for visual impacts from the ferry alternatives is low, because the area along Tongass Narrows already has a waterfront character and setting. Therefore, the area within which the ferry alternatives may have a visual effect on historic properties is the same as the APE for other direct and construction-related impacts.

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[127] Roppel, Patricia, *Land of Mists, Revillagigedo & Gravina Islands, Misty Fiords National Monument*, Farwest Research, Wrangell, AK, 1998.

[128] Sealaska Corporation, *Native Cemetery & Historic Sites of Southeast Alaska*, prepared by Wilsey & Ham, Seattle, WA, 1975.

[129] Roppel, 1998.

[130] DOT&PF. 2001. *Draft Gravina Access Project Visual Impacts Assessment Technical Memorandum*. Prepared by Millard+Peters Architects.

The following paragraphs describe the historic and archeological resources in the project area potentially affected by the alternatives. The information provided is based on a review of available information and field reconnaissance. To protect these resources, as suggested in FHWA Technical Advisory T6640.8A[131], their locations are not shown.

3.21.2.1 Alternatives C3(a), C3(b), C4, D1, and G4

There are no known or suspected historic or archeological resources within the APE for Alternatives C3(a), C3(b), C4, D1, and G4 on Revillagigedo Island or in the vicinity of these alignments on Gravina Island.

3.21.2.2 Alternative F1 (DOT&PF and FHWA Preferred)

Revillagigedo Island

The alignment of Alternative F1 on Revillagigedo Island would be 2,400 feet from the center of the USCG Station, which includes four buildings and structures that have been determined by the USCG to be eligible for inclusion in the NRHP; all other USCG buildings have been found not eligible. Those eligible include an administration building (KET-279), a buoy shed (KET-542), an explosives bunker (KET-546), and a machine gun emplacement (KET-548). There are also six culturally modified trees (CMTs) near the Commanding Officer's Quarters and the rifle range.[132] These sites are located outside the APE, including the APE for visual effects.

Alternative F1 would cross Tongass Avenue just southeast of a block of private property that includes a Craftsman-style house (KET-776). Located at 1749 Tongass Avenue, this wood-framed dwelling is similar to many built in the Ketchikan area during the 1920s economic boom.[133] This house is within the APE for visual effect and outside the APE for other direct effects. A determination of eligibility for this project found that the house is not eligible for the NRHP.[134]

An old Ketchikan dump (KET-435) is within the APE for visual effects, but is outside the area for physical effects. This site is located at the southern end of the USCG Station property. Dating as early as 1926, it consists of a scatter of "artifacts in the intertidal zone along with an artifact-laden organic soil horizon exposed in the marine cutbank."[135] This site is outside the APE for permanent, direct impacts, but inside the APE for visual effects. However, the dump is not considered to have any visual qualities that could be disturbed.

Pennock Island

On the east side of Pennock Island, the Alternative F1 East Channel bridge would touch down near parcels identified as U.S. Surveys 1562 and 3316. The plat of U.S. Survey 3316[136] shows

[131] FHWA Technical Advisory T6640.8A.

[132] Charles M. Mobley, *An Architectural and Archaeological Survey of U.S. Coast Guard Facilities, Ketchikan, Revillagigedo Island, Alaska* (Draft), manuscript on file with Charles M. Mobley & Associates, Anchorage, AK, 1995.

[133] Welsh, Amanda, personal communication with Mike Yarborough, Cultural Resource Consultants, June 2001.

[134] Cultural Resource Consultants. May 2003. *Determination of Eligibility for the Salamanchuk House*, KET-776.

[135] Mobley, 1995.

[136] Gordon W. Webber, Field Notes for U.S. Surveys 3094 and 3316, Surveyor General's Office, Juneau, 1954.

two houses and two sheds in this vicinity, although they do not seem to be the same structures found during the archeological reconnaissance for this project.[137] According to Jean Howard,[138] daughter of early Gravina Island settler Vincent Boucher, there were numerous small "shacks" on Pennock Island that miners and fishermen used during the winter. The buildings found during the field reconnaissance for this project[139] (KET-774) are **outside the APE for physical effects, but** within the APE for visual effects. A preliminary determination of eligibility performed for this project indicated that these cabins are eligible for the NRHP under NRHP Criterion D (information potential).

There is an old rock quarry (owned by R&S Construction) along the western shore of Pennock Island south of the location where Alternative F1 would cross from Pennock Island over West Channel to Gravina Island. Scattered across the overgrown floor of the quarry are several large metal tanks, a portable building, and other construction-related debris. The gravel pit was first used in 1931 by Puget Sound Bridge and Dredging Company for construction of the Thomas Basin breakwater.[140] This site is well outside the APE.

Gravina Island

A short distance north of the touchdown of the Alternative F1 West Channel bridge on Gravina Island are the remains of a large barge, a cabin, and large engine. There is also a "boat way" cleared through the rocks on the beach in front of the cabin. These comprise KET-775. The forest along the shore is dotted with cut stumps and at least one CMT. A determination of eligibility for this project[141] found KET-775 eligible for the NRHP under Criterion D (information potential). **The site is outside the APE for physical effects, but within the APE for visual effects.** A site noted on a 1957 U.S. Survey plat (USS 3536) as having a house, shed, and chicken coop lies farther to the north and is within the APE for visual effects only. The site was not located on current aerial photography or visible from the beach and, if it exists, is assumed to have integrity only for the information it may provide and to have no visual qualities that might be disturbed. Along the Alternative F1 corridor on Gravina Island is a water line made of 10-inch wire-wrapped wood stave pipe. This line, which extends downhill toward Clam Cove, probably began at a large lake farther inland. It may have provided water to the USFS marine station established at Clam Cove in 1914. The water line, where it is crossed by the alternative, is within the APE. However, it is an isolated artifact and therefore not eligible for the NRHP.

3.21.2.3 Alternative F3

Revillagigedo Island

Alternative F3 would originate on Revillagigedo Island near the historic dump (KET-435). This site is outside the APE for permanent, direct impacts, but is inside the area for potential visual effects. However, the dump is not considered to have any visual qualities that would be

[137] DOT&PF, Gravina Access Project, *Archeological Reconnaissance Survey*, Draft, prepared for HDR Alaska, Inc. by Cultural Resource Consultants, Anchorage; updated by memoranda from Mike Yarborough, Cultural Resource Consultants, to Mark Dalton, HDR, June and July, 2002.

[138] Howard, Jean, personal communication with Mike Yarborough, Cultural Resource Consultants, May 2001.

[139] Cultural Resource Consultants. May 2003. *Determination of Eligibility for the Pennock Island Cabins, KET-774*.

[140] Roppel, 1998.

[141] Cultural Resource Consultants. May 2003. *Determination of Eligibility for KET-775*.

disturbed. The Craftsman House, KET-776, is outside the APE for visual effects and all other effects.

Pennock Island

The Alternative F3 East Channel bridge would touch down on Pennock Island in the U.S. Survey 3316 parcel. Webber's 1954 survey plat[142] shows several cabins on the 28 lots that make up the parcel, but none within the APE for the alternative. No additional cabins were found within the APE during field reconnaissance. The cabins that were found near Alternative F1 (KET-774) are within the APE for visual effects for F3, but are outside any danger of physical effects.

Gravina Island

The touchdown of the Alternative F3 West Channel bridge on Gravina Island would be in the vicinity of the U.S. Survey 3536 parcel, approximately 900 feet north of the cabin and boatway site (KET-775) and the F1 alignment. A determination of eligibility found KET-775 to be eligible for the NRHP under Criterion D (information potential). KET-775 is outside the area of potential physical effects for Alternative F3, but it is within the APE of potential visual effects. It is not considered to have visual qualities that could be disturbed. The U.S. Survey 3536 site (house, woodshed, chicken house, and two trails) also lies outside the Alternative F3 APE for physical impacts, but is within the APE for F3 for potential visual effects. The site was not located on current aerial photography or visible from the beach. If it exists, it is assumed to have integrity only for the information it may provide and to have no visual qualities that might be disturbed.

The forest along the Gravina Island shoreline at the Alternative F3 touchdown is dotted with cut stumps and CMTs. Generally, individual or small numbers of CMTs are not eligible for the NRHP. The Alternative F3 road would head inland from West Channel along the northwestern side of Clam Cove Creek. Along the Alternative F3 corridor on Gravina Island is a water line made of 10-inch wire-wrapped wood stave pipe. This line, which extends downhill toward Clam Cove, probably began at a large lake farther inland. It may have provided water to the USFS marine station established at Clam Cove in 1914. The water line, where it is crossed by the alternative, is within the APE. However, as an isolated artifact, it is not eligible for the NRHP.

3.21.2.4 Alternative G2

Revillagigedo Island

The Alternative G2 ferry terminal on the Revillagigedo Island side of Alternative G2 would be on a fill-covered peninsula now occupied by Temsco Helicopters. No cultural sites are nearby.

Gravina Island

The ferry terminal on Gravina Island would be near Lewis Point in the U.S. Survey 1803 parcel, where there is a gravel beach protected between two bedrock outcrops. The point has been logged, and several of the stumps have springboard notches. Farther inland is a CMT with a scar that is more than 6 feet above the ground. To the south, at the head of the gravel beach, is a grounded barge. In this area are various elements of the AHRS Lewis Cove Sites (KET-670), including a midden and wood-framed structures. The CMTs are within the APE, but, generally, are not considered eligible for the NRHP. KET-670 and the barge are outside the APE.

[142] Gordon W. Webber, Field Notes for U.S. Surveys 3094 and 3316, Surveyor General's Office, Juneau, 1954.

3.21.2.5 Alternative G3

Revillagigedo Island

Alternative G3 would originate south of Bar Harbor and north of the Plaza Mall and Carrs grocery store, in the area of a new Burger King at Bar Point. Archeologists and historians from the Alaska Office of History and Archaeology evaluated two buildings in this area—the Market Place and Union Oil Station—during a 1990 study of the potential effects of the Tongass Avenue Capacity Improvements Project, but determined that neither were old enough to be eligible for the NRHP. These sites, dating from the 1970s and 1980s, are still less than 50 years old and therefore are not eligible.

Gravina Island

The ferry terminal on Gravina Island would be just southeast of East Clump, near the eastern corner of the U.S. Survey 1600 parcel. In the East Clump area are the remains of numerous early twentieth century homesteads. The sites are south of the ferry terminal and outside the APE.

3.22 HAZARDOUS WASTE SITES

Known and potential hazardous waste sites in the project area were identified through review of federal and state databases and site reconnaissance. The database search reviewed sites regulated by the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); state-listed spill sites and contaminated sites; and sites with leaking underground storage tanks (LUSTs).

There are no CERLA sites within or adjacent to the construction right-of-way of any of the project alternatives. The database search for RCRA permitted sites identified eight sites that could affect construction of an alternative because a release of hazardous materials from the site could migrate to the project construction area. These sites and their permit status are provided in Table 3-24.

TABLE 3-24
RCRA PERMITTED SITES

Facility Name and Location	*RCRA Permit Number*	*Potentially Affected Alternative*	*Inspection History*	*Significant Non-compliance or High Priority Violator?*
Taquan Air Service Inc. 1500 Airport Way Hangar 1)	AKR000004580	All Build Alternatives	No record	No
Petro Marine Services Ketchikan Ketchikan International Airport	AKD000834846	All Build Alternatives	8/2000	No
Pro Mech Inc. Ketchikan International Airport	AKD983075615	All Build Alternatives	No Record	No
Alaska Airlines Ketchikan 1200 Airport Terminal Building)	AKD983069592	All Build Alternatives	No Record	No
South Coast Inc. 4049 Tongass Avenue	AK0001005297	Alternative C4	No Record	No
City of Ketchikan Landfill 1100 Nordstrom Drive	AKD983075979	Alternative F1	No Record	No
USCG Integrated Support Command 1300 Stedman Street	AK8690360492	Alternative F1	8/2000	No
Temsco Helicopter 5411 North Tongass Highway	AKD983076407	Alternative G2	8/2000	No

Source: EPA Region 10, Enforcement and Compliance On Line Database: http://yosemite.epa.gov/R10/ENFORCE.NSF/webpage/EC-On-Line

Based on review of the ADEC Statewide Contaminated Sites Database[143] and Leaking Underground Storage Tank Program Database,[144] there are three known contaminated properties and one LUST site that are within the areas potentially affected by the project alternatives. These properties and sites are identified in Figure 3.18 (Hazardous Waste Sites) and the status of their cleanup is provided in Table 3-25.

TABLE 3-25
KNOWN CONTAMINATED SITES

Site Name and Location	*Problem*	*Cleanup Status; Priority*
	Statewide Contaminated Sites Database	
USCG Station (1 Mile South Tongass Highway)	Petroleum contamination in soils due to overfilling of aboveground storage tank (AST) and underground storage tank (UST) on north side of barracks and leaking fuel lines between the two; unknown quantity; gasoline-range organics (GRO), metals, and polychlorinated biphenyls (PCBs) in soils	Active; Medium
	Diesel contamination in soils from heating oil tank in Commanding Officer's Quarters	Active; Low
	Lead (35,000 milligrams per kilogram [mg/kg]) and petroleum product (127 mg/liter [mg/L]) in soil at firing range (active from ~1960 to 1995)	Active; High
Ketchikan Tank Farm (1100 Stedman Street)	Petroleum contamination in soil and groundwater; unknown quantity	Inactive; Low
Bailey Power Plant (Tongass Avenue near airport ferry dock)	Diesel contamination in soil from buried fuel line leak; unknown quantity	Inactive; Medium
	LUST Program Database	
Ketchikan International Airport	Confirmed release in May 1999; no details in database	Information not available

AST = aboveground storage tank; GRO = gasoline-range organics; mg/kg = milligram per kilogram; mg/L = milligram per liter; PCBs = polychlorinated biphenyls; USCG = U.S. Coast Guard; UST = underground storage tank.

Sources: ADEC Contaminated Sites Database, August 2002; ADEC LUST Program Database, August 2002.

3.23 VISUAL ENVIRONMENT

The visual environment of Ketchikan and Tongass Narrows is defined by the natural and built features of the area. Natural features dominating the view include open water, the steep topography of Gravina and Revillagigedo Islands, and the heavily forested hillsides. The built environment includes the urban and shoreline development of Ketchikan, Ketchikan International Airport on Gravina Island, and those visual elements associated with the developed areas of Ketchikan, such as ships and boats, aircraft, automobiles, and buses.

[143] ADEC, Contaminated Sites Database FOIA Report, August 30, 2002.

[144] ADEC, LUST Program Database, <www.state.ak.us/local/akpages/ENV.CONSERV/ dspar/stp/search.htm>.

Overall, the natural scenic quality of the Ketchikan area, and the combination of urban and natural landscape elements, define the overall visual quality of the project area.

3.23.1 Tongass Narrows Area

The visual environment of the project area is dominated by the natural features of Tongass Narrows and the steep mountain slopes characterizing the surrounding landmasses. The lush forests, rivers, lakes, and marine habitat enhance the scenery and create recreation and sightseeing opportunities for tourists and residents of the area. Views from Ketchikan are primarily over-water views toward nearby forested, mountainous islands. Waterfront areas are popular for wildlife viewing, picnicking, hiking, and sightseeing. Viewing scenery is among the most popular activities for visitors in the Ketchikan region. During the summer tourist season, increases in shipping and floatplane activity in Tongass Narrows create a perception of human dominance in the viewshed.

3.23.2 City of Ketchikan

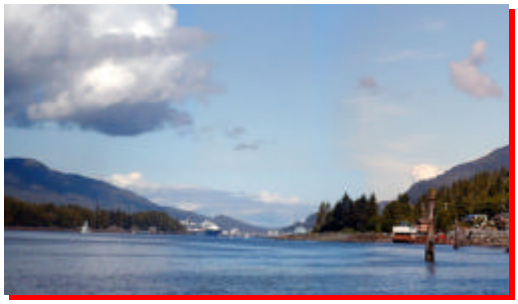
The City of Ketchikan's visual environment is dominated by a commercial and industrial waterfront, a downtown area with small multi-story buildings, and hillside homes. Most land structures are small- to medium-scale buildings. Cruise ships in the downtown harbor area add a large visual element to the environment.

3.23.3 Gravina and Pennock Islands

Natural features primarily dominate views of Gravina and Pennock Islands from Ketchikan. Except for the airport and the timber processing plant just north of the airport, Gravina Island is mostly undeveloped along Tongass Narrows. Pennock Island is developed only along its waterfront, and this development primarily consists of small residential structures with docks and watercraft.

3.23.4 Key Views

The project team established "key views" representing the visual quality of the project area and views that could be changed by construction of one or more of the project alternatives (Figure 3.19). The locations and directions of key views are shown on the figure. Each key view comprises water, sky, vegetation, natural landscape features, town buildings and structures, as well as other elements of the built environment (e.g., roads, utilities, ships, etc.). Photographic images of these key views are provided below. The alternatives associated with each view are noted parenthetically. No key view was established in relation to Alternative G4 because the alignment of this alternative would be adjacent to that of the existing ferry, and so would not appreciably change any view.



Key View 1: Along Tongass Narrows from shoreline at Saxman (looking north) [F1, F3]



Key View 2: On Tongass Avenue south of U.S. Coast Guard Base (looking north) [F1, F3]



Key View 2A: On Tongass Avenue, south of U.S. Coast Guard Base (looking north) [F1, F3]



Key View 3: Along Tongass Narrows from southern end of Berth 1 dock, downtown (looking south) [F1, F3]



Key View 3A: Along Tongass Narrows from Berth 2 dock, downtown (looking north) [C3a, C3b, C4, D1, G2]



Key View 4: From upper Front Street above the Tongass Avenue/Front Street tunnel (looking south) [F1, F3]



Key View 5: Along Tongass Narrows from upper Front Street on Knob Hill (looking north) [C3a, C3b, C4, D1, G2, G3]



Key View 6: Toward AMHS north berth and Alaska Ship & Drydock (ASD) from AMHS passenger terminal (looking north) [C3a, C3b, C4, D1]



Key View 8: From Gravina Island shoreline near northern end of airport runway (looking north) [G3]



Key View 10: From mid-Tongass Narrows near airport toward Pennock Island (looking south) [F1. F3, G2]



Key View 10a: On Tongass Avenue near Wolff Point (looking south) [G4, G2, C3a, C3b, C4, D1]



Key View 11: On Tongass Avenue north of Wolff Point (looking south) [G4, G2, C3a, C3b, C4, D1]



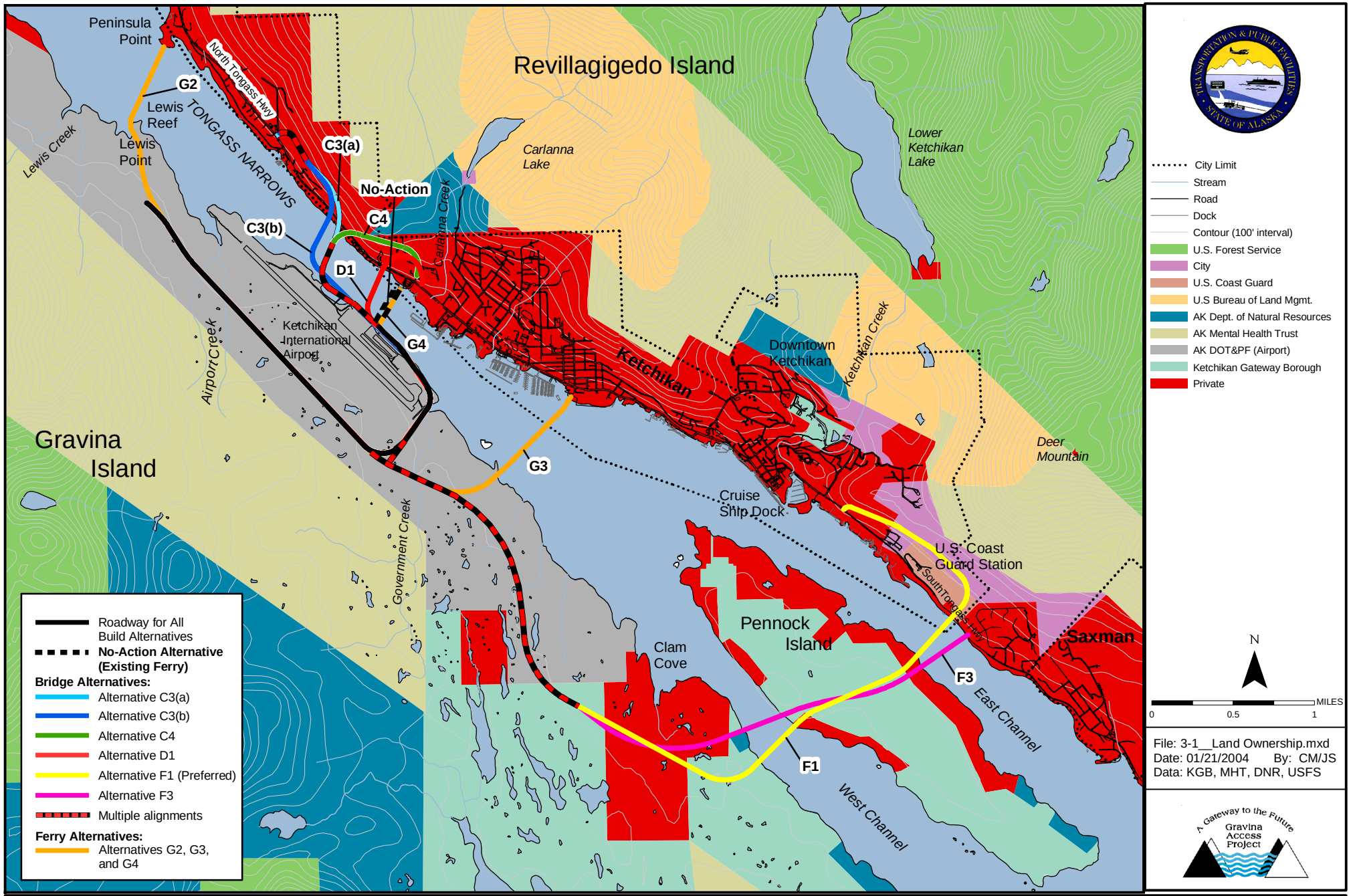
Key View 12: Along Tongass Narrows from Bar Harbor Float (looking north) [G4, C3a, C3b, C4, D1]



Key View 13: Across Tongass Narrows toward Gravina Island from the north parking area adjacent to Plaza Port West (looking northwest) [G2, C3a, C3b, D1]

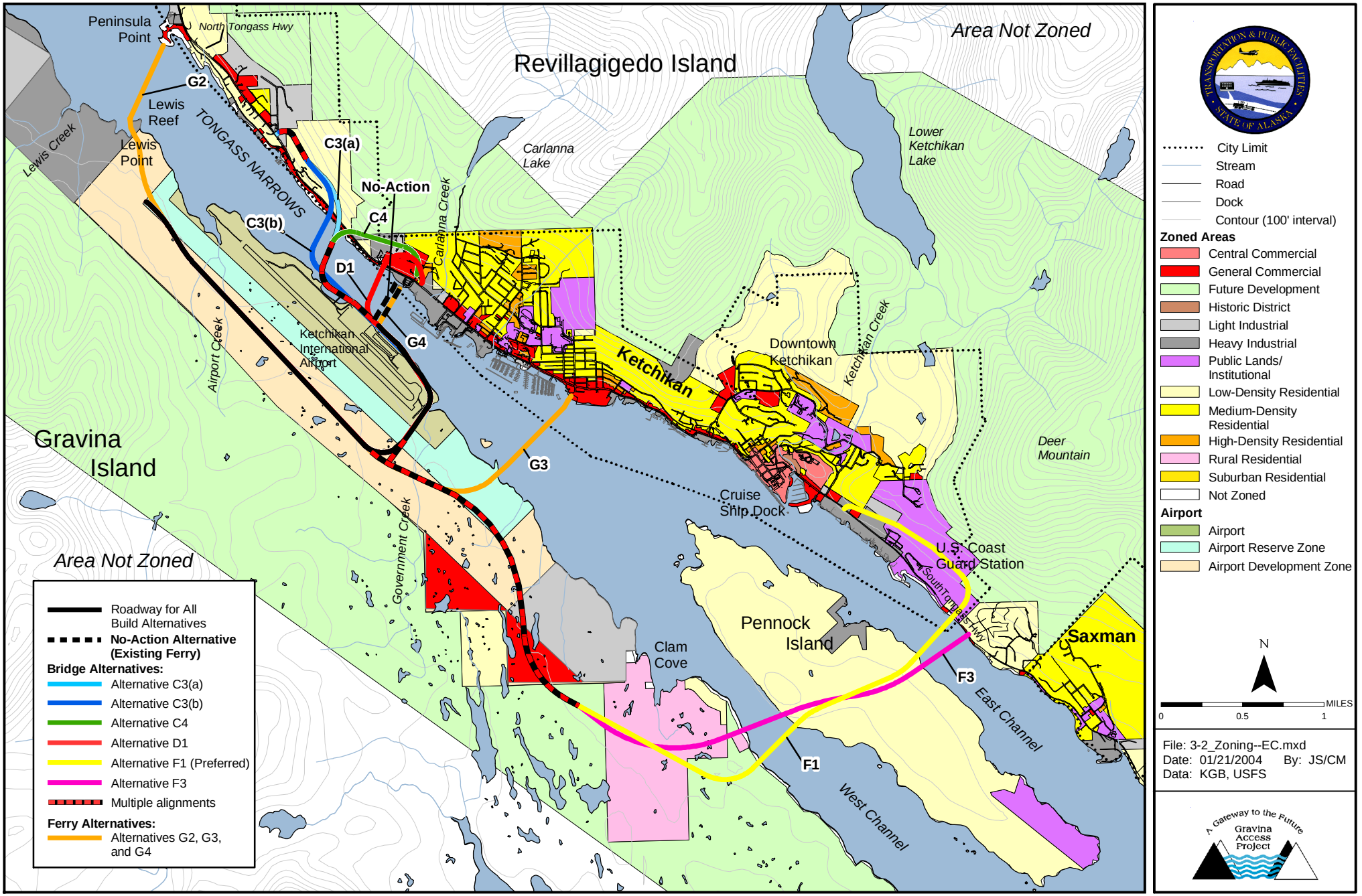
3.24 ENERGY

Energy use related to this project is fossil fuels used for transportation. Currently, people use automobiles and the ferries to travel between Ketchikan and Gravina Island. Energy is also used by other ships and boats in Tongass Narrows, floatplanes using Tongass Narrows, and other aircraft using the airport, all of which could be affected by alternatives that cross Tongass Narrows (including the airspace above the Narrows). Fuel in the Ketchikan area is supplied to local suppliers by ship. Energy requirements are met by these local suppliers. Some air and marine craft are fueled outside the Borough in other communities or other states.



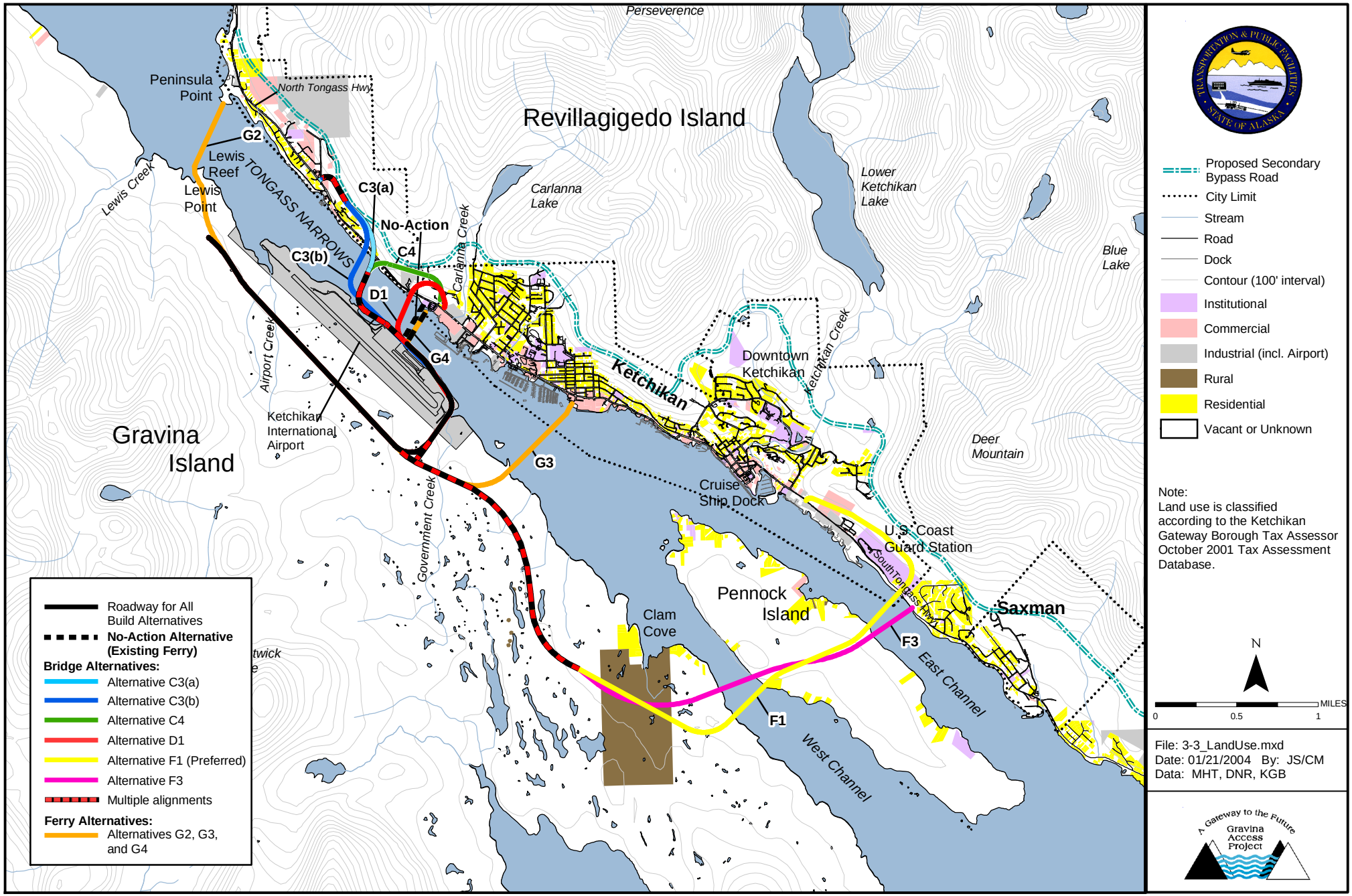
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Figure 3.1
Land Ownership



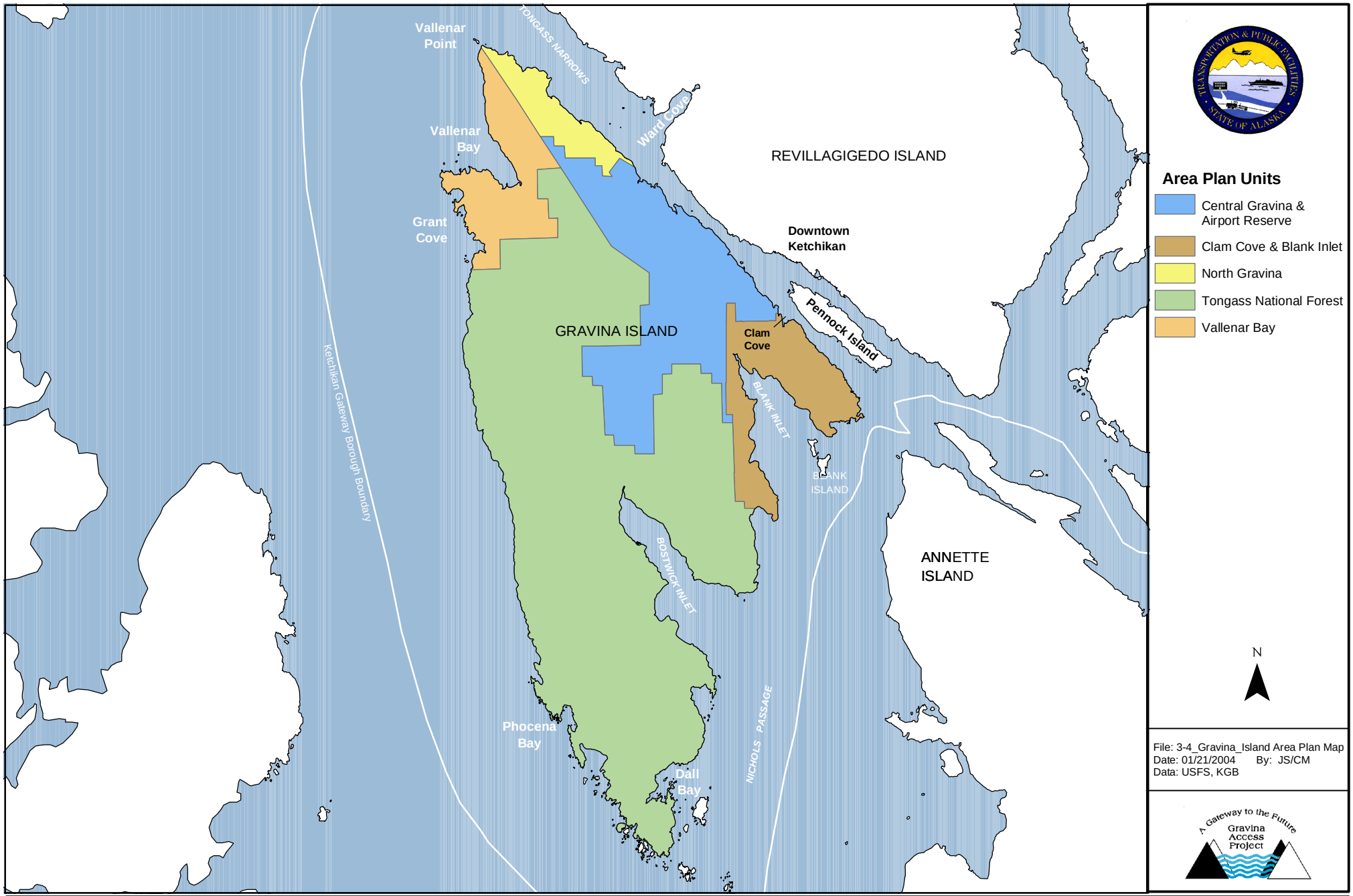
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Figure 3.2
Zoning



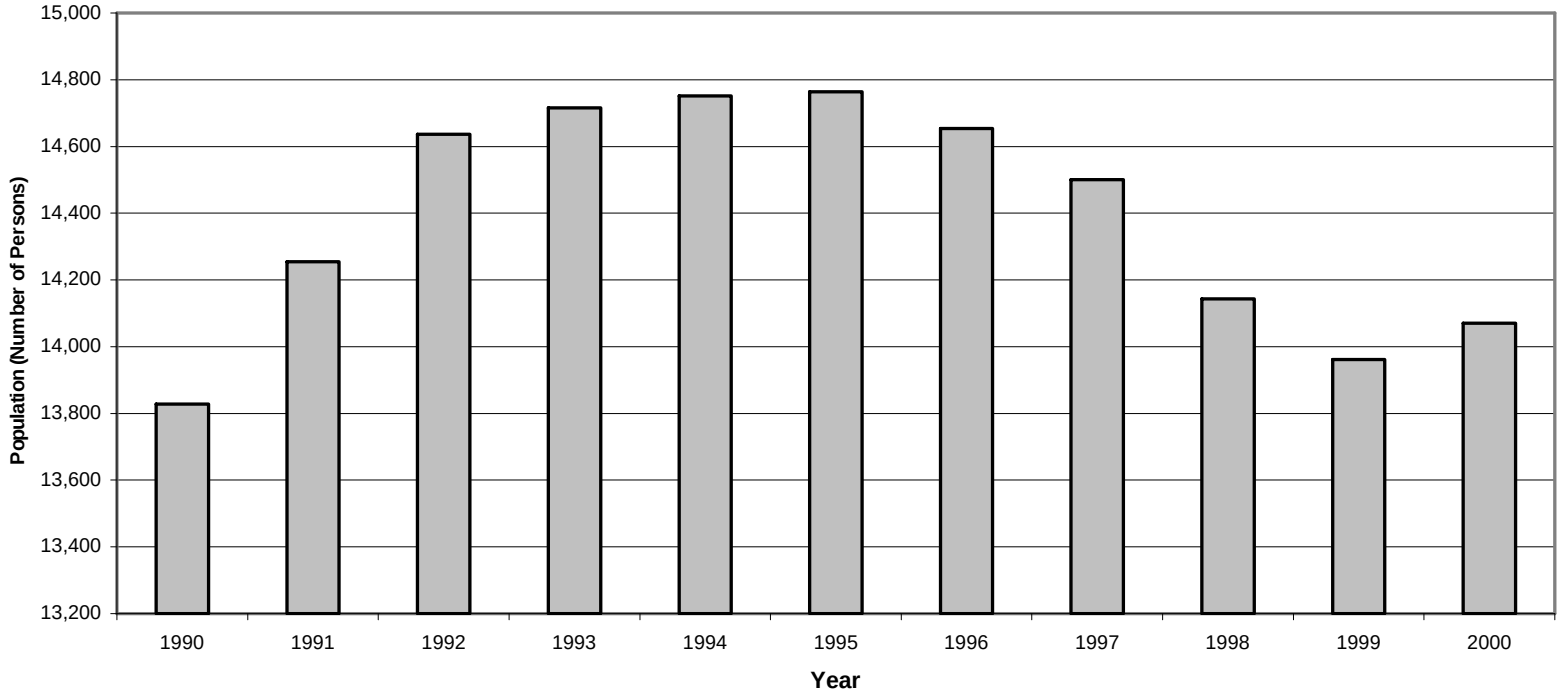
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Figure 3.3
Land Use



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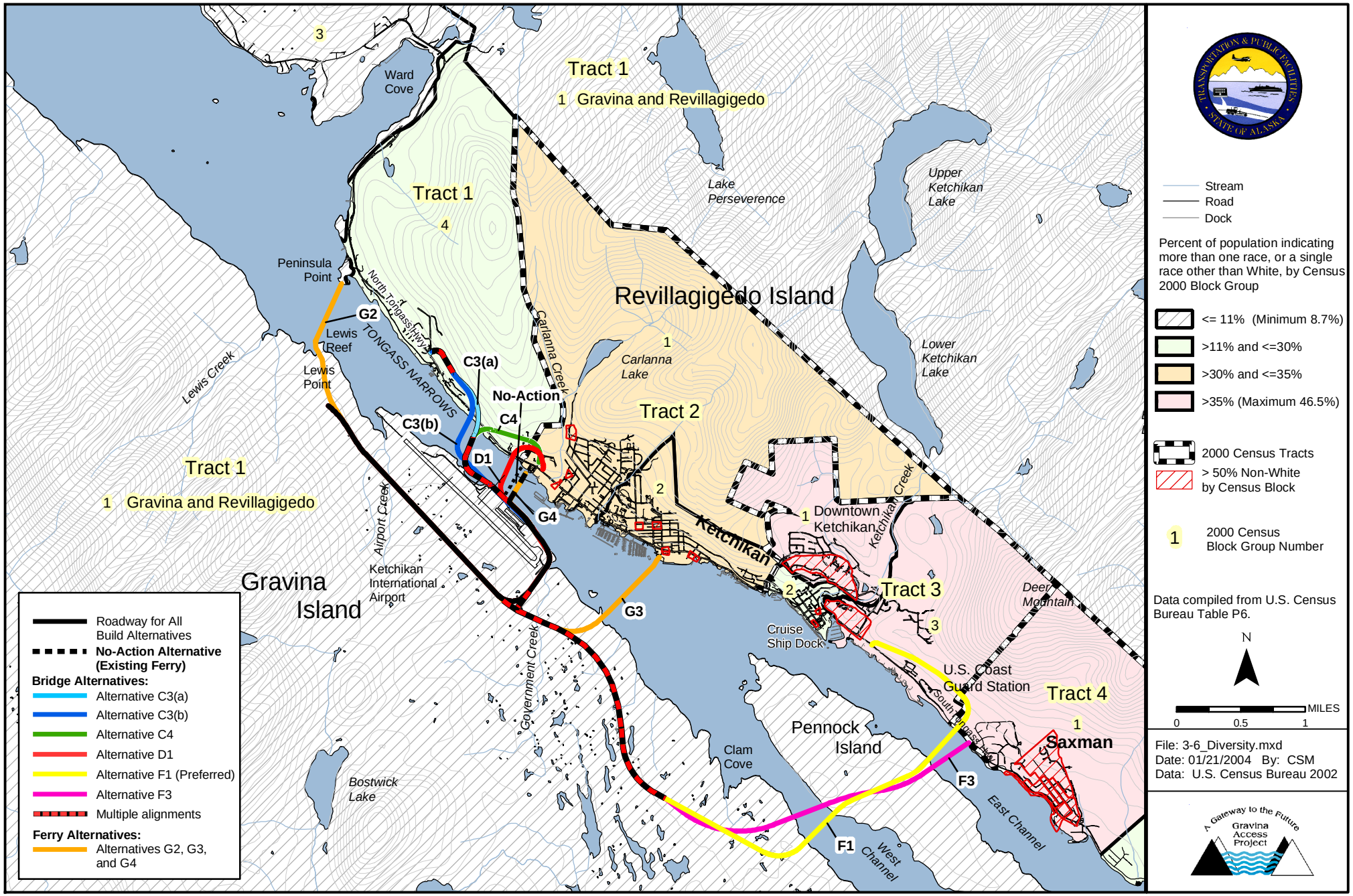
Figure 3.4
Gravina Island Area Plan Map



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Date: 01/21/2004 By: CM
Data: U.S.Census (1990, 2000)

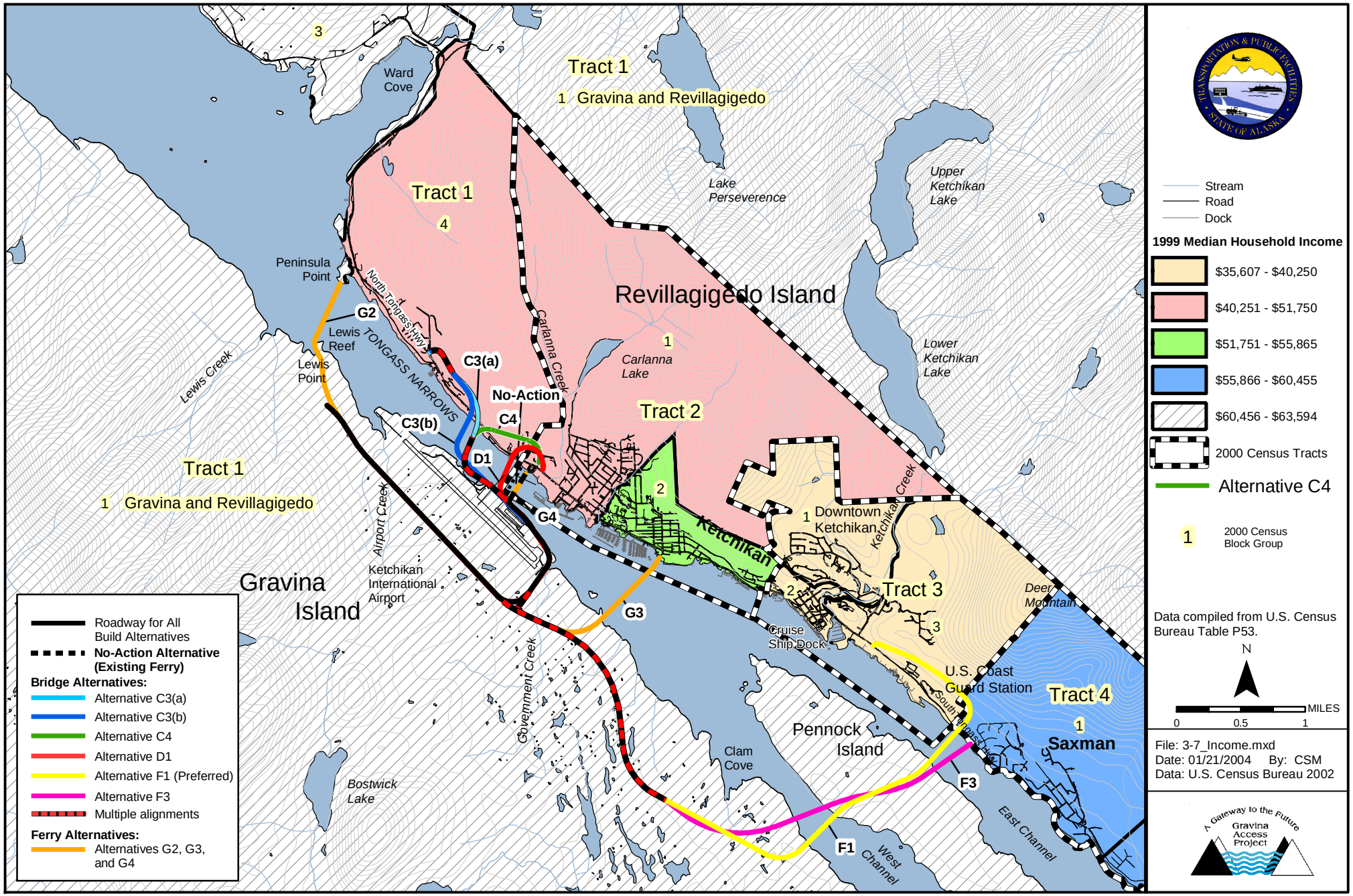
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Figure 3.5
Population of the Ketchikan Gateway Borough, 1990-2000



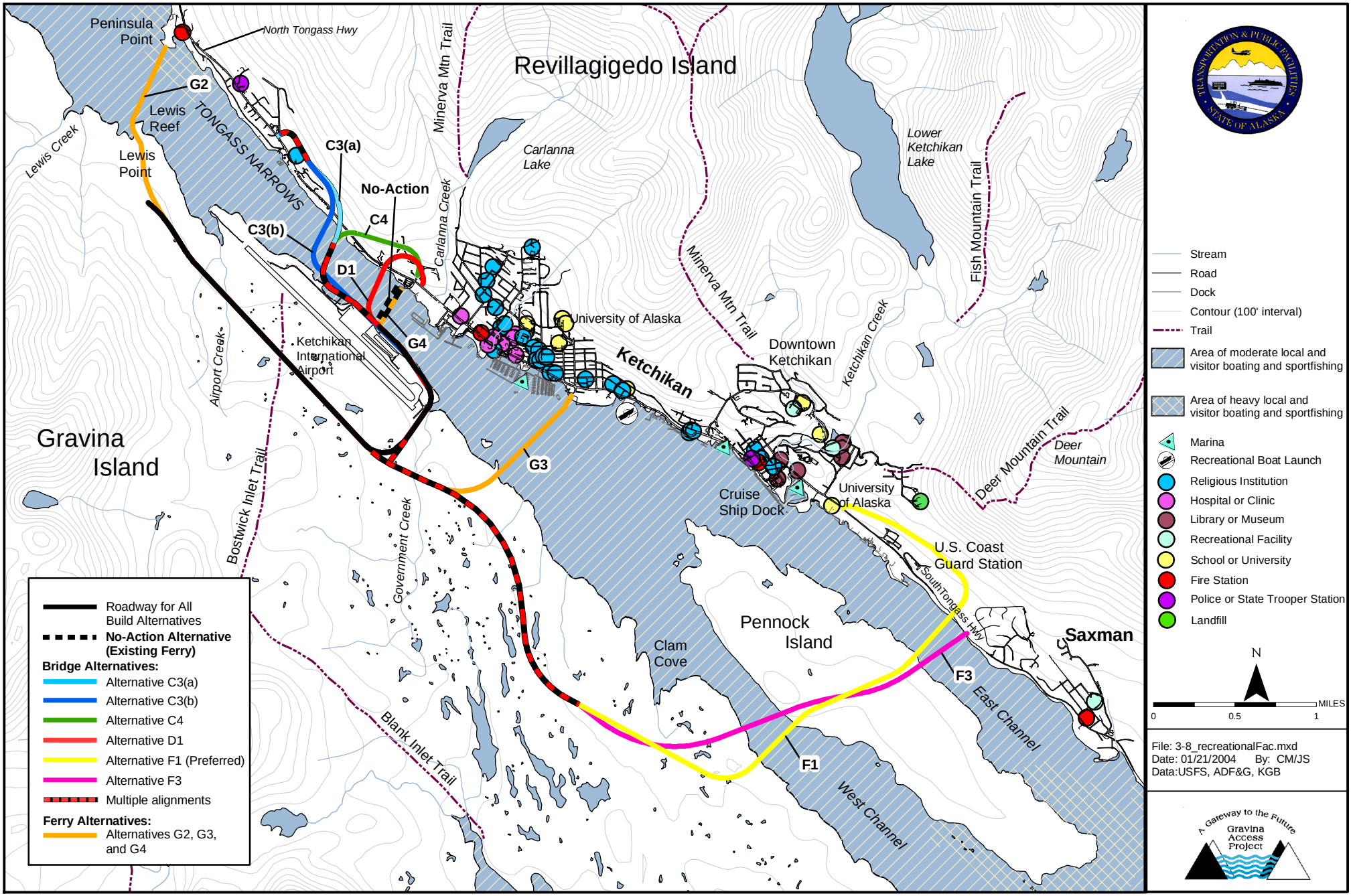
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Figure 3.6
Diversity by Block and Block Group



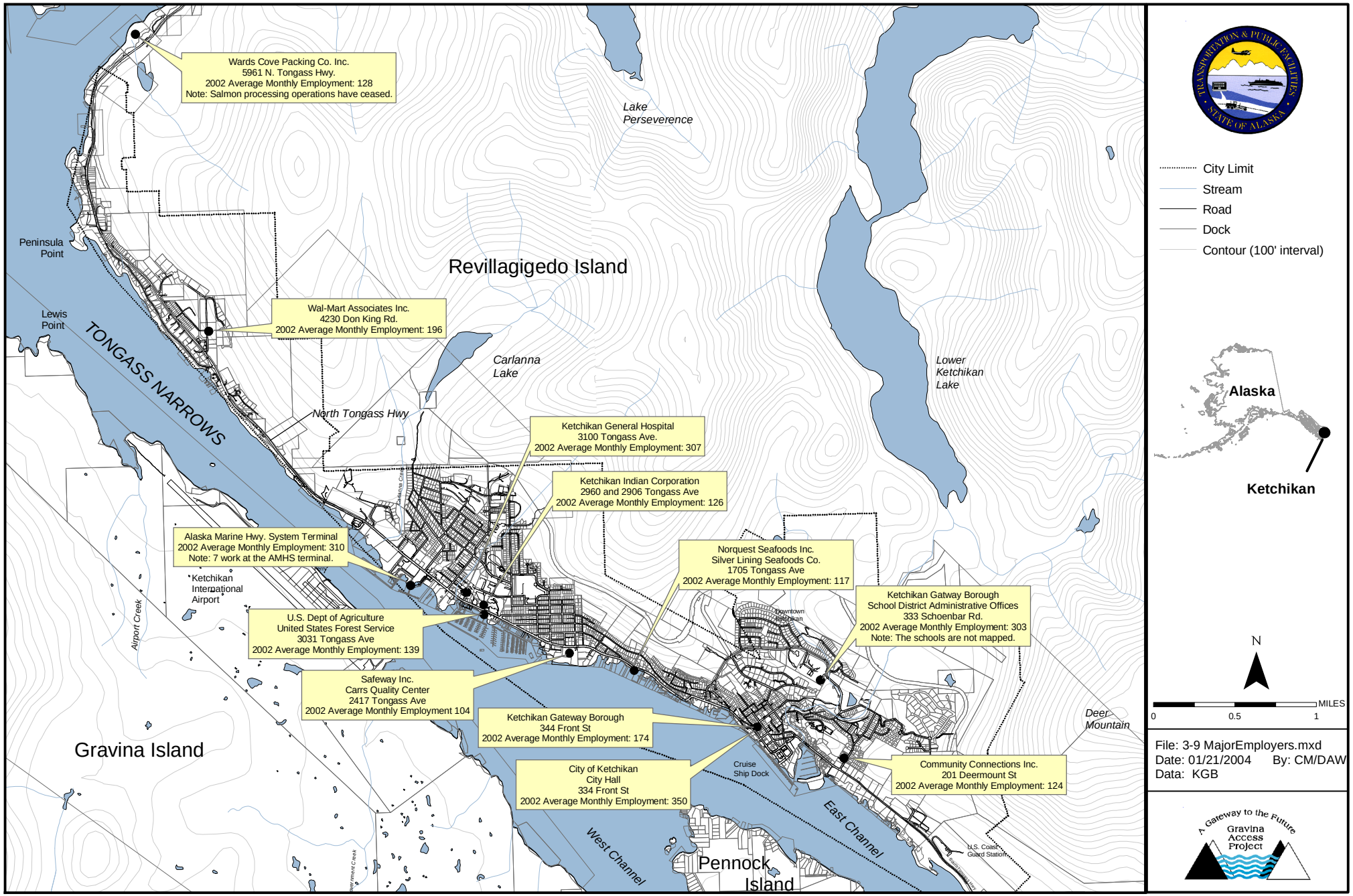
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Figure 3.7
1999 Median Household Income



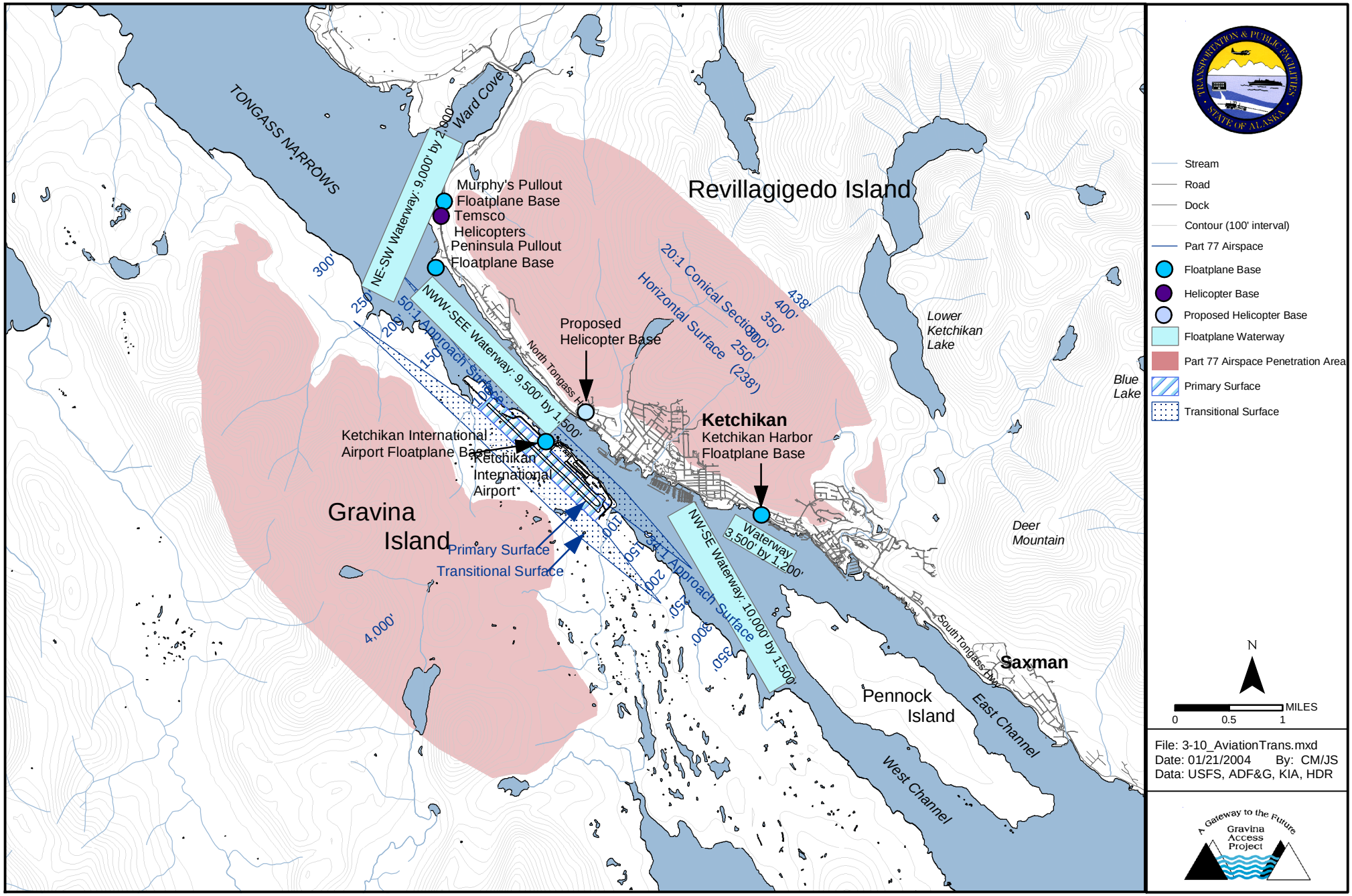
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Figure 3.8
Community and Recreation Facilities



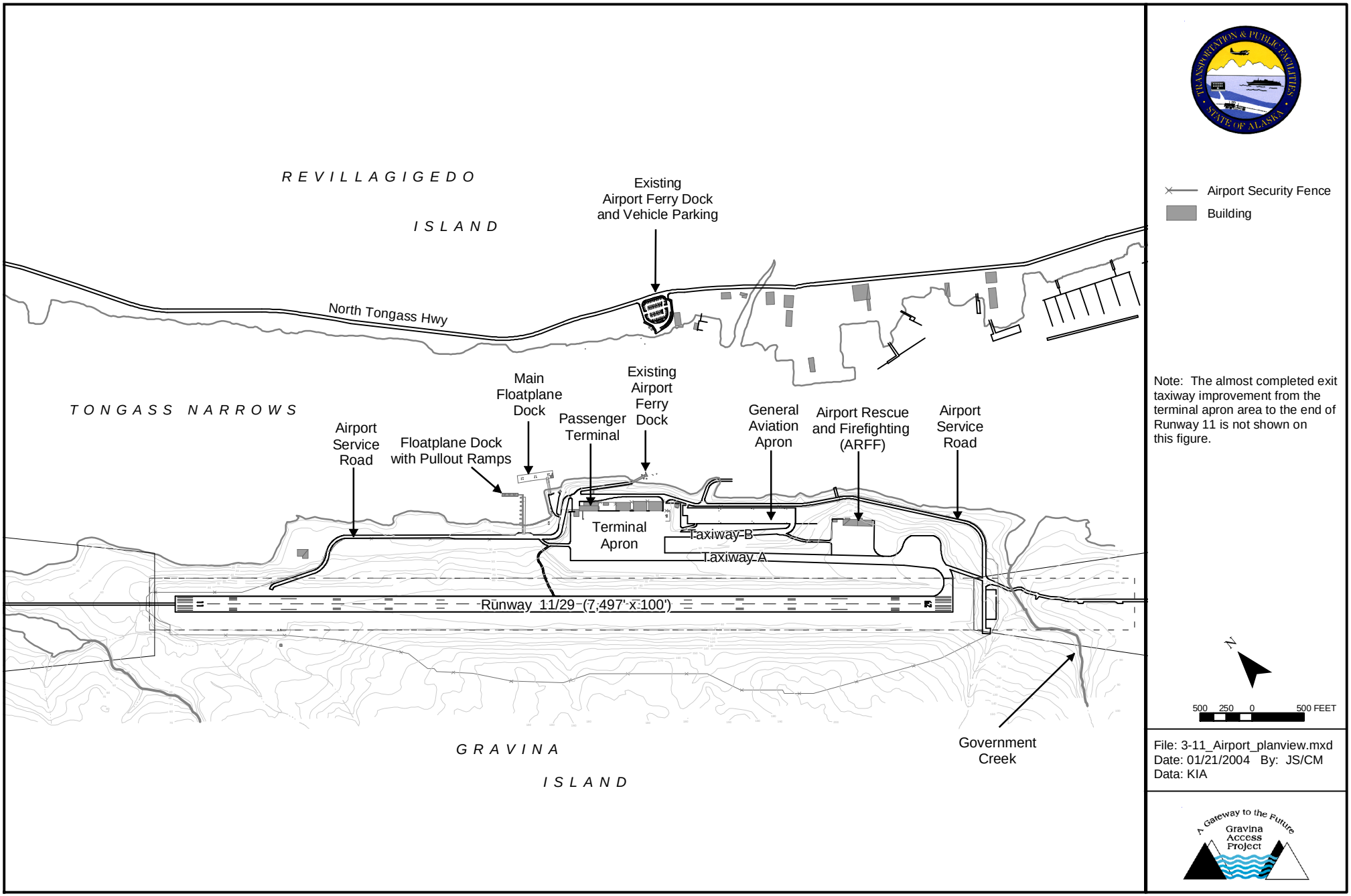
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Figure 3.9
Major Employers in the Ketchikan Area



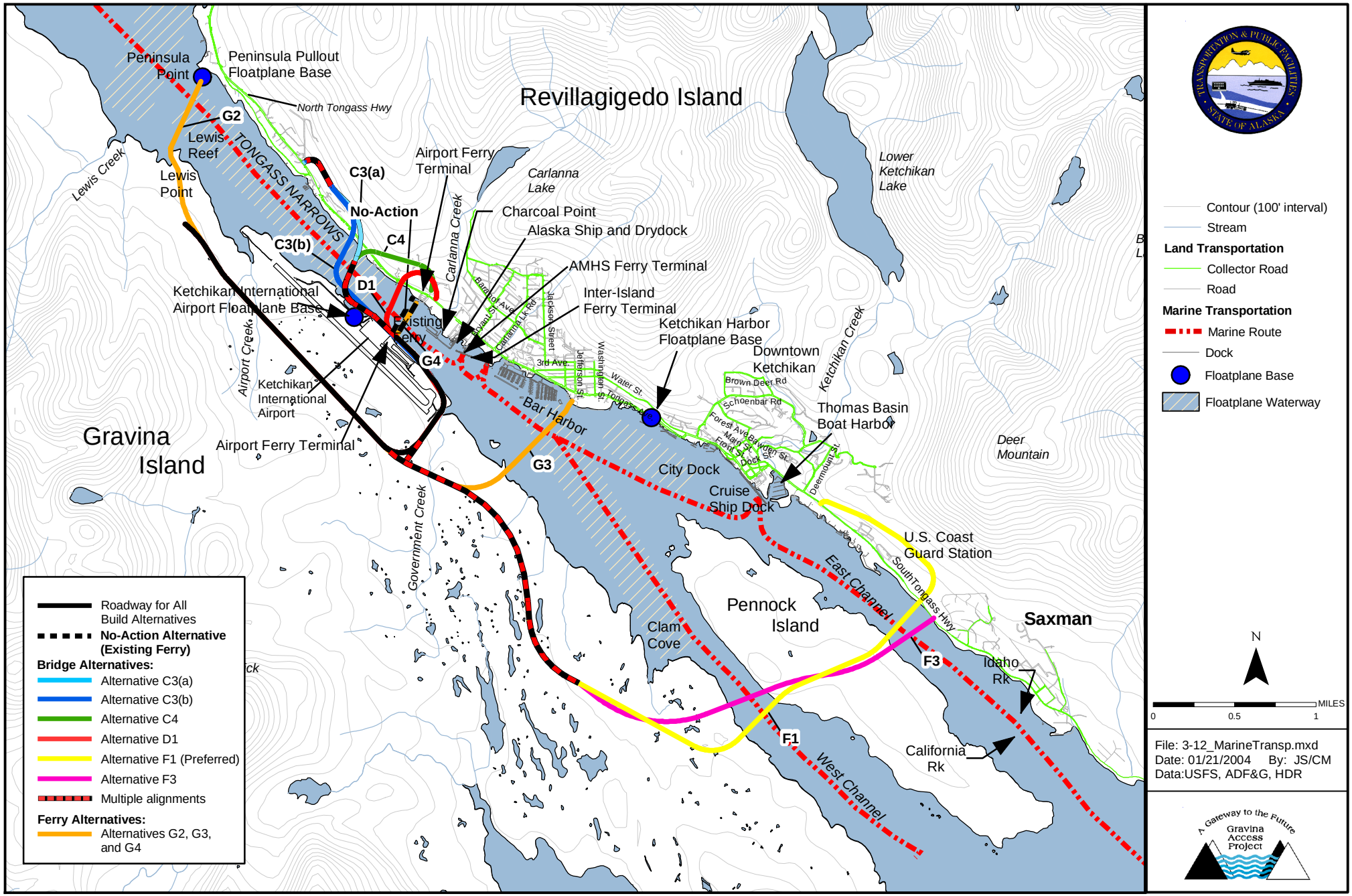
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Figure 3.10
Aviation Transportation Facilities



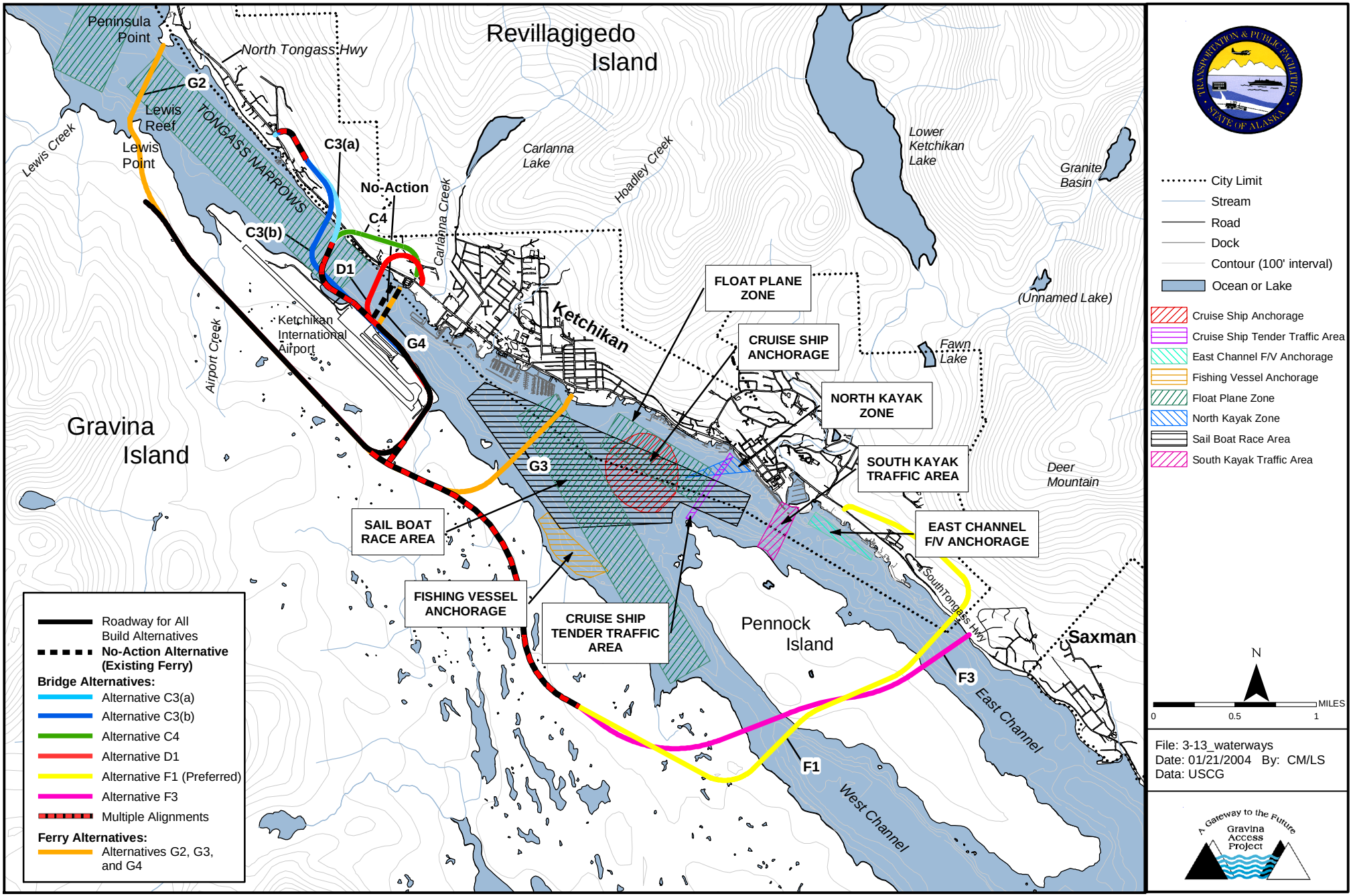
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Figure 3.11
Ketchikan International Airport: Existing Conditions



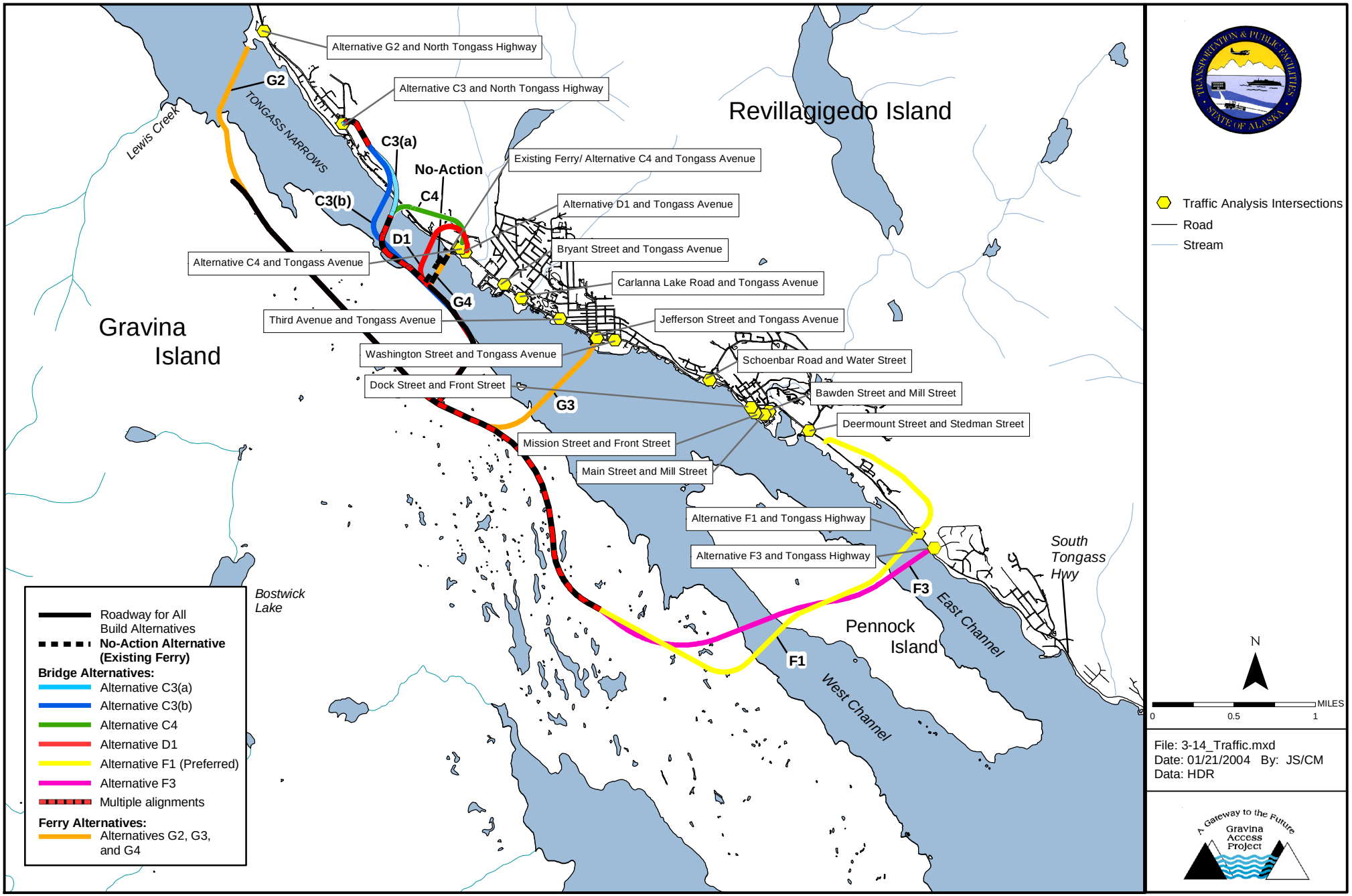
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Figure 3.12
Marine and Land Transportation Facilities



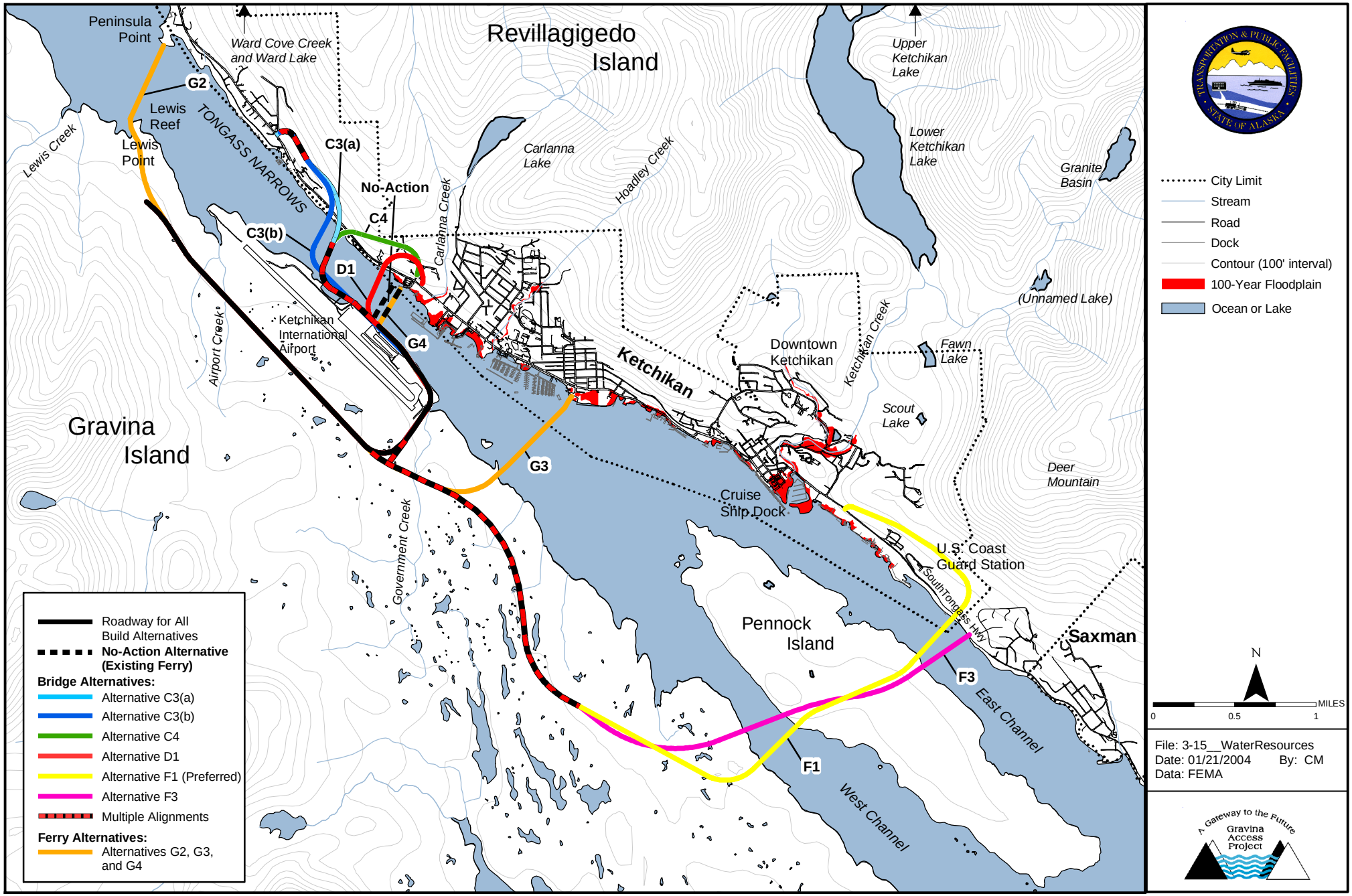
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Figure 3.13
Tongass Narrows Primary Waterway Uses



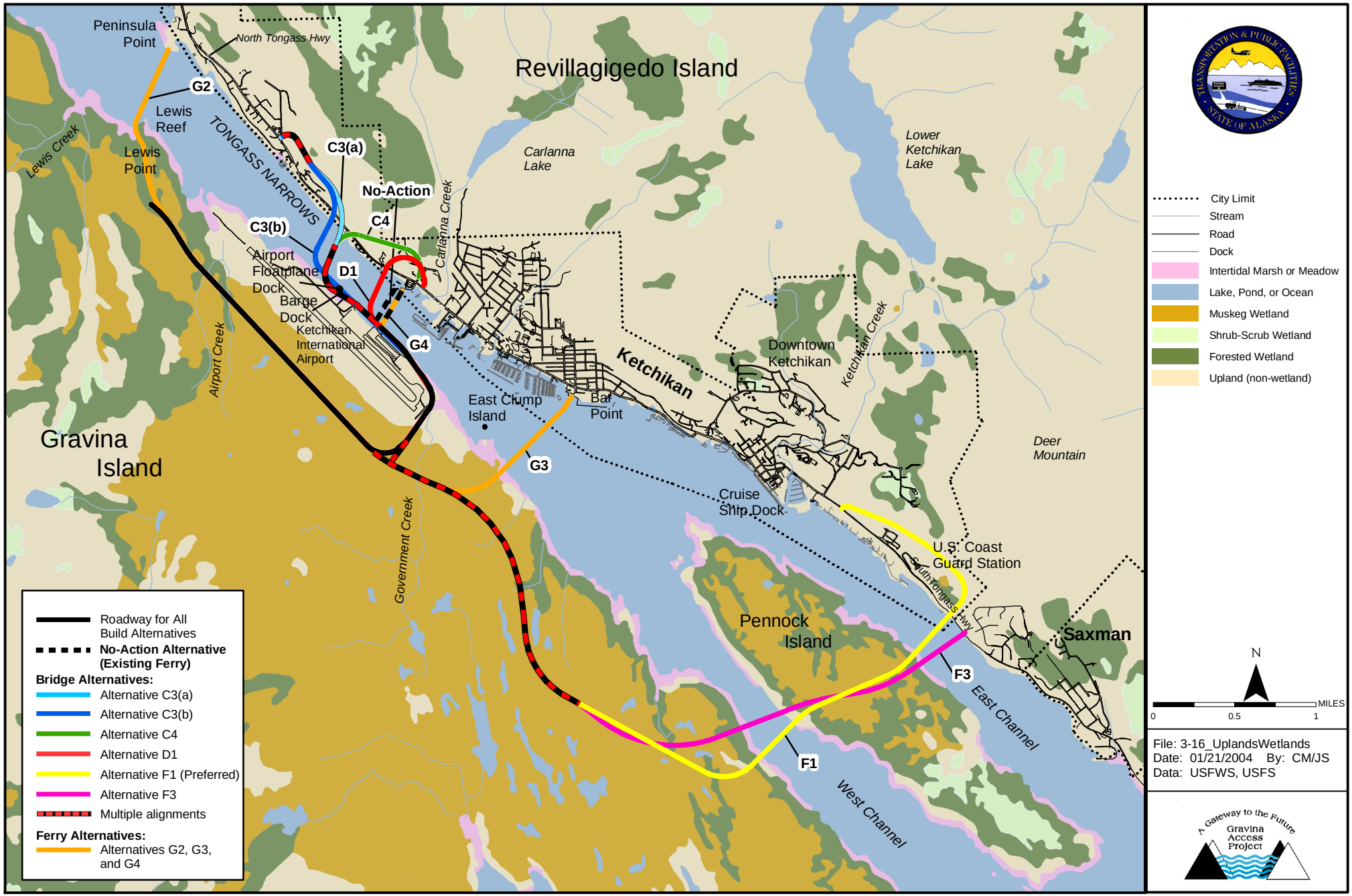
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Figure 3.14
Traffic Analysis Intersections



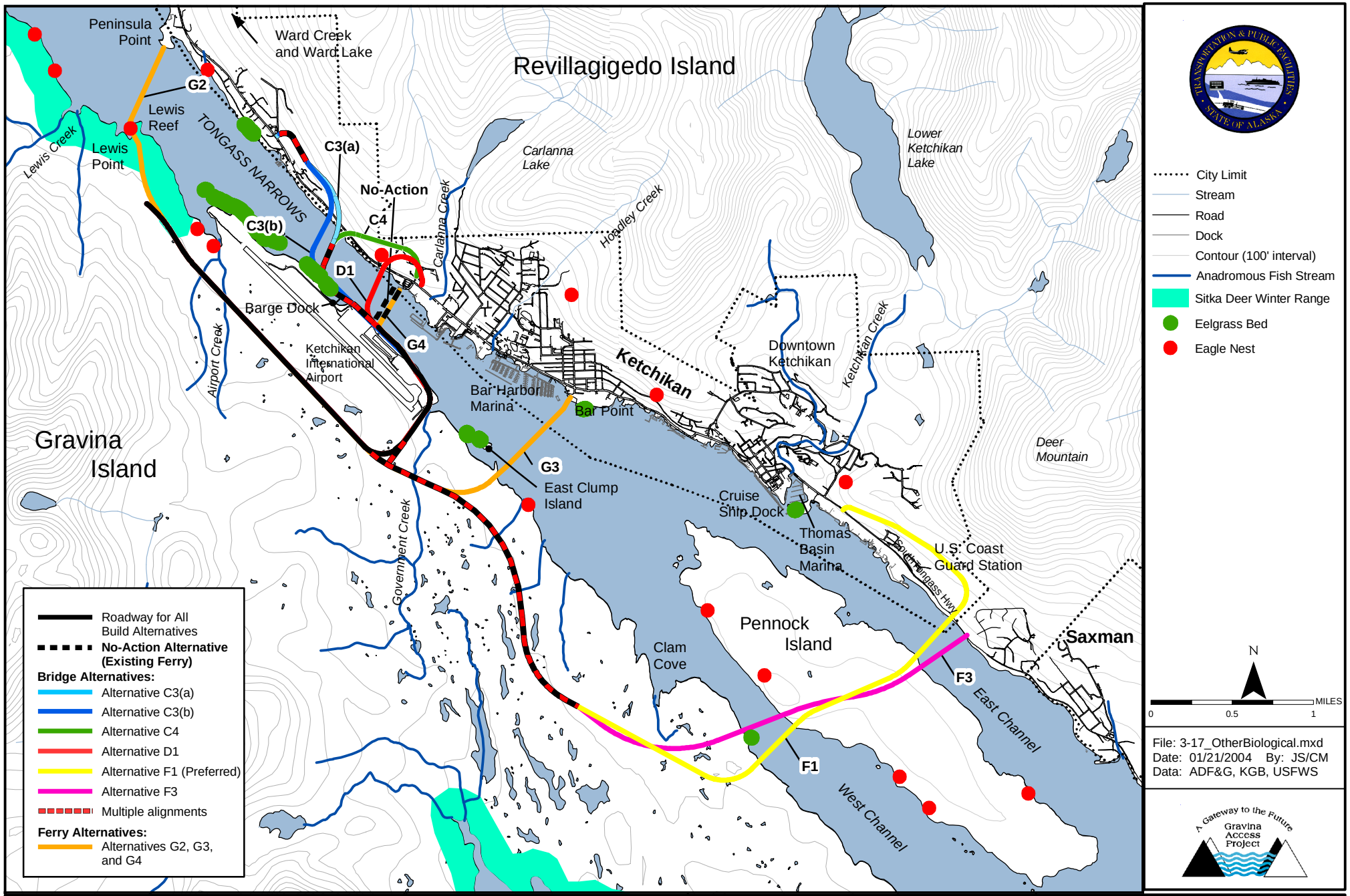
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Figure 3.15
Water Resources



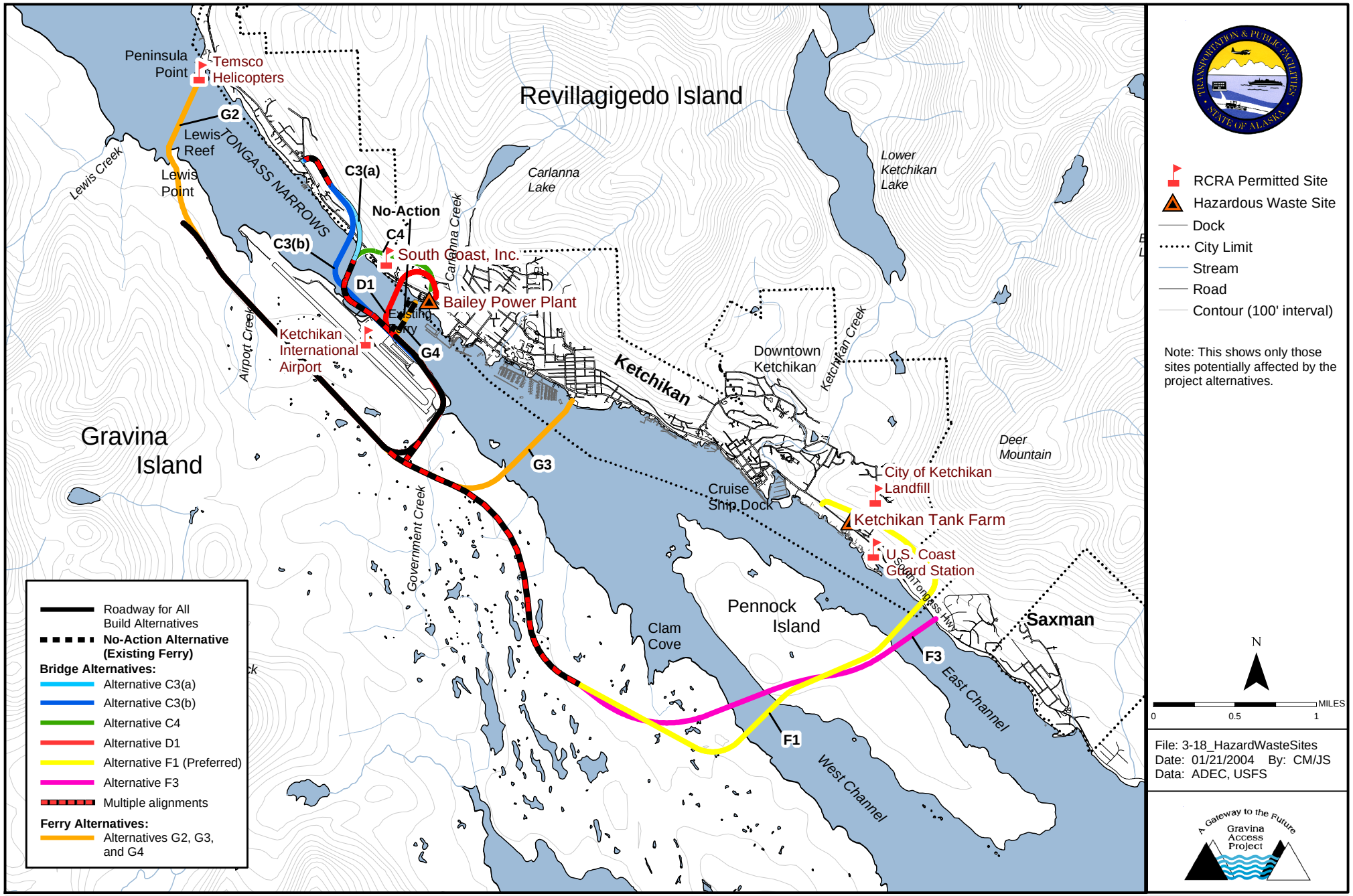
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Figure 3.16
Biological Resources (Wetlands and Uplands)



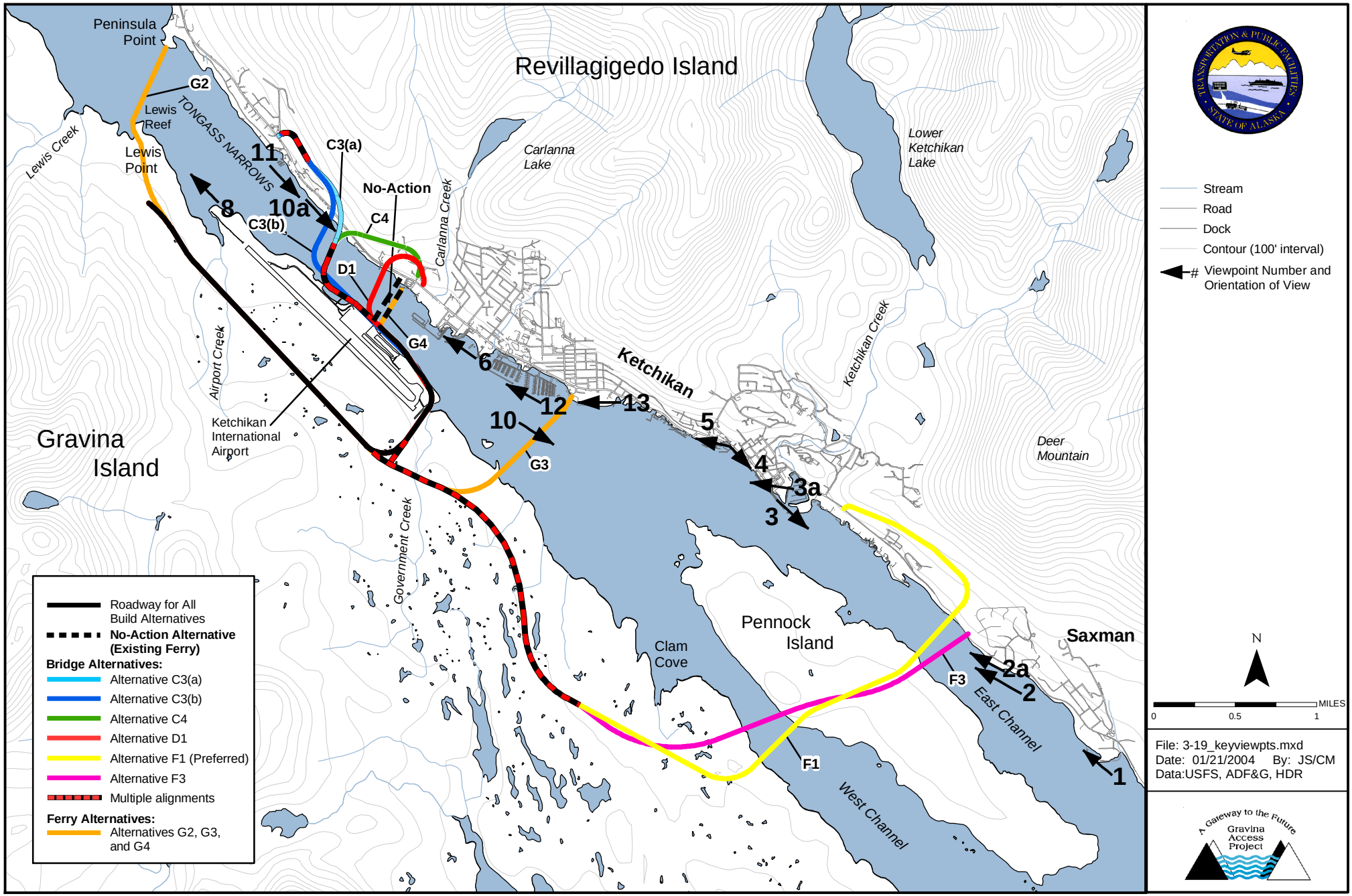
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Figure 3.17
Other Biological Resources



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Figure 3.18
Hazardous Waste Sites



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Figure 3.19
Key Viewpoints

Contents

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4.0 ENVIRONMENTAL CONSEQUENCES

This chapter identifies and describes potential environmental consequences of the project alternatives (including the No Action Alternative), including both adverse and beneficial impacts. Generally, impacts are categorized as direct, or indirect or secondary.

Direct Impacts. Impacts that occur as a direct, immediate, and local result of a project are termed direct impacts. Direct impacts are either permanent or temporary. Permanent impacts are direct, continuing impacts that result from the existence and operation of a project. Temporary impacts are direct impacts that result from project construction activities, and include effects such as temporary disturbance of land and wildlife habitat, noise and air pollutants from operation of construction machinery and vehicles, traffic detours and congestion, degradation of the visual environment by large construction equipment, and the economic benefits of additional jobs in the construction sector.

The direct impacts of the Gravina Access Project are discussed in the first 25 sections of this Chapter 4 as follows:

4.1 Land Use Impacts
4.2 Farmland Impacts
4.3 Social Impacts
4.4 Relocation Impacts
4.5 Economic Impacts
4.6 Joint Development
4.7 Transportation Impacts
4.8 Considerations Relating to Pedestrians and Bicyclists
4.9 Impacts on Geology, Topography, and Wind
4.10 Air Quality Impacts
4.11 Noise Impacts
4.12 Water Quality Impacts
4.13 Permits
4.14 Wetland and Vegetation Impacts
4.15 Water Body and Wildlife Impacts
4.16 Floodplain Impacts
4.17 Wild and Scenic Rivers
4.18 Coastal Barriers
4.19 Coastal Zone Impacts
4.20 Threatened and Endangered Species
4.21 Historical and Archeological Preservation
4.22 Hazardous Waste Sites
4.23 Visual Impacts
4.24 Energy
4.25 Construction Impacts

Indirect or Secondary Impacts. Secondary impacts are impacts related to the project that are reasonably foreseeable, yet (compared to direct impacts) occur later in time and farther in distance (40 CFR 1508.8). For instance, the construction of a road in an undeveloped area could have direct adverse impacts (such as removing wildlife habitat, disrupting bird nesting

behavior, and forcing businesses to relocate) and direct benefits (such as providing access to developable land). However, any effects of the project that occur indirectly (such as land development that is induced because it now has roadway access) would be secondary impacts. The secondary impacts of the project alternatives are discussed in Section 4.26.

Cumulative Impacts. The cumulative effects of a project are those that "result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions" (40 CFR 1508.7). Such future actions are those projects that are far enough along in the planning process that their implementation is reasonably foreseeable. The cumulative impacts of the project alternatives are discussed in Section 4.27.

Short-Term Uses and Long-Term Productivity. The natural productivity of land is considered a long-term, renewable use of the land, whereas land development generally is short-term and has a relatively short economic life. The short-term uses and long-term productivity of the project are described in Section 4.28.

Irreversible and Irretrievable Commitments of Resources. Implementing any of the project build alternatives would use a range of natural, physical, human, and fiscal resources, some of which would be irreversible and irretrievable. The commitment of such resources by the project is discussed in Section 4.29.

Mitigation. Measures to minimize the potential impacts associated with the project alternatives, where warranted, are provided following the individual sections describing impacts. These mitigation measures are presented as a compilation in Section 4.30.

4.1 LAND USE IMPACTS

Section 4.1 discusses the project's direct impacts on land use: Section 4.1.1 examines the impacts of the project on land use, based on current development trends, patterns, and zoning, and Section 4.1.2 assesses the consistency of project alternatives with relevant land use plans.

4.1.1 Direct Impacts on Land Use

The alignment of the build alternatives on Gravina Island has been coordinated with available information from the *Ketchikan International Airport Master Plan* to avoid adverse impacts to land use within the airport property. See Section 4.4 (Relocation Impacts), Section 4.7 (Transportation Impacts), Section 4.14 (Wetland and Vegetation Impacts), and Appendix C (*Conceptual Stage Relocation Study and Assessment of Right-of-Way Acquisition Costs*) for more information.

4.1.1.1 No Action Alternative

No land would be developed or directly affected as a result of the No Action Alternative. Land use patterns would not change. This has adverse impacts for the City and Borough of Ketchikan, although they are principally secondary impacts (see Section 4.26.1). No direct access to airport and Borough lands would take place.

4.1.1.2 Alternative C3(a)

Alternative C3(a) would require acquisition of right-of-way from individual commercial and residential properties, converting portions of these properties to transportation use. The affected commercial properties contain a bank and an auto dealership at the intersection of Tongass Avenue and Signal Road. Some of the parking area for the bank and the car dealership would be reduced as a result of this alternative; however, the bank and car dealership would continue to function and overall land use of these properties would not change. Along the hillside parallel to Tongass Avenue, the construction right-of-way would require acquisition of portions of residential properties along Baker Street North and Bucey Avenue North. The conversion of these areas to transportation use would not affect the continued use of the remaining portions of the properties for residential use. One residential property would likely be converted entirely to transportation use for the Alternative C3(a) alignment. This would not affect the overall supply of residential land in Ketchikan.

4.1.1.3 Alternative C3(b)

The alignment of Alternative C3(b) would follow the same general alignment as Alternative C3(a), except where it crosses Tongass Avenue. Like Alternative C3(a), Alternative C3(b) would require acquisition of right-of-way within commercial and residential properties, converting portions of these properties to transportation use. The affected commercial properties contain a bank and an auto dealership at the intersection of Tongass Avenue and Signal Road. Some of the parking area for the bank and the car dealership would be reduced as a result of this alternative; however, the bank and car dealership would continue to function and overall land use of these properties would not change.

The different configuration of the Alternative C3(b) alignment in its approach to the bridge crossing would require more right-of-way than Alternative C3(a) within the residential area of Baker Street North and Bucey Avenue North along the hillside parallel to Tongass Avenue. For most of these properties, the conversion of portions of the property to transportation use would not affect the continued use of the remaining portions of the properties for residential use. Two residential properties would likely be converted entirely to transportation use for the Alternative C3(b) alignment. This would not affect the overall supply of residential land in Ketchikan.

4.1.1.4 Alternative C4

Alternative C4 would intersect Tongass Avenue north of Cambria Drive and south of the Carlanna Construction Quarry. The intersection of Alternative C4 and Tongass Avenue would be directly north of a residential property on Tongass Avenue.

The right-of-way would also cross through the approximate center of the Ketchikan Ready-Mix and Quarry property and through the Dawson Construction property. This location of the alignment would disrupt Ketchikan Ready-Mix and Quarry operations and may require the acquisition of portions of the Dawson Construction facilities. Other hard rock quarry resources are available in Ketchikan and the change to transportation uses would not affect the supply of quarry rock in the region. There are also two buildings under construction (a construction office and three-bay large equipment garage) that may have to be relocated to construct Alternative C4.

4.1.1.5 Alternative D1

Alternative D1 would intersect Tongass Avenue at Cambria Drive, south of the Carlanna Construction Quarry. Acquisition of a small amount of land on the south side of Cambria Drive may be required. The right-of-way would traverse the hillside parallel to Tongass Avenue, north of the Cambria neighborhood, for approximately 0.3 mile, crossing through the Dawson Construction Company property and west of the Carlanna Construction quarry operations. This location of the alignment would disrupt Dawson Construction Company operations and may require acquisition of portions of their facilities. There are also two buildings under construction (a construction office and three-bay large equipment garage) that might have to be relocated to construct Alternative D1.

4.1.1.6 Alternative F1 (DOT&PF and FHWA Preferred)

On Revillagigedo Island, Alternative F1 would connect with Tongass Avenue south of Tatsuda's grocery store in the vicinity of the existing rock quarry. The road would gain elevation, heading up the hill in a southeasterly direction, staying east of the tank farm, the cemetery, and the U.S. Coast Guard Station. The road would turn to the west, traversing the south end of the USCG Base property, north of the Forest Park Subdivision, and cross East Channel of Tongass Narrows to Pennock Island. On Pennock Island, Alternative F1 would require the use of undeveloped, Borough-owned property, which is zoned for residential use. On Gravina Island, the alignment would traverse undeveloped land until reaching the airport property. Approximately 0.5 mile of the road would traverse private, undeveloped, residentially zoned property. The remaining undeveloped property along the alignment is owned by the Borough or state and zoned for future development, commercial, or airport related uses. The conversion of undeveloped property to transportation use would not cause any adverse effect to the overall supply of undeveloped land.

Alternative F1 would run parallel to the eastern boundary of the USCG Station on City of Ketchikan land, and a portion of the southeast end of the USCG Station (approximately one acre) would be used for some of the actual roadway, the bridge abutment, and one pier. Another portion of the southeast end of the property would be in the shadow of the bridge before it crosses South Tongass Avenue and Tongass Narrows. Although the alignment would not affect the overall mission of the USCG at this facility, it could affect the base in the following ways: Alternative F1 could provide informal and unauthorized access to a portion of the eastern perimeter of the Integrated Support Command (ISC), thus affecting the ability to keep the facility secure; it could impede the USCG's ability to move their armory magazine (explosives and munitions storage) to another location to meet clear zone setback requirements; and it could preclude use of the existing firing range because the Alternative F1 roadway would be within the limits of the Surface Danger Zone (SDZ) of the firing range.

Mitigation for Alternative F1

A meeting between the USCG and DOT&PF (November 14, 2003; see Table 7-1) resulted in a February 13, 2004 letter from DOT&PF to the USCG committing to the following measures to mitigate the impacts of Alternative F1 on the USCG Station:

- **DOT&PF commits to providing fencing along the roadway embankment adjacent to the USCG Station (eastern boundary) in order to mitigate any potential security impacts.**

- **DOT&PF will work with the USCG to ensure that Alternative F1 would not affect the USCG's planned relocation of the magazine.**
- **The DOT&PF recognizes that Alternative F1 would affect current use of the firing range. The DOT&PF is committed to mitigating the downrange hazard by enclosing the current range so that it complies with federal SDZ regulations.**

4.1.1.7 Alternative F3

On Revillagigedo Island, Alternative F3 would intersect Tongass Avenue south of the USCG station in an area that is presently undeveloped. On Pennock Island, the bridge would traverse undeveloped Borough land south of Whiskey Cove and would remain on vacant Borough land across Pennock Island. The road would pass a residential lot on the Pennock Island waterfront of West Channel and make landfall on Gravina Island south of Clam Cove. On Gravina Island, the alignment would traverse undeveloped property until reaching the airport property. Approximately 0.5 mile of the road would traverse private, undeveloped, residentially zoned property. The remaining undeveloped property along the alignment is owned by the Borough or state and zoned for future development, commercial, or airport related uses. The conversion of undeveloped property to transportation use would not cause any adverse effect to the overall supply of undeveloped land.

4.1.1.8 Alternative G2

Alternative G2 would require the conversion of a commercial property on Peninsula Point, which is now used as a floatplane maintenance hangar, to transportation use for construction of a ferry terminal and associated parking facilities. Access to the ferry terminal from Tongass Highway would require acquisition of right-of-way from commercial properties adjacent to the highway, but the properties would continue to function as commercial sites.

4.1.1.9 Alternative G3

Alternative G3 would require the construction of a ferry terminal on Bar Point, just south of the Ketchikan boat harbor. This alternative would involve construction of a ferry terminal and parking facilities at the current location of three commercial buildings—a gas station, a fast-food restaurant (Burger King), and the Gateway City Realty building. The Gateway City Realty building has four tenants (businesses) that would be displaced. In addition, a portion of the Plaza Mall parking lot would have to be acquired to build the ferry terminal. Reduction of parking availability would affect the commercial use of the mall. The mall, however, would retain a sufficient amount of parking to be viable.

4.1.1.10 Alternative G4

Alternative G4 would require the construction of a new ferry terminal adjacent to the existing ferry terminal. No change in land use would occur.

4.1.1.11 Assistance for Property Impacts

Fair market value and relocation assistance would be provided to property owners affected by Alternatives C3(a), C3(b), C4, D1, F1, F3, G2, and G3 (also traverses a private lot on Gravina) (see also Section 4.4 Relocation Impacts).

4.1.2 Consistency with Land Use Plans and Policies

The plans of local jurisdictions with authority to govern land use decisions are the *Pennock and Gravina Island Neighborhood Plan*, 1985*;* the *Coastal Management Program*, 1984 (Amended 1989); the *Ketchikan Gateway Borough Comprehensive Plan*, 1996[1]; and the *Ketchikan International Airport Master Plan* (May 2003)*.*

4.1.2.1 No Action Alternative

The No Action Alternative would be inconsistent with the *Pennock and Gravina Island Neighborhood Plan,* the *Coastal Management Program,* and the *Ketchikan Gateway Borough Comprehensive Plan*. The *Pennock and Gravina Island Neighborhood Plan* envisions some kind of ferry access for Pennock Island over the long term. The No Action Alternative would not provide ferry access to Pennock Island and would therefore do nothing to foster the implementation of the plan. Both the *Coastal Management Program* and the *Ketchikan Gateway Borough Comprehensive Plan* discuss the need for improved access to Gravina Island and identify a hard link (bridge) as the solution supported by the plans. The No Action Alternative would provide no improvement consistent with the intent of either of these plans.

The *Ketchikan International Airport Master Plan* explores both ferry and bridge access to the airport. Ferry access as described by the No Action Alternative would be consistent with the plan.

Overall development in the Borough would continue under the No Action Alternative, corresponding to the growth in population. On Pennock Island, a few residential lots could be developed. Gravina Island, without improved access, would experience only a small portion of the region's future development. On Revillagigedo Island, the fastest-growing residential areas would be near Point Higgins (about 15 miles north of downtown Ketchikan); future residential development is anticipated to occur increasingly farther from downtown Ketchikan because of the lack of developable land in the city.

4.1.2.2 Alternatives C3(a), C3(b), C4, and D1

These four bridge alternatives are consistent or have not been identified as conflicting with the *Pennock and Gravina Island Neighborhood Plan*, the *Coastal Management Program*, the *Ketchikan Gateway Borough Comprehensive Plan*, and the *Ketchikan International Airport Master Plan.*

The *Pennock and Gravina Island Neighborhood Plan* clearly articulates that residents were (in 1985) concerned about the changes to the island that a bridge could bring. The plan also envisioned some kind of ferry access for Pennock Island over the long term. Alternatives C3(a), C3(b), C4, and D1 would not provide ferry access to Pennock Island and would therefore do nothing to foster the implementation of the plan.

The *Coastal Management Program* identifies a need for additional commercial and industrial waterfront property and specifies a hard link to Gravina Island as a solution. As such, these bridge alternatives would be consistent with the plan. These alternatives also would further the implementation of the key economic development and land supply strategy articulated in the

[1] Ketchikan Gateway Borough Planning Department, 1989, *Neighborhood Plan; Coastal Management Plan;* and *Comprehensive Plan.*

Coastal Management Program. As quoted from the *Coastal Management Program*, the benefits of a hard link would be:

- Airport development
- Access to commercial and industrial waterfront property
- Access to Borough land selections
- Access to developable land close to the city center
- Mutual aid opportunities for fire and police services
- Improved airfreight service to the business community

The *Ketchikan Gateway Borough Comprehensive Plan* envisions a hard link as the mode of future access to the Gravina Island and, under the "Transportation Element," identifies a bridge as the number 1 strategy for "ensuring adequate access." As such, these bridge alternatives would be consistent with the plan. These alternatives also would further the implementation of the key economic development and land supply strategy articulated in the *Ketchikan Gateway Borough Comprehensive Plan*. The plan cites access to additional developable lands on Gravina Island as an economic development strategy of the Borough. The plan further states that the goal of economic development is to "expand and diversify the local economy," and that the primary mechanism for achieving this goal is "Gravina Island development."[2]

The forecasting chapter of *the Ketchikan International Airport Master Plan* examines bridge access, anticipates it as a possible future mode of access and identifies a location for a parking garage, should bridge access come to fruition. If properly planned and designed to minimize and mitigate adverse impacts on the airport, bridge access would be consistent with the plan.

4.1.2.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Alternatives F1 and F3 are consistent with the *Coastal Management Program,* the *Ketchikan Gateway Borough Comprehensive Plan*, and the *Ketchikan International Airport Master Plan*, but inconsistent with the *Pennock and Gravina Island Neighborhood Plan*.

Improved access to Gravina Island is consistent with the *Coastal Management Plan*, as noted in Section 3.1.2.2. However, the plan provides little policy guidance regarding access to Pennock Island or to Gravina Island via Pennock Island. As presented in Chapter 4 of the *Ketchikan Gateway Borough Comprehensive Plan*, the Borough anticipates a shortage of commercial and industrial land and envisions using Borough holdings on Gravina and Pennock Islands to satisfy the demand. The plan indicates that "expanding the community's land base to any extent, however, is dependent on providing roaded access to it, in this case, a hard link." From this discussion, hard-link access via Pennock Island would not be inconsistent with the *Ketchikan Gateway Borough Comprehensive Plan*. Under the "Transportation Element," the plan identifies a bridge as the number 1 strategy for "ensuring adequate access." The plan, however, does not support accessing Pennock Island lands as clearly as it does Gravina Island lands.

Bridge access is examined and anticipated as a possible future mode of access in the forecasting chapter of the *Ketchikan International Airport Master Plan*. Bridge access, if properly planned and designed to minimize and mitigate the secondary impacts associated with additional car parking and circulation, would be consistent with the plan.

[2] DOT&PF, *Ketchikan International Airport Master Plan*, June 2003.

The *Pennock and Gravina Island Neighborhood Plan* clearly articulates a vision for future transportation access that could include a ferry to Pennock Island. Regarding a bridge, the plan states: "Hard access by bridge or tunnel from Pennock to Gravina Island is not envisioned in the foreseeable future and, in light of the rural characteristics, should not be pursued. Hard access and its possible location is of concern to the community as a whole and should be determined by a Borough-wide vote" (p. 26).

A Borough-wide proposition in October 2002 asked voters if the Borough should be prohibited from using Borough lands for the Gravina Access Project. The proposition failed by nearly a two to one margin, indicating that a majority of those who voted support the use of Borough-owned lands for improving access to Gravina Island.

Many of the actions and strategies articulated in the Pennock Island component of the *Pennock and Gravina Island Neighborhood Plan* have never been implemented. The Borough may decide to update and amend the plan if Alternative F1 or F3 were selected. If the Borough's updated plan included connections to the new road system of Alternative F1 or F3, such a connection would require DOT&PF approval. The DOT&PF would control the number of connecting local driveways and roads to the bridge access road across the island, based on DOT&PF policy and community input.

4.1.2.4 Alternatives G2, G3, and G4

Improved access to Gravina Island by means of increased ferry service is consistent with the *Ketchikan International Airport Master Plan*, which anticipates that the ferry would continue to be the future mode of transport to the airport. The ferry alternatives are also consistent with the *Ketchikan Gateway Borough Comprehensive Plan.* The number 2 strategy of the plan for "ensuring adequate access" to Gravina Island is "enhancing ferry access." As such, Alternatives G2, G3, and G4 are consistent with the plan, but the plan articulates a stronger preference for bridge access.

Improving ferry access to Gravina Island with Alternatives G2, G3, or G4 would not implement ferry access to Pennock Island, which was articulated as a long-term planning goal of the *Pennock and Gravina Island Neighborhood Plan*; therefore, the ferry alternatives do not advance the goals and objectives of the plan. The G Alternatives would not have an adverse impact on the *Coastal Management Program* vision, as stated in Section 3.1.2.2.

4.1.3 Section 4(f) Lands

As indicated in Section 3.1.3, there are 17 parks managed by the Borough that occur in the project area. These are shown in relation to the alternatives on Figure 4.1. Most of these parks are inland of Tongass Highway and therefore away from the proposed crossings of Tongass Narrows. Only Harborview Park, Whale Park, Tunnel Park, and Berth II/Eagle Park are on or seaward of Tongass Highway. These four are small parks, each a fraction of an acre. Of these, the nearest park to any alternative would be Tunnel Park. Alternative G3 would be more than 3,500 feet from the boundary of Tunnel Park. Of the uphill parks, Alder Park on Bryant Avenue, a 1-acre park with picnic pavilion, is the farthest north, and would be nearest an alternative. The nearest Alternatives, Alternatives C4 and D1, are more than 2,000 feet from the boundary of Alder Park.

There are many Ketchikan and Saxman properties on the National Register of Historic Places, particularly downtown. Not one would be near any of the alternatives. Other historic sites were discovered as part of this project near the alignments of some alternatives. Details of these are provided in Sections 3.21 and 4.21. The only sites near enough to be within the area of potential effect are those important for the archaeological information they may provide, and not for preservation in place. These are governed by Section 106 of the National Historic Preservation Act, but are not subject to Section 4(f) law.

In summary, the FHWA has determined that no land would be taken from any park, recreation area, wildlife refuge, or historic site subject to Section 4(f) for the project and that therefore, a Section 4(f) evaluation is not necessary.

4.2 FARMLAND IMPACTS

The No Action Alternative and Alternatives C3(a), C3(b), C4, D1, F1, F3, G2, G3, and G4 would have no impact on farmland because there is no farmland in the project area that is considered prime or unique, or is of statewide or local importance.

4.3 SOCIAL IMPACTS

4.3.1 Population and Social Groups

4.3.1.1 Ketchikan Gateway Borough

None of the alternatives (No Action Alternative, Alternatives C3[a], C3[b], C4, D1, F1, F3, G2, G3, and G4) would impact the population or social groups of the Borough.

4.3.1.2 Minority and Low-Income Populations

Demographic analysis indicated that there are some minority populations in the area (see Figure 3.6), but there is no evidence that any of the alternatives (No Action Alternative, Alternatives C3[a], C3[b], C4, D1, F1, F3, G2, G3, and G4) would disproportionately adversely impact any of these groups. The impacts to these groups are discussed more in Section 4.3.6.

4.3.2 Neighborhoods and Community Cohesion

4.3.2.1 No Action Alternative

The No Action Alternative would not change existing neighborhoods and community character.

4.3.2.2 Alternatives C3(a) and C3(b)

The Baker Street North/Bucey Avenue North neighborhood along the hillside between Signal Road and the Alternative C3(a) and C3(b) bridges would be adversely affected by the proximity of traffic on the new alignment, which would diminish the sense of quiet and the suburban atmosphere. The alignments associated with these alternatives traverse the edge of the neighborhood; they would not affect the cohesion of the neighborhood (see Section 4.4,

Relocation Impacts, for more information). Direct access to the new facility would be limited and current neighborhood streets would not be used for cut-through access.

The alignments of these alternatives are not within or adjacent to neighborhoods on Gravina Island. Although the hard-link connection would provide a greater sense of connection to Ketchikan for Gravina Island neighborhoods, the communities would maintain their remote character. This remote character would be altered if secondary development created a physical connection to these neighborhoods.

4.3.2.3 Alternatives C4 and D1

The Cambria Drive neighborhood would be adversely affected by the proximity of traffic on the new alignment, which would diminish the relative sense of quiet and the suburban atmosphere. The alignments associated with these alternatives traverse the edge of the neighborhood; they would not affect the cohesion of the neighborhood (see Section 4.4, Relocation Impacts, for more information). Direct access to the new facility would be limited and current neighborhood streets would not be used for cut-through access.

The alignments of these alternatives are not within or adjacent to neighborhoods on Gravina Island. Although the hard-link connection would provide a greater sense of connection to Ketchikan for Gravina Island neighborhoods, the communities would maintain their remote character. This remote character would be altered if secondary development created a physical connection to these neighborhoods.

4.3.2.4 Alternative F1 (DOT&PF and FHWA Preferred)

This alternative would not bisect neighborhoods or adversely affect the cohesion of neighborhoods; however, noise and traffic levels associated with the alignment could diminish the sense of quiet and the suburban atmosphere on the north side of the Forest Park neighborhood (see Section 4.4, Relocation Impacts, for more information). Direct access to the new facility would be limited and current neighborhood streets would not be used for cut-through access.

Some could view the hard link between Revillagigedo Island, Pennock Island, and Gravina Island as a positive impact because it could improve the cohesion of the community by linking neighborhoods (existing and future) on all sides of Tongass Narrows. On the other hand, residents of Gravina and Pennock Islands who value the separation and remote aspects of life on those islands could be affected adversely by the physical connection between the communities.

4.3.2.5 Alternative F3

This alternative would not bisect neighborhoods or adversely affect the cohesion of neighborhoods (see Section 4.4, Relocation Impacts, for more information). Direct access to the new facility would be limited and current neighborhood streets would not be used for cut-through access.

Some could view the hard link between Revillagigedo Island, Pennock Island, and Gravina Island as a positive impact because it could improve the cohesion of the community by linking neighborhoods (existing and future) on all sides of Tongass Narrows. On the other hand,

residents of Gravina and Pennock Islands who value the separation and remote aspects of life on those islands could be affected adversely by the physical connection between the communities.

4.3.2.6 Alternatives G2, G3, and G4

No residential areas would be directly affected by these alternatives. The alignment does not bisect any neighborhoods; they would not adversely affect the cohesion of neighborhoods (see Section 4.4, Relocation Impacts, for more information). The limited access provided by the ferry alternatives would not significantly change the separation and remote lifestyle of Gravina Island residents offered by the physical divide of Tongass Narrows.

4.3.3 Community and Public Service Facilities

4.3.3.1 No Action Alternative

Under the No Action Alternative, the problems and inconvenience identified and associated with the current ferry access between public facilities and developed land on Revillagigedo Island (police, fire stations, hospital) and Ketchikan International Airport would continue. **The emergency response system would remain unchanged. Table 4-1 characterizes travel time for emergency vehicles traveling from Revillagigedo Island to Gravina Island for all alternatives, including No Action.**

TABLE 4-1
TRAVEL TIMES FOR EMERGENCY VEHICLES

	Travel Times (minutes)									
*Origin and Destination**	*Existing Conditions/ No Action*	*C3(a)*	*C3(b)*	*C4*	*D1*	*F1*	*F3*	*G2*	*G3*	*G4*
From Hospital to Airport Terminal	26	*6*	*5*	*5*	*3*	*16*	*16*	34	29	*23*
From Peninsula Point Fire Station to Airport Terminal	22	*4*	*3*	*6*	*5*	*21*	*21*	29	34	*19*
From AMHS Terminal to Airport Terminal	23	*5*	*4*	*4*	*3*	*17*	*17*	33	30	*21*
From Main Street Fire Station to Airport Terminal	25	*10*	*9*	*9*	*8*	*12*	*12*	38	31	*22*
From Hospital to Developable Land	NA	9	9	7	6	11	11	28	25	21
From Peninsula Point Fire Station to Developable Land	NA	7	7	8	8	16	16	23	30	22
From AMHS Terminal to Developable Land	NA	8	8	6	6	12	12	27	26	20
From Main Street Fire Station to Developable Land	NA	13	13	11	11	7	7	32	27	25

* *Italics* = Shorter Time Than Existing Condition

Airport Terminal = Terminal of Ketchikan International Airport

Developable Land = Airport Development Zone on Gravina Island

4.3.3.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), and F3

There would be no direct impact on existing or planned community facilities and public services with the bridge alternatives. Accessibility to public services such as fire, police, and hospitals would improve considerably with the 24-hour access provided by a bridge (see Table 4-1 Travel Times). It would be easier for residents of Gravina Island to travel to Revillagigedo Island for necessary medical services, and it would be easier for emergency personnel to travel to Gravina Island.

4.3.3.3 Alternatives G2, G3, and G4

There would be no direct impact on community facilities and public services with the ferry alternatives. Accessibility to public services such as fire, police, and hospitals would improve with the additional ferry service, although travel time to the airport for emergency vehicles would be the same for Alternatives G2 and G3 (assuming use of the existing ferry) and improve by 3 minutes or less for Alternative G4 (see Table 4-1 Travel Times). Additional ferry service would make it easier for residents of Gravina Island to travel to Revillagigedo Island for necessary medical services, and make it easier for emergency personnel to travel to Gravina Island with an additional ferry, but access (as with the existing ferry) would still be unavailable during non-operating hours or severe weather. **The emergency response system would be the same as the existing condition except that Alternatives G2 and G3 would offer different access locations, which may affect emergency response time (depending on the location of the emergency).**

4.3.4 Recreation

4.3.4.1 No Action Alternative

With the No Action Alternative, access to recreational land on Gravina Island would not improve and those opportunities would remain difficult and inconvenient for Ketchikan residents and visitors to access. These issues are described in detail in Chapter 1 (Purpose and Need).

4.3.4.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

A direct benefit of improved access to Gravina Island associated with all build alternatives would be better accessibility to recreational areas, parks, and facilities. There are numerous recreational opportunities on Gravina Island and improved access would make those opportunities more accessible to Ketchikan residents and visitors. The improved access to recreational opportunities would likely have adverse secondary impacts by increasing demand for recreation and public services, such as fire and police protection. These secondary impacts are described in Section 4.26 (Secondary Impacts).

4.3.5 Accessibility

4.3.5.1 No Action Alternative

There would be no change in travel patterns and accessibility. Travel to the airport would continue on the existing ferry; other trips would continue to be made with private boats. Accessibility problems, as identified in Chapter 1 (Purpose and Need), would continue.

Weather can be a factor in reliability of ferry access, although such instances are rare. The existing airport ferry has been closed once for weather-related conditions in the last 12 years.[3] That closure occurred when the wind was blowing at approximately 90 miles per hour and there were no vehicles or other passengers waiting to cross.

The No Action Alternative would have no traffic safety effects. Overall public safety for residents and development on Gravina Island would continue to be adversely affected by poor accessibility to medical services and fire protection. Residents would continue to make trips to and from Ketchikan in private skiffs across Tongass Narrows. Tongass Narrows is a narrow waterway with heavy boat and seaplane traffic.

4.3.5.2 Alternative C3(a) and Alternative C3(b)

Alternatives C3(a) and C3(b) would improve accessibility between Revillagigedo and Gravina Islands. The alternatives are located near Signal Road; they would improve accessibility to the airport and developable lands on Gravina Island by providing 24-hour access. Development potential would increase due to more convenient access to Gravina Island. Vehicular travel patterns would change slightly because the location of these alternatives on Revillagigedo Island is near Signal Road (north of the existing airport ferry). Accessibility for pedestrians and bicyclists would be improved as a result of 24 hours-per-day availability of access; however, the travel route would be longer for pedestrians and bicyclists originating from, or destined to, areas on Revillagigedo Island south of the existing airport ferry terminal, and require more physical exertion to overcome grade changes (particularly with Alternative C3[a]). Effects on travel time are described in Sections 4.7.3 (vehicles) and 4.8 (pedestrians and bicyclists).

These alternatives would add an additional intersection on Tongass Avenue. This would increase traffic conflicts and affect traffic safety. The improved access and additional lane miles would increase vehicle miles traveled. Driving an automobile can be dangerous and, to the extent that vehicle miles traveled would increase, traffic accidents would also increase. However, the intersections of the alignment with Tongass Avenue would be signalized and designed to American Association of State Highway Transportation Officials (AASHTO) standards, minimizing the impact on traffic safety.

Overall public safety would increase by improving accessibility between medical services and Ketchikan International Airport for medical evacuations and through an opportunity for sharing firefighting equipment and personnel between airport and community emergency services.

[3] Garten, Tim (Deputy Director of Transportation Services, Ketchikan International Airport), telephone conversation with Carol Snead, HDR. September 5, 2001.

4.3.5.3 Alternative C4 and Alternative D1

Alternatives C4 and D1 would improve accessibility between Revillagigedo and Gravina Islands. These alternatives would be located near the airport and would improve accessibility to the airport and developable lands on Gravina Island by providing 24-hour access. Development potential would increase due to more convenient access to Gravina Island. Vehicular travel patterns would not change, because the location of these alternatives on Revillagigedo Island is near the existing airport ferry. Accessibility for pedestrians and bicyclists would be improved as a result of the 24 hours-per-day availability of access; however, as compared with existing conditions, the new travel corridor would be longer for many pedestrians and bicyclists, and require more physical exertion to overcome grade changes (particularly with Alternative C4). Effects on travel time are described in Sections 4.7.3 (vehicles) and 4.8 (pedestrians and bicyclists).

These alternatives would add an additional intersection on Tongass Avenue. This would increase traffic conflicts and affect traffic safety. The improved access and additional lane miles would increase vehicle miles traveled. Driving an automobile can be dangerous and, to the extent that vehicle miles traveled would increase, traffic accidents would also increase. However, the intersections of the alignment with Tongass Avenue would be signalized and designed to AASHTO standards, minimizing the impact on traffic safety.

Overall public safety would increase by improving accessibility between medical services and Ketchikan International Airport for medical evacuations and through an opportunity for sharing firefighting equipment and personnel between airport and community emergency services.

4.3.5.4 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Alternatives F1 and F3 would improve accessibility between Revillagigedo and Gravina Islands. These alternatives would be located south of downtown Ketchikan and would improve accessibility to the airport and developable lands on Gravina Island by providing 24-hour access. Development potential would increase due to more convenient access to Gravina Island. Vehicular travel patterns would change because the location of these alternatives on Revillagigedo Island would lie south of downtown Ketchikan. Accessibility for pedestrians and bicyclists would be improved as a result of 24 hours-per-day availability of access; however, as compared with existing conditions, the new travel corridor would be longer for many pedestrians and bicyclists, and require more physical exertion to overcome grade changes. Effects on travel time are described in Sections 4.7.3 (vehicles) and 4.8 (pedestrians and bicyclists).

Alternatives F1 and F3 also would touch down on Pennock Island. Road access from the Alternative F1 and F3 alignments to Pennock Island neighborhoods is not included in these alternatives. However, the Borough Assembly has indicated that, with the selection of Alternative F1 as the preferred alternative, it will request that the Borough Planning Department develop a Pennock Island Plan to include a framework for local transportation access and infrastructure. Alternatives F1 and F3 would provide an opportunity to connect the Pennock Island neighborhoods to Gravina and Revillagigedo Islands in the future.

These alternatives would add an additional intersection on Tongass Avenue. This would increase traffic conflicts and affect traffic safety. The improved access and additional lane miles would increase vehicle miles traveled. Driving an automobile can be dangerous and, to the extent that vehicle miles traveled would increase, traffic accidents would also increase.

However, the intersections of the alignment with Tongass Avenue would be signalized and designed to AASHTO standards, minimizing the impact on traffic safety.

Overall public safety would increase by improving accessibility between medical services and Ketchikan International Airport for medical evacuations and through an opportunity for sharing firefighting equipment and personnel between airport and community emergency services.

4.3.5.5 Alternatives G2, G3, and G4

Alternatives G2, G3, and G4 would improve accessibility between Revillagigedo and Gravina Islands. The alternatives would improve accessibility to the airport and developable lands on Gravina Island by providing another option for ferry access—G2 is located north of the existing ferry, G3 is located south of the existing ferry, and G2 is located next to the existing ferry. Development potential would increase due to more convenient access to Gravina Island. Vehicular travel patterns would change for Alternatives G2 and G3 because of the location of these alternatives on Revillagigedo Island (north or south of the existing airport ferry). Accessibility for pedestrians and bicyclists would be improved as a result of having two location options for crossing Tongass Narrows. Effects on travel time are described in Sections 4.7.3 (vehicles) and 4.8 (pedestrians and bicyclists).

Ferry closures due to weather are not anticipated to occur more frequently under Alternatives G2, G3, or G4 than under the No Action Alternative (see Section 4.3.5.1).

Overall public safety for residents on Gravina Island would improve as compared to the No Action Alternative as a result of the additional ferry connection to Revillagigedo Island. However, residents would continue to be adversely affected by the accessibility to medical services and fire protection as dictated by ferry scheduling. Safety would not improve over existing conditions during the hours in which the ferries would not be operating. Residents would continue to make trips to and from Ketchikan in private skiffs across Tongass Narrows after the operating hours of the ferry.

4.3.6 Environmental Justice

Research shows that impacts often do not fall equally on everyone in a community and that the effects of an action can be disproportionate because of cultural, social, historical, and economic characteristics. Environmental justice populations (low-income or minority) could be more sensitive to such effects, and less resilient in adapting to them. All build alternatives would have some social, economic, and environmental impacts. Some of the adverse impacts would include: impacts on neighborhoods and community cohesion due to increased traffic (Section 4.3.2), increased pressure on subsistence resources (Section 4.3.7), required relocation of businesses and/or residences (Section 4.4), restrictions on cruise ship and float plane operations (Section 4.7), increased travel times for pedestrians and bicyclists (Section 4.8), increased noise levels (Section 4.11), impacts on the visual environment (Section 4.23), construction impacts (Section 4.25), secondary impacts (Section 4.26), and cumulative impacts (Section 4.27).

As described in this chapter, all of the build alternatives would have some impact on the Ketchikan area and its residents. As a result and in accordance with Executive Order 12898 (see Section 3.3.6 for more information on EO 12898) and because of the

importance of the Alaska Native community, the project team analyzed the demographics of the area and consulted with Native groups in determining the impacts on minority groups. Demographic analysis indicates there are no low-income populations in the area, but it has been determined that there are some minority populations in the area (see Figure 3.6). However, the DOT&PF and FHWA have determined that no disproportionately high or adverse impacts would occur as a result of construction and operation of any of the build alternatives. Therefore, none of the build alternatives would have an adverse environmental justice impact.

4.3.7 Subsistence

The project team met with representatives of the Metlakatla Indian Community, the Ketchikan Indian Corporation Tribal Council, the Organized Village of Saxman, and Cape Fox Corporation, and subsistence was identified as a major issue in the area. Gravina Island, in general, and the Bostwick Inlet area of the island, in particular, were noted as important subsistence areas for Alaska Natives by all the tribal entities consulted. These tribal entities expressed concern that the logging roads associated with the USFS Gravina Island timber sale combined with improved access from the Gravina Access Project would create an even greater impact on subsistence practices than the Gravina Access Project alone. See Section 4.27.1 (Land Use) for a discussion of the cumulative impacts of the Gravina Access Project and the USFS timber sale on subsistence resources on Gravina Island.

4.3.7.1 No Action Alternative

The No Action Alternative would have no impact on subsistence.

4.3.7.2 Alternatives C3(a), C3(b), C4, D1, G2, G3, and G4

The only direct impact on subsistence would be the loss of habitat that might support subsistence activity (see Table 4-12 in Section 4.14). **Habitat loss is a direct function of the amount of development that occurs, over time, and where it occurs. Information on the location of potential development is presented, in part, in Figure 4.2. Additional information is available in the Borough's *Gravina Island Plan* (final public review draft) contained in Appendix S. The analysis of impacts is based on a medium case development scenario (see Section 4.26 for more information). While it is impractical to determine the exact level of impacts on subsistence, it can be inferred indirectly from the amount of habitat impacted.** Alternative C3(a) would impact 44.**0** acres of wetlands, 0.1 acre of ponds, and **5.1 acres of uplands**. Alternative C3(b) would impact 42.**3** acres of wetlands, 0.1 acre of ponds, and **9.1 acres of uplands**. Alternative C4 would impact **38.8** acres of wetlands, 0.1 acre of ponds, and **10.4 acres of uplands**. Alternative D1 would affect 36.**1** acres of wetlands, 0.1 acre of ponds, and **8.6 acres of uplands**. Alternative G2 would affect 42.5 acres of wetlands, 0.1 acre of ponds, and **7.6 acres of uplands**. Alternative G3 would affect 47.**6** acres of wetlands, 0.1 acre of ponds, and **7.0 acres of uplands**. Alternative G4 would affect 35.4 acres of wetlands, 0.1 acre of ponds, and **4.7 acres of uplands**.

In contrast to the direct loss of habitat from all build alternatives, the total area of Gravina Island is 61,404 acres. Seventy percent of the island (approximately 43,000 acres) is wetland. Approximately 3,276 acres of the wetlands, including estuaries, tall sedge fens, scrub-shrub alder/willow, and moss muskeg/sphagnum peat muskegs, were identified by the USDA Forest

Service as "high-value wetlands" because of their fish and wildlife habitat value, a relative rarity. Productive old-growth forest, particularly at low elevations, is important for deer. There are 11,123 acres of productive old growth below 800 feet elevation on National Forest lands of Gravina Island, and another 7,800 acres above that elevation. Additional deer habitat exists on non-Forest lands. Secondary impacts on subsistence are addressed in Section 4.26.

4.3.7.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

One direct impact on subsistence would be the loss of habitat that might support subsistence activity (see Table 4-12 in Section 4.14). Alternative F1 would have a direct impact on 96.**5** acres of wetlands, 0.1 acre of ponds, and **10.7 acres of uplands**. Alternative F3 would have a direct impact on 85.**1** acres of wetlands, 0.1 acre of ponds, and **4.8 acres of uplands**. Improved access to Pennock Island with these alternatives would result increased subsistence use on Pennock Island. **Alternatives F1 and F3 are expected to affect subsistence more than the other alternatives because these alternatives provide access to both Pennock and Gravina Islands, but the effect will be indirect or secondary in nature. Indirect or secondary impacts to subsistence would result from habitat loss associated with future development on Gravina and Pennock Islands. Habitat loss associated with future development is addressed in Section 4.26. While it is impractical to determine the level of impacts habitat loss would have on subsistence, it can be inferred from the amount of habitat impacted.**

In contrast to the direct loss of habitat from all build alternatives, the total area of Gravina Island is 61,404 acres. Seventy percent of the island (approximately 43,000 acres) is wetland. Approximately 3,276 acres of the wetlands, including estuaries, tall sedge fens, scrub-shrub alder/willow, and moss muskeg/sphagnum peat muskegs, were identified by the USDA Forest Service as "high-value wetlands" because of their fish and wildlife habitat value, a relative rarity. Productive old growth forest, particularly at low elevations, is important for deer. There are 11,123 acres of productive old growth below 800 feet elevation on National Forest lands of Gravina Island, and another 7,800 acres above that elevation. Additional deer habitat exists on non-Forest lands. Secondary impacts on subsistence are addressed in Section 4.26.

4.3.8 Utilities

4.3.8.1 Water

No Action Alternative

The No Action Alternative would not involve construction or additional utility usage; therefore, it would have no effect on the water utilities in the project area.

Alternatives C3(a) and C3(b)

In the Signal Road area, potable water systems consist of roof catchment systems or hauled water and there is no water distribution system; therefore, no impact on the existing water system would occur. On Gravina Island, the water supply main to Ketchikan International Airport would also not be affected by either of these alternatives.

Alternatives C4 and D1

In the Cambria Drive area, the potable water system consists of a buried 8-inch water line. It is highly unlikely that there would be any direct impact on this existing water line. However, depending on the final alignment of the bridge approach, there is a remote possibility that other buried facilities associated with the bridge approach, such as conduits for the lighting and signaling systems, would interfere with the water line. Relocation of up to 100 feet of water line in the Cambria Drive area might be required (the estimated cost of relocating 100 feet of water line is $10,000).

On Gravina Island, the water supply main to Ketchikan International Airport would not be affected by either of these alternatives.

Alternative F1 (DOT&PF and FHWA Preferred)

A buried water supply main parallels South Tongass Avenue on Revillagigedo Island, extending as far south as the USCG Station. This water supply main could be within the construction area of Alternative F1 and might need to be relocated. Relocation of up to 100 feet of water line on South Tongass Avenue might be required (the estimated cost of relocating 100 feet of water line is $10,000). Potable water supplies for residences on Pennock and Gravina Islands consist of roof catchment systems or hauled water and would not be affected by Alternative F1. Alternative F1 would not affect the water supply main to the airport. No other water distribution systems exist in the vicinity of this alternative, so there is no expected impact on existing facilities.

Alternative F3

Potable water supplies in the vicinity of Alternative F3 on Revillagigedo Island and for residences on Pennock and Gravina Islands consist of roof catchment systems or hauled water and there is no water distribution system. Alternative F3 would not affect the water supply main to the airport. No other water distribution systems exist in the vicinity of this alternative, so there is no expected impact on existing facilities.

Alternatives G2, G3, and G4

At the Revillagigedo Island landings of each of the proposed ferry routes, all project improvements would be seaward of any water lines, so there is no expected impact. In addition, none of these alternatives would affect any water lines on Gravina Island.

4.3.8.2 Sewer

No Action Alternative

The No Action Alternative would not involve construction or additional utility usage; therefore, it would have no effect on the sewer utilities in the project area.

Alternatives C3(a) and C3(b)

In the Signal Road area, sewage disposal typically consists of on-site disposal systems, and there is no sewage collection system; therefore, no impact on the existing sewer system would

occur. On Gravina Island, the wastewater treatment facilities at the airport would also not be affected by these alternatives.

Alternatives C4 and D1

In the Cambria Drive area, the sewage collection system consists of a buried 8-inch line. It is highly unlikely that there would be any direct impact on this existing sewer line. However, depending on the final alignment of the bridge approach, there is a remote possibility that other buried facilities associated with the bridge approach, such as conduits for the lighting and signaling system, would interfere with the sewer line. Relocation of up to 100 feet of sewer line in the Cambria Drive area might be required (the estimated cost of relocating 100 feet of sewer lines is $10,000).

On Gravina Island, the wastewater treatment facilities at the airport would not be affected by either of these alternatives.

Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Sewage disposal in the project area of Revillagigedo Island and for residences on Pennock and Gravina Islands typically consists of on-site disposal systems. The wastewater treatment facilities at the airport would not be affected by either of these alternatives. No other sewage collection systems exist in the vicinity of these alternatives, so there is no expected impact on other existing sewer facilities.

Alternatives G2, G3, and G4

At the Revillagigedo Island landings of each of the proposed ferry routes, all project improvements would be seaward of any sewer lines, so there is no expected impact. Nor would any sewer lines on Gravina Island be affected by any of these alternatives.

4.3.8.3 Electricity and Telephone

The electrical and telephone lines on Revillagigedo Island are, in most instances, co-located and, therefore, are discussed together in this impact analysis.

No Action Alternative

The No Action Alternative would not involve construction or additional utility usage; therefore, it would have no effect on the electrical and telephone utilities in the project area.

Alternatives C3(a) and C3(b)

Along Tongass Avenue, the main electrical and telephone lines are located overhead on poles, but the bridge overpass is expected to be high enough to clear them. On Gravina Island, electric and telephone service to the airport would not be affected by either of these alternatives.

In the Signal Road area, electric and telephone lines are overhead on poles. Depending on the final alignment of the bridge approach, the project might interfere with the power poles or lines on Signal Road. Relocation of up to two power poles and associated lines in the Signal Road

area might be required (the estimated cost of relocating two poles and associated electric and telephone lines is $40,000).

Alternatives C4 and D1

On Tongass Avenue, the main electrical and telephone lines are located on overhead poles, but the bridge overpass is expected to be high enough to clear these power poles and lines. On Gravina Island, electric and telephone service to the airport would not be affected by either of these alternatives.

In the Cambria Drive area, electric and telephone lines are in underground conduits. It is highly unlikely that there would be any direct impact on these existing underground electrical and telephone lines. However, depending on the final alignment of the bridge approach, there is a remote possibility that other buried facilities associated with the bridge approach, such as conduits for lighting and signaling systems, would interfere with the existing buried electrical and telephone conduits. Relocation of up to 100 feet of buried electrical and telephone conduit might be required (the estimated cost of relocating 100 feet of buried conduit is $10,000).

4.3.8.4 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

On Gravina Island, electric and telephone service to the airport would not be affected by either of these alternatives. On Tongass Avenue, the main electrical and telephone lines are located overhead on poles. The Alternative F1 bridge overpass of Tongass Avenue is expected to be high enough to clear these power poles and lines. Similarly, Alternative F3 would not require any changes to these poles and lines.

On Pennock Island, electric and telephone service is provided by overhead lines on poles. Depending on the final alignment of the bridge approaches and the roadway, there may be some interference with the power poles or lines. Relocation of up to two power poles and associated lines on Pennock Island might be required (the estimated cost of relocating two poles and associated electric and telephone lines is $40,000).

4.3.8.5 Alternatives G2, G3, and G4

At the Revillagigedo Island landings of each of the proposed ferry routes, all project improvements would be seaward of any electrical and telephone lines, so there is no expected impact. Nor would any electrical or telephone lines on Gravina Island be affected by any of these alternatives.

4.4 RELOCATION IMPACTS

Should the Gravina Access Project require acquisition of real property, all property owners, without discrimination, would be compensated for their loss of property at fair market value and all displaced persons would be moved at no expense to them. Any relocation would comply with the “Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970” as amended. A detailed evaluation of each of the alignments with respect to property acquisition requirements is provided in Appendix C (*Conceptual Stage Relocation Study and Assessment of Right-of-Way Acquisition Costs*). There is sufficient existing housing in the community to accommodate those residents who would be relocated, although they might have to locate outside of their existing neighborhood. Businesses that could be displaced by an alternative

would also have to locate in a different area of the community; the cost of relocating would be covered as part of the relocation process.

4.4.1 No Action Alternative

The No Action alternative would have no relocation impacts; no homes or businesses would have to be relocated.

4.4.2 Alternative C3(a)

Alternative C3(a) would require acquisition of property from 23 parcels. One residence would likely have to be relocated where Alternative C3(a) crosses Tongass Avenue. The proposed alignment of Alternative C3(a) would not require the relocation of any other residences or businesses.

4.4.3 Alternative C3(b)

Alternative C3(b) would require acquisition of property from 28 parcels. The different configuration of the Alternative C3(b) alignment in its approach to the bridge crossing would require more right-of-way within the residential area of Baker Street North and Bucey Avenue North along the hillside parallel to Tongass Avenue. The required right-of-way would encroach upon residential property and would therefore require the relocation of two residences on the hillside. The proposed alignment of Alternative C3(b) would not require the relocation of any other residences or businesses.

4.4.4 Alternative C4

Alternative C4 would require acquisition of property from 15 parcels. The right-of-way for Alternative C4 would traverse the hillside parallel to Tongass Avenue for approximately 0.5 mile, crossing through the approximate center of the Ketchikan Ready-Mix and Quarry property and through the Dawson Construction Company property. This location of the alignment would disrupt Ketchikan Ready-Mix and Quarry operations and may require the acquisition of portions of the Dawson Construction Company facilities, including two trailers, which currently serve as an office. There are also two buildings (a construction office and three-bay large equipment garage) under construction that might have to be relocated with the selection of Alternative C4. The proposed alignment of Alternative C4 would not require the relocation of any other residences or businesses.

4.4.5 Alternative D1

Alternative D1 would require acquisition of property from 14 parcels. The right-of-way for Alternative D1 would traverse the hillside parallel to Tongass Avenue, north of the Cambria neighborhood, for approximately 0.3 mile, crossing through the Dawson Construction Company property and west of the Carlanna Construction quarry operations. This location of the alignment would disrupt operations of the Dawson Construction Company and might require relocation of portions of the construction company facilities, including two trailers presently located on the construction company property, which currently serve as an office. The proposed alignment of Alternative D1 would not require the relocation of any other residences or businesses.

4.4.6 Alternative F1 (DOT&PF and FHWA Preferred)

Alternative F1 would require acquisition of property from 30 parcels. The proposed alignment of Alternative F1 would not require the relocation of any residences or businesses.

4.4.7 Alternative F3

Alternative F3 would require acquisition of property from 27 parcels. The proposed alignment of Alternative F3 would not require the relocation of any residences or businesses.

4.4.8 Alternative G2

Alternative G2 would require acquisition of property from 13 parcels. Alternative G2 would involve construction of a ferry terminal and parking facilities on Peninsula Point at the existing location of a Pro Mech aircraft hangar. The hangar and the associated aircraft operations would have to be relocated. The proposed alignment of Alternative G2 would not require the relocation of any residences or other businesses.

4.4.9 Alternative G3

Alternative G3 would require acquisition of property from 15 parcels. Alternative G3 would involve construction of a ferry terminal and parking facilities at the current location of three commercial buildings—a gas station, a fast-food restaurant (Burger King), and the Gateway City Realty building, which currently has four businesses as tenants that would be displaced (Gateway City Realty, Basic Transportation Co., Matty's World of Toys/Silver Basin, and Alaska Indoor Sports). These six businesses would therefore have to be relocated with the selection of Alternative G3. The proposed alignment of Alternative G3 would not require the relocation of any other residences or businesses.

4.4.10 Alternative G4

Alternative G4 would require acquisition of property from 14 parcels. The proposed alignment of Alternative G4 would not require the relocation of any businesses or residences.

4.5 ECONOMIC IMPACTS

Section 4.5 discusses the direct economic impacts, Section 4.25.4.1 discusses economic impacts from construction, and Section 4.26.3 discusses secondary economic impacts. Most of the economic impacts associated with the project alternatives would not be directly attributable to the action taken, rather they would be an indirect effect, and are therefore described in Section 4.26.3. For a complete description of all the economic impacts of the project alternatives, see the *Gravina Access Project Economic Impact Assessment* (Appendix D).

4.5.1 Economy and Economic Development

A long-term direct impact of the Gravina Access Project would be the beneficial impact of operations and maintenance spending on the Ketchikan economy. The effect of this spending would depend on the particular alternative since the operations and maintenance costs of each alternative vary. The ferry alternatives (G2, G3, and G4) have the greatest operations and maintenance costs ($3.3 million/year). The estimates of operations and maintenance-related

spending expected to occur within the Borough, shown in Table 4-2 do not include any indirect or multiplier effects of the spending in the local area; see the comparison table in the Summary Chapter and Appendix D for total spending, costs, etc., that include the multiplier effects. These indirect effects (including the economic development that results because of improved access) are discussed in Section 4.26. A complete description of the economic impacts of the project alternatives is provided in Appendix D.

TABLE 4-2
ESTIMATED OPERATIONS AND MAINTENANCE SPENDING IN THE KETCHIKAN GATEWAY BOROUGH BY ALTERNATIVE

Alternative	*Annual Operations & Maintenance[1, 2] (Millions of 2003$)*
No Action	$2.1
C3(a)	$0.2
C3(b)	$0.2
C4	$0.2
D1	$0.1
F1	$0.1
F3	$0.1
G2	$3.3
G3	$3.3
G4	$3.3

Source: Appendix D, Economic Impact Assessment, Gravina Access Project. Northern Economics. April 2003.

[1] Annual costs may not match O&M costs presented elsewhere due to rounding.

[2] The annual O&M costs presented here do not include periodic replacement and major rehabilitation costs for the improved ferry service. These costs are included in direct construction and acquisition activities to facilitate the input-output analysis for secondary effects.

If any of the bridge alternatives were selected, one additional impact would be the elimination of the ferry service between Gravina and Revillagigedo Islands. Based on past performance, elimination of the ferry would represent a small net financial gain (i.e., benefit) to the operator, the Borough, since historically the ferry has been an unprofitable operation. However, recent fare increases might result in the ferry service becoming profitable in the future. In any event, the traveling public would benefit from the reduced travel cost to Gravina Island if a bridge alternative were selected rather than a ferry alternative because of the elimination of a toll to travel to and from the Island.

4.5.2 Employment

4.5.2.1 No Action Alternative

The No Action Alternative would have employment impacts related to periodic replacement of facilities and equipment, in addition to the jobs associated with operating the existing ferry service. There are approximately 16 annual operations and maintenance jobs associated with the No Action Alternative.

4.5.2.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Operations and maintenance of the alternatives would create jobs in the region. Table 4-3 illustrates the total number of annual operation and maintenance jobs that would employ residents of the Borough for each alternative; additional jobs would go to workers from outside of the Borough.

TABLE 4-3
ESTIMATED OPERATIONS AND MAINTENANCE JOBS IN THE KETCHIKAN GATEWAY BOROUGH BY ALTERNATIVE

Alternative	*Annual Operations & Maintenance Jobs*
No Action	16
C3(a)	2
C3(b)	2
C4	2
D1	1
F1	1
F3	1
G2	51
G3	51
G4	51

Operations and maintenance activities would also indirectly result in the creation of additional jobs in the region. Indirect impacts include full-time and part-time employment created as a result of the secondary round of spending by businesses, households, and local governments that support the project; these secondary impacts are discussed in Section 4.26.3.

4.6 JOINT DEVELOPMENT

There are no joint development projects associated with the Gravina Access Project.

4.7 TRANSPORTATION IMPACTS

4.7.1 Aviation

For each project alternative, direct impacts (both adverse and beneficial) on aviation are discussed under three aviation categories and related subcategories, as follows:

- Ketchikan International Airport, including airport property and facilities, airport access and circulation, and Part 77 airspace
- Floatplane Facilities and Operations
- Helicopter Facilities and Operations

Parts of this discussion of impacts on aviation are based on the project report on aviation impacts, *Airport and Floatplane Facilities and Operational Effects*.[4]

The following figures are relevant to this Section 4.7.1:

- Figures 2.5 through 2.11, and 2.17 through 2.19 (depictions of alignments of each project alternative)
- Figure 2.4—Ketchikan International Airport: Circulation and Parking (for build alternatives)
- Figure 3.10—Aviation Transportation Facilities
- Figure 3.11—Ketchikan International Airport: Existing Conditions

4.7.1.1 No Action Alternative

Ketchikan International Airport

The No Action Alternative would have no adverse impact on airport property; existing airport facilities; or Part 77 airspace in the vicinity of Ketchikan International Airport. This alternative would not improve access to or circulation around Ketchikan International Airport. Existing problems associated with convenience and reliability of access for passengers, airport tenants, emergency personnel and equipment, congestion around the airport terminal, and shipment of freight would continue.

Floatplane Facilities and Operations

The No Action Alternative would not affect existing floatplane facilities or operations.

Helicopters Operations and Facilities

The No Action Alternative would not affect helicopter operations or facilities.

4.7.1.2 Alternatives C3(a), C3(b), C4, and D1

Ketchikan International Airport

These alternatives would enhance access to Ketchikan International Airport by providing a hard link (bridge) from Ketchikan. Alternatives C3(a), C3(b), C4, and D1 include access and circulation roadways to and around the airport on Gravina Island. These would have no adverse impacts on airport facilities as they have been specifically laid out to avoid impacts on any facilities currently in use at the airport.

The existing parking and circulation system in the immediate vicinity of the terminal area would be modified to accommodate access from the bridges associated with Alternatives C3(a), C3(b), C4, and D1. Specifically, the access and circulation of vehicles and pedestrian traffic would be modified in front of the existing terminal area to accommodate entrance and exit ramps to the

[4] DOT&PF, *Gravina Access Project, Airport and Floatplane Facilities and Operational Effects*, prepared by HDR Alaska, December 2001.

bridge. The terminal area would continue to have space available for short-term parking and a drop-off lane. Increased long-term parking demand would be relocated to a parking structure that is an element of the airport master plan (see Section 4.26 Secondary Impacts).

Alternative C3(a)

Alternative C3(a) would penetrate the horizontal surface of the Part 77 airspace by 21 feet and the transitional surface by 37 feet. According to the FAA preliminary analysis of this alternative, these penetrations would not affect current landing procedures for the airport under instrument flight rules (IFR).[5] The proposed bridge would be lighted and marked in accordance with FAA regulations and advisory circulars to mitigate the effects of the airspace penetration on aviation operations.

Alternative C3(b)

This alternative does not penetrate airspace surfaces, and would have no adverse effect on approaches or departures from Ketchikan International Airport.[6] Although the Alternative C3(b) bridge would not penetrate Part 77 airspace, marking and lighting on the bridge would still conform to FAA regulations and advisory circulars.

Alternative C4

Alternative C4 would penetrate the horizontal surface of Part 77 airspace by 36 feet and the transitional surface by 64 feet;[7] however, these penetrations are not expected to affect current instrument approach procedures for Ketchikan International Airport. Alternative C4 would have no direct adverse effect on standard Ketchikan International Airport approach and departure procedures for wheeled aircraft. The proposed bridge would be lighted and marked in accordance with FAA regulations and advisory circulars to mitigate the effects of the airspace penetration on aviation operations.

Alternative D1

This alternative does not penetrate airspace surfaces, and would have no adverse effect on approaches or departures from Ketchikan International Airport.[8] Although the Alternative D1 bridge would not penetrate Part 77 airspace, marking and lighting on the bridge would still conform to FAA regulations and advisory circulars.

Floatplane Facilities and Operations

Alternatives C3(a), C3(b), C4, and D1 would have a direct adverse impact on floatplane operations, as the bridge would present a new obstruction in Ketchikan Class E airspace (i.e., the restricted airspace around Ketchikan and Tongass Narrows) and would further complicate floatplane operations within airspace that is currently congested.

[5] Tony Wylie, Alaska Region Air Traffic Division, letter to Roger Healy, DOT&PF Project Manager, July 22, 2002.

[6] Ibid.

[7] Ibid.

[8] Ibid.

Section 3.7.1.4 describes the visual flight rules in effect for Ketchikan, including the SVFR airspace. Adverse impacts to floatplane operations would occur during those periods of inclement weather that require SVFR and Exemption No. 4760 operations. According to a preliminary analysis and recommendation by the FAA Juneau Flight Standards District Office, these alternatives "…would hinder aircraft flying inbound from the west to Ketchikan Harbor."[9] This analysis further states that the proposed bridges would, at a minimum, require modification of the boundaries of Exemption 4760 "…to exclude any airspace west of the airport. This would greatly reduce the effectiveness of Exemption 4760, to the point that less than 10 percent of the current operations conducted under Exemption 4760 would still be allowed." Assuming approximately 2,000 SVFR operations per year (see description of SVFR operations in Section 3.7.1.4), the Alternatives C3(a), C3(b), C4, and D1 bridges would eliminate approximately 1,800 flights per year, or approximately 1.7 percent of the total number of floatplane operations in Ketchikan.

Thus, Alternatives C3(a), C3(b), C4, and D1 would have an adverse impact on floatplane operations in the form of operational delays due to changes in operating requirements.[10] The FAA would evaluate, through a process separate from this EIS, the need to adjust or eliminate the minimum altitudes allowed under SVFR and/or Exemption No. 4760 as a result of Alternatives C3(a), C3(b), C4, or D1. Proper lighting and marking of the bridge structure would reduce the risk of floatplanes colliding with the bridge.

Alternatives C3(a), C3(b), C4, and D1 would have no direct adverse impacts on the existing floatplane facilities at Ketchikan Harbor Floatplane Base, Murphy's Pullout Floatplane Base, or other private facilities.

Alternative D1 would have no impact on the existing floatplane base at Ketchikan International Airport; however, the alignment of Alternative C3(a), C3(b), and C4 would be very close to these facilities. Under Alternatives C3(a), C3(b), and C4, a bridge pier would be located approximately 100 feet from the western end of the main floatplane dock, and would be centered along the primary floatplane taxi lane into and out of the turning basin. Another bridge pier would be located on the shoreline directly adjacent to the ramp to the transient floatplane dock. For Alternatives C3(a) and C4, the bridge height at this location would be approximately 100 feet above mean sea level, which would allow sufficient clearance for continued operation of the base but would adversely affect existing floatplane taxiing and turning patterns at the dock. For Alternative C3(b), the bridge height at this location would be approximately 10 feet above mean sea level, which would adversely affect continued operation of the facility.

Because of the proximity of bridge piers associated with Alternatives C3(a), C3(b), and C4 to the airport floatplane facilities, the ramp and dock would likely need to be relocated, at least during construction, and could require permanent relocation. Another option would be to keep the transient dock in place and provide access to it through a parking structure. Under such a scenario, the parking structure would be located on the road and ramp area currently used to access the transient float. Access to the ramp could be maintained from the bottom floor of the parking structure on a ramp of similar construction as currently exists. Development of a parking structure is dependent upon future traffic conditions, which are discussed in Section 4.26, Secondary Impacts. The

[9] Mick Green, Flight Standards District, Juneau, letter to John Schommer, FAA Flight Obstruction Specialist, July 15, 2002.

[10] DOT&PF, *Gravina Access Project Special Visual Flight Rules Analysis* prepared by HDR, December 2001.

need to temporarily or permanently relocate the airport floatplane facilities would be determined during final design of the selected alternative. Any relocation effort would be done in coordination with floatplane operators and would be planned to minimize disruption of operations.

Alternatives C3(a), C3(b), and C4 would also have a direct adverse impact on the waterway designated for take-offs and landings from the airport floatplane base (the NWW-SEE Waterway). Any of these bridges would transect the southern portion of the waterway and might require shortening the waterway from its current 9,500-foot length, or shifting the waterway to the north. Such a bridge would affect floatplane operations in that pilots would have to fly over the bridge or taxi under it. Alternative D1 would have no impact on this waterway facility.

Helicopter Operations and Facilities

Alternative C3(a), C3(b), C4, or D1 would have no effects on helicopter operations or facilities.

4.7.1.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Ketchikan International Airport

These alternatives would enhance access to Ketchikan International Airport by providing a hard link (bridge) from Ketchikan.

Alternatives F1 and F3 would cross Tongass Narrows approximately 3 miles south of the airport. Alternatives F1 and F3 include access and circulation roadways to and around the airport on Gravina Island. These would have no adverse impacts on airport facilities as they have been specifically laid out to avoid impacts on any facilities currently in use at the airport.

The proposed bridges do not penetrate any airspace surfaces and would have no effect on approaches or departures from Ketchikan International Airport.[11] Although the two bridges of Alternatives F1 and F3 would not penetrate Part 77 airspace, marking and lighting on the bridge would still conform to FAA regulations and advisory circulars.

Floatplane Facilities and Operations

Alternatives F1 and F3 would have no adverse effect on floatplane facilities in the Ketchikan area.

The two bridges of Alternatives F1 and F3 would adversely affect floatplane operations because pilots would have to fly over a bridge or taxi under it when traversing the East and West Channels. Proper lighting and marking of the bridge structures would help minimize the risk to floatplanes of collision with the bridge.

Section 3.7.1.4 describes the visual flight rules in effect for Ketchikan, including the SVFR airspace. None of the bridges proposed under these alternatives would be within the boundaries of the Exemption 4760 airspace. Nonetheless, according to preliminary analysis by the FAA, the bridge locations are sufficiently close to the Exemption 4760 airspace **to**

[11] Ibid.

potentially reduce the number of float plane operations such that the exemption might require adjustment.[12] The direct effect on SVFR operations under Exemption 4760 would be, however, less severe under Alternatives F1 and F3 than under Alternatives C3(a), C3(b), C4, and D1. According to FAA, Alternative F3 would be favorable over Alternative F1 with respect to floatplane operations because Alternative F3 offers a lower bridge in East Channel and aircraft are typically lower in East Channel; "a high bridge in East Channel would create a hazard for floatplanes during all operations, VFR or SVFR."[13]

Based on conversations with FAA, DOT&PF assumes in this analysis that, with Alternative F1 or F3 in place, there would be a 10 percent or 5 percent reduction in SVFR operations, respectively[14]. Assuming approximately 2,000 SVFR operations per year (see description of SVFR operations in Section 3.7.1.4), Alternatives F1 and F3 would eliminate approximately 200 and 100 flights per year, respectively; or less than 0.002 percent of the total number of floatplane operations in Ketchikan.

Helicopters Operations and Facilities

Neither Alternative F1 nor Alternative F3 would affect helicopter operations or facilities.

4.7.1.4 Alternative G2

Ketchikan International Airport

The Gravina Island terminus of Alternative G2 is approximately 2 miles north of the airport. Alternative G2 includes access and circulation roadways to and around the airport on Gravina Island. These would have no adverse impacts on airport facilities as they have been specifically laid out to avoid impacts on any facilities currently in use at the airport.

Alternative G2 would have no impact on Part 77 airspace or aviation operations at the airport.

Floatplane Facilities and Operations

Alternative G2 would have no effect on SVFR operations under Exemption 4760. Alternative G2 would introduce ferry vessel traffic across the northern end of the NWW-SEE Waterway used for floatplane operations, affecting a relatively small portion of the waterway. This would directly adversely affect floatplanes using that portion of the waterway for take-offs and landings. Alternative G2 would affect no other floatplane facilities. The FAA might deem it necessary to formally shift the boundaries of the NWW-SEE Waterway slightly to the south to lessen or eliminate any impacts on floatplane take-offs and landings. This would be an impact to FAA. Alternatively, floatplane operations would have to avoid that portion of the waterway affected by Alternative G2.

[12] Ibid.

[13] Green, July 15, 2002.

[14] Based on input from FAA, DOT&PF evaluated the number of SVFR operations per year, the percentage of hours for SVFR conditions, and the number of flights that were time-sensitive, in order to determine that there would be a 10% reduction in SVFR operations resulting from F1 and a 5% reduction resulting from F3. DOT&PF considers this a conservative estimate on which to assess the impacts of the project. FAA will likely make a final determination on changes to the Exemption 4760 through a public review and hearing process if one of the Gravina Access Project alternatives is constructed.

Helicopters Operations and Facilities

Alternative G2 would have no impact on helicopter operations or facilities.

4.7.1.5 Alternative G3

Ketchikan International Airport

The Gravina Island terminus of Alternative G3 is approximately 0.6 mile south of the airport. Alternative G3 includes access and circulation roadways to and around the airport on Gravina Island. These would have no adverse impacts on airport facilities as they have been specifically laid out to avoid impacts on any facilities currently in use at the airport. Alternative G3 would not impact air space or aviation operations at the airport.

Floatplane Facilities and Operations

Alternative G3 would have no effect on SVFR operations under Exemption 4760. Alternative G3 would have no impact on floatplane facilities. This alternative would introduce ferry vessel traffic across the northern portion of the NW-SE Waterway, and would have a direct adverse impact on floatplane take-offs and landings in that waterway; however, the portion of the waterway affected would be relatively small. Alternative G3 would affect no other floatplane facilities. The FAA might deem it necessary to shift the boundaries of the NW-SE Waterway slightly to the south to lessen or eliminate any impacts on floatplane take-offs and landings. This would be an impact to FAA. Alternatively, floatplane operations could avoid that portion of the waterway affected by Alternative G3.

Helicopters Operations and Facilities

Alternative G3 would have no impact on helicopter operations or facilities.

4.7.1.6 Alternative G4

Ketchikan International Airport

Alternative G4 would include development of a new ferry terminal adjacent to the existing terminal at Ketchikan International Airport. The alternative includes access and circulation roadways to and around the airport on Gravina Island. These would have no adverse impacts on airport facilities as they have been specifically laid out to avoid impacts on any facilities currently in use at the airport.

Alternative G4 would not affect air space or aviation operations at the airport.

Floatplane Facilities and Operations

This alternative would have no impact floatplane facilities or operations.

Helicopters Operations and Facilities

Alternative G4 would have no impact on helicopter operations or facilities.

4.7.2 Marine Transportation

This section describes the potential impacts on marine transportation. Considerable technical analyses have been completed to characterize the impacts of the Gravina Access Project alternatives on marine navigation. The technical reports detailing these analyses are provided in the following appendices to this EIS:

- Appendix E *Wind Climatology Technical Memorandum* presents joint probability wind speed and direction tables, an annual extreme value distribution with return periods, and monthly and annual wind statistics for the Ketchikan, Alaska area.
- Appendix F *Consequences of Various Channel Closures to Large Shipping* summarizes the consequences of closing East Channel and, alternatively, closing the north branch of Tongass Narrows to large vessels calling at Ketchikan.
- Appendix G *Reconnaissance of Vessel Navigation Requirements* provides a detailed analysis of the navigational requirements associated with each of the alternatives.
- Appendix H *Monte Carlo Navigation Simulation Technical Memorandum* and *Supplemental Monte Carlo Navigation Simulation Technical Memorandum* describes the fast-time maneuvering simulation study of large cruise ships and Alaska ferries transiting Tongass Narrows under the alternative bridge sites of the Gravina Access Project.
- Appendix I *RTM STAR Center Report* provides the results of real-time simulations of navigation in Tongass Narrows with the project alternatives.
- Appendix J *Real Time Navigation Simulation Study (STAR Center) Technical Memorandum* is The Glosten Associates' analysis of the RTM STAR Center full-mission real-time simulation study.
- Appendix K *Effects on Cruise Ship Operations* explains the possible direct effects of project alternatives on the cruise ship industry and the indirect effects of those alternatives on the cruise lines and the Ketchikan community.

None of the appendices related to navigational safety has been revised since the issuance of the Draft EIS. A minor design modification was made to Alternative F1. See Section 4.7.2.4 for a complete description of the design modification to Alternative F1 and the implications for navigational safety. Alternative F3 has been changed to include a commitment from DOT&PF to widen West Channel. See Section 2.1.2.6 for a complete description of Alternative F3 and Section 4.7.2.5 for the implications for navigational safety.

With respect to cruise ships as an element of marine navigation, this section presents the direct impacts of the project alternatives (i.e., how alternatives affect cruise ship access to Ketchikan, mobility within Tongass Narrows, and durations of travel and port calls). The secondary impacts of changes in cruise ship traffic and navigation are presented in Section 4.26.4. Impacts related to cruise ship emissions are addressed in Section 4.10, Air Quality.

4.7.2.1 No Action Alternative

Cruise Ships

The No Action Alternative would have no impact on cruise ship operations or the Ketchikan docking and berthing areas and facilities used by the cruise ships. No new infrastructure or marine operations would be introduced to the project area.

Alaska Marine Highway System Ferry

The No Action Alternative would have no impact on AMHS ferry services or facilities.

Airport Ferry

The No Action Alternative would have no impact on the existing airport ferry service or facilities.

Tugs and Barges

The No Action Alternative would have no impact on tug and barge traffic in Tongass Narrows.

USCG Facilities and Operations and NOAA Vessels

The No Action Alternative would have no impact on the USCG Station or USCG operations. NOAA vessels would not be affected by this alternative.

Small Boats and Other Watercraft

The No Action Alternative would have no impact on the facilities for or the use of small boats, kayaks, or other watercraft in Tongass Narrows.

4.7.2.2 Alternatives C3(a) and C4

Cruise Ships

The bridges associated with Alternatives C3(a) and C4 would have navigational clearances of 200 feet (vertical) and 550 feet (horizontal), which would accommodate the passage of all ships currently transiting Tongass Narrows and those ships expected to be transiting Tongass Narrows in the foreseeable future. All cruise ships currently sailing in Alaska, as well as ships anticipated in the foreseeable future, would be able to pass under the Alternatives C3(a) and C4 bridges and through Tongass Narrows. The introduction of piers in the deep navigable waters of Tongass Narrows would introduce new, permanent, grounding and allision[15] risks[16] and increase the imperative for the existing custom and practice of one-way traffic for large vessels operating in Tongass Narrows.

[15] An allision is defined as a moving object colliding with a stationary object (e.g., a ship colliding with a bridge pier).

[16] DOT&PF, *Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum*, prepared by The Glosten Associates, January 2002.

There is no generally recognized and accepted standard for assessing the probability of ship allisions or groundings.[17] The analysis presented in the Monte Carlo maneuvering simulation study (Appendix H) provides a good basis for evaluating the probable safety of the proposed horizontal clearances for Alternatives C3(a) and C4[18]. The Monte Carlo study used the risk associated with current operations in Tongass Narrows as the basis for assessing the statistical risks associated with the proposed new bridges. The study evaluated the risks for single, maximum-width cross-sections, i.e., the area of greatest constriction. For Alternatives C3(a) and C4, a bridge with an effective horizontal clearance of 550 feet presents a theoretical passage hazard 3.97 times greater than the existing operations passage near Charcoal Point (maximum width 687 feet). Note that this comparison is for individual constrictions. The risk associated with multiple constrictions in the channel was not modeled.

AMHS Ferry

Alternatives C3(a) and C4 would have no impact on AMHS ferry facilities or operations. The vertical clearances of these bridges would be significantly higher than is required for AMHS ferries. The introduction of piers in the deep navigable waters of Tongass Narrows would introduce new, permanent, grounding and allision risks;[19] however, the horizontal spans are substantially wider than the other navigational clearances on the AMHS system routes (e.g., Wrangell Narrows).

Airport Ferry

Airport ferry service would be discontinued under Alternatives C3(a) and C4, thereby reducing overall marine operations crossing Tongass Narrows, but not adversely affecting the access to Gravina Island currently provided by the ferry. The reduction in cross-pattern marine operations will increase the safety of ongoing long-channel transits of Tongass Narrows.

Tugs and Barges

The vertical and horizontal clearances of Alternatives C3(a) and C4 would be sufficient to accommodate tug and barge traffic in Tongass Narrows, and would not affect tug and barge operations. The introduction of piers in the deep navigable waters of Tongass Narrows would introduce new, permanent, grounding and allision risks.[20]

USCG Facilities and Operations and NOAA Vessels

Alternatives C3(a) and C4 would not affect USCG facilities, as the alternative alignments would be substantially north of the USCG facilities. Nor would the bridge affect USCG operations in Tongass Narrows. NOAA vessels would not be affected by this alternative.

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[17] DOT&PF, *Gravina Access Project Supplemental Monte Carlo Navigation Simulation Technical Memorandum*, prepared by The Glosten Associates, July 2003.

[18] It is important to note that the real-time STAR Center simulations upheld the Monte Carlo fast-time simulations. See Appendix J *Real Time Navigation Simulation Study (STAR Center) Technical Memorandum* (DOT&PF 2002), p. 47.

[19] DOT&PF, *Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum*, prepared by The Glosten Associates, January 2002.

[20] Ibid.

Small Boats and Other Watercraft

Alternatives C3(a) and C4 would have no impact on the facilities for or the use of small boats, kayaks, or other watercraft in Tongass Narrows.

4.7.2.3 Alternatives C3(b) and D1

Cruise Ships

The height of the Alternative C3(b) and Alternative D1 bridges (120 feet) would preclude passage of large cruise ships, which would constrain the direction of their approach to the cruise ship dock in Ketchikan. This would have an adverse impact on the routes and travel times of cruise ships that currently pass through Tongass Narrows. Cruise ships would be required to approach the dock from the south only, whereas they currently can approach from (and depart to) either the north or south; for departure, the ships would be required to turn around and depart to the south. These approach and departure directions would be required regardless of a ship's ultimate direction of travel.

The majority of cruise ships that currently call at Ketchikan either arrive from or depart to the north. A 120-foot-high bridge would require northbound large cruise ships leaving the Port of Ketchikan to sail south of Gravina Island (through Nichols Passage) and around the western side of Gravina Island. Southbound vessels would enter Tongass Narrows from the south via Nichols Passage and then depart Ketchikan in the same fashion as today. The typical increase in route distance would be 30.5 nautical miles.[21] Because the Port of Ketchikan would become effectively a one-way in and out for vessels over 120 feet, an additional turning movement would be required either when approaching the dock or after departure. The direct effects on the cruise ship operations would be expending extra fuel and sailing time, and changing the arrival and departure schedules. As a result, cruise ship operators could reduce port time in Ketchikan or possibly by-pass Ketchikan altogether.

Table 4-4 illustrates the additional transit time required under Alternative C3(b) and Alternative D1 to navigate around Gravina Island on northbound and southbound voyages. The analysis that produced these figures (i.e., *Gravina Access Project Effects on Cruise Ship Operations*; provided as Appendix K) assumed that large cruise ships use their maximum cruising speed between Ketchikan and Juneau (this speed may be greater than that associated with their current schedules). Alternatives C3(b) and D1 would require 41 additional minutes of transit time for northbound voyages and 60 minutes of additional time for southbound voyages. These numbers were derived from mean transit speeds between Juneau and Ketchikan based on 2001 cruise ship data and the achievable schedule at maximum cruising speed. The additional transit time accounts for the needed turn upon arrival or just after departure to ensure the vessel is oriented south, and includes 15 minutes that must be allowed for casting off and getting underway, and 15 minutes for maneuvering to the berth and making fast.

[21] DOT&PF, *Gravina Access Project Marine Navigation Conditions Summary Technical Memorandum*, prepared by The Glosten Associates, October 1999.

TABLE 4-4
ANALYSIS OF SAILING TIME BETWEEN JUNEAU AND KETCHIKAN USING MAXIMUM CRUISING SPEED FOR ALTERNATIVES C3(b) AND D1

2001 Cruise Season	*Baseline Hours between Ketchikan/Juneau*	*Average Hours at Max Cruise (knots)*	*Average Time Lost (minutes)*
Ketchikan to Juneau – 95 trips	16.56	17.23	41
Juneau to Ketchikan – 94 trips	16.49	17.48	60

Source: Running Time and Other Impacts on Large Cruise Ships, Fax Memo to HDR Alaska, Inc., Glosten Associates, August 28, 2001

Additional transit time would, in turn, reduce the length of port calls and usable port times for cruise ships. Estimates of reduced port call durations for Alternatives C3(b) and D1 are presented in Table 4-5.

TABLE 4-5
ESTIMATED NEW PORT CALL LENGTH – NORTHBOUND (NB) AND SOUTHBOUND (SB) VOYAGES FOR ALTERNATIVES C3(b) AND D1

			NB	*NB*	*SB*	*SB*
Length of Port Call in 2001	*Number of NB Port Calls*	*Number of SB Port Calls*	*New Length of Port Call*	*Usable Port Time*	*New Length of Port Call*	*Usable Port Time*
6.5 hours or less	1	22	<5.8 hours	<4.3 hours	<5.5 hours	<4.0 hours
6.6 to 7.5 hours	5	79	<6.8 hours	<5.3 hours	<6.5 hours	<5.0 hours
7.6 to 8.5 hours	56	80	<7.8 hours	<6.3 hours	<7.5 hours	<6.0 hours
8.6 to 9.5 hours	25	86	<8.8 hours	<7.3 hours	<8.5 hours	<7.0 hours
9.6 hours or longer	9	14	9 to 10 hours	8 to 9 hours	9 to 10 hours	8 to 9 hours

Source: DOT&PF, Gravina Access Project Effects on Cruise Ship Operations prepared by Northern Economics and Klugherz & Associates, May 2003.

The operational and itinerary changes described above are estimated to reduce the number of port calls by two percent for large cruise ships; i.e., based on 2001 cruise ship traffic, there would be eight fewer port calls by large cruise ships in Ketchikan for Alternatives C3(b) and D1 (see Appendix K).[22] These effects would have adverse secondary economic effects on cruise ship lines, Ketchikan businesses that rely on the patronage of cruise ship passengers, and local government. The potential secondary economic impacts of changes in cruise ship operations are detailed in Section 4.26.3.4 (Secondary Impacts).

AMHS Ferry

A bridge having a vertical clearance of 120 feet would be high enough to accommodate passage of the AMHS ferries, and would not adversely impact existing AMHS ferry operations or facilities in Ketchikan. The introduction of piers in the deep navigable waters of Tongass Narrows would introduce new, permanent, grounding and allision risks[23] however; the horizontal spans are substantially wider than the other navigational clearances in the AMHS system routes (e.g., Wrangell Narrows).

[22] This assumes a mid-range growth rate for cruise ship traffic to and from Ketchikan.

[23] DOT&PF, *Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum*, prepared by The Glosten Associates, January 2002

Airport Ferry

Airport ferry service would be discontinued under these bridge alternatives, thereby reducing overall marine operations crossing Tongass Narrows. The reduction in cross-pattern marine operations will increase the safety of ongoing long-channel transits of Tongass Narrows.

Tugs and Barges

The vertical and horizontal clearances of Alternatives C3(b) and D1 would be sufficient to accommodate tug and barge traffic in Tongass Narrows, and would not affect tug and barge operations.

USCG Facilities and Operations and NOAA Vessels

Alternatives C3(b) and D1 would have no impact on the USCG facilities or operations. NOAA vessels would not be affected by these alternatives.

Small Boats and Other Watercraft

Alternatives C3(b) and D1 would have no impact on the facilities for or the use of small boats, kayaks, or other watercraft in Tongass Narrows.

4.7.2.4 Alternative F1 (DOT&PF and FHWA Preferred)

Cruise Ships

Cruise ships use East Channel almost exclusively, and the 200-foot vertical clearance of the East Channel bridge would allow passage of large cruise ships. **The West Channel bridge would be high enough to pass Alaska Marine Highway ferry vessels but not high enough to pass cruise ships. Because cruise ships rarely use West Channel, this principally affects a theoretical option and is not expected to alter cruise ship or other vessel use patterns and instead would preserve the status quo.** The introduction of bridge piers in the deep navigable waters of East Channel would introduce an incremental increase in grounding and allision risks at those locations.[24] In addition, when considered with the fact that navigation of East Channel currently involves passage through a constriction of the channel created by California and Idaho Rocks (approximate navigational clearance [width] of 477 feet), the placement of bridge piers in East Channel would add a second point of constriction in the channel by narrowing the channel width from approximately 1,100 feet to 550 feet. This second point of constriction would limit maneuvering opportunities in East Channel and the potential for groundings and allisions at other locations within East Channel would increase.

Numeric models and simulation studies were conducted for the original alignment of Alternative F1 (as it was presented in the Draft EIS) to determine its effects on navigational safety in Tongass Narrows. The analysis presented in the Monte Carlo maneuvering simulation study (Appendix H) indicates that the existing risk associated with East Channel passage between Idaho and California Rocks (maximum width equals 477 feet; see Figure 3.12), under current operations, is 8.66 times more hazardous than the passage near Charcoal Point (maximum width equals 687 feet). The theoretical risk

[24] Ibid.

associated with the introduction of the Alternative F1 East Channel bridge with bridge piers 550 feet apart is 4.03 times more hazardous than the existing passage near Charcoal Point. The Alternative F1 bridge over West Channel would not be high enough to pass large cruise ships and was not modeled. Note that these comparisons are for individual constrictions. The risk associated with multiple constrictions in the channel was not modeled.

Marine pilots expressed concern over the bridges' angled crossings of East and West Channels (i.e., the original alignment of Alternative F1, as presented in the Draft EIS). Discussions of these safety concerns are detailed in "Ketchikan Bridge Project, Port of Ketchikan, Alaska, Tongass Narrows, Summary Report," prepared by RTM STAR Center in Dania, Florida (see Appendix I). With the bridge crossing the main channel at an angle, the bridge piers are closer to the main channel than they would be if the bridge were perpendicular to the main channel, thus increasing the risk of allisions. Cruise ship pilots would likely alter their approach to the bridge to create a track line that is more perpendicular to the bridge.

Based on input from the marine pilots, DOT&PF made minor design modifications to the alignment of Alternative F1 to orient the bridge crossings of East and West Channels perpendicular to the main navigational channels (see Section 2.1.2.5). While the bridges associated with Alternative F1 presented in this Final EIS would likely be safer from a navigation standpoint than the alignment of Alternative F1 presented in the Draft EIS, the degree to which navigational safety would improve could not be measured by the numeric models and simulation studies used to evaluate navigation impacts in the Draft EIS; therefore, no additional modeling was done for Alternative F1 for this Final EIS.

Although the risk of allisions would increase with the presence of bridges over East and West Channels, Alternative F1 would not result in a reduction of cruise ship port calls in Ketchikan.

AMHS Ferry

AMHS ferries usually use West Channel to avoid cruise ship traffic and because there is less adjacent shoreline development and, thus, less need to slow down to control their wakes. The West Channel span of Alternative F1 would be 120 feet high, which would allow passage of the AMHS ferries and, thus, their continued use of West Channel. The introduction of piers in the deep navigable waters of Tongass Narrows would introduce new, permanent, grounding and allision risks[25] however; the horizontal spans are substantially wider than the other navigational clearances in the AMHS system routes (e.g., Wrangell Narrows).

Airport Ferry

Airport ferry service would be discontinued under the bridge alternatives, thereby reducing overall marine operations crossing Tongass Narrows. The reduction in cross-pattern marine operations will increase the safety of ongoing long-channel transits of Tongass Narrows.

[25] Ibid.

Tugs and Barges

The vertical and horizontal clearances of Alternative F1 would be sufficient to accommodate tug and barge traffic in Tongass Narrows, and would not impact tug and barge operations.

USCG Facilities and Operations and NOAA Vessels

Alternative F1 would pass to the south of the USCG facilities south of Ketchikan, but would not affect those facilities or USCG operations. NOAA vessels would not be affected by this alternative.

Small Boats and Other Watercraft

Alternative F1 would have no impact on the facilities for or the use of small boats, kayaks, or other watercraft in Tongass Narrows.

4.7.2.5 Alternative F3

Cruise Ships

Alternative F3 includes a low (60-foot vertical clearance) bridge over East Channel, and a higher bridge (200-foot clearance) over West Channel. The Alternative F3 bridges would be south of the Ketchikan cruise ship dock. This alternative would require cruise ships calling at Ketchikan to use West Channel or enter and exit Tongass Narrows from the north. Either option would have an adverse impact on cruise ship operations because it would require additional maneuvering and increased sailing time (and therefore a possible decrease in port time).

Use of West Channel by large cruise ships adds approximately 1.8 nautical miles to the running distance, adding approximately 3 minutes to total cruise ship run-times for southbound voyages, and 18 minutes to northbound voyages (Table 4-6). This would consume more fuel, thus increasing fuel costs (see Section 4.26.4). In addition, cruise ships would have to execute the equivalent of two 180-degree turns that are not required under existing conditions. The two 180-degree turns would presumably be executed on that section of the voyage that is least time critical, or the maneuvers may be split between the northern and southern segments of the Ketchikan port call. Overall, this is estimated to add 30 to 40 minutes to the ships' harbor maneuvers. **It is anticipated that cruise lines will make up the additional transit time needed to utilize West Channel by using faster running speeds between Ketchikan and Juneau; therefore, no reduction in port time is expected** (see Appendix K). The potential economic effects of changes in cruise ship operations are discussed in Section 4.26.3 (Secondary Impacts).

TABLE 4-6
ANALYSIS OF SAILING TIME BETWEEN JUNEAU AND KETCHIKAN FOR ALTERNATIVE F3 – PENNOCK ISLAND CROSSING

2001 Cruise Season	*Baseline Hours between Ketchikan/Juneau*	*Average Hours at Max Cruise (knots)*	*Average Time Lost (minutes)*
Ketchikan to Juneau – 95 trips	16.56	16.60	3
Juneau to Ketchikan – 94 trips	16.49	16.79	18

Source: Running Time and Other Impacts on Large Cruise Ships, Fax Memo to HDR Alaska, Inc., Glosten Associates, August 28, 2001.

Prior to DOT&PF's commitment to widen West Channel (see Section 2.1.2.6), cruise ship lines and ship pilots identified safety concerns associated with navigating West Channel. Discussions of these safety concerns are detailed in "Ketchikan Bridge Project, Port of Ketchikan, Alaska, Tongass Narrows, Summary Report," prepared by RTM STAR Center in Dania, Florida (see Appendix I). The RTM STAR Center study included full-mission computer generated simulation of large cruise ships maneuvering into and out of Ketchikan. As presented in the report, Ketchikan cruise ship pilots commented that West Channel with the Alternative F3 bridge **(and without channel modification)** is too narrow to safely navigate large ships. The primary issue the pilots identified was that there would be no margin for error at the bridge; e.g., a gust of wind, an engineering casualty, an error in responding to helm commands, or opposing traffic, would allow very little time (or space) to react and take sufficient evasive action. Other issues identified by the pilots included risks associated with a tidal current set toward Pennock Island, bank suction effects at the bridge site, maintaining vessel control in following winds and currents by increasing speed above the existing speed limit, and the need to execute a 120-degree turn around Pennock Reef, especially when the harbor has other maneuvering vessels and vessels at anchor.

In response to these safety concerns, DOT&PF investigated modifying West Channel to improve navigation. The analysis presented in the supplement to the Monte Carlo maneuvering simulation study (Appendix H) indicates that widening West Channel to 750 feet would improve navigational safety in the channel. According to the analysis, navigation through the widened West Channel under the Alternative F3 bridge would be 62 percent safer than existing navigation through East Channel. [Note that these comparisons are for individual constrictions. The risk associated with multiple constrictions in the channel was not modeled. The bridge over East Channel would not be high enough to pass large cruise ships and was not modeled.] Based on this analysis and in response to safety concerns expressed by marine pilots, DOT&PF decided to include channel modification as part of Alternative F3 (see Section 2.1.2.6 for a complete description of Alternative F3 and the associated channel modification). With channel modification, it is anticipated that there would be no reduction in port calls in Ketchikan under Alternative F3.

Marine pilots also expressed concern over the bridges' angled crossings of East and West Channels (see Appendix I). With the bridge crossing the main channel at an angle, the bridge piers are closer to the main channel than they would be if the bridge were perpendicular to the main channel, thus increasing the risk of allisions. Cruise ship pilots would likely alter their approach to the bridge to create a track line that is more perpendicular to the bridge.

Mitigation of Impacts to Cruise Ships from Alternative F3. Project engineers investigated the possibility of realigning the Alternative F3 bridges so that they would cross perpendicular to East and West Channels also to reduce the risk of allisions. If Alternative F3 were selected, DOT&PF would further investigate the possibility of realigning the bridges and evaluate the potential environmental impacts associated with the realignment.

AMHS Ferry

As noted above, AMHS ferries usually use West Channel, and the high span over West Channel would allow continued use by the AMHS ferries. The AMHS ferries would not be able to transit East Channel. With cruise ships required to use West Channel as well, marine traffic

in West Channel would increase. The current separation of AMHS traffic from cruise ship traffic by Pennock Island would cease. The added traffic could adversely affect AMHS ferry operations due to congested conditions in West Channel. In addition, the introduction of piers in the deep navigable waters of Tongass Narrows would introduce new, permanent, grounding and allision risks.[26] However, the horizontal spans are substantially wider than the other navigational clearances in the AMHS system routes (e.g., Wrangell Narrows).

Airport Ferry

Airport ferry service would be discontinued under the bridge alternatives, thereby reducing overall marine operations crossing Tongass Narrows. The reduction in cross-channel marine operations will increase the safety of ongoing long-channel transits of Tongass Narrows.

Tugs and Barges

The vertical and horizontal clearances of Alternative F3 would be sufficient to accommodate most tug and barge traffic in Tongass Narrows. Barges have been known to transit Tongass Narrows with container stacks and cargo that require air drafts of 64 feet; however, this is the maximum air draft requirement and does not represent the majority of barges in Tongass Narrows. Since the East Channel bridge has a vertical clearance of 60 feet above high tide, tug masters could elect to wait for lower tides to navigate 64-foot high barges through East Channel rather than deciding to navigate these barges through West Channel. Barge operators may limit the height of their container stacks to avoid reliance on the tides or transits through West Channel. Therefore, operations of some barges may change as a result of Alternative F3.

USCG Facilities and Operations and NOAA Vessels

Alternative F3 would have no impact on USCG facilities; however, the 60-foot bridge over East Channel would adversely affect operations of USCG vessels with air drafts greater than 60 feet, including the USCG cutter *Acushnet*, which has an air draft of 100 feet. Such vessels would have to use a northern approach to and departure from the USCG pier, which would require additional turning maneuvers for the ship to navigate around Pennock Island.

The NOAA Ship *Fairweather* would not be able to use East Channel to reach its proposed mooring site south of the USCG pier. This would have an adverse impact on the proposed operations of this NOAA vessel because it would require additional turning maneuvers for the ship to navigate around Pennock Island when approaching from or departing to the south.

Small Boats and Other Watercraft

Alternative F3 would have no impact on the facilities for or the use of small boats, kayaks, or other watercraft in Tongass Narrows. Restriction of large vessel traffic to West Channel could increase safety for watercraft using East Channel exclusively.

[26] DOT&PF, *Gravina Access Project Monte Carlo Navigation Simulation Technical Memorandum*, prepared by The Glosten Associates, January 2002

4.7.2.6 Alternatives G2, G3, and G4

Cruise Ships

These alternatives would introduce a new lane of regular ferry travel across Tongass Narrows, which is also used by in- and out-bound cruise ships. However, given the regularity of the ferry schedules and the current general compatibility of ferry and cruise ship operations at the existing airport ferry location, Alternatives G2, G3, and G4 would not have adverse impacts on cruise ship operations. These alternatives are distant from the cruise ship dock in Ketchikan; the alternatives would not affect any cruise ship facilities.

AMHS Ferry

As with cruise ship operations and facilities, the AMHS ferry operations and facilities would not be affected by Alternatives G2, G3, or G4.

Airport Ferry

The existing airport ferry would continue operations from its current location. Alternatives G2, G3 and G4 would supplement this service, and would reduce crowding on the ferries during peak usage, providing a benefit for the ferry passengers.

Tugs and Barges

Given the regularity of ferry schedules and the current general compatibility of ferry services and other marine navigation traffic in Tongass Narrows, Alternatives G2, G3, and G4 would not have adverse effects on tug and barge traffic.

USCG Facilities and Operations and NOAA Vessels

Alternatives G2, G3, and G4 would not affect USCG facilities or operations. NOAA vessels would not be affected by this alternative.

Small Boats and Other Watercraft

Although the additional ferry service of Alternatives G2, G3, and G4 would introduce more marine traffic into Tongass Narrows at a new location, it would not adversely affect the facilities for or use of boats, kayaks, and other watercraft in Tongass Narrows.

4.7.3 Vehicles

The direct effects of the Gravina Access Project alternatives on vehicles include impacts related to construction and impacts related to new infrastructure that creates new traffic patterns. Construction related impacts are described in Section 4.25. Traffic projections based on growth induced by new access opportunities and the impacts of that traffic are secondary impacts and are described in Section 4.26.

The primary measure of direct impacts of the alternatives on vehicular travel (not related to construction) is based on how each alternative affects travel times to Ketchikan International Airport and developable land on Gravina Island from three key points of origin on Revillagigedo Island:

- The Ketchikan central business district (downtown)
- The U.S. Post Office at Ward Cove
- Carlanna Creek

Table 4-7 (Travel Distances and Estimated Vehicular Travel Times) presents the calculated travel times for each of the project alternatives. Analysis is based on a travel speed of 5 miles per hour (mph) below the posted speed limit. On this table, the travel times to the airport that are shorter than existing conditions are shown in boldface. Because vehicular access to developable land on Gravina Island is not possible under existing conditions or the No Action Alternative, there is no such comparison for travel time to developable lands. All of the build alternatives would have a beneficial impact on vehicular transportation because they provide access from Revillagigedo Island to developable lands on Gravina Island.

TABLE 4-7
TRAVEL DISTANCES AND ESTIMATED VEHICULAR TRAVEL TIMES

	Distance (miles) and Vehicular Travel Times (minutes)									
*Origin and Destination**	*Existing Conditions/ No Action*	*C3(a)*	*C3(b)*	*C4*	*D1*	*F1*	*F3*	*G2*	*G3*	*G4*
From Downtown	3.29	6.21	5.55	4.80	4.14	7.49	7.43	10.61	5.49	3.40
to Airport Terminal	27	14	12	11	11	13	13	42	35	25
From Ward Cove	5.04	5.49	4.83	6.61	4.48	14.77	14.71	8.12	9.70	5.15
to Airport Terminal	25	8	6	9	7	27	27	34	40	23
	Distance (miles) and Vehicular Travel Times (minutes)									
*Origin and Destination**	*Existing Conditions/ No Action*	*C3(a)*	*C3(b)*	*C4*	*D1*	*F1*	*F3*	*G2*	*G3*	*G4*
From Carlanna Creek	0.53	3.45	2.79	2.10	1.54	10.26	10.20	7.85	5.19	0.64
to Airport Terminal	19	6	4	3	3	21	21	34	34	17
From Downtown		8.72	8.71	7.31	6.65	4.01	3.95	5.86	2.44	6.31
to Developable Land		17	17	15	14	7	7	34	29	29
From Ward Cove		8.00	7.99	9.12	6.99	11.29	11.23	3.37	6.65	8.06
to Developable Land		11	11	13	10	21	21	26	34	27
From Carlanna Creek		5.96	5.95	4.61	4.05	6.78	6.72	3.10	2.14	3.55
to Developable Land		9	9	7	6	15	15	26	28	21

Boldface = Shorter Time Than Existing Condition

Ward Cove = Post Office at Ward Cove

Developable Land = Airport Development Zone on Gravina Island

* Downtown = Central Business District of Ketchikan, Milepost 0
Airport Terminal = Terminal of Ketchikan International Airport

4.7.3.1 No Action Alternative

Under the No Action Alternative, there would be no traffic improvements that would change vehicular access to Ketchikan International Airport or developable lands on Gravina Island. Vehicles would continue to use the existing airport ferry to access the airport and the travel time to the airport would be the same from any location in Ketchikan as under existing conditions. Vehicles would not be able to more conveniently access developable lands. However, use of trails would continue to provide access to other Borough and developable lands.

4.7.3.2 Alternatives C3(a), C3(b), C4 and D1

Alternatives C3(a), C3(b), C4, and D1 would have a beneficial impact on travel time from Ketchikan to the airport. These alternatives would also provide vehicular access to developable land on Gravina Island, which is a benefit associated with all of the build alternatives. Travel time to the airport would be shorter than under existing conditions, taking less than half the time from downtown Ketchikan, Ward Cove, and Carlanna Creek locations.

With Alternatives C3(a) and C3(b), access to developable lands on Gravina Island from downtown Ketchikan, Ward Cove, and Carlanna Creek locations would take 17, 11, and 9 minutes, respectively. The intersection of Signal Road and Tongass Avenue would be altered to accommodate either of these alternatives, resulting in a new traffic pattern at this intersection.

With Alternatives C4 and D1, access to developable lands Gravina Island from downtown Ketchikan, Ward Cove, and Carlanna Creek locations would all take less than 15 minutes. Both of these alternatives would require a new intersection with Tongass Avenue near Cambria Drive and the existing airport ferry terminal access point, resulting in a new traffic pattern in that area.

4.7.3.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Alternatives F1 and F3 would have beneficial impacts for travel from downtown Ketchikan to the airport, but would not reduce travel times from Carlanna Creek or Ward Cove. Travel time to the airport would be shorter than under existing conditions for vehicles originating in downtown Ketchikan and points south; however, vehicles originating in the Carlanna Creek area and points north of that would have slightly longer travel times (i.e., 2 minutes longer) than under existing conditions. Vehicle access to developable lands on Gravina Island would take 21 minutes from Ward Cove. Both of these alternatives would require a new intersection with Tongass Avenue south of downtown Ketchikan, resulting in a new traffic pattern in that area.

4.7.3.4 Alternative G2

Alternative G2 would have no impact on travel time to the airport because the existing airport ferry would still be operational. Travel time to the airport from downtown Ketchikan, Ward Cove, and Carlanna Creek would be longer using the Alternative G2 ferry rather than the existing airport ferry, which would continue to be operational under this alternative. Travel time to developable land on Gravina Island for vehicles originating in downtown Ketchikan, Carlanna Creek, and Ward Cove would be 34, 26, and 26 minutes, respectively. This alternative would require intersection improvements to the point of access for Peninsula Point from Tongass Avenue, resulting in a new traffic pattern in that area.

4.7.3.5 Alternative G3

Alternative G3 would have no impact on travel time to the airport because the existing airport ferry would still be operational. Travel time to the airport from downtown Ketchikan, Ward Cove, and Carlanna Creek would be longer using the G3 ferry rather than the existing airport ferry, which would continue to be operational under this alternative. Travel time to developable land on Gravina Island for vehicles originating in downtown Ketchikan, Carlanna Creek, and Ward Cove would be 29, 34, and 28 minutes, respectively. This alternative would require a new

intersection with Tongass Avenue near the Plaza Mall, resulting in a new traffic pattern in that area.

4.7.3.6 Alternative G4

Alternative G4 would have a beneficial effect on travel time to the airport. Travel time to the airport from downtown Ketchikan, Ward Cove, and Carlanna Creek would be shorter under this alternative because the wait time for ferry transit across Tongass Narrows would be shorter considering that twice as many ferries would be operating from the same location. Travel time to developable land on Gravina Island for vehicles originating in downtown Ketchikan, Carlanna Creek, and Ward Cove would be 29, 21, and 27 minutes, respectively. This alternative would require improvements to the ferry terminal access point and its intersection with Tongass Avenue, but would not substantially change the traffic pattern in that area.

4.7.3.7 Effects of Wind – All Alternatives

The effects of high winds and inclement weather on any crossing of Tongass Narrows can be considered a direct impact to vehicular transportation. The design of the bridge alternatives must accommodate the wind loading on the structure itself as well as the safety implications of vehicles, bicycles, and pedestrians crossing during inclement weather. Ferries are also affected by extreme weather conditions. The effects of wind, tide, or waves in Tongass Narrows could individually or in combination make the ferry crossing unsafe. It would be up to the master of the ferry to determine whether or not the ferry sailing would be delayed until conditions improve. Such instances have been rare with respect to current airport ferry operations.

The structural design of all bridge alternatives includes wind loadings as one of the design criteria. This design loading is normally based on tables using historic records of wind speed and direction at the bridge location. Because of the surrounding land shapes, the prevailing wind direction and speed, and the height, a bridge crossing Tongass Narrows would most probably need to be modeled in a wind tunnel to obtain accurate values of probable maximum design wind speed and resultant force on the bridge. This would be used for design to ensure safety of the structure.

In addition, the design wind speed and its frequency would be used to evaluate safety of operations for the traveling public crossing the bridge. Currently, there are some bridges that restrict travel (for example, using automated signs) when wind velocities reach some predetermined velocity. These restrictions may be invoked on certain types of high-profile vehicles, such as panel trucks, empty truck trailer combinations, or motor homes. Travel restrictions are undesirable; as an option, safety measures could be designed into the Tongass Narrows structure to avoid or minimize restrictions. These measures could include additional height barriers, or other types of wind-reducing appurtenances. If a bridge alternative were selected, the final combination of the Tongass Narrows bridge design and potential weather-induced travel restrictions would be determined with the cost, convenience, and ultimate safety of the traveling public in mind.

4.8 CONSIDERATIONS RELATING TO PEDESTRIANS AND BICYCLISTS

The No Action Alternative would have no impact on pedestrian and bicycle facilities. The build alternatives would benefit pedestrians and bicyclists by providing additional facilities. Existing bike paths and sidewalks on Tongass Avenue would not be disrupted and would be connected with the selected alternative.

Impacts on pedestrians and bicyclists are based on how each alternative affects travel time to Ketchikan International Airport and developable land on Gravina Island from three key points of origin on Revillagigedo Island: the Ketchikan central business district (downtown), the U.S. Post Office at Ward Cove, and Carlanna Creek. Analysis is based on a travel speed of 3 mph (4.4 feet per second) for pedestrians and 10 mph (14.7 feet per second) for bicyclists.

Table 4-8 (Travel Distances and Estimated Pedestrian Travel Times) and Table 4-9 (Travel Distances and Estimated Bicycle Travel Times) present the calculated travel times for each of the project alternatives. On these tables, the travel times to the airport that are shorter than the existing condition are shown in boldface. Because pedestrian and bicycle access to developable land on Gravina Island is not be possible in a specific pedestrian/bicycle corridor under existing conditions or the No Action Alternative, there is no such comparison for travel time to developable lands.

TABLE 4-8
TRAVEL DISTANCES AND ESTIMATED PEDESTRIAN TRAVEL TIMES

	Distance (miles) and Pedestrian Travel Times (minutes)									
*Origin and Destination**	*Existing Conditions/ No Action*	*C3(a)*	*C3(b)*	*C4*	*D1*	*F1*	*F3*	*G2*	*G3*	*G4*
From Downtown	3.29	6.21	5.55	4.80	4.14	7.49	7.43	10.61	5.49	3.40
to Airport Terminal	76	124	111	95	82	150	149	219	116	75
From Ward Cove	5.04	5.49	4.83	6.61	4.48	14.77	14.71	8.12	9.70	5.15
to Airport Terminal	111	109	96	132	90	295	294	169	201	110
From Carlanna Creek	0.53	3.45	2.79	2.10	1.54	10.26	10.20	7.85	5.19	0.64
to Airport Terminal	21	69	56	42	31	205	204	164	111	20
From Downtown		8.72	8.71	7.31	6.65	4.01	3.95	5.86	2.44	6.31
to Developable Land		174	174	145	132	80	79	123	54	133
From Ward Cove		8.00	7.99	9.12	6.99	11.29	11.23	3.37	6.65	8.06
to Developable Land		159	159	182	140	225	224	73	139	168
From Carlanna Creek		5.96	5.95	4.61	4.05	6.78	6.72	3.10	2.14	3.55
to Developable Land		119	119	92	81	135	134	68	49	78

Boldface = Shorter Time Than Existing Condition

* Downtown = Central Business District of Ketchikan, Milepost 0
Airport Terminal = Terminal of Ketchikan International Airport

Ward Cove = Post Office at Ward Cove
Developable Land = Airport Development Zone on Gravina Island

TABLE 4-9
TRAVEL DISTANCES AND ESTIMATED BICYCLE TRAVEL TIMES

	Distance (miles) and Bicyclist Travel Times (minutes)									
*Origin and Destination**	*Existing Conditions/ No Action*	*C3(a)*	*C3(b)*	*C4*	*D1*	*F1*	*F3*	*G2*	*G3*	*G4*
From Downtown	3.29	6.21	5.55	4.80	4.14	7.49	7.43	10.61	5.49	3.40
to Airport Terminal	37	38	**34**	**29**	**25**	45	45	81	51	**34**
From Ward Cove	5.04	5.49	4.83	6.61	4.48	14.77	14.71	8.12	9.70	5.15
to Airport Terminal	47	**34**	**30**	**40**	**27**	89	89	65	76	**44**
From Carlanna Creek	0.53	3.45	2.79	2.10	1.54	10.26	10.20	7.85	5.19	0.64
to Airport Terminal	20	21	**17**	**13**	**9**	62	62	64	49	**17**
From Downtown		8.72	8.71	7.31	6.65	4.01	3.95	5.86	2.44	6.31
to Developable Land		52	52	43	40	24	24	53	33	52
From Ward Cove		8.00	7.99	9.12	6.99	11.29	11.23	3.37	6.65	8.06
to Developable Land		48	48	54	42	68	68	37	58	62
From Carlanna Creek		5.96	5.95	4.61	4.05	6.78	6.72	3.10	2.14	3.55
to Developable Land		35	35	27	24	41	41	36	31	35

Boldface = Shorter Time Than Existing Condition

* Downtown = Central Business District of Ketchikan, Milepost 0
Airport Terminal = Terminal of Ketchikan International Airport

Ward Cove = Post Office at Ward Cove
Developable Land = Airport Development Zone on Gravina Island

4.8.1 No Action Alternative

Under the No Action Alternative, there would be no improvements that would change pedestrian and bicycle access to Ketchikan International Airport or developable lands on Gravina Island. Pedestrians and bicyclists would continue to use the existing airport ferry to access the airport and the travel time to the airport would be the same from any location in Ketchikan as for existing conditions. Pedestrians and bicyclists would not be able to more conveniently access developable lands; however, use of trails would continue to provide access to other Borough and developable land.

4.8.2 Alternatives C3(a) and C3(b)

Alternatives C3(a) and C3(b) would reduce pedestrian travel times to the airport from points north of the existing ferry terminal, but would increase pedestrian travel time to the airport from points south of the existing ferry terminal. Without ferry service, travel times for pedestrians originating from points south of the existing airport ferry terminal on Revillagigedo Island to the airport would be substantially longer, whereas travel times for pedestrians originating from the Signal Road area and points north of that would be shortened. Bicyclists traveling to the airport from all locations on Revillagigedo Island would experience shorter or comparable travel times using the Alternative C3(a) or C3(b) bridge rather than using the existing airport ferry.

Alternatives C3(a) and C3(b) would have a beneficial impact on pedestrian and bicycle access to developable land on Gravina Island. Pedestrian and bicycle access to developable lands on Gravina Island would be improved as a result of the road development on Gravina Island, which would include combined use shoulders/pedestrian walkways/bikepaths. The time of travel for pedestrians from downtown Ketchikan to developable lands would be almost 3 hours (i.e., 174 minutes) and less than 1 hour (52 minutes) for bicyclists.

4.8.3 Alternatives C4 and D1

Without ferry service, travel times for pedestrians originating from points south of the existing airport ferry terminal on Revillagigedo Island to the airport would be longer. Travel times for pedestrians originating from points north of the existing ferry terminal on Revillagigedo Island to the airport would be longer for Alternative C4 than under existing conditions, but shorter for Alternative D1.

These alternatives would improve bicycle travel time to the airport. Bicyclists traveling to the airport from all locations on Revillagigedo Island would experience shorter travel times using the Alternative C4 or D1 bridge as compared to travel times using the existing airport ferry.

Alternatives C4 and D1 would improve pedestrian and bicycle access to developable land on Gravina Island. Pedestrian and bicycle access to developable lands on Gravina Island would benefit from road development on Gravina Island, which would include combined use shoulders/pedestrian walkways/bikepaths. The time of travel for pedestrians from downtown Ketchikan and the Ward Cove area to developable lands would take more than 2 hours (i.e., 132 to 182 minutes) and less than 1 hour (43 to 54 minutes) for bicyclists. Pedestrians and bicyclists traveling from the Carlanna Creek area would have shorter travel times to developable land: 81 to 92 minutes for pedestrians and 24 to 27 minutes for bicycles.

4.8.4 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Without ferry service, travel times for pedestrians originating from the Carlanna Creek area and points north of the existing airport ferry terminal on Revillagigedo Island to the airport would be approximately 3 hours longer than the time it takes pedestrians to reach the airport using the existing airport ferry. Thus, Alternatives F1 and F3 would have an adverse impact on pedestrian and bicycle travel times to the airport. Pedestrians traveling to the airport from downtown Ketchikan would experience travel times that are nearly double what it currently takes on the airport ferry. Bicyclists traveling to the airport from all locations on Revillagigedo Island would experience longer travel times using the Alternative F1 and F3 bridges as compared to travel times using the existing airport ferry.

Alternatives F1 and F3 would have a beneficial impact on access to developable lands on Gravina Island. Pedestrian and bicycle access to developable lands on Gravina Island would benefit from road development on Gravina Island, which would include combined use shoulders/pedestrian walkways/bikepaths. The time of travel for pedestrians to developable lands ranges from about 1 hour and 20 minutes (i.e., from downtown Ketchikan) to almost 4 hours (from the Ward Cove area). The time of travel for bicyclists to developable lands ranges from less than half an hour (i.e., from downtown Ketchikan) to just over one hour (from the Ward Cove area).

4.8.5 Alternatives G2 and G3

All of the ferry alternatives include continued operation of the existing airport ferry; therefore, the new ferry would provide an additional access option for pedestrians and bicyclists. Thus, these alternatives would have no impact on pedestrian and bicycle travel times to the airport. For Alternatives G2 and G3, travel times for pedestrians and bicyclists to the airport using the new ferry would be longer than the travel time using the existing ferry.

Alternatives G2 and G3 would have a beneficial impact on access to developable lands on Gravina Island. Pedestrian and bicycle access to developable lands on Gravina Island would benefit from road development on Gravina Island, which would include combined use shoulders/pedestrian walkways/bikepaths. Access to developable land would be possible from both the existing and the new ferries, providing additional access options for pedestrians and bicycles.

4.8.6 Alternative G4

All of the ferry alternatives include continued operation of the existing airport ferry; therefore, the new ferry would provide an additional access option for pedestrians and bicyclists. Alternative G4 would have a beneficial impact on pedestrian and bicycle travel time to the airport. For Alternative G4, travel times for pedestrians and bicyclists traveling to the airport using the new ferry would be shorter than the travel time under existing conditions using the airport ferry because the co-location of the two ferries would reduce the amount of time spent waiting for the transit across Tongass Narrows.

Alternative G4 would have a beneficial impact on access to developable lands on Gravina Island. Pedestrian and bicycle access to developable lands on Gravina Island would benefit from road development on Gravina Island, which would include combined use shoulders/pedestrian walkways/bikepaths.

4.9 GEOLOGY, TOPOGRAPHY, AND WIND

4.9.1 Geology and Topography

None of the project alternatives would adversely affect any unique or significant geologic feature.

4.9.1.1 No Action Alternative

The No Action Alternative would have no effect on the topography in the project area. No excavation would be required; therefore, no changes to the existing landforms would occur.

4.9.1.2 Alternatives C3(a), C3(b), C4, D1, and F1 (DOT&PF and FHWA Preferred)

On Revillagigedo Island, construction of these bridge alternatives would require blasting to remove bedrock. With very little overburden in the area, the risk of slides caused by blasting is minimal. There are no known historic slides in the areas where blasting would be required. A geotechnical investigation would be conducted during final design of the selected alternative to identify any localized slope stability problems and devise an approach to removing material. On Gravina and Pennock Islands, the roadway would require minimal blasting to remove bedrock; in most areas, the road could be constructed using surface scrapers. On all three islands, such removal of surface sediments, soils, and bedrock to accommodate roadway construction and grading would alter the topography along the roadway corridor. **The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act.**

4.9.1.3 Alternative F3

No blasting of bedrock on Revillagigedo Island is expected under the Alternative F3 bridge alternative.

On Gravina and Pennock Islands, the roadway would require minimal blasting to remove bedrock; in most areas, the road could be constructed using surface scrapers. On all three islands, such removal of surface sediments, soils, and bedrock to accommodate roadway construction and grading would alter the topography along the roadway corridor. **The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act.**

Blasting and dredging in West Channel would be required for the channel modifications, resulting in the removal of approximately 184,000 cubic yards of material (bedrock, gravel, silts). These actions would permanently alter the configuration of the channel bottom at that location.

4.9.1.4 Alternatives G2 and G4

On Revillagigedo Island, no blasting of bedrock is expected under Alternatives G2 and G4. On Gravina Island, the roadway would require minimal blasting to remove bedrock. In most areas of Gravina Island, the road could be constructed using surface scrapers. Removal of surface sediments, soils, and bedrock to accommodate roadway construction and grading under any of these alternatives would alter the topography along the roadway corridor.

Dredging (1,400 and 18,600 cubic yards respectively) likely would be required to provide adequate navigation depths for the ferry terminals. Such dredging would modify the configuration of the channel bottom at these locations.

4.9.1.5 Alternative G3

Alternative G3 would not require blasting of bedrock on Revillagigedo Island. On Gravina Island, the roadway would require minimal blasting to remove bedrock. In most areas of Gravina Island, the road could be constructed using surface scrapers. Removal of surface sediments, soils, and bedrock to accommodate roadway construction and grading under this alternative would alter the topography along the roadway corridor.

Dredging (15,200 cubic yards) could be required to provide adequate navigation depths for the ferry terminal on Revillagigedo Island. Such dredging would modify the configuration of the channel bottom at this location.

4.9.2 Soils

4.9.2.1 No Action Alternative

The No Action Alternative would have no effect on soils in the project area.

4.9.2.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The temporary adverse effects of construction on soils and surface sediments are described in Section 4.25 (Construction Impacts). These alternatives would require excavation of surface sediments and/or soils along the entire over-land alignment. Removal of surface sediments and soils to accommodate roadway construction and grading under any of these alternatives would not adversely affect any unique or significant soil materials.

4.9.3 Wind

The Gravina Access Project would have no effect on wind. The effects of wind on vehicular access for all of the project alternatives are described in Section 4.7.3.7.

4.10 AIR QUALITY IMPACTS

4.10.1 Pollutants of Concern

Air pollutants of concern associated with the Gravina Access Project are elevated concentrations of:

- Carbon monoxide (CO) from vehicular emissions at intersections, interchanges, and other similar sites with high vehicle densities and slow speeds
- Particulate matter with a diameter equal to or less than 10 microns (PM_{10}), resulting primarily from construction activities that generate fugitive dust

4.10.2 Emissions

4.10.2.1 No Action Alternative

The No Action Alternative would have no effect on air quality in the Ketchikan area. There would be no increases in emissions of carbon monoxide or PM_{10} as a result of the No Action Alternative.

4.10.2.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Other than impacts related to construction and traffic associated with the build alternatives, there are no air quality impacts associated with the project build alternatives. Emissions from marine vessels are regulated only for opacity levels (see Section 4.10.1), and no new violations of the regulated levels are expected to result from implementation of any of the project alternatives.

Compared with existing conditions, and assuming the same level of traffic, all build alternatives would result in greater vehicle emissions as a result of increased road travel. Alternatives adding the greatest length of new road (i.e., Alternatives F1 and F3) would have greater vehicle emissions than alternatives with the least amount of new road. With the bridge alternatives, emissions from the airport ferry would be eliminated, resulting in an overall decrease in emissions, compared with the No Action Alternative (see Table 4-10). The ferry alternatives,

however, would double the ferry emissions and add vehicular emissions, resulting in an overall increase in emissions. None of the emissions increases associated with any of the project alternatives would affect the air quality in Ketchikan.

TABLE 4-10
ESTIMATED ANNUAL EMISSIONS ASSOCIATED WITH ALTERNATIVES

Alternative	*Emissions (tons per year)**				
	SO2	*PM*	*NOx*	*CO*	*HC*
No Action	0.23	1.26	47.11	11.87	2.47
C3(a)	0.07	0.02	1.18	7.21	0.81
C3(b)	0.07	0.03	1.24	7.54	0.85
C4	0.07	0.02	1.16	7.06	0.80
D1	0.06	0.02	1.08	6.55	0.74
F1	0.14	0.05	2.48	15.13	1.70
F3[1]	0.12	0.04	2.14	13.04	1.47
G2	0.52	2.54	95.34	30.53	5.71
G3	0.53	2.54	95.42	31.03	5.76
G4	0.52	2.54	95.20	29.74	5.62

* Based on 450 vehicle trips per day between Revillagigedo Island and Gravina Island.

The adverse effects of emissions from construction activities associated with the build alternatives are described in Section 4.25 (Construction Impacts). The adverse effects of projected traffic levels on air quality are described in Section 4.26 (Secondary Impacts).

4.11 NOISE IMPACTS

The adverse effects of construction-related noise by the build alternatives are described in Section 4.25 (Construction Impacts). The adverse effects of projected traffic levels on noise are described in Section 4.26 (Secondary Impacts).

4.11.1 No Action Alternative

Noise levels in the Ketchikan area would not increase as a result of the No Action Alternative.

4.11.2 Alternatives C3(a), C3(b), C4, D1, G2, G3, and G4

If Alternative C3(a), C3(b), C4, D1, G2, G3, or G4 were constructed, traffic volumes on the new alignment initially would be similar to existing traffic volumes on the airport ferry, which are lower than the traffic projections for 2025. There are no adverse noise impacts associated with the 2025 traffic volumes (see Section 4.26.7); therefore there would be no adverse noise impacts when the constructed alternative first becomes operational.

4.11.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

If Alternative F1 and F3 were constructed, traffic volumes on the new alignment initially would be similar to existing traffic volumes on the airport ferry, which are lower than the traffic projections for 2025. There are no adverse noise impacts associated with the 2025 traffic

volumes (see Section 4.26.7); therefore, there would be no adverse noise impacts when the constructed alternative first becomes operational.

Flight paths of floatplanes departing Ketchikan Harbor Floatplane Base might be altered by the presence of a bridge over the East and West Channels, which could increase sound levels for some Pennock Island residents. Typically, floatplanes taking off to the south but bound for points north make their northward turn at the south end of Pennock Island. With the Alternative F1 or Alternative F3 bridges in place, floatplanes might need to make their northward turn north of the bridge, which would involve flying over the northern end of Pennock Island, where many of the residences on Pennock Island are located. Residents of this area could experience increased noise from floatplane traffic as a result this altered flight pattern.

4.12 WATER QUALITY IMPACTS

The following sections describe the potential direct effects of the project alternatives on water quality in Tongass Narrows, streams, wetlands, ponds, and other water bodies. See Section 4.25.10 (Construction Impacts) for the temporary adverse effects of project construction activities on water quality. See Section 4.26.8 (Secondary Impacts) for a discussion of the indirect impacts of the project on water quality.

4.12.1 No Action Alternative

Under the No Action Alternative, the ferry between Revillagigedo and Gravina Islands would continue to be operated. Pollutants would continue to be washed off the ferry terminals into Tongass Narrows and be produced by the ferry itself. Pollutants might include particulates, petroleum products, metals, and solvents.

4.12.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), and F3

Alternatives C3(a), C3(b), C4, and D1 could affect the water quality of streams crossed, i.e., both channels of Airport Creek and several unnamed streams. Alternatives F1 and F3 could affect water quality of both channels of Airport Creek, Government Creek, and several unnamed streams. The water quality of Tongass Narrows and freshwater streams and creeks on Gravina Island could be adversely affected by pollutants in runoff from the bridges and roadways, including particulate matter, metals, and petroleum products from vehicle emissions and road maintenance activities. **These impacts would be of similar character to those that occur today from ferry terminals, the ferry deck, and the ferry engines. The ferry itself would no longer be a pollutant source, but a larger volume of traffic and an extensive new road would mean incrementally more of these pollutants and pollutant discharge in new areas. However, with mitigation, overall water quality in Tongass Narrows would not be noticeably changed**.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), and F3

Wetlands were avoided to the extent practicable during preliminary design, and such consideration would continue in final design. All roads would be designed to maintain existing surface water courses and storm water drainage. Final roadway design would include culverts or bridges along existing drainages and across streams on Revillagigedo and Gravina Islands. The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to

meet ADEC and EPA requirements of the Clean Water Act. The roadway and bridge designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would need to be approved by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. Impacts to water quality would be minimized through the use of Best Management Practices (BMPs), most of which would be part of the SWPPP. The plan will follow DOT&PF's SWPPP Guide. BMPs that would be employed include the following:

- **Where practicable, the angle of fill slopes would be increased to reduce encroachment into adjacent wetlands.**
- **The roadway would be designed and constructed with a low-profile embankment to minimize the fill footprint.**
- **Rock would be used to stabilize toes of slopes at pond and stream crossings to limit the erosion of fine-grained material into adjacent waters and wetlands.**
- **To protect the integrity of the natural plant communities, plant species indigenous to the area would be used for vegetating road slopes, except that nonnative, non-invasive annual grasses may be used to provide rapid, initial soil cover to prevent runoff of fine-grained material into adjacent wetlands. Topsoil would be applied to the surface of road slopes to aid in the reseeding process.**
- **Roadside swales would be designed to keep surface water within the natural drainage basins to allow sediment-laden water to clear before its discharge to adjacent wetlands and waters.**
- **At all stream crossings (both culverts and bridge crossings), stream banks would be re-contoured to approximate original conditions and re-seeded with native vegetation to minimize erosion.**

See Section 4.25.10 for construction-related BMPs to protect water quality. See also sections 4.14.1; 4.15.1-4.15.4; and 4.25.10-4.25.12 for related BMPs. All necessary permits and agency approvals would be obtained prior to construction, and any permit stipulations would be incorporated into the construction contract specifications.

4.12.3 Alternatives G2, G3, and G4

Wetlands were avoided to the extent practicable during preliminary design, and such consideration would continue in final design. Alternatives G2 and G4 could affect the water quality in both channels of Airport Creek, as well as in several unnamed streams. Alternative G3 could affect water quality of both channels of Airport Creek, Government Creek, and several unnamed streams. The water quality of Tongass Narrows and freshwater creeks could be adversely affected by pollutants in runoff from the ferry terminals and roadways, and by ferry vessel emissions. These pollutants could include petroleum products, metals, and particulate matter from the operation and maintenance of the ferry, ferry terminals, and road links. Bridge and road crossings of Gravina Island creeks and watersheds would have the same detrimental effect on water quality as described for Alternatives C3(a), C3(b), C4, D1, F1, and F3 (see Section 4.12.2). **These impacts would be of similar character to those that occur today from ferry terminals, the ferry deck, and the ferry engines. Two ferries instead of one, a larger volume of traffic, and roads extended beyond the airport, would mean incrementally more of these pollutants and effects to new areas, but with mitigation, overall water quality in Tongass Narrows would not be noticeably changed**

Mitigation for Alternatives G2, G3, and G4

All roads would be designed to maintain existing surface water courses and storm water drainage. Final roadway design would include culverts or bridges along existing drainages and across streams on Revillagigedo and Gravina Islands. The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act. The roadway and ferry terminal designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would be approved by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. BMPs (see Sections 4.12.2 and 4.25.10) would further limit adverse effects on water quality.

4.13 PERMITS

4.13.1 No Action Alternative

No permits or certifications would be required for the No Action Alternative.

4.13.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The Army COE, EPA, ADEC, USCG, DNR, and both the Ketchikan Gateway Borough and City of Ketchikan would require permits or approvals to implement any of the Gravina Access Project build alternatives. Permits and approvals for temporary construction activities would also be necessary from the Army COE, DNR, NOAA Fisheries, and the EPA.

Permit requirements for all of the alternatives are summarized below. The draft application for the COE Section 10/404 permit is contained in Appendix L, along with a preliminary jurisdictional determination, draft Section 404(b)(1) evaluation, and a DOT&PF and FHWA Wetlands Finding, as indicated by Executive Order 11990. The draft 404(b)(1) evaluation was prepared for the COE to supplement the EIS analysis of wetlands and water bodies, and to satisfy COE requirements. DOT&PF will continue to coordinate development proposals with the Borough and City with respect to local permit requirements.

Major federal, state, and local permits common to all the build alternatives are:

- **COE, Clean Water Act Section 404 Permit for placement of dredged or fill material in waters of the United States, including wetlands, and Section 10 permit for work in, on, and over navigable waters; see also Appendix L.**
- **State of Alaska Coastal Zone Consistency Review.**
- **Ketchikan Gateway Borough Coastal Management Plan review.**
- **DNR, Title 41 Fish Habitat Permit for crossings of fish bearing streams.**
- **EPA, NPDES General Permit for Storm Water Discharges from Construction Activities.**
- **ADEC Section 401 Certification (Certificate of Reasonable Assurance).**
- **ADEC plan review for non-domestic wastewater treatment system.**

- **ADEC non-domestic wastewater disposal permit.**
- **Ketchikan Gateway Borough and City of Ketchikan permits and approvals, as required.**

4.13.2.1 Alternatives C3(a), C3(b), C4, D1, and F1 (DOT&PF and FHWA Preferred)

The bridge alternatives would require the permits common to all alternatives, described above, plus the following:

- USCG Bridge Permit issued under the authority of Section 9 of the Rivers and Harbors Act of 1899.

Construction impacts that have the potential to result in harassment of marine mammals (as defined at 50 CFR 216.3) would be mitigated; see Sections 4.25.12.3 and 4.25.15. Therefore, no Incidental Harassment Permit or Letter or Authorization from NOAA Fisheries is anticipated to be necessary. If during final design or prior to construction of any of these alternatives plans changed such that harassment of marine mammals could not be avoided or mitigated, a permit would be applied for in accordance with Section 101(a)5 of the Marine Mammal Protection Act. DOT&PF and FHWA would also reinitiate consultation with NOAA Fisheries under Section 7 of the Endangered Species Act.

4.13.2.2 Alternative F3

Alternative F3 would require the permits common to all alternatives, described above, plus the following:

- USCG Bridge Permit issued under the authority of Section 9 of the Rivers and Harbors Act of 1899.
- **COE permits under Sections 102 and 103 of the Marine Protection, Research, and Sanctuaries Act (i.e., Ocean Dumping Act) for ocean disposal of dredged material from West Channel. Section 404 of the Clean Water Act also would apply to ocean disposal.**

Channel modification of West Channel would require blasting. Blasting could result in harassment of marine mammals (as defined at 50 CFR 216.3); however, such impacts would be avoided or minimized as described in Sections 3.15.4 and 3.20. Therefore, no Incidental Harassment Permit or Letter or Authorization from NOAA Fisheries is anticipated to be necessary. If during final design or prior to construction of any of these alternatives plans changed such that harassment of marine mammals could not be avoided or mitigated, a permit would be applied for in accordance with Section 101(a)5 of the Marine Mammal Protection Act.

4.13.2.3 Alternatives G2, G3, and G4

Ferry alternatives would require the permits common to all alternatives. **Construction impacts that have the potential to result in harassment of marine mammals (as defined at 50 CFR 216.3) would be mitigated; see Sections 4.25.12.3 and 4.25.15. Therefore, no Incidental Harassment Permit or Letter or Authorization from NOAA Fisheries is anticipated to be necessary. If during final design or prior to construction of any of these alternatives**

plans changed such that harassment of marine mammals could not be avoided or mitigated, a permit would be applied for in accordance with Section 101(a)5 of the Marine Mammal Protection Act.

4.14 WETLAND AND VEGETATION IMPACTS

Table 4-11 (Impacts on Wetlands, Ponds, and Uplands [Acres]) provides the number of acres of wetlands (by types) that would be directly affected by each project alternative, **as well as the approximate amount of fill to be placed in wetlands (given in cubic yards).** Figure 3.16 shows the locations of alternatives relative to wetlands, ponds, and uplands.

TABLE 4-11
IMPACTS ON WETLANDS, PONDS, AND UPLANDS (ACRES)

	*Area Total**	*No Action Alternative*	*Bridge Alternatives*						*Ferry Alternatives*		
Wetland Type**		No Action	C3(a)	C3(b)	C4	D1	F1	F3	G2	G3	G4
Forested Wetlands	8,190	0.0	15.6	14.2	10.6	8.0	23.6	13.0	14.2	10.0	7.7
Shrub/Scrub Wetlands	0*	0.0	3.1	3.0	3.1	3.0	12.9	14.4	2.9	6.5	2.9
Muskegs	8,350	0.0	25.3	25.1	25.1	25.1	60.0	57.7	25.3	29.4	24.8
Intertidal Marshes and Meadows**	195	0.0	0	0	0	0	0	0	0.1	1.7	0
Total Wetland Impacts	--	0.0	44.0	42.3	38.8	36.1	96.5	85.1	42.5	47.6	35.4
Ponds	220	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Uplands (Nonwetlands)	21,900	0.0	5.1	9.1	10.4	8.6	10.7	4.8	7.6	7.0	4.7
Approximate Amount of Fill Placed into Wetlands (CY)	--	0	213,000	205,000	189,900	176,000	500,000	412,000	206,000	230,000	171,000
Piers in Wetlands (number)***	--	0	2	2	1	0	7	7	0	0	0

*Total wetland acreage in Tongass Narrows Watershed is based on National Wetland Inventory mapping. NWI showed not Shrub/Scrub, but Shrub/Scrub type does exist. See discussion in Section 3.14

**Impacts on marine waters other than mapped intertidal marshes and meadows are shown in Table 4-14 (Potential Impacts on Essential Fish Habitat)

***This indicates the number of bridge piers and abutments in the wetland types listed above. Table 4-12 lists piers in Tongass Narrows.

Section 4.25.11 describes the additional temporary effects of project construction on wetlands and vegetation. Section 4.26.9 provides a discussion of the indirect impacts of the project on wetlands and vegetation.

4.14.1 Wetlands

Direct, long-term impacts on wetlands would primarily be permanent loss resulting from placing roadway and ferry or bridge facilities in wetland areas. The project design would minimize such use of wetlands to the extent practicable. Section 3.14 and Appendix M provide **details on the various types of wetlands found in the project area, as well as their functions. This characterization of wetland impacts is based on the best available design information at this stage of the project. If wetland fill quantities and affected wetland acreages were to change during final design, then the COE Section 10/404 permit application would be re-submitted to reflect those changes.**

4.14.1.1 No Action Alternative

The No Action Alternative would have no effect on wetlands.

4.14.1.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

All build alternatives would cross wetlands within the project area. Alternatives C3(a), C3(b), C4, D1, G2, G3, and G4 each would eliminate fewer than 50 acres of wetlands (see Table 4-11). Alternatives F1 and F3 would eliminate approximately **97** and 85 acres, respectively, because they would require the most new roadway construction. **As indicated in Section 3.14, t**he wetlands in the project area are extensive. **There are nearly 17,000 acres of wetlands in the watersheds that drain to Tongass Narrows, an area of just under 40,000 acres total**. The proportion of wetlands that would be converted to transportation facilities under any of the build alternatives would be **greatest under Alternative F1, which would result in a loss of six-tenths of 1 percent of the wetlands in the area. No other alternative would result in more than one-half of 1 percent of area wetlands**..

Forested Wetlands

All build alternatives would result in the elimination and alteration of forested wetlands, principally along the road alignments. Overall, Alternative F1 would have the greatest acreage of impact on forested wetlands (see Table 4-11). A small amount of the support that forested wetlands provide to adjacent stream habitat (e.g., woody debris and invertebrates from overhanging vegetation) would be eliminated. Impacts on forested wetlands would occur primarily northwest of the airport and on Revillagigedo Island.

Elimination of forested wetlands would result in increased runoff, altered surface and subsurface drainage patterns, loss of wildlife habitat, and slight changes in plant community composition in forested wetlands adjacent to the road due to increased sunlight in the understory**.** Impacts on wildlife from human activity (motion, noise, people leaving the roadway) would extend beyond the project footprint and would be permanent.

Shrub/Scrub Wetlands

All build alternatives would result in the loss and alteration of shrub/scrub wetlands along the lengths of the roadway on Gravina Island. Alternatives F1 and F3 would have the greatest impacts because they have the longest road lengths (see Table 4-11). Loss of shrub/scrub wetlands would result in increased runoff, altered surface and subsurface drainage patterns, and loss of wildlife habitat. The area of shrub-scrub wetlands that supports adjacent stream ecosystems would be diminished. Impacts on wildlife from human activity would extend beyond the project footprint and would be permanent.

Muskegs

All build alternatives would result in the loss and alteration of muskegs resulting from placement of road embankment fill. Impacts on muskegs would occur primarily along road routes west and south of the airport on Gravina Island, and on Pennock Island. Alternatives F1 and F3 would have the greatest impacts because they have the longest road lengths (see Table 4-11). A road across muskeg wetlands would eliminate a ribbon of wildlife habitat and could alter the flow patterns of both surface and subsurface water. Altering flow patterns could reduce the amount

of organic material exported to downstream ecosystems, and cause slight changes in plant community composition as a result of altered drainage patterns and runoff of pollutants to the wetlands. Mitigation, addressed below, is designed to minimize or eliminate these effects. Impacts on wildlife from human activity would extend beyond the project footprint and would be permanent.

Intertidal Marshes and Meadows

Alternatives G2 and G3 would eliminate intertidal marshes and meadows at their terminal areas (Lewis Point and south of the airport, respectively—see Table 4-11). Potential direct impacts resulting from removal of this highly productive habitat include loss of important feeding areas for terrestrial and aquatic species, loss of nurseries for young fish, and loss of organic matter produced in these marshes and exported to deeper marine waters. Impacts on wildlife from human activity would extend beyond the project footprint and would be permanent. See also **Section 4.15.3 and Table 4-12, below, regarding impacts to other marine vegetated shallows, including eelgrass and kelp in Tongass Narrows.**

Mitigation of Impacts to Wetlands from Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Final mitigation would be based on discussions among DNR, FHWA, COE, and other resource management agencies. Detailed mitigation measures would be developed and adhered to as a condition of future federal permits. In addition to the BMPs listed in Section 4.12.2, the following wetlands-specific **measures would be employed:**

- **Culvert installation through fill slopes in appropriate locations to maintain natural flow patterns for surface water courses to ensure that the existing timing and amounts of inflow to adjacent wetlands and waters is retained**

DOT&PF proposes to compensate for unavoidable adverse impacts to wetlands by paying $248,400.00 as a fee in lieu of wetland restoration, enhancement, or preservation. This compensatory mitigation proposal applies only to Alternative F1, the DOT&PF and FHWA preferred alternative. A physical project that would compensate for wetland losses does not appear to be practical immediately adjacent to impacted wetlands or in the general Ketchikan area, because wetlands are prevalent and there is relatively little damaged or impaired wetland that could benefit from restoration or enhancement.

The monetary value has been determined using historical values for DOT&PF Southeast Alaska projects. The per-acre costs used are $2,800 for forested, shrub/scrub, and muskeg wetlands; $50,000 for bodies of fresh water; and $20,000 for marine waters. Table 4-12 presents a breakdown of the fee by wetland type. The fee represents the total compensation for all expected wetland impacts for the project. This fee will be provided to a land trust acceptable to the U.S. Army Corps of Engineers (COE). The proposed fee is to be directed toward activities relating to wetland creation, restoration, enhancement, and preservation or land acquisition.

TABLE 4-12
CALCULATION OF FEE IN LIEU OF COMPENSATORY MITIGATION FOR ALTERNATIVE F1

Wetland Type[1]	Proposed cost per acre[2]	Impacted Area (acres) by F1 Alternative	Total cost per wetland/water type
Wetlands	$2,800.00	96.5	**$270,200.00**
Forested Wetlands	*$2,800.00*	*23.6*	*$66,080.00*
Shrub/Scrub Wetlands	*$2,800.00*	*12.9*	*$36,120.00*
Muskegs	*$2,800.00*	*60.0*	*$168,000.00*
Water Bodies (ponds)	$50,000.00	0.1	$5,000.00
Marine Waters	$20,000.00	0.2	$4,000.00
TOTAL		**96.8**	**$279,200.00**
KGB permitted commitment for Lewis Reef Road mitigation[3]		*11.0[3]*	*- $30,800.00[3]*
RESULTING FEE		**85.8**	**$248,400.00[3]**

1. No impact to intertidal meadow and marsh wetlands is anticipated for Alternative F1.
2. Cost is based upon past SE Alaska value of wetlands used for compensatory mitigation.
3. KGB has already received a permit for 11 acres of wetland impact, and compensation has been accepted, for a "Lewis Reef Rd." project. A permit modification is proposed for that project to ensure its alignment coincides with the Gravina Access Project alignment. Therefore, the 11 acres has been subtracted from the total.

The proposed fee is reduced by $30,800 because of the relationship between the Gravina Access Project and the "Lewis Reef Road," a Ketchikan Gateway Borough (KGB) proposal recently approved by Corps but not yet built. The two roads serve much the same purpose and follow much the same alignment on airport property. (The Lewis Reef Road would connect the southern end of the Ketchikan Airport to the Industrial Park at the northern end of the Airport.) The KGB permit (COE #M-2000-0307) includes commitments for compensatory mitigation. DOT&PF is currently working with KGB, the Federal Aviation Administration (FAA), and the COE to modify the alignment of the permitted Lewis Reef Road to coincide with Alternative F1 alignment, and to modify the Lewis Reef Road permit to reflect this alignment shift. This will avoid construction of two parallel roads through the same wetlands on airport property. The total compensation proposal referenced in Table 4-12 therefore takes into account the mitigation commitment by KGB for 11 acres of impact from the Lewis Reef Road and reduces the total wetlands area that otherwise would be impacted by the Gravina Access Project.

4.14.1.3 Wetland Finding

Executive Order (E.O.) 11990, "Protection of Wetlands," and Section 404 of the Clean Water Act, as amended, mandate that federally funded projects are to avoid construction in wetlands unless (1) there is no practicable alternative and (2) the proposed action includes all practicable measures to minimize harm to wetlands. In compliance with E.O. 11990 and FHWA guidance, Alternative F1 has been determined to be the only practicable alternative for the Gravina Access Project. A separate Wetland Finding is included in Appendix L.

Based on the information provided in the Wetland Finding, it is determined that there is no practicable alternative to the proposed construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands that might result from such use.

4.14.2 Vegetation

4.14.2.1 No Action Alternative

There would be no adverse impact on upland vegetation as result of the No Action Alternative.

4.14.2.2 Alternatives C3(a), C3(b), C4, and D1

Alternatives C3(a), C3(b), C4, and D1 would require the permanent removal of upland vegetation on some steep slopes and high knobs on Revillagigedo Island, near areas that are already developed. The upland vegetation affected by these alternatives would be primarily western hemlock/Sitka spruce forest in the relatively undisturbed areas and alder thickets in more disturbed areas. The project roadway also would require the permanent removal of upland vegetation in or adjacent to currently developed areas around the airport on Gravina Island. Loss of vegetation would cause loss of wildlife habitat, and would increase the volume of surface runoff. Table 4-11 provides the total amount of upland and wetland vegetation affected by each of these alternatives.

4.14.2.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Alternatives F1 and F3 would require removal or cause shading of upland forest vegetation on the west side of Pennock Island and on the Gravina Island shoreline. The upland vegetation affected by these alternatives would be primarily western hemlock/Sitka spruce forest in the relatively undisturbed areas and alder thickets in more disturbed areas. The project roadway would require the permanent removal of upland vegetation in or adjacent to currently developed areas around the airport on Gravina Island. Loss of vegetation would cause loss of wildlife habitat, and would increase the volume of surface runoff. Table 4-11 provides the total amount of upland and wetland vegetation affected by each of these alternatives.

4.14.2.4 Alternative G2

Alternative G2 would require removal of undisturbed spruce/hemlock forest at Lewis Point on Gravina Island. The upland vegetation affected by these alternatives would be primarily western hemlock/Sitka spruce forest in the relatively undisturbed areas and alder thickets in more disturbed areas. The project roadway would require the permanent removal of upland vegetation in or adjacent to currently developed areas around the airport on Gravina Island. Loss of vegetation would cause loss of wildlife habitat, and would increase the volume of surface runoff. Table 4-11 provides the total amount of upland and wetland vegetation affected by this alternative.

4.14.2.5 Alternatives G3 and G4

The upland vegetation affected by these alternatives would be primarily western hemlock/Sitka spruce forest in the relatively undisturbed areas and alder thickets in more disturbed areas. The project roadway would require the permanent removal of upland vegetation in or adjacent to currently developed areas around the airport on Gravina Island. Loss of vegetation would cause loss of wildlife habitat, and would increase the volume of surface runoff. Table 4-11 provides the total amount of upland and wetland vegetation affected by each of these alternatives.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

An objective of final project design will be to further minimize impacts to vegetation by reducing clearing limits and using previously disturbed areas for staging whenever feasible.

4.15 WATER BODY AND WILDLIFE IMPACTS

Direct adverse impacts on water bodies and wildlife would result from roadway stream crossings, roadway placement within terrestrial areas that serve as wildlife habitat, placement of bridge piers in Tongass Narrows, placement of pilings for ferry terminals on the shoreline of Tongass Narrows, and placement of fill on the margins of Tongass Narrows. Table 4-13 tabulates the expected impacts to water bodies. The same numbers are important indicators of effect on fish and marine mammal habitats.

TABLE 4-13
QUANTITIES OF FILL AND DREDGING IN TONGASS NARROWS, AND NUMBERS OF PIERS AND CROSSINGS

	C3(a)	*C3(b)*	*C4*	*D1*	*F1*	*F3*	G2	G3	*G4*
Total Number Water Body Crossings [a]	8	8	8	8	14	14	8	10	8
Anadromous fish streams (subset)[a]	*2*	*2*	*2*	*2*	*5*	*5*	*2*	*3*	*2*
Piers in Tongass Narrows (Number)	5	7	5	6	6	6	0	0	0
Fill in Tongass Narrows (Cubic Yards)[b]	280,000	140,000	280,000	295,000	0	0	0	0	0
Dredging Quantities (Cubic Yards)	0	0	0	0	0	184,000[c]	1,400	15,200	18,600

[a] Number of crossings does not include Tongass Narrows. The anadromous fish streams line is a subset of the first line. No permanent loss of EFH would occur because bridge and culvert design would preserve EFH.

[b] For bridge alternatives, fill quantities shown do not include the bridge piers themselves.

[c] Of this total, approx. 125,000 cy of solid and fractured rock would be loosened by blasting and removed by clamshell dredge. For the balance, surficial sediments would be removed by dredge without blasting.

Section 4.25.12 provides a discussion of the temporary impacts on water bodies and wildlife during project construction. Section 4.26.10 provides a discussion of the indirect impacts of the project on water bodies and wildlife.

4.15.1 Water Bodies

4.15.1.1 No Action Alternative

There would be no modifications to water bodies in the project area.

4.15.1.2 Alternatives C3(a), C3(b), C4, and D1

These bridge alternatives would require the placement of piers in Tongass Narrows, which would affect water flow locally, but would not alter general flow patterns in Tongass Narrows. See Table 4-13, above. None of these alternatives includes a roadway that would cross Government Creek. These alternatives include roadway crossings of two channels of Airport Creek **using clear-span bridges, and crossings of several smaller unnamed creeks using culverts**.

Mitigation for Alternatives C3(a), C3(b), C4, and D1

The project design would maintain natural stream flow conditions under the Airport Creek bridges, and culvert design would accommodate storm water flow, not result in scour, and allow fish passage. **Potential** adverse impacts of roadway crossings of Airport Creek would be **avoided** by using **clear-span** bridges at the crossings. All construction in and around anadromous fish streams will take place when stream disturbances would have the least impact on anadromous fish species. **(See 4.25.12.3, subsection on essential fish habitat, for related detail regarding mitigation of construction impact).** In-water work areas, except for stream crossings by construction equipment, will be isolated from flowing waters in all anadromous fish streams. In addition, gravels and streambed material will be used in the bottoms of culverts. **The roadway and bridge designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would be approved by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC, EPA, and COE requirements of the Clean Water Act.**

4.15.1.3 Alternative F1 (DOT&PF and FHWA Preferred)

These bridge alternatives would require the placement of piers in Tongass Narrows, which would affect water flow locally, but would not alter general flow patterns in Tongass Narrows. See Table 4-13, above. On Gravina Island, Alternative F1 includes **clear-span bridge** crossings of Airport Creek (two channels), Government Creek, and **an unnamed creek, as well as culvert crossings of several other smaller unnamed creeks (see Table 4-13, above)**. **Alternative F1 also would require a culvert crossing at an unnamed anadromous fish stream southeast of Government Creek. In accordance with the memorandum of agreement between DOT&PF and ADF&G, the culvert crossing would use a Tier 1 stream simulation design, which means it would maintain natural stream conditions such as flow, substrate, and existing fish passage efficiency for the fish found in the stream**.

Mitigation for Alternative F1

Potential adverse impacts of creek crossings would be **avoided** at the larger creeks (two channels of Airport Creek, Government Creek, one unnamed creek) by using **clear-span** bridges. Another unnamed anadromous fish stream southeast of Government Creek would have a culvert crossing. In accordance with the memorandum of agreement between DOT&PF and ADF&G, the culvert crossing would be designed to a Tier 1 stream simulation design level and would maintain natural stream conditions such as flow, substrate, and existing fish passage efficiency. Changes in the hydrology of smaller creeks would be minimized by designing culverts that are appropriately sized and placed, accommodate storm water flow, and do not cause scour. In-water work areas, except for stream crossings by construction equipment, will be isolated from flowing waters in all anadromous fish streams. In addition, gravels and streambed material will be used in the bottoms of culverts. **The construction contractor would be responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC, EPA, and COE requirements of the Clean Water Act. The roadway and bridge designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would be approved**

by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. See Section 4.25.12.3, and its subsection on essential fish habitat, for related detail on mitigation of construction impact.

4.15.1.4 Alternative F3

These bridge alternatives would require the **placement** of piers in Tongass Narrows, which would affect water flow locally, but would not alter general flow patterns in Tongass Narrows. See Table 4-13, above. On Gravina Island, Alternative F3 includes **clear-span bridge** crossings of Airport Creek (two channels), Government Creek, and **an unnamed creek, as well as culvert crossings of several other smaller unnamed creeks (see Table 4-13, above)**. **Alternative F3 would require a culvert crossing at an unnamed anadromous fish stream southeast of Government Creek. In accordance with the memorandum of agreement between DOT&PF and ADF&G, the culvert crossing would use a Tier 1 stream simulation design, which means it would maintain natural stream conditions such as flow, substrate, and existing fish passage efficiency for the fish in the stream**.

This alternative would require the removal of approximately 184,000 cubic yards of material (bedrock, gravel, silts) from West Channel for the proposed channel modifications. This would widen the channel and modify the localized flow regime, but would not affect overall flow through the channel.

Mitigation for Alternative F3

Potential adverse impacts of creek crossings would be **avoided** at the larger creeks (two channels of Airport Creek, Government Creek, one unnamed creek) by using **clear-span** bridges. Changes to the hydrology of smaller creeks would be minimized by designing culverts that are appropriately sized and placed, accommodate storm water flow, and do not cause scour. In-water work areas, except for stream crossings by construction equipment, would be isolated from flowing waters in all anadromous fish streams. In addition, gravels and streambed material would be used in the bottoms of culverts. **The construction contractor would be responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC, EPA, and COE requirements of the Clean Water Act. The roadway and bridge designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would be approved by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. See Section 4.25.12.3, and its subsection on essential fish habitat, for related detail on mitigation of construction impact.**

4.15.1.5 Alternatives G2, G3, and G4

The ferry alternatives would require building pile-supported docks and floating ferry berthing facilities in intertidal and subtidal areas of Tongass Narrows to accommodate staging, parking, and loading areas at the ferry terminals. **As shown in Table 4-13, above, the ferry alternatives would also require minor dredging in Tongass Narrows to produce adequate water depths for ferry docking at all tidal stages. Alternative G2 would require the removal of approximately 1,400 cubic yards of material in approximately 0.2 acre of Tongass Narrows near the proposed Gravina Island terminal. Alternative G3 would**

require the removal of approximately 18,600 cubic yards of material in approximately 2.2 acres near both the Revillagigedo Island and Gravina Island terminals. Alternative G4 would require the removal of approximately 15,200 cubic yards of material in approximately 1.3 acres near both the Revillagigedo Island and Gravina Island terminals. The structures, fill, **and dredging** associated with the ferry alternatives would have localized impacts on water flow, but would not alter general flow patterns in Tongass Narrows.

The roadway on Gravina Island associated with these alternatives would require road crossings of two channels of Airport.

Mitigation for Alternatives G2, G3, and G4

Potential adverse impacts of the Government and Airport Creek crossings would be **avoided** by using **clear-span** bridges. **The roadway and ferry terminal designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would be approved by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. See Section 4.25.12.3, and it subsection on essential fish habitat, for related detail on mitigation of construction impact.**

4.15.2 Ponds

4.15.2.1 No Action Alternative

There would be no adverse impact on ponds as a result of the No Action Alternative.

4.15.2.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

On Pennock and Revillagigedo Islands, no impacts on ponds are expected as a result of any of the build alternatives.

There would be no impacts to large ponds, but all build alternatives might eliminate very small ponds within muskeg areas on Gravina and Pennock Islands. Filling ponds for roadway construction would result in a permanent loss of pond habitat.

4.15.3 Marine Habitat

Appendix N provides a detailed description of impacts to marine habitat potentially resulting from **construction and operation of** the project alternatives. This section provides a summary of that report. **Approximate maximum acreages of marine habitat, eelgrass, and kelp that would be affected by each alternative are provided in Table 4-14, "Potential Impact to Essential Fish Habitat." Intertidal and subtidal marine benthic resources at each landfall are described in some detail in the *Phase II Marine Reconnaissance* report.[27] Additional discussions of potential impacts of each alternative on EFH are provided in Section 4.15.4.4 and Appendix O. Many project construction details that would influence the degree of project impact would be determined later in design of the selected alternative.**

[27] DOT&PF, Phase *II Marine Reconnaissance,* prepared by Pentec Environmental, July 2001.

4.15.3.1 No Action Alternative

The No Action Alternative would have no effect on marine resources.

4.15.3.2 Alternatives C3(a) and C4

These bridge alternatives would require a pier in near-shore waters on the eastern side of Tongass Narrows that could affect bull kelp beds. However, these beds would likely re-establish on the lower intertidal rock or concrete structure of the pier. Deep-water piers in mid-channel would develop a rich community of marine organisms.

On the western side of Tongass Narrows, the required piers would be located in an area that currently supports part of a near-continuous eelgrass bed that is interspersed with beds of kelp and an area of bull kelp. In the area where the bridge would extend southward, parallel to the airport runway, the bridge would create shade and require 6 to 7 acres of fill in an area with near-continuous eelgrass or kelp beds. Shading of marine habitats would reduce their productivity.

4.15.3.3 Alternative C3(b)

This bridge alternative would have impacts similar to those of Alternative C3(a) and C4, except that it would avoid some pier placement and shading impacts on kelp, eelgrass, and other shallow-water organisms off the barge dock and the beach north of the airport floatplane dock by crossing over deeper water.

4.15.3.4 Alternative D1

This bridge alternative would adversely affect marine habitats, but fewer such resources than the other bridge alternatives near the airport (i.e., C3[a], C3[b], and C4). This is because no pier would be required in near-shore waters on the eastern side of Tongass Narrows, and the length and area of shoreline affected by the bridge and road along the southern half of the airport shoreline would be shorter. About 4 acres of marine habitat would be filled.

4.15.3.5 Alternative F1 (DOT&PF and FHWA Preferred)

Alternative F1 would likely have few impacts on eelgrass and kelp beds. The East Channel bridge of Alternative F1 would cross kelp beds on both the eastern and western shores at approximately 200 feet above the water. Because the bridge would be so high, little reduction in productivity of these kelp beds from shading is expected. Piers on both sides would avoid productive shallower near-shore waters.

The West Channel bridge crossing of Alternative F1 would require three piers in Tongass Narrows. Two of these would be placed in deeper waters, likely avoiding direct impacts on marine vegetation, but the western pier would be in shallower waters that support kelp and/or eelgrass beds. The West Channel bridge of Alternative F1 would be 120 feet above the water surface over these beds and over the mid- and upper intertidal vegetation along Gravina and Pennock Islands. Because the bridge is high, little reduction in productivity is expected.

4.15.3.6 Alternative F3

The bridge construction associated with Alternative F3 would likely have few **direct** impacts on eelgrass and kelp beds. The eastern take-off of Alternative F3 from Revillagigedo Island for the East Channel bridge would require an abutment along the shoreline in the vicinity of the south dump. This shoreline contains mixed gravel-sand beaches interspersed with much debris, such as broken glass and metal. The East Channel bridge of Alternative F3 would cross kelp beds on both the eastern and western shores at approximately 60 feet above the water. Shading by this bridge would likely reduce the productivity of those kelp beds. Piers on both sides would avoid productive shallower near-shore waters.

The West Channel bridge crossings of Alternative F3 would require two piers in Tongass Narrows. These piers would likely avoid direct impacts on marine vegetation because they would be placed in deeper waters. The West Channel bridge of Alternative F3 would be 200 feet above the water surface over these beds and over the mid- and upper intertidal vegetation along Gravina and Pennock Islands. Because the bridge is high, little reduction in productivity is expected.

Blasting and dredging associated with modification of West Channel would remove approximately 16 surface acres of subtidal slopes and associated vegetation from areas adjacent to Gravina and Pennock Islands. This action would eliminate **approximately 0.03 acre of** eelgrass and **3.50 acres of** kelp beds located in this area. However, this vegetation may reestablish itself after project completion. The channel widening could also adversely affect the densities of hard-shell clams (littleneck and butter clams) located within the project impact area. **There would be no noticeable effect on net flow through West Channel; therefore, no measurable impact on marine communities adjacent to the channel entrances is anticipated.**

4.15.3.7 Alternative G2

Construction of a ferry terminal at Peninsula Point on Revillagigedo Island would fill over a portion of the rich rocky intertidal face of the point. However, because of the steepness of this face, the net area affected would be relatively small, and similar organisms would reestablish on the new hard structures placed for the terminal.

Construction of the ferry terminal at Lewis Point on the western side of Tongass Narrows would likely eliminate some of **the** areas of eelgrass **and some of the kelp beds** that lie offshore of the rocky point and in silty-sand pocket beaches at the base of the rocky intertidal outcrops. These same pocket beaches **and those lying to the south on the shore** have very high densities of butter and littleneck clams**, cockles, mussels, and soft-shell clams, three types of sea star, and lesser amounts of horse clams. A portion of this diverse community of organisms would be eliminated by this alternative.**

Ferry alternatives could result in substantial scour of the bottom of the channel in areas under and near the loading ramps. Propeller scour caused by power reversal during docking would eliminate existing unconsolidated surficial sediments and associated biota over a small area (assumed 0.1 acre for each ferry docking area) shoreward of the berth.

4.15.3.8 Alternative G3

Under this alternative, placement of a ferry terminal at Bar Point on Revillagigedo Island would disrupt a portion of the rich rocky intertidal bench at this site. Beds of eelgrass, kelp, and other algae offshore of Bar Point could be eliminated by project-related dredging and/or filling to extend the existing pier.

A band of kelp and other algae would also likely be eliminated by dredging at the proposed western ferry terminal near East Clump Island on Gravina Island. The ferry terminal would also be located partially on a relatively broad intertidal bench that has a mix of habitat types, with bedrock outcrops in a mixed-soft (cobble/gravel/silt) lower beach and a mixed gravel/cobble upper beach. This mix of habitat types supports a diverse community of organisms (including hard-shell clams, which are abundant on the lower beach), and this alternative would eliminate approximately 1.7 acres of this habitat.

Ferry alternatives could result in substantial scour of the bottom of the channel in areas under and near the loading ramps. Propeller scour caused by power reversal during docking would eliminate existing unconsolidated surficial sediments and associated biota over a small area (assumed 0.1 acre for each ferry docking area) shoreward of the berth.

4.15.3.9 Alternative G4

This alternative would require construction of new ferry terminals near the existing terminals on each side of Tongass Narrows. Both terminals would be close to deep water and would require little dredging. Also, both would be constructed in areas that are already riprapped, and thus would avoid impacts on natural intertidal areas. Narrow bands of bull kelp lie offshore of the proposed eastern terminal and would be eliminated in the area of construction.

Ferry alternatives could result in substantial scour of the bottom of the channel in areas under and near the loading ramps. Propeller scour caused by power reversal during docking would eliminate existing unconsolidated surficial sediments and associated biota over a small area (assumed 0.1 acre for each ferry docking area) shoreward of the berth.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Marine habitat mitigation is included in the description of mitigation for essential fish habitat at the end of Section 4.15.4.4. Further mitigation for adversely affected marine habitat may be determined at the time of project permitting with input from DNR, NOAA Fisheries, COE, and USFWS.

4.15.4 Wildlife—Aquatic Species

4.15.4.1 Marine Mammals

No Action Alternative

The No Action Alternative would involve continued slight disturbance of marine mammals in the project area by routine shipping, engine noise, and occasional in-water construction in Tongass Narrows.

Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), and F3

No additional impact to marine mammals is anticipated from operation of any of the bridge alternatives once constructed. Marine mammal habitat and food sources are not expected to be substantially affected. Section 4.20 (Threatened and Endangered Species) describes potential impacts to Steller sea lions and humpback whales. **Section 4.25.15 addresses construction impacts to these species. All project-related activities would conform to the pertinent provisions of the Marine Mammal Protection Act and the Endangered Species Act.**

Alternatives G2, G3, and G4

Marine mammal habitat and food sources are not expected to be substantially affected. Marine mammals could be exposed to slightly increased noise levels from increased ferry operations, but this would be of the same character of noise already present in the Tongass Narrows shipping lanes and not distinguishable from daily and annual variations. Collision with vessels is not likely, because marine mammals in general tend to avoid collisions by using their excellent auditory capabilities. Section 4.20 (Threatened and Endangered Species) describes potential impacts to Steller sea lions and humpback whales. **Section 4.25.15 addresses construction impacts to these species. All project-related activities would conform to the pertinent provisions of the Marine Mammal Protection Act and the Endangered Species Act.**

4.15.4.2 Anadromous Fish

Table 4-13 at the beginning of Section 4.15 tabulates water body crossings, piers and fill impacts to Tongass Narrows, and dredging impacts to Tongass Narrows, any of which could affect anadromous fish.

No Action Alternative

The No Action Alternative would not adversely affect anadromous fish in the project area.

Alternatives C3(a), C3(b), C4, and D1

Alternatives C3(a), C3(b), C4, and D1 would require crossings of anadromous fish streams. These alternatives would employ **clear-span** bridge crossings at two channels of Airport Creek. **No loss of EFH would occur by the placement of bridges over the creek. No fill would be required in Airport Creek because bridge abutments would be above stream floodplains.** Placing concrete, rock, and other fill materials in intertidal and subtidal areas adjacent to the airport would displace fish and permanently eliminate foraging habitat and cover. This

permanent removal of EFH could have long-term adverse effects on anadromous and fish species.[28]

Communities of small organisms typical of natural hard-bottom areas would develop on bridge piers and provide cover to small fish. Placing bridge piers in Tongass Narrows would have a slight effect on the movements of juvenile anadromous fish in near-shore areas, particularly where the bridge structure parallels the shore. However, the fish could easily swim around the structures.

A small portion of the bridge structures could slow the growth of eelgrass beds (an important habitat for juvenile salmon during their migration and an area of refuge for salmon and other small fish) by partially shading the beds. Less robust eelgrass beds would provide less eelgrass blade area to support aquatic insects and zooplankton (important food source for juvenile salmon)**.**

Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Alternatives F1 and F3 would employ **clear-span bridge** crossings of two channels of Airport Creek, Government Creek, and an unnamed creek south of Government Creek**. No loss of EFH would occur by the placement of bridges over the creeks.** Another anadromous fish stream would be crossed with a culvert. **In accordance with the memorandum of agreement between DOT&PF and ADF&G, the culvert crossing would use a Tier 1 stream simulation design, which means it would maintain natural stream conditions such as flow, substrate and existing fish passage efficiency. Any impacts to EFH would be temporary and would be related to the installation of the culvert; see Section 4.25.12.1 for construction and temporary impacts. There will be no permanent loss of EFH resulting from the culvert crossing.**

Placing bridge piers in Tongass Narrows would have a slight effect on the movements of juvenile anadromous fish in near-shore areas. However, the fish could swim around the structures. As with the other bridge alternatives, bridge piers would replace a small area of ocean bottom habitat with a community of organisms that would establish on the piers. Placing piers in intertidal and subtidal areas would displace fish and permanently eliminate small amounts of bottom foraging habitat and cover.

Alternatives G2, G3 and G4

The roadways associated with Alternatives G2, G3, and G4 would require crossings of anadromous fish streams. These alternatives would use **clear-span** bridge crossings at **the** two channels of Airport Creek. **In addition, Alternative G3 would cross Government Creek, an anadromous fish stream, with a clear-span bridge.** Direct impacts from these ferry alternatives would result from placement of pilings for ferry terminals in Tongass Narrows and dredging to produce adequate water depths for ferry terminal docking at all tidal stages. Placing ferry docks in Tongass Narrows would have a slight effect on the movements of juvenile anadromous fish in near-shore areas. However, the fish could swim around the structures. Placing pilings in intertidal and subtidal areas and shading these area would displace fish and permanently eliminate foraging habitat and cover. Alternative G3 would affect approximately 1.7 acres (see Table 4-11, at the beginning of Section 4.14).

[28] DOT&PF, *Gravina Access Project Biology Report,* prepared by HDR Alaska and Pentec Environmental, October 2001.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

All anadromous stream crossings would be designed to minimize impacts on proper stream function and, at fish streams, to provide passage to both anadromous and resident fish. **At all stream crossings (both culverts and bridge crossings), stream banks would be re-contoured to approximate original conditions and re-seeded with native vegetation to minimize erosion.** All road structures crossing other fish habitat would be designed to provide passage for resident fish. To mitigate the effects of placing bridge piers in near-shore areas, all such structures would be located in a manner that would leave a near-shore migration corridor (down to at least –5 feet MLLW) clear of obstruction. The footprint of fill placed in marine waters would be minimized.

4.15.4.3 Marine Fish

No Action Alternative

The No Action Alternative would not adversely affect marine fish in the project area.

Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The adverse impacts of the build alternatives on marine fish would be similar to the impacts on anadromous fish in Tongass Narrows, discussed in Section 4.15.4.2 (Anadromous Fish), above. In particular, impacts on eelgrass beds could reduce the availability of spawning sites for Pacific herring and other marine fish (refer to Table 4-14 for impacts to eelgrass and kelp). Herring, herring eggs, and larvae are an important source of food for a wide variety of fish, mammals, and birds. In addition, the loss of soft-bottom substrate to bridge pier foundations would reduce habitat for halibut and other bottom-dwelling species.

Placing concrete, rock, and other fill materials or removing materials in intertidal and subtidal areas would displace fish and permanently eliminate spawning and foraging habitat. This permanent habitat removal could have long-term effects on some fish species (such as Pacific herring, surf smelt, and Pacific sand lance) that depend on the middle to upper intertidal and subtidal zones for spawning and rearing.

4.15.4.4 Essential Fish Habitat

An Essential Fish Habitat (EFH) Assessment was completed in order to satisfy Federal agency consultation and response requirements with NOAA Fisheries. The EFH Assessment concluded that the proposed Gravina Access Project Alternatives have the potential for adverse impacts to EFH in the project area. Adverse impacts to EFH include direct, indirect, site-specific, and cumulative impacts. The impacts are expected to be localized and minimal. Extensive interagency discussion and negotiation have resulted in mitigation measures to address and minimize these impacts. For more detailed information on impacts to EFH, refer to Appendix O, Essential Fish Habitat Assessment.

Direct Impacts to Essential Fish Habitat
All build alternatives would require placement of either pier footings (for bridge alternatives) or pilings (for ferry facilities) in shallower waters (e.g., shallower than -50

feet MLLW) near the shoreline of Tongass Narrows. Table 4-13 at the beginning of Section 4.15 shows the required number of piers, water body crossings, amount of roadway fill for Tongass Narrows, and the dredging quantity for each alternative. Relatively small areas of essential fish habitat would be permanently lost in all cases, although the alternatives have varying impacts, as described in the subsections below. The impacts of construction are addressed in Section 4.25.12.3 under Aquatic Animals and an EFH subsection. This section and 4.25.12.3 should be read together.

Table 4-14 characterizes the acreage loss of EFH for each alternative. See Appendix O, Essential Fish Habitat Assessment, for more information on impacts to EFH**.**

TABLE 4-14
POTENTIAL IMPACTS ON ESSENTIAL FISH HABITAT

		Bridge Alternatives						*Ferry Alternatives*		
Type of EFH	*No-Action*	*C3(a)*	*C3(b)*	*C4*	*D1*	*F1*	*F3*[3]	*G2*	*G3*	*G4*
Marine EFH (approximate acreage)										
Dredging	0	0	0	0	0	0	16.0	0.20	2.14	1.22
Shading[a]	0	0	0.3	0	0	0	0.1	0.5	1.6	0.3
Filling	0	6.1	6.5	6.7	4.1	0	0	0	0	0
Pier Area[b]	0	0.13	0.21	0.13	0.18	0.16	0.16	0*	0*	0*
Marine Total[c]	0	6.3	7.1	6.9	4.3	0.2	16.2	0.7	3.8	1.6
The following three lines indicate subsets of the marine total shown above										
Eelgrass	0	0.02	0.00	0.04	0.00	0.02	0.03	0.08	0.29	0.00
Kelp	0	2.79	2.99	2.75	1.64	0.02	3.01	0.29	1.36	1.01
Saltmarsh	0	0	0	0	0	0	0	0.1	1.70	0
Freshwater EFH (number of crossings)										
EFH Streams[d]	0	2	2	2	2	5	5	2	3	2

[a] Area that is covered by over-water structures fewer than 30 feet above MHHW, both for ferry docks and the low portions of bridge alternatives. Ferry loading transfer bridge assumed to be 24'x140'; floating barge 24'x60'; apron 24'x24'.

[b] Bridge alternatives include piers 30'x30'. Ferry alternatives include small-diameter pilings, but these are not calculated. The impact of ferry pilings is included under the shaded area (two lines above).

[c] Marine Total is the total of the first four lines of the table. Impacts include loss of habitat and change in habitat function. Eelgrass, kelp, and saltmarsh impacts are a subset of this total. Total is rounded up to the next tenth acre.

[d] Number of anadromous fish streams shaded by bridge or covered with culvert. No permanent loss of EFH is anticipated at these locations.

No Action Alternative

The No Action Alternative would not adversely affect EFH in the project area.

Alternatives C3(a), C3(b), C4, and D1

Direct adverse effects of the bridge alternatives would include loss and alteration of EFH, which could cause loss of spawning areas, food sources, and cover, and permanent displacement of fish species. **These four alternatives would require the** placement of concrete, rock, and other fill materials in intertidal and subtidal areas in front of the airport. **Placement of fill** would displace fish and permanently eliminate spawning, foraging, and nursery habitat. **There would be some permanent loss of eelgrass beds from placement of fill in Tongass Narrows. Placement of fill could modify current patterns and water circulation slightly by changing the direction or velocity of water flow, or changing the rough dimensions of the bottom. These changes to water dynamics could result in increased deposition of particulates, or**

increased bed scour, either of which could reduce the area of habitats available for spawning, breeding, feeding, or growth to maturity of fish.

Table 4-13 at the beginning of Section 4.15 shows the required number of piers, water body crossings, amount of roadway fill in Tongass Narrows, and dredging quantity for each alternative.

These four alternatives would involve crossings of two forks of Airport Creek, which are anadromous fish streams. The crossings would be by clear-span bridges, therefore avoiding loss of EFH. Mitigation for all alternatives is discussed under Construction Impacts in Section 4.25.12.4.

Alternatives F1 (DOT&PF and FHWA Preferred), and F3

Direct adverse effects of the F1 and F3 bridge alternatives would include loss and alteration of EFH through placement of piers in East and West Channels, which would cause minor loss of spawning areas, food sources, and cover, and minor permanent displacement of fish species.

In addition, the widening of West Channel to improve navigation clearances would modify the localized nearshore tidal flow regime slightly, but would not affect overall flow through West Channel. Altered hydrology in the channel would not substantially impact benthic assemblages or productivity outside of the area directly modified. Channel modification would require the removal of approximately 59,000 cubic yards of surficial sediment material and 125,000 cubic yards of fractured rock and solid bedrock. Dredging in West Channel would remove approximately 16 acres of subtidal habitat from areas adjacent to Gravina and Pennock Islands (Table 4-14). This action would eliminate approximately 3 acres of existing kelp beds including *Nereocystis* and *Laminaria*, and 0.03 acre of eelgrass beds (see Table 4-14). This would affect 0.75 acre of sea cucumber (*Parastichopus californica*) habitat.

Newly exposed soil and rock surfaces would be recolonized over a period of several years. Newly exposed lower rock at depths from the lower intertidal zone to about –20 feet MLLW would be recolonized by epibenthic biota similar to that seen at low tide levels on the existing west shore, including red algae, kelp, and a variety of other small species. Subtidal rock would be colonized by a wide variety of invertebrates such as coral (*Balanophyllia elegans*), erect bryozoan (*Dendrobenia lichenoides*), scallop (*Chalmys hasata*), gastropods (*Scabrotrophon maltzani* and *Trichotropus cancellata*), white limpet (*Acmaea mitra*), sea peach (*Halocynthia auranthium*), and several other hydroids and bryozoans. A variety of red algae is expected to form an understory, and large *Laminaria* species are expected to form an overstory. Bull kelp will recolonize at depths down to about –20 to –25 feet MLLW. Red algae will form the deepest zone and may extend to –50 feet MLLW. Pockets of newly exposed sediment and sediment that accumulates in rock crevices will be colonized by an infauna composed of a variety of polychaetes, crustaceans, bivalves, echinoderms, and other taxa.[29] Because of the loss of some shallow water habitats, especially on the southwest side of the channel, overall productivity in the area would be less than current productivity in the existing shallower areas.

[29] Jon Houghton, Pentec, pers. communication to Sirena Brownlee, HDR 2003

These two alternatives would cross four anadromous fish streams (two forks of Airport Creek, Government Creek, and an unnamed creek) and would use clear-span bridges to avoid loss of EFH. Another unnamed anadromous fish stream would be crossed using a culvert. In accordance with the memorandum of agreement between DOT&PF and ADF&G, the culvert crossing would use a Tier 1 stream simulation design, which means it would maintain natural stream conditions such as flow, substrate, and existing fish passage efficiency for the fish in the stream. Changes in the hydrology of smaller creeks would be minimized by designing culverts that are appropriately sized and placed, accommodate storm water flow, and do not cause scour. The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act. The road and bridge designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would be approved by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. Any impacts to EFH would be temporary and would be related to the installation of the culvert; see Section 4.25.12.1 for construction and temporary impacts. There would be no permanent loss of EFH resulting from the culvert or bridge crossings. EFH mitigation for all alternatives is discussed under Construction Impacts below and in Section 4.25.12.3.

Alternatives G2, G3, and G4

Direct adverse effects of the ferry alternatives would include loss and alteration of EFH, which could cause loss of spawning areas, food sources, and cover, and permanent displacement of fish species. **Alternative G2 would require the removal of approximately 1,400 cubic yards of material near the proposed Gravina Island terminal (approximately 0.2 acre; Table 4-14). Alternative G3 would require the removal of approximately 18,600 cubic yards of material combined from the proposed Gravina and Revillagigedo terminals (approximately 2.14 acres total; Table 4-14). Alternative G4 would require the removal of approximately 15,200 cubic yards of material combined from the Gravina and Revillagigedo terminals (1.22 acres; Table 4-14). The roadway portions of the three ferry alternatives would cross two anadromous fish streams (two forks of Airport Creek). In addition, Alternative G3 would cross Government Creek, an anadromous fish stream. All these crossings would employ clear-span bridges to avoid loss of EFH. Mitigation for all alternatives is discussed under Construction Impacts below and in Section 4.25.12.4.**

Construction Impacts to Essential Fish Habitat

See the general discussion of construction impact to aquatic animals for its applicability to marine EFH (Section 4.25.12.3). The discussion of impacts here adds further information. The first paragraphs, preceding discussion of the individual alternatives, apply similarly to all build alternatives. This section should be read with Section 4.15.4.4, which also addresses EFH impacts.

All alternatives could require limited pile driving to penetrate any existing sediment in the area and enable the pile to bear on or within rock. Geophysical surveys suggest that this soil sediment might be as much as 20 feet thick in some locations. A vibratory hammer would be used to advance the steel pile or casing (probably 18 to 30 inches in diameter for pilings to support ferry terminal facilities and 10 feet or more in diameter for bridge

pier footings) through the existing sediment until it reached bedrock; drilling then would be employed to penetrate the rock and/or install the piling or rock anchors in the rock formation.

Peak sound pressures generated by rotary drilling would be comparable to or less than that generated by clamshell dredging, and well below levels known to be harmful to fish and marine life. Sound frequencies with rotary drilling would be generally higher pitched and sound pressure levels would be steadier than they would be with clamshell dredging. As a result, there likely would be less disruption of fish movement and feeding patterns than would occur during dredging.

Blasting is the activity most likely to result in fish mortality, but most alternatives are expected to require little or no blasting (see further discussion under Alternative F3, below). No specific site studies have been conducted to describe the precise fish populations potentially at risk in the locations of each alternative. Nonetheless, the general nature of fish that might be present at each site could be deduced from the nature of the habitats present. Underwater reconnaissance by marine biologists using video equipment recorded habitats in the project area. Rocky habitats in Tongass Narrows likely support rockfish and cottids. Adjacent soft bottom areas likely support flatfish species and skates and gadids. A number of other species may be present in the water column, depending on the time of year. These could include salmonids, forage fish, and some gadids. Fish with closed swim bladders (e.g., rockfish, gadids) would be most vulnerable to sharp changes in acoustic energy from blasting, while those with open swim bladders (e.g., salmonids) would be less affected; fish lacking a swim bladder (e.g., cottids, flatfish) would be least susceptible to impact of this kind.

Alternatives C3(a), C3(b), C4, and D1

These four alternatives would have the construction activities described above, particularly reverse rotary drilling of very large diameter bridge pier footings. Shafts and casings to support the foundation for bridge piers would be placed into Tongass Narrows using a reverse rotary drill and vibratory hammer where appropriate (see Appendix O for more detailed information). Blasting is not anticipated, but minor blasting to properly seat the casing might be necessary. Mitigation measures listed below would limit the effects of these alternatives.

Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Alternatives F1 and F3 involve the construction activities described above to varying degrees, particularly drilling for the very large diameter bridge pier footings. Limited pile driving using a vibratory hammer and limited blasting might be required to seat steel casing on submerged bedrock and begin drilling to install the pier foundations. Drilling with a reverse rotary drill would be necessary to place bridge pier foundations. Mitigation measures listed below would limit the effects of these alternatives.

For Alternative F3 only, West Channel modification to improve navigation would require the removal of approximately 59,000 cubic yards of surficial sediment material, which would be removed by dredging (not blasting), and 125,000 cubic yards of fractured rock and solid bedrock, which would require blasting to be removed. Use of a clamshell dredge is the most likely method of dredging and rock removal for Alternative F3 (see

Temporary Impacts Section of Appendix O for discussion of clamshell dredges and unlikelihood of fish entrainment). The channel widening would consist of a combination of drilling, blasting, and dredging activities. The duration of these activities would be one to three months. Channel modification work would occur up to seven days a week with almost continuous disturbance from dredging and intermittent disturbance from blasting. Blasting and dredging would affect 16 acres of habitat. The eventual regeneration of most of this habitat is addressed under permanent impacts in Section 4.15.4.4. Mitigation of blasting and dredging impacts are listed below.

Alternatives G2, G3, and G4

The three ferry alternatives would involve the construction activities described above, particularly drilling of small diameter pilings. Limited pile driving, using a vibratory hammer, and limited blasting might be necessary near shore to establish pilings for ferry moorage. Mitigation measures listed below would limit impacts of these activities. The ferry alternatives might also require minor dredging in Tongass Narrows to produce adequate water depths for ferry docking at all tidal stages. Use of a clamshell dredge is the most likely method of dredging for the ferry alternatives (see Section 4.25.12.3 for discussion of clamshell dredges and unlikelihood of entrainment).

Alternative G2 would require the removal of approximately 1,400 cubic yards of material near the proposed Gravina Island terminal (approximately 0.2 acres; see Table 4-14 in Section 4.15.4.4). Alternative G3 would require the removal of approximately 18,600 cubic yards of material combined from the proposed Gravina and Revillagigedo terminals (approximately 2.14 acres total; Table 4-14). Alternative G4 would require the removal of approximately 15,200 cubic yards of material combined from the Gravina and Revillagigedo terminals (1.22 acres; Table 4-14). Dredging for the ferry alternatives might require a small amount of blasting. If blasting is necessary for the ferry alternatives, it would last two to three days and would have relatively small, localized impacts in relation to the large areas of similar habitats available in Tongass Narrows.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Construction of this project would require a Title 41 Fish Habitat Permit through the Alaska Department of Natural Resources and a U.S. Army Corps of Engineers Permit for fill in waters of the United States. Coordination with NOAA Fisheries has been ongoing during the planning of this project. The following conservation measures would be incorporated to avoid, minimize, and mitigate impacts to EFH. These are general measures that would be modified to specifically address details of the preferred alternative through further coordination with the agencies during design.

- **At all stream crossings (both culverts and bridge crossings), stream banks would be re-contoured to approximate original conditions and re-seeded with native vegetation to minimize erosion.**

- **BMPs, developed in accordance with EPA's "Storm Water Management for Construction Activities: Developing Pollution and Prevention Plans and Best Management Practices," EPA Document 832 R-92-005 (EPA 1992), and the DOT&PF Storm Water Pollution Prevention Plan Guide, would be employed to minimize the**

introduction of sediment and siltation of ponds and streams during adjacent fill placement and during culvert placement. Some related BMPs are listed in Sections 4.12; 4.14.1; 4.15.1-4.15.4; 425.10; and 4.25.11.

- **All anadromous fish stream crossings would be designed to provide passage for the salmon present in any given stream, per DOT&PF's memorandum of agreement with the Alaska Department of Fish and Game.**

- **In-water work in Tongass Narrows would be restricted, as follows. General use of boats and barges could occur year round for general survey and work on bridge structures above water. Except for blasting, dredging, and pile driving, other work in marine waters could occur July 1-February 28. As further described below, blasting, dredging, and pile driving could occur only November 1-February 28, with the possible exception of mid-channel locations, based on further consultation with the Alaska Department of Natural Resources (DNR), NOAA Fisheries, U.S. Army Corps of Engineers (COE), and U.S. Fish and Wildlife Service (USFWS).**

- **The following conservation recommendations would be followed with respect to pile driving in Tongass Narrows: A vibratory hammer would be used to drive steel piles instead of an impact hammer. Piles should be driven during low tide when in intertidal and subtidal areas.**

- **All construction in and around anadromous fish streams would take place when stream disturbances would have the least impact on anadromous fish species. The recommended time period for in-stream construction work in the Ketchikan area is June 15 through August 7 (Minnillo 2004). In-stream construction activities should completely avoid the period from August 8 through June 14. For the Ketchikan area, salmon fry generally emerge in the spring from April 15 to May 15, and the adults move into the streams by August 1 and remain through October 31 (Doherty 2003). However, timing of fry emergence and adult spawning depend on the species of fish present in each stream. For example, steelhead spawn in the spring and eggs are generally present in the stream until the middle of July. Fish surveys would be conducted in the summer of 2004 for all streams that will be affected by the project. If additional species are found to be present in the project streams, the existing timing window for in-stream construction (June 15 to August 7) might be modified to protect additional species. Construction work that occurs above the ordinary high water area of the stream and does not include in-stream construction might be conducted throughout the year (Minnillo 2004). In-water work areas, except for stream crossings by construction equipment, would be isolated from flowing waters of all anadromous fish streams.**

- **Any in-water blasting would be performed such that ground vibration (particle velocity) does not exceed 2.0 inches per second and peak water overpressure (instantaneous pressure change) does not exceed 2.7 pounds per square inch. The project would employ monitoring devices to ensure adherence to these standards. If blasting amounts are minor, and if agreed by ADF&G and NOAA Fisheries, monitoring may not be undertaken.**

- **The contractor would be required to prepare a blasting plan prior to any blasting activities. The blasting plan would need to be reviewed by NOAA Fisheries for both EFH and marine mammal impacts. A fish and invertebrate monitoring program would be required for any proposed blasting activities. Any blasting would be conducted during daylight hours only. A pre-blasting survey would be required to ensure that no fish schools are in the vicinity of the blasting area. If fish schools were detected, blasting would be delayed until they leave. A biologist would check the area and record any kills that were within 100 feet up current and 300 feet down current of the blast area after blasting is completed. Monitoring of the dredge materials might be incorporated into the blasting monitoring plan as a method for documenting organisms injured or killed in the blasting. Measures such as covering the rock to be blasted with sand might be used to dampen blast impact. In-water blasting should avoid the entire months of March through June to avoid juvenile salmonids and the period from June through October 31 to avoid adult salmon. All project-related activities would conform to the pertinent provisions of the Marine Mammal Protection Act and the Endangered Species Act.**

- **Dredged debris would be placed onto a barge where it would enter a settling basin and be disposed of on land. Only under Alternative F3, which could require substantial removal of sediment and rock, would ocean disposal be necessary. These operations for Alternative F3 would be consistent with the regulations of Clean Water Act, Section 404(b)(1) (disposal of dredged materials into waters of the U.S.) and Marine Protection, Research, and Sanctuaries Act, Sections 102 and 103. Monitoring of the dredged materials might be incorporated into the blasting monitoring plan as a method for documenting organisms injured or killed in the blasting. Dredging activities would avoid the entire months of March through October.**

- **All fueling and servicing operations would be conducted at least 100 feet away from all streams and water bodies, and fuel storage will be at least 100 feet away from all wetlands and water bodies.**

- **All necessary permits and agency approvals would be obtained prior to construction, and any permit stipulations would be incorporated into the contract specifications.**

- **Perimeter staking would be required on the outside of the disturbance area prior to construction to ensure that there is no additional impact from construction activities.**

- **Silt fences would be used adjacent to EFH stream channels, just beyond the estimated toe of fill.**

- **Gravels and streambed material would be used in the bottoms of fish passage culverts.**

- **Riprap would be placed along stream banks as necessary to maintain stream bank integrity. Placement of riprap along stream banks to maintain stream bank integrity should include the use of bioengineering techniques to improve habitat value of the riprap, by incorporation of willow stakes or other locally available vegetation.**

Mitigation measures would be finalized during the permitting process with input from DNR, NOAA Fisheries, COE, and USFWS.

4.15.5 Wildlife—Amphibians

4.15.5.1 No Action Alternative

There would be no effect on amphibian species as a result of the No Action Alternative.

4.15.5.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Roadways associated with all of the alternatives would eliminate some habitat potentially used by the rough-skinned newt and the western toad, though neither species is known to inhabit the project area. Direct impacts would include filling wetlands and uplands, clearing of habitat adjacent to roadways, and amphibian losses due to vehicle strikes.

4.15.6 Wildlife—Birds

4.15.6.1 No Action Alternative

There would be no effect on birds as a result of the No Action Alternative.

4.15.6.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

All build alternatives would result in a permanent loss of habitat for birds. This includes a variety of habitats (including marine waters, freshwater wetlands, and forests) that support some 160 bird species. All build alternatives would require construction of new road facilities. This would eliminate habitat within the road footprint (including the loss of food sources, cover, breeding grounds, and roosting sites), reduce habitat quality adjacent to the road, and increase disturbance of avian species by human activity.

Northern Goshawk

The northern goshawk, listed as an Alaska species of special concern, may use the project area and adjacent areas for nesting and foraging. However, northern goshawks use old growth and mature forest habitat, which is limited in the project area. Direct impacts from construction of a road and other associated disturbances would result in permanent removal of foraging habitat and increased disturbance from human activity. In addition, disturbances associated with road construction could potentially cause nest failure and abandonment in goshawk territories. No documented goshawk nesting occurs on Gravina or Revillagigedo Island.[30]

Bald Eagles

All proposed build alternatives have the potential to disturb breeding eagles due to the proximity of the alternatives to known nests. See Section 3.16 for information on eagle distribution. No bald eagle nest trees would need to be removed. Unmitigated proximity impacts could include

[30] Craig Flatten, Wildlife Biologist, Alaska Department of Fish and Game, personal communication Sirena Brownlee, HDR Alaska, 2002.

disturbance and stress to the eagles, possibly to the point of nest abandonment. Of the potential impacts on the bald eagle, the roadway construction phase would be the most disturbing; see Section 4.25.12.5. The resulting new roads and ferry docks or bridges would reduce perching and feeding areas for eagles along the shoreline and inland. Other possible direct impacts could include bald eagles being struck by vehicles while foraging for carrion on or along the new roadway.

Alternative G2 is located immediately adjacent to a bald eagle nest at Lewis Point. **Because of topography, the** Alternative G2 **alignment cannot be shifted to create a 330-foot buffer between the road and nest This is likely to result in displacement of nesting eagles, although eagles have nested close to human activity elsewhere in Alaska**.

The nearest fill for Alternative D1 would lie **about 225 feet from nest on Revillagigedo Island, and the road centerline would be about 285 feet from the nest. A long tongue of fill for** Alternative C4 would be located **about 160 feet from the same nest, with the road centerline about** 400 feet **from the** nest. **A nest near the Revillagigedo Island terminus of Alternative F1 lies about 690 feet from the alignment. Two nests near the mouth of Airport Creek lie about 700 feet from the proposed alignment of all alternatives. Those alignments within the primary zone (330 feet) are the most likely to be disturbed and likely would require mitigation. Those within the secondary zone (660 feet) may require mitigation.**

Mitigation of Impacts to Bald Eagles for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

If the selected alternative would **come within 330 feet of** a bald eagle nest, DOT&PF would work with USFWS to develop mitigation measures. **Alternative G2, and to a lesser degree Alternatives C4 and D1, are constrained by topography, and it may not be practical to shift the alignments to more than 330 feet away to create a buffer between the road and nest.** Biologists would be required to monitor construction activities around eagle nests, or adjacent construction activities (defined as work within 100 meters or blasting within one-half mile) would not occur during the nesting season.

4.15.7 Wildlife—Land Mammals

The indirect impacts of the increase—through access to Gravina and Pennock Islands—on wildlife populations are discussed in Section 4.26.10.2 (for Secondary Impacts; see also 4.26.13 and Section 4.27.9.2 for Cumulative Impacts). Roads act as barriers to land mammal movement and fragment habitat. Some animals will avoid the road altogether, which might be a detriment to those animals' fitness. Some animals will choose to use the new road as an easy ground travel corridor, aiding the survival of some animals, but which could lead to some animals' deaths due to collisions with vehicles.

4.15.7.1 Sitka Black-Tailed Deer

No Action Alternative

There would be no effect on Sitka black-tailed deer as a result of the No Action Alternative.

Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

All build alternatives would result in a loss and alteration of deer habitat. Direct impacts would include loss of food sources and cover, loss of winter habitat, fragmentation of habitat, permanent displacement from habitats within and adjacent to land footprints, and incidental deaths from vehicle collisions. Alternative G2 could interfere with the access of deer to winter foraging habitat immediately north of the airport.

4.15.7.2 Alexander Archipelago Wolf

No Action Alternative

There would be no effect on Alexander Archipelago wolves as a result of the No Action Alternative.

Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Direct impacts of the build alternatives on the Alexander Archipelago wolf would be similar to the impacts on the Sitka black-tailed deer because deer comprise 80 percent of the diet of the wolf on Gravina Island. All project build alternatives could affect Sitka black-tailed deer, and therefore could affect the wolf by reducing its primary prey. Collisions with cars on the new road would also be a potential direct impact on wolves.

4.15.7.3 Black Bear

No Action Alternative

There would be no effect on black bears as a result of the No Action Alternative.

Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Direct impacts on black bears would mainly consist of direct habitat loss within the footprint of the road and displacement of bears from habitat adjacent to the road due to increased human disturbance.

4.16 FLOODPLAIN IMPACTS

4.16.1 No Action Alternative

The No Action Alternative would have no effect on floodplains in the project area.

4.16.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), and F3

All bridge alternatives would avoid impacts to mapped riverine floodplains within the Borough. No work would be performed in active floodplains, which could result in a change to the base flood elevation in areas with known base flood elevations. However, all bridge alternatives would require construction within the coastal flood zone (Zone A) associated with Tongass Narrows. Base flood elevations for the Zone A coastal flood zone have not been established. Any structures in the coastal flood zone would not alter or increase the risk of flooding. No impacts to the natural hydraulics of Tongass Narrows, including tides and flooding, are expected

to result from development of one of the bridge alternatives. Sections 4.14.1 (Wetlands), 4.15.1 (Water Bodies), 4.15.3 (Marine Habitat), and 4.15.4 (Wildlife—Aquatic Species) describe the potential effects of bridge pier placement on natural resources in the floodplain and intertidal areas. Impacts on natural and beneficial floodplain values would occur only in the area of the bridge pier footprint, as described in those sections. The natural and beneficial floodplain values associated with all of Tongass Narrows would not be affected by development of a bridge alternative.

4.16.3 Alternatives G2, G3, and G4

All ferry alternatives would avoid impacts to mapped riverine floodplains within the Borough. Ferry terminals necessarily would be placed at the shoreline, which is influenced by tides as well as flooding. No work will be performed in active floodplains, which could result in a change to the base flood elevation in areas with known base flood elevations. However, all ferry terminal facilities would require construction within the coastal flood zone (Zone A) associated with Tongass Narrows. Base flood elevations for the Zone A coastal flood zone have not been established. Any structures in the coastal flood zone would not alter or increase the risk of flooding. No impacts to the natural hydraulics of Tongass Narrows, including tides and flooding are expected to result from development of one of the ferry alternatives. Sections 4.14.1 (Wetlands), 4.15.1 (Water Bodies), 4.15.3 (Marine Habitat), and 4.15.4 (Wildlife—Aquatic Species) describe the potential effects of ferry terminal development on the shoreline on natural resources in the floodplain and intertidal areas. Impacts on natural and beneficial floodplain values would occur only in the area of the ferry terminal footprint, as described in those sections. The natural and beneficial floodplain values associated with all of Tongass Narrows would not be affected by development of a ferry alternative.

4.17 WILD AND SCENIC RIVERS

There are no national or state-designated wild or scenic rivers in the project area; therefore, no impacts to these resources would result from this project.

4.18 COASTAL BARRIERS

There are no coastal barriers in the project area; therefore, no impacts to these resources would result from this project.

4.19 COASTAL ZONE IMPACTS

4.19.1 No Action Alternative

The No Action Alternative would have no adverse effect on coastal zone management.

4.19.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

All build alternatives fall within Alaska's coastal zone and are subject to consistency review under the ACMP and the Borough Coastal Management Program.[31]

[31] Ketchikan Gateway Borough, *Ketchikan District Coastal Management Program*.

During preparation of an EIS, the federal agency issuing the EIS determines whether the project is consistent with the ACMP, including the Borough's Coastal Management Program. During project permitting, the ACMP requires that each project in Alaska's coastal zone be reviewed by **State and local** coastal resource management professionals and be found consistent with the statewide standards of the ACMP and the enforceable policies of the project's coastal district. A finding of consistency with the ACMP must be obtained before permits can be issued for the project.

Although the Borough has begun an update of its Coastal Management Program, at this time, the document adopted in 1984 is still the Borough's official coastal management program. FHWA finds the project generally to be consistent with the plan's enforceable policies, and the project is specifically addressed in policy C6:

> **Adequate public access (improved ferry service or a hard link) to future commercial/industrial development on the Airport Reserve shall be encouraged, ensured, and/or provided.**

There are two policies, regarding bald eagles and visual effects, for which some alternatives may not be consistent or where there are inherent conflicts between policies. Where bald eagle nests lie close to project alternatives, those alternatives appear to be inconsistent with the coastal management policy E2:

> **No construction shall take place within 330 feet of a tree with an active eagle nest without first consulting the local Fish and Wildlife Service, and development within this radius shall be limited to low density residential uses.**

Portions of Alternatives G2, C4, and D1 are closer than 330 feet to nest trees and, especially for Alternative G2, there may be no way to avoid such proximity. See Section 4.15.6 for further discussion effects to bald eagles.

Policy G1 states:

> **New State roads shall be designed and landscaped to blend with their surroundings and to complement and water views.**

Visual impacts are addressed in this EIS in Section 4.23. All build alternatives add new structures and roads to the visual environment. The bridges are the most substantial new visual element. As stated in Section 4.23, if a build alternative were selected, design quality, art, and architecture would be taken into consideration during final project design and planning. The Alaska State Council on the Arts and the Ketchikan Area Arts and Humanities Council would be consulted during the final design phase if a build alternative were selected.

Based on this discussion, FHWA finds that Alternative F1, the DOT&PF and FHWA preferred alternative, is consistent with the ACMP.

4.20 THREATENED AND ENDANGERED SPECIES

A stand-alone biological assessment for the Steller sea lion and humpback whale was prepared and sent to NOAA Fisheries during preparation of the FEIS. This assessment is included in Appendix T.

4.20.1 Steller Sea Lions

4.20.1.1 No Action Alternative

There would be no new impacts to Steller sea lions under the No Action Alternative.

4.20.1.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

No additional impact to the Steller sea lion population is anticipated from operation of any of the build alternatives. The habitat and population of sea lion prey, principally off-bottom fish, is not expected to be substantially affected. Sea lions could be exposed to increased noise from project operation (principally ferry engines) from Alternatives G2, G3, and G4, but this would be of the same character of noise already present in the Tongass Narrows shipping lanes and not distinguishable from daily and annual variations. Collision with vessels is not likely, because marine mammals in general tend to avoid collisions by using their excellent acoustic capabilities. A June 4, 2001 letter from NOAA Fisheries provides the response to the request for informal consultation in accordance with Section 7 of the Endangered Species Act (see Appendix R). DOT&PF and FHWA have determined that the project is not likely to adversely affect Steller sea lions. Construction impacts are discussed in Section 4.25.15.

4.20.2 Humpback Whales

4.20.2.1 No Action Alternative

Movements of humpback whales would continue to be slightly altered by ferry operations associated with the No Action Alternative.

4.20.2.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The completed project is expected to have no population-level effects on humpback whales in Tongass Narrows distinguishable from natural variations. Occasional individual passing whales could be exposed to increased noise from project operation (principally ferry engines/propellers); however, whales hear such noise in the area now, because Tongass Narrows is a busy shipping lane. They would likely move away from areas of excessive noise and disturbance. They do not stay in Tongass Narrows for extended periods; therefore, these disturbances are not expected to have a measurable impact on humpback whales. In 2001, NOAA Fisheries provided a response to a request for informal consultation in accordance with Section 7 of the Endangered Species Act (see Appendix R). In 2004, DOT&PF transmitted a Biological Assessment to NOAA Fisheries that concluded that "the proposed action will not likely affect listed [Threatened and Endangered] Species." NOAA Fisheries concurred with the DOT&PF

and FHWA conclusion that "the Gravina Access Project is not likely to adversely affect listed species or their designated critical habitat."[32] Construction impacts are discussed in Section 4.25.15.

4.21 HISTORICAL AND ARCHEOLOGICAL PRESERVATION

Under Section 106 of the National Historic Preservation Act,[33] any impact, direct or indirect, "that alters any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity location, design, setting, materials, workmanship, feeling, or association" of the property is an adverse effect.

Because the build alternatives under consideration consist of several corridors, a phased process is being used to conduct identification and evaluation efforts per 36 CFR 800.4(b)(2). The likely presence of historic properties within the area of potential effect (APE) for each alternative has been established through background research, consultation, an appropriate level of field investigation, and determinations of eligibility. The level of effort, to date, has been commensurate with the number of alternatives under consideration, the likely effects of the undertaking, and the views of the SHPO. At the time the fieldwork was conducted, as late as August 2002, there was no preferred alternative (DOT&PF and FHWA identified Alternative F1 as the preliminary preferred alternative in January 2003).

Concern was expressed regarding potential grave sites on the eastern side of Pennock Island, but a qualified archaeologist conducted a reconnaissance level ground survey of the Alternative F1 alignment and no graves were found. FHWA has determined, and SHPO has concurred[34], that no historic properties would be affected by Alternative F1, the DOT&PF and FHWA preferred alternative. The following paragraphs consider those cultural sites noted in Chapter 3 that are within the APE for the reasonable alternatives (see Section 3.21.2). **Construction impacts on historical and archeological preservation are further discussed in Section 4.25.16. Potential indirect effects to archeological and historic resources are described in Section 4.26.14 and cumulative impacts are discussed in Section 4.27.10.**

4.21.1 No Action Alternative

The No Action Alternative would have no direct effect on cultural resources.

4.21.2 Alternatives C3(a), C3(b), C4, D1, G2, G3, and G4

There are no known or suspected historic or archeological resources within the APE for Alternatives C3(a), C3(b), C4, D1, G2, G3, or G4. Therefore, there would be no impact on Section 106 resources under these alternatives. Should any of these alternatives later be selected as the DOT&PF and FHWA Preferred alternative, a reconnaissance level survey (including a foot survey) could be undertaken.

[32] January 26, 2004 letter from Bill Ballard to Kaja Brix, NOAA Fisheries, and February 17, 2004 letter from James Balsiger, NOAA Fisheries, to Bill Ballard.

[33] National Historic Preservation Act, as amended (Executive Order 11593; 23 CFR 771; 36 CFR 60, 63, and 800).

[34] April 16, 2004, letter from Judith Bittner, SHPO, to Tim Haugh, FHWA.

4.21.3 Alternative F1 (DOT&PF and FHWA Preferred)

The FHWA, in consultation with DOT&PF, has determined the craftsman house (KET-776) not eligible for the National Register, **and the SHPO has concurred.** The historic dumpsite (KET-435) is also within the APE for visual effects but not physical effects. Because of the nature of this site as a dumpsite, visual impacts are not an issue, and this site was not considered further.

The buildings found on the eastern side of Pennock Island during the field reconnaissance for this project (KET-774) **are outside the APE of Alternative F1 for physical impacts by about 200 feet, but within the APE for visual effects.** The determination of eligibility performed for this project indicated that these cabins are significant under National Register Criterion D (information potential) and therefore eligible for the National Register. **FHWA determined that there would be no effect. The SHPO concurred with the determination of eligibility and the determination of no effect to KET-774.**

On Gravina Island, **about 300 feet north of the alignment of the Alternative F1 West Channel bridge,** are the remains of a large barge, a cabin, and a large engine. There is also a "boat way" cleared through the rocks on the beach in front of the cabin. These comprise KET-775. **The site is outside the APE for physical effects, but within the APE for visual effects.** The forest along the shore is dotted with cut stumps and at least one culturally modified tree (CMT). The FHWA determination of eligibility for this project found KET-775 eligible for the National Register under Criterion D (information potential). **FHWA determined that there would be no effect. The SHPO concurred with the determination of eligibility and the determination of no effect to KET-775.**

A house, shed, and chicken coop site lies within the APE for visual effects, but outside the APE for physical effects. The site was not located in the field, and it was confirmed that this site is not within the APE for direct, physical effects. Based on examination of aerial photographs and investigation along the beach, it is assumed that the site, if it exists, could be important only for its information potential and is not subject to visual effects.

Based on the FHWA determination of eligibility, and in accordance with 36 CFR 800.4(a) and (c), none of these sites would be affected. **The Alternative F1 bridge alignment would avoid the KET-774 and KET-775 sites. The sites are within the APE for visual effects only, and, because of their eligibility under Criterion D, there would be no impact. A reconnaissance level survey (including a foot survey) for subsurface archeological resources within the construction footprint will be conducted for Alternative F1 during the final design process, pursuant to a March 4, 2004 letter from SHPO to FHWA.[35]**

Therefore FHWA determined, and the SHPO concurred, that there would no historic properties affected by Alternative F1.

4.21.4 Alternative F3

KET-435, the historic dumpsite, is within the Alternative F3 APE for visual effects, but not physical effects. Because of the nature of the site as a dumpsite, visual impacts are not an issue, and this site was not considered further.

[35] March 4, 2004 letter from Judith Bittner, SHPO, to Edrie Vinson, FHWA.

The buildings found on the eastern side of Pennock Island during the field reconnaissance for this project (KET-774) are within the APE of Alternative F3 for visual effects, but not physical impacts. The FHWA determination of eligibility performed for this project indicated that these cabins are significant under National Register Criterion D (information potential) and therefore are eligible for the National Register. **The SHPO concurred.** Because this site is significant under Criterion D only, and lacking integrity for preservation in place, it is not subject to visual effects.

On Gravina Island are the remains of a large barge, a cabin, and large engine south of the Alternative F3 bridge alignment. There is also a "boat way" cleared through the rocks on the beach in front of the cabin. These comprise KET-775. This site is outside the Alternative F3 APE for physical effects, but within the APE for visual effects. The FHWA determination of eligibility for this project found KET-775 eligible for the National Register under Criterion D (information potential), **and the SHPO concurred. Because this site is significant under Criterion D only, and lacking integrity for preservation in place, it is not subject to visual effects.**

A house, shed, and chicken coop site lies within the APE for visual effects but outside the APE for physical effects. The site was not located in the field, and it was confirmed that this site is not within the APE for direct, physical effects. Based on examination of aerial photographs and investigation along the beach, it is assumed that the site, if it exists, could be important only for its information potential and is not subject to visual effects.

Based on the FHWA determination of eligibility, and in accordance with 36 CFR 800.4(a) and (c), none of these sites would be affected. All are within the APE for visual effects only, and none is subject to visual effects.

4.22 HAZARDOUS WASTE SITES

A preliminary analysis of hazardous waste sites that could affect project development was conducted for each of the project alternatives, based on database searches and site reconnaissance. Appendix P provides a detailed description of hazardous waste sites identified in the analysis as sites that could affect the project alternatives.

4.22.1 Known Sites

4.22.1.1 No Action Alternative

No known hazardous waste site would be affected by the No Action Alternative.

4.22.1.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Four known hazardous waste sites were identified in the preliminary hazardous waste sites investigation as being near the construction right-of-way of one or more build alternatives: the USCG Station and Ketchikan Tank Farm near Alternative F1, Bailey Power Plant near Alternative G4, and a leaking underground storage tank at the airport (see Table 3-24). For all build alternatives, the location and extent of the release from the LUST at the airport should be determined prior to construction. Further investigation would include a Phase I Hazardous Waste Site Investigation in accordance with guidelines of the American Society for Testing and

Materials (ASTM E1527-00, 2000), which would include interviews with property owners, a review of historical documents, regulatory agency consultation, and complete site inspection. The Phase 1 investigation at the airport should include a review of all tenant operations involving hazardous materials; i.e., the RCRA permitted sites operated by Alaska Airlines, Taquan Air Service, Petro Marine Services, and Pro Mech (see Table 3-23). The investigation would characterize hazardous materials transport, storage, use, and disposal practices and identify potential releases of hazardous wastes.

None of the other known hazardous waste sites identified in the analysis (see in Section 3.22) is within the construction right-of-way. Although the three contaminated areas at the USCG Station are close to Alternative F1, the contaminants are downgradient from the alignment or the alignment is outside of the migratory pathway of the contaminants. Therefore, the known hazardous waste releases at the USCG Station would not affect development of Alternative F1. The Ketchikan Tank Farm, also close to Alternative F1, is downgradient from any construction areas associated with Alternative F1 and therefore not a concern for development of that alternative. Similarly, the Bailey Power Plant would not affect Alternative G4 because migration pathways from the site do not intersect the proposed Alternative G4 ferry terminal.

4.22.2 Potential Sites

The following paragraphs identify properties where, based on visual inspection and database review, further investigation is recommended to determine whether hazardous wastes are present. Sites recommended for further study would be subject to a Phase I Hazardous Waste Site Investigation in accordance with guidelines of ASTM E1527-00 and would include interviews with property owners, a review of historical documents, regulatory agency consultation, and site inspection. The recommendation for future study is made if the property would be acquired for construction of the selected alternative. If a release of hazardous materials is identified during the Phase I investigation, a sampling plan would be developed to determine the extent of the release and establish an approach to site remediation. Contaminated sites identified during the Phase I investigations would be remediated prior to construction to eliminate the human health hazard.

If unknown hazardous materials were encountered during construction, construction contractors would be required to meet all federal, state, and local regulatory requirements regarding the discovery and use of hazardous materials. These regulatory requirements include worker right-to-know and safety training for the discovery and use of hazardous materials. Construction contractors on site must be trained to meet federal, state, and local regulatory requirements in recognizing and reporting discovery of unknown contamination, and proper use and handling of hazardous materials during construction. The contractor would be expected to isolate the area and prevent migration of any contaminants.

4.22.2.1 No Action Alternative

The No Action Alternative would not involve any property acquisition or construction activity; therefore, this alternative would have no effect on the potential hazardous waste sites in the project area.

4.22.2.2 Alternative C3(a) and C3(b)

At the intersection of Tongass Avenue and Signal Road, the proposed alignments would be located directly north of a car dealership. Construction right-of-way would be required within the car dealership property. Previous use of this property may have involved the use of hazardous materials and/or the generation of hazardous wastes. Current practices at the car dealership (e.g., vehicle maintenance and repair) could have resulted in the release of hazardous wastes (e.g., solvents, used oil, battery fluids) to the environment. If Alternative C3(a) or C3(b) were selected, a Phase I investigation of the car dealership property should be conducted to characterize the hazardous waste potential of the site.

4.22.2.3 Alternatives C4 and D1

Alternatives C4 and D1 would traverse the Ketchikan Ready-Mix and Quarry. A construction staging area with construction waste (e.g., rusted metal, lumber, and 55-gallon drums) is located adjacent to the alignment of Alternative C4 and within the alignment of Alternative D1. If Alternative C4 or D1 were selected, a Phase I investigation is recommended to determine whether hazardous wastes have been released at the quarry site and associated construction staging area.

The South Coast Inc. property located on Tongass Avenue near the Alternative C4 bridge crossing (see Figure 3.18) has a RCRA permit. The EPA database[36] indicates there are no compliance issues associated with the site; however, there are no reported inspections of the site with respect to permit compliance. Further investigation of the site (i.e., Phase I) should be conducted if Alternative C4 were selected.

4.22.2.4 Alternative F1 (DOT&PF and FHWA Preferred)

If Alternative F1 were selected, further investigation of potential hazardous wastes should be conducted at the USCG property. Although the known contaminated sites at the USCG facility are undergoing an active cleanup program and are downgradient from the Alternative F1 alignment, a Phase I investigation of the area of the USCG property to be traversed by the alternative should be completed if Alternative F1 were selected.

The Ketchikan City Landfill, a RCRA permitted site, is also a potential source of contamination for Alternative F1. The EPA database[37] indicates there are no compliance issues associated with the site; however, there are no reported inspections of the site with respect to permit compliance. Because it is located upgradient from the proposed Alternative F1 alignment, further investigation (i.e., Phase I) of this facility should be conducted to ensure that there are no contaminants migrating offsite into the area proposed for construction of Alternative F1, if this alternative were selected.

4.22.2.5 Alternative F3

None of the properties traversed by this alignment, other than the airport (see Section 4.22.1.2), indicates the potential of hazardous wastes.

[36] EPA Region 10, Enforcement and Compliance On Line Database: http://yosemite.epa.gov/R10/ENFORCE.NSF/webpage/EC-On-Line.

[37] Ibid.

4.22.2.6 Alternative G2

Alternative G2 would involve construction of a ferry terminal and parking facilities on Peninsula Point in the vicinity of the Pro Mech aircraft hangar and the Temsco Helicopter site, and other developed lands. Past and current aircraft maintenance activities at the hangar likely involve the use of hazardous materials and disposal of hazardous wastes, some of which may have been released to the environment. If Alternative G2 were selected, a Phase I investigation of the Pro Mech hangar should be conducted to determine whether hazardous wastes have been released from the site. Other previously disturbed (cleared and filled) areas on Peninsula Point would be included in the investigation.

4.22.2.7 Alternative G3

The site of the proposed ferry terminal on Revillagigedo Island is in a commercial area on Bar Point that could have been used for activities that involved the use of hazardous materials or the generation and disposal of hazardous wastes. If Alternative G3 were selected, a Phase I investigation of this site would be required to determine whether past uses of the site could have resulted in the release of hazardous wastes to the environment.

4.22.2.8 Alternative G4

The site of the proposed ferry terminal adjacent to the existing airport ferry terminal could have been used for activities that used hazardous materials and/or generated and disposed of hazardous wastes. If Alternative G4 were selected, a Phase I investigation of this site would be required to determine whether past uses of the site could have resulted in the release of hazardous wastes to the environment.

4.23 VISUAL IMPACTS

Visual impacts of each project alternative were identified relative to the key views described in Section 3.23 (Visual Environment). The photographs in this section show a simulation of each of the project alternatives superimposed on key views in the project area. The assessment of the impacts of the alternatives, in the form of visual changes to the existing environment, is based largely on these visual simulations.

Aesthetics and scenic qualities of an area—and project-related impacts on those resources—are subjective and based on the interests and values of the viewers. For this EIS, an impact on visual quality is classified as “adverse” if a substantial new visual element is introduced into a predominantly undeveloped existing view, or if a new visual element would substantially change an existing view (such as the introduction of a major new structure in a landscape or view featuring urban development).

In general, each of the bridge alternatives would introduce a major new visual element into key views by adding a large structure across Tongass Narrows and adding roadways and/or structures to Revillagigedo and Gravina Islands, and, for Alternatives F1 and F3, Pennock Island. The ferry alternatives would add a minor new visual element to several key views in the form of added shoreline development and roadways to support ferry operations. None of the build alternatives would result in removal of existing substantial structures that contribute to the visual environment.

Construction activities associated with the build alternatives would have an adverse impact on the visual environment due to land clearing and the presence of construction equipment. These impacts are addressed in Section 4.25.18.

All build alternatives except Alternative G4 would provide new views of the landscape and Tongass Narrows for vehicles, pedestrians, and bicyclists using the new crossing.

If a build alternative were selected, design quality, art, and architecture would be taken into consideration during final project design and planning. The Alaska State Council on the Arts and the Ketchikan Area Arts and Humanities Council would be consulted during the final design phase if a build alternative were selected. Both entities are on the distribution list of this EIS and invited to comment.

4.23.1 No Action

The No Action Alternative would have no impacts on the visual environment in the project area.

4.23.2 Alternative C3(a)

Alternative C3(a) would introduce a major new visual element to the project area—a high bridge across Tongass Narrows—and would have an adverse effect on the scenic quality of the views from the Ketchikan area. The bridge would be visible from several key viewpoints: the cruise ship dock downtown, Bar Harbor, Knob Hill, the AMHS passenger terminal (Key Views 3A, 12, 5, 6, and 10A, respectively, in Section 3.23.4), and Tongass Avenue (Key View 11 shown again below, with a simulated Alternative C3(a) bridge). Views toward Tongass Narrows and Gravina Island from these locations would be partially obstructed by the presence of the bridge. In addition, this alternative would involve a roadway and structure from its terminus at Signal Road north of downtown Ketchikan that would proceed along the hillside toward the southwest. This roadway and structure would have an adverse impact on the visual environment.



Alternative C3(a) bridge from north of Wolff Point on Tongass Avenue, looking south.

4.23.3 Alternative C3(b)

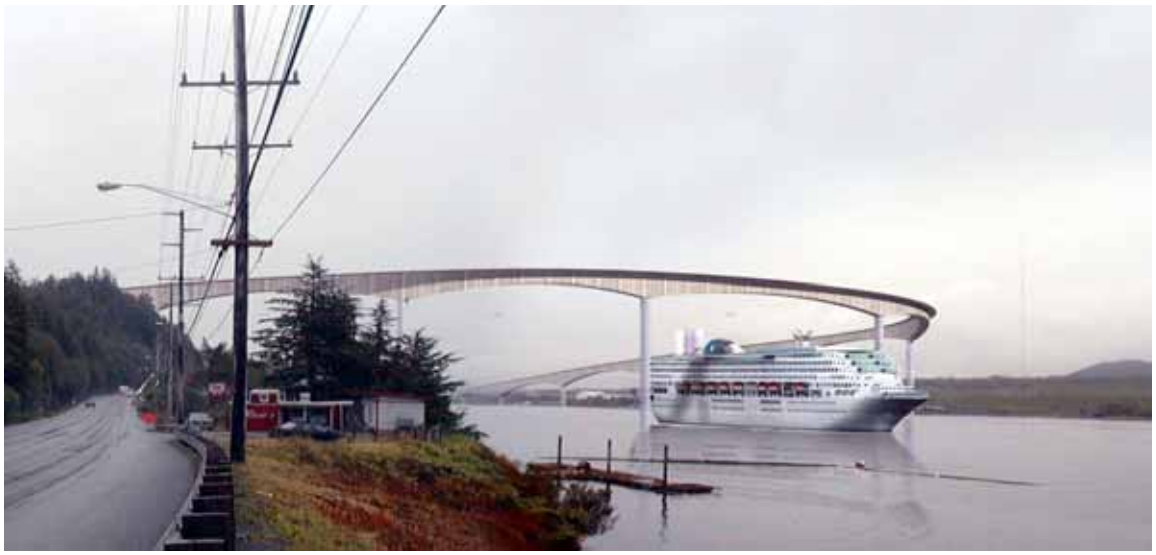
Alternative C3(b) would have similar impacts on the visual environment as Alternative C3(a), and would be visible from the same key views: the cruise ship dock downtown, Bar Harbor, Knob Hill, the AMHS passenger terminal (Key Views 3A, 12, 5, 6, and 10A, respectively, in Section 3.23.4), and Tongass Avenue (Key View 11 shown again below with a simulated Alternative C3(b) bridge). Views toward Tongass Narrows and Gravina Island from these locations would be partially obstructed by the presence of the bridge. Although the bridge structure is lower (by approximately 80 feet) than that of Alternative C3(a), the bridge still introduces a major new structural element to the visual environment. Alternative C3(b) would have an adverse impact on visual quality of the project area.



Alternative C3(b) bridge from north of Wolff Point on Tongass Avenue, looking south.

4.23.4 Alterative C4

Alternative C4 would have similar impacts with respect to crossing Tongass Narrows as Alternatives C3(a) and C3(b), and would be visible from the same key views: the cruise ship dock downtown, Bar Harbor, Knob Hill, the AMHS passenger terminal (Key Views 3A, 12, 5, 6, and 10A, respectively, in Section 3.23.4), and Tongass Avenue (Key View 11 shown again below with a simulated Alternative C4 bridge). Views toward Tongass Narrows and Gravina Island from these locations would be partially obstructed by the presence of the bridge. The Ketchikan terminus for Alternative C4 would be on Tongass Avenue near the existing airport ferry terminal, and would include a roadway and structure along the hillside before it crosses Tongass Narrows. This element of the bridge alternative would have an adverse visual impact on the area around the roadway.



Alternative C4 bridge from north of Wolff Point on Tongass Avenue, looking south.

4.23.5 Alternative D1

Alternative D1 would introduce a new visual element to the project area—a bridge across Tongass Narrows. While the bridge would be 80 feet lower than those proposed for Alternatives C3(a) and C4, it would still adversely impact the visual quality of the study area and would be visible from the same key views: the cruise ship dock downtown, Bar Harbor, Knob Hill, the AMHS passenger terminal (Key Views 3A, 12, 5, 6, and 10A, respectively, in Section 3.23.4), and Tongass Avenue (Key View 11 shown again below with a simulated Alternative D1 bridge). Views toward Tongass Narrows and Gravina Island from these locations would be partially obstructed by the presence of the bridge. Also, similar to Alternative C4, the Ketchikan terminus of Alternative D1 would be Tongass Avenue near the existing airport ferry terminal, and would require construction of a roadway and structure on the hillside to the northwest of the terminus. This roadway and structure would have an adverse impact on the visual quality of the surrounding area.



Alternative D1 bridge from near Wolff Point on Tongass Avenue, looking south.

4.23.6 Alternative F1 (DOT&PF and FHWA Preferred)

For this alternative, the East Channel bridge across Tongass Narrows would be approximately 200 feet above the water and would partially obstruct the views toward Tongass Narrows from Saxman, the USCG Station, the cruise ship docks downtown, (Key View 1, 2A, and 3 in Section 3.23.4 and Key View 2 shown again below with a simulated Alternative F1 East Channel bridge), and from upper Front Street (Key View 4, shown again below with a simulated Alternative F1 East Channel bridge). Views toward Tongass Narrows and Pennock Island from these locations would be partially obstructed by the presence of the bridge.



Alternative F1 200-foot bridge over East Channel from south of the USCG Station on Tongass Avenue, looking north.



Alternative F1 200-foot bridge from the cruise ship dock (Upper Front Street), looking south.

In addition, the alternative includes a second, lower bridge (120 feet above the water) across West Channel. Both bridges would be visible from mid-Tongass Narrows near the airport (Key View 10, shown again below with a simulated Alternative F1 West Channel bridge). Because the bridges are distant from this mid-Tongass Narrows location, they present only a minor obstruction to views southward from this viewpoint.



Alternative F1 bridges and Pennock Island from mid-Tongass Narrows near the airport, looking south.

This alternative would also include a roadway on Pennock and Gravina Islands that would adversely affect the existing, generally undeveloped visual environment of these islands. In addition, Alternative F1 would require construction of a roadway and structure from the Ketchikan terminus on Tongass Avenue, up and along the hillside to the south and east of downtown Ketchikan. This roadway and structure would have an adverse impact on the visual environment.

4.23.7 Alternative F3

For this alternative, the East Channel bridge across Tongass Narrows would be approximately 60 feet above the water and would partially obstruct the views toward Tongass Narrows from Saxman and the USCG Station (Key View 1, 2, and 2A in Section 3.23.4; Key View 2 shown again below with a simulated Alternative F3 East Channel bridge). Views toward Tongass Narrows, Pennock Island, and Gravina Island from these locations would be partially obstructed by the presence of the bridge.



Alternative F3 60' bridge over East Channel from south of the USCG Station on Tongass Avenue, looking north.

In addition, the alternative includes a second, higher bridge (200 feet above the water) across West Channel. Both bridges would be visible from mid-Tongass Narrows near the airport (Key View 10, shown again below with simulated Alternative F3 East Channel and West Channel bridges). Because the bridges are distant from this mid-Tongass Narrows location, they present only a minor obstruction to views southward from this viewpoint. This alternative would also include a roadway on Pennock and Gravina Islands that would adversely affect the existing, generally undeveloped, visual environment of these islands.



Alternative F3 bridges and Pennock Island from mid-Tongass Narrows near the airport, looking south.

4.23.8 Alternative G2

Ferry operation would not adversely affect the visual environment of Tongass Narrows. The ferry terminals for this alternative would include new parking areas and a roadway from Lewis Point to the airport. The proposed ferry terminal on Gravina Island would adversely affect the visual environment by introducing a new built element into a generally undeveloped area.



Alternative G2 ferry from Gravina Island shoreline near the northern end of the airport runway, looking north.

4.23.9 Alternative G3

The ferry terminal facilities in Ketchikan would involve redevelopment of an area with existing urban development and would not affect the visual quality of the terminal area. This alternative would adversely affect the visual environment associated with the addition of a ferry terminal and roadway on Gravina Island.



Alternative G3 ferry from the north parking area adjacent to Plaza Port West, looking northwest toward Gravina Island.

4.23.10 Alternative G4

Alternative G4 would expand the existing ferry terminal facilities in Ketchikan and involve development of an access roadway in the vicinity of the airport. This alternative would not affect the visual environment of the study area, since it would not introduce substantial new visual elements into the landscape. It would not provide new viewing opportunities.

4.24 ENERGY

The transportation systems included in this analysis rely on energy consumption for their function and mobility. Other than transportation and construction activities associated with the build alternatives, there are no actions associated with the Gravina Access Project that would require energy consumption. The availability of energy in the form of fuel (petroleum products) for motor vehicles, cruise ships, and ferry vessels would not change as a result of the Gravina Access Project alternatives. Fuel consumption would change as a result of changes in travel patterns associated with any of the project's build alternatives.

4.25 CONSTRUCTION IMPACTS

Construction impacts are the temporary impacts on environmental resources in the project area that are caused by the actual activities associated with the construction of the project. These impacts are examined separately from the permanent impacts of a project from its ongoing existence and operation.

The major potential construction activities considered in the evaluation of construction impacts in this Section 4.25 for all build alternatives are:

- Preparing foundation for bridge piers and abutments (all build alternatives include some bridge construction)
- Pile driving
- Demolishing structures and disposing of debris
- Mining borrow material (for aggregate fill)
- Material waste disposal and construction equipment staging
- Preparing foundations (grading, filling, and compacting)
- Constructing roadways
- Temporarily rerouting traffic at existing road links
- Temporary navigational restrictions

In addition, Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), and F3 would include the following construction activities:

- Drilling through rock and sediment
- Channel excavation
- Erection of shoring and falsework
- Installing piers and abutments
- Constructing bridge(s) and bridge approaches

The ferry terminal and facilities associated with Alternatives G2, G3, and G4 would include the following construction activities:

- Constructing ferry terminals
- **Dredging in Tongass Narrows**
- Constructing parking lots, passenger facilities, and docks

The following sections describe the impacts of construction of the Gravina Access Project alternatives on the project area. There would be no construction impacts associated with the No Action Alternative; therefore, that alternative is omitted from this discussion.

4.25.1 Land Use

For all build alternatives, the existing land use of some parcels could be changed temporarily to stage construction equipment and supplies. The locations of staging areas for each alternative have not been determined; therefore, specific parcels potentially affected by construction staging are not yet known. It is expected that Gravina Island and vacant land on existing construction yards would be used for staging areas where possible in order to minimize disruption of businesses, residences, and the community. Any land affected during construction would be restored to approximate original condition after the completion of construction.

4.25.1.1 Alternatives C3(a) and C3(b)

The bank and car dealership at the intersection of Tongass Avenue with Signal Road would be affected by construction. The existing use of these properties during construction would be disrupted by the movement of vehicles and equipment adjacent to and across portions of these properties. Movement of construction equipment adjacent to these properties would constrain

access. The movement of construction vehicles and equipment would also disrupt some residential properties along Baker Street North and Bucey Avenue North; however, access to these properties would not be impeded.

On Gravina Island, the movement of construction vehicles and equipment would affect use of open space areas along the alignment for subsistence activity, recreation, and hunting. These effects would be limited to a small corridor immediately adjacent to the construction activity.

Mitigation for Alternatives C3(a) and C3(b)

The DOT&PF would work with the businesses and local residents to maintain property access throughout the construction phase, using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be selected in a fashion that minimizes disturbance, and properties and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.25.1.2 Alternative C4 and D1

The Ketchikan Ready-Mix and Quarry would be affected by construction. The existing use of this property during construction would be disrupted by the movement of vehicles and equipment adjacent to and across the property. Movement of construction equipment adjacent to the property would constrain access. On Gravina Island, the movement of construction vehicles and equipment would affect use of open space areas along the alignment for subsistence activity, recreation, and hunting. These effects would be limited to a small corridor immediately adjacent to the construction activity.

Mitigation for Alternatives C4 and D1

The DOT&PF would work with the Ketchikan Ready-Mix and Quarry to maintain property access throughout construction, using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be selected in a fashion to minimize disturbance, and properties and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and have clear demarcation lines to prevent encroachment into adjacent areas.

4.25.1.3 Alternative F1 (DOT&PF and FHWA Preferred)

Alternative F1 would affect the R&S Construction quarry, potentially affecting access to portions of the southern end of the site. Beyond the R&S Construction quarry, Alternative F1 would affect an area currently used, somewhat informally, for old construction equipment storage. The stored equipment would have to be moved to another site. Alternative F1 would cross the USCG Station property; however, construction activities would occur in a portion of the property not currently used by the USCG for its operations or training. Alternative F1 is not expected to affect existing developed land use on Revillagigedo Island. On Gravina and Pennock Islands, the movement of construction vehicles and equipment would affect use of open space areas along the alignment for subsistence activity, recreation, and hunting. These effects would be limited to a small corridor immediately adjacent to the construction activity.

Mitigation for Alternative F1 (DOT&PF and FHWA Preferred)

Construction staging and movement would be constrained within construction easements. Activities within the USCG Station property would be closely coordinated with USCG officials. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.25.1.4 Alternative F3

No land uses on Revillagigedo Island would be directly affected by construction vehicles and equipment. On Gravina and Pennock Islands, the movement of construction vehicles and equipment would affect use of open space areas along the alignment for subsistence activity, recreation, and hunting. These effects would be limited to a small corridor immediately adjacent to the construction activity.

Mitigation for Alternative F3

Construction staging and movement would be constrained within construction easements. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.25.1.5 Alternative G2

Commercial properties along the Peninsula Point access road would be affected by construction. Use of these properties during construction would be disrupted by the movement of vehicles and equipment adjacent to and across the properties. Movement of construction equipment adjacent to the properties would constrain access.

On Gravina Island, the movement of construction vehicles and equipment would affect use of open space areas along the alignment for subsistence activity, recreation, and hunting. These effects would be limited to a small corridor immediately adjacent to the construction activity.

Mitigation for Alternative G2

DOT&PF would work with the commercial properties near Peninsula Point to maintain property access throughout construction, using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be selected in a fashion that minimizes disturbance, and properties and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.25.1.6 Alternative G3 and G4

No land uses on Revillagigedo Island would be affected by movement of construction vehicles and equipment. On Gravina Island, the movement of construction vehicles and equipment would affect use of open space areas along the alignment for subsistence activity, recreation, and hunting. These effects would be limited to a small corridor immediately adjacent to the construction activity.

Mitigation for Alternatives G3 and G4

Construction easements would be selected in a fashion that minimizes disturbance. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.25.2 Social Environment

4.25.2.1 Population and Social Groups

None of the build alternatives would have an adverse construction impact on the size or composition of the general population, or on any distinct population group (i.e., minority, low-income, elderly, or handicapped).

4.25.2.2 Neighborhoods and Community Cohesion

Construction would have temporary and intermittent adverse impacts on travel patterns in neighborhoods near the build alternatives. Construction activities would be disruptive to normal activities in these neighborhoods because of the noise, vibration, and traffic that would be introduced to these areas. Depending on the alternative, traffic might have to be diverted during construction, and travel patterns and community access might have to be altered to accommodate construction activities and heavy equipment. Noise and vibration impacts are specifically addressed in Section 4.25.9. Traffic impacts are specifically addressed in Section 4.25.5.3.

4.25.2.3 Community and Public Safety Facilities

Construction of the build alternatives would not affect schools, medical facilities, fire stations, and the provision of public safety services in the Borough. Vehicular access to all community and public safety facilities and would be maintained throughout construction.

Construction of any of the build alternatives would adversely affect traffic on Tongass Avenue near the alternative's intersection with and/or crossing of Tongass Avenue and at the airport, which could result in delays for emergency vehicles, depending on the location of the emergency and the routes available. Traffic impacts are specifically addressed in Section 4.25.5.3.

4.25.2.4 Recreation

Construction of the build alternatives would not affect the use of parks, trails, playing fields, recreation areas and centers, and tennis courts in Ketchikan. Construction could affect fishing, hunting, hiking, and bicycling activities that might otherwise occur within or immediately adjacent to construction areas on Revillagigedo, Gravina, and Pennock Islands.

Recreational boating in Tongass Narrows would be prohibited in the immediate in-water and shorefront construction zones of the project build alternatives. However, the overall opportunity for such recreation activities would not be affected during construction. Similarly, recreational fishing, hunting, hiking, and bicycling on Revillagigedo, Gravina, and Pennock Islands would be prohibited in construction zones. However, the overall opportunity for such recreation activities would not be affected during construction.

4.25.2.5 Accessibility

Under all build alternatives, access to properties in and near construction zones could be altered by construction activities. The DOT&PF would work with the businesses and local residents to maintain property access throughout the construction phase, using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be selected in a fashion that minimizes disturbance, and properties and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.25.3 Relocation Impacts

Project construction activities would not require any temporary relocation of homes or businesses.

4.25.4 Economy and Economic Resources

4.25.4.1 Construction Spending

Construction spending associated with any build alternative would directly benefit the Ketchikan economy. The spending discussed here is money that is spent within the Borough and does not include any indirect or multiplier effects of the spending in the local area. These indirect effects (including the economic development that results because of improved access) are discussed in Section 4.26. The estimates of construction spending expected to occur within the Borough are shown in Table 4-15. Alternative F3 has the highest total local construction spending ($53.8 million) and Alternative G4 has the lowest ($29.0 million).

TABLE 4-15
ESTIMATED LOCAL CONSTRUCTION SPENDING IN THE KETCHIKAN GATEWAY BOROUGH

Build Alternative	*Construction Spending (Millions of 2003$)*			
	Materials	*Labor*	*Equipment*	*Total*
C3(a)	6.4	22.2	9.8	38.4
C3(b)	5.9	18.7	8.1	32.7
C4	6.2	23.8	13.5	43.5
D1	4.8	16.9	10.5	32.2
F1	11.3	27.3	12.9	51.5
F3	10.5	30.2	13.1	53.8
G2[1]	4.3	18.4	6.4	29.2
G3[1]	4.8	19.5	7.1	31.4
G4[1]	4.1	18.4	6.5	29.0
No Action[2]	0.9	0.5	0.7	2.1

[1] Includes replacement of one ferry, and major rehabilitation of ferry terminals in year 10 of operation.

[2] Includes replacement and pending maintenance expenses that may occur between 2004 and 2006, as well as replacement of one ferry, and major rehabilitation of ferry terminals in year 10 of operation.

4.25.4.2 Acquisition and Relocation

The money spent on the acquisition of property would benefit the Ketchikan economy although the amount of private land, and associated property tax revenues, within the Borough and the

City of Ketchikan would decrease as the rights-of-way are converted to public lands. However, it is expected that property values on Gravina Island **and Pennock Island (with the selection of Alternative F1 or F3**) would increase with improved access and infrastructure and, therefore, property taxes assessed on those lands would increase (see Section 4.26.3.5). Assessment of the acquisition and relocation effects is based on acquisition of rights-of-way for the proposed routes. A summary of the cost of land and buildings that would need to be acquired is shown in Table 4-16.

TABLE 4-16
ESTIMATED ACQUISITION COSTS

Project Alternative	*Amount of Land Acquired (Square Feet)*	*Tax Assessor's Database/Unmodified Acquisition Value ($2003)*	*Market Value ($2003)*[1]
No Action	0	0	0
C3(a)	2,012,990	553,936	587,172
C3(b)	1,977,512	802,752	850,917
C4	1,434,536	1,495,428	1,585,154
D1	1,756,764	227,731	241,395
F1	3,694,329	533,048	565,031
F3	3,182,232	47,326	50,166
G2	1,913,844	958,800	1,016,328
G3	1,099,626	3,905,953	4,140,310
G4	1,591,875	397,867	421,739

[1] Market Value equals 1.066 X the Unmodified Acquisition Value

The estimated acquisition costs in Table 4-16 include the cost of land and buildings that would need to be acquired for right-of-way under each alternative.[38] Most public lands (state and Borough) are assumed to be available at no cost to the project; this assumption applies to all airport land needed for the project, including the airport floatplane facility.[39] Mental Health Trust Authority lands would have to be purchased. All property owners would be compensated in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.[40]

[38] To determine private land values, the fraction of each parcel of land to be acquired for the right-of-way is multiplied by the assessed value of the unimproved land. Once the land value is determined, maps of the rights-of-way are consulted to determine if structures would be affected by the rights-of-way. The values of any affected structure are then added to the land value. For property with structures within a right-of-way, it is always assumed either none or all of the structure would be acquired. In cases where the right-of-way acquisition would take a large portion of the parcel, an attempt is made to determine whether the remaining section(s) has usefulness to the original owner. If the remaining portion is determined not to be useful to the owner, then it is assumed that DOT&PF would acquire the entire property.

[39] The value of the public lands is included in benefit-cost analyses in consideration of the opportunity cost for using the lands for transportation instead of some other use.

[40] The Uniform Relocation Assistance and Real Property Acquisition Policies Act ensures the fair and equitable treatment of persons whose real property would be acquired or who would be displaced as a result of a Federal or Federally assisted project. Government-wide regulations provide procedural and other requirements (appraisals, payment of fair market value, notice to owners, etc.) in the acquisition of real property and provide for relocation payments and advisory assistance in the relocation of persons and businesses.

4.25.4.3 Employment

Construction of any of the Gravina Access Project build alternatives would have a positive economic impact on employment. Construction of the project would require roughly 80 to 160 additional workers annually (i.e., over a 3-year construction period) from the Ketchikan labor force, depending on the build alternative chosen (see Table 4-17). While these jobs would be filled by local Ketchikan residents, many jobs would require skilled specialists to be brought in from outside of the Ketchikan area.

TABLE 4-17
ESTIMATED CONSTRUCTION JOBS IN THE KETCHIKAN GATEWAY BOROUGH

Alternative	*Total Construction Jobs*	*Annual Construction Jobs*[1]
C3(a)	360	120
C3(b)	310	100
C4	390	130
D1	290	100
F1	470	160
F3	460	150
G2[2]	250	80
G3[2]	270	90
G4[2]	250	80

[1] Annual construction jobs for bridge alternatives estimated by dividing total cumulative jobs created by a three-year construction period. The improved ferry alternatives assume a three-year initial construction period and a single year for ferry replacement and major rehabilitation in the tenth year of operation. Numbers may not calculate due to rounding.

[2] Assumes that the new replacement ferries would be built at ASD in Ketchikan.

Construction activity would increase the need for support industries (e.g., retail, trade, etc.), which would create some additional local jobs in the retail and service sectors. This would result in additional positive economic effects for the area. The actual number of support jobs created as a result of construction would depend on which build alternative is selected, what supplies are needed for its construction, the number of construction workers, and the personal preferences of the workers (i.e., where they decide to spend their money). These secondary impacts are discussed in Section 4.26.3.1.

4.25.5 Transportation

4.25.5.1 Aviation

Alternatives C3(a), C3(b), C4, and D1

Fixed-wing aircraft operating from Ketchikan International Airport (with the exception of floatplanes) would not be affected during construction of Alternative C3(a), C3(b), C4, or D1. The operations of floatplanes would be affected by construction of any of these alternatives. During construction of the bridge, large cranes and other heavy equipment in the channel would interfere with floatplane operations because of the physical obstruction they would present to aircraft operating in the Tongass Narrows airspace. Approaches to and use of the airport

floatplane dock could be affected during construction of any of these bridge alternatives crossing at the airport.

The USCG helicopter pad at Wolff Point (scheduled for construction in 2004) would be within the alignment right-of-way for Alternative D1. Use of the pad for helicopter operations would not be possible during construction of this alternative. The USCG would have to resume medevac operations at Ketchikan International Airport or relocate the pad elsewhere. No other helicopter operations or facilities would be affected during construction of Alternative C3(a), C3(b), C4, or D1. The helicopter pad would no longer be needed once the bridge becomes fully operational because USCG personnel would use ground transport.

Alternative F1 (DOT&PF and FHWA Preferred) and F3

Fixed-wing aircraft operating from Ketchikan International Airport would not be affected during construction of Alternative F1 or F3. Because the bridges associated with these alternatives are south of most floatplane facilities, including existing floatplane waterways, construction would affect few floatplane operations.

Alternatives G2, G3, and G4

The operations of fixed-wing aircraft, including floatplanes in the project area, would not be affected by construction of any these alternatives.

Temsco Helicopters Inc. and Alpine Helicopters Inc. operate from Peninsula Point, the site of the G2 ferry terminal. Construction of the ferry terminal on Peninsula Point could temporarily disrupt helicopter operations at these facilities, primarily due to constrained access to the site and not any restriction on actual helicopter operations.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The DOT&PF would work with helicopter and floatplane operators to minimize disruption of service to the maximum extent practicable during the construction period. The DOT&PF would provide continued access to floatplane service for floatplane customers at the airport, even if it is necessary to temporarily relocate the floatplane dock with Alternatives C3(a), C3(b), C4 and D1. Access will be maintained to the terminal during construction, including construction of a new parking garage at the airport.

4.25.5.2 Marine Navigation

Alternatives C3(a) and C4

The Tongass Narrows main channel would remain open to marine traffic throughout most of the construction period. Mooring buoys and construction equipment would be present in Tongass Narrows around and under bridge piers and spans as the bridge is constructed. During bridge construction in Tongass Narrows, cruise ships and other vessels traveling through the construction area would likely decrease their speed near the construction area and adjust their routes and possibly schedules to avoid construction equipment. During bridge construction, ship passage under the bridge would be prohibited when bridge segments are being lifted from barges on the water into position on the bridge, which would occur during a 24-hour period.

Maintaining the existing ferry service between Revillagigedo Island and the airport during construction would require moving the airport ferry terminal facility to accommodate construction of the bridge structure in that area.

Alternatives C3(b) and D1

The Tongass Narrows main channel would remain open to marine traffic requiring a vertical clearance of 120 feet or lower throughout most of construction. Ships requiring a vertical clearance greater than 120 feet would be routed permanently around the west side of Gravina Island once construction of the bridge piers adjacent to the main shipping channel begins. Mooring buoys and construction equipment would be present in Tongass Narrows around and under bridge piers and spans as the bridge is constructed. During bridge construction in Tongass Narrows, vessels capable of transiting Tongass Narrows would likely decrease their speed near the bridge construction and adjust their routes and possibly schedules to avoid construction equipment. Ship passage under the bridge would be prohibited when bridge segments are being lifted from barges on the water into position on the bridge, which would occur during a 24-hour period.

Maintaining the existing ferry service between Revillagigedo Island and the airport during construction could require moving the airport ferry terminal facility to accommodate construction of the bridge structure in that area.

Mitigation for Alternatives C3(a), C3(b), C4, and D1

Impacts to ships transiting Tongass Narrows would be minimized by scheduling bridge construction activity, to the extent practicable, during times of the year when the marine traffic in Tongass Narrows is low (i.e., outside of the tourist and cruise ship season). The DOT&PF would work with cruise ship and other marine vessel operators in order to facilitate marine navigation during construction. Moving the existing airport ferry terminal facility would be staged so that impacts on ferry operations would be minimized and service to the airport would not be interrupted. When bridge segment placement requires limiting vessel traffic, DOT&PF would issue sufficient notification of such closures to reduce conflict with marine navigation activities.

Alternative F1 (DOT&PF and FHWA Preferred)

The Tongass Narrows main channel would remain open to marine traffic throughout construction of Alternative F1. Construction of the bridges over the East and West Channels would limit ship passage at various phases of the construction. Vessels traveling through East Channel during construction of that bridge would likely decrease their speed near the construction area and adjust their routes and possibly schedules to avoid mooring buoys and construction equipment. During East Channel bridge construction, ship passage under the bridge would be prohibited when bridge segments are being lifted from barges on the water into position on the bridge, which would occur during a 24-hour period. Once construction of the bridge piers in West Channel begins, ships requiring a vertical clearance greater than 120 feet would permanently be routed around the east side of Pennock Island. Vessels requiring 120 feet of vertical clearance or less would either move temporarily to East Channel or likely decrease their speed near and adjust their routes and possibly schedules to avoid construction equipment in West Channel.

Alternative F3

The Tongass Narrows main channel would remain open to marine traffic throughout construction of Alternative F3. Construction of the bridges over the East and West Channels would limit ship passage at various phases of the construction. Vessels traveling through West Channel during construction of that bridge would likely decrease their speed near the construction area, and adjust their routes and possibly schedules to avoid mooring buoys and construction equipment. During West Channel bridge construction, ship passage under the bridge would be prohibited when bridge segments are being lifted from barges on the water into position on the bridge, which would occur during a 24-hour period. Once construction of the bridge piers adjacent to the main shipping channel in East Channel begins, ships requiring a vertical clearance greater than 60 feet would permanently be routed around the west side of Pennock Island. Vessels requiring 60 feet of vertical clearance or less would either move temporarily to West Channel or likely decrease their speed near, and adjust their routes and possibly schedules to avoid, construction equipment in East Channel.

Modification of West Channel would require the placement of a working barge in West Channel for the drilling, blasting, and dredging activities. The channel modification work would be scheduled to occur prior to bridge construction in the East and West Channels, and all marine traffic would be routed through East Channel while the channel modification work is underway. Disposal of the dredged material would require the use of tugs and tows to transport dredged materials into and out of Tongass Narrows to the disposal site, which would create additional marine traffic in the area.

Mitigation for Alternatives F1 (DOT&PF and FHWA Preferred) and F3

For these alternatives, impacts on navigation could be minimized by constructing each bridge in a separate phase so that one of the two channels would always be unaffected by construction activities, including channel dredging with Alternative F3. DOT&PF would work with cruise ship and marine vessel operators to facilitate marine navigation during construction. When bridge segment placement requires limiting vessel traffic, DOT&PF would issue sufficient notification of such closures to reduce conflict with marine navigation activities.

Alternatives G2, G3, and G4

Construction of Alternatives G2, G3, and G4 would have little or no effect on marine navigation. Small boats and watercraft using nearshore areas would be diverted around construction areas. Construction areas would be relatively small and the diversion would not add to the travel time of small boats.

4.25.5.3 Vehicle Traffic

Alternatives C3(a) and C3(b)

Construction activities (i.e., vehicle and equipment movement) could temporarily disrupt traffic patterns and cause delays where these alternatives cross Tongass Avenue and at the Signal Road-Tongass Avenue intersection.

Construction in the vicinity of the airport could require temporary changes in the airport circulation road and elimination of some of the adjacent parking. The ferry terminal and

approach ramp would also be relocated, which would change the traffic flow configuration. Some parking spaces might be eliminated to accommodate construction vehicles and the new ramp location.

Alternatives C4 and D1

Construction activities (i.e., vehicle and equipment movement) could temporarily disrupt traffic patterns and cause delays where these alternatives cross Tongass Avenue. Vehicle traffic to and from the Cambria neighborhood would also be adversely affected by the movement of construction vehicles on Cambria Drive and near the Cambria Drive-Tongass Avenue intersection.

Construction in the vicinity of the airport could require temporary changes in the airport circulation road and elimination of some of the adjacent parking. The ferry terminal and approach ramp could also be relocated, which would change the traffic flow configuration. Some parking spaces might be eliminated to accommodate construction vehicles and the new ramp location.

Alternative F1 (DOT&PF and FHWA Preferred)

Construction activities (i.e., vehicle and equipment movement) could temporarily disrupt traffic patterns and cause delays on South Tongass Highway north of the Municipal Cemetery and the USCG Station where Alternative F1 intersects and crosses South Tongass Highway. Construction of the airport access road near the airport terminal could require temporary changes in the airport circulation road and elimination of some of the adjacent parking.

Alternative F3

Construction could cause traffic delays on South Tongass Highway where the alternative intersects the highway south of the USCG Station. South Tongass Highway would have to be slightly elevated to accommodate construction of Alternative F3. This could require reducing South Tongass Highway to one lane and closing the highway for short periods of time.

Construction of the airport access road near the airport terminal could require temporary changes in the airport circulation road and elimination of some of the adjacent parking.

Alternatives G2, G3, and G4

Movement of construction vehicles and equipment in and out of the ferry terminal construction sites on Revillagigedo Island could affect traffic movement along Tongass Avenue and cause delays.

Construction of the terminal for Alternative G3 would affect access, circulation, and parking in the vicinity of the Jefferson Street right-of-way north of the Plaza Mall.

Construction in the vicinity of the airport could require temporary changes in the airport circulation road and elimination of some of the adjacent parking. Some parking spaces might be eliminated to accommodate construction vehicles.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

A traffic maintenance and parking plan would be developed to minimize impacts on vehicle travel on Ketchikan roadways and at the airport. **Construction that might cause lane closures would be timed for low-traffic periods. Temporary roads and driveways would be employed where necessary to ensure continued mobility during construction.** Construction of temporary roadways might be required to maintain access to the airport facilities. For Alternative F3, construction that would elevate a portion of South Tongass Highway involving road closure and restricting traffic to one lane could be done during off-peak hours to minimize the impacts on vehicular traffic. Access to the USCG Station and other affected property would be accommodated during construction through temporary driveways.

4.25.6 Pedestrians and Bicyclists

4.25.6.1 Alternatives C3(a), C3(b), C4, D1, and F1 (DOT&PF and FHWA Preferred)

Construction activities near the airport and Tongass Avenue could temporarily disrupt pedestrian and bicycle travel patterns. Construction activities associated with Alternatives C3(a), C3(b), C4, D1, and F1 would require rerouting of pedestrians and bicyclists where the alternatives intersect and cross Tongass Avenue. Pedestrian and bicycle access would be impeded during periods of overhead construction on Tongass Avenue when temporary closures of the roads, sidewalks, or bike paths are necessary. Construction at the airport would require rerouting pedestrian pathways between the ferry terminal, airport terminal, and floatplane dock.

4.25.6.2 Alternatives F3, G2, G3, and G4

Alternatives F3, G2, G3, and G4 would temporarily disrupt pedestrian and bicycle travel patterns. Construction activities associated with Alternatives F3, G2, G3, and G4 would require rerouting of pedestrians and bicyclists where the alternatives intersect Tongass Avenue. Construction at the airport would require rerouting pedestrian and bicycle pathways between the ferry terminal, airport terminal, and floatplane dock.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The traffic maintenance and parking plan would include provisions for maintaining pedestrian and bicycle traffic and safety through construction areas. When possible, all roads, sidewalks, and bike paths would be left unobstructed and unaffected so that access would remain available.

4.25.7 Geological Resources

Other than areas that would be permanently altered for development of any of the build alternatives, there would be no direct construction-related impacts to geologic resources. Construction-related soil disturbance could include compaction and/or erosion in temporary staging areas and areas adjacent to permanent right-of-way as a result of movement of construction equipment. Assuming the construction right-of-way would involve 20 feet of temporarily disturbed area adjacent to the permanent right-of-way, on average, and 3 to 5 acres of disturbance at staging areas, the total area of temporary soil disturbance would be between

14 and 58 acres, depending on the alternative (see Table 4-18). **The estimates for upland soil disturbance are conservative estimates and may include areas that have been previously disturbed (i.e., areas where previous disturbance has adversely affected the upland soil and where construction activity associated with this project would have little or no additional effect to soils).**

TABLE 4-18
AREAS OF POTENTIAL TEMPORARY SOIL DISTURBANCE (ACRES)

	Bridge Alternatives						*Ferry Alternatives*		
	C3(a)	C3(b)	C4	D1	F1	F3	G2	G3	G4
Upland soil disturbance	12.5	10.9	13.2	10.7	11.6	9.0	1.8	1.7	1.2
Wetland soil disturbance	18.5	16.5	14.7	13.4	47.1	41.7	15.5	18.9	13.2
Total soil disturbance	31.0	27.4	27.9	24.1	58.7	50.7	17.3	20.6	14.4

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Impacts to wetland soils would be minimized by placing geotextile mats on top of wetland soils in areas that would be temporarily disturbed by construction equipment (see Section 4.25.11). This would limit the soil disturbance to upland areas only, reducing the total area of soil disturbance to between 1 and 13.2 acres, depending on the alternative (see Table 4-18).

The construction contractor would be responsible for developing an erosion and sediment control plan to meet ADEC and EPA requirements of the Clean Water Act. The erosion and sediment control plan would be prepared by a registered engineer and implemented during project construction to minimize soil disturbance. The erosion and sediment control plan would provide guidance to construction contractors to reduce construction impacts, particularly those that would result in the destabilization of adjacent slopes. Disturbed areas outside of the permanent right-of-way would be restored to preconstruction conditions.

4.25.8 Air Quality

Construction of any build alternative would not affect regional air quality. Carbon monoxide and nitrogen oxides emissions from the operation of construction equipment and vehicles would increase overall concentrations of these pollutants at construction sites, but would not affect the attainment status of the area with respect to the NAAQS. The amount of airborne particulate matter up to 10 microns in size (PM_{10}) could be temporarily increased in the immediate vicinity of the construction sites by construction activities such as grading, placement of fill, hauling of materials, and cutting through rock that creates fugitive dust. Because of the frequency of rain in the Ketchikan area, weather conditions are often such that no dust is raised by construction activities.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Measures would be implemented to control fugitive dust (PM_{10}) at construction sites, as needed.

4.25.9 Noise and Vibration

The majority of the potential construction area is primarily open space on Gravina and Pennock Islands. On Revillagigedo Island, the construction area would be adjacent to existing industrial, residential, and commercial properties. Residential areas are considered sensitive noise receptors. Vibrations are also considered disruptive to people, structures, and fish and wildlife.

4.25.9.1 Noise

Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), and F3

Construction of a bridge would generate noise from equipment such as motors, chain saws, front-end loaders, cranes, pile drivers, power generators, and diesel-fueled trucks. The effects of construction noise would be most noticeable in the area immediately surrounding the construction site. These alternatives would require construction in the vicinity of residential neighborhoods. Construction noise in these areas could disrupt residential activities.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), and F3

In accordance with City of Ketchikan noise regulations, construction activities would be prohibited between the hours of 11:00 p.m. and 6:00 a.m. to avoid disruption of residents. Some exceptions to the noise regulations might be requested from the city during special construction activities.

Alternatives G2, G3, and G4

Construction of new ferry facilities for this project would generate noise from equipment; however, there are no noise-sensitive receptors that would be affected by the construction of Alternative G2, G3, or G4.

4.25.9.2 Vibration

Alternatives C3(a), C3(b), C4, D1, and F1 (DOT&PF and FHWA Preferred)

On Revillagigedo Island, construction of these bridge alternatives would require blasting to remove bedrock. On Gravina and Pennock Islands, the roadway would require minimal blasting to remove bedrock. Vibration associated with the blasting would potentially be felt by residents and wildlife in the area of the blasting, but would not have long-term adverse effects on these receptors.

In Tongass Narrows, underwater blasting with explosives, and pile driving, would generate vibration, which would affect aquatic resources. Vibration impacts to these resources from blasting and pile driving are described in Sections 4.25.12.3 and 4.25.15.

Alternative F3

No blasting of bedrock on Revillagigedo Island is expected for Alternative F3. On Gravina and Pennock Islands, the roadway would require minimal blasting to remove bedrock. Vibration associated with the blasting would potentially be felt by Gravina Island and Pennock Island residents, as well as wildlife in the area of the blasting, but would not have long-term adverse effects on these receptors.

In Tongass Narrows, underwater blasting with explosives and pile driving during pier construction and channel widening, would generate vibration, which would affect aquatic resources. Vibration impacts to these resources from blasting and pile driving are described in Sections 4.25.12.3 and 4.25.15.

Alternatives G2, G3, and G4

No blasting of bedrock on Revillagigedo Island is expected under any of the ferry alternatives. On Gravina Island, the roadway would require minimal blasting to remove bedrock. Vibration associated with the blasting would potentially be felt by Gravina Island residents, as well as wildlife in the area of the blasting, but would not have long-term adverse effects on these receptors.

In Tongass Narrows, underwater blasting with explosives and pile driving during ferry terminal pier construction would generate vibration, which would affect aquatic resources. Vibration impacts to these resources from blasting and pile driving are described in Sections 4.25.12.3 and 4.25.15.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Blasting would be controlled to avoid damage of nearby structures and to meet the requirements of the local noise ordinance. In-water blasting, pile driving, and/or drilling would be controlled to ensure that the pressure waves generated would not pose a consistent, adverse threat to fish and other marine resources. Permit conditions for in-water work would be adhered to during construction.

4.25.10 Water Quality

For all project build alternatives, water quality would be affected by in-water and on-land construction activities that remove vegetation and expose soils; disturb creek and marine sediments; divert creeks; and release fuels, chemicals, construction debris, and other pollutants to the ground surface and nearby water bodies. Runoff from construction sites would transport sediment and pollutants to Tongass Narrows, its tributaries, and lands adjacent to work sites. The potential for water quality impacts is proportional to the time spent constructing close to and within water bodies and wetlands and the amount of surface runoff that occurs during construction. Disturbance of creek and marine sediments during in-water work, such as blasting or dredging, would suspend these sediments within water bodies. Similarly, disposal of dredged materials associated with channel widening (Alternative F3) would cause temporary suspension of sediments at the disposal location.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Construction of all water body and wetland crossings would adhere to applicable state and federal permit conditions. **The construction contractor would be responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act.** Runoff from the construction area would be controlled by BMPs to minimize erosion and transport of sediment, to prevent

any accidental leaks of oil or fuel from equipment from contaminating creeks or Tongass Narrows, and to contain any such leaks**.** The storm water pollution prevention plan, which would incorporate BMPs, would be prepared by a registered engineer **per the DOT&PF Alaska Construction Manual,** and implemented during project construction to minimize impacts to water quality. **Construction-related** BMPs would include:

- **DOT&PF would hold meetings at the beginning of construction with the construction contractor and agencies to ensure implementation of mitigation commitments.**
- **Staking the planned outside limits of disturbance prior to construction to ensure that impacts are limited to that area**
- **Limiting clearing and grubbing outside of the fill footprint to the extent practicable to control physical disturbance of wetlands and habitats**
- **Installing silt fences adjacent to waterways just beyond the estimated toe of fill to capture fine-grained material contained in runoff**
- **Installing ditch checks to reduce bank erosion**
- **Employing sedimentation basins, as necessary (based on the potential volume of storm water runoff), to limit sedimentation of adjacent wetlands and other waters and habitats**
- **Locating all staging, fueling, and equipment-servicing operations at least 100 feet away from all streams and wetlands**
- **Having spill response equipment readily available and ensuring that construction personnel are trained in spill response to contain accidental leaks of oil or fuel from construction equipment**

See also Sections 4.12; 4.14.1; 4.15.1-4.15.4; 4.25.11; and 4.25.12 for related BMP discussion. An erosion and sedimentation control plan and a spill prevention plan would be implemented during construction of any of the build alternatives. In-water work would comply with all permit conditions to minimize sediment suspension to the extent practicable.

4.25.11 Wetlands

For all project build alternatives, construction-related impacts on wetlands could include temporary fill, vegetation removal, and degraded water quality. Such impacts would occur at staging areas (i.e., areas used for temporary storage and maneuvering of construction equipment) and in the area approximately 20 feet beyond the cut and fill prism of the new facilities (i.e., areas where construction equipment would need to operate outside of the permanent area of impact). For all bridge alternatives, it is also assumed that temporary impacts would occur within a circular area with a radius of approximately 150 feet around bridge piers or abutments that occur on land. If these areas were located in wetlands, temporary fill would be required. The estimated volume and acreage of wetlands expected to be temporarily affected by construction activities associated with each of the project build alternatives are identified in Table 4-19.

TABLE 4-19
ESTIMATED TEMPORARY CONSTRUCTION IMPACTS ON WETLANDS

	Bridge Alternatives						*Ferry Alternatives*		
Disturbance Type	C3(a)	C3(b)	C4	D1	F1	F3	G2	G3	G4
Volume of Temporary Fill (cy)	16,500	8,300	3,400	0.0	54,700	56,200	0.0	0.0	0.0.
Vegetation removal (ac.)	15.1	14.8	14.0	13.4	35.8	30.1	15.5	18.9	13.2
Vegetation removal and Temporary fill (ac.)	3.4	1.7	0.7	0.0	11.3	11.6	0.0	0.0	0.0
Total Temporary Wetland Impacts (ac.)	18.5	16.5	14.7	13.4	47.1	41.7	15.5	18.9	13.2

At present, the locations and extent of all construction staging areas have not been determined; however, it is anticipated that each build alternative would require one staging area on Revillagigedo Island and one staging area on Gravina Island. Each of these staging areas would cover an area of 3 to 5 acres. In addition, Alternatives F1 and F3 would each require two, 1.5-acre staging areas on Pennock Island. Placing staging areas in wetlands would be avoided to the extent practicable. The staging areas on Gravina and Revillagigedo Islands would likely be located on uplands and would have no effect on wetlands. The staging areas on Pennock Island for Alternative F1 or F3 would likely be located entirely in wetlands. The Pennock Island staging areas would have to be filled temporarily. Alternatives C3(a), C3(b), F1, and F3 would also require the construction of temporary access roads in wetlands. Temporary access roads would be required to move construction equipment from the shoreline to the interior of the islands where new road or bridge construction would take place. Temporary access roads would be approximately 55 feet wide and would vary in length for each alternative. Temporary access roads would require temporary fill in wetlands. Temporary fill might be in place for up to three years and could have long-term effects on wetlands as a result of erosion and/or compaction, depending on the activities undertaken in the staging areas.

For all build alternatives, most of the temporary impacts to wetlands involve vegetation removal only. These impacts would occur in the area approximately 20 feet beyond the cut and fill prism of new roadway and other facilities. Such disturbance would occur in increments along the roadway as it is being constructed (i.e., over an anticipated 3-year construction period). Removal of wetland vegetation would expose soils to erosive forces and/or compaction, which could limit their ability to recover from the disturbance.

Waste disposal in and near wetlands and other habitats would be avoided to the extent possible.

Specific impacts to wetlands relative to each build alternative are described in the following sections.

Alternatives C3(a), C3(b), C4, and D1

Construction of Alternatives C3(a), C3(b), C4, and D1 would require the temporary disturbance of wetland vegetation 20 feet beyond the fill prism for new roadway on Gravina Island (see Table 4-19). In addition, Alternatives C3(a), C3(b) and C4 would require the placement of temporary fill into wetlands that exist around the proposed

bridge piers that occur on land (see Table 4-19). Because of the location of its bridge piers, Alternative D1 would not require the placement of temporary fill into wetlands. Alternatives C3(a) and C3(b) would also require the placement of temporary fill into wetlands on Revillagigedo Island for temporary construction roads. Alternative C3(a) would require approximately 135 feet of temporary access roads in wetlands and Alternative C3(b) would require approximately 200 feet of temporary access roads in wetlands.

Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Construction of Alternatives F1 and F3 would require the temporary disturbance of wetland vegetation 20 feet beyond the cut and fill prism on Revillagigedo, Pennock, and Gravina Islands (see Table 4-19). In addition, Alternatives F1 and F3 would require the placement of temporary fill into wetlands that exist around the proposed bridge piers that occur on land and in staging areas on Pennock Island (see Table 4-19). The total size of staging areas on Pennock Island would be approximately 3 acres (all of which would be located in wetlands). Temporary construction roads located in wetlands for Alternative F1 would be required on portions of Revillagigedo, Pennock, and Gravina Islands. For Alternative F1, these roads would have a total length in wetlands of approximately 1,100 feet. Alternative F3 would require temporary construction roads in wetlands on portions of Pennock and Gravina Islands. Temporary construction roads for Alternative F3 would have a total length in wetlands of approximately 775 feet.

Alternatives G2, G3, and G4

Construction of Alternatives G2, G3, and G4 would require the temporary disturbance of wetland vegetation 20 feet beyond the fill prism for new roadway on Gravina Island (see Table 4-19). None of the ferry alternatives would require the placement of temporary fill into wetlands.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Use of wetlands for construction activities would be minimized to the extent practicable. Wetland soils in the areas 20 feet beyond the fill prism of new roadway would be protected from disturbance because DOT&PF would require the construction contractor to operate construction equipment on geotextile mats to allow complete removal of the mat without further soil disturbance upon completion of construction. After construction activities, shrubs and herbs are expected to recover naturally, but the disturbed areas would be reseeded after construction to minimize erosion. Seeding of the disturbed areas would conform to Section 618 of the Alaska Department of Transportation and Public Facilities Standard Specifications for Seeding. Materials used for seeding would conform to the Alaska Department of Transportation and Public Facilities Standard Specification Section 724 (Seed), Section 725 (Fertilizer), and Subsection 712-2.01 (Water) (DOT&PF 2004).[41]

[41] Alaska Department of Transportation and Public Facilities. 2004. Alaska Department of Transportation and Public Facilities Standard Specifications for Highway Construction. http://www.dot.state.ak.us/stwddes/dcsspecs/assets/pdf/hwyspecs.

In areas where temporary fill is required, DOT&PF would require the construction contractor to place temporary fill on geotextile mats or other suitable materials of sufficient thickness to facilitate the removal of the fill and the materials to the maximum extent practicable when they are no longer needed for construction. No natural earthen material would be removed from under the geotextile mat when the temporary fill is removed. Wetlands would be stabilized against erosion once construction equipment and protective mats are removed. DOT&PF would restore wetlands that had been temporarily filled by reseeding and revegetating the disturbed areas.

If waste disposal sites were unavoidably placed in wetlands, every effort would be made to use a wetland already affected by construction staging. The wastes would be placed on mats and removed promptly.

Detailed mitigation measures would be developed and adhered to as conditions of the required federal permits.

4.25.12 Water Body Modification and Wildlife

4.25.12.1 Water Body Modification

Construction activities associated with any of the build alternatives within and along Tongass Narrows would not modify the channel or its shoreline to the extent that water flow or overall channel hydrology would be affected. For all build alternatives, roadway development would require crossings of streams on Gravina Island. Temporary diversions of these water bodies would be required during culvert and possibly bridge placement, which would temporarily alter the configurations of creek banks and beds. Diversion structures might include cofferdams, dams and pumps, pipes, and flumes. **Temporary work in streams would be included in the COE Section 404 permit. Detailed descriptions of impacts from each alternative are provided in Appendices N and O.**

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Construction activity in any water body would adhere to applicable state and federal permit conditions. Temporary diversions would be designed so that the flow of the water body is not impeded. Any creek banks or beds affected by diversion structure placement would be restored to preconstruction conditions to the maximum extent practicable.

4.25.12.2 Marine Habitat

Bridge pier placement (Alternatives C3[a], C3[b], C4, D1, F1, and F3), channel modification (i.e., associated with Alternative F3), dredging (Alternatives F3, G2, G3, and G4), or ferry dock construction (Alternatives G2, G3, and G4) in Tongass Narrows could degrade marine habitat outside the project footprint by causing increased erosion, suspension of sediments, and turbidity. The potential for these adverse effects would be greater for the alternatives with roadways near the airport (i.e., Alternatives C3[a], C3[b], C4, and D1), the channel widening associated with Alternative F3, and dredging requirements for Alternatives F3, G2, G3, and G4 because they would require more work in Tongass Narrows. **Construction disturbance (blasting and dredging) in West Channel associated with the channel widening for**

Alternative F3 would reduce the primary and secondary productivity of West Channel during construction for -one to two years following channel expansion. This would reduce the flux of plant matter, smaller organisms, and the prey available for larger organisms on either end of the channel, where those animals were dependent for prey on plants or algae produced in the impacted area. This effect would be short term and likely would be immeasurable since few organisms would be dependent solely on prey produced in the impacted area.

Eelgrass beds (which occur in subtidal areas) would not likely be affected by erosion and turbidity because the currents would flush out the finer-grained sediments. Turbidity and sedimentation from erosion are part of the natural cycle in marine systems, and most marine plants and animals are adapted to short-term changes in these parameters; however, if sediment loads are unusually high, last for extended periods of time, or occur at unusual times of the year, adverse impacts to marine habitats could occur. **The maximum potential area that would be directly affected by construction required for each alternative is provided in Table 4-11.**

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

All applicable state and federal permit conditions would be adhered to throughout the construction phase. To minimize these potential impacts, the DOT&PF would ensure that construction BMPs, an erosion and sedimentation control plan, and a spill prevention plan are all implemented during project construction. **The construction contractor would be responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act.**

4.25.12.3 Wildlife—Aquatic Animals

Marine Mammals, Anadromous Fish, and Marine Fish

Aquatic animals would be affected by construction activities from all project build alternatives as a result of increased erosion and sediment suspension, noise, and direct displacement from construction activities. **The discussion below applies to marine mammals as well as fish. Essential Fish Habitat is also discussed in the following subsection of 4.25.12.3. Section 4.25.15 presents further information specific to potential construction impacts on marine mammals, and proposed mitigation measures.** For more detailed discussion of construction impacts on fish refer to Appendix O, Essential Fish Habitat Assessment.

Sedimentation. For all build alternatives, erosion and the movement of sediment and rock to fill shoreline areas and install in-water piers would cause turbidity. Dredging associated with Alternatives F3, G2, G3, and G4, and blasting work associated with these alternatives (particularly Alternative F3) would also cause turbidity by the movement of sediments and rock. Fine silts would be suspended in the water column by these activities. The strong tidal current would quickly carry turbidity plumes downstream. The distance the turbidity plume moves from the point of origin would be dependent on tides, currents, nature of the substrate, and other factors. Because of the strong tidal currents in the channel, intermittent generation of waterborne sediments, especially when released into deeper waters offshore, will be quickly dissipated with minimal effect on biota. While specific sampling of sediments that would require dredging and/or blasting has not been conducted, underwater video and side scan sonar

surveys in the areas of proposed dredging and/or blasting indicate that sediments to be dredged would range from silts and silty sand to coarse gravel and sand.

Noise. Construction of a bridge or ferry docks would transmit in-water noise generated by dredging, fill placement, **drilling, pile driving**, blasting, and movement of construction barges. Construction of bridge foundations would require four to six shafts to be drilled to support each pier. Each shaft would take approximately 1 week to complete. Drilling activities for bridge foundations could last anywhere from 9 to 12 months. **Construction noise from blasting for Alternative F3 could last one to three months.** Construction noise generated above the water could also be transmitted into the water through steel or concrete structures. All of these noise sources would temporarily elevate noise levels above the existing background noise levels. Construction noise is not expected to have long-term or permanent effects on marine and anadromous fish **or marine mammals**. Effects would be short-term and localized.

Using reverse rotary drilling and a vibratory hammer would have less noise impact on fish than would impact hammers to drive piles, which are known to have adverse effects on fish. The small amount of pile driving that may occur for ferry alternatives would be in sediment; conservation measures would reduce the harmful vibratory impacts of pile driving by using a vibratory hammer instead of impact hammer, driving piles at low tide only. Peak sound pressures generated by rotary drilling would be comparable to or less than that generated by clam-shell dredging, and would be below levels known to be harmful to fish and marine life. Sound frequencies generally would be higher pitched and sound pressure levels would be steadier than would clam shell dredging. As a result, there likely would be less disruption of fish and mammal movement and feeding patterns than would occur during dredging (refer to Appendix O for detailed discussion of noise impacts on fish).

While no site-specific studies have been conducted to describe fish populations in the project area, the fish that are likely to be present can be deduced from the nature of the prevailing habitat. Rocky habitats in Tongass Narrows likely support rockfish, which, because of their large swim bladders, are thought to be highly susceptible to sound pressures generated by blasting, and cottids, which would be less susceptible. Adjacent soft bottom areas likely support flatfish species and skates, somewhat less vulnerable to blast effects because they lack swim bladders, and gadids that are known to be very susceptible. A number of other species may be present in the water column, depending on the time of year. These could include salmonids, forage fish, and some gadids, all of which would be very susceptible to blast effects. Blasting could affect marine mammals, particularly damaging their ears, if blasting took place when mammals were present. Timing and other measures to avoid impacts to marine mammals are discussed further in Section 4.25.15.

Displacement. In-water work, such as blasting**, dredging, drilling, and pile driving**, would cause the temporary displacement of marine wildlife from the area around the construction activities. **The channel widening activities for Alternative F3 would consist of a combination of drilling, blasting, and dredging activities. The duration of these activities would be one to three months. Channel modification work would occur up to seven days a week with almost continuous disturbance from dredging and intermittent disturbance from blasting.** Construction activities in eelgrass beds could eliminate important feeding and refuge areas for several species of fish and shellfish, causing displacement of these species. Because of the abundance of similar habitat in Tongass Narrows, it is unlikely that the

temporary impacts of construction on fish habitat would have a lasting effect on these species. **It is expected that construction activities in Tongass Narrows would last for approximately two to three years. During this time, construction barges would be present in the Narrows.**

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Runoff from the construction area would be controlled by BMPs to minimize erosion and transport of sediment. An erosion and sedimentation control plan, spill prevention plan, and BMPs would be implemented during construction to minimize contamination of creeks and Tongass Narrows. **The construction contractor would be responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act. If they were required, blasting and pile driving would be performed such that ground vibration (particle velocity) would not exceed 2.0 inches per second and peak water overpressure (instantaneous pressure change) would not exceed 2.7 pounds per square inch. For blasting, the project would employ monitoring devices to ensure adherence to these standards and to ensure that these activities would** not pose a consistent, adverse threat to fish and other marine resources. **Refer to mitigation measures described in Section 4.25.15, Threatened and Endangered Species, as many of these measures would ensure protection of all aquatic animals.**

Essential Fish Habitat

See the general discussion of construction impact to aquatic animals for its applicability to marine EFH (Section 4.25.12.3, immediately above). The discussion of impacts here adds further information. The first paragraphs, preceding discussion of the individual alternatives, apply similarly to all build alternatives. This section should be read with Section 4.15.4.4, which also addresses EFH impacts.

All alternatives could require limited pile driving to penetrate any existing sediment in the area and enable the pile to bear on or within rock. Geophysical surveys suggest that this soil sediment might be as much as 20 feet thick in some locations. A vibratory hammer would be used to advance the steel pile or casing (probably 18 to 30 inches in diameter for pilings to support ferry terminal facilities and 10 feet or more in diameter for bridge pier footings) through the existing sediment until it reached bedrock; drilling then would be employed to penetrate the rock and/or install the piling or rock anchors in the rock formation.

Peak sound pressures generated by rotary drilling would be comparable to or less than that generated by clamshell dredging, and well below levels known to be harmful to fish and marine life. Sound frequencies with rotary drilling would be generally higher pitched and sound pressure levels would be steadier than they would be with clamshell dredging. As a result, there likely would be less disruption of fish movement and feeding patterns than would occur during dredging.

Blasting is the activity most likely to result in fish mortality, but most alternatives are expected to require little or no blasting (see further discussion under Alternative F3, below). No specific site studies have been conducted to describe the precise fish

populations potentially at risk in the locations of each alternative. Nonetheless, the general nature of fish that might be present at each site could be deduced from the nature of the habitats present. Underwater reconnaissance by marine biologists using video equipment recorded habitats in the project area. Rocky habitats in Tongass Narrows likely support rockfish and cottids. Adjacent soft bottom areas likely support flatfish species and skates and gadids. A number of other species may be present in the water column, depending on the time of year. These could include salmonids, forage fish, and some gadids. Fish with closed swim bladders (e.g., rockfish, gadids) would be most vulnerable to sharp changes in acoustic energy from blasting, while those with open swim bladders (e.g., salmonids) would be less affected; fish lacking a swim bladder (e.g., cottids, flatfish) would be least susceptible to impact of this kind.

Alternatives C3(a), C3(b), C4, and D1

These four alternatives would have the construction activities described above, particularly reverse rotary drilling of very large diameter bridge pier footings. Shafts and casings to support the foundation for bridge piers would be placed into Tongass Narrows using a reverse rotary drill and vibratory hammer where appropriate (see Appendix O for more detailed information). Blasting is not anticipated, but minor blasting to properly seat the casing might be necessary. Mitigation measures listed below would limit the effects of these alternatives.

Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Alternatives F1 and F3 involve the construction activities described above to varying degrees, particularly drilling for the very large diameter bridge pier footings. Limited pile driving using a vibratory hammer and limited blasting might be required to seat steel casing on submerged bedrock and begin drilling to install the pier foundations. Drilling with a reverse rotary drill would be necessary to place bridge pier foundations. Mitigation measures listed below would limit the effects of these alternatives.

For Alternative F3 only, West Channel modification to improve navigation would require the removal of approximately 59,000 cubic yards of surficial sediment material, which would be removed by dredging (not blasting), and 125,000 cubic yards of fractured rock and solid bedrock, which would require blasting to be removed. Use of a clamshell dredge is the most likely method of dredging and rock removal for Alternative F3 (see Temporary Impacts Section of Appendix O for discussion of clamshell dredges and unlikelihood of fish entrainment). The channel widening would consist of a combination of drilling, blasting, and dredging activities. The duration of these activities would be one to three months. Channel modification work would occur up to seven days a week with almost continuous disturbance from dredging and intermittent disturbance from blasting. Blasting and dredging would affect 16 acres of habitat. The eventual regeneration of most of this habitat is addressed under permanent impacts in Section 4.15.4.4. Mitigation of blasting and dredging impacts are listed below.

Alternatives G2, G3, and G4

The three ferry alternatives would involve the construction activities described above, particularly drilling of small diameter pilings. Limited pile driving, using a vibratory hammer, and limited blasting might be necessary near shore to establish pilings for ferry

moorage. Mitigation measures listed below would limit impacts of these activities. The ferry alternatives might also require minor dredging in Tongass Narrows to produce adequate water depths for ferry docking at all tidal stages. Use of a clamshell dredge is the most likely method of dredging for the ferry alternatives (see Section 4.25.12.3 for discussion of clamshell dredges and unlikelihood of entrainment).

Alternative G2 would require the removal of approximately 1,400 cubic yards of material near the proposed Gravina Island terminal (approximately 0.2 acres; see Table 4-14 in Section 4.15.4.4). Alternative G3 would require the removal of approximately 18,600 cubic yards of material combined from the proposed Gravina and Revillagigedo terminals (approximately 2.14 acres total; Table 4-14). Alternative G4 would require the removal of approximately 15,200 cubic yards of material combined from the Gravina and Revillagigedo terminals (1.22 acres; Table 4-14). Dredging for the ferry alternatives might require a small amount of blasting. If blasting is necessary for the ferry alternatives, it would last two to three days and would have relatively small, localized impacts in relation to the large areas of similar habitats available in Tongass Narrows.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Construction of this project would require a Title 41 Fish Habitat Permit through the Alaska Department of Natural Resources and a U.S. Army Corps of Engineers Permit for fill in waters of the United States. Coordination with NOAA Fisheries has been ongoing during the planning of this project. The following conservation measures would be incorporated to avoid, minimize, and mitigate impacts to EFH. These are general measures that would be modified to specifically address details of the preferred alternative through further coordination with the agencies during design.

- **At all stream crossings (both culverts and bridge crossings), stream banks would be re-contoured to approximate original conditions and re-seeded with native vegetation to minimize erosion.**

- **BMPs, developed in accordance with EPA's "Storm Water Management for Construction Activities: Developing Pollution and Prevention Plans and Best Management Practices," EPA Document 832 R-92-005 (EPA 1992), and the DOT&PF Storm Water Pollution Prevention Plan Guide, would be employed to minimize the introduction of sediment and siltation of ponds and streams during adjacent fill placement and during culvert placement. Some related BMPs are listed in Sections 4.12; 4.14.1; 4.15.1-4.15.4; 425.10; and 4.25.11.**

- **All anadromous fish stream crossings would be designed to provide passage for the salmon present in any given stream, per DOT&PF's memorandum of agreement with the Alaska Department of Fish and Game.**

- **In-water work in Tongass Narrows would be restricted, as follows. General use of boats and barges could occur year round for general survey and work on bridge structures above water. Except for blasting, dredging, and pile driving, other work in marine waters could occur July 1-February 28. As further described below, blasting, dredging, and pile driving could occur only November 1-February 28, with the possible exception of mid-channel locations, based on further consultation with the**

Alaska Department of Natural Resources (DNR), NOAA Fisheries, U.S. Army Corps of Engineers (COE), and U.S. Fish and Wildlife Service (USFWS).

- **The following conservation recommendations would be followed with respect to pile driving in Tongass Narrows: A vibratory hammer would be used to drive steel piles instead of an impact hammer. Piles should be driven during low tide when in intertidal and subtidal areas.**

- **All construction in and around anadromous fish streams would take place when stream disturbances would have the least impact on anadromous fish species. The recommended time period for in-stream construction work in the Ketchikan area is June 15 through August 7 (Minnillo 2004). In-stream construction activities should completely avoid the period from August 8 through June 14. For the Ketchikan area, salmon fry generally emerge in the spring from April 15 to May 15, and the adults move into the streams by August 1 and remain through October 31 (Doherty 2003). However, timing of fry emergence and adult spawning depend on the species of fish present in each stream. For example, steelhead spawn in the spring and eggs are generally present in the stream until the middle of July. Fish surveys would be conducted in the summer of 2004 for all streams that will be affected by the project. If additional species are found to be present in the project streams, the existing timing window for in-stream construction (June 15 to August 7) might be modified to protect additional species. Construction work that occurs above the ordinary high water area of the stream and does not include in-stream construction might be conducted throughout the year (Minnillo 2004). In-water work areas, except for stream crossings by construction equipment, would be isolated from flowing waters of all anadromous fish streams.**

- **Any in-water blasting would be performed such that ground vibration (particle velocity) does not exceed 2.0 inches per second and peak water overpressure (instantaneous pressure change) does not exceed 2.7 pounds per square inch. The project would employ monitoring devices to ensure adherence to these standards. If blasting amounts are minor, and if agreed by NOAA Fisheries, monitoring may not be undertaken.**

- **The contractor would be required to prepare a blasting plan prior to any blasting activities. The blasting plan would need to be reviewed by NOAA Fisheries for both EFH and marine mammal impacts. A fish and invertebrate monitoring program would be required for any proposed blasting activities. Any blasting would be conducted during daylight hours only. A pre-blasting survey would be required to ensure that no fish schools are in the vicinity of the blasting area. If fish schools were detected, blasting would be delayed until they leave. A biologist would check the area and record any kills that were within 100 feet up current and 300 feet down current of the blast area after blasting is completed. Monitoring of the dredge materials might be incorporated into the blasting monitoring plan as a method for documenting organisms injured or killed in the blasting. Measures such as covering the rock to be blasted with sand might be used to dampen blast impact. In-water blasting should avoid the entire months of March through June to avoid juvenile salmonids and the period from June through October 31 to avoid adult salmon. All project-related activities would conform to the pertinent provisions of the Marine Mammal Protection Act and the Endangered Species Act.**

- **Dredged debris would be placed onto a barge where it would enter a settling basin and be disposed of on land. Only under Alternative F3, which could require substantial removal of sediment and rock, would ocean disposal be necessary. These operations for Alternative F3 would be consistent with the regulations of Clean Water Act, Section 404(b)(1) (disposal of dredged materials into waters of the U.S.) and Marine Protection, Research, and Sanctuaries Act, Sections 102 and 103. Monitoring of the dredged materials might be incorporated into the blasting monitoring plan as a method for documenting organisms injured or killed in the blasting. Dredging activities would avoid the entire months of March through October.**

- **All fueling and servicing operations would be conducted at least 100 feet away from all streams and water bodies, and fuel storage will be at least 100 feet away from all wetlands and water bodies.**

- **All necessary permits and agency approvals would be obtained prior to construction, and any permit stipulations would be incorporated into the contract specifications.**

- **Perimeter staking would be required on the outside of the disturbance area prior to construction to ensure that there is no additional impact from construction activities.**

- **Silt fences would be used adjacent to EFH stream channels, just beyond the estimated toe of fill.**

- **Gravels and streambed material would be used in the bottoms of fish passage culverts.**

- **Riprap would be placed along stream banks as necessary to maintain stream bank integrity. Placement of riprap along stream banks to maintain stream bank integrity would include the use of bioengineering techniques to improve habitat value of the riprap, by incorporation of willow stakes or other locally available vegetation.**

Mitigation measures would be finalized during the permitting process with input from DNR, NOAA Fisheries, COE, and USFWS.

4.25.12.4 Wildlife—Amphibians

Construction activity related to roadway development on land would disrupt the movements and eliminate habitat of amphibians, which live in wetlands, in creeks, and on land with any of the build alternatives. Because these animals have limited mobility, mechanized clearing outside the project footprint would likely eliminate some of the amphibians living in those areas.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The final alignment of the selected alternative and construction methods would be selected to minimize impacts on wetlands and streams to the extent practicable, and thereby reduce the potential effects of construction on amphibian populations.

4.25.12.5 Wildlife—Birds

Birds in and immediately adjacent to roadway and bridge alignments or ferry terminal areas would be disturbed by construction, which could temporarily displace birds from nesting, resting, and foraging habitat. Nesting waterfowl and bald eagles might abandon nests near the road if disturbed by construction activities. Construction activities might affect individual birds and nest productivity. However, it is expected that birds would relocate to adjacent habitat and the overall impacts on birds would not result in measurable population changes.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

All migratory birds are protected under the Migratory Bird Treaty Act. The Migratory Bird Treaty Act (16 USC 760c-760g) makes it unlawful for anyone to kill, capture, collect, possess, buy, sell, trade, ship, import, or export any migratory bird. Indirect killing of birds by destroying their nests and eggs is covered by the Act, so construction in nesting areas could constitute a taking. Bald eagles are protected by the Bald Eagle Protection Act of 1940 (16 USC 668-668d) as amended. In accordance with USFWS guidelines, DOT&PF would establish a construction activity buffer surrounding active bald eagle nests that could be affected by construction activities. USFWS will be consulted prior to construction to review and comment on the proposed buffer area(s) and to identify additional measures to prevent abandonment of a nest during the breeding season.

4.25.12.6 Wildlife—Land Mammals

Road construction activities would disrupt the activities of land mammals and degrade habitat of land mammals beyond the project footprint with all of the build alternatives. These effects would be greatest on Gravina and Pennock Islands, where there is currently little human activity. Noise and disturbance generated by construction equipment and other human activity would likely drive large land mammals from the area, but would not physically harm them. Most mammals would likely move away from the construction zones to other areas that provide similar habitat. Smaller, less mobile mammals might not be able to move away quickly from construction zones and would be eliminated during construction.

4.25.13 Floodplains

Construction activities would have no adverse effect on floodplains.

4.25.14 Coastal Zone

Temporary construction activities related to any of the build alternatives would not affect coastal zone management. Impacts to the resources protected by the Borough Coastal Management Plan would be minimized through erosion and sediment control and other BMPs for reducing impacts to water quality, wetlands and other water bodies, marine habitat and biota, and threatened and endangered species (see Sections 4.25.10, 4.25.11, 4.25.12, and 4.25.15).

4.25.15 Threatened and Endangered Species

In 2001, NOAA Fisheries provided a response to a request for informal consultation in accordance with Section 7 of the Endangered Species Act (see Appendix R). In 2004, DOT&PF transmitted a Biological Assessment to NOAA Fisheries that concluded that "the proposed action will not likely affect listed [Threatened and Endangered] Species." The Biological Assessment appears in Appendix T. NOAA Fisheries responded that the agency concurred with the DOT&PF and FHWA conclusion that "the Gravina Access Project is not likely to adversely affect listed species or their designated critical habitat."[42]

Construction of the project under any build alternative would include activities that could disturb sea lions or humpback whales if completed while these mammals were present. These would include the noise of reverse rotary drilling in submerged rock and pile driving with a vibratory hammer in substrate for placement of pier foundations. Activities also would include dredging West Channel for shipping (Alternative F3 only), and dredging near shore for ferry terminal construction (Alternatives G2, G3, G4). Underwater blasting is anticipated for Alternative F3, for widening the shipping lane in West Channel, and for the ferry alternatives (G2, G3, and G4), to aid in dredging. However, minor in-water blasting is a possibility for any of the alternatives. NOAA Fisheries stated in the June 4, 2001 letter, "Steller sea lions are unlikely to be affected by underwater noise associated with project construction activities because they have higher thresholds for noise disturbance and are able to raise their heads out of the water to avoid noise transmission."

Whales also appear to have higher thresholds than fish. Nonetheless, all blasting and dredging activities would be scheduled for fall and winter. This timing would occur between late summer salmon runs and spring herring runs that attract sea lions. This timing also would occur after most humpback whales leave Southeast Alaska for wintering grounds near Hawaii and before the spring herring runs that may also attract humpback whales to the area. Project commitments to ensure negligible disturbance to these and other marine mammals are listed below. By employing these measures, the project is not likely to adversely affect the Steller sea lion or humpback whale.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

To ensure no injury to or harassment of Steller sea lions, humpback whales, or other marine mammals, DOT&PF and FHWA are committed to the measures listed below. These are designed to be compatible with EFH mitigation measures for the project.

- **In-water work would occur outside the springtime months, when there is greatest sea lion use of the project area. The EFH work window for in-water work in Tongass Narrows is July 1 to February 28, and this would be followed for marine mammals as well. Major work, such any dredging or in-water blasting required, would occur only November 1 to February 28, unless pre-approved by NOAA**

[42] January 26, 2004 letter from Bill Ballard, DOT&PF, to Kaja Brix, NOAA Fisheries, and February 17, 2004 letter from James Balsiger, NOAA Fisheries, to Bill Ballard.

Fisheries. This timing would avoid runs of salmon and herring, on which humpback whales and Steller sea lions feed.

- **The construction contract would require a blasting plan approved by NOAA Fisheries. Blasting would be performed such that ground vibration (particle velocity) would not exceed 2.0 inches per second and peak water overpressure (instantaneous pressure change) would not exceed 2.7 pounds per square inch. Monitoring devices would be used to measure these parameters. If blasting amounts are minor, and if agreed by the agencies, monitoring may not be undertaken.**
- **Should dredging be required, the construction contract would require a dredging plan approved by NOAA Fisheries.**
- **If blasting and dredging were required, the project would ensure use of trained and NOAA fisheries-approved observers to indicate when marine mammals were within a 164-foot (50-meter) zone around pier work or other in-water work, and activity would wait until the animals moved out of the area, or work would be stopped if marine mammals were to enter the area.**
- **An in-water warning sound would be issued prior to blasting to allow any marine mammals to voluntarily move to a comfortable distance.**
- **All necessary permits and agency approvals would be acquired prior to construction, and stipulations would be incorporated into contract specifications.**
- **If design should change, an incidental harassment authorization might need to be obtained from NOAA fisheries.**
- **Mitigation measures will be finalized during the permitting process with input from DNR, NOAA Fisheries, COE, and USFWS.**

All project-related activities would conform to the pertinent provisions of the Marine Mammal Protection Act and the Endangered Species Act.

4.25.16 Historic and Archeological Preservation

There are no known historic or archeological resources within the APE of any of the proposed alternatives except Alternatives F1 and F3 (see Sections 4.21.3 and 4.21.4). As described in Section 4.21, KET-774 and KET-775 would not be affected by construction activities under Alternatives F1 and F3 because the bridges would be located approximately 300 feet away and would be overhead. In addition, there would be no effect because DOT&PF and FHWA have committed to ensuring that pier construction and construction access routes would avoid these sites. Other archeological sites are known to exist in the Tongass Narrows area, and previously unknown subsurface sites could be discovered during construction.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

DOT&PF and FHWA will continue coordination with the SHPO's office through design. Once the alignment is staked during design and prior to construction, a qualified archaeologist would be sent into the field to ensure that no cultural sites were missed. If new properties with potential to be eligible for inclusion in the National Register were discovered during construction, construction at that location would halt for site evaluation. DOT&PF would consult with the SHPO about the appropriate course of

action. If such a site were found to be eligible for the National Register, it would be avoided, or DOT&PF and FHWA would develop a memorandum of agreement with the SHPO to mitigate any adverse effects.

4.25.17 Hazardous Waste Sites

Construction activities associated with any of the build alternatives would not affect any known hazardous waste sites. Sites recognized as potential hazardous waste sites within the construction right-of-way (see Section 4.22 Hazardous Waste Sites) would be investigated prior to construction and any waste found would be removed in accordance with state and federal regulations.

Hazardous materials that would be used, transported, or stored within the project right-of-way as part of the construction activities could adversely affect the environment if not properly handled and contained. Materials would include asphalt, concrete, cable lubricants, and equipment fuel and lubricants.

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Hazardous materials used during project construction would be stored and handled according to state and federal regulations. Material Safety Data Sheets would be available for all hazardous materials on the site. A spill prevention and response plan would be developed for the selected alternative. Construction vehicles would contain spill prevention kits in case of minor hazardous materials or chemical spills during construction.

4.25.18 Visual Environment

4.25.18.1 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), and F3

Temporary visual impacts resulting from construction could include the presence and use of equipment and materials (e.g. spoil piles, cones). Construction of the bridge alternatives would temporarily vary the current views of natural features with the introduction of large cranes, barges, and other operating equipment in the channel. Because of the industrial character of the Ketchikan waterfront, the impact on the visual environment of that shoreline would be minor. As the bridge construction work progresses into Tongass Narrows and, in the case of Alternatives F1 and F3, the East and West Channels, construction equipment would intrude upon views of predominantly natural features.

Construction of roadways and bridge approaches would adversely affect the visual character of the area immediately surrounding the construction zones. This temporary effect would have a minor impact on visual resources. Construction of roadways and bridge approaches on Gravina and Pennock Islands would not be visible from most areas of Ketchikan.

4.25.18.2 Alternatives G2 and G3

Construction of the new ferry terminals for Alternative G2 or G3 on Gravina Island, amid the existing natural features, would have an impact on views of the shoreline. An uninterrupted natural shoreline view would be converted to a view of a segmented shoreline with a cleared area and construction equipment.

Construction of a ferry terminal for Alternatives G2 and G3 on Revillagigedo Island would not dramatically change the visual setting due to the industrial and commercial character, respectively, of the terminal sites.

4.25.18.3 Alternative G4

The construction of this ferry terminal on Gravina and Revillagigedo Islands would occur in industrial areas. Construction equipment and activity would therefore not have a visual impact with Alternative G4.

4.25.18.4 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

All construction equipment and debris would be removed after construction is completed.

4.25.19 Energy

Energy consumption related to each of the build alternatives depends on the duration of construction and the types of construction equipment required. These factors have not been determined and, therefore, energy consumption related to the construction of each alternative is not known. Impacts on energy supply are not expected.

4.25.20 Utilities

Construction of any of the project alternatives **might result in short-term temporary interruption of existing utility services. Such service interruptions would be identified and characterized during the design phase. Affected customers would be given advance notice of any service interruptions. For longer outages, temporary facilities would be provided to ensure maintenance of service to affected customers**.

4.26 SECONDARY IMPACTS

After examining the existing conditions of the affected environment and the direct impacts of the proposed project, the project team considered how the various directly affected resources are related to other resources and how the direct impacts on affected resources might cause impacts on these related resources. This analysis identifies secondary impacts.

An important component of secondary impact analysis for the Gravina Access Project is the estimate of the potential development that would be induced by the project within a reasonable period of time. According to the FHWA Position Paper on *Secondary and Cumulative Impact Assessment in the Highway Project Development Process* (April 1992)[43]:

> *New access to undeveloped locations can contribute to subsequent development activity. In some instances, the stated purpose for proposed projects may be to promote economic development in depressed areas needing overall infrastructure improvement. In cases like these, a discussion of the indirect effects should be included in the project environmental analysis. Without it the project purpose and need will be difficult to defend and any decisions to proceed with the project may likely be challenged.*

[43] FHWA, *Secondary and Cumulative Impact Assessment in the Highway Project Development Process*, April 1992.

Part of the stated purpose and need of the Gravina Access Project (in Chapter 2) is to improve access to Borough land and other developable or recreation lands on Gravina Island to support the adopted land use plans of the Borough, and to promote environmentally sound, planned long-term economic development on Gravina Island. The degree of development that could occur on Gravina Island is based on projections for economic growth in the Borough[44] and the type and location of the alternative alignments (i.e., bridge alternatives near the airport, the Pennock Island alternatives, ferry alternatives, or the No Action Alternative).

To determine how much of the future growth expected in the Borough might be attributable to Gravina Island, economists and planners have looked at Gravina Island land ownership patterns; the plans of federal, state, and Borough landowners; economic growth potential for the region; and current development patterns. They have looked at each Gravina Access Project alternative for its level of convenience, user cost, and location to determine how it might influence development on Gravina Island, and they have worked with Borough planners, who developed the *Gravina Island Plan* (April 2002), to characterize development patterns on Gravina Island.

The analysis of secondary impacts in this Section 4.26 is based on the development that would occur under the medium economic growth condition. **Low, medium, and high scenarios were examined in the *Economic Forecasts Technical Memorandum* (September 2002), but the results of this study indicate these extremes are less likely to occur, and the medium scenario best reflects a reasonably foreseeable future level of growth.** Medium economic growth for the region assumes the following:

- In 2025, the population of the Borough will be 18,300 people, representing a compound annual growth rate of less than 1 percent from 14,070 in 2000.
- In 2025, total employment (jobs) in the Borough will be 8,500.
- The veneer plant will reopen in the near term and Tongass timber harvests will stabilize after that time.
- Seafood harvesting and processing employment will not change significantly over the long term although short-term fluctuations will continue.
- In the near term (by 2009), employment related to shipyard activities will increase moderately (perhaps by 25 more jobs), and then will increase by 2 percent per year.
- Tourism expenditures will increase—at 2 percent per year to 2005, then at 3 percent per year to 2010, and then at 2 percent per year after 2010.
- Spending and employment related to state or local government will change very little.
- Continued community growth will require approximately 1,730 acres of additional land for future commercial, industrial, residential, and community uses.[45]

Development induced by the Gravina Access Project has been projected through 2025. On Revillagigedo Island, project-induced development is based on the analysis of economic impacts of the project (see Appendix D). Project-induced development on Pennock Island (i.e.,

[44] DOT&PF, *Gravina Access Project*, *Ketchikan Gateway Borough Economic Forecasts Technical Memorandum*, prepared by Northern Economics under contract to HDR Alaska, September 2002.

[45] Ibid.

from Alternatives F1 and F3) is based on the assumption that local transportation access and infrastructure would connect developable land on the island to the Alternative F1/F3 alignment.[46] On Gravina Island, project-induced development is based on the development scenarios presented in the *Gravina Access Project Traffic Projections Technical Memorandum.*[47]

The Gravina Island development scenarios associated with the project alternatives, assuming medium economic growth, are summarized in Table 4-20 (Development Scenarios Assumed for Gravina and Pennock Islands in the Secondary Impact Analysis).

TABLE 4-20
DEVELOPMENT SCENARIOS ASSUMED FOR GRAVINA AND PENNOCK ISLANDS IN THE SECONDARY IMPACT ANALYSIS

Project Alternatives	*Type and Location of New Development by 2025 Assuming Medium Economic Growth*
No Action Alternative	Gravina Island 3.9 miles of gravel road to Borough lands north of airport 5 acres developed for industrial use 15 acres developed for residential use Pennock Island No additional development anticipated
Alternatives C3(a), C3(b), C4, and D1	Gravina Island 5 acres of land developed for airport-related industries 2 acres developed for limited retail 15 acres developed for industrial use 287 acres developed for residential use 1 acre dedicated to community use Pennock Island No additional development anticipated
Alternatives F1 and F3	Gravina Island 5 acres of land developed for airport-related industries 2 acres developed for limited retail 15 acres developed for industrial use 383 acres developed for residential use 1 acre dedicated to community use Pennock Island 75 acres for residential use 1 acre developed for retail/commercial use
Alternatives G2, G3, and G4	Gravina Island 5 acres of land developed for airport-related industries 50 acres developed for residential use 2 acres developed for limited retail 15 acres developed for industrial use 1 acre dedicated to community use Pennock Island No additional development anticipated

Source: *Gravina Access Project Traffic Projections Technical Memorandum*, prepared by HDR Alaska, November 2002

[46] The Borough Assembly has indicated that, with the selection of Alternative F1 as the preferred alternative, it will request the Borough Planning Department to update the Pennock Island Plan. Such a plan would include a framework for local transportation access and infrastructure. The framework for local transportation and infrastructure would provide the connection with the proposed road across Pennock Island.

[47] DOT&PF, *Gravina Access Project Traffic Projections Technical Memorandum,* prepared by Northern Economics, Inc. under contract to HDR Alaska, November 2002.

4.26.1 Land Use Impacts

The development scenarios, in combination with the Borough's *Gravina Island Plan* **(Appendix S)** were used to determine where the land use changes would likely occur. The *Gravina Island Plan* identifies five areas for planning purposes: North Gravina (which includes Rosa Reef), Central Gravina and Airport Reserve, Clam Cove and Blank Inlet, Vallenar Bay, and Tongass National Forest (see Figure 3.4). **The Borough recently completed detailed area plans of three of these areas: North Gravina, Central Gravina and Airport Reserve, and Clam Cove and Blank Inlet (see Appendix S). These area plans outline proposed future development on Gravina Island—including residential, commercial, industrial, and recreational development. Key elements of these area plans as they relate to the Gravina Access Project alternatives are illustrated in Figure 4.2.** The locations of future development on Gravina Island described below are based on the Borough plans for these five areas relative to the location of the alternative under consideration. For example, Alternative G2 would likely result in development on Gravina Island north of the airport, which could include development within the North Gravina and Vallenar Bay areas identified in the *Gravina Island Plan.*

4.26.1.1 No Action Alternative

Overall development in the Borough would continue under the No Action Alternative, corresponding to the growth in population. Gravina Island, without improved access, would experience a small portion of the region's future development. By 2025, Gravina Island would add 5 acres of industrial development and 15 acres of residential development north of the airport. Most industrial development is projected to occur within the Central Gravina and Airport Reserve area, whereas residential development would occur in the North Gravina area. These sites would be accessible by the proposed Borough road extending from the airport to the Borough-leased industrial lands north of the airport. **Water-based industrial facilities would potentially be developed in the North Gravina Area (the Conceptual North Gravina Industrial Park in Figure 4.2).** The land use would be converted from open space and forested areas to developed land.

On Revillagigedo and Pennock Islands, with medium growth in the local economy, development would continue at a rate and in a pattern similar to those of the past 10 years. On Pennock Island, a few residential lots could be developed. On Revillagigedo Island, the fastest-growing residential areas would be near Point Higgins (about 15 miles north of downtown Ketchikan) **which consists mostly of Borough-owned land. Other areas include: between the City of Ketchikan and the City of Saxman, between Saxman and Mountain Point (which also consists mostly of Borough-owned land), and the Borough land from Mud Bight to Whipple Creek (just above the existing subdivisions)**. Future residential development is anticipated to occur increasingly farther from downtown Ketchikan. **Industrial and some commercial lands are expected to be sold in and around the old pulp mill site at Ward Cove**.

The benefits of the build alternatives, described below, would not occur. Land use would continue to be constrained on Revillagigedo Island, where mostly marginal lands (steep or wet) are left for development. Access by the Borough to its lands on Gravina Island, as suggested in Title 29 of the Alaska Statutes (regarding land grants, see Chapter 1), would not improve. These lands would remain functionally unavailable to the Borough for the foreseeable future. This would also be true of airport reserve and Mental Health Trust lands on Gravina Island.

4.26.1.2 Alternatives C3(a), C3(b), C4, and D1

Improved access to Gravina Island under Alternatives C3(a), C3(b), C4, and D1 would shift about 20 percent of the future development activity from Revillagigedo Island to Gravina Island as Borough, airport, and other lands are made directly accessible by road. This would be a substantial beneficial impact for the Borough, as it would provide greater options and opportunity for commerce, industry, and residences. It would also reduce land use constraints on the east side of Tongass Narrows.

On Gravina Island, industrial and commercial uses near the airport (Central Gravina and Airport Reserve area) and north of the airport (North Gravina area) would occupy approximately 22 acres of land that had been used as open space and forested areas along the Tongass Narrows waterfront and is zoned for industrial/commercial development. **Water-based industrial facilities would potentially be developed in the North Gravina Area (the Conceptual North Gravina Industrial Park shown in Figure 4.3).** Approximately 288 acres of open space and forested land would be converted for use as residential or community development. Most of the new residential development would be located in the North Gravina area, and some could occur in the Vallenar Bay area. Most of the new land development would be accessed via gravel roads connecting with the project's new roadway. The change in land use on Gravina Island associated with this level of development would be consistent with the planned and existing land uses (i.e., existing residential development north of the airport; industrial development on the Airport Reserve property and north of the airport).

Owners of land on Gravina Island with significant timber resources were contacted to determine how improved access associated with Alternatives C3(a), C3(b), C4, and D1 would affect their plans for future timber harvests.[48] All landowners indicated that the Gravina Island access road associated with these alternatives would not be adjacent to areas of commercial quality timber. The USFS timber sale will occur independently of the Gravina Access Project; therefore, no change in USFS timber harvests is expected to occur as a result of improved access. DNR plans to harvest timber on its lands in conjunction with the USFS timber sale/harvest, making use of the roads constructed for that project; therefore, the DNR timber harvest would be independent of the Gravina Access Project.[49] Mental Health Land Trust plans to dispose of its timber resources on Gravina Island through a timber sale prior to construction of any Gravina Access Project alternative.[50] The largest stand of commercial quality timber (4.5 to 5 million board feet) on Mental Health Land Trust property is located at the head of the Lewis Creek valley and would likely be accessed from a temporary logging road connecting to the Pacific Log and Lumber timber processing facility north of the airport. The University of Alaska has no current plans for timber harvest.[51]

[48] Robert Reeck, District Planning Staff Officer, Tongass National Forest, U.S. Forest Service, personal communication with K. Maines, Planner, HDR Inc. March 11, 2004. Greg Stanton, Regional Resource Forester, DNR; Doug Campbell, Senior Resource Manager (Timber), Mental Health Land Trust; and Steve Connelly, Senior Property Manager, University of Alaska Land Management -- personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

[49] Greg Stanton, Regional Resource Forester, DNR, personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

[50] Doug Campbell, Senior Resource Manager (Timber), Mental Health Land Trust, personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

[51] Steve Connelly, Senior Property Manager, University of Alaska Land Management, personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

4.26.1.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Alternatives F1 and F3 would shift about 25 percent of the future development activity from Revillagigedo Island to Gravina Island and about 9 percent to Pennock Island as Borough, airport, and other lands are made directly accessible by road. This would be a substantial beneficial impact for the Borough (greatest of the alternatives), as it would provide greater options and opportunity for commerce, industry, and residences. It would also reduce land use constraints on the east side of Tongass Narrows.

On Gravina Island, industrial and commercial uses near the airport (Central Gravina and Airport Reserve area) would occupy approximately 22 acres of land that had been used as open space and forested areas along the Tongass Narrows waterfront and is zoned for industrial/ commercial development. **Water-based industrial facilities would potentially be developed in the Conceptual South Gravina Fisheries Industrial Park (see Figure 4.2).** Approximately 383 acres of residential development and 1 acre of community development would be induced by either of these alternatives, most of which would occur in the Clam Cove and Blank Inlet area **(e.g., Conceptual Clam Cove Community Development in Figure 4.2**). **Residential development in the Clam Cove area could include a marina or other docking facilities (Figure 4.2).** Very little project-induced development is expected to occur in the Vallenar Bay area.

Pennock Island would also experience development, with approximately 75 additional acres of residential development and 1 acre of retail/commercial development. Most development would likely occur along the waterfront in areas that are currently undeveloped and used as open space and forested land. This level of development would be consistent with the development anticipated in the *Pennock and Gravina Island Neighborhood Plan*, adopted May 6, 1985. The *Pennock and Gravina Island Neighborhood Plan* is the only planning document, though outdated, that addresses Pennock Island at the present time. *Ketchikan 2020* is expected to supersede the Gravina Island portion of that plan (see Section 3.1.2.1).

Owners of land on Gravina Island with significant timber resources were contacted to determine how improved access associated with Alternatives F1 and F3 would affect their plans for future timber harvests.[52] All landowners indicated that the Gravina Island access road associated with these alternatives would not be adjacent to areas of commercial quality timber. The USFS timber sale will occur independently of the Gravina Access Project; therefore, no change in USFS timber harvests is expected to occur as a result of improved access. DNR plans to harvest timber on its lands in conjunction with the USFS timber sale/harvest, making use of the roads constructed for that project; therefore, the DNR timber harvest would be independent of the Gravina Access Project.[53] Mental Health Land Trust plans to dispose of its timber resources on Gravina Island

[52] Robert Reeck, District Planning Staff Officer, Tongass National Forest, U.S. Forest Service, personal communication with K. Maines, Planner, HDR Inc. March 11, 2004. Greg Stanton, Regional Resource Forester, DNR; Doug Campbell, Senior Resource Manager (Timber), Mental Health Land Trust; and Steve Connelly, Senior Property Manager, University of Alaska Land Management -- personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

[53] Greg Stanton, Regional Resource Forester, DNR, personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

through a timber sale prior to construction of any Gravina Access Project alternative.[54] The largest stand of commercial quality timber (4.5 to 5 million board feet) on Mental Health Land Trust property is located at the head of the Lewis Creek valley and would likely be accessed from a temporary logging road connecting to the Pacific Log and Lumber timber processing facility north of the airport. The University of Alaska has no current plans for timber harvest.[55]

4.26.1.4 Alternatives G2 and G4

Alternatives G2 and G4 would shift about 6 percent of the future development activity from Revillagigedo Island to Gravina Island as Borough, airport, and other lands become directly accessible by road. This would be a beneficial impact for the Borough, as it would provide greater options and opportunity for commerce, industry, and residences. It would also reduce land use constraints on the east side of Tongass Narrows.

On Gravina Island, industrial and commercial uses near the airport (Central Gravina and Airport Reserve area) and north of the airport (North Gravina area) would occupy approximately 22 acres of land that had been used as open space and forested areas along the Tongass Narrows waterfront and is zoned for industrial/commercial development. **Water-based industrial facilities would potentially be developed in the North Gravina Area (the Conceptual North Gravina Industrial Park in Figure 4.2).** Approximately 50 acres of residential and 1 acre of community development would be induced by either of these alternatives. Most of the new residential development would be located in the North Gravina area, and some could occur in the Vallenar Bay area. Most of the new land development would be accessed via gravel roads connecting with the project's new roadway. The change in land use on Gravina Island associated with this level of development would be consistent with the planned and existing land uses (i.e., existing residential development north of the airport; industrial development on the Airport Reserve property, and north of the airport).

Owners of land on Gravina Island with significant timber resources were contacted to determine how improved access associated with Alternatives G2 and G4 would affect their plans for future timber harvests.[56] All landowners indicated that the Gravina Island access road associated with these alternatives would not be adjacent to areas of commercial quality timber. The USFS timber sale will occur independently of the Gravina Access Project; therefore, no change in USFS timber harvests is expected to occur as a result of improved access. DNR plans to harvest timber on its lands in conjunction with the USFS timber sale/harvest, making use of the roads constructed for that project; therefore, the DNR timber harvest would be independent of the Gravina Access Project.[57]

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[54] Doug Campbell, Senior Resource Manager (Timber), Mental Health Land Trust, personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

55 Steve Connelly, Senior Property Manager, University of Alaska Land Management, personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

56 Robert Reeck, District Planning Staff Officer, Tongass National Forest, U.S. Forest Service, personal communication with K. Maines, Planner, HDR Inc. March 11, 2004. Greg Stanton, Regional Resource Forester, DNR; Doug Campbell, Senior Resource Manager (Timber), Mental Health Land Trust; and Steve Connelly, Senior Property Manager, University of Alaska Land Management -- personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

57 Greg Stanton, Regional Resource Forester, DNR, personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

Mental Health Land Trust plans to dispose of its timber resources on Gravina Island through a timber sale prior to construction of any Gravina Access Project alternative.[58] The largest stand of commercial quality timber (4.5 to 5 million board feet) on Mental Health Land Trust property is located at the head of the Lewis Creek valley and would likely be accessed from a temporary logging road connecting to the Pacific Log and Lumber timber processing facility north of the airport. The University of Alaska has no current plans for timber harvest.[59]

4.26.1.5 Alternative G3

Alternative G3 would shift about 6 percent of the future development activity from Revillagigedo Island to Gravina Island as Borough, airport, and other lands were made directly accessible by road. This would be a beneficial impact for the Borough, as it would provide greater options and opportunity for commerce, industry, and residences. It would also reduce land use constraints on the east side of Tongass Narrows.

On Gravina Island, industrial and commercial uses near the airport (Central Gravina and Airport Reserve area) and north of the airport (North Gravina area) would occupy approximately 22 acres of land that had been used as open space and forested areas along the Tongass Narrows waterfront and is zoned for industrial/commercial development. **Water-based industrial facilities would potentially be developed in the North Gravina Area (the Conceptual North Gravina Industrial Park in Figure 4.2).** Approximately 50 acres of residential and 1 acre of community development would be induced by either of these alternatives. Most of the new residential development would be located in the North Gravina area, and some could occur in the Central Gravina and Airport Reserve area. Most of the new land development would be accessed via gravel roads connecting with the project's new roadway. The change in land use on Gravina Island associated with this level of development would be consistent with the planned and existing land uses (i.e., existing residential development north of the airport; industrial development on the Airport Reserve property, and north of the airport).

Owners of land on Gravina Island with significant timber resources were contacted to determine how improved access associated with Alternative G3 would affect their plans for future timber harvests.[60] All landowners indicated that the Gravina Island access road associated with this alternative would not be adjacent to areas of commercial quality timber. The USFS timber sale will occur independently of the Gravina Access Project; therefore, no change in USFS timber harvests is expected to occur as a result of improved access. DNR plans to harvest timber on its lands in conjunction with the USFS timber sale/harvest, making use of the roads constructed for that project; therefore, the

58 Doug Campbell, Senior Resource Manager (Timber), Mental Health Land Trust, personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

59 Steve Connelly, Senior Property Manager, University of Alaska Land Management, personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

60 Robert Reeck, District Planning Staff Officer, Tongass National Forest, U.S. Forest Service, personal communication with K. Maines, Planner, HDR Inc. March 11, 2004. Greg Stanton, Regional Resource Forester, DNR; Doug Campbell, Senior Resource Manager (Timber), Mental Health Land Trust; and Steve Connelly, Senior Property Manager, University of Alaska Land Management -- personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

DNR timber harvest would be independent of the Gravina Access Project.[61] Mental Health Land Trust plans to dispose of its timber resources on Gravina Island through a timber sale prior to construction of any Gravina Access Project alternative.[62] The largest stand of commercial quality timber (4.5 to 5 million board feet) on Mental Health Land Trust property is located at the head of the Lewis Creek valley and would likely be accessed from a temporary logging road connecting to the Pacific Log and Lumber timber processing facility north of the airport. The University of Alaska has no current plans for timber harvest.[63]

4.26.2 Social Impacts

The secondary impacts on the social environment would result primarily from changes in access to and new development on Gravina Island. Assuming medium economic growth for the region through 2025, the population in the Borough would increase from 14,070 in 2000 to approximately 18,300 in 2025. Total employment (jobs) in the Borough would be about 8,500 in 2025.

4.26.2.1 No Action Alternative

The No Action Alternative would not improve the social environment of Ketchikan because it would not improve access to developable lands that would be needed to support growth in the community. On Revillagigedo Island, community services and facilities would need to be expanded to meet the needs of the growing population. Limitations on available land would have an adverse impact on the Ketchikan community by constraining the locations of development of any such facilities. These limitations might also constrain residential development, creating denser neighborhoods, which would change neighborhood character. Constraints on available industrial land would limit the types of industries that could be developed in the Ketchikan region, which could diminish the availability of employment opportunities.

The restricted access to Gravina Island (via the existing airport ferry) also would continue to limit recreational use of the island.

On Gravina Island, the growth in population and employment could result in the formation of one or more new small neighborhoods. New industrial/commercial and residential developments on Gravina Island would rely on existing community services and facilities available from Revillagigedo Island.

Competition for subsistence resources on Gravina and Pennock Islands would not be affected by the No Action Alternative.

61 Greg Stanton, Regional Resource Forester, DNR, personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

62 Doug Campbell, Senior Resource Manager (Timber), Mental Health Land Trust, personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

63 Steve Connelly, Senior Property Manager, University of Alaska Land Management, personal communication with C. Snead, Environmental Planner, HDR Inc. April 15, 2004.

4.26.2.2 Alternatives C3(a), C3(b), C4, and D1

By providing improved access to Gravina Island, these alternatives would promote growth and development on the island. The availability of developable land in the Borough would increase and the locations of new development would be less constrained than under the No Action Alternative. With more industrial development shifting to Gravina Island, there would be more opportunities for other types of development (e.g., residential and commercial/retail) on Revillagigedo Island, particularly along the waterfront. The residential development on Gravina Island could occur in cluster areas, such as Rosa Reef, which could lead to neighborhood structure and cohesiveness. Improved access to Gravina Island would also increase recreational opportunities in the Ketchikan area.

Competition for Gravina Island subsistence resources could increase as a result of the implementation of Alternatives C3(a), C3(b), C4, or D1 and have an adverse effect on these resources. **Residents of Saxman harvest the following subsistence resources in substantial quantities and could therefore be impacted by Alternatives C3(a), C3(b), C4, and D1: salmon (sockeye and Chinook), non-salmon fish (halibut, rockfish), game (deer), marine mammals (seal), birds and eggs (ducks, geese, and seabirds), marine invertebrates (Dungeness crab, clams, and cockles), plants and berries (seaweed and various berries). Residents of Metlakatla harvest the following resources in substantial quantities and could be impacted by Alternatives C3(a), C3(b), C4, and D1: salmon (Chinook and coho), non-salmon fish (halibut), game (deer), marine mammals (seal), birds and eggs (ducks and geese), marine invertebrates (Dungeness crab and octopus), plants and berries (seaweed and kelp).**

The projected development on Gravina Island would increase the need for community services and facilities. Most services (e.g., those provided by schools, libraries, and medical facilities) would continue to be obtained from Revillagigedo Island. However, emergency response services (e.g., fire protection and ambulance service) would likely be enhanced on Gravina Island, although such services would likely continue to be physically located on Revillagigedo Island through 2025. Community services and facilities on Revillagigedo Island would likely be expanded to meet the needs of the growing population of the region.

4.26.2.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

By providing better access to Gravina and Pennock Islands, these alternatives would promote growth and development on those islands. The availability of developable land in the Borough would increase and the locations of new development would be less constrained than under the No Action Alternative. With more industrial development shifting to Gravina Island, there would be more opportunities for other types of development (e.g., residential and commercial/retail) on Revillagigedo Island, particularly along the waterfront. The residential development on Gravina Island could occur in cluster areas, such as Clam Cove, which could lead to neighborhood structure and cohesiveness. Improved access to Gravina Island would also increase recreational opportunities in the Ketchikan area.

Roadway access to and increased development of Pennock Island would substantially change its neighborhood character. As indicated by the input from Pennock Island and Clam Cove residents at the May 2001 workshops (see Section 3.3.2.2 and Appendix B), the Pennock Island community is divided with respect to its vision for future development on access to the island as a result of these alternatives. The Borough would likely revise the *Pennock and Gravina Island*

Neighborhood Plan[64] to respond to the change in access to Pennock Island and ensure that the future development of the island would occur within an appropriately planned framework.

Competition for subsistence resources on Gravina and Pennock Islands could increase as a result of implementation of Alternatives F1 or F3 and have an adverse effect on these resources**. Residents of Saxman harvest the following subsistence resources in substantial quantities and could therefore be impacted by Alternatives F1 and F3: salmon (sockeye and Chinook), non-salmon fish (halibut, rockfish), game (deer), marine mammals (seal), birds and eggs (ducks, geese, and seabirds), marine invertebrates (Dungeness crab, clams, and cockles), plants and berries (seaweed and various berries). Residents of Metlakatla harvest the following resources in substantial quantities and could be impacted by Alternatives F1 and F3: salmon (Chinook and coho), non-salmon fish (halibut), game (deer), marine mammals (seal), birds and eggs (ducks and geese), marine invertebrates (Dungeness crab and octopus), plants and berries (seaweed and kelp).**

The projected development on Gravina and Pennock Islands would increase the need for community services and facilities. Most services (e.g., those provided by schools, libraries, and medical facilities) would continue to be obtained from Revillagigedo Island. However, emergency response services (e.g., fire protection and ambulance service) would likely be enhanced on Gravina and Pennock Islands, although such services would likely continue to be physically located on Revillagigedo Island through 2025. Community services and facilities on Revillagigedo Island would likely be expanded to meet the needs of the growing population of the region.

4.26.2.4 Alternatives G2, G3, and G4

The new ferry access to Gravina Island associated with these alternatives would promote modest amounts of growth and development on the island (53 additional acres of growth), representing a 6 percent shift of the future development activity from Revillagigedo Island to Gravina Island. The improved access offered by the additional ferry would not significantly relieve the development constraints on Revillagigedo Island because some of the community would still perceive access to Gravina Island as inconvenient.

Although some of the Ketchikan community would perceive continued limitation on available land under these alternatives, industrial and commercial development would occur on Gravina Island, leaving more opportunities for other types of development (e.g., residential and commercial/retail) on Revillagigedo Island, particularly along the waterfront. This would have a positive impact on the Ketchikan area.

The restricted access to the island (via the new and existing airport ferry) would continue to limit recreational use of the island. **While Alternatives G2, G3, and G4 would benefit recreational users by making access to Gravina Island more convenient than the existing ferry, the benefit would not be as great as with any of the hard link options.**

On Gravina Island, the growth in population and employment could result in the formation of one or more new small neighborhoods and development of approximately 1 acre for community

[64] Ketchikan Gateway Borough Planning Department, *Neighborhood Plan.*

services or facilities. New industrial/commercial and residential developments on Gravina Island would primarily rely on existing community services and facilities available from Revillagigedo Island, but would not adversely affect these facilities.

Competition for Gravina Island subsistence resources could increase as a result of Alternatives G2, G3, and G4 and have an adverse effect on these resources.

4.26.3 Economic Impacts

The project's secondary impacts on the economy and economic development are related to:

- The ability of the construction industry in the Borough to participate in constructing the alternatives
- Changes in spending associated with project operations
- Changes in transportation patterns (aviation, marine navigation, and vehicles)
- The effect of regional economic activity on development on Gravina and Pennock Islands
- Fiscal impacts on the local economy and government services

These impacts are addressed in the following sections in general terms for the No Action Alternative and the build alternatives, unless otherwise specifically stated. Detailed descriptions of these impacts are provided in Appendix D.

The Gravina Access Project is not expected to substantially affect the amount of timber harvested from Gravina Island. Specifically, it is not expected to increase the likelihood of a timber harvest, or the volume of timber harvested that is anticipated in the USFS Gravina Island timber sale or timber harvests/sales from other property owners on Gravina Island (see Sections 4.26.1.2, 4.26.1.3, 4.26.1.4, and 4.26.1.5).

4.26.3.1 Indirect and Induced Construction Spending

When a bridge, road, or ferry is built in Alaska, the construction firms contracted for the project directly benefit (i.e., there is a direct project impact). These construction firms, in turn, spread the benefits by buying supplies from other Alaska firms and hiring workers. The suppliers make additional purchases, as do the project workers. A large share of purchases might also be transferred out of the local economy by out-of-state purchases. The additional rounds of spending caused by construction firm expenditures are part of the subsequent indirect and induced effects, which are often collectively referred to as secondary effects.

The potential secondary economic effects of construction spending are estimated using an economic input-output (I-O) model available from the Minnesota IMPLAN[65] Group. The company uses a variety of data sources to construct economic models of the economy of each state, county, and borough in the U.S. The I-O model captures the inter-industry transactions generated by the construction firms and their suppliers, and the additional economic activity generated by household and government spending that would result from construction of a project alternative. The data provided in this Section 4.26.3 were estimated using the Borough

[65] "IMPLAN" was originally an acronym for "impact analysis for planning."

I-O model. For total spending and cost data that include the multiplier effects, see the tables in the Summary chapter, Chapter 2, and Appendix D.

Employment. Indirect employment effects relate to full-time and part-time jobs created as a result of spending by businesses, households, and local governments that directly support the project. Table 4-21 includes jobs representing the number of persons employed in activities stimulated by inter-industry transactions and the employment created by additional household and government spending. The estimates do not include direct employment of workers involved in construction activities. Each of the improved ferry alternatives (G2, G3, and G4) assumes that the two new ferry vessels will be built at the Ketchikan Shipyard between 2003 and 2005. The improved ferry alternatives and the No Action Alternative include replacement of an existing ferry vessel (also built at the Ketchikan Shipyard) in 2015. If the ferry vessels were built elsewhere, the number of secondary jobs would be less than presented in Table 4-21. The bridge alternatives have a greater capital cost, and therefore generate more secondary jobs than the ferry alternatives.

Gross Regional Product. Table 4-21 also provides the estimated changes in the gross regional product and labor income generated by construction of each of the project alternatives. The change in gross regional product (also called output) is a measure of the total change in economic activity of the region (in this case attributable to project construction), including both inputs into other industries and outputs consumed by governments and individuals.[66]

Labor Income. Labor income is a measure of the change in payments made to labor as well as proprietor income (income received by self-employed individuals) as a result of project construction and subsequent spending by industry, households, and governments.

Government Revenues. The I-O model uses state and Borough-level data sources as well as the *Annual Survey of Government Finances*[67] in estimating the state and local government revenues that can result from additional economic activity in the region.

Based on the I-O model for the region, the build alternatives could potentially generate additional government revenues of between $1.2 million (Alternative D1) and $2.0 million (Alternative F3); see Table 4-21. These estimates include indirect taxes paid by businesses, such as excise taxes, property taxes, fees, licenses, and sales taxes paid by business. The estimates also include payments by households to state and local governments for estate and gift taxes, motor vehicle licenses, property taxes, fishing and hunting fees, and other taxes, fees, and charges. Unemployment taxes from both businesses and households are also included.

[66] Households are the common unit of measure used in input-output analysis for persons or individuals.

[67] U.S. Bureau of the Census, 2001.

TABLE 4-21
SECONDARY EFFECTS OF CONSTRUCTION SPENDING
ON EMPLOYMENT, INCOME, AND GOVERNMENT REVENUE

		Bridge Alternatives						Ferry Alternatives		
Secondary Effect	*No Action Alternative*	*C3(a)*	*C3(b)*	*C4*	*D1*	*F1*	*F3*	*G2*	*G3*	*G4*
Total Employment (Jobs)	10	250	220	270	200	310	310	130	130	120
Annual Employ. (Jobs)[1]	5	80	70	90	70	100	100	40	40	40
Gross Regional Product ($million)[2]	N.A.[3]	22.4	20.1	25.1	17.3	28.1	24.4	11.8	15.9	11.1
Labor Income ($million)[2]	N.A.[3]	8.7	7.5	9.2	6.6	10.4	9.6	4.5	4.9	3.8
State Revenue ($million)[2]	N.A.[3]	0.6	0.6	0.7	0.5	0.9	0.9	0.6	0.7	0.6
Local Revenue ($million)[2]	N.A.[3]	0.8	0.7	0.9	0.7	1.0	1.1	0.7	0.8	0.7

[1] Total employment divided by three-year construction period for the bridge alternatives. Annual employment for the improved ferry alternatives uses three years for initial construction and 1-year for ferry replacement and terminal rehabilitation in the tenth year of operation. A two-year construction period is used for the No Action Alternative. Numbers may not calculate due to rounding. The jobs shown for the No Action Alternative are not a result of the Gravina Access Project, as they would occur in the absence of any action; the jobs are associated with periodic replacement and maintenance activities for the existing ferry system.
[2] 2003 dollars
[3] Not applicable; not a result of the Gravina Access Project.

Table 4-21 illustrates that F1 would have the greatest secondary beneficial economic effects of the build alternatives in the categories of gross regional product and labor income. Alternatives F1 and F3 would have similar benefits for total employment and annual employment, and local and state revenues created by Alternative F1 would be slightly less than those revenues generated by Alternative F3. Alternatives C3(a) and C4 would have the next most beneficial alternatives with respect to the economy. Alternative G4 has the least secondary beneficial economic effects for employment and gross regional product.

4.26.3.2 Changes in Spending Associated with Project Operations

Secondary spending associated with long-term operations and maintenance of the project alternatives can be represented by gross regional product; labor income, other property-type income (such as rents), and indirect business taxes; employment that can potentially be generated in the Borough from the annual O&M of the structures, equipment, and facilities built for each of the alternatives, and changes in discretionary spending due to the presence or absence of tolls for the various alternatives. Effects on state and local revenues from long-term use of the project are described in Section 4.26.3.5.

Table 4-22 illustrates that the build alternatives would have minimal effects on gross regional product; labor income, other property type income, and indirect business taxes; and employment. Operations and maintenance of Alternatives G2, G3, G4, and the No Action Alternative would be funded primarily by tolls from users.[68] Tolls reduce the discretionary spending available to users and reduce the amount that can be spent elsewhere in the local economy.

[68] Grants and other sources provide funds for periodic replacement and refurbishment of facilities and equipment. Replacement and refurbishment activities are included in construction.

Gains in employment and economic activity with the ferry alternatives would be offset by losses in other sectors for a net effect of zero.[69]

TABLE 4-22
ANNUAL SECONDARY ECONOMIC EFFECTS OF OPERATIONS

Secondary Effect	*No Action Alter-native*	*Bridge Alternatives*					*Ferry Alternatives*			
		C3(a)	*C3(b)*	*C4*	*D1*	*F1*	*F3*	*G2*	*G3*	*G4*
Gross Regional Product (millions of 2003$)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Total labor income, other property type income, and indirect business taxes (millions of 2003$)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Employment (Jobs)	0	2	2	2	1	1	1	0	0	0

4.26.3.3 Economic Effects of Changes in Aviation Operations

No Action Alternative and Alternatives G2, G3, and G4

Neither the No Action Alternative nor the ferry alternatives would affect aviation in a way that would have a secondary impact on the local or regional economy.

Alternatives C3(a), C3(b), C4, and D1

The construction of a bridge alternative might lead to changes in or the possible elimination of the SVFR clearance (Exemption 4760), which currently governs some air traffic in the Borough.[70] The FAA anticipates that some type of change should be expected under all of the bridge alternatives, but the level of impact varies with the alternative.[71] Those alternatives that would be constructed in the vicinity of the airport would have the greatest effect on aircraft operations.

Any bridge alternative may require adjustment to or elimination of the SVFR minimums. The FAA would make this determination through a separate public process. In addition, it is anticipated that air charter operators and others would seek modification of the SVFR or changes in operating procedures (i.e., wheel-based operations instead of floatplane operations) to offset the presence of the bridge alternatives and the potential adverse impacts on their businesses. To account for this uncertainty, there is a wide range of probabilities for the various scenarios.

[69] Economic activity associated with increased discretionary spending would have different effects on sectors within the local economy but the total effects in aggregate would be similar.

[70] A decision has not yet been made regarding elimination of the SVFR clearance if a bridge is constructed. Presumably safety considerations would be the main factor. But it does not appear that collisions between aircraft and man-made structures cause many air crashes in Alaska. According to data from the National Transportation Safety Board, there were nine aircraft crashes involving a plane or helicopter striking a building, tower, or other man-made structure in Alaska between 1983 and 2001; none of these crashes involved a bridge.

[71] Green, July 15, 2002.

In the medium case scenario, the presence of Alternatives C3(a), C3(b), C4, and D1 would reduce current SVFR operations by roughly 50 percent (see Section 4.7.1.2, Floatplane Facilities and Operations, and Appendix D). The net loss to the Ketchikan economy of these eliminated trips (including indirect and induced effects as estimated from a regional economic model) would be approximately $334,500 annually for Alternatives C3(a), C3(b), C4, and D1.

Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Alternatives F1 and F3 are outside of the current boundaries of SVFR airspace, but the proximity of these bridge alternatives to the SVFR area might require some adjustment of Exemption 4760. For purposes of this analysis, DOT&PF assumed that with Alternatives F1 and F3 in place, there would be reductions of 10 and 5 percent, respectively, in current SVFR operations in the medium case scenario (see Section 4.7.1.3 and Appendix D). The net annual loss to the Ketchikan economy of these eliminated trips (including indirect and induced effects as estimated from a regional economic model) would be approximately $66,900 for Alternative F1 and $33,450 for Alternative F3.

4.26.3.4 Economic Effects of Changes in Cruise Ship Operations

Cruise Ship Spending. A significant portion of the Ketchikan economy relies on its status as a port of call for the cruise ship industry. The greatest secondary economic impacts resulting from primary impacts on marine navigation would be from changes in cruise ship operations (i.e., fewer or shorter port calls) as a result of the bridge alternatives. There are three types of on-shore spending related to cruise ship calls:

- Spending by cruise ship passengers for tours, sightseeing, gifts, souvenirs, food, and beverages
- Purchases made by cruise ship crewmembers
- Direct spending by the cruise line for ship docking, tug services, pilots, and miscellaneous supplies

Table 4-23 summarizes average spending in Ketchikan related to cruise ship port calls.

TABLE 4-23
CRUISE SHIP SPENDING (PER PORT CALL)

	Average Number per Ship	*Average Spending per Person*	*Total Spending per Port Call*
Passengers	1,664	$95	$158,080
Crewmembers	727	$15	$10,900
Cruise Line	--	---	$22,100
Total	2,391	---	$191,080

Source: *Economic Impact of Cruise Line Spending in Southeast Alaska in 1999*, prepared for the Southeast Conference by the McDowell Group, 2000

Per-Hour Spending. While information exists on average passenger spending per port call in Ketchikan, there is no current information available on passenger spending per hour during a port call. Spending by passengers would vary by ship, length of time in port, direction of the cruise (northbound versus southbound), and weather conditions. To assess the potential effects of reduced port time by those ships visiting Ketchikan, several assumptions have been

made about spending by usable hours in port. Assuming that passenger spending varies with the duration of the port call and by hour (with more spending occurring earlier in the port call than later) and quantifying the shore excursion spending during the first hour, an estimate can be made of spending by hour. For ships with longer usable port time, it is assumed that the second wave of shore excursion spending is reflected in the fourth hour.

Using these assumptions, Table 4-24 provides an estimate of average passenger spending for each hour in port.

TABLE 4-24
ESTIMATED CRUISE SHIP PASSENGER HOURLY SPENDING (PER PORT CALL)

Hour	*Usable Port Time*				
	<5.0 hours	*<6.0 hours*	*<7.0 hours*	*<8.0 hours*	*8.0 hours or more*
1	$38.56	$44.00	$47.50	$42.00	$46.92
2	$17.53	$16.00	$14.25	$10.50	$11.73
3	$10.52	$12.00	$14.25	$10.50	$11.73
4	$3.51	$4.00	$9.50	$21.00	$23.46
5		$4.00	$4.75	$10.50	$11.73
6			$4.75	$5.25	$5.87
7				$5.25	$5.87
8+					
Totals	$70.11	$80.00	$95.00	$105.00	$117.31

Source: DOT&PF, *Gravina Access Project Effects on Cruise Ship Operations*, prepared by Klugherz & Associates/Northern Economics, Inc. under contract to HDR Alaska, May 2003

No Action Alternative and Alternatives G2, G3, and G4

Neither the No Action Alternative nor the ferry alternatives would affect marine navigation or cruise ship operations in a way that would have a secondary impact on the local or regional economy.

Alternatives C3(a), C4, F1 (DOT&PF and FHWA Preferred), and F3

Alternatives C3(a), C4, and F1 would have bridges with a 200-foot-high vertical clearance and would allow continued use of East Channel by large cruise ships. Alternative F3 would have a bridge with a 200-foot high vertical clearance over West Channel. All cruise ships currently sailing in Alaska would be able to pass under these proposed bridges, as well as those anticipated to sail to Alaska in the foreseeable future (see Sections 4.7.2.2 and 4.7.2.4). These bridge alternatives should have no discernible effect on cruise ship operations or related spending.

Alternatives C3(b) and D1

The 120-foot vertical clearance of these bridges would not allow the passage of large cruise ships. These bridge alternatives would have an adverse impact on cruise ship passenger activities and other revenues. In the analysis of direct impacts, eight fewer port calls would be expected as a result of implementing Alternatives C3(b) or D1 (see Section 4.7.2.3). Table 4-25 demonstrates the consequent potential reductions in revenue for the 2001 base year.

TABLE 4-25
POTENTIAL ANNUAL CRUISE-RELATED SPENDING REDUCTIONS WITH REDUCED PORT CALLS FOR ALTERNATIVES C3(B) AND D1

Approach Direction	*Port Calls (2001 Base Year*	*Potential Reduction in 2001 Port Calls*	*Total Spending per Port Call*	*Potential Spending Reduction for 2001 Base Year*
Northbound Sailings	104	8	$191,080	$1,528,600
Southbound Sailings	281	0	$191,080	$0
Total	385	8	$191,080	$1,528,600

Source: DOT&PF, *Gravina Access Project Effects on Cruise Ship Operations*, prepared Klugherz & Associates/ Northern Economics, Inc. under contract to HDR Alaska, May 2003

The analysis of direct impacts also determined that, for the remaining 377 port calls in 2001, there would be some reduction in the amount of time the ships would spend in port because of additional transit time necessary to bypass the bridges by navigating around Gravina Island.[72] To calculate potential reductions in passenger spending from reduced time in port, it was assumed that the last hour of spending for passengers calling at Ketchikan would be lost for northbound sailings only. (Northbound sailings cannot make up additional transit time; southbound sailings can.) The total reduction in passenger revenues was calculated by multiplying the average number of passengers per port call (1,662) by the number of port calls remaining for each usable port hour category by the amount associated with the last hour of spending. Table 4-26 presents the results of these calculations.

TABLE 4-26
POTENTIAL ANNUAL REDUCTIONS IN CRUISE SHIP PASSENGER SPENDING WITH REDUCED PORT TIME FOR NORTH BOUND SAILINGS WITH ALTERNATIVES C3(b) AND D1

Usable Port Time (hours)	*Number of Port Calls*	*Amount Spent in Last Hour*	*Average Number of Passengers*	*Reduced Spending from Loss of Port Time ($)*
< 4.0 hours	1	$3.51	1664	5,834
4.0 hours	5	$3.51	1664	29,168
5.0 hours	56	$4.00	1664	372,288
6.0 hours	25	$4.75	1664	197,363
> 7.0 hours	9	$5.25	1664	78,530
Total	95			$683,182

72 The results of an analysis of transit time between Vancouver and Ketchikan demonstrated that nearly all ships have the capability to make up the additional transit time. Southbound vessels can make up the additional transit time required en route to Vancouver. Northbound vessels, while able to make up the time, would likely not do so en route to Ketchikan because they would arrive even earlier than the early morning schedules currently used, long before shops open or tours begin. Ships would not likely attempt to make up the time by reducing their time in Juneau or Skagway, the two primary ports of call when northbound from Ketchikan, since these two ports contribute more shore excursion revenues than Ketchikan. The remaining way to make up the time is to leave earlier from Ketchikan. Therefore, northbound ships would spend less time in port.

Table 4-27 summarizes the effects on passenger, crew, and cruise line spending using the number of port calls in 2001 as the base year.

TABLE 4-27
SUMMARY OF REDUCTION IN ANNUAL CRUISE-RELATED SPENDING WITH ALTERNATIVES C3(B) AND D1 (2001 BASE YEAR)

Total Spending Reduction from Fewer Port Calls	$1,528,600
Spending Reduction from Fewer Hours in Port	$683,100
Total Reduction in Cruise -Related Spending	$2,211,700

Source: DOT&PF, *Gravina Access Project Effects on Cruise Ship Operations*, prepared by Klugherz & Associates/Northern Economics, Inc. under contract to HDR Alaska, May 2003

Annual estimates presented in the *Gravina Access Project Economic Impacts Assessment* (Appendix D) apply these reduced spending estimates to the increasing number of cruise ships and cruise passengers in future years.

Reductions in cruise-related spending arising from Alternatives C3(b) or D1 would have some additional negative effects on the Ketchikan economy. These effects are determined using the I-O model for Ketchikan. To estimate the consequences of the changes in spending, the estimates for total reductions were used to measure the initial spending changes. The results of this analysis are shown in Table 4-28.

TABLE 4-28
ANNUAL SECONDARY ECONOMIC EFFECTS FROM REDUCED CRUISE-RELATED SPENDING WITH ALTERNATIVES C3(B) AND D1

Reduction in Gross Regional Product (2003$)	$2,700,000
Reduction in total labor income, other property type income, and indirect business taxes (2003$)	$1,900,000
Employment Losses (Jobs)	60

Note: Estimated impacts include direct and secondary (indirect plus induced) effects

4.26.3.5 Fiscal Impact on the Ketchikan Gateway Borough, City of Ketchikan, and City of Saxman

Property Tax Revenue

No Action Alternative

The No Action Alternative would have no impact on property tax revenues for the Borough, City of Ketchikan, and City of Saxman.

Alternatives C3(a), C3(b),C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Improved access to Gravina Island **and Pennock Island (with the selection of Alternative F1 or F3) would result in increased property values on the two islands**, thus generating greater property tax revenue from these properties for the Borough. Offsetting this effect, at least to some extent, would be probable decreases in property values on Revillagigedo Island

as the availability of additional land on Gravina Island **and Pennock Island** lessens demand for Revillagigedo Island land. The net effect on property tax revenue from this change in land value is uncertain.

Private lands and some structures would be acquired for each of the build alternatives. The assessed value of the private property (including structures) that might be acquired ranges from $50,000 (Alternative F3) to $4,140,000 (Alternative G3) (see Section 4.25.4 and Table 4-16). When the property was acquired, it would be removed from the tax rolls for the Borough, and if located within the City of Ketchikan, from the tax rolls in that government entity. None of the build alternatives is anticipated to require lands located within the City of Saxman. The conversion of private lands to public rights-of-way for Alternative G3, which has the highest acquisition cost, will reduce the assessed values, and associated property taxes, in the Borough by about 0.4 percent, and in the City of Ketchikan by about 0.7 percent. Other alternatives would have lesser impacts than those calculated for Alternative G3.

Business and Sales Tax Revenues

No Action Alternative and Alternatives G, G3, and G4

The No Action Alternative and Alternatives G, G3, and G4 would have no impact on business and sales tax revenues for the Borough, City of Ketchikan, and City of Saxman.

Alternatives C3(a), C3(b), D1, F1 (DOT&PF and FHWA Preferred), and F3

Bridge Alternatives C3(b) and D1 would adversely affect businesses operating in the Borough, and resulting tax revenues to the Borough government, the City of Ketchikan, and the City of Saxman. The extent of the reduction would include reduced spending by vessel crew members, a lesser amount of ship expenditures while in port, and reduced spending associated with fewer flight-seeing charters, and other shore excursions. These spending reductions (see Table 4-26 and Table 4-27) would be less than 2 percent of total 2001 summer visitor expenditures ($127,800,000). These percentages would be slightly lower (less than 0.5 percent lower) if measured against total annual visitor expenditures of $151,800,000 (see Appendix D).

The Borough and the City of Ketchikan would experience reduced sales tax revenues as a result of lower spending levels. A previous study indicated that about 85 percent of cruise-related expenditures were taxable.[73] Assuming that this same percentage is applicable to total annual spending by other segments of the visitor industry, the spending reductions would result in sales tax revenues about 1 percent lower for the City of Ketchikan and the Borough with Alternatives C3(b) and D1.

Tourism is estimated to account for almost $293,000 (43 percent) of the $682,000 general fund revenues for the City of Saxman.[74] These tourism-dependent revenues include fees charged to tour operators for visitors they bring to the totem park, sales at the city-owned Native Artist Cooperative Store, and sales tax revenues (excluding nontourism-dependent businesses). A reduction of less than 2 percent in total visitor-related revenues for the City would result in a

[73] DOT&PF, *The Economic Impacts of the Cruise Industry in Southeast Alaska,* prepared for the Southeast Conference by the McDowell Group. October 2000.

[74] Bob Rubin, Administrator, City of Saxman, July 12, 2002. Meeting with Bob Rubin, City Administrator for the City of Ketchikan; Kristen Maines, HDR Alaska Inc.; and Pat Burden, Northern Economics, Inc.

reduction of less than 1 percent (about $4,000) in total general fund revenues for Alternatives C3(b) and D1.

The reduction in spending associated with changes or loss of the SVFR for the bridge alternatives (see Section 4.26.3.3) would also have an effect on sales tax revenues for the City of Ketchikan and the Borough. Changes in the SVFR are not anticipated to have a discernible effect on the City of Saxman. Table 4-29 shows the potential fiscal effect of the SVFR based on the assumptions noted in Section 4.26.3.3.

TABLE 4-29
FISCAL EFFECT OF CHANGES IN SVFR OPERATIONS ON LOCAL GOVERNMENT SALES TAX REVENUES

Alternative/Local Government	*Change in Sales Tax Revenue ($)*
Alternatives C3(a), C3(b), C4, and D1	
Ketchikan Gateway Borough	(7,743)
City of Ketchikan	(13,550)
Alternative F1	
Ketchikan Gateway Borough	(1,549)
City of Ketchikan	(2,710)
Alternative F3	
Ketchikan Gateway Borough	(774)
City of Ketchikan	(1,355)

4.26.3.6 Additional Infrastructure and Government Services

No Action Alternative

With the No Action Alternative, a greater portion of regional economic development can be expected to occur on Revillagigedo Island. Current development on the periphery of Ketchikan would likely continue. Such development would also require additional government services and infrastructure. Limited development is expected on Gravina Island in the future under the No Action Alternative, so infrastructure requirements and needs for government services on the island would be limited.

Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Development on Gravina or Pennock islands will primarily be a transfer of growth that would have otherwise occurred on Revillagigedo Island. As a result, the location of additional infrastructure and where government services are provided within the Borough will change, but the total amount of such infrastructure and services will not be significantly affected.

With any of the build alternatives, development on Gravina Island would require infrastructure and government services. Again, these effects depend on the nature and scale of the development. For example, a high-density residential development would probably require street lighting and sewage services, whereas a low-density development would probably not. However, an expansion of police, fire, and other emergency services would almost certainly be necessary after there is a sufficient amount of residential and commercial development. Since the bridge alternatives would result in higher levels of development than the ferry alternatives, the provision of infrastructure and government services on Gravina Island would be required

sooner with the bridge alternatives. The City of Ketchikan and the Borough would determine when those services would be provided in the future.

4.26.3.7 Regional Economic Development

No Action Alternative

Based on the medium economic growth forecast for the Borough summarized in *Ketchikan Gateway Borough Economic Forecasts,*[75] the sectors of highest growth until 2025 are likely to be in the trade and services sector, which is driven primarily by tourism activity. Improvements in the AMHS and the recent development of the IFA are likely to attract shoppers and other visitors to Ketchikan from parts of southeast Alaska. Increases in tourism are expected because of the anticipated growth in cruise ship visits. Population in the Borough is predicted to grow slightly more than 1 percent annually during this period.

Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Development of one of the build alternatives could shift some economic activity to Gravina Island. In particular, anticipated population growth of just slightly higher than 1 percent annually suggests that some expansion of local housing would occur. If additional land on Gravina Island were available for residential development, then a bridge would probably result in more interest in Gravina Island housing than improved ferry service because of the greater convenience that a bridge offers. However, even with expanded ferry service or a bridge alternative, most of the additional housing required by a growing Borough population would probably be located on Revillagigedo Island. It is important to note that development of additional roads and other infrastructure by the Borough will be necessary to achieve more than very modest levels of economic development on Gravina Island by 2025. Without the Borough support for expansion of the road network and utilities availability on the island, development would be constrained.

In addition, a bridge or improved ferry, along with the availability of additional land on Gravina Island, would be likely to lower regional land prices and housing costs or, at least, slow their rate of increase over time in the Borough.[76] Lower housing costs might stimulate some purchases that would not otherwise be made. This effect on housing costs is certainly beneficial to potential buyers. However, each market transaction requires a seller, too, and landowners would receive lower prices when selling their properties.

Table 4-30 shows several indicators of the level of economic development on Gravina and Pennock Islands that might be achieved with the project alternatives (as compared to the No Action Alternative) with a medium level of economic activity in the region. As noted previously, much of the growth on Gravina or Pennock Island represents a transfer of development that would have occurred on Revillagigedo Island. The indicators presented here represent the area, population, or employment that would be served by the Gravina Access Project. It is

[75] DOT&PF, *Gravina Access Project*, *Ketchikan Gateway Borough Economic Forecasts Technical Memorandum*, prepared by Northern Economics under contract to HDR Alaska, August 2002.

[76] The magnitude of the effect on land prices would depend, in part, on how much additional land becomes available. Although, overall, regional land prices are likely to fall, initially, land prices on Gravina Island would be expected to rise. At present, there are no clear indications how Gravina Island property owners might react to higher prices, thus there are no indications of the amount of land that might be made available.

anticipated that development would also occur in areas outside of the areas of influence of the Gravina Access Project; such development is not included here.

TABLE 4-30
REGIONAL ECONOMIC DEVELOPMENT IN GRAVINA ACCESS PROJECT SERVICE AREA

Category	*Additional Development*			
	No Action Alternative	*Alternatives G2, G3, and G4*	*Alternatives C3(a), C3(b), C4, and D1)*	*Alternatives F1 and F3*
Land Use Served (Acres)[1]:				
Gravina Island	20	73	310	406
Pennock Island (F1 and F3 only)	0	0	0	76
Total[1]	20	73	310	482
Population Served:[2]				
Gravina Island	40	130	730	980
Pennock Island (F1 and F3 only)	0	0	0	190
Total	40	130	730	1,170
Employment:				
Gravina Island	10	50	50	60
Pennock Island (F1 and F3 only)	0	0	0	<10
Total	10	50	50	<70

[1] Acres of land served by the Gravina Access Project alternatives; other development may occur beyond the area of influence of the Gravina Access Project but such lands would continue to be accessed by private vessels and other means.

[2] Permanent, year-round residents that are served by the Gravina Access Project alternatives. Residents of Gravina or Pennock Islands living beyond the anticipated road network are not counted in the population estimate with a bridge alternative. A large population is expected to have seasonal or second homes on Gravina Island.

4.26.3.8 User Benefits

The benefits to users of the Gravina Access Project alternatives arise in two principal categories: those associated with existing trips, and those associated with new demand for trips. The first category includes potential time savings for existing trips and the improved standard of living and productivity gains associated with those savings. In addition, current travelers might realize a change in out-of-pocket costs such as tolls (also addressed in Sections 4.5.1 and 4.26.3.2) and vehicle operating costs, and, statistically, a change in accident probability rates due to a shift from one mode or level of service to another.

Benefits in the second principal category arise in the form of additional trips to and from Gravina Island by travelers for whom the costs and inconvenience of access under the existing ferry system are outweighed by the value of opportunities (e.g., existing draws such as shops, work places, and social and recreational activities) on Revillagigedo Island. With potential development induced by the Gravina Access Project, opportunities such as new retail outlets can emerge in response to the new cost-to-value travel equation, leading to additional demand for travel between Gravina and Revillagigedo Islands. The new opportunities can be followed by or led by new residential and workplace development.

Table 4-31 provides a summary of the user benefits associated with each alternative. Existing and new trip benefits can be offset by environmental impacts. For purposes of this analysis, environmental costs (shown as negative environmental benefits) are based on annual emissions calculated per vehicle mile traveled for each of the alternatives (see Appendix D).

TABLE 4-31
USER ECONOMIC BENEFITS OF GRAVINA ACCESS PROJECT ALTERNATIVES
2003-2025 (MILLIONS OF 2003 $)

	Airport Bridge				*Pennock Island Bridge*		*Enhanced Ferry Service*		
	C3(a)	*C3(b)*	*C4*	*D1*	*F1*	*F3*	*G2*	*G3*	*G4*
Existing Trips[1]									
Travel Time Savings	$19.70	$22.60	$22.90	$23.60	$9.50	$6.90	$0.00	$0.00	$2.20
Out-of-Pocket Cost Savings	$17.00	$18.20	$18.50	$20.10	$8.80	$8.90	$0.00	$0.00	($0.10)
Accident Cost Savings	($3.50)	($3.00)	($2.90)	($2.20)	($7.00)	($6.90)	$0.00	$0.00	$0.00
Existing Trip Benefits	$33.20	$37.80	$38.40	$41.50	$11.20	$9.00	$0.00	$0.00	$2.10
New Trip Benefits[2]	$22.90	$25.40	$26.60	$29.10	$17.50	$15.20	$0.00	$0.00	$0.00
Total Consumer Surplus	$56.10	$63.20	$65.00	$70.60	$28.70	$24.20	$0.00	$0.00	$2.10
Environmental Benefits[3]	($0.90)	($0.80)	($0.80)	($0.60)	($1.60)	($1.60)	($0.20)	($0.20)	($0.20)
Total Project Benefits[4]	$55.20	$62.30	$64.20	$70.00	$27.10	$22.60	($0.20)	($0.20)	$2.00

Note: Numbers in parentheses represent negative values.

[1] Existing trip benefits are based on forecasts of passenger trips under the No Action Alternative.

[2] New trips are trips induced by improved access; i.e., trips that occur as a result of growth and development associated with the build alternative.

[3] Environmental benefits (costs are defined as negative benefits) are the costs that result from vehicle use, emissions, and vehicle-generated noise. For more information, see Appendix D.

[4] Project benefits are calculated based on the traffic projections discussed in Section 4.26.4.3. For more information, see Appendix D.

No Action Alternative

User benefits are calculated as the change from the No Action Alternative, so by definition, the No Action Alternative would not have any impacts.

Alternatives C3(a), C3(b), C4, and D1

For the bridge alternatives located near the airport, the majority of the benefits are related to user benefits realized from existing trips as these alternatives provide for shorter trip times and ferry toll savings for users[77]. The benefits realized from new demand are also very significant for similar reasons, but are less than that from existing trips. A slight offset to these user benefits is the increased emission costs due to increased roadway vehicle use. Overall, the bridge alternatives nearest the airport provide the greatest user benefits, with total benefits in the range of $55 million to $70 million.

[77] DOT&PF, *Gravina Access Project, Quantification of User Economic Benefits Technical Memorandum*, prepared by HLB Decision Economics, Inc. under contract to HDR Alaska, November 2002.

Alternatives F1 (DOT&PF and FHWA Preferred) and F3

The user benefits from the bridge alternatives that cross Pennock Island are primarily derived from new trips to developable lands. Benefits related to existing trips are relatively small in comparison to the bridge alternatives located near the airport, as more roadway travel is required and the time savings are less. In total, the user benefits of the Pennock Island crossing option are less than 40 percent of that provided by Alternatives C3(a, b), C4, and D1.

Alternatives G2, G3, and G4

The longer transit time for ferries between Gravina and Revillagigedo Islands for Alternatives G2 and G3 offsets any potential time savings from the Revillagigedo Island ferry terminals being in closer proximity to the origin. More frequent service under Alternative G4 would result in benefits greater than the other improved ferry alternatives, but much smaller than the bridge alternatives.

4.26.4 Transportation Impacts

4.26.4.1 Aviation Impacts

No Action Alternative

The No Action Alternative would have no secondary impacts on aviation.

Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The only secondary impacts to aviation potentially resulting from the Gravina Access Project alternatives are related to Ketchikan International Airport. None of the build alternatives would have adverse secondary impacts on planned airport facilities. The Airport Master Plan[78] calls for upgrading the Runway Safety Area (RSA) by shifting the runway 800 feet to the southeast. This shift would create 1,000 feet of RSA at the northwestern end and 1,000 feet of RSA beyond the shifted runway at the southeastern end. The proposed alternatives and associated roadways would not affect implementation of these plans.

The airport circulation road would be aligned to traverse to the south end of the existing RSA, through the area of the planned RSA extension. This would bring the road through the current runway protection zone, but outside the current RSA. The road would be approximately 45 feet below the existing runway surface, well below the approach surface to Runway 29. Such an alignment would have no secondary impact on current airport operations. The planned runway extension would occur over the top of the roadway, at which time the roadway would be placed in a cut-and-cover tunnel, thereby avoiding impacts on the runway or the RSA.

The traffic projections associated with these alternatives (see Table 4-32) indicate a need for additional parking facilities at the airport by 2025. A parking structure is included in the Airport Master Plan and each of the Gravina Access Project build alternatives. Adding a parking structure at the airport terminal would be a benefit to the airport because it would functionally separate the parking facilities from the terminal, and thus improve airport security. In addition,

[78] DOT&PF. *Ketchikan International Airport Master Plan.* June 2003.

shifting the airport parking area from its waterfront location in Ketchikan to Gravina Island would free up the waterfront land for other uses.

Development of the airport circulation road could raise the grade near the current general aviation apron, thereby creating additional usable space for airport use in that location. The airport circulation road to the southwest side of the airport would provide additional opportunity for future airport expansion. The ability to shift airport development to the southwest side of the airport over the long term could free up existing waterfront area for water-dependent development, which represents a benefit to the airport facilities.

4.26.4.2 Marine Navigation Impacts

No Action Alternative

The No Action Alternative would have no secondary impacts on marine navigation. **Any water-based facilities developed on Gravina Island would not likely create enough marine traffic to affect marine navigation in Tongass Narrows.**

Alternatives C3(b), D1, G2, G3 and G4

The secondary impacts associated with these alternatives are related to the economic effects of changes in operations of cruise ships and other vessels. Section 4.26.3 (Secondary Economic Impacts) describes the economic impacts that would result from the direct impacts on marine transportation. Alternatives C3(b), D1, G2, G3 and G4 would have no other secondary impacts on marine transportation. **The potential development of water-based facilities in the Conceptual North Gravina Industrial Park (see Figure 4.2) would not likely affect marine navigation in Tongass Narrows because the width of Tongass Narrows at this location can accommodate higher volumes of marine traffic.**

Alternatives C3(a), C4, F1 (DOT&PF and FHWA Preferred), and F3

The secondary impacts associated with Alternatives C3(a), C4, F1, and F3 are primarily related to the economic effects of changes in operations of cruise ships and other vessels. Section 4.26.3 (Secondary Economic Impacts) describes the economic impacts that would result from the direct impacts on marine transportation. These bridge alternatives would also have long-term secondary effects because of increased risk associated with transiting under a bridge, scheduling requirements for large ships passing under the bridge, and the requirement for one-way traffic in Tongass Narrows for the lifetime of the bridge.

For Alternatives C3(a) and C4, the potential development of water-based facilities in the Conceptual North Gravina Industrial Park (see Figure 4.2) would not likely affect marine navigation in Tongass Narrows because the width of Tongass Narrows at this location can accommodate higher volumes of marine traffic. The potential development of water-based facilities in the Conceptual South Gravina Fisheries Industrial Park and Conceptual Clam Cove Community Development (see Figure 4.2) under Alternative F1 would likely not affect marine navigation in Tongass Narrows or West Channel because most marine traffic would navigate in the main shipping channel east of Pennock Island. For Alternative F3, the potential development of water-based facilities in the Conceptual South Gravina Fisheries Industrial Park and Conceptual Clam Cove Community Development (see Figure 4.2) could affect marine navigation by adding congestion to

West Channel of Tongass Narrows, which would be the primary travel corridor for all ships in excess of 60 feet in height.

4.26.4.3 Vehicle Impacts

The secondary effects of the Gravina Access Project on vehicular traffic are based on traffic projections for 2025 (Table 4-32). The analysis examined 12 existing study area intersections on Tongass Avenue between Bryant Street, which is approximately 0.5 mile south of the airport ferry terminal site, and Deermount Street, which is approximately 0.3 mile south of downtown Ketchikan, as well as the intersections with the approaches to each of the alternatives (see Figure 3.14).

TABLE 4-32
TRAFFIC PROJECTIONS FOR PROJECT ALTERNATIVES IN 2025:

Alternative	*One-Way Trips Across Tongass Narrows: People per Day in 2025*	*Peak Hourly Volumes on New Alignment*
C3(a), C3(b), C4, and D1	4,300	330
F1 and F3	5,100	420
G2	1,600	101
G3	1,600	138
G4	1,600	202
No Action	1,350	NA
Reference	There were 1,056 passenger trips per day on the ferry in 1999.	NA

Source: The reference number of 1,056 passenger trips per day is from *Ketchikan 2020 & Gravina Access Project: Existing Conditions Demographic and Socioeconomic Analysis*, and forecast numbers are from the *Traffic Projections Tech Memo* (HDR Alaska 2002).

The traffic analysis characterized the effects of the project alternatives on the Level of Service (LOS) of the 12 study area intersections and the approaches to the alternatives. The analysis was conducted for the afternoon peak hour, as this time period places the greatest demands on the roadway system. Intersections with a LOS E or F are considered to have traffic impacts deemed "unacceptable" from a traffic engineering perspective.

Traffic projections and the LOS analysis for the No Action Alternative represent background traffic conditions for 2025. Based on traffic projections associated with the ferry alternatives (Alternatives G2, G3, and G4), these alternatives would not significantly affect the background traffic conditions on the local roadway system; therefore, LOS was calculated only for the intersections associated with the new and existing ferry terminal access drives for these alternatives. Table 4-33 provides the projected LOS for the No Action Alternatives and the bridge alternatives (Alternatives C3[a], C4, D1, F1, and F3) at the analyzed intersections. Table 4-34 provides the projected LOS for the ferry alternatives where the ferry terminal access drives intersect Tongass Avenue. Note that the *Highway Capacity Manual* methodology provides a composite LOS for signalized intersections and the LOS for each minor move (individual approaches) at unsignalized intersections.

TABLE 4-33
LEVEL OF SERVICE AT PROJECT AREA INTERSECTIONS-NO ACTION AND BRIDGE ALTERNATIVES (PROJECTIONS FOR 2025 ASSUMING MEDIUM ECONOMIC GROWTH)

*Intersection with Tongass Avenue (Type of Control)**	*No Action*		*C3(a)/C3(b)/C4/D1*		*F1/F3*	
	LOS	*Delay (seconds)*	*LOS*	*Delay (seconds)*	*LOS*	*Delay (seconds)*
Deermount Street (Stop)						
EBL	A	9.1	A	9.2	A	9.7
SBL	F	55.2	F	72.3	F	142.4
SBR	B	14.2	C	15.0	C	17.1
Bawden Street (Stop)						
NBL	A	8.5	A	8.6	A	8.9
SBLR	A	9.1	A	9.4	A	9.6
WBLR	F	209.1	F	344.1	F	557.4
EBL	F	112.4	F	172.0	F	327.0
EBR	C	24.7	D	28.7	E	37.0
Main Street (Stop)						
NBL	A	8.8	A	9.0	A	9.3
SBLR	A	8.4	A	8.6	A	8.7
WBLR	D	26.7	D	34.6	E	45.1
EBLR	E	40.1	F	54.3	F	87.0
Mission Street (Stop)						
NBL	B	11.5	B	12.1	B	12.8
Dock Street (Signal)	A	5.1	A	5.2	A	5.4
Schoenbar Road (Stop)						
EBL	C	18.5	C	20.2	C	21.4
WBL	B	11.0	B	11.4	B	11.5
NBLR	F	**	F	**	F	**
SBL	F	**	F	**	F	**
SBR	F	169.2	F	224.8	F	249.1
Washington Street (Signal)	A	9.4	B	10.3	B	11.1
Jefferson Street (Signal)	B	16.8	B	18.2	B	18.5
Third Avenue (Stop)						
EBL	B	13.7	B	14.8	B	14.3
SBL	F	261.5	F	401.7	F	330.7
SBR	C	15.3	C	16.5	C	15.9
Carlanna Lake Road (Signal)	E	57.3	E	68.7	E	68.7
Bryant Street (Stop)						
EBL	A	10.0	B	10.5	B	10.2
SBL	F	168.5	F	326.9	F	305.2
SBR	C	17.5	C	20.4	C	18.4
Airport Ferry Access Drive (Stop)						
WBL	B	10.8	X	X	X	X
NBLR	F	91.6				
C3(a)/C3(b)/C4/D1 Access						
EBL	X	X	B	10.6	X	X
SBLR			F	986.0		
F1 Access						
EBL	X	X	X	X	A	9.5
SBLR					F	87.2
F3 Access						
WBL	X	X	X	X	A	9.9
NBL					F	321.2

* Direction of Movement: NB = Northbound, SB = southbound, EB = Eastbound, WB = Westbound, L = left turn movement, R = right turn movement, LR = left and right turn movements. ** Delay greater than 1,000 seconds per vehicle. X intersection does not exist in this alternative.

TABLE 4-34
LEVEL OF SERVICE AT PROJECT AREA INTERSECTIONS-FERRY ALTERNATIVES
(PROJECTIONS FOR 2025 ASSUMING MEDIUM ECONOMIC GROWTH)

*Intersection with Tongass Avenue (Type of Control)**	*G2*		*G3*		*G4*	
	LOS	*Delay (seconds)*	*LOS*	*Delay (seconds)*	*LOS*	*Delay (seconds)*
Jefferson Street (Signal) G3 Access	NA	NA	C	22.9	NA	NA
Existing Airport Ferry Access Drive (Stop) WBL NBLR	 B D	 10.6 26.1	 B E	 10.3 38.5	 B F	 10.9 125.9
G2 Access (Stop) WBL NBLR	 B D	 10.3 29.5	 X	 X	 X	 X

* Direction of Movement: NB = Northbound, SB = southbound, EB = Eastbound, WB = Westbound, L = left turn movement, R = right turn movement, LR = left and right turn movements. ** Delay greater than 1,000 seconds per vehicle. X intersection does not exist in this alternative.

No Action Alternative

Traffic projections show that, under the No Action Alternative, the LOS would decrease from existing acceptable levels to unacceptable levels (i.e., E or F), resulting in corresponding traffic congestion and vehicle delays, for one or more turning movements at the following seven project area intersections:

- Deermount Street and Stedman Street/Tongass Avenue
- Bawden Street and Front Street/Tongass Avenue
- Main Street and Front Street/Tongass Avenue
- Schoenbar Road and Tongass Avenue
- Carlanna Lake Road and Tongass Avenue
- Bryant Street and Tongass Avenue
- Airport ferry access drive and Tongass Avenue

These intersections would require traffic signal operation in order to attain acceptable traffic conditions. With the exception of Third Avenue southbound left turn movement, traffic at the remaining five intersections included in the analysis would not be affected by future (2025) traffic conditions because the length of delay would not increase by more than a few seconds and the intersections would continue to operate at LOS C or better. The Third Avenue southbound left turn movement would continue to operate at LOS F and the delay would increase from 65 seconds (existing) to approximately 262 seconds (2025). This result, however, is due to an anomaly in the analysis methodology that allows a single left turn to disproportionately affect delay. The projected number of left turns is limited to one for all analysis cases. As such, improvements were not investigated at this location.

Alternatives C3(a), C3(b), C4, and D1

The intersections of Alternatives C3(a), C3(b), C4, and D1 with Tongass Avenue would operate at unacceptable levels (i.e., LOS F) for turning movements from the alternative alignment onto Tongass Avenue. Vehicle travel between the alignments and Tongass Avenue would be adversely affected by long delays.

A traffic signal would be installed at the Alternative C3(a)/C3(b)/C4/D1 intersection with Tongass Avenue to reduce traffic congestion and vehicle delays, and restore operating conditions to acceptable levels of service. Pedestrian signals would be required as part of the signal installation. The traffic signal itself would cause some off-peak traffic delays. However, if no signal were installed, the additional peak hour traffic expected by 2025 would delay traffic even more and exacerbate LOS problems.

The LOS at the intersections of Tongass Avenue with Deermount Street, Bawden Street, Main Street, Washington Street, and Bryant Street would be adversely affected for certain turning motions by 2025. These intersections would be closely monitored, and a corrective action (e.g., installation of traffic signals) would be taken to avoid any reduction in LOS.

Alternatives F1 (DOT&PF and FHWA Preferred) and F3

The intersections of Alternatives F1 and F3 with South Tongass Highway would operate at unacceptable levels (i.e., LOS F) for turning movements at the intersection with South Tongass Highway. Vehicle travel between the alignments and South Tongass Highway would be adversely affected by long delays.

A traffic signal would be installed at the Alternatives F1 and F3 access to South Tongass Highway to reduce traffic congestion and vehicle delays, and restore operating conditions to acceptable levels of service. Pedestrian signals would be required as part of the signal installation. The traffic signal itself would cause some off-peak traffic delays. However, if no signal were installed, the additional peak hour traffic expected by 2025 would delay traffic even more and exacerbate LOS problems.

The LOS at the intersections of Tongass Avenue with Bawden Street, Main Street, Washington Street, and Bryant Street would be adversely affected for certain turning motions by 2025. These intersections would be closely monitored, and a corrective action (e.g., installation of traffic signals) would be taken to avoid any reduction in LOS.

Traffic entering and exiting the USCG Station would be affected by Alternative F3 more so than Alternative F1 because Alternative F3 traffic would have to pass the entrance to the base. In 2025, an estimated 1,356 vehicles would pass the USCG Station during the peak hour under Alternative F1, whereas an estimated 1,492 vehicles would pass the base entrance during the peak hour under Alternative F3. Either alternative would likely cause delays for vehicles entering and exiting the USCG Station.

Alternative G2

Alternative G2 would not cause unacceptable LOS at any project area intersections beyond future background levels. Both the existing airport ferry access drive and the Peninsula Point ferry access drive would operate at LOS D. Background traffic levels resulting in unacceptable LOS at the intersections of Tongass Avenue with Deermount Street, Bawden Street, Main Street, Schoenbar Road, Carlanna Lake Road, and Bryant Street would not be affected by Alternative G2. The new ferry terminal at Peninsula Point would reduce traffic at the existing airport ferry access drive, and improve the LOS to an acceptable level (D) as compared with the background level (F). This alternative would therefore have a beneficial effect on traffic.

Alternative G3

Alternative G3 would not cause unacceptable LOS at any project area intersections beyond future background levels. Turning movements onto Tongass Avenue from the existing airport ferry access drive would experience delay at LOS E, which would be an improvement compared with the background level (F), but would still be unacceptable. The new ferry access drive at Jefferson Street would operate at LOS C. Background traffic levels resulting in unacceptable LOS at the intersections of Tongass Avenue with Deermount Street, Bawden Street, Main Street, Schoenbar Road, Carlanna Lake Road, and Bryant Street would not be affected by Alternative G3.

Installation of a traffic signal at the existing airport ferry access drive is recommended to reduce traffic congestion and vehicle delays, and restore operating conditions to acceptable levels of service. Pedestrian signals would be required as part of the signal installation.

The traffic signal itself would cause some off-peak traffic delays. However, if no signal were installed, the additional peak-hour traffic expected by 2025 would delay traffic even more and exacerbate LOS problems.

Alternative G4

Alternative G4 would not cause unacceptable LOS at any project area intersections beyond future background levels. Turning movements onto Tongass Avenue from the existing airport ferry access drive would experience delay at LOS F, the same LOS anticipated for future background levels. The LOS at this intersection would be unacceptable. Background traffic levels resulting in unacceptable LOS at the intersections of Tongass Avenue with Deermount Street, Bawden Street, Main Street, Schoenbar Road, Carlanna Lake Road, and Bryant Street would not be affected by Alternative G4.

Installation of a traffic signal at the existing airport ferry access drive is recommended to reduce traffic congestion and vehicle delays, and restore operating conditions to acceptable levels of service. Pedestrian signals would be required as part of the signal installation.

The traffic signal itself would cause some off-peak traffic delays. However, if no signal were installed, the additional peak hour traffic expected by 2025 would delay traffic even more and exacerbate LOS problems.

4.26.5 Pedestrians and Bicyclists

4.26.5.1 No Action Alternative

As a result of expected traffic increases not related to the project, traffic signal operation would be required at seven project area intersections in order to attain acceptable traffic conditions. These intersections are:

- Deermount Street and Stedman Street/Tongass Avenue
- Bawden Street and Front Street/Tongass Avenue
- Main Street and Front Street/Tongass Avenue
- Schoenbar Road and Tongass Avenue
- Carlanna Lake Road and Tongass Avenue

- Bryant Street and Tongass Avenue
- Existing ferry terminal and Tongass Avenue

Each of these intersections would be expected to include pedestrian phasing, which would increase pedestrian and bicyclist safety over existing conditions with no traffic signals.

4.26.5.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), and F3

The new intersection formed by the bridge intersection with Tongass Avenue would require traffic signal operation to achieve acceptable conditions considering the projected traffic levels. In addition to the other intersections requiring traffic signals for the No Action Alternative, the new intersection would be equipped with pedestrian signals, providing another safe crossing of Tongass Avenue for pedestrians and bicyclists.

4.26.5.3 Alternatives G2 and G3

The new intersection formed by the intersection of the new ferry terminal access drive with Tongass Avenue would operate at acceptable levels under projected traffic conditions; therefore, no new traffic signal on Tongass Avenue would be required. There would be no pedestrian signals and no additional safe crossing of Tongass Avenue for pedestrians and bicyclists.

4.26.5.4 Alternative G4

The existing intersection formed by the ferry terminal access drive with Tongass Avenue would operate at acceptable levels under projected traffic conditions; therefore, no new traffic signal on Tongass Avenue would be required. Pedestrian signals for an additional safe crossing of Tongass Avenue for pedestrians and bicyclists are not planned at this time.

4.26.6 Air Quality Impacts

Increased vehicular traffic associated with the project would increase emissions of particulate matter smaller than 10 microns in diameter (PM_{10}) and carbon monoxide (CO); however, because the project area has always been in attainment with respect to the NAAQS and because the projections for increased traffic volumes associated with the Gravina Access Project alternatives would be less than 3,000 vehicles per hour (assuming medium economic growth), no air quality conformity analysis or detailed modeling is required. The methodology for determining secondary air quality impacts of the project is described in Appendix Q.

4.26.6.1 Particulate Matter

FHWA recommended that a qualitative analysis of future PM_{10} levels be conducted to determine if the projected traffic levels associated with the project alternatives could result in an exceedance of the NAAQS for PM_{10}[79] (i.e., a 24-hour average of 150 micrograms per cubic meter[80] or an annual average of 50 micrograms per cubic meter).

[79] Jeff Houk, Air Quality Specialist, FHWA Western Resource Center, e-mail correspondence to C. Snead, HDR Environmental Planner. October 23, 2002.

[80] The 24-hour average for PM_{10} is based on the highest (maximum) and second highest (second maximum) recorded concentrations at a given receptor, allowing for one exceedance of the standard per year at any receptor.

To determine if the project alternatives could result in an exceedance of the NAAQS for PM_{10}, the project team referred to suggestions found in the FHWA publication, *Guidance for Qualitative Project Level "Hot Spot" Analysis in PM-10 Nonattainment and Maintenance Areas*[81]. The analysis involved identifying an area with similar traffic and air quality conditions to the project area and where monitoring data for PM_{10} is available, and making a comparison of PM_{10} concentration based on traffic levels. The PM_{10} monitoring location that most closely represents traffic and air quality conditions of the Gravina Access Project area is located in Juneau, Alaska, at Floyd Dryden Junior High School (Dryden) on Mendenhall Loop Road. The traffic volumes at this location in 2000 were 1,201 vehicles during the peak hour[82]. The PM_{10} levels at Dryden show a downward trend since 1996, with concentrations falling to less than 20 percent of standards by 2001 (see Table 4-35). The monitoring values for all years are well below the NAAQS for PM_{10}.

TABLE 4-35
PM_{10} CONCENTRATIONS AT DRYDEN MONITORING STATION, JUNEAU, ALASKA

Year	*Number of Daily Observations*	*24-Hour Values (µg/m³)*		*Annual Average (µg/m³)*	
		Observed Maximum/Second Maximum	*NAAQS*	*Observed*	*NAAQS*
1996	273	86/79	150	15.3	50
1997	199	70/63	150	10.7	50
1998	75	48/40	150	10.6	50
1999	113	28/27	150	6.6	50
2000	96	33/27	150	7.5	50
2001	91	28/24	150	6.1	50

Source: EPA online database: http://www.epa.gov/air/data/index.html

Traffic levels associated with the Gravina Access Project alternatives indicate that, under medium economic growth, the highest peak hourly volume resulting from any of the project alternatives in 2025 would be 2,648 vehicles on Tongass Avenue between Carlanna Lake Drive and Third Avenue. This is approximately 2.2 times higher than the 1,201 vehicles for the peak hour at Dryden in 2000. Therefore, a multiplier of 2.2 was applied to the 2000 PM_{10} data at Dryden to estimate worst-case PM_{10} emissions for the Gravina Access Project ($\mu g/m^3$ = micrograms per cubic meter):

24-hour Value: $33\ \mu g/m^3 \times 2.2 = 72.6\ \mu g/m^3$
Annual: $7.5\ \mu g/m^3 \times 2.2 = 16.5\ \mu g/m^3$

These estimates indicate that, with any of the project alternatives, the PM_{10} concentrations would be less than half of both the NAAQS 24-hour and annual averages. Because paved roads generally contribute to only a small fraction of the total PM_{10} concentration at any location (the majority is anticipated to be caused by other sources such as fuel combustion and sea salt in this coastal region), an increase in traffic on paved roads will not mean a proportionate increase in PM_{10} concentrations. Therefore, none of the project alternatives would cause or contribute to violations of the NAAQS for PM_{10}.

[81] FHWA Office of Natural Environment, September 2001.

[82] Rick Purves, Traffic Engineer, DOT&PF, personal communication with S. Zilka, HDR Air Quality Specialist, October 2002.

4.26.6.2 Carbon Monoxide

Based on a comparison of air quality conditions in Juneau, Alaska, the traffic projections associated with the project alternatives would not result in exceedances of NAAQS for CO in the Ketchikan area. With a similar climate and a larger population (over 30,000), Juneau has no reported exceedances of CO. With continued improvement in automobile engineering to reduce CO emissions, ambient CO concentrations would continue to decline. Traffic projections associated with the Gravina Access Project would not affect ambient concentrations of CO.

4.26.7 Noise Impacts

Secondary noise impacts are associated with construction of new residential, commercial, and industrial developments; long-term operations at industrial and commercial sites; and vehicular travel associated with the new land uses. Construction-related noise would be restricted by local ordinance consistent with City of Ketchikan requirements. Noise from commercial and industrial sources would be limited to development zones specifically intended for such uses; therefore, the nearby land uses would not be expected to be sensitive to noise emanating from these sources.

In accordance with FHWA noise regulations (23 CFR Part 772) and DOT&PF Noise Abatement Policy (March 1996), an evaluation was conducted to determine the noise impacts associated with traffic patterns resulting from the proposed alternative alignments and the No Action Alternative.

Noise levels associated with traffic projected to occur in 2025 with each of the alternatives were determined by using the FHWA Traffic Noise Model Version 2.0. The basic model inputs are:

- Afternoon peak hourly traffic volumes for 2025, assuming medium economic growth and development;[83]
- A proposed fleet mix for vehicle travel north of Dock Street of 92.0 percent Autos, 6.2 percent Medium Trucks, 0.4 percent Heavy Trucks, 1.3 percent Buses, and 0.13 percent Motorcycles.[84]
- A proposed fleet mix for vehicle travel south of Dock Street of 93.7 percent Autos, 4.0 percent Medium Trucks, 0.4 percent Heavy Trucks, 1.8 percent Buses, and 0.1 percent Motorcycles.[85]
- Operational speed of 25 mph for Tongass Avenue north of Schoenbar Road and 20 mph for Tongass Avenue from Schoenbar Road to Deermount Avenue (a.k.a. Mill Street and Stedman Street);
- Operational speed of 45 mph along the alternative roadway and, where applicable, bridges;

The FHWA Traffic Noise Model defaults for options such as meteorological conditions and pavement type (i.e., 50 percent humidity, 68°F, average pavement type).

[83] DOT&PF, *Gravina Access Project Traffic Assessment Technical Memorandum*, prepared by HDR Alaska, Inc. November 2002.

[84] Vehicle mix provided by Rick Purves, DOT&PF Traffic Engineer, to C. Snead, HDR, May 21, 2003.

[85] Ibid.

Traffic noise levels were determined at various distances from the centerline of the modeled segments of Tongass Avenue, Mill Street, and Stedman Street, and of the alternatives and roadways approaching the alternatives. The results of this analysis provide the distances from centerline at which the noise levels approach the Noise Abatement Criteria (NAC) for Activity Category B (67 dB[A]) or C[86] (72 dB[A]); i.e., where the noise level is within 1 dB(A) of the NAC for those activity categories, or 66 dB(A) and 71 dB(A), respectively (see Table 3-18). For all alternatives, including No Action, the distance from centerline within which noise impacts would occur would expand from current conditions (see Table 3-20) as a result of increased traffic projected to occur along these roadways. For purposes of this analysis, impacts of the build alternatives on noise levels along Tongass Avenue are described relative to the No Action Alternative.

4.26.7.1 No Action Alternative

As shown in Table 4-36, the distance from the centerline of Tongass Avenue to the most sensitive noise impact threshold (i.e., 66 dB[A]) ranges from 31 feet to 64 feet in the study area under the No Action Alternative during the peak hour of traffic volume. Noise levels would be greatest in the area between Carlanna Lake Drive and Dock Street. The increased traffic associated with the No Action Alternative would result in increased noise levels on Tongass Avenue that would effectively widen the impact area by 12 to 28 feet (i.e., 6 to 143 feet on either side of centerline), as compared to existing conditions (see Table 3-20).

TABLE 4-36
DISTANCE FROM CENTERLINE TO NOISE IMPACT THRESHOLDS FOR NO ACTION ALTERNATIVE

Segment	*PHV[1] (2025)*	*Distance to Traffic Noise Impact Threshold (feet)*	
		66 dB(A)[2]	*71 dB(A)[3]*
North Tongass Ave. to Ferry Terminal Access Drive	1768	53	26
Ferry Terminal Access Drive to Bryant Street	1822	54	27
Bryant Street to Carlanna Lake Dr.	1786	53	26
Carlanna Lake Dr. to Third Ave.	2462	58	32
Third Ave. to Jefferson St.	2410	57	32
Jefferson St. to Washington St.	2250	62	31
Washington St. to Schoenbar Rd.	2341	64	31
Schoenbar Rd. to Dock St.	2309	54	27
Dock St. to Mission St.	1635	40	20
Mission St. to Main Street	1381	36	18
Main Street to Bawden Street	1083	31	15
Bawden Street to Deermount Street	1283	36	17
Deermount Street to South Tongass Highway	1164	34	16

[1] Peak Hourly Volume

[2] 66 dB(A) is 1 dB(A) less than the NAC of 67 dB(A) for Activity Category B

[3] 71 dB(A) is 1 dB(A) less than the NAC of 72 dB(A) for Activity Category C

[86] Activity Category B includes picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals. Activity Category C includes other developed lands, properties, or activities not included in Category B and not including lands on which serenity and quiet are of extraordinary significance or that serve an important public need where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.

4.26.7.2 Alternatives C3(a), C3(b), C4 and D1

As shown in Table 4-37, the distance from the centerline of Tongass Avenue to the most sensitive noise impact threshold ranges from 33 feet to 60 feet in the study area under Alternatives C3(a), C3(b), C4, and D1 during the peak hour of traffic volume. Noise levels would be greatest in the area between the north end of the study area and Dock Street. The increased traffic associated with these alternatives on Tongass Avenue would result in increased noise levels that would effectively widen the impact area by 12 feet or less (i.e., as much as 6 feet on either side of centerline), as compared to the No Action Alternative (see Table 4-36). The greatest expansion of the noise threshold contour would occur in the northern end of the project area. Noise levels at the approaches to the intersections of the alternatives with Tongass Avenue and along the alternative alignments would be comparable to noise levels at other locations along Tongass Avenue. The relatively minor expansion of the noise impact area (i.e., no more than 6 feet on either side of centerline) as compared with the No Action Alternative, would have no effect on activities in the project area.

TABLE 4-37
DISTANCE FROM CENTERLINE TO NOISE IMPACT THRESHOLDS
FOR ALTERNATIVES C3(A), C3(B), C4, AND D1

Segment	*PHV[1] (2025)*	*Distance to Traffic Noise Impact Threshold (feet)*	
		66 dB(A)[2]	*71 dB(A)[3]*
North Tongass Avenue to Bryant Street	2040	58	29
Bryant Street to Carlanna Lake Dr.	1990	57	28
Carlanna Lake Dr. to Third Ave.	2648	60	34
Third Ave. to Jefferson St.	2564	60	33
Jefferson St. to Washington St.	2386	57	32
Washington St. to Schoenbar Rd.	2469	58	32
Schoenbar Rd. to Dock St.	2422	56	27
Dock St. to Mission St.	1745	42	20
Mission St. to Main Street	1487	37	18
Main Street to Bawden Street	1182	34	16
Bawden Street to Deermount Street	1375	36	18
Deermount Street to South Tongass Highway	1249	33	16
Approach West of C3(a)/C3(b)/C4/D1	1808	48	25
Approach East of C3(a)/C3(b)/C4/D1	2050	53	27
New roadway alignment of C3(a)/C3(b)/C4/D1	330	39	19

[1] Peak Hourly Volume

[2] 66 dB(A) is 1 dB(A) less than the NAC of 67 dB(A) for Activity Category B

[3] 71 dB(A) is 1 dB(A) less than the NAC of 72 dB(A) for Activity Category C

Alternative C3(a)

The closest noise sensitive receptor to Alternative C3(a) is a residence 70 feet from the centerline. The existing noise level in this residential neighborhood is 58 dB(A). The modeled future (2025) noise level at 70 feet from the centerline is 61 dB(A). Because the modeled noise level is less than 10 dB(A) higher than the existing noise level, and since the estimated distance to the residential traffic noise impact threshold along the new roadway alignment is 39 feet, and the closest residence is located approximately 70 feet away, it is unlikely Alternative C3(a) would have an impact on sensitive receptors along the new alignment.

Alternative C3(b)

The closest sensitive receptor to Alternative C3(b) is a residence 135 feet from centerline. The existing noise level in this residential neighborhood is 58 dB(A)[87]. The modeled future (2025) noise level at 135 feet from the centerline is 55 dB(A). Because the modeled noise level is less than the existing noise level, and since the estimated distance to the residential traffic noise impact threshold along the new roadway alignment is 39 feet, and the closest residence is located approximately 135 feet away, it is unlikely Alternative C3(b) would have an impact on sensitive receptors along the new alignment.

Alternative C4

The closest sensitive receptor to Alternative C4 is a residence 65 feet from the centerline. The existing noise level in this residential neighborhood is 59 dB(A)[88]. The modeled future (2025) noise level at 65 feet from the centerline is 62 dB(A). Because the modeled noise level is less than 10 dB(A) higher than the existing noise level, and since the estimated distance to the residential traffic noise impact threshold along the new roadway alignment is 39 feet, and the closest residence is located approximately 65 feet away, it is unlikely Alternative C4 would have an impact on sensitive receptors along the new alignment.

Alternative D1

The closest sensitive receptor to Alternative D1 is a residence 90 feet from the centerline. The existing noise level in this residential neighborhood is 59 dB(A)[89]. The modeled future (2025) noise level at 90 feet from the centerline is 59 dB(A). Because the modeled noise level is the same as the existing noise level, and since the estimated distance to the residential traffic noise impact threshold along the new roadway alignment is 39 feet, and the closest residence is located approximately 90 feet away, it is unlikely Alternative D1 would have an impact on sensitive receptors along the new alignment.

4.26.7.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

As shown in Table 4-38, the distance from the centerline of Tongass Avenue to the most sensitive noise impact threshold ranges from 32 feet to 60 feet in the study area under Alternatives F1 and F3 during the peak hour of traffic volume. Noise levels would be greatest in the area between the north end of the study area and Dock Street. The increased traffic associated with these alternatives on Tongass Avenue would result in increased noise levels that would effectively widen the impact area by 10 feet or less (i.e., as much as 5 feet on either side of centerline), as compared to the No Action Alternative (see Table 4-36). The greatest expansion of the noise threshold contour would occur in the southern end of the project area, although traffic noise levels in that area would be lower than in the northern portion of the project area (i.e., north of Deermount Street). The relatively minor expansion of the noise impact area (i.e., no more than 5 feet on either side of centerline), as compared with the No Action Alternative, would have no noise impact in the project area.

[87] Ibid.

[88] Ibid.

[89] Ibid.

TABLE 4-38
DISTANCE FROM CENTERLINE TO NOISE IMPACT THRESHOLDS FOR ALTERNATIVES F1 AND F3

Segment	*PHV[1] (2025)*	*Distance to Traffic Noise Impact Threshold (feet)*	
		66 dB(A)[2]	*71 dB(A)[3]*
North Tongass Avenue to Bryant Street	1869	55	27
Bryant Street to Carlanna Lake Dr.	1874	55	27
Carlanna Lake Dr. to Third Ave.	2587	60	33
Third Ave. to Jefferson St.	2535	59	33
Jefferson St. to Washington St.	2413	57	32
Washington St. to Schoenbar Rd.	2521	59	33
Schoenbar Rd. to Dock St.	2502	57	28
Dock St. to Mission St.	1834	43	21
Mission St. to Main Street	1587	39	19
Main Street to Bawden Street	1302	34	17
Bawden Street to Deermount Street	1515	38	18
Deermount Street to South Tongass Highway	1422	37	18
Approach West of F1/F3	1492	36	18
Approach East of F1/F3	1256	32	16
New Roadway Alignment of F1/F3	420	46	23

[1] Peak Hourly Volume

[2] 66 dB(A) is 1 dB(A) less than the NAC of 67 dB(A) for Activity Category B

[3] 71 dB(A) is 1 dB(A) less than the NAC of 72 dB(A) for Activity Category C

Alternative F1 (DOT&PF and FHWA Preferred)

The closest sensitive receptor to Alternative F1 on Revillagigedo Island is a residence 275 feet from the centerline. The existing noise level in this residential neighborhood is 55 dB(A)[90]. The modeled future (2025) noise level at 275 feet from the centerline is 50 dB(A). Because the modeled noise level is less than the existing noise level, and since the estimated distance to the residential traffic noise impact threshold is 46 feet, and the closest residence is located approximately 275 feet away, Alternative F1 would have no impact on sensitive receptors near the new alignment on Revillagigedo Island.

The closest sensitive receptors to Alternative F1 on Pennock and Gravina Islands are residences approximately 350 feet and 2,300 feet from the centerline, respectively. The existing noise level at these receptors is 49 dB(A)[91]. The modeled future (2025) noise level for the nearest sensitive receptor on Pennock Island is 47 dB(A) and 37 dB(A) for the nearest sensitive receptor on Gravina Island. Because the modeled noise levels are less than the existing noise levels, Alternative F1 would have no impact on sensitive receptors along the new alignment on Pennock and Gravina Islands.

[90] Ibid.

[91] Ibid.

Alternative F3

The closest sensitive receptor to Alternative F3 on Revillagigedo Island is a residence 200 feet from the centerline. The existing noise level in this residential neighborhood is 55 dB(A)[92]. The modeled future (2025) noise level at 200 feet from the centerline is 53 dB(A). Because the modeled noise level is less than the existing noise level, and since the estimated distance to the residential traffic noise impact threshold is 46 feet, and the closest residence is located approximately 200 feet away, Alternative F3 would have no impact on sensitive receptors along the new alignment.

The closest sensitive receptors to Alternative F3 on Pennock and Gravina Islands are 1,000 feet and 1,500 feet from the centerline, respectively. The existing noise level at these receptors is 49 dB(A)[93]. The modeled noise level for the nearest sensitive receptor on Pennock Island is 40 dB(A) and 39 dB(A) for the nearest sensitive receptor on Gravina Island. Because the modeled noise levels are less than the existing noise levels, Alternative F3 would not affect sensitive receptors along the new alignment on Pennock and Gravina Islands.

4.26.7.4 Alternative G2

As shown in Table 4-39, the distance from the centerline of Tongass Avenue to the most sensitive noise impact threshold ranges from 32 feet to 58 feet in the study area under Alternative G2 during the peak hour of traffic volume. Noise levels would be greatest in the area between Carlanna Lake Road and Dock Street. The increased traffic associated with this alternative on Tongass Avenue would result in increased noise levels that would effectively widen the impact area by no more than 2 feet (i.e., approximately 1 foot on either side of centerline), as compared to the No Action Alternative (see Table 4-36). Noise levels at the approaches to the intersection of the alternative with Tongass Avenue and along the alternative alignment would not be higher than noise levels at other locations in the study area. There are no sensitive receptors along the alignment; therefore, noise generated by traffic on Alternative G2 would have no impact on sensitive receptors.

TABLE 4-39
DISTANCE FROM CENTERLINE TO
NOISE IMPACT THRESHOLDS FOR ALTERNATIVE G2

Segment	*PHV[1] (2025)*	*Distance to Traffic Noise Impact Threshold (feet)*	
		66 dB(A)[2]	*71 dB(A)[3]*
North Tongass Avenue to Ferry Terminal Access Drive	1721	52	26
Ferry Terminal Access Drive to Bryant Street	1827	54	27
Bryant Street to Carlanna Lake Dr.	1814	54	27
Carlanna Lake Dr. to Third Ave.	2486	58	32
Third Ave. to Jefferson St.	2434	58	32
Jefferson St. to Washington St.	2268	54	31
Washington St. to Schoenbar Rd.	2358	56	31
Schoenbar Rd. to Dock St.	2320	54	27
Dock St. to Mission St.	1646	40	20
Mission St. to Main Street	1392	36	18

[92] Ibid.

[93] Ibid.

Segment	PHV[1] (2025)	Distance to Traffic Noise Impact Threshold (feet)	
		66 dB(A)[2]	71 dB(A)[3]
Main Street to Bawden Street	1094	32	15
Bawden Street to Deermount Street	1294	36	17
Deermount Street to South Tongass Highway	1175	34	16
Approach West of G2	1654	46	23
Approach East of G2	1721	48	24
G2	101	7	3

[1] Peak Hourly Volume

[2] 66 dB(A) is 1 dB(A) less than the NAC of 67 dB(A) for Activity Category B

[3] 71 dB(A) is 1 dB(A) less than the NAC of 72 dB(A) for Activity Category C

4.26.7.5 Alternative G3

As shown in Table 4-40, the distance from the centerline of Tongass Avenue to the most sensitive noise impact threshold ranges from 31 feet to 58 feet in the study area under Alternative G3 during the peak hour of traffic volume. Noise levels would be greatest in the area between Carlanna Lake Road and Dock Street. The increased traffic associated with this alternative on Tongass Avenue would result in increased noise levels that would effectively widen the impact area by no more than 2 feet (i.e., approximately 1 foot on either side of centerline), as compared to the No Action Alternative (see Table 4-36). There are no sensitive receptors along the alignment; therefore, noise generated by traffic on Alternative G3 would have no impact on sensitive receptors.

TABLE 4-40
DISTANCE FROM CENTERLINE
TO NOISE IMPACT THRESHOLDS FOR ALTERNATIVE G3

Segment	PHV[1] (2025)	Distance to Traffic Noise Impact Threshold (feet)	
		66 dB(A)[2]	71 dB(A)[3]
North Tongass Avenue to Ferry Terminal Access Drive	1732	52	26
Ferry Terminal Access Drive to Bryant Street	1784	53	26
Bryant Street to Carlanna Lake Dr.	1794	53	26
Carlanna Lake Dr. to Third Ave.	2472	58	32
Third Ave. to Jefferson St.	2432	58	32
Jefferson St. to Washington St.	2305	55	31
Washington St. to Schoenbar Rd.	2359	56	31
Schoenbar Rd. to Dock St.	2321	54	27
Dock St. to Mission St.	1647	40	20
Mission St. to Main Street	1393	36	18
Main Street to Bawden Street	1095	31	15
Bawden Street to Deermount Street	1295	34	17
Deermount Street to South Tongass Highway	1175	32	16
G3	138	10	5

[1] Peak Hourly Volume

[2] 66 dB(A) is 1 dB(A) less than the NAC of 67 dB(A) for Activity Category B

[3] 71 dB(A) is 1 dB(A) less than the NAC of 72 dB(A) for Activity Category C

4.26.7.6 Alternative G4

As shown in Table 4-41, the distance from the centerline of Tongass Avenue to the most sensitive noise impact threshold ranges from 32 feet to 58 feet in the study area under Alternative G4 during the peak hour of traffic volume. Noise levels would be greatest in the area between Carlanna Lake Road and Dock Street. The increased traffic associated with this alternative on Tongass Avenue would result in increased noise levels that would effectively widen the impact area by no more than 2 feet (i.e., approximately 1 foot on either side of centerline), as compared to the No Action Alternative (see Table 4-36). There are no sensitive receptors along the alignment; therefore, noise generated by traffic on Alternative G4 would have no impact on sensitive receptors.

TABLE 4-41
DISTANCE FROM CENTERLINE
TO NOISE IMPACT THRESHOLDS FOR ALTERNATIVE G4

Segment	*PHV[1] (2025)*	*Distance to Traffic Noise Impact Threshold (feet)*	
		66 dB(A)[2]	*71 dB(A)[3]*
North Tongass Ave. to Ferry Terminal Access Drive	1775	53	26
Ferry Terminal Access Drive to Bryant Street	1845	55	27
Bryant Street to Carlanna Lake Dr.	1810	54	27
Carlanna Lake Dr. to Third Ave.	2482	58	32
Third Ave. to Jefferson St.	2429	58	32
Jefferson St. to Washington St.	2266	54	31
Washington St. to Schoenbar Rd.	2357	56	31
Schoenbar Rd. to Dock St.	2321	54	27
Dock St. to Mission St.	1647	40	20
Mission St. to Main Street.	1393	36	18
Main Street to Bawden Street	1095	32	15
Bawden Street to Deermount Street	1295	36	17
Deermount Street to South Tongass Avenue	1175	34	16
G4	202	13	6

[1] Peak Hourly Volume

[2] 66 dB(A) is 1 dB(A) less than the NAC of 67 dB(A) for Activity Category B

[3] 71 dB(A) is 1 dB(A) less than the NAC of 72 dB(A) for Activity Category C

4.26.8 Water Quality Impacts

The secondary effects of project-induced development on water quality in both fresh water and marine environments are primarily caused by land-clearing activities that increase the potential for surface water runoff and erosion, which could lead to increased sedimentation in streams and nearshore areas, as well as increased water turbidity (cloudiness). Runoff would also increase as a result of the increase in impervious area associated with new roadway facilities and structures. Increased human activity on Gravina Island could also increase the potential for pollutants (e.g., trash, petroleum products from cars, and household and industrial wastes) to enter streams. Industrial development along the shoreline would introduce a greater risk of pollutant releases to the marine environment.

4.26.8.1 No Action Alternative

New development on lands on Revillagigedo Island near Point Higgins, between Ketchikan and Saxman, between Saxman and Mountain Point, and above existing subdivisions between Mud Bight and Whipple Creek could affect surface water quality in these areas from increased runoff from increased impervious surfaces.

The No Action Alternative could have adverse effects on water quality in the North Gravina area from residential development, which could occur adjacent to wetlands, small streams, and the marine environment of Tongass Narrows. Because development in this area would be relatively limited (**e.g., 15 acres in the North Gravina Area**) and would not involve the creation of extensive impervious surfaces, the impacts would be minor. **Water-based industrial facilities in the North Gravina Area could have an adverse affect on water quality in that area of Tongass Narrows. However, by limiting the development of water-based facilities to a planned area, the impacts could be controlled and contained in that area.** Industrial use in the Central Gravina and Airport Reserve area **(e.g., the building footprints – assuming gravel driveways and access roads)** could adversely affect the near-shore marine environment as a result of potential accidental industrial releases and an increase in impervious area, which would result in increased runoff.

4.26.8.2 Alternatives C3(a), C3(b), C4, D1, G2, G3, and G4

Under Alternatives C3(a), C3(b), C4, D1, G2, G3, and G4, adverse effects on water quality are anticipated on Gravina Island in the North Gravina and Vallenar Bay areas from residential development, which could occur adjacent to wetlands, small streams, and the marine environment of Tongass Narrows. Industrial use in Central Gravina and the Airport Reserve area could adversely affect water quality in the near-shore marine environment as a result of potential accidental industrial releases and an increase in impervious area, which would result in increased runoff. **Water-based industrial facilities in the North Gravina Area could have an adverse affect on water quality in that area of Tongass Narrows. However, by limiting the development of water-based facilities to a planned area, the impacts could be controlled and contained in that area.**

Road access to USFS lands and Vallenar Bay would introduce potential impacts on water quality in the interior of Gravina Island as a result of increased human activity in these areas. Residential development at Vallenar Bay could adversely affect water quality in wetlands, small streams, and the marine environment of Vallenar Bay as a result of land-clearing activities and increased runoff and erosion.

4.26.8.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Under Alternatives F1 and F3, adverse effects on water quality from residential development are anticipated on Pennock Island and on Gravina Island in the North Gravina, Clam Cove, and Blank Inlet areas. Residential development in these areas could occur adjacent to wetlands, small streams, and the marine environment of Tongass Narrows. Human activity in these areas could adversely affect water quality. Industrial development and use in the Central Gravina and Airport Reserve area could have an adverse effect on water quality in the near-shore marine environment as a result of potential accidental industrial releases and an increase in impervious area, which would result in increased runoff. **Water-based industrial facilities in the Central Gravina and Airport Reserve Area (i.e., Conceptual South Gravina Fisheries Industrial**

Park) and marina development in the Clam Cove and Blank Inlet Area (i.e., Conceptual Clam Cove Community Development) could have an adverse affect on water quality in local areas of Tongass Narrows. However, by limiting the development of water-based facilities to planned areas, the impacts could be controlled and contained in those areas.

Road access to USFS lands would introduce potential impacts on water quality in the interior of Gravina Island as a result of increased human activity in these areas. Road extension to and residential development at Blank Inlet could adversely affect water quality in small streams and the marine environment of Blank Inlet as a result of land clearing activities, increased runoff and erosion, and increased human activity.

4.26.9 Wetland and Vegetation Impacts

Development in the Ketchikan area inevitably results in loss of wetlands because so much of the land where building is practical is wet. As wetlands are cleared and filled to provide foundations for roads, homes, and businesses, the functions of the wetlands are permanently lost. These functions include maintaining natural hydrologic regimes and moderating stream flows, producing plant material that supports on-site and off-site ecosystems, providing wildlife habitat and travel corridors, supporting fish habitat by providing stream cover and structure and food sources, and providing subsistence and recreational areas for humans. In addition, wetlands adjacent to development are affected by increased and polluted runoff, channelized runoff, and by the human activity that occurs within developed areas. Runoff from roads, yards, and gardens might carry with it nutrients (e.g., phosphorous and nitrogen) and sediments that alter the types of plants and animals that occupy the wetlands. Impervious surfaces created by building pads and roads result in increased runoff, which may alter the remaining hydrologic regimes of adjacent wetlands and streams and cause erosion. Human and pet activity degrades the quality of habitat on adjacent lands and displaces sensitive animals.

Development entails vegetation removal in uplands as well, which results in a loss of wildlife habitat and increased runoff and potential for erosion.

The impact discussion below for each alternative provides a projected acreage of secondary impact to wetlands on each island. The context for these impacts, based on the National Wetland Inventory mapping of wetlands, includes approximately 10,000 acres of wetlands on the portion of Gravina Island that drains to Tongass Narrows, just under 1,000 acres of wetlands on Pennock Island, and nearly 6,000 acres of wetlands on that portion of Revillagigedo Island that drain to Tongass Narrows, for a total of approximately 17,000 acres of wetlands in an area of nearly 40,000 acres. See Section 3.14 for further discussion of wetlands in the Tongass Narrows vicinity.

4.26.9.1 No Action Alternative

The No Action Alternative would have adverse effects on wetlands **on Revillagigedo Island in the areas of new residential development near Point Higgins, north and south of Saxman, and** in the North Gravina, Central Gravina, and Airport Reserve areas from industrial and residential development; almost all lands that would be developed are wetlands. Development in these areas would be relatively limited in extent (20 acres total on Gravina Island), so the offsite effects would not likely be substantial.

4.26.9.2 Alternatives C3(a), C3(b), C4, and D1

Under these alternatives, wetlands would be replaced by human developments on Gravina Island—in the North Gravina and Vallenar Bay areas by residential development, and in the Central Gravina and Airport Reserve area by industrial and commercial development. Most of the 310 acres of anticipated development would occur in wetlands because relatively little upland exists in those areas. The adverse effects of the wetland loss and increase of human activity within wetlands are as described at the beginning of this section. Depending on where and how development would occur, it could have noticeable effects off site.

4.26.9.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Under Alternatives F1 and F3, adverse effects on wetlands are anticipated on Pennock Island and on Gravina Island in the North Gravina, Clam Cove, and Blank Inlet areas from residential development. Almost all of the expected development—406 acres on Gravina Island and 76 acres on Pennock Island—would occur in wetlands because little upland exists there. The adverse effects of the wetland loss and increase of human activity within wetlands are as described at the beginning of this section. Depending on where and how development would occur, it could have noticeable effects off site.

4.26.9.4 Alternatives G2 and G4

Under these alternatives, adverse effects on wetlands are anticipated on Gravina Island in the North Gravina and Vallenar Bay areas from residential development and in the Central Gravina and Airport Reserve area from industrial and commercial development. The 73 acres of anticipated development would mostly occur in wetlands because little upland exists in those areas. The adverse effects of the wetland loss and increase of human activity within wetlands are as described at the beginning of this section. Depending on how and where development would occur, it might have little noticeable effect off site.

4.26.9.5 Alternative G3

Alternative G3 would have adverse effects on wetlands in the North Gravina area from residential development and in the Central Gravina and Airport Reserve area from residential, industrial, and commercial development. Most of the 73 acres of anticipated development would occur in wetlands because little upland exists in those areas. The adverse effects of the wetland loss and increase of human activity within wetlands are as described at the beginning of this section. Depending on how and where development would occur, it might have little noticeable effect off site.

4.26.10 Water Body Modification and Wildlife Impacts

4.26.10.1 Water Body Modification

Stream and wetland hydrology could be adversely affected by changes in the hydrologic regime as a result of increased sedimentation, increased impervious area, channelization, and soil compaction. The type, amount, and specific location of development relative to water bodies would dictate the magnitude of adverse secondary impacts on these resources. For all alternatives, modifications of water bodies could be avoided by selecting development sites that have no existing water bodies, and minimized by leaving buffers between development and

water bodies and by limiting clearing and grading activities, which could change hydrologic regimes.

No Action Alternative

Projected development associated with the No Action Alternative would be relatively limited (20 acres) and would not involve the creation of extensive impervious surfaces.

Alternatives C3(a), C3(b), C4, and D1

Under these alternatives, modifications of water bodies could occur on Gravina Island in the North Gravina, Vallenar Bay, and Central Gravina and Airport Reserve areas from residential development (287 acres) and from industrial/commercial/community use (23 acres).

Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Under Alternatives F1 and F3, modifications of water bodies could occur on Pennock Island from access road and residential/community development (76 acres) and on Gravina Island in the North Gravina, Central Gravina, Airport Reserve, Clam Cove, and Blank Inlet areas from residential development (383 acres) and from industrial/commercial/ community use (23 acres).

Alternatives G2 and G4

Under these alternatives, modifications of water bodies could occur on Gravina Island in the North Gravina, Vallenar Bay, and Central Gravina and Airport Reserve areas from residential development (50 acres) and from industrial/commercial/community use (23 acres).

Alternative G3

Under Alternative G3, modifications of water bodies could occur on Gravina Island in the North Gravina, Central Gravina, and Airport Reserve areas from residential development (50 acres) and from industrial/commercial/community use (23 acres).

4.26.10.2 Wildlife Impacts

Adverse secondary impacts on fish and wildlife would occur as a result of loss or disruption of habitat associated with development. Aquatic habitat would be adversely affected by in-water construction and development, and by activities that affect water quality. Increased human access might also increase risk of harassment of spawning salmon. Terrestrial species would be adversely affected by habitat losses associated with future development, as well as increased human activity and noise that would disturb wildlife. Increased wildlife losses on Gravina Island are also expected to result from improved access for hunters.

No Action Alternative

Adverse secondary impacts of the No Action Alternative on fish and wildlife habitat would be limited to small areas of development and human activity that are primarily accessible by gravel road. Animals displaced by human activity could relocate to nearby similar habitat with negligible loss of life.

Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The predominant habitat type potentially affected by development associated with the build alternatives would be wetlands, which could adversely affect animals that use wetlands for feeding and shelter. With commercial and industrial development of the shoreline, animal use of the area would be reduced further**. Loss of habitat would lead to reduced populations of game and non-game species, and long-term wildlife loss resulting from reduced carrying capacity.**

Hunters, trappers, fishermen, and other recreationists would have increased access that would affect wildlife resources on Gravina Island and, in the case of Alternatives F1 and F3, on Pennock Island. Some animals would change their routes and foraging areas to avoid areas of increased human activity. Some animals, mainly bears and other scavengers, might be attracted to areas frequented by humans if people were to leave garbage and other attractants behind. **Increases in bear-human encounters would likely increase bear mortality.** The increase in human activity in the area could also lead to increased harvest or over harvest of certain species. Small populations, such as the wolf pack on Gravina Island, might be especially vulnerable to decline because of increased access from hunters who kill wolves **and the deer they prey on**. **The Alaska Board of Game and ADF&G have the authority and responsibility to set hunting regulations to manage wildlife populations.**

Habitat fragmentation and barriers to wildlife movement would occur as a result of development of a road and the associated development activities. Possible adverse impacts could include the isolation of smaller, less mobile species; loss of genetic integrity within species or populations; and a decrease in usable ranges.

Alternatives C3(a), C3(b), C4, and D1

These alternatives could have adverse secondary impacts on fish and wildlife habitat on Gravina Island. The development in the North Gravina and Vallenar Bay areas could reduce the amount and quality of important upland habitat and high-density deer wintering habitat.[94] There are also several streams classified as EFH north of the airport that could be affected by roadway, residential, and industrial development in that area. The combination of residential and industrial development in the North Gravina Area **(i.e., as much as 288 acres residential and 15 acres industrial by 2025)** would alter animal activity in that area, **and potentially result in population declines due to increased harvest, habitat loss, and unwanted human encounters (e.g., vehicle collisions**). **The development areas identified in the North Gravina Area Plan are within high-density deer wintering habitat and important upland habitats identified by the Borough (Appendix S).**

Development of a road to Vallenar Bay and residential development around Vallenar Bay would affect important upland habitat and could affect streams that provide EFH. Increased human activity in the area could affect animal use of the upland habitat and might alter animal migration patterns.

[94] Ketchikan Gateway Borough Department of Planning and Community Development, *Gravina Island Plan* (final public review draft), December 2003.

Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Alternatives F1 and F3 could have adverse secondary impacts on fish and wildlife habitat on Pennock Island and on Gravina Island in the North Gravina, Central Gravina and Airport Reserve, and Clam Cove and Blank Inlet areas **as a result of projected development on these islands** (see Table 4-20). There are also several streams classified as EFH that could be affected by development in those areas, including Airport Creek, Government Creek, and the unnamed creek in the Clam Cove watershed. **Development in the North Gravina Area would reduce the amount and quality of important habitat and high-density deer wintering habitat, although most of the projected development would occur south of the airport, outside of these habitats**.[95] The combination of residential and industrial development in the North Gravina, Central Gravina, and Airport Reserve areas would alter animal activity in those areas, and potentially result in population declines due to increased harvest, habitat loss, and unwanted human encounters (e.g., vehicle collisions).

Alternatives G2, G3, and G4

These alternatives could have adverse secondary impacts on fish and wildlife habitat on Gravina Island. The development in the North Gravina and Vallenar Bay areas could reduce the amount and quality of important upland habitat and high-density deer wintering habitat.[96] The development areas identified in the North Gravina Area Plan are within high-density deer wintering habitat and important upland habitats identified by the Borough (Appendix S). There are also several streams classified as EFH north of the airport that could be affected by roadway, residential, and industrial development in that area. The combination of residential and industrial development under these alternatives (i.e., as much as 50 acres residential and 15 acres industrial by 2025) would alter animal activity in relatively small areas and would not likely result in population declines.

4.26.11 Floodplain Impacts

None of the project-induced development is expected to occur within floodplains. New development would likely be located above the 100-year flood elevation. No alteration to the hydraulic regime of floodplains is expected to occur as a result of any of the project alternatives; therefore, no adverse impacts to floodplains are expected.

4.26.12 Coastal Zone Impacts

Planning activity for *Ketchikan 2020*, which includes the Borough *Coastal Management Plan*, is being closely coordinated with the Gravina Access Project. Secondary impacts to resources within the coastal zone are expected to be consistent with the coastal management program.

[95] Ibid.

[96] Ibid.

4.26.13 Threatened or Endangered Species Impacts

4.26.13.1 No Action Alternative

Adverse secondary impacts on Steller sea lions and humpback whales as a result of the No Action Alternative are not expected because most development and human activity would be limited to small areas on land, primarily accessible by gravel road.

4.26.13.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

Adverse secondary impacts on Steller sea lions and humpback whales as a result of the build alternatives are not expected because most development and human activity would be limited to small areas on land, primarily accessible by gravel road. Increased disturbance from man-made noise, increased development and access along shorelines, and pollution carried in runoff from development on land **are possible with or without the project. The limited amount of shoreside development that is projected under any of the alternatives is not likely to have a material effect on sea lions or whales. Appendix N further describes potential impacts to the marine environment. The Biological Assessment is included in Appendix T.**

4.26.14 Historic and Archeological Preservation

Secondary impacts to cultural resources could result from development of residential, commercial, or industrial properties along the shorelines of Gravina and Pennock Islands under the No Action Alternative or any of the build alternatives. There is no current or immediate plan to develop specific areas if one of the alternatives were built. Some development of properties along the Gravina Island and Pennock Island shorelines is likely to occur regardless of the outcome of this project (see detail, below). To the extent that the alternatives improve accessibility to and development of shoreline areas, known and as-yet-undiscovered historic and archaeological sites could be affected. In addition, improved public access to areas that have cultural resources could result in destruction of these resources or their removal by visitors. The exact locations of possible secondary development are not known. In certain areas, not known at this time, it is possible that greater development could lead to better cataloging and preservation of cultural features than would otherwise occur under the No Action Alternative.

4.26.14.1 No Action Alternative

Under the No Action Alternative, development along the Tongass Narrows shoreline of **Revillagigedo Island and** Gravina Island in the North Gravina area and the Central Gravina and Airport Reserve area could affect archaeological and historic properties in those areas, **if construction took place where there were cultural sites**. Because the amount of development on Gravina Island would be approximately 20 acres and the access would be inconvenient, the potential effects on cultural resources would be relatively low. **The potential for disturbance to cultural properties on Revillagigedo Island, particularly in the vicinity of Saxman, would be higher due to the long history of human settlement there.**

4.26.14.2 Alternatives C3(a), C3(b), C4, and D1

Development along the shorelines of Gravina Island in the North Gravina, Central Gravina and Airport Reserve, and Vallenar Bay areas could result in the physical destruction of cultural properties from construction activities and from increased access that generates increased human activity, **if construction took place where there were cultural sites**. With about 300 acres of development projected by 2025, the secondary impact potential is greater than under the No Action Alternative. Little additional impact potential, beyond the No Action level, is anticipated on Pennock Island under these alternatives.

4.26.14.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Development along the shorelines of North Gravina, Central Gravina and Airport Reserve, and Clam Cove and Blank Inlet areas, as well as on Pennock Island, could result in the physical destruction of cultural properties from construction activities and from increased access that generates increased human activity, **if they were to take place where there were cultural sites**. With approximately 400 acres of development projected on Gravina Island and 75 acres on Pennock Island, the potential to affect cultural sites is greater than under the No Action Alternative. Early homesteading occurred north of the airport and in the vicinity of Clam Cove, indicating a likelihood of historic sites in those areas. Pennock Island was used as a burial site for tribal communities on Revillagigedo and Annette Islands in the late Nineteenth Century and early Twentieth Century. Disturbance of these sites would be of concern to the tribal communities and could affect their cultural practices.

These alternatives are the only build alternatives that include known sites within their areas of potential effects. However, the bridges are high overhead and offset horizontally where KET-774 and KET-775 are located. These alternatives would provide greater pedestrian access to these sites than the No Action Alternative, and therefore greater potential for secondary effects to these sites. But the access is so indirect, currently involving trail-less overland hiking, that there is no substantial difference in risk to these sites from these alternatives compared to any of the other build alternatives.

4.26.14.4 Alternatives G2 and G4

Development along the shorelines of Gravina Island in the North Gravina and Central Gravina and Airport Reserve areas, and in the Vallenar Bay area, could result in the physical destruction of cultural properties from construction activities and from increased access that generates increased human activity, **if construction took place where there were cultural sites**. Early homesteading occurred north of the airport, indicating a likelihood of historic sites in those areas. Because the amount of development projected is only 73 acres and the convenience of access would not be as improved as with a bridge, the potential impacts to cultural resources would be only slightly greater than with the No Action Alternative.

4.26.14.5 Alternative G3

The amount of secondary development projected for Alternative G3 is the same as Alternatives G2 and G4. The location of that development is centered somewhat farther south on Gravina Island in the North Gravina and Central Gravina and Airport Reserve areas, but not in the Vallenar Bay area. Such development could result in the physical destruction of cultural properties from construction activities and from increased access that generates increased

human activity, **if construction took place where there were cultural sites**. Early homesteading occurred north of the airport, indicating a likelihood of historic sites in those areas. Because the amount of development projected is only 73 acres and the convenience of access would not be as improved as with a bridge, the potential impacts on cultural resources would be only slightly greater than with the No Action Alternative.

4.26.15 Visual Impacts

4.26.15.1 No Action Alternative

Development on Gravina Island would be limited to 20 acres and would occur in areas that are not predominant in views from the populated areas of Revillagigedo Island (i.e., North Gravina, Central Gravina, and Airport Reserve areas). **Development on Revillagigedo Island would occur in areas that are outside of the viewshed of most of the Ketchikan population, or would only broaden the visual effect of existing development.** Therefore, no visual impact is expected under the No Action Alternative.

4.26.15.2 Alternatives C3(a), C3(b), C4, and D1

Development of on Gravina Island could affect views from Revillagigedo Island; however, most of the development (i.e., 287 acres of the 310 total acres) would be residential and be located in the North Gravina and Vallenar Bay areas, which are not predominant in views from the populated areas of Revillagigedo Island. In addition, the residential development would likely be small in scale and occur in isolation or small clusters, which would not create a noticeable change in the viewshed.

4.26.15.3 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Development on Gravina Island could adversely affect views from Revillagigedo Island. Most of the development (i.e., 383 acres of the 406 total acres) would be residential and be located in the Clam Cove and Blank Inlet, Central Gravina, Airport Reserve, and North Gravina areas. Clam Cove and the Central Gravina and Airport Reserve areas are within the viewshed of populated areas of Revillagigedo Island. Because the residential development would likely be small in scale and occur in isolation or small clusters, it is not expected to create a noticeable change in the viewshed.

Development on Pennock Island under Alternatives F1 and F3 would be visible from downtown Ketchikan and Saxman because of the relative proximity of Pennock Island to these populated areas. Most of the development on Pennock Island would be residential and would occur along the shoreline. The predominantly natural viewsheds from Downtown Ketchikan and Saxman would not be adversely altered.

4.26.15.4 Alternatives G2 and G4

Development on Gravina Island would be limited to 73 acres and would occur in areas that are not predominant in views from the populated areas of Revillagigedo Island (i.e., the North Gravina, Central Gravina and Airport Reserve, and Vallenar Bay areas). Most of the development (i.e., 50 acres) would be residential and be located in the North Gravina and Vallenar Bay areas, which are not predominant in views from the populated areas of Revillagigedo Island. In addition, the residential development would likely be small in scale and

occur in isolation or small clusters, which would not create a noticeable change in the viewshed. Therefore, no visual impact is expected under Alternatives G2 and G4.

4.26.15.5 Alternative G3

Development on Gravina Island would be limited to 73 acres and would occur in areas that are not predominant in views from the populated areas of Revillagigedo Island (i.e., the North Gravina area and the Central Gravina and Airport Reserve area). Most of the development (i.e., 50 acres) would be residential and be located in the North Gravina area, which is not predominant in views from the populated areas of Revillagigedo Island. In addition, the residential development would likely be small in scale and occur in isolation or small clusters, which would not create a noticeable change in the viewshed. Therefore, no visual impact is expected under Alternative G3.

4.26.16 Energy Impacts

Although all of the project alternatives would result in additional growth in the Borough and generate more energy needs, it would not affect the ability of vendors to supply the required amount of energy. Secondary impacts on energy resources are not expected.

4.26.17 Utility Impacts

New development in outlying areas of Ketchikan could spur the extension of existing utility services to reach areas north and south of the existing service areas.

Future development on Gravina Island and, for Alternatives F1 and F3, Pennock Island, would require provision of water, sewer, electric, and telephone facilities. The existing utility systems have adequate capacity to supply these utilities to development areas on Gravina and Pennock Islands under any of the alternatives. Impacts on the utilities would be minor, and related primarily to the construction and maintenance of new utility transmission line corridors.

4.26.17.1 No Action Alternative

It is unlikely that KPU would construct new water transmission lines and new water storage facilities on Gravina Island for the 20 acres of development expected to occur there under the No Action Alternative. Wastewater would likely be handled by "on-lot" disposal systems for low-density residential and industrial development, having no adverse effect on the utility system.

Electricity would likely be obtained by on-site generators, having no impact on the electrical utility system. Telephone connection for the new development is unlikely.

4.26.17.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

With the anticipated development on Gravina Island under these alternatives, new transmission lines would be needed to transport water to Gravina Island, and water storage facilities on the island would be needed to meet fire flow needs. These facilities would require additional land clearing, which could affect fish and wildlife habitat. The transmission line corridors would follow roadway corridors where practicable to reduce the amount of construction in pristine habitat. In areas where the transmission corridor would not follow the roadway, the transmission corridor

would be maintained in low vegetation coverage. This would not preclude animal use of the transmission corridor, but would alter the habitat type. It is unlikely that the 76 acres of development on Pennock Island under Alternatives F1 and F3 would warrant construction of water distribution lines. Water supply on Pennock Island would likely continue to be obtained from cisterns on individual properties.

Although the existing wastewater treatment plant has the capacity to treat wastewater from Gravina and Pennock Islands under these alternatives, it might be more cost-effective to establish "on-lot" disposal systems for low-density residential development and, for core area developments of commercial and/or industrial facilities, a small "package" wastewater treatment plant and outfall. Such a system would be established within the requirements of the Clean Water Act to mitigate the potential adverse effects of discharge from the outfall.

The electrical system has sufficient capacity to support the additional development on Gravina and Pennock Islands under any of these alternatives. **Bridge alternatives would be designed to include provisions for attaching cables to the bridge(s). The ferry alternatives, however, would require a submarine line across Tongass Narrows. The line would have a maximum diameter of 6 inches. Placement of the submarine line along the channel bottom would affect a very small area and its location would be selected to avoid sensitive resources. A new substation in Ketchikan and a new substation on Gravina Island would be required for proper distribution from the feeder cable. Substations would be mounted on 8-foot square cement pads adjacent to the roadway and would have minimal additional impact on environmental resources.** New transmission lines would be needed on Gravina and Pennock Islands, which would require additional clearing of wildlife habitat. The transmission line corridors would follow roadway corridors where practicable to reduce the amount of construction in pristine habitat. In areas where the transmission corridor would not follow the roadway, the transmission corridor would be maintained in low vegetation coverage, which would provide an alternate habitat type.

The connection to the existing telephone system on Revillagigedo Island from Gravina Island and Pennock Island would require a new (submarine) fiber optic cable across Tongass Narrows and a cable line system connecting to new areas of development. As in the case of other new utility lines, development of the telephone lines would require additional clearing of wildlife habitat. Where practicable, the telephone line corridors would follow roadway corridors to reduce the amount of construction in pristine habitat. In areas where the transmission corridor would not follow the roadway, the transmission corridor would be maintained in low vegetation coverage, which would provide an alternate habitat type. Placement of the submarine cable could have minor short-term impacts on marine habitat and water quality.

4.27 CUMULATIVE IMPACTS

The analysis of cumulative effects is centered on four key elements:

- Critical resources likely to experience cumulative effects
- Geographic (spatial) boundaries of the affected area
- Temporal (time frame) of the analysis
- Relevant past, present, and future actions that could affect the critical resources

The critical resources identified for the cumulative impact analysis are land use, the recreation and subsistence elements of the social environment, local economic conditions, transportation, water quality, wetlands, wildlife, historic and archeological resources, and visual resources.

The geographic boundaries for evaluating potential cumulative effects were identified for each critical resource based on the distribution of the resource relative to the area in which significant cumulative effects could occur and beyond which the resource would not be substantially affected. For water quality, wetlands, wildlife, and historic and archeological resources, the geographic area comprises Gravina and Pennock Islands. For water quality, the area also includes Tongass Narrows and East and West Channels. For land use, the social environment, economics, transportation, and visual resources, the area is broader, encompassing the Borough and including the cities of Ketchikan and Saxman.

The temporal boundaries for determining cumulative impacts of the project were based on the rise in settlement and development in the area during the past 100 years and a planning horizon extending out to 2025. The Gold Rush of the early Twentieth Century brought about rapid growth and development of southeast Alaska, including Ketchikan. Growth in the timber industry in the area also contributed to development of Ketchikan. The relatively recent changes in the area due to exploitation of natural resources help establish the temporal boundary of past actions. The future temporal boundary of 2025 is considered as a reasonable horizon for community planning.

Each resource potentially affected by the project was individually examined to identify all past, present, and future activities and factors affecting that resource.

Past Actions. For purposes of this analysis, past actions are:

- Logging
- Mining
- Hunting, fishing, and trapping
- Industrial, commercial, and residential development

Future Actions. Reasonably foreseeable future projects are:

- Improvements associated with the Ketchikan International Airport Master Plan[97] (i.e., **runway safety area extension,** parking additions, circulation modifications, and expansions of the terminal and apron)
- Activities associated with the preferred alternative presented in the Gravina Island Timber Sale Draft Environmental Impact Statement[98]
- A proposed gravel road between the airport and the Pacific Log and Lumber timber processing facility north of the airport that follows the south and west boundaries of the airport and extends north of the airport to Lewis Reef. The road would be limited in width, but would provide public access to Borough

[97] DOT&PF. *Ketchikan International Airport Master Plan,* June 2003.

[98] USFS, *Gravina Island Timber Sale Draft Environmental Impact Statement*, December 2002.

and private land adjacent to and immediately north of the airport. The planned access would be on a road from the ferry landing that follows the south and west boundaries of the airport.

These future actions (listed above) have been identified by the Borough Planning Department as actions that are likely to occur, independent of the Gravina Access Project. The road between the airport and the Pacific Log and Lumber timber processing facility north of the airport, approximately 3.9 miles long, would be in approximately the same location as the airport access road and spine road common to all alternatives of the Gravina Access Project. The Borough has acquired a provisional permit from the COE for construction of this road; however, at this time, funding has not been secured. The DOT&PF would closely coordinate the location and design of the airport access road and spine road with this gravel road to minimize additional clearing of right-of-way.

Although it is possible that, in the case of Alternatives F1 and F3, a road would be constructed on Pennock Island to provide a connection between the project roadway and homes on the island, the Borough has no plan for infrastructure on Pennock Island independent of the Gravina Access Project. Therefore, new road construction on Pennock Island is not considered a reasonably foreseeable future action in this cumulative impact analysis. It is, however, included in the cumulative impact analysis of Alternatives F1 and F3 because it is a likely indirect (secondary) action associated with those alternatives.

The cumulative impact assessment considered the direct and indirect (secondary) impacts of the Gravina Access Project alternatives, together with the impacts of past, present, and reasonably foreseeable future actions on the critical resources within the appropriate geographic and temporal boundaries.

4.27.1 Land Use Impacts

The Borough Department of Planning and Community Development has been reviewing the existing land uses and planning for future growth and development on Gravina Island. The goal of the Borough is to assist the Ketchikan community in making decisions regarding future development of Gravina Island. This planning activity is being conducted in conjunction with the Gravina Access Project, as well as with the other reasonably foreseeable future projects. Including all of these projects in the planning process ensures consistency in land use goals and development trends. Because of this coordinated planning activity, the Gravina Access Project, considered with the reasonable foreseeable actions, would have no adverse cumulative effect on the land use plans, policies, and goals of the Borough.

On Gravina Island, the cumulative effects of past, present, the proposed, and reasonably foreseeable future actions on land use would be the gradual change from undeveloped land to developed land along the eastern shorelines of the island, which would occur under the No Action Alternative and all of the build alternatives. With most of the land owned by the USFS and the Alaska Department of Natural Resources, it is likely that most of the island would be maintained as undeveloped lands. Therefore, the physical changes in overall land use on Gravina Island would be very small.

On Pennock Island, there is no reasonably foreseeable action other than the Gravina Access Project that would contribute to land use changes; therefore, no cumulative impacts on land use on Pennock Island are expected.

4.27.2 Social Impacts

There are two elements comprising the social environment that would experience cumulative impacts as a result of the project alternatives: recreation and subsistence on Gravina and Pennock Islands. Recreational and subsistence uses of natural resources on Gravina and Pennock Islands have been limited because access is possible only by private boat or floatplane and, for Gravina Island, the airport ferry, and that access is provided only to the shorelines. Once on the shoreline of either island, access to the interior and most other areas of these islands is limited to foot traffic. Past use of subsistence resources has increased steadily with population growth in the area. The No Action Alternative would not contribute to any change in recreation or subsistence uses of Gravina or Pennock Islands.

4.27.2.1 Alternatives C3(a), C3(b), C4, and D1

The cumulative effect of improved road access to Gravina Island on recreation would be the attraction of more tourists and visitors to the area. People who drive for recreational pleasure would be able to access the once-remote interior areas of Gravina Island. The USFS plans to enhance recreation resources in the area by creating trails and campgrounds and, possibly, cabins for recreational use. Increased recreational opportunities on Gravina Island would enhance overall recreation resources in the Ketchikan area.

The primitive setting within the interior of the island would be modified by the road system and the increase in human activity, which might deter people seeking a primitive experience.

Residents of Ketchikan, Metlakatla, and Saxman use Gravina Island and its surrounding waters for subsistence resources. With greater accessibility to Gravina Island, more residents would be using its subsistence resources, and competition for these resources would increase. Much of this increased competition for subsistence use of resources on Gravina Island, however, would probably result from a shifting of subsistence harvesting from elsewhere in the Borough to Gravina Island, rather than representing an overall net expansion of these activities. Even with the increased competition on Gravina Island, most subsistence resources there would be sustainable, with enough resources for everyone. However, increased competition for subsistence hunting of deer could decrease the deer population to a level that is not sustainable. This impact could be compounded by another project impact, a loss of deer habitat (see Section 4.15.7.1). As a result, subsistence use of deer could be substantially restricted. **Impacts on subsistence could also be compounded by the USFS timber sale on Gravina Island, which would involve the construction of new roads, some of which would remain open after the timber harvest was complete. Increased use of the logging roads could be expected with improved access from Alternatives C3(a), C3(b), C4, and D1, which would create an even greater impact on subsistence practices.**

4.27.2.2 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

Alternatives F1 and F3 would have the same benefits and adverse impacts as those described for Alternatives C3(a), C3(b), C4, and D1. In addition, either Alternative F1 or F3 could contribute substantially to growth in recreational and subsistence uses of Pennock Island by improving access to the area. However, because there are no reasonably foreseeable future actions on Pennock Island, the cumulative beneficial effects on recreation and subsistence resources there are expected to be negligible.

4.27.2.3 Alternatives G2, G3, and G4

Without hard-link access (such as a bridge) to Gravina or Pennock Island, growth in recreational and subsistence uses of Gravina Island would be associated primarily with the permanent roads developed as part of the USFS timber sale. Although, access would be improved with a new ferry, there would be no substantial cumulative effects on recreational and subsistence uses of Gravina or Pennock Islands as a result of the ferry alternatives.

4.27.3 Economic Impacts

Ketchikan and the surrounding area has grown in population and economic activity since late in the Nineteenth Century as a mining, fishing, timber, and tourist area, and before that, as a fishing area for Alaska Natives. The most pertinent past actions have been development of a timber and pulp industry and fishing industry around which the City of Ketchikan grew to be the fifth-largest city in Alaska in 2000. Tourism has boomed in southeast Alaska in the past two decades, primarily with steadily expanding cruise ship activity. Growth of the tourism industry and the decline of the forest products industry have accounted for most of the changes in Ketchikan's economy over the last decade. The downturn in the Borough economy has been a catalyst for the current project, in an effort to diversify the economy and spur new growth.

The preferred alternative for the proposed USFS timber sale on Gravina Island and the Borough's proposed road between the airport and the sawmill site located north of the airport are reasonably foreseeable actions that would result in cumulative impacts on the regional economy. The timber sale preferred alternative would create 22.6 miles of new road, 15 miles of which would be left open for public access following the harvest activities.[99] The USFS road network would connect with the road proposed by the Borough to connect the airport and the sawmill site. If a build alternative for the Gravina Access Project were selected and the construction for these foreseeable actions were to occur at the same time as the construction activity for the Gravina Access Project, there may be insufficient local labor available for the number and type of jobs that would be created with all of the construction activity. This situation could require in-migration of workers from outside the region. If the in-migration occurs during the summer months when services and facilities in Ketchikan are already stretched by the seasonal influx of tourists and visitors, the additional in-migration could be an adverse impact.

With improved access to Gravina Island and the additional road network established as part of the USFS Gravina Island timber sale preferred alternative, transporting timber to processing facilities could be enhanced, which could spur growth in the logging industry. Such growth would be limited by the viability of trucking substantial quantities of timber to Tongass Narrows and Revillagigedo Island and by restrictions on the amount of logging that can be done in the area, as per USFS resource management plans for Tongass National Forest.

Other cumulative effects of the build alternatives on the Ketchikan economy are described below; the No Action Alternative would have no cumulative effect on the economy of Ketchikan.

[99] USFS, *Gravina Island Timber Sale Draft Environmental Impact Statement*, January 2001.

4.27.3.1 Alternatives C3(a), C4, F1 (DOT&PF and FHWA Preferred), G2, G3, and G4

The preferred timber sale alternative is projected to create a total of 346 direct and indirect jobs from construction and harvesting activities.[100] Other jobs would be created by the construction of the proposed road and airport improvements. These jobs are in addition to those associated with the Gravina Access Project alternatives. The jobs associated with these foreseeable actions would reduce the unemployment rate and contribute income to a Ketchikan economy that is currently in a depressed situation. The availability of timber from Gravina Island that can be accessed via a road network would likely improve the financial position of the sawmill, with the potential for additional employment as well. Expenditures by non-local construction workers would be a benefit to the local community.

4.27.3.2 Alternatives C3(b) and D1

Construction of these alternatives would create jobs in addition to the 346 direct and indirect jobs associated with the preferred timber sale alternative, the proposed road, and airport improvements. The jobs associated with these foreseeable actions would reduce the unemployment rate and contribute income to a Ketchikan economy that is currently in a depressed situation. The availability of timber from Gravina Island that can be accessed via a road network would likely improve the financial position of the sawmill, with the potential for additional employment as well. Expenditures by non-local construction workers would be a benefit to the local community.

Alternatives C3(b) and D1 would reduce the amount of spending in Ketchikan by cruise ships, cruise passengers, and crew. The employment and income generated by the other reasonably foreseeable actions would offset some of the potential reduction in cruise-related spending during the period of construction, and timber harvesting and processing activities.

4.27.4 *Transportation Impacts*

4.27.4.1 Aviation

No cumulative impacts on aviation are expected as a result of the Gravina Access Project. Implementation of the Airport Master Plan[101] **for such projects as the runway safety area extension** would be closely coordinated with the selected alternative of the Gravina Access Project. No other reasonably foreseeable action would affect aviation.

4.27.4.2 Vehicles

No Action Alternative

The cumulative impacts associated with the No Action Alternative relate to the inconvenience associated with continued reliance on the airport ferry for access to the airport and other lands on Gravina Island (via the gravel road proposed by the Borough), which would limit the amount of development on Gravina Island. Traffic to Gravina Island generated by the No Action

[100] Ibid.

[101] DOT&PF, *Ketchikan International Airport Master Plan*, June 2003.

Alternative may not be enough to warrant construction of additional parking facilities at the airport, as identified in the Airport Master Plan.[102]

Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The cumulative impacts of the project build alternatives, when combined with the reasonably foreseeable future actions, would be the creation of a large road network that makes most of Gravina Island accessible. No adverse cumulative impact on transportation would occur. While an extensive roadway network would enhance vehicular transportation, it would have adverse effects on the environment (as described elsewhere in this section). The roadway on Gravina Island skirting the airport boundary to the south and west would be closely coordinated with the Borough's permitted gravel road **and the airport's extension of the runway safety area** so that clearing of new right-of-way would be minimized **and so that the road would not be built and then moved for runway construction**.

4.27.5 Pedestrian and Bicyclist Impacts

There would be no cumulative effects on pedestrians and bicyclists as a result of the No Action Alternative. With a greater network of roads on Gravina Island and improved access to Gravina Island under a build alternative, pedestrians and bicyclists would have more opportunities to walk and ride.

4.27.6 Geology and Soils Impacts

There would be no cumulative effects on geology and soils as a result of the No Action Alternative. Permanent changes to topography and removal of soils to accommodate development of a build alternative combined with other past, present, and future development results in overall changes to land resources. The cumulative effect on these resources would not detract from the overall prevalence of natural landforms in the project area.

4.27.7 Water Quality Impacts

Water resources potentially adversely affected by the project, both directly and indirectly, are Tongass Narrows and several streams and water bodies on Gravina Island (Airport Creek, Government Creek, Clam Cove, Vallenar Bay and its tributaries**,** and Blank Inlet and its tributaries).

The major past and ongoing activities affecting water quality in Tongass Narrows are emissions from boats and ships, discharges from seafood processing plants (permitted under NPDES), logging and timber processing, and discharge from cruise ships. Although these activities can degrade water quality, the strong tidal currents help flush pollutants out of Tongass Narrows and maintain its overall good water quality. Logging and mining activities may have affected the freshwater streams and marine waters of Gravina Island in the past; however, these water bodies, at present, have no known water quality problems.

Land-clearing and grading for the improvements to the airport, the Gravina Island timber sale, and the road north of the airport could have short-term adverse impacts on water quality during

[102] Ibid.

construction (from exposing sediments and debris to erosion), as well as long-term adverse impacts (from runoff and a larger impermeable area). The roads included in the timber sale project would also improve access to the interior of Gravina Island, which would result in increased human activity—and the potential for pollutants—near streams and lakes.

4.27.7.1 No Action Alternative

Secondary impacts on water quality on Gravina Island as a result of the No Action Alternative would contribute to the cumulative adverse effects of past and future actions on water resources. However, with no bridge access to Gravina Island, the incremental impact would be negligible.

4.27.7.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The build alternatives of the Gravina Access Project would contribute a slight incremental adverse impact on the water quality of Tongass Narrows and streams throughout Gravina Island when considered with all past, present, and reasonably foreseeable actions that have affected or could affect water quality. Pollutant sources associated with foreseeable development include untreated runoff from bridges, ferry emissions, roadway runoff, runoff and pollutant spills associated with industrial (including timber) and commercial development, runoff and pollutants produced by residential development, erosion resulting from land clearing and altered stream hydrology, and increased human activity on currently inaccessible lands.

4.27.8 Wetland Impacts

Wetlands on Gravina Island were lost during the period in which the Ketchikan International Airport was being developed. Most development on Gravina Island has been small in scale, having relatively little effect on wetlands; however, some wetlands were no doubt filled to construct the airport and the timber processing plant north of the airport. Continued growth in the region under any of the Gravina Access Project alternatives would require the filling of wetlands, **and extension of the runway safety area likely would result in filling of high value wetlands in the Government Creek estuary and perhaps in the Airport Creek estuary**.

4.27.8.1 No Action Alternative

Secondary impacts on wetlands on Gravina Island as a result of the No Action Alternative would contribute to the cumulative effects of past and future actions on wetland resources. However, with no bridge access to Gravina Island, the incremental impact would be negligible.

4.27.8.2 Alternatives C3(a), C3 (b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The roadway development associated with the bridge and ferry alternatives of the Gravina Access Project, when considered with all past, present, and reasonably foreseeable actions, would have a cumulative effect on wetlands. Continued loss of wetland resources to development would reduce the function provided by these resources, including provision of wildlife habitat and moderation of surface runoff. The loss of wetland functions would be minor within the context of the Gravina and Pennock Island ecosystems and their extensive wetland resources. However, within specific watersheds (e.g., Government Creek and Airport Creek), a

greater proportion of wetlands would be lost relative to the total wetland acreage in the watershed.

4.27.9 Water Body Modification and Wildlife Impacts

4.27.9.1 Water Body Modification

There has likely been little modification of water bodies to date on Gravina and Pennock Islands. Airport development has occurred between two major streams, with most of the water-related impacts of the airport affecting Tongass Narrows directly. The Gravina shoreline has been much altered by fill and rock-armoring related to airport and neighboring marine transport development. The No Action Alternative would not contribute to cumulative impacts on water bodies.

The Gravina Access Project build alternatives, when considered with past, present, and other future actions, would contribute to the trend of modifying the Gravina waterfront along the airport and would induce development that could have a measurable cumulative effect on streams **and estuaries**. Roadways, and clearing and filling for residential, commercial, and resource (timber) development would lead to directing small streams into culverts, channelization of flows, and increased runoff intensity that could alter natural stream hydrology.

4.27.9.2 Wildlife Impacts

Fish and wildlife resources on Gravina and Pennock Islands have been affected by historic development of the shoreline, past logging activities, airport development, and hunting. These human activities have reduced habitat availability and quality, and affected the populations of some species. The No Action Alternative would not contribute to cumulative impacts on wildlife.

The Gravina Access Project alternatives, when considered with past, present, and other future actions, would add to existing cumulative effects on fish and wildlife species. Existing development, coupled with future actions (**extension of the runway safety area and other** improvements to the airport, the Gravina Island timber sale, the road north of the airport, and widely dispersed residential and commercial development) would further impact fish and wildlife species and habitat on Gravina Island and Pennock Islands as a result of direct disturbance during construction and long-term use of the lands. **Loss of habitat, particularly higher value habitats such as estuaries, would lead to reduced populations of game and non-game species, and long-term wildlife loss resulting from reduced carrying capacity.** Particularly important would be the improved access to and increased human activity in the interior of Gravina Island. The combination of improved access from the Gravina Access Project and new roads established for the Gravina Island timber sale, and residential and commercial development, would result in increased human activity in the interior of Gravina Island. This would potentially affect EFH associated with tributaries to Vallenar Bay and Bostwick Inlet, deer winter habitat around Bostwick Inlet and Lewis Cove, important upland habitats in the valley of Vallenar and Bostwick Creeks, and important marine habitat at Vallenar Bay and Bostwick Inlet. The Alexander Archipelago wolf is particularly sensitive to human presence and could experience declines in population as a result of increased human activity in these areas of Gravina Island. Roads may increase both legal harvest and illegal poaching of wolves. Increased human presence along the project corridor would also increase the frequency of bear-human interactions, some resulting in “defense of life and property” kills.

Hunters in Southeast Alaska actively pursue wolf and deer. With improved access to their habitat, it is likely that human harvest of these species would increase. It should be noted that, due to projected increases in numbers of hunters, even without improved access to Gravina Island or new roads associated with the USFS timber sale, future hunter demand for deer would reduce deer numbers. Because deer are the primary food source for wolves, an increase in deer harvest would reduce deer numbers, potentially to levels inadequate to support the wolf population, adding to its decline. The Alexander Archipelago wolves are dependent on long-term deer habitat viability. The loss of long-term carrying capacity for deer due to increased hunting and habitat degradation would be detrimental to wolf population viability. Regardless of alternative, increased hunting pressure and reduction of habitat viability could lead to a reduction in population viability of both wolves and deer on Gravina Island. **The Alaska Board of Game may choose to implement more restrictive hunting regulations to reduce the potential for overall declines in game species populations.**

4.27.10 Historic and Archaeological Resources

Historically, the use and development of Gravina and Pennock Islands have occurred primarily along their shorelines, and have contributed to their cultural richness. Some development within the past 50 years, including the development of Ketchikan International Airport, could have resulted in the removal and/or destruction of cultural properties; however, documentation of such losses is limited.

Continued growth along the shorelines is anticipated under all of the alternatives evaluated for the Gravina Access Project, and this growth could have secondary impacts on cultural resources, as described in Section 4.26.14. Future actions associated with the Airport Master Plan[103] would occur mostly in areas that have been previously disturbed, and so would likely have little potential to affect cultural resources. **According to the USFS**, construction and long-term use of the proposed roads identified in the preferred alternative of the Gravina Island Timber Sale Draft EIS would have no effect on cultural resources (p. 3-27). Similarly, the proposed road north of the airport is expected to have no effect on cultural resources.

When considering past actions that could have resulted in adverse impacts on cultural resources with the project's secondary impacts and the impacts on cultural resources expected from reasonably foreseeable actions, cumulative impacts on cultural resources are not expected.

4.27.11 Visual Impacts

The incremental changes to the visual environment of the Ketchikan area throughout its history have been primarily related to human development along the western shoreline of Revillagigedo Island, the eastern shoreline of Gravina Island, and the northern shoreline of Pennock Island. The most substantial adverse effects on the visual environment occurred through the development of commercial and industrial facilities along the shoreline of Revillagigedo Island and the development of the airport and related facilities on Gravina Island. All of these facilities introduced large-scale, man-made features into a predominantly natural viewshed. Logging activities on Gravina Island have historically been limited in scale, resulting in minor adverse impacts on visual resources. Similarly, mining activities have been limited and generally

[103] Ibid.

occurred in areas outside of the viewshed of most populated areas. The No Action Alternative would have no adverse cumulative effect on the visual environment.

4.27.11.1 Alternatives C3(a), C3(b), C4, and D1

The proposed development of any of the bridge alternatives near the airport (i.e., Alternatives C3(a), C3(b), C4, or D1) would contribute substantially to the influence of man-made structures on the viewshed in that area. With future development planned for the airport area, such as the runway extension, the elements contributing to the adverse cumulative impact on the visual environment would be concentrated in this section of the Borough. No other reasonably foreseeable actions would contribute substantially to the visual impacts near the airport. Any of these bridges would dominate views from marine vessels and aircraft in the area, particularly for vessels and aircraft transiting under or over the bridge.

4.27.11.2 Alternatives F1 (DOT&PF and FHWA Preferred) and F3

The Alternative F1 or F3 bridges would be visible from downtown Ketchikan but, because it is 1.5 miles distant from major viewpoints in Ketchikan, the visual intrusion of the structures would be limited. Alternative F1 would have a greater influence on the views from downtown Ketchikan than Alternative F3 because of the greater height of its East Channel bridge. Future development associated with the airport, including runway extension, would affect the visual environment in that area. No past or reasonably foreseeable future actions in the area have contributed or would contribute substantially to the visual impacts of these alternatives. The adverse cumulative effect on visual resources would be the incremental increase in man-made structures in predominantly natural viewsheds.

4.27.11.3 Ferry Alternatives (G2, G3, and G4)

The ferry alternatives (G2, G3, and G4) would have a low profile within any of the viewsheds to which they contribute. When considered with past or reasonably foreseeable future actions in the area, the adverse cumulative impacts of these alternatives on the visual environment would be negligible.

4.28 SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

In the assessment of environmental impacts under NEPA, the natural productivity of land is viewed as a long-term, renewable resource, whereas a developed use of the land is considered a short-term use with a relatively short economic life. Therefore, conversion of the land use from its natural productivity to a developed use is an environmental impact.

4.28.1 No Action Alternative

Under the No Action Alternative, some of the productive land (wetlands and uplands) proposed for right-of-way under the build alternatives would be developed to some extent, as projected by the various land use and planning documents of the Borough. However, these short-term uses of the environment are consistent with local land use plans, and there is an abundant supply of naturally productive land in the area. Therefore, there would be no adverse effect on the long-term productivity of the renewable resources that dominate the area.

4.28.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

For the Gravina Access Project, the long-term productivity that would be lost is the current productivity of wetlands and forested uplands within the proposed right-of-way of the build alternatives. This natural productivity would be replaced by the relative short-term use of the land for the life of the proposed project. These losses are similar to, but of greater magnitude than, those that would occur under the No Action Alternative.

However, these short-term uses of the environment by the Gravina Access Project would be consistent with local land use plans, which are the same for the build alternatives and the No Action Alternative. In this context, there is little difference between project alternatives.

Considering the overall abundance of naturally productive land in the project area, the project's consistency with local land use plans, and the benefits of the project's short-term use of the land, the project would not be detrimental to maintaining and enhancing the long-term productivity of the renewable resources that dominate the project area.

4.29 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

4.29.1 No Action Alternative

This alternative would involve no construction, and therefore would not irreversibly or irretrievably commit resources.

4.29.2 Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), F3, G2, G3, and G4

The build alternatives would irreversibly and irretrievably commit a broad range of natural, physical, human, and financial resources. All of the build alternatives would adversely affect habitat and vegetation. Although mitigation measures would be implemented during project construction, re-creation or restoration of some of these areas would not be possible.

A substantial amount of cement, aggregate, and fill materials would be expended. Substantial amounts of human labor and physical resources would be used to fabricate and prepare construction materials, and these materials are generally not retrievable. However, these resources are not in short supply, and their use would not have an adverse effect upon their continued availability; construction is not predicted to exhaust known sources of these materials. The benefit provided by the project—improved access to Gravina Island—would outweigh the impacts of this commitment of resources.

The build alternatives would require a substantial expenditure of funds, which would not be retrievable. Federal funds (91 percent) and state funds (9 percent) would be expended to develop one of the build alternatives. The ferry alternatives would require the least commitment of financial resources: construction and project development costs would range from approximately $60 million (Alternatives G2 and G4) to $70 million (Alternative G3)[104]. The Pennock Island alternatives would require the greatest commitment of financial resources: $205 million (Alternative F3) to $230 million (Alternative F1) in construction and project development

[104] See the summary tables in the Summary Chapter, Chapter 2, and Appendix A for more cost information.

costs. The Pennock Island alternatives would also require the greatest commitment of environmental resources, with 7 to 8 miles of new roadway and over 100 acres of habitat losses. Alternatives C3(a), C3(b), C4, D1, G2, G3, and G4 would require 3 to 4 miles of new roadway and result in 40 to 60 acres of habitat losses.

4.30 MITIGATION COMPILATION

This section compiles all the individual mitigation sections from Sections 4.1—4.29, above, into one section for easy reference. The text is the same as in the sections above.

4.30.1 Mitigation of Direct Impacts

4.30.1.1 Land Use Impacts

Direct Impacts on Land Use—Mitigation for Alternative F1

DOT&PF, in a letter to the USCG dated February 13, 2004, committed to the following measures to mitigate the impacts of Alternative F1 on the USCG Station:

- **DOT&PF commits to providing fencing along the roadway embankment adjacent to the USCG Station (eastern boundary) to mitigate any potential security impacts.**
- **DOT&PF will work with the USCG to ensure that Alternative F1 would not affect the USCG's planned relocation of the magazine.**
- **DOT&PF recognizes that Alternative F1 would affect current use of the firing range. DOT&PF is committed to mitigating the downrange hazard by enclosing the current range so that it complies with federal surface danger zone regulations.**

Mitigation of construction impacts is discussed in Section 4.30.2.1.

4.30.1.2 Transportation Impacts

Direct Impacts on Transportation—Mitigation for Alternative F3
Project engineers investigated the possibility of realigning the Alternative F3 bridges so that they would cross perpendicular to East and West Channels also to reduce the risk of allisions. If Alternative F3 were selected, DOT&PF would further investigate the possibility of realigning the bridges and evaluate the potential environmental impacts associated with the realignment.

4.30.1.3 Water Quality Impacts

Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), and F3

All roads would be designed to maintain existing surface water flow and storm water drainage. **Final roadway design would include culverts or bridges along existing drainages and across streams on Revillagigedo and Gravina Islands.** The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act. The roadway and bridge designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would be approved by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater

disposal permit. Impacts to water quality also would be minimized through the use of BMPs. BMPs that would be employed include the following (from Section 4.12.2):

- Where practicable, the angle of fill slopes would be increased to reduce encroachment into adjacent wetlands.
- The roadway would be designed and constructed with a low-profile embankment to minimize the fill footprint.
- Rock would be used to stabilize toes of slopes at ponds and stream crossings to prevent the erosion of fine-grained material into adjacent waters and wetlands.
- To protect the integrity of the natural plant communities, plant species indigenous to the area would be used for vegetating road slopes, except that nonnative annual grasses might be used to provide rapid, initial soil cover to prevent runoff of fine-grained material into adjacent wetlands. Topsoil would be applied to the surface of road slopes to aid in the reseeding process.
- Roadside swales would be designed to keep surface water within the natural drainage basins to allow sediment-laden water to clear before its discharge to adjacent wetlands and waters.
- At all stream crossings (both culverts and bridge crossings), stream banks would be re-contoured to approximate original conditions and re-seeded with native vegetation to minimize erosion.

Construction-specific BMPs (from Section 4.25.10) for minimizing impacts to water quality are listed in Section 4.30.2.7.

All necessary permits and agency approvals will be obtained prior to construction, and any permit stipulations will be incorporated into the construction contract specifications.

Mitigation for Alternatives G2, G3, and G4

All roads would be designed to maintain existing surface water flow and storm water drainage. **Final roadway design would include culverts or bridges along existing drainages and across streams on Revillagigedo and Gravina Islands.** The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act. The roadway and ferry terminal designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would be approved by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit. BMPs (see Sections 4.30.1.2 and 4.30.2.7) would further limit adverse effects on water quality.

4.30.1.4 Wetlands and Vegetation Impacts

Wetlands Mitigation for all Build Alternatives

Final mitigation would be based on discussions among DNR, FHWA, COE, and other resource management agencies. Detailed mitigation measures would be developed and adhered to as a condition of future federal permits. In addition to the BMPs listed in Sections 4.30.1.2 and 4.30.2.7, the following wetlands specific measures would be employed:

- Culvert installation through fill slopes in appropriate locations to maintain natural flow patterns for surface water to ensure that timing and amounts of inflow to adjacent wetlands and waters is retained.

DOT&PF proposes to compensate for unavoidable adverse impacts to wetlands by paying $248,400.00 as a fee in lieu of wetland restoration, enhancement, or preservation. This compensatory mitigation proposal applies only to Alternative F1, the DOT&PF and FHWA preferred alternative. A physical project that would compensate for wetland losses does not appear to be practical immediately adjacent to impacted wetlands or in the general Ketchikan area, because wetlands are prevalent and there is relatively little damaged or impaired wetland that could benefit from restoration or enhancement.

The monetary value has been determined using historical values for DOT&PF Southeast Alaska projects. The per-acre costs used are $2,800 for forested, shrub/scrub, and muskeg wetlands; $50,000 for bodies of fresh water; and $20,000 for marine waters. The fee represents the total compensation for all expected wetland impacts for the project. This fee will be provided to a land trust acceptable to the U.S. Army Corps of Engineers (COE). The proposed fee is to be directed toward activities relating to wetland creation, restoration, enhancement, and preservation or land acquisition. The wetlands acreage and resulting fee are reduced somewhat to account for 11 acres of wetland impact for which the Ketchikan Gateway Borough already has made compensation commitments and received a Section 404 permit as part of its proposed "Lewis Reef Road" project.

Mitigation of construction impacts is discussed in Section 4.30.2.8.

Vegetation Mitigation for all Build Alternatives

Final project design would seek to minimize direct impacts on these resources by defining narrow clearing limits and using disturbed areas for staging.

4.30.1.5 Water Body and Wildlife Impacts

Mitigation of construction impacts is discussed in Section 4.30.2.9.

Water Bodies Mitigation for Alternatives C3(a), C3(b), C4, and D1

The project design would maintain natural stream flow conditions under the Airport Creek bridges, and culvert design would accommodate storm water flow, not result in scour, and allow fish passage. Potential adverse impacts of roadway crossings of Airport Creek would be avoided by using clear-span bridges at the crossings. All construction in and around anadromous fish streams will take place when stream disturbances would have the least impact on anadromous fish species. In-water work areas, except for stream crossings by construction equipment, will be isolated from flowing waters in all anadromous fish streams. In addition, gravels and streambed material will be used in the bottoms of culverts. The roadway and bridge designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would be approved by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit.

Water Bodies Mitigation for Alternative F1 (DOT&PF and FHWA Preferred)

Potential adverse impacts of creek crossings would be avoided at the larger creeks (two channels of Airport Creek, Government Creek, one unnamed creek) by using clear-span bridges. Another unnamed anadromous fish stream southeast of Government Creek would have a culvert crossing. In accordance with the memorandum of agreement between DOT&PF and ADF&G, the culvert crossing would be designed to a Tier 1 stream simulation design level and would maintain natural stream conditions such as flow, substrate, and existing fish passage efficiency. Changes in the hydrology of smaller creeks would be minimized by designing culverts that are appropriately sized and placed, accommodate storm water flow, and do not cause scour. The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act. The road and bridge designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would be approved by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit.

Water Bodies Mitigation for Alternative F3

Potential adverse impacts of creek crossings would be avoided at the larger creeks (two channels of Airport Creek, Government Creek, one unnamed creek) by using clear-span bridges. Another unnamed anadromous fish stream southeast of Government Creek would have a culvert crossing. In accordance with the memorandum of agreement between DOT&PF and ADF&G, the culvert crossing would be designed to a Tier 1 stream simulation design level and would maintain natural stream conditions such as flow, substrate, and existing fish passage efficiency. Changes to the hydrology of smaller creeks would be minimized by designing culverts that are appropriately sized and placed, accommodate storm water flow, and do not cause scour. The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act. The roadway and bridge designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would be approved by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit.

Water Bodies Mitigation for Alternatives G2, G3, and G4

Potential adverse impacts of the Government and Airport Creek crossings would be avoided by using clear-span bridges. The roadway and ferry terminal designs would incorporate a storm water treatment system to minimize the effects of runoff. The storm water treatment system would be approved by ADEC under their plan review for a non-domestic wastewater treatment system and issuance of a non-domestic wastewater disposal permit.

Marine Habitat Mitigation for All Build Alternatives

Marine habitat mitigation is listed below in Wildlife—Aquatic Species—EFH Mitigation. Further mitigation for adversely affected marine habitat may be determined at the time of project permitting with input from DNR, NOAA Fisheries, COE, and USFWS.

Wildlife—Aquatic Species—Anadromous Fish Mitigation for All Build Alternatives

All anadromous fish stream crossings would be designed to provide passage for the salmon present in any given stream, per DOT&PF's memorandum of agreement with the Alaska Department of Fish and Game. All road structures crossing other fish habitat would be designed to provide passage for resident fish. To mitigate the effects of placing bridge piers in near-shore areas, all such structures would be located in a manner that would leave a near-shore migration corridor (down to at least –5 feet MLLW) clear of obstruction. The footprint of fill placed in marine waters would be minimized. At all stream crossings (both culverts and bridge crossings), stream banks would be re-contoured to approximate original conditions and re-seeded with native vegetation to minimize erosion.

Wildlife—Aquatic Species—EFH Mitigation for All Build Alternatives

Construction of this project will require a Title 41 Permit through the Alaska Department of Natural Resources and a COE Permit for fill in wetlands and waters of the United States. Coordination with NOAA Fisheries has been ongoing during the planning of this project. The following conservation measures would be incorporated to avoid, minimize, and mitigate impacts to EFH. These are general measures that would be modified to specifically address details of the preferred alternative through further coordination with the agencies during design.

- At all stream crossings (both culverts and bridge crossings), stream banks would be re-contoured to approximate original conditions and re-seeded with native vegetation to minimize erosion.
- BMPs, developed in accordance with EPA's "Storm Water Management for Construction Activities: Developing Pollution and Prevention Plans and Best Management Practices," EPA Document 832 R-92-005 (EPA 1992), would be employed to minimize the introduction of sediment and siltation of ponds and streams during adjacent fill placement and during culvert placement.
- **All anadromous fish stream crossings would be designed to provide passage for the salmon present in any given stream, per DOT&PF's memorandum of agreement with the Alaska Department of Fish and Game.**
- **In-water work in Tongass Narrows would be restricted, as follows. General use of boats and barges could occur year round for general survey and work on bridge structures above water. Except for blasting, dredging, and pile driving, other work in marine waters could occur July 1-February 28. As further described below, blasting, dredging, and pile driving could occur only November 1-February 28, with the possible exception of mid-channel locations, based on further consultation with the Alaska Department of Natural Resources (DNR), NOAA Fisheries, U.S. Army Corps of Engineers (COE), and U.S. Fish and Wildlife Service (USFWS).**
- The following conservation recommendations would be followed with respect to pile driving in Tongass Narrows: A vibratory hammer would be used to drive steel piles instead of an impact hammer. Piles should be driven during low tide when in intertidal and subtidal areas. As applicable, a smaller hammer would be used or use of a hydraulic hammer would be employed to reduce the impact force.
- **All construction in and around anadromous fish streams would take place when stream disturbances would have the least impact on anadromous fish species.**

The recommended time period for in-stream construction work in the Ketchikan area is June 15 through August 7 (Minnillo 2004). In-stream construction activities should completely avoid the period from August 8 through June 14. For the Ketchikan area, salmon fry generally emerge in the spring from April 15 to May 15, and the adults move into the streams by August 1 and remain through October 31 (Doherty 2003). However, timing of fry emergence and adult spawning depend on the species of fish present in each stream. For example, steelhead spawn in the spring and eggs are generally present in the stream until the middle of July. Fish surveys would be conducted in the summer of 2004 for all streams that would be affected by the project. If additional species are found to be present in the project streams, the existing timing window for in-stream construction (June 15 to August 7) might be modified to protect additional species. Construction work that occurs above the ordinary high water area of the stream and does not include in-stream construction might be conducted throughout the year (Minnillo 2004). In-water work areas, except for stream crossings by construction equipment, would be isolated from flowing waters of all anadromous fish streams.

- Blasting will be performed such that ground vibration (particle velocity) does not exceed 2.0 inches per second and peak water overpressure (instantaneous pressure change) does not exceed 2.7 pounds per square inch. The project would employ monitoring devices to ensure adherence to these standards. If blasting amounts are minor, and if agreed by the agencies, monitoring may not be undertaken.
- The contractor will be required to prepare a blasting plan prior to any blasting activities. The blasting plan will need to be reviewed by NOAA Fisheries for both EFH and marine mammal impacts. A fish and invertebrate monitoring program would be required for any proposed blasting activities. A pre-blasting survey will be required to ensure that no fish schools are in the vicinity of the blasting area. If fish schools are detected, blasting will be delayed until they leave. A biologist will check the area and record any kills that are within 100 feet up current and 300 feet down current of the blast area after blasting is completed. Monitoring of the dredge materials might be incorporated into the blasting monitoring plan as a method for documenting organisms injured or killed in the blasting. Measures such as covering the rock to be blasted with sand might be used to dampen blast impact. In-water blasting shall avoid the entire months of March through June to avoid juvenile salmonids and the period from June through October 31 to avoid adult salmon. **All project-related activities would conform to the pertinent provisions of the Marine Mammal Protection Act and the Endangered Species Act.** Dredged debris would be placed onto a barge where it would enter a settling basin and be disposed of on land. Only under Alternative F3, which could require substantial removal of sediment and rock, would ocean disposal be necessary. These operations for Alternative F3 would be consistent with the regulations of Clean Water Act, Section 404(b)(1) (disposal of dredged materials into waters of the U.S.) and Marine Protection, Research, and Sanctuaries Act, Sections 102 and 103. Monitoring of the dredged materials may be incorporated into the blasting monitoring plan as a method for documenting organisms injured or killed in the blasting. Dredging activities will avoid the entire months of March through October.
- All fueling and servicing operations will be conducted at least 100 feet away from all streams and water bodies, and fuel storage will be at least 100 feet away from all wetlands and water bodies.

- All necessary permits and agency approvals would be obtained prior to construction, and any permit stipulations will be incorporated into the contract specifications.
- Perimeter staking would be required on the outside of the disturbance area prior to construction to ensure that there is no additional impact from construction activities.
- Silt fences would be used adjacent to EFH stream channels, just beyond the estimated toe of fill.
- Gravels and streambed material would be used in the bottoms of culverts.
- Riprap would be placed along stream banks as necessary to maintain stream bank integrity. Placement of riprap along stream banks to maintain stream bank integrity should include the use of bioengineering techniques to improve habitat value of the riprap, by incorporation of willow stakes or other locally available vegetation.

Mitigation measures would be finalized during the permitting process with input from DNR, NOAA Fisheries, COE, and USFWS.

Wildlife—Bald Eagle Mitigation for all Build Alternatives

If the selected alternative would affect a bald eagle nest, DOT&PF would work with USFWS to develop mitigation measures. Biologists would be required to monitor construction activities around eagle nests, or adjacent construction activities (defined as work within 100 meters or blasting within one-half mile) would not occur during the nesting season.

4.30.2 Mitigation of Construction Impact

4.30.2.1 Land Use—Construction

Land Use Mitigation for Alternatives C3(a) and C3(b)

The DOT&PF would work with the businesses and local residents to maintain property access throughout the construction phase, using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be selected in a fashion that minimizes disturbance, and properties and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

Land Use Mitigation for Alternatives C4 and D1

The DOT&PF would work with the Ketchikan Ready-Mix and Quarry to maintain property access throughout construction, using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be selected in a fashion to minimize disturbance, and properties and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and have clear demarcation lines to prevent encroachment into adjacent areas.

Land Use Mitigation for Alternative F1 (DOT&PF and FHWA Preferred)

Construction staging and movement would be constrained within construction easements. Activities within the USCG Station property would be closely coordinated with USCG officials.

Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

Land Use Mitigation for Alternative F3

Construction staging and movement would be constrained within construction easements. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

Land Use Mitigation for Alternative G2

DOT&PF would work with the commercial properties near Peninsula Point to maintain property access throughout construction, using signs, temporary entrances, and traffic controls, as appropriate. Construction easements would be selected in a fashion that minimizes disturbance, and properties and land uses would be returned to preconstruction conditions to the maximum extent practicable. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

Land Use Mitigation for Alternative G3 and G4

Construction easements would be selected in a fashion that minimizes disturbance. Construction limits would be staked and clearly demarcated to prevent encroachment into adjacent areas.

4.30.2.2 Transportation Impact—Construction

Aviation Mitigation for all Build Alternatives

DOT&PF would work with helicopter and floatplane operators to ensure that service disruption is minimized to the maximum extent practicable during the construction period. DOT&PF would provide continued access to floatplane service for floatplane customers at the airport, even if it is necessary to temporarily relocate the floatplane dock with Alternatives C3(a), C3(b), C4 and D1. Access will be maintained to the terminal during construction, including construction of a new parking garage at the airport.

Marine Navigation Mitigation – Alternatives C3(a), C3(b), C4, and D1

Impacts to ships transiting Tongass Narrows would be minimized by scheduling bridge construction activity, to the extent practicable, during times of the year when the marine traffic in Tongass Narrows is low (i.e., outside of the tourist and cruise ship season). DOT&PF would work with cruise ship and other marine vessel operators in order to facilitate marine navigation during construction. Moving the existing airport ferry terminal facility would be staged so that impacts on ferry operations would be minimized and service to the airport would not be interrupted. When bridge segment placement requires limiting vessel traffic, DOT&PF would issue sufficient notification of such closures to reduce conflict with marine navigation activities.

Marine Navigation Mitigation – Alternatives F1 (DOT&PF and FHWA Preferred) and F3

For these alternatives, impacts on navigation could be minimized by constructing each bridge in a separate phase so that one of the two channels would always be unaffected by construction

activities, including channel dredging with Alternative F3. DOT&PF would work with cruise ship and marine vessel operators in order to facilitate marine navigation during construction. When bridge segment placement requires limiting vessel traffic, DOT&PF would issue sufficient notification of such closures to reduce conflict with marine navigation activities.

Vehicle Traffic Mitigation – All Build Alternatives

A traffic maintenance and parking plan would be developed to minimize impacts on vehicle travel on Ketchikan roadways and at the airport. **Construction that might cause lane closures would be timed for low-traffic periods. Temporary roads and driveways would be employed where necessary to ensure continued mobility during construction.** Construction of temporary roadways may be required to maintain access to the airport facilities. For Alternative F3, construction that would elevate a portion of South Tongass Highway involving road closure and restricting traffic to one lane could be done during off-peak hours to minimize the impacts on vehicular traffic. Access to the USCG Station and other affected property would be accommodated during construction through temporary driveways.

4.30.2.3 Pedestrians and Bicyclists—Construction

Mitigation for all Build Alternatives

The traffic maintenance and parking plan would include provisions for maintaining pedestrian and bicycle traffic and safety through construction areas. When possible, all roads, sidewalks, and bike paths would be left unobstructed and unaffected so that access would remain available.

4.30.2.4 Geological Resources—Construction

Mitigation for all Build Alternatives

Impacts to wetland soils would be avoided by placing geotextile mats on top of wetland soils in areas that would be temporarily disturbed by construction equipment. This would limit the soil disturbance to upland areas only, reducing the total area of soil disturbance.

The construction contractor is responsible for developing an erosion and sediment control plan to meet ADEC and EPA requirements of the Clean Water Act. The erosion and sediment control plan would be prepared by a registered engineer and implemented during project construction to minimize soil disturbance. The erosion and sediment control plan would provide guidance to construction contractors to reduce construction impacts, particularly those that would result in the destabilization of adjacent slopes. Disturbed areas outside of the permanent right-of-way would be restored to preconstruction conditions.

4.30.2.5 Air Quality—Construction

Mitigation for all Build Alternatives

Measures would be implemented to control fugitive dust (PM_{10}) at construction sites, as needed.

4.30.2.6 Noise and Vibration from Construction

Noise Mitigation for Alternatives C3(a), C3(b), C4, D1, F1 (DOT&PF and FHWA Preferred), and F3

In accordance with City of Ketchikan noise regulations, construction activities would be prohibited between the hours of 11:00 p.m. and 6:00 a.m. to avoid disruption of residents. Some exceptions to the noise regulations may be requested from the city during special construction activities.

Note for Alternatives G2, G3, and G4: Construction of new ferry facilities for this project would generate noise from equipment; however, there are no noise-sensitive receptors that would be affected by the construction of Alternative G2, G3, or G4.

Vibration Mitigation for all Build Alternatives

Blasting would be controlled to avoid damage of nearby structures and to meet the requirements of the local noise ordinance. In-water blasting, pile driving, and/or drilling would be controlled to ensure that the pressure waves generated do not pose a consistent, adverse threat to fish and other marine resources. Permit conditions for in-water work would be adhered to during construction.

4.30.2.7 Water Quality—Construction

Mitigation for all Build Alternatives

Construction of all water body and wetland crossings would adhere to applicable state and federal permit conditions. The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act. Runoff from the construction area would be controlled by best management practices (BMPs) to minimize erosion and transport of sediment, to prevent any accidental leaks of oil or fuel from equipment from contaminating creeks or Tongass Narrows, and to contain any such leaks. The storm water pollution prevention plan, which would incorporate BMPs, would be prepared by a registered engineer and implemented during project construction to minimize impacts to water quality. Construction-related BMPs would include:

- **DOT&PF would hold meetings with the construction contractor and agencies to ensure implementation of mitigation commitments.**
- Staking the planned outside limits of disturbance prior to construction to ensure that impacts are limited to that area
- Limiting clearing and grubbing outside of the fill footprint to the extent practicable to control physical disturbance of wetlands
- Installing silt fences adjacent to waterways just beyond the estimated toe of fill to capture fine-grained material contained in runoff
- Performing ditch checks to reduce bank erosion
- Utilizing sedimentation basins, as necessary (based on the potential volume of storm water runoff), to limit sedimentation of adjacent wetlands and other waters

- Locating all staging, fueling, and equipment-servicing operations at least 100 feet away from all streams and wetlands
- Having spill response equipment readily available and ensuring that construction personnel are trained in spill response to contain accidental leaks of oil or fuel from construction equipment

An erosion and sedimentation control plan and a spill prevention plan would be implemented during construction of any of the build alternatives. In-water work would comply with all permit conditions to minimize sediment suspension to the extent practicable.

4.30.2.8 Wetlands—Construction

Wetlands Mitigation for all Build Alternatives

Use of wetlands for construction activities would be minimized to the extent practicable. Wetland soils in the areas 20 feet beyond the fill prism of new roadway would be protected from disturbance because DOT&PF would require that the construction contractor operate construction equipment on geotextile mats to allow complete removal of the mat without further soil disturbance upon completion of construction. After construction activities, shrubs and herbs are expected to naturally recover from this disturbance. These areas would be lightly reseeded after construction to prevent erosion.

In areas where temporary fill is required, DOT&PF would require that the construction contractor place temporary fill on geotextile mats or other suitable materials of sufficient thickness to facilitate the removal of the fill and the materials to the maximum extent practicable when they are no longer needed for construction. No natural earthen material would be removed from under the geotextile when the temporary fill is removed. Wetlands would be stabilized against erosion once construction equipment and protective mats were removed. DOT&PF would restore wetlands that had been temporarily filled by reseeding and revegetating the areas. Revegetation should reach 80 percent of preconstruction levels after three years.

If waste disposal sites were unavoidably placed in wetlands, every effort would be made to use a wetland already affected by construction staging. The wastes would be placed on mats and removed promptly.

Detailed mitigation measures would be developed and adhered to as conditions of the required federal permits.

4.30.2.9 Water Body Modification and Wildlife—Construction

Water Body Mitigation for all Build Alternatives

Construction activity in any water body would adhere to applicable state and federal permit conditions. Temporary diversions would be designed so that the flow of the water body is not impeded. Any creek banks or beds affected by diversion structure placement would be restored to preconstruction conditions to the maximum extent practicable.

Marine Habitat Mitigation for all Build Alternatives

All applicable state and federal permit conditions would be adhered to throughout the construction phase. To minimize these potential impacts, the DOT&PF would ensure that construction BMPs (listed in Section 4.30.2.7), an erosion and sedimentation control plan, and a spill prevention plan were implemented during project construction. The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act.

Wildlife—Aquatic Species Mitigation for all Build Alternatives

Runoff from the construction area would be controlled by BMPs to minimize erosion and transport of sediment. An erosion and sedimentation control plan, spill prevention plan, and BMPs would be implemented during construction to minimize contamination of creeks and Tongass Narrows. The construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act. If required, blasting and pile driving will be performed such that ground vibration (particle velocity) does not exceed 2.0 inches per second and peak water overpressure (instantaneous pressure change) does not exceed 2.7 pounds per square inch. The project will employ monitoring devices to ensure adherence to these standards and to ensure that these activities do not pose a consistent, adverse threat to fish and other marine resources. Additional mitigation is listed in Section 4.30.2.11. Many of these measures will ensure protection of all aquatic animals.

Wildlife—Amphibians Mitigation for all Build Alternatives

The final alignment of the selected alternative and construction methods would be chosen to minimize impacts on wetlands and streams to the extent practicable, and thereby reduce the potential effects of construction on amphibian populations.

Wildlife—Birds Mitigation for all Build Alternatives

All migratory birds are protected under the Migratory Bird Treaty Act. The Migratory Bird Treaty Act (16 USC 760c-760g) makes it unlawful for anyone to kill, capture, collect, possess, buy, sell, trade, ship, import, or export any migratory bird. Indirect killing of birds by destroying their nests and eggs is covered by the Act, so construction in nesting areas could constitute a taking. In accordance with USFWS guidelines, DOT&PF would establish a construction activity buffer surrounding active bald eagle nests that could be affected by construction activities. USFWS will be consulted prior to construction to review and comment on the proposed buffer area(s) and to identify additional measures to prevent abandonment of a nest during the breeding season.

4.30.2.10 Threatened and Endangered Species—Construction

Mitigation for all Build Alternatives

To ensure no injury to or harassment of Steller sea lions, humpback whales, or other marine mammals, the project is committed to the measures listed below. These are designed to be compatible with EFH mitigation measures for the project.

- In-water work would occur outside the springtime months, when there is greatest sea lion use of the project area. The EFH work window for in-water work in Tongass Narrows is July 1 to February 28, and this would be followed for marine mammals as

well. Major work, such any dredging or in-water blasting required, would occur only November 1 to February 28. This timing avoids runs of salmon and herring, on which humpback whales and Steller Sea Lions feed.

- Should blasting be necessary, the construction contract would require a blasting plan approved by NOAA Fisheries. If required by agencies, blasting would be performed such that ground vibration (particle velocity) does not exceed 2.0 inches per second and peak water overpressure (instantaneous pressure change) does not exceed 2.7 pounds per square inch. Monitoring devices would be used to measure these parameters. **If blasting amounts are minor, and if agreed to by NOAA Fisheries, monitoring may not be undertaken.**
- Should dredging be required, the construction contract would require a dredging plan approved by NOAA Fisheries.
- If blasting and dredging are required, the project would ensure use of trained and NOAA fisheries-approved observers to indicate when mammals were within a 50 m zone around pier work or other in-water work, and activity would wait until the animals move out of the area, or work would be stopped if mammals were to enter the area.
- An in-water warning sound would be issued prior to blasting to allow any marine mammals to voluntarily move to a comfortable distance.
- All necessary permits and agency approvals would be acquired prior to construction, and stipulations will be incorporated into contract specifications.
- **If design should change, an incidental harassment authorization might need to be obtained from NOAA Fisheries.**
- **Mitigation measures would be finalized during the permitting process with input from DNR, NOAA Fisheries, COE, and USFWS.**

All project-related activities would conform to the pertinent provisions of the Marine Mammal Protection Act and the Endangered Species Act.

4.30.2.11 Historic and Archeological Preservation—Construction

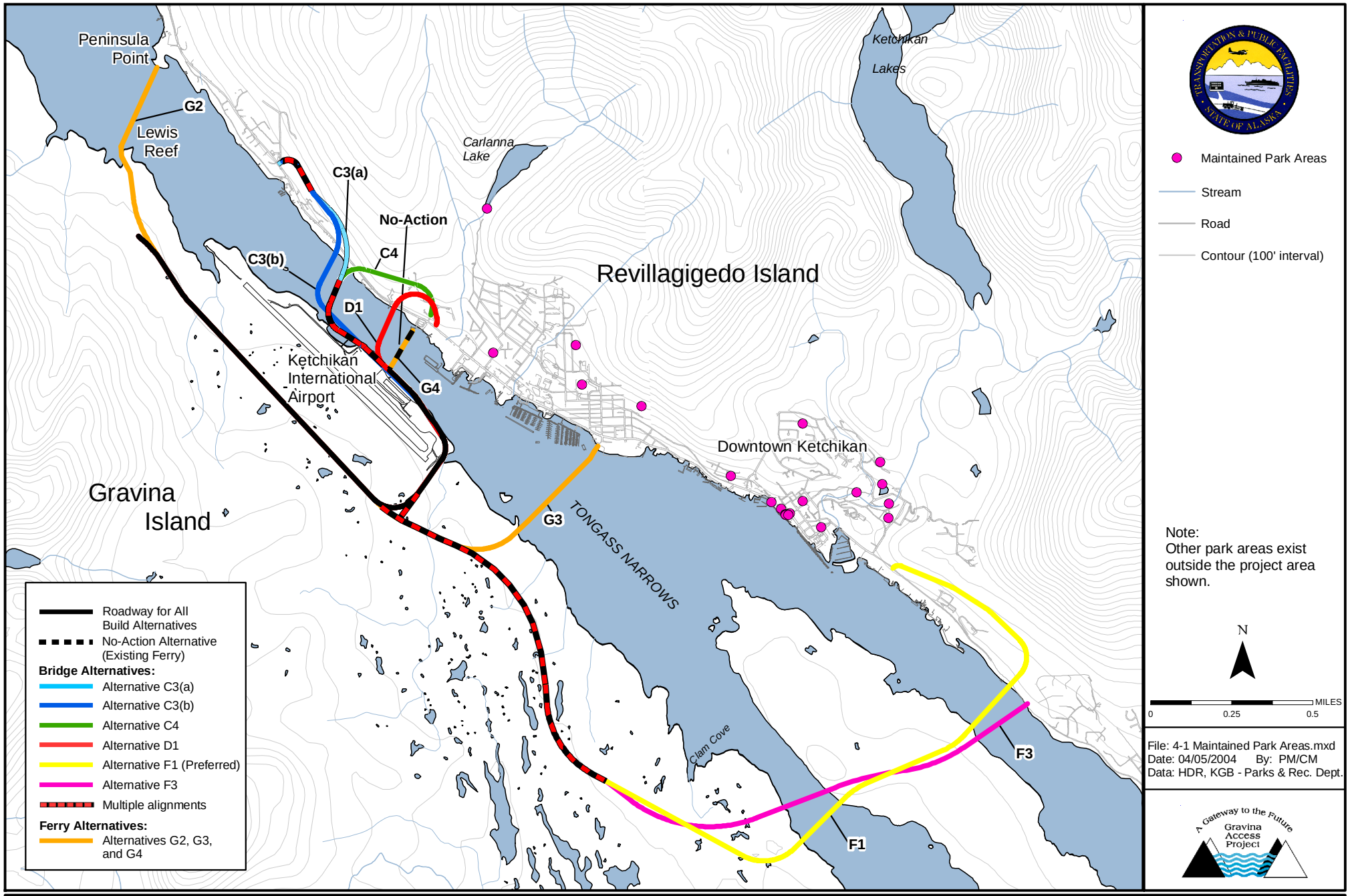
Mitigation for all Build Alternatives

DOT&PF and FHWA will continue coordination with the SHPO's office through design. KET-774 and KET-775 may be further investigated and the limits of each recorded and marked in the field for design engineers and construction workers, should SHPO require these measures. If new properties with potential to be eligible for inclusion in the National Register are discovered during construction, construction at that location will halt for site evaluation. If such a site is found to be eligible for the National Register of Historic Places, it will be avoided, or DOT&PF and FHWA will develop a memorandum of agreement with the SHPO to mitigate any adverse effects.

4.30.2.12 Hazardous Waste Sites—Construction

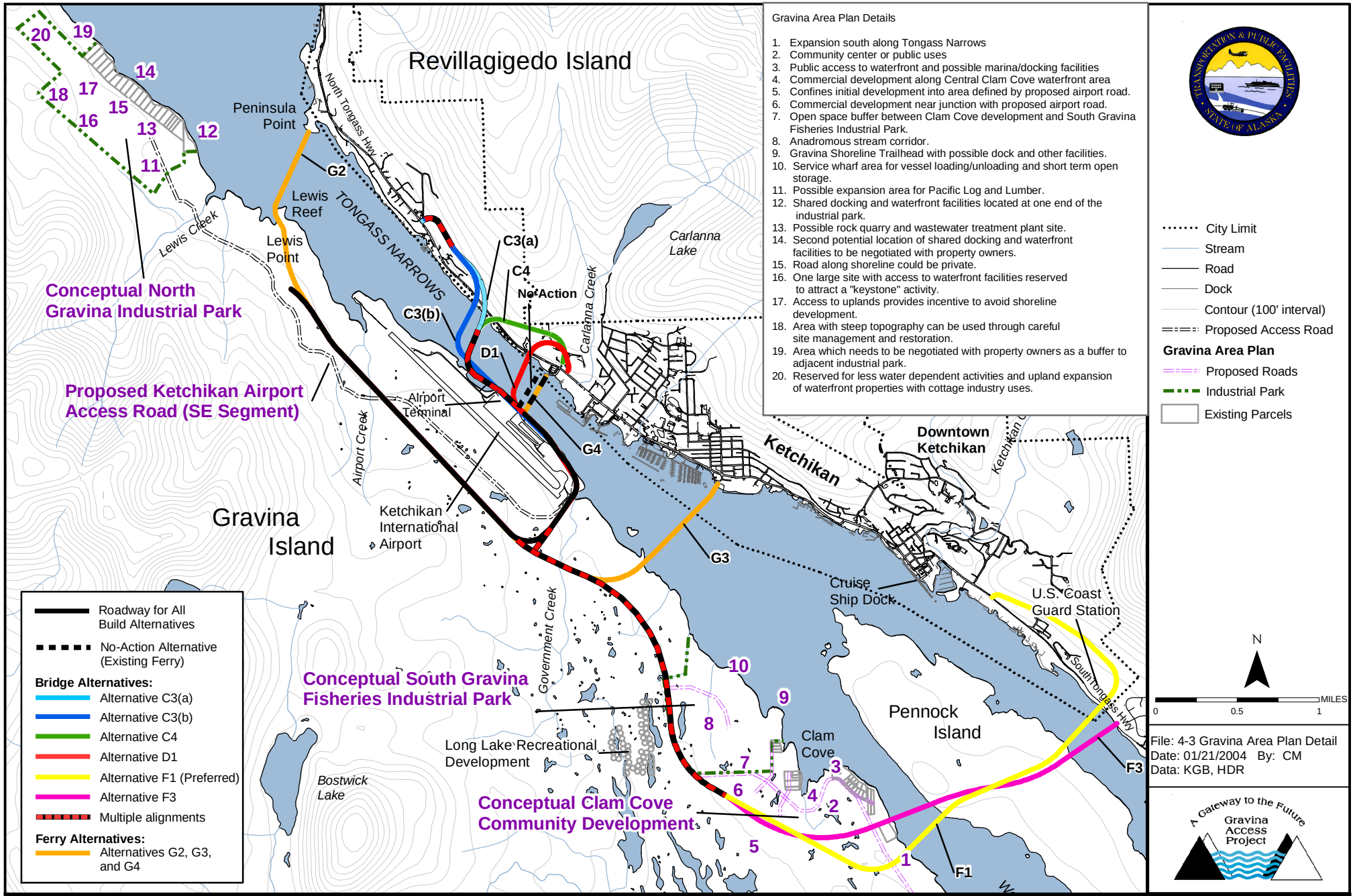
Mitigation for all Build Alternatives

Hazardous materials used during project construction would be stored and handled according to state and federal regulations. Material Safety Data Sheets would be available for all hazardous materials on the site. A spill prevention and response plan would be developed for the selected alternative. Construction vehicles would contain spill prevention kits in case of minor hazardous materials or chemical spills during construction.



Gravina Access Project
Environmental Impact Statement

Figure 4.1
Ketchikan Gateway Borough - Maintained Park Areas in Project Vicinity



Gravina Access Project
Environmental Impact Statement

Figure 4.2
Gravina Area Plan Details

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7.0 COMMENTS AND COORDINATION

As part of the process of fulfilling the requirements of NEPA for the Gravina Access Project, the DOT&PF and the project team solicited comments from the Ketchikan community and coordinated with many governmental agencies. The purpose of this coordination effort is to produce an EIS that is based on the best available information and reflects the input of all interested parties.

A primary component of the Gravina Access Project has been early involvement of key stakeholders and the integration of the public's comments, concerns, and input into the process. In 1999, the DOT&PF project team developed the *Gravina Access Project Public Involvement Plan* to formally document how it would exchange project information with those who have interests that are potentially affected by the project. These persons are members of the general public and representatives of businesses, special interest groups, governmental entities and agencies, and Alaska Native organizations.

A major element of the public involvement program is the development and maintenance of a project website on the Internet (at www.gravina-access.com). The website functions as an electronic bulletin board and library that make available to the public all project study reports; background information; the current project status, schedule, and recent activities; graphic displays of the route of each proposed alternative; contacts and an e-mail address for sending comments and requesting further information; links to the websites of the DOT&PF and other relevant agencies; and other project information.

The project team obtained public comments and coordinated with agencies primarily through two important processes: project and agency scoping (including a Public Involvement Plan) and other agency coordination (principally through the Project Development Team), as described later in this chapter.

7.1 Public and Agency Scoping Process

7.1.1 Environmental Scoping Process

Purpose. Project scoping is a National Environmental Policy Act (NEPA) requirement in which project planners initiate a dialog with public agencies, communities, nongovernmental organizations, interested parties, stakeholders, and the general public. The purpose of scoping is twofold: to solicit participants' views and to inform them about the proposed project and its development schedule. In addition, scoping documents public outreach activities and the input of all participants.

Early Participation. Scoping is the starting point in developing an environmental document that meets all requirements and becomes the basis of agency deliberations and decisions. The first scoping activity is to provide early notification of the project to the local community, the general public, and the regulatory agencies. Project planners can then solicit input from interested parties in the first stages of the project.

Goals. In scoping for NEPA, project planners employ two-way information exchange to reach three specific goals:

Ascertain the project's key issues, potential benefits, and alternatives to be addressed by the NEPA document.

Determine specific needs for special technical studies.

Identify sources of information.

Techniques. The most commonly used scoping techniques were meetings with the public and the regulatory agencies, individual outreach to interested parties, public notices, public open houses and information meetings, newsletters mailed to residents and inserted into the local newspapers, formal solicitation of written comments, meetings with elected officials and agency representatives, consultations with a project development team, and, more recently, information posted on a project website.

Outcome. The outcome of the scoping process was definition of the project scope of study, and project alternatives that reflect the input from the community and regulatory agencies. This enabled the project planners to productively focus preliminary engineering and environmental analysis work.

Scoping Plan and Report. Before scoping began, project planners developed a scoping plan to guide the project team throughout the scoping process. At the completion of scoping, all scoping activities were summarized in a report that documents the input received from all interested parties.

7.1.2 Notice of Intent

For the proposed Gravina Access Project, the FHWA (in cooperation with the DOT&PF) published a Notice of Intent (NOI) To Prepare an Environmental Impact Statement in the *Federal Register* on February 22, 1999. The NOI presented the project purpose and invited public participation. The NOI was also posted on the Gravina Access Project website (www.gravina-access.com) and the DOT&PF's Internet homepage (www.dot.state.ak.us), and it was published in the following:

Alaska Journal of Commerce
Anchorage Daily News
Ketchikan Daily News
The Local Paper
Juneau Empire
Island News
Petersburg Pilot
Wrangell Sentinel

7.1.3 Project Scoping Plan

At the outset of this project, the project team developed a Scoping Plan[1] to specify in detail its scoping activities.

[1] DOT&PF, *GAP Scoping Plan*, prepared by HDR Alaska (September 1999)

Contents. The Scoping Plan governed determination of the project need and purpose, development of a scope of work, identification of cooperating agencies, deciding what technical studies would be undertaken and by whom, setting a project schedule, and setting the dates and locations of scoping meetings. The plan described the anticipated scoping tasks and techniques, specified the scoping work products, and established a schedule of scoping activities.

Coordination with Other Planning Activities. The Scoping Plan expressed DOT&PF's intent to closely coordinate project scoping with other related projects in Ketchikan, including the Airport Master Plan, the U.S. Forest Service Tongass Gravina Island timber sale, and the Ketchikan Gateway Borough's 2020 land use planning program.

7.1.4 Scoping and Public Outreach Activities

7.1.4.1 Initial Scoping Activities

Initial project scoping activities were conducted from August through December 1999. The two major events were a scoping meeting with the regulatory agencies and a public scoping meeting.

Initial Ketchikan Meetings

Project scoping began in Ketchikan on August 11, 1999, when the project team presented an overview of the proposed project to the Ketchikan Chamber of Commerce. The team also met informally with representatives of regulatory agencies to begin identifying agency-specific issues and concerns.

Initial Agency Scoping Meeting and Agency Comments

The initial scoping meeting for regulatory agencies was held in Juneau on September 27, 1999, with a teleconference connection for participants located in Ketchikan and Anchorage. The scoping meeting was an interactive and collaborative discussion of proposed project alternatives, facilitated by HDR Alaska's project team members on behalf of the DOT&PF. The participants' objectives were to determine major regulatory and permitting concerns, identify agency likes and dislikes, and define information needs. The project team invited representatives of Native organizations and local, state, and federal agencies, and sent all invitees a packet of advance information about the project in mid-September.

Participants. The participating agencies and organizations were:

Juneau:
Federal Highway Administration (FHWA)
National Oceanic and Atmospheric Administration (NOAA Fisheries (previously National Marine Fisheries Service [NMFS])
U.S. Army Corps of Engineers (COE)
U.S. Coast Guard (USCG)
U.S. Forest Service (USFS)
Alaska Department of Environmental Conservation (DEC)
Alaska Department of Natural Resources (DNR)
Alaska Department of Transportation and Public Facilities (DOT&PF)
Alaska Division of Governmental Coordination

Ketchikan:
U.S. Forest Service (USFS)
Alaska Department of Fish and Game (ADF&G)
Ketchikan Gateway Borough (Borough)
Cape Fox Corporation

Anchorage:
Federal Aviation Administration (FAA)
Ketchikan Gateway Borough (Borough)

Initial Public Scoping Meeting and Public Comments



The initial public scoping meeting was held in Ketchikan on October 6, 1999, and was attended by approximately 110 members of the community. The meeting was advertised in the *Ketchikan Daily News, The Local Paper*, and the *Juneau Empire,* and a post-card announcement was mailed to all Ketchikan residents in late September. The meeting was structured as a planning fair, at which multiple local, state, and federal agencies were invited to set up booths and present their respective planning activities, especially as they relate to the project.

Participants. The participating agencies and their particular interests and responsibilities were:

U.S. Army Corps of Engineers (COE)—U.S. waters and wetlands planning
U.S. Coast Guard (USCG)—Navigation oversight in Tongass Narrows
U.S. Environmental Protection Agency (EPA)—Wetland and watershed planning
U.S. Forest Service (USFS)—West Gravina Island proposed timber sale
Alaska Department of Natural Resources (DNR)—Five-year schedule of timber sales
Alaska Department of Transportation and Public Facilities (DOT&PF)—Ketchikan International Airport master plan
Alaska Division of Governmental Coordination—Coastal management planning
Alaska Mental Health Trust Land Office—Trust resources asset planning
Ketchikan Gateway Borough—Ketchikan 2020 comprehensive planning
HDR Alaska (project team consultant)—Gravina Access Project

Agenda. The public meeting began with an open house from 3:00 to 8:30 p.m., during which attendees browsed through the information displays and talked with the agency representatives. Handouts presented the statement of the project purpose and the need for action. The project team then made a formal presentation to introduce the Gravina Access Project to the public, and conducted a question-and-answer session afterwards. The meeting served as a venue for verbal comments, and attendees could also comment in writing, both at the meeting and later (via a pre-addressed, mail-in comment form). Written comments were accepted for approximately one month after the meeting.

Other Initial Scoping Activities

Generally, the other initial project scoping activities comprised:

- Numerous informal agency meetings for exchange of information and discussion of issues specific to a particular agency
- Analysis of revised regulations issued in May 1999 regarding Section 106 of the National Historic Preservation Act (NHPA), regarding consultation with Native groups and other interested parties
- Compilation of mailing lists for dissemination of project information and meeting notices to agencies, businesses, nongovernmental organizations, Alaska Native organizations, and Ketchikan residents
- Newsletter(s) to publicize project planning activities and status (mailed to mailing list, inserted in the *Ketchikan Daily News*, and distributed to various organizations for insertion in their newsletters)
- Postings of project information on public bulletin boards
- Establishing and maintaining a project drop-in information center at 306 Main Street, Suite 312, in Ketchikan (initially open weekdays from 8:00 a.m. to 5:00 p.m.) and a project information kiosk (first in the Plaza Mall, then in the airport)
- Distribution of public service announcements to local radio and television stations in Ketchikan and Juneau
- Distribution of a flyer about the project to elementary school students
- Posting of project information and status on the project website (www.gravina-access.com) and the DOT&PF Internet home page (www.dot.state.ak.us)

Gravina Access Project

Published by the Alaska Department of Transportation & Public Facilities Volume II February 2002





DOT&PF Announces its Recommended Alternative

On January 7, 2002, Joe Perkins, Commissioner of the Alaska Department of Transportation and Public Facilities (DOT&PF), announced Alternative F5 – the bridge alternative that crosses Pennock Island – as DOT&PF's recommended alternative for the Gravina Access Project. The DOT&PF's recommendation was based on successful review of technical studies conducted for the Gravina Access Project during the past year. The DOT&PF made its recommendation publicly known to encourage a dialogue within the community and get the community's input on a recommended alternative.

The recommended alternative was selected over seven other alternatives and the no action alternative. Commissioner Perkins said the Pennock Island crossing was chosen because "it best meets the community's need for improved access to Gravina Island, allows the passage of major cruise ships, has less impact on floatplane traffic and the Ketchikan International Airport, will be less visibly intrusive, and uses bridge structures that are not as technically challenging as other alternatives. Building the crossing at Pennock Island is estimated to cost $160 million.

Ketchikan Community Encouraged to Review the Alternatives and Make its Recommendation

Now that the DOT&PF has made its recommendation for the Gravina Access Project, it's time for the community to weigh in and provide input. Over the next couple of months, the DOT&PF is welcoming input from members of the community on the evaluation of all of the alternatives currently under consideration and DOT&PF's recommendation for the Pennock Island crossing, Alternative F5. A Public Open House will be held on Monday, February 11 at the Ted Ferry Civic Center from 6pm to 8pm. This meeting is intended as an opportunity for the public to meet with the Gravina Access Project Team and ask questions regarding the alternatives analysis, as well as the factors that went into DOT&PF's recommendation.

Technical Reports Available for Public Review

Over the past year, the Gravina Access Project Team has conducted numerous engineering and environmental studies to refine project design information and evaluate the potential environmental impacts of the project alternatives. These studies include detailed evaluations of economic impacts, impacts to navigation in Tongass Narrows, impacts to floatplane operations, costs associated with construction and long-term use of each alternative, and impacts to wildlife habitat and other natural resources. The findings of these studies are summarized in a report entitled "Alternatives Evaluation – Summary Report." The summary report and the supporting technical reports are now available for public and agency viewing at the following locations – the Ketchikan Public Library, Gravina Access Project office (Millard + Peters Architects, LLC, 800 Mill Street, Suite 201 in Ketchikan, and the project website: www.gravina-access.com. The public is invited to review these studies and become informed on the project alternatives and their potential effects.

The findings of the technical studies will be used as the basis for developing the environmental impact statement for the project. By making the technical reports available to the public, the project team hopes to (1) facilitate the community's discussion of the recommended alternative and (2) get feedback from the community on the information provided.

www.gravina-access.com

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SAMPLE PROJECT NEWSLETTER

Scoping Summary Report (1999)

The project team documented the initial scoping activities in the Scoping Summary Report,[2] issued in December 1999. The text of the document, including a summary of issues, along with agency letters appears in Appendix R of this EIS. The full report is on file at DOT&PF. This report includes:

Description of the scoping methods used
Chronological list of scoping activities
Summaries of the public comments received
Written comments from participating agencies
A summary of the public meetings
Transcripts of the agency scoping meetings
Copies of the meeting sign-in sheets
Suggested new alternatives
A list of identified information sources
Determination of special studies required to adequately assess impacts
Copies of newspaper display ads, newsletters, and public service announcements
Mailing lists for agencies, businesses, and organizations

7.1.4.2 Continuing Scoping and Public Outreach Activities

From December 1999 through June 2000, the project team continued its public outreach with more than 70 scoping activities.[3] In addition to soliciting more public input, the team worked to obtain agency concurrence on the project purpose and need, develop and refine the project alternatives, and begin environmental fieldwork. The major events were four more public meetings, numerous "one-on-one" meetings with various agencies, and several meetings of the Project Development Team (see Section 7.3.2). The project team continued to solicit and accept public and agency comments at the public meetings, at informal meetings, and via e-mail, telephone, and U.S. mail.

Four Public Meetings

Early in 2000, four public meetings were held in Ketchikan—two on January 27 and two on April 12. These meetings afforded the public additional opportunities to become informed about the project, continue the dialog with the project team and agency representatives, and comment on the project, both formally and informally.

January 2000. The January meetings presented a summary of the scoping results, public involvement activities, technical studies, an economic analysis, and results of a ferry service survey. The project options being developed were described, including computer-simulated visualizations. The meetings concluded with extensive question-and-answer periods.

April 2000. The April meetings continued the exchange of information and concerns between the project team and the public, with presentations describing 16 project options and further

[2] DOT&PF, *GAP Scoping Summary Report,* prepared by HDR Alaska (December 1999)

[3] DOT&PF, *GAP Scoping Summary Report–June 2000 Supplement*, prepared by HDR Alaska (October 2000)

questions and answers. Many of the questions were related to the estimated project costs and funding sources.

Meetings with Government Agencies and Tribal Governments

The team consulted further with resource agencies to review the methodology for analyzing impacts, identify previous studies of the project area or specific environmental resources, and determine environmental and land use constraints on particular alignment alternatives. The following agencies were consulted:

Federal Aviation Administration (FAA)
National Oceanic and Atmospheric Administration, NOAA Fisheries (previously National Marine Fisheries Service [NMFS])
U.S. Army Corps of Engineers (COE)
U.S. Coast Guard (USCG)
U.S. Environmental Protection Agency (EPA)
U.S. Fish and Wildlife Service (USFWS)
U.S. Forest Service (USFS)
Alaska Department of Commerce
Alaska Department of Environmental Conservation (ADEC)
Alaska Department of Fish and Game (ADF&G)
Alaska Department of Natural Resources (DNR)
Alaska Division of Governmental Coordination (ADGC)
Alaska Mental Health Trust Land Office
Ketchikan Gateway Borough (KGB)
City of Ketchikan
City of Saxman
Ketchikan International Airport
Tribal Governments and Native Organizations
Organized Village of Saxman
Ketchikan Indian Corporation Tribal Council
Metlakatla Indian Community
Cape Fox Corporation

Meetings with Other Organizations

The project team continued its information exchanges and outreach to interested parties by meeting with the following organizations and businesses:

Alaska Marine Pilots Board
Cruise Line Agencies of Alaska
Holland America
Ketchikan Chamber of Commerce
North West Cruiseship Association
Princess Cruises
Tongass Narrows Work Group
USFS Gravina Timer Sale EIS Interdisciplinary Team

Other Continuing Scoping Activities

Among the continuing project scoping activities were:

- Meetings of the Project Development Team (PDT) (see Section 7.3.2)
- Maintaining a project kiosk in Ketchikan
- Two additional public meetings (February 11 and 27, 2002)
- Public newsletters (posted on the project website and inserted into the *Ketchikan Daily News*) dated September 1999, December 1999, February 2000, October 2000, and February 2002

Scoping Summary Supplement (2000)

In October 2000, the project team documented the continuing scoping activities in a supplement to the *Scoping Summary Report.*[4] This report listed all scoping activities between January 1 and June 30, 2000; summarized the additional public comments received; contained the agency concurrence on the project purpose and need; and appended copies of the project newsletters during that period. The text of the report, including an issues summary, along with agency letters, appears in Appendix R of this EIS. The full report is on file with DOT&PF.

Additional Public Comment

In June 2002, the project team documented public input associated with the Alternatives Evaluation and announcement of a "recommended" alternative. DOT&PF announced in January 2002 that Alternative F3 was recommended. Comments were solicited between January and April 2002. These were compiled in *Alternatives Evaluation Summary Report – Public Comment Summary.*[5] (Subsequently, the recommendation was reversed, Alternative F1 was brought back as a reasonable alternative, and Alternative F1 is now identified as the DOT&PF and FHWA Preferred Alternative. See Section 2.1.4). The text of the *Alternatives Evaluation Summary Report – Public Comment Summary*, including an issues summary, along with agency letters, appears in Appendix R of this EIS. The full report is on file with DOT&PF.

Summary of Scoping Activities

The project scoping and public outreach activities through 2003 are summarized in Table 7-1 (Project Scoping Activities [1999-2003]).

[4] DOT&PF, *GAP Scoping Summary Report—June 2000 Supplement,* prepared by HDR Alaska, October 2000.

[5] DOT&PF, *GAP Alternatives Evaluation Summary Report – Public Comment Summary*, prepared by HDR Alaska, June 2002.

TABLE 7-1
PROJECT SCOPING AND PUBLIC OUTREACH ACTIVITIES (1999-2003)

Date	*Scoping Activity*	*Location*	*Project Team Representative(s)**
08-10-99	Meeting with U.S. Coast Guard (USCG) re USCG issues	Juneau	Dalton
08-11-99	Coordination meeting with City of Ketchikan	Ketchikan	Dalton
08-25-99	Meeting with Ketchikan Gateway Borough (Borough) re local planning	Ketchikan	Dalton
08-25-99	Meeting with U.S. Forest Service (USFS) re USFS West Gravina Timber Sale EIS process	Ketchikan	Dalton
08-30-99	Meeting with U.S. Army Corps of Engineers (USCOE) re wetlands and Section 404 requirements	Anchorage	Dalton
09-01-99	Gravina Access Project (GAP) Newsletter, Volume 1, with introduction to project (insert in *Ketchikan Daily News* plus overrun)	---	---
09-09-99	Meeting with USCG re USCG issues	Juneau	Kyle, Dalton
09-15-99	Meeting with Alaska Department of Fish and Game (ADF&G) and USFWS to obtain agency issues of concern	Ketchikan	Dalton, Reich
09-16-99	Meeting with Borough and USFS re land ownership, access, and development issues on Gravina Island	Ketchikan	Dalton
09-27-99	Agency scoping meeting (with teleconference link to Anchorage)	Ketchikan, Anchorage	Dalton, McPherson, Brooks
10-06-99	Open house and public scoping meeting (Ketchikan Planning Fair)	Ketchikan	---
10-22-99	Meeting with Ketchikan International Airport (KIA) Affairs Committee Chair re aviation issues	Ketchikan	Dalton, Hippe, Klugherz
11-03-99	Follow-up meeting with Tongass Conservation Society (TCS)	Ketchikan	Dalton, McPherson, Klugherz
11-04-99	Project Development Team (PDT) meeting in Ketchikan (with teleconference links to Juneau and Anchorage)	Ketchikan, Juneau, Anchorage	Project Team
11-30-99	Meeting with USCOE re wetlands analysis	Anchorage	Leggett
12-01-99	GAP Newsletter, Volume 2, summarizes issues and concerns raised at the 10-99 public scoping meeting insert in *Ketchikan Daily News* plus overrun)	Ketchikan	---
12-09-99	Presentation to Ketchikan Chamber of Commerce Transportation Committee	Ketchikan	Klugherz
12-14-99	PDT meeting in Ketchikan (with teleconference links to Juneau and Anchorage)	Ketchikan	Project Team
01-04-00	Meeting with ADF&G re crossing alignment and fish and wildlife issues	Ketchikan	Klugherz
01-10-00	Discussion with ADF&G re wetlands, Lewis Creek drainage, estuaries, and shorebirds	Gravina	Morsell, Leggett
01-11-00	PDT meeting in Ketchikan (with teleconference links to Juneau and Anchorage)	Ketchikan	Project Team
01-12-00	Meeting with U.S. Environmental Protection Agency (EPA)	Seattle	Dalton
01-12-00	Discussion with U.S. Fish and Wildlife Service (USFWS) re wetland types in the project area	Ketchikan	Morsell, Leggett
01-13-00	Discussion with ADF&G re background information on seabird populations in Tongass Narrows	Ketchikan	Reich

TABLE 7-1
PROJECT SCOPING AND PUBLIC OUTREACH ACTIVITIES (1999-2003)

Date	*Scoping Activity*	*Location*	*Project Team Representative(s)**
01-13-00	Discussion with USFWS re background information on seabird populations in Tongass Narrows	Ketchikan	Reich
01-13-00	Discussion with USFS soil scientist re wetland functions	Ketchikan	Leggett
01-13-00	Discussion with USFS ecologist re wetland functions assessment methods	Ketchikan	Leggett
01-17-00	Meeting with KIA manager, Tim Garton	Ketchikan	Springer
01-19-00	Preliminary alternatives discussion with Federal Aviation Administration (FAA)	Anchorage	Kyle, Hippe, SlatonBarker
01-20-00	Presentation to Senator Frank Murkowski	Ketchikan	Klugherz
01-21-00	Public service announcement for 01-27-00 public meeting	Ketchikan	Brooks
01-23-00	Public meeting advertisement in *Ketchikan Daily News* Saturday-Sunday edition, and *Juneau Empire* Sunday edition	Ketchikan	---
01-24-00	Meeting with USFS re timber harvest on Gravina Island and within Ketchikan Ranger District	Ketchikan	Klugherz, Burden
01-24-00	Discussion with Alaska Ship and Drydock (AS&D)	Ketchikan	Burden
01-25-00	Meeting with Steve Seley re sawmill on Gravina Island	Ketchikan	Klugherz, Burden
01-25-00	Discussion with realtors re property on Gravina Island	Ketchikan	Klugherz, Burden
01-25-00	Meeting with Ketchikan Assistant City Manager Jim Voetberg	Ketchikan	Klugherz, Burden
01-26-00	Meeting at Ketchikan Hospital discussing hospital issues	Ketchikan	Klugherz, Burden
01-26-00	Meeting at Borough Assessor's Office re property values	Ketchikan	Klugherz, Burden
01-26-00	Discussion with Borough Assistant Manager John Hozey re economic issues	Ketchikan	Klugherz, Burden
01-26-00	PDT meeting in Ketchikan (with teleconference links to Juneau and Anchorage)	Ketchikan	Project Team
01-26-00	Public meeting advertisement in *Ketchikan Daily News*	Ketchikan	---
01-27-00	Public meetings to present project alternatives (11:00 a.m. and 5:00 p.m.)	Ketchikan	Project Team
01-27-00	KRBD radio interview	Ketchikan	Dalton, Brooks, Kyle
01-27-00	Public comment period after 01-27-00 public meetings (01-27 to 03-17)	---	---
01-29-00	Presentation of project status to Senator Frank Murkowski and staff during his meeting with Borough	Ketchikan	Klugherz
02-01-00	Discussion with USFS re wetland functions and wildlife use of wetlands	Juneau	Leggett
02-01-00	Telephone interview with Gateway City Realty re housing market and general economy	Ketchikan	Klugherz
02-01-00	Interview with Tongass Realty re commercial and residential rental market	Ketchikan	Klugherz
02-01-00	Interview with Mayor of Metlakatla re economy	Ketchikan	Klugherz
02-02-00	General discussion with USFS Research Laboratory regional soil scientist re wetland functions	Juneau	Leggett
02-02-00	Interview with State Parks ranger re access to visitor data in area	Ketchikan	Klugherz
02-03-00	Interview with president of Gateway Forest Products re the timber industry in Ketchikan	Ketchikan	Klugherz

TABLE 7-1
PROJECT SCOPING AND PUBLIC OUTREACH ACTIVITIES (1999-2003)

Date	*Scoping Activity*	*Location*	*Project Team Representative(s)**
02-03-00	Interview with executive director of Ketchikan Visitors Bureau re the state tourism industry in Ketchikan	Ketchikan	Klugherz
02-07-00	Discussion with Ketchikan Indian Corporation Tribal Council	Ketchikan	Klugherz
02-10-00	Project update to the Ketchikan Chamber of Commerce Transportation Committee	Ketchikan	Klugherz
02-26-00	GAP Newsletter, Volume 3, with description of 12 preliminary project alternatives and status of ongoing technical studies (insert in *Ketchikan Daily News* weekend edition, February 26-27, plus overrun)	Ketchikan	---
03-13-00	Meeting on Gravina Island planning activities and secondary and cumulative impacts with Alaska Department of Natural Resources (DNR), USFS, Borough, DOT&PF, and Steve Planchon (Trust Land Office [TLO])	Ketchikan	Dalton, McPherson, Klugherz, Hippe
03-13-00	Meeting with floatplane operators to discuss access options and preliminary ideas about the potential impacts	Ketchikan	Dalton, Hippe, Peters, McPherson, Klugherz
03-14-00	Field reconnaissance of proposed road alignment to Seley Mill site with Borough and USCOE staff.	Ketchikan	Dalton
03-15-00	Meeting with Kris Geldaker of Cruise Line Agencies of Alaska re Marine Safety Task Force input.	Ketchikan	Dalton, Klugherz
03-15-00	Meeting with Borough staff re Gravina Island land planning	Ketchikan	Klugherz, McPherson, Hippe, Dalton
03-15-00	Meeting with area pilots re Tongass Narrows aircraft use	Ketchikan	Dalton
03-20-00	Meeting with John Clifton of the Tongass Narrows Work Group	Ketchikan	Dalton. Klugherz
04-04-00	Project team briefing to DOT&PF staff (Centennial Hall)	Juneau	Project Team
04-04-00	Meeting with Jim Helfinstine, USCG, and Tim Haugh, Federal Highway Administration (FHWA)	Juneau	Dalton, Kyle, Brooks, Hutchison
04-06-00	Presentation to the Alaska Department of Commerce, Alaska marine pilots, and Alaska Marine Pilots board	Anchorage	Dalton, Brooks, Kyle, Klugherz, Hutchison
04-06-00	Discussion with Grahame Burton of Princess Cruises, Bill Sharp of Holland America, and Les Cronk of Cruise Line Agencies of Alaska	Anchorage	Dalton, Brooks, Kyle, Hutchison, Klugherz
04-00-00	Public service announcement for 04-12-00 public meeting	Ketchikan	Brooks
04-08-00	Public meeting advertisement in *Ketchikan Daily News* for 04-12-00 public meeting	Ketchikan	---
04-08-00	Postcard mailer to all box holders in Ketchikan area re 04-12-00 public meeting	Ketchikan	---
04-11-00	PDT meeting in Ketchikan at the Ted Ferry Civic Center, 2:00 to 4:00 p.m. (with teleconference links to Juneau and Anchorage)	Ketchikan, Juneau, Anchorage	Project Team
04-12-00	KRBD radio interview	Ketchikan	Dalton, Brooks, Morrow
04-12-00	Two public meetings re project alternatives (11:00 a.m. and 5:00 p.m.)	Ketchikan	Project Team
04-13-00	Meeting with Ketchikan Chamber of Commerce Transportation Committee	Ketchikan	Dalton, Kyle, Brooks, Klugherz, McPherson, Reich
04-13-00	Presentation to City of Saxman and Saxman IRA Council, including subsistence and other traditional activities on Pennock and Gravina Islands	Saxman	Reich, Dalton

TABLE 7-1
PROJECT SCOPING AND PUBLIC OUTREACH ACTIVITIES (1999-2003)

Date	*Scoping Activity*	*Location*	*Project Team Representative(s)**
04-13-00	"HDR Presents More Gravina Options," article on electronic news page www.kanoe.com	World Wide Web	---
04-15-00	Feature article in *Ketchikan Daily News* weekend edition (April 15-16, 2000): "Engineers Estimate Gravina Crossing Costs, Prices for Bridge, Tunnel and Combination Options Span a Range from $63 Million to $384 Million"	Ketchikan	---
04-15-00	Display at Ketchikan Chamber of Commerce Expo (two days)	Ketchikan	Klugherz
04-21-00	Alternative analysis discussion with DOT&PF's Morrow, Yost, and Healy	Juneau	Dalton, Snead
04-21-00	Meeting with USCG and Capt. Winter, marine pilot	Juneau	Dalton, Snead
04-24-00	Project briefing to DOT&PF Commissioner	Juneau	Keen, Kyle, Dalton
04-25-00	Project briefing at Metlakatla	Metlakatla	Snead, Dalton
05-08-00	*Ketchikan Daily News* editorial, "Input Sought," encouraging public input	Ketchikan	---
05-10-00	Meeting for floatplane operators (no operators attended)	Ketchikan	Dalton, Peters, Klugherz, Hippe
05-11-00	Presentation to Technical and Operations Committee of the North West Cruiseship Association	Vancouver	Dalton, Kyle, Klugherz
05-15-00	Cruise vessel navigation demonstration (with Jim Helfinstine, USCG, and others	Ketchikan	Dalton, Kyle
05-16-00	PDT meeting in Ketchikan (with teleconference links to Juneau and Anchorage)	Ketchikan	Project Team
05-16-00	Elected officials meeting at Ted Ferry Civic Center, 6:00 to 7:00 p.m.	Ketchikan	Dalton, Keen, Kyle, Klugherz
05-17-00	Meeting with Ketchikan Chamber of Commerce board	Ketchikan	Dalton
05-30-00	Presentation of project update to Colin Chapman, administrative assistant to Congressman Don Young.	Ketchikan	Klugherz
06-15-00	Meeting with Eric Hummel of Tongass Conservation Society (TCS).	Ketchikan	McPherson, Dalton
06-15-00	Meeting with Susan Dickinson and Steve Reeve (Borough), Dave Miller (KIA), and Roger Healy (DOT&PF) re planned taxiway improvements	Ketchikan	Klugherz, Dalton, McPherson
06-15-00	Ketchikan Pulp Company (KPC) Mill redevelopment and brownfields planning meeting	Ketchikan	McPherson, Dalton
06-16-00	Meeting with USFS Gravina Timber Sale EIS staff (Jerry Ingersoll, Susan Marthaller, et al.) re coordination of timber sale EIS studies with Gravina access EIS studies, particularly for cumulative and secondary impacts	Ketchikan	Dalton, McPherson
06-19-00	Meeting with DOT&PF (Winters, Skagerberg, Moore) to discuss parallel taxiway design at KIA	Juneau	Dalton
06-28-00	Display for Gravina Access Project located at the KIA	Ketchikan	Dalton, Klugherz
08-03-00	PDT meeting (with teleconference links to Anchorage, Juneau, Portland, and Seattle)	Ketchikan, Anchorage, Juneau, Portland, Seattle	McPherson, Dalton, Hippe, Brooks, Kyle, Snead
10-01-00	GAP Newsletter, Volume 4, with description of 18 identified build options (insert in *Ketchikan Daily News* plus overrun)	---	---

TABLE 7-1
PROJECT SCOPING AND PUBLIC OUTREACH ACTIVITIES (1999-2003)

Date	*Scoping Activity*	*Location*	*Project Team Representative(s)**
12-12-00	PDT meeting (with teleconference links to Anchorage, Juneau, and Portland)	Ketchikan, Anchorage, Juneau, Portland	McPherson, Dalton, Brooks, Snead
04-04-01	Meeting with DOT&PF re clarification of alternatives definitions	Juneau	Dalton
05-07-01	Meeting with DOT&PF to discuss refinement of preliminary options	Juneau	Kyle, Dalton, Hippe
05-23-01-05-24-01	Meetings with residents of Pennock Island and Clam Cove on Gravina Island	Ketchikan	Dalton
09-27-01	Meeting with DOT re preliminary bridge structures technical memorandum	Juneau	Kyle, Dalton
10-11-01	Meeting with Alaska Air Chief Pilot (Terry Smith)	Anchorage	Hippe, McPherson
01-07-02	Borough Assembly meeting	Ketchikan	Dalton, Healy
01-21-02	Borough Assembly meeting	Ketchikan	Dalton, Healy
02-07-02	Ketchikan City Council Meeting	Ketchikan	Dalton, Healy
02-08-02	Ketchikan Chamber of Commerce (at Ketchikan City Council chambers)	Ketchikan	Dalton, Healy
02-08-02	Joint meeting with Saxman City Council, Saxman IRA Council, and the Cape Fox Corporation Board (at Saxman City Hall)	Saxman	Dalton, Healy
02-09-02	GAP Newsletter, Volume 5, with identification of 8 reasonable project alternatives as evaluated in detailed engineering and environmental studies and announcement of DOT&PF's recommended alternative (insert in *Ketchikan Daily News*, plus overrun)	---	---
02-11-02	Meeting with marine pilots	Ketchikan	Dalton
02-11-02	Open house public meeting	Ketchikan	Dalton, Healy, Project Team
02-19-02	Meeting with Ketchikan Visitors Bureau	Ketchikan	Healy
02-26-02	Borough Planning Commission meeting	Ketchikan	Dalton
02-08-02	Cape Fox Corporation chief executive officer, Saxman Mayor, and a marine pilot	Cape Fox Corporation	Dalton, Healy
02-08-02	Ketchikan Economic Development Authority meeting	Ketchikan	Dalton, Healy, Burden
03-05-02	Meeting with USCG regarding bridge clearances	Juneau	Dalton, Healy
03-06-02	PDT meeting (with teleconferences in Anchorage and Seattle)	Ketchikan, Anchorage, Seattle	Project Team
03-06-02	Meeting with elected officials at Ted Ferry Civic Center	Ketchikan	Dalton, Healy, Burden, Maines
03-12-02	Meeting with Borough Planning Commission re project alternatives	Ketchikan	Dalton, Healy
05-23-02	Kickoff meeting for project Notice to Proceed (NTP) 8	Seattle	Project Team
06-18-02	Meeting with EPA re content of EIS	Seattle	Dalton
07-01-02	GAP Newsletter, Volume 6, with description of public scoping activities on reasonable alternatives (insert in *Ketchikan Daily News* plus overrun)	---	---
07-12-02	Meeting with City of Saxman and Cape Fox Corporation	Saxman	Maines, Burden
09-04-02	Meeting with Ketchikan Economic Development Authority (KEDA) board	Ketchikan	Dalton, Healy

TABLE 7-1
PROJECT SCOPING AND PUBLIC OUTREACH ACTIVITIES (1999-2003)

Date	*Scoping Activity*	*Location*	*Project Team Representative(s)**
09-26-02	Open House at the Ketchikan Project Office	Ketchikan	Dalton, Healy, Maines
09-26-02	Ketchikan Economic Development Authority meeting	Ketchikan	Dalton, Healy, Maines
09-23-02-09-30-02	Ketchikan Project Office Open	Ketchikan	Maines, Ohlsen
10-15-02-10-17-02	Ketchikan Project Office Open	Ketchikan	Maines
3-17-03-3-19-03	Ketchikan Project Office Open	Ketchikan	Maines
4-2-03-4-4-03	Ketchikan Project Office Open	Ketchikan	Maines
4-29-03-5-1-03	Ketchikan Project Office Open	Ketchikan	Maines
8-6-03-8-7-03	Ketchikan Project Office Open	Ketchikan	Maines, Dalton
8-12-03-8-14-03	Ketchikan Project Office Open	Ketchikan	Maines
8-19-03-8-21-03	Ketchikan Project Office Open	Ketchikan	Maines
8-26-03-8-28-03	Ketchikan Project Office Open	Ketchikan	Maines
9-2-03-9-3-03	Ketchikan Project Office Open	Ketchikan	Kyle
9-9-03-9-11-03	Ketchikan Project Office Open	Ketchikan	Maines
9-15-03-9-19-03	Ketchikan Project Office Open, Open House, and Public Hearings	Ketchikan	Maines, Dalton, Snead, Evensen, Hutchison
9-23-03-9-25-03	Ketchikan Project Office Open	Ketchikan	Maines
9-30-03-10-2-03	Ketchikan Project Office Open	Ketchikan	Maines

Sources: DOT&PF, GAP Scoping Summary Report–June 2000 Supplement, by HDR Alaska (October 2000); and Project Team files

* Brooks, Anne (Brooks & Associates); Burden, Pat (Northern Economics); Dalton, Mark (HDR); Garber, Sorin (HDR); Haugh, Tim (FHWA); Healy, Roger (DOT&PF); Evenson, Jim (DOT&PF); Hippe, Duane (HDR); Hutchison, Bruce (The Glosten Associates); Keen, Eric (HDR); Klugherz, Mary (Maritime Strategy International, Inc., formerly with Klugherz & Associates); Kyle, Larry (HDR); Leggett, Anne (HDR); Maines, Kristen (HDR); McPherson, John (HDR); Morrow (DOT&PF); Morsell (formerly Boggs), Sally (HDR); Peters, Stephen (Millard + Peters); Ohlsen, Ron (HDR); Reich, Robin (HDR); SlatonBarker, Carla (HDR); Snead, Carol (HDR); John Springer (The Glosten Associates).

7.2 Summary of Scoping Meeting Comments

7.2.1 Agency and Tribal Government Scoping Comments

At the September 27, 1999, agency scoping meeting, agency representatives voiced their concerns about the project and issues of particular interest. The agencies were also asked to identify information gaps, fieldwork, and special studies that would be helpful in preparing this EIS. The meeting was followed by a comment period, during which the agencies submitted written comments. The comment period deadline was initially October 13, 1999, but this deadline was later extended until October 27, 1999, at agency request.

Following are the topics addressed and the information needs identified in the agencies' comments (both verbal and written). These topics and information needs are excerpted from the scoping summary reports, which include the full text of all agency comment letters.[6] See also Appendix R.

7.2.1.1 Federal Agencies

Federal Aviation Administration (FAA)

Bridge impacts on navigable airspace
Impacts on Ketchikan International Airport
Heavy use of the airspace by aircraft flying under visual flight rules

National Oceanic and Atmospheric Administration (NOAA) Fisheries - Previously National Marine Fisheries Service (NMFS)

Impacts on fish and marine invertebrates and mammals
Relationship between the Gravina Access Project and Ketchikan 2020
Minimization of direct, indirect, and cumulative impacts
Impacts of noise on marine mammals and fish
Consultation requirements of the Endangered Species Act (ESA)
Essential fish habitat (EFH) requirements

The NMFS could potentially help with studies if needed.

U.S. Army Corps of Engineers, Regulatory Branch (COE)

Probable need for Section 10 and Section 404 permits
Compensatory mitigation
Long-term maintenance
Storm water
Purpose of and need for the project
Public support
Identification of appropriate development on Gravina Island
Evaluation of all practicable alternatives
Impact on airport expansion plans
Inclusion of proposed road system in project

[6] DOT&PF, *GAP Scoping Summary Report* (December 1999) and *GAP Scoping Summary Report—June 2000 Supplement* (October 2000), prepared by HDR Alaska.

Cumulative and secondary impacts
Impacts on land and water on both sides of Tongass Narrows
Further information needs:
- Jurisdictional wetlands determinations
- Impacts of airport expansion, new roads, and development
- Bathymetry, geology, currents, wind, tidal data, and weather patterns
- Aquatic and other natural resources
- Dive surveys

U.S. Coast Guard (USCG)

Separate section in environmental document on navigational impacts
USCG permit for a hard link
Vertical and horizontal bridge clearances
Potential confusion/ unwieldiness of combining the project with Ketchikan 2020

The USCG also provided navigation data prepared by its Marine Safety Detachment in Ketchikan.

U.S. Environmental Protection Agency (EPA)

Purpose and need statement requirements
Inclusion of other planning efforts being undertaken with the access project
Indirect and cumulative impacts of the project and subsequent development
Description of wetlands types, acreage, and locations, functions, and values
Evaluation of freshwater sources for availability, type, and quantity
Effects of development on Gravina hydrology, water quality, and fish habitat
Impacts of storm water, wastewater, and sewage associated with development

The EPA also noted that project funding is secure only for the environmental process and design.

U.S. Fish and Wildlife Service (USFWS)

Cumulative and secondary impacts on fish and wildlife resources and habitats
Avoidance of development in the most productive and sensitive habitats
Siting of roads away from the shoreline and obvious beach fringe areas

The USFWS offered assistance (through its dive program) with siting of marine facilities

U.S. Forest Service – Ketchikan Ranger District (USFS)

Tie-in of a hard link into the USFS road system
Impacts on Gravina road system of increased public access
Potential confusion and complexity of considering project with Ketchikan 2020
Potential access provided by project to USFS timber sale areas on Gravina
Potential development of recreational facilities based on increased access
Compatibility of USFS plans for federal lands with other Gravina landowners

7.2.1.2 State Agencies

Department of Environmental Conservation (DEC)

Environmental safeguards to protect aquatic resources on Gravina Island

Department of Fish and Game (ADF&G)

Impacts on fish and wildlife resources and habitat
Public uses of fish and wildlife
Secondary and cumulative effects, as well as direct impacts
Need for field surveys for sensitive species and habitats
Cumulative effects of linking Ketchikan to roads accessing most of Gravina
Avoidance and mitigation of impacts
Construction monitoring to protect water quality, fish, wildlife, and habitats

Department of Natural Resources – Division of Mining, Land and Water (DNR)

The DNR indicated it would become actively involved after development of the project alternatives.

Department of Natural Resources – Alaska Mental Health Trust (AMHT) Land Office

The Trust supports a hard link that accesses not only the airport but also Borough lands and Trust lands beyond the airport.

Department of Natural Resources – Office of History and Archeology

Native burial sites on Pennock Island
Resistance to construction on Pennock Island by Native residents

The Office of History and Archeology noted that the following Native entities should be contacted: IRA Councils of the Ketchikan Indian Corporation and the Organized Village of Saxman, and Cape Fox Corporation.

Alaska Division of Governmental Coordination (ADGC)

Relationship of Lewis Reef industrial development to project
Relationship between the project and Ketchikan 2020

DGC involvement will be limited until environmental permit applications have been submitted.

7.2.1.3 Local Agencies

Ketchikan Gateway Borough (KGB)

Need for close coordination with the Borough for comprehensive planning
Information needs:
- Updated land use inventory for Gravina and Revillagigedo Islands
- Updated Borough-wide base maps
- System for data retrieval, maintenance, and analysis of mapped information
- Current scalable, digital aerial photos compatible with digital map system

The Borough noted that land ownership on Gravina Island is more defined now that the status of Mental Health Trust Land has been resolved.

7.2.1.4 Government to Government Coordination, Tribal Governments / Organizations

This subsection includes comments from the initial scoping meeting and other meetings. The project team met with the Metlakatla Indian Community (governing body for the Metlakatla Indian reservation 15 miles south of Ketchikan), the Ketchikan Indian Corporation Tribal Council (governing body for Alaska Natives living on Revillagigedo Island), the Organized Village of Saxman (organized under the Indian Reorganization Act), and Cape Fox Corporation (the local Native corporation established under the Alaska Native Claims Settlement Act). Some of these meetings were joint meetings of these organizations. Meeting dates are shown in Table 7-1, above. There are three main issues, described below, that have been raised at these meetings. The description indicates when an issue or sub-issue is specific to one government or corporation.

Burial Sites. Pennock Island includes burial sites along East Channel, with potential for sites reported from the southern tip to the northern tip of the island, although the only known locations are at the north and south ends. There is concern about impact of secondary development on the island (e.g. development of new homes) as well as the initial construction of the project. This issue is common to the Revillagigedo Island groups and was not raised as an issue for Metlakatla.

Subsistence. Gravina Island in general and the Bostwick Inlet area of the island in particular were noted as important subsistence areas for Alaska Natives from all the tribal governments. Residents of Metlakatla, Saxman, and Ketchikan regularly travel to the southern portions of Gravina Island for subsistence activities. There is concern that the project could make the Gravina Island timber sale proposed by the Forest Service more likely, and that the timber sale and resulting use of logging roads could create the greater impact on subsistence practices. Subsistence is important culturally and economically. It is of greater importance economically now, since the cash economy has slowed (see below).

Economy. Saxman and particularly Metlakatla struggle economically. Any impact that would reduce cruise ship traffic would hurt Saxman's economy. Saxman and Cape Fox Corporation revenues are largely tourism dependent (local artists' gift shop, totem pole carving, excursions, Cape Fox Corporation's hotel and restaurants, etc.). Passengers now pass Saxman on the cruise ship in East Channel and can see Totem Park, and they may be drawn to visit the community during their shore stay. This incentive could be removed if ships were routed to West Channel. Similarly, there is concern that changes to navigation patterns that put more boats in Nichols Passage could disturb operation of Metlakatla's Alaska Native commercial fishing fleet (possibly both commercial and subsistence operations).

7.2.2 Public Scoping Comments on Project Issues

At the October 6, 1999, public scoping meeting, members of the public commented verbally about the project. The public was also invited (at the meeting and in the October 13 edition of the *Ketchikan Daily News*) to submit written comments via mail or e-mail. Written comments were received up to late October 1999.

Following are the topics addressed in the public comments (both verbal and written) on project issues and concerns. These issues are excerpted from the scoping summary reports, which include the full text of all public comments[7]. See also Appendix R.

Access to Gravina Island

Need for access by emergency response providers and airport passengers

Airspace

Interference of bridge with floatplane traffic

Biological Resources

Protection of sensitive species and habitats on Gravina Island

Burial Grounds

Disturbance of Native burial grounds on Pennock Island by bridge construction

Community Support

Sufficiency of community support

Comprehensive Planning

Length of planning period before action
Completion date of Borough comprehensive plan for Gravina Island
Coordination of project and Borough's long-range planning
Relationship of project to Gravina Island comprehensive plan

Cost/Benefit Analysis

Role of cost/benefit analysis in decision to construct an improvement
Small number of people who would benefit from project
Previous cost/benefit analysis of bridge and ferry alternatives

Development of Gravina Island

Dependence of Gravina Island development on this project and Borough planning
Percentage of Gravina Island land that is actually developable
Developing roads on Gravina Island before planning hard link access
Access to Gravina Island lands as well as airport
Fostering of development opportunities by road access
Development of road corridor without waiting for the access project
Permittability of a road on Gravina Island by regulatory agencies

[7] DOT&PF, *GAP Scoping Summary Report* (December 1999) and *GAP Scoping Summary Report—June 2000 Supplement* (October 2000), prepared by HDR Alaska, Inc.

Economic Development and Jobs

Economic development as a stated project need
Identification of land suitable for development on Revillagigedo and Gravina Islands
Identification of biological resource constraints on development
Creation of jobs by project construction and Gravina Island development
Economic constraints (lack of developable land) in Ketchikan
Comparison of development potentials on Revillagigedo Island vs. Gravina Island

Funding

Source of project funding
Whether community will pay for a portion of the project

Infrastructure

Increase in demand for power and water generated by project
Impacts on parking and access roads to the airport

Land Use Planning

Development of land use assumptions before Gravina Island hard link
Need for land use decisions to accurately forecast Gravina Island traffic
Public review of assumptions about land use and traffic generation

Landfill

Possible location of landfill on Gravina Island

Maintenance

Maintenance required by bridge and tunnel

Marine Navigation

Congestion of Tongass Narrows
Vertical clearance of bridge (accommodation of cruise ships)

Other Community Needs

Other important community needs, such as recreational land
Possible preclusion of funding for other important projects by access project

Pennock Island Crossing

Opposition of residents to previously proposed crossing via Pennock Island

Previous Studies

Use of previous studies by DOT&PF on the Tongass Narrows crossing

Purpose of and Need for Project

Development on Gravina as project purpose and need compared to safety

Traffic Congestion

Relief of traffic congestion on Revillagigedo Island by Gravina Island hard link

Visual Environment

Unattractive appearance of bridge and development on Gravina Island

Water Quality

Impact of Gravina development on water quality

Wetlands on Gravina

Criteria used to make wetlands developable
Disturbance or destruction of wetlands by Gravina Island development
Classification of wetlands on Gravina Island

7.2.3 Public Suggestions for Project Alternatives

Members of the public were also provided with a map of the project area and asked to suggest specific crossing alignments and access modes (e.g., bridge, tunnel, ferry, etc.). These other suggested alternatives are listed in the project *Scoping Summary Report.*[8]

7.3 Project Development Team (PDT)

7.3.1 Purpose and Membership

During the initial scoping process, the DOT&PF formed the Project Development Team (PDT) to provide for regular communication with and frequent input from interested agencies and key project stakeholders. This group was established as the regular forum for continuing the dialog begun in the initial agency scoping meeting, and is continuing in this role until completion of the EIS. The objectives of the PDT were established to provide:[9]

1—A communication and coordination tool that helps the project team remain in regular, close contact with the agencies and local governments

2—A forum for reviewing technical studies, fieldwork, and draft reports

3—A forum for updating participants regarding the overall project schedule

4—A platform for the participants to voice concerns early in the process so that concerns can be addressed efficiently without adding undue delays

5—An opportunity for the participants to become familiar with the technical studies and discuss them directly with the technical experts who conducted them

6—An opportunity for the concurrence agencies to merge the NEPA and Section 404 permit review processes, including participation in the project team's development of the project purpose and need statement and the reasonable alternatives

[8] DOT&PF, *GAP Scoping Summary Report*, prepared by HDR Alaska (December 1999)

[9] DOT&PF, *GAP Project Development Team Memorandum (Draft),* prepared by HDR Alaska (December 1999)

Member Agencies. The PDT members comprise representatives of the following groups:

Federal Aviation Administration (FAA)
Federal Highway Administration (FHWA)
National Oceanic and Atmospheric Administration, NOAA Fisheries (previously National Marine Fisheries Service [NMFS])
U.S. Army Corps of Engineers (COE)
U.S. Coast Guard (USCG)
U.S. Environmental Protection Agency (EPA)
U.S. Fish and Wildlife Service (USFWS)
U.S. Forest Service (USFS)
Alaska Department of Fish & Game (ADF&G)
Alaska Department of Environmental Conservation (ADEC)
Alaska Department of Natural Resources
Alaska Department of Transportation and Public Facilities (DOT&PF)
Alaska Division of Governmental Coordination (ADGC)
Alaska Mental Health Trust Land Office
Ketchikan Gateway Borough (Borough)
City of Ketchikan
City of Saxman
Ketchikan International Airport (KIA)
Cape Fox Corporation
Ketchikan Indian Corporation
Saxman IRA Council
HDR Alaska and other project team consultants

7.3.2 Meetings

The PDT has met periodically in Ketchikan, with teleconference connections to sites in Anchorage and Juneau.

November 4, 1999. At the initial meeting of the PDT, presentations were made by senior members of the project team to acquaint the PDT membership with the purpose of the PDT, the content of two in-process technical memoranda (on avigation and navigation), the scoping comments received from the participating regulatory agencies, the working draft of the project's purpose and need statement, and the upcoming work activities of the project team members.

December 14, 1999. The PDT was informed about ongoing public outreach activities and preliminary engineering activities, including base mapping, a geotechnical report, development of design criteria, consultation regarding threatened and endangered species, inventory of land uses, a ferry passenger survey, updating and forecasting economic conditions using three growth scenarios, survey of the shoreline marine environment, and biological resources fieldwork. The draft purpose and need statement was discussed in detail, and many suggestions were made for additions and revisions by the agency representatives.

January 26, 2000. The meeting centered on developing the project's purpose and need statement, to initiate the agency concurrence process. The project team presented the status of ongoing technical studies. Nine initial project options were described (including bridge, tunnel, and ferry modes): A, B, C1, C2, D, E, F1, G1, and G3. The PDT was asked to comment on

these options to identify potential "fatal flaws" and unrecognized major impacts, and was updated on other current planning projects in the Borough.

April 11, 2000. The main topics of this meeting were the ongoing technical studies and the presentation of further details of the project options under consideration: A, B, C1, C2, C3, C4, D, D (moveable), E, E2, F1, F2, G1, G2, and G3.

May 16, 2000. Members were asked for feedback on the completed drafts of the technical memoranda, and were briefed on two new options, G4 and F3. The team also presented the methodology for screening the project options to determine which options are reasonable alternatives for detailed analysis in the EIS, and solicited input from the PDT members regarding the process.

August 3, 2000. The project team listed the screening factors to be used in evaluating project options. The PDT members suggested refinements to some factors and for new factors. The project team also reported on life-cycle costs.

December 12, 2000. Members reviewed and commented on the project team's proposed list of seven reasonable alternatives: C3, C4, D1, F3, G2, G3, and G4. Concurrence on these alternatives was to be formally requested from the participating agencies. The PDT also noted and discussed concurrent planning activities.

March 6, 2002. Most of the discussion focused on the *GAP Alternatives Evaluation Summary Report,* completed in January, and the adequacy of the more than 20 technical studies summarized in the report. The DOT&PF's designation of Alternative F3 as its preliminary preferred alternative was discussed, and, in light of F3's unresolved navigational issues, several PDT members asked that Alternative F1 be reconsidered as a reasonable alternative.

7.4 Agency Coordination and Concurrence Process

7.4.1 Lead and Cooperating Agencies

For this project, the Federal Highway Administration (FHWA) is the lead federal agency for NEPA compliance. The following agencies accepted the invitation of DOT&PF to participate as cooperating agencies:

U.S. Army Corps of Engineers (USACOE)
U.S. Coast Guard (USCG)
U.S. Environmental Protection Agency (EPA)
Ketchikan Gateway Borough
City of Ketchikan

7.4.2 Agency Concurrence

In June 1997, the DOT&PF and the Federal Highway Administration (FHWA) Alaska Division entered into an Interagency Working Agreement to Integrate Section 404 and Related Permit Requirements into the National Environmental Policy Act. The agreement integrates the Clean Water Act Section 404(b)(1) process and other Section 404-related permitting and certification requirements with the NEPA process. Signatories of the agreement are committed to ensuring the earliest possible identification and consideration of environmental concerns to waters of the

United States, including wetlands, in the planning, design, and construction of Federal-aid highway projects.

The concurrence agreement was developed to allow the NEPA and Section 404 processes to run concurrently instead of sequentially, as with the traditional approach. This merged process is designed to identify issues of concern early in the project, as well as the need for additional environmental studies to meet requirements of NEPA and Section 404. The benefit of this process is that it streamlines the environmental review and identifies and resolves potentially contentious issues early in the project.

The resource agency signatories to this agreement are:

U.S. Army Corps of Engineers (COE)
U.S. Environmental Protection Agency (EPA)
National Oceanic and Atmospheric Administration, NOAA Fisheries (previously National Marine Fisheries Service [NMFS])
Alaska Department of Fish and Game (ADF&G)
Alaska Department of Natural Resources (DNR)
Alaska Department of Environmental Conservation (DEC)
Alaska Division of Governmental Coordination

The U.S. Fish and Wildlife Service (USF&WS) participated in the concurrence process, but was not a signatory to the concurrence agreement.

Concurrences. The merged process resulted in agency concurrence on the project's purpose and need statement (in February 2000) and on which of the initial project options would be analyzed in the DEIS as reasonable alternatives (in February 2001 and, by addendum, in June 2002). A third planned concurrence review—of the DOT&PF and FHWA preferred alternative—was not conducted because the agreement expired in June 2002.

Additional informal and ongoing consultation with the agencies has occurred on items relating to essential fish habitat and other information necessary for the preparation of the Draft EIS.

7.5 Draft EIS Review Process

7.5.1 Review Process

The Gravina Access Project Draft Environmental Impact Statement was released August 6, 2003. Distribution to agencies and other primary stakeholders in Ketchikan, Juneau, and Anchorage began that day. The DEIS was available to the public for viewing on the project web site, at the Ketchikan Gateway Borough Planning Office, at the Ketchikan Library, at the project office in Ketchikan during scheduled and advertised times each week through October 2 (detailed below), and at DOT&PF offices in Juneau. Compact disk versions of the document were available for free, and the entire document with appendices could be purchased for the fee to help offset printing costs.

Public open house meetings and a formal hearing were held in September 2003, as further detailed below. As stated in the notice of availability of the DEIS, all comments on the DEIS were due October 6, 2003. A summary of substantive comments submitted in writing and as testimony at the hearing appears, along with the DOT&PF and FHWA

responses, in Section 7.5.2, below. The actual written comments and hearing transcript appear in Appendix R.

The advertising and notices for the DEIS release and comment process were as follows.

- **Notice of Availability, Notice of Public Hearing, and Request for Comments published by FHWA and U.S. Coast Guard in the *Federal Register* in Washington, D.C. and on the Internet August 15, 2003.**
- **Notice of Availability published as a paid display in the *Ketchikan Daily News* August 14, 15, and 16, 2003 (the ad was inadvertently not published by the *Ketchikan Daily News* on August 6, as originally intended).**
- **Notice of Availability published as a paid display ad in *The Island News*, Thorne Bay, Alaska (Prince of Wales Island, distributed in southern Southeast Alaska).**
- **Notice of Public Open House and Hearing Sessions published as a paid display ad in the *Ketchikan Daily News* August 16, 2003 (separate from the Notice of Availability, above).**
- **Notice of Availability published by U.S. EPA in the *Federal* Register in Washington, D.C. and on the Internet August 22, 2003.**
- **Notices of open hours at the project office in Ketchikan, for the public to learn more about the project and the DEIS, published as display ads in the *Ketchikan Daily News* 8/16 and 8/19; 8/23 and 8/26; 8/30 and 9/3; 9/6 and 9/9; and 9/20 and 9/23.**
- **Notice of Public Hearing published as a display ad September 13, 17, and 18, 2003 in the *Ketchikan Daily News*, advertising the public open house and hearing sessions.**
- **Notice of Availability and Notice of Public Open House and Hearing Sessions information was sent to the following for free public service notices or announcements:**
    - **Sitnews—Stories in the News, Ketchikan on-line weekly news (www.sitnews.us).**
    - **Weekly Images, a print and on-line (www.ktnmirrorimages.com) news and advertising forum distributed in Ketchikan, Metlakatla, and Prince of Wales.**
    - **KRBD public radio, Ketchikan.**

Between publication of the DEIS and the public hearing, the project team held open office hours intended to allow the public to review the DEIS, ask questions, view a scale model of the alternatives, and make comments. These hours were advertised as noted above twice each week for five weeks preceding the hearing and one week following the hearing. The public hours typically were 5-8 hours per day for three consecutive days each week (Tuesday-Thursday).

Community-wide public open house sessions, for the purpose of examining maps, data, and the DEIS itself and for asking questions of project staff, were held in conjunction with the public hearing:

- **September 16, 2003, 3 pm – 8 pm**
- **September 17, 2003, 5 pm – 7 pm (with displays remaining throughout the hearing)**
- **September 18, 2003, 5 pm – 7 pm (with displays remaining throughout the hearing)**

The public hearing itself ran for two sessions:

- **September 17, 2003, 7 pm to approximately 10 pm**
- **September 18, 2003, 7 pm to approximately 10 pm**

FHWA, U.S. Coast Guard, and DOT&PF representatives were at the head table during the hearings. A total of 24 people testified during the two sessions. Multiple local, state, and federal agencies submitted written comments. Thirty members of the general public or organizations submitted written comments.

The project team cataloged all substantive comments and responded to them, as shown in the comment and response summary table in Section 7.5.2. Where appropriate, and as indicated in the summary table, the responses are reflected in the text of this Final EIS.

As part of responding to comments, project team members contacted the following agencies:

- **Army Corps of Engineers (a Cooperating Agency), to clarify COE's comments regarding the 404(b)(1) evaluation in Appendix L and related EIS text, to discuss permit requirements for marine disposal of dredged material under the Marine Resources Protection, Research, and Sanctuaries Act (MRPSA) and Section 10/404. DOT&PF and FHWA met with COE February 18 and 24, 2004, May 17, 2004, and held a teleconference on July 15, 2004, regarding these issues to ensure the document met COE's needs as a cooperating agency.**
- **U.S. Coast Guard (a Cooperating Agency), to address issues specific to the Coast Guard facilities in Ketchikan and how alternatives F1 and F3 would affect existing and future uses of the Coast Guard base. The project team met with the U.S. Coast Guard to discuss these issues November 14, 2003. DOT&PF sent a letter February 13, 2004 committing to mitigate impacts to USCG facilities (see Appendix R).**
- **EPA, regarding EPA's request for an extension on the comment deadline (granted), and to discuss permit requirements for marine disposal of dredged material under the MRPSA.**
- **NOAA Fisheries, regarding marine mammals, threatened and endangered species, and incidental harassment permit requirements. The project team met with a NOAA Fisheries representative January 15, 2004, delivered a stand-alone biological assessment, and sent a follow-up letter dated January 26, 2004 requesting concurrence with a finding that the project would not likely have an adverse effect on threatened and endangered species.**
- **NOAA Fisheries, substantial informal consultation regarding essential fish habitat, conservation measures, and timing windows for in-water work. Timing windows were clarified during a teleconference January 13, 2004.**
- **Alaska Office of History and Archeology, regarding further clarification of the SHPO's findings. FWHA sent a letter to the SHPO on February 3, 2004 seeking concurrence with FHWA's finding of "no historic properties affected" and requesting SHPO concurrence. The SHPO responded March 4 and April 16, 2004, concurring that no historic properties would be affected by the DOT&PF and FHWA Preferred Alternative, provided that the project footprint was surveyed on**

foot by an archeologist once the final alignment was surveyed and staked, and that shovel tests were conducted where warranted.

- **ADF&G, regarding ADF&G's offer to provide further data on subsistence practices related to the project vicinity. Further data was incorporated into the EIS (see Section 4.26.2.2).**

In addition to the efforts of the project team, the press provided information that served to inform the public. The *Ketchikan Daily* News ran six articles between August 5, 2003 and September 18, 2003 specific to the project. KRBD public radio in Ketchikan also conducted a live interview with the project team September 16, 2003, in advance of the hearing.

Section 7.5.2 includes a table of specific comments and project team responses. Comments from agencies and the public covered similar broad issues to those raised in the extended scoping period (see Section 7.2). In some cases, agencies requested greater detail pertaining to issues raised in the DEIS. Among the primary issues requiring response were the following:

- **Provide further detail and maps regarding areas of potential secondary impact on Gravina and Pennock Islands, including roads, building development areas, and timber harvest areas.**
- **Provide more information about subsistence uses of Gravina Island and impacts to subsistence.**
- **Assess the impact of the possible alignment shifts to Alternatives F1 and F3 to reduce impacts to navigation.**
- **Further address the impacts on marine mammals and threatened and endangered species.**
- **Further address the impacts on essential fish habitat/fish species in the areas where Tongass Narrows in-water work is proposed.**
- **Specifically address land uses protected by Section 4(f) law—publicly owned public parks, recreation areas, historic and archaeological sites, and wildlife or waterfowl refuges.**
- **Ensure that there is sufficient information to complete a Section 404 permit decision and meet COE's NEPA requirements, especially pertaining to dredging and ocean disposal of dredged material.**
- **Further address anadromous fish streams and maintenance of fish passage.**

Appendix R provides copies of the individual comments made, and the public hearing transcript.

7.5.2 DEIS Comments and Responses

Table 7-2 presents agency and public comments and FHWA's response to each issue. These are cross-referenced to the preceding chapters of this EIS. Agency and public comment letters and the public hearing transcript appear in Appendix R. The substantive comments from each letter were numbered on each of the letters and paraphrased for inclusion in this table. The numbers noted in the margins of letters in Appendix R correspond to the issue numbers below. The responses are a brief explanation of how the issue has been addressed in this Final EIS.

TABLE 7-2
DEIS COMMENTS AND RESPONSES

GRAVINA ACCESS PROJECT DEIS COMMENT	RESPONSE/FEIS REVISION
FEDERAL AGENCIES	
Environmental Protection Agency Dated October 23, 2003	
1. DOT&PF and FHWA should carefully consider the merits of Alternative G4 (or some variation) in light of the high project costs and tenuous nature of funding to construct Alternative F1, and the ability to meet the purpose and need for the project with significantly lower impacts.	DOT&PF and FHWA have carefully considered the merits of all alternatives.
2. The DEIS seems to emphasize the convenience of a bridge (relative to a ferry) rather than the improvements to access that all of the alternatives (including ferries) offer.	The EIS presents all alternatives and impacts fairly and comprehensively. One element of the project's Purpose and Need statement is the need for improved convenience of access, which is, in part, a function of the availability of 24-hour per day, unrestricted access. While ferry alternatives help to improve convenience of access by offering additional access points and/or improved travel time, they do not provide 24-hour per day access and travel is subject to scheduled ferry service.
3. The beneficial impacts of creating a "hard link," as with Alternative F1, should be clearly identified in the EIS and contrasted with the lower impact and cost benefits of Alternative G4.	The EIS presents all alternatives and impacts fairly and comprehensively.
4. The EIS suggests that selection of a ferry alternative would result in unsafe conditions after normal ferry operating hours. The EIS should identify and evaluate options for dealing with emergency situations when ferries would not be running to complete the assessment of the ferry alternatives.	The existing conditions of Fire Protection and Emergency Response are discussed in Section 3.3.3.4. Section 4.3.3.3 indicates that Alternatives G2, G3, and G4 would result in no change during the hours the ferry is not in operation. Alternatives G2, G3, and G4 would all have a similar response system as the existing condition, although Alternatives G2 and G3 offer different access locations which would improve emergency response time for areas close to these alternatives. Text has been added to Sections 4.3.3.1 and 4.3.3.3 to reflect this.
5. Section 4.26.2.4 concludes that Alternatives G2, G3, and G4 would "have adverse impacts on recreation in the project area." This is not supported by information presented in the EIS.	The text in Section 4.26.2.4 has been revised to show that the ferry alternatives are not as beneficial as the bridge alternatives, but are better than the No Action Alternative.
6. It may be beneficial to consider a phased approach to accessing Gravina Island that would first include construction of some roads on the island that would be served by improved ferry service. Should sufficient demand for greater access and development result, bridge access could be reconsidered at a later date.	The difficulty with such an approach is that none of the build alternatives have inconsequential cost. To build a ferry alternative as the first phase of improving access would seriously limit the ability to construct another access option in the future. We have added a discussion of the phased approach concept in Section 2.3.4.
7. The EIS should be augmented with maps that depict information from relevant planning efforts related to development activities on Gravina Island and reflect island-wide information and assessments (e.g., maps contained in the Gravina Island Plan). These should be referred to in the further development of indirect and cumulative effects.	Maps from the Borough's *Gravina Island Plan* (final public review draft, December 2003) have been incorporated into the discussion of secondary impacts (Section 4.26). The *Gravina Island Plan Citizen's Guide to Public and Private Decision-making* and the final public review drafts of the Gravina Island area plans for Clam Cove and Blank Inlet, Central Gravina and Airport Reserve, and North Gravina (i.e., the only Gravina Island Plans available at this time) are appended to the EIS

GRAVINA ACCESS PROJECT DEIS COMMENT	RESPONSE/FEIS REVISION
	(Appendix S).
8. More specific information is needed to clearly inform the public and the decision maker on the impacts from future development on Gravina Island, as presented in Table 4-16.	Section 4.26 (Secondary Impacts) draws its impact analysis from the amount of development likely to occur on Gravina Island and Pennock Island as a result of each alternative (determined in the *Gravina Access Project Traffic Projections Technical Memorandum*) and the locations of future development identified by the Borough in the Gravina Island Plan (Appendix S). The impacts of future development are described in Section 4.26 at a level of detail commensurate with the planning work that has been done for Gravina Island.
9. Provide maps showing the distribution of development on an island-wide basis along with attendant infrastructure, such as roads. Show the proximity of the development to important natural resources, such as important terrestrial and aquatic habitat, EFH, and wetlands. This type of information should then be utilized to quantify some of the expected effects.	Maps from the Borough's *Gravina Island Plan* have been incorporated into the discussion of secondary impacts (Section 4.26). The locations of future development as depicted by the Borough in the Gravina Island Plan relative to "important natural resources" can be reviewed in the area plans, which have been appended to the EIS (Appendix S).
10. The EIS should include maps of the following: - potential road network on Gravina Island - location and access to timber and potential commercial timber harvesting - location and access to minerals and potential mining activities - location of recreational destinations - subsistence areas - development in the Airport Reserve	Maps showing the requested information are provided in the *Gravina Island Plan Citizen's Guide to Public and Private Decision-making* and the plans for the North Gravina, Central Gravina and Airport Reserve, and Clam Cove and Blank Inlet areas (final public review drafts), which have been appended to the EIS (Appendix S).
11. The EIS should discuss whether water-based facilities would be developed to support planned growth and where future facilities supporting water-based transport (such as barge traffic) would likely be constructed. Effects from such facilities on marine and land-based resources and marine traffic should be assessed and included in the EIS.	The Borough has identified potential locations for water-based facilities in its Gravina Island area plans for the North Gravina, Central Gravina and Airport Reserve, and Clam Cove and Blank Inlet areas (final public review drafts), which have been appended to the EIS (Appendix S). Key components of these plans are illustrated in Figure 4.2. Section 4.26 has been revised to address water-based facilities on Gravina Island that could be developed under each of the development scenarios, as they correspond to the alternatives, and the associated impacts.
12. The EIS should include a map showing future development, roads, and other infrastructure expected on Pennock Island and an evaluation of these environmental effects of such development.	There is currently no land use plan for Pennock Island and, thus, it is not possible to depict reasonably foreseeable development on Pennock Island. Section 4.26 evaluates the potential environmental effects of future development based solely on the amount and type of future development projected in the *Gravina Access Project Traffic Projections Technical Memorandum.*
13. The EIS should be revised to clearly indicate how the Spine Road would provide access to Borough lands, a primary element of the purpose and need statement, and why it is the only option being considered.	In order to meet the purpose and need, the DOT&PF, in consultation with FHWA, determined that all build alternatives should provide access to the developable land north of the Airport Reserve zone, consistent with the road planned by the Borough. The rationale for the spine road terminus at the boundary of the Airport Reserve and Airport Development lands is explained in Section 2.4.4. The boundary between these lands is shown in Figure 3.2. A reference to this figure has been added to Section 2.4.4 to clarify the location.

GRAVINA ACCESS PROJECT DEIS COMMENT	RESPONSE/FEIS REVISION
14. The EIS should explain why the Spine Road ends where currently proposed and how this meets FHWA requirements for logical termini.	Section 2.4.4 includes an explanation of the spine road and its terminus. FHWA determined this to be a logical terminus because it connects with the planned Borough road and Airport Development lands.
15. The EIS should identify where growth on Revillagigedo Island would occur in the absence of improved access (i.e., under No Action), and characterize the direct and indirect effects of that growth.	The DOT&PF consulted with the Borough Planning Department to identify growth areas under the No Action Alternative. These areas and potential impacts are described in Section 4.26
16. The EIS should include an evaluation of alternatives that complies with the requirements of 404(b)(1) guidelines and demonstrates that the preferred alternative represents the least damaging practicable alternative.	The EIS contains a draft 404(b)(1) evaluation in Appendix L that was developed in consultation with the U.S. Army Corps of Engineers (COE) and complies with Section 404(b)(1) guidelines
17. The EIS should identify the specific streams and creeks that are expected to be impacted by storm water runoff and actions that would be taken to minimize such discharges.	A discussion of specific creeks and streams that could potentially be impacted by project alternatives has been added to Section 4.12 (Water Quality Impacts). These streams are depicted in Figure 3.15. Many of the creeks on Gravina Island are not named and are simply referred to as "unnamed smaller creeks." Final roadway and bridge design would include a storm water treatment system to minimize the effects of runoff. Alaska Department of Environmental Conservation (ADEC) would approve the storm water treatment system under their plan review for a non-domestic wastewater treatment system for issuance of a non-domestic wastewater disposal permit. Minimization of the impacts from storm water runoff will be addressed in these approvals. In addition, the project design would maintain natural stream flow conditions when possible, and culverts would be appropriately sized and placed to accommodate storm water flow. A complete list of Best Management Practices and mitigation measures that would be employed to minimize impacts to water quality is provided in Section 4.12.
18. The EIS should provide information indicating where construction activities would take place, their proximity to surface waters (particularly those of high value), the duration of these activities or the degree of degradation of water quality that would result in these water bodies. The EIS should also identify specific actions that would be taken to avoid or minimize these effects.	A discussion on the approximate duration of construction activities for specific water body modification activities was added to Section 4.25.12. Specific construction timeframes for blasting, drilling, and dredging activities for Alternatives F3, G2, G3, and G4 can be found in the EFH Assessment (Appendix O). Refer to Section 4.25.10 for a discussion of water quality impacts due to construction activities, and mitigation measures (including BMPs) that will be implemented to reduce or avoid impacts to water quality. The construction contractor would be responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act (i.e., Section 401 certification and NPDES permits). Figures 2.6 through 2.19 show locations of piers, ferry terminals, dredging, and roads.
19. The specific BMPs to be employed to avoid or minimize specific effects on water quality and marine habitat should be identified in the EIS. An erosion and sediment control plan and spill prevention plan should be developed and included in the EIS.	Descriptions of specific BMPs that could be used during project development have been added to Sections 4.12 and 4.25.10. The erosion and sediment control plan and spill prevention plan would be tailored specifically to the selected alternative and incorporated into the permit process (which will be reviewed by COE and EPA). Specific erosion and sediment control and spill

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	prevention plans are not part of the scope of the EIS, nor are they appropriate to include in an EIS.
20. The EIS should specifically identify terrestrial and aquatic subsistence resources that would be directly impacted by the project alternatives, explain the nature and extent of those impacts, and the significance.	The EIS has been updated to include a discussion of federal and state subsistence regulations (see Section 3.3.7) and the subsistence resources that could be impacted by the build alternatives (see Section 4.3.7). The document has been developed consistent with FHWA policy and guidance concerning impacts on subsistence users and resources.
21. The EIS should be revised to present predicted results and conclusions along with a characterization of their significance.	The document has been developed consistent with FHWA regulations for implementing NEPA (see 23 CFR 771) and associated policy and guidance. Impacts are quantified whenever possible, described qualitatively where quantification wasn't appropriate, and presented in a comparative format to help decision-makers and the public understand relative severity of impacts.
22. The draft EIS presents no evidence of consultation with Tribes, consistent with EO 13175. Further development of the EIS and project should be conducted in consultation and coordination with governments of potentially affected tribes and the results of these consultations be documented and reported in the EIS.	The project has been conducted in compliance with Executive Order 13175. Section 7.1.4.1 indicates Native organizations were invited to initial scoping meetings and Section 7.1.4.2 indicates, under "Meetings with Government Agencies," that Native groups and governments were consulted. Table 7-1 identifies scoping activities related to tribal organizations on 2/1/00, 2/7/00, 4/13/00, 4/25/00, 2/8/02 (x2), and 7/12/02. Section 3.21indicates tribal consultation pertaining to historical and archeological resources. Secondary subsistence impacts are addressed in Section 4.26.2. Indication of tribal responses has been better documented in Sections 7.1.4.2, 7.2.1, and 7.2.1.4.
23. The EIS should be revised to more accurately reflect the funding authorized and available for current evaluation activities and, if known, for implementation of the identified access solution.	The EIS describes the available funding in the Summary, and in Sections 1.2 and 2.1. The language refers directly to the language in TEA-21 authorizing the project. The EIS also states in the Summary that "additional funding would be necessary to construct any of the build alternatives." Additional funding sources have not been identified.
24. Section 4.7.2.4 should include a description of the magnitude and significance of the reported increased risk of allisions and groundings for cruise ships.	This information is available in the EIS Appendices H and J, and has been summarized in Sections 4.7.2.2, 4.7.2.4, and 4.7.2.5.
25. The EIS (Section 4.7.2.4) identifies additional evaluation related to realigning the bridges and evaluating the environmental effects as mitigation for increased risks to cruise ships. Such evaluation is not mitigation and should be included as analyses for the EIS because they have direct implications on the decision to be rendered.	The design modification to Alternative F1 to minimize its impacts on marine navigation has been added to the description of this alternative in the Summary and Section 2.1.2.5. For those resources where the design modification of Alternative F1 materially changes the results of the impact analysis, a revised analysis has been provided in Chapter 4.
26. Section 4.7.3.7 indicates that additional analyses of bridge design for wind effects would need to be conducted. The costs presented in the EIS should reflect these analyses and potential design changes.	The costs considered in the EIS account for any additional analyses or design changes that would be required for wind effects.
27. The EIS should include information related to weather conditions that would restrict operations of the ferry alternatives.	Descriptions of weather impacts on ferry operations have been added to Section 4.3.5 Accessibility.
U. S. Coast Guard Dated October 3, 2003	
1. The DEIS does not adequately address adverse	The potential impacts to the USCG station and possible

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impacts to the Integrated Support Command (ISC) in Ketchikan.	mitigation measures were discussed in meetings between the USCG and DOT&PF. The impacts of the project and mitigation commitments of DOT&PF are described in Sections 4.1.1.6, 4.3.8.1, and 4.25.1.3.
2. Alternative F1 would provide ready access to a considerable portion of the eastern perimeter of the ISC. The ISC would have to install and maintain a new fence line and lighting, increase personnel for security patrols, and enhance its security camera system along this perimeter as a result of Alternative F1.	DOT&PF commits to providing fencing along the roadway embankment adjacent to the USCG property or to continue the USCG fence around the developed area of the property. This and other mitigation measures were discussed in meetings between the USCG and DOT&PF, and are described in Section 4.1.1.6.
3. The proposed alignment of the new bridge access road, which is not completely clear due to the possible inaccuracy of current information and drawings, may impede the USCG's ability to move this magazine to a safe location.	Alternative F1 would not affect the USCG's existing planned location for the magazine. During a coordination meeting USCG staff and DOT&PF, it was determined that the Alternative F1 roadway would meet the separation requirements for the location of such a facility. If Alternative F1 is selected, DOT&PF will coordinate with the USCG during the final design phase to ensure that actual locations of these facilities are compatible. The proposed mitigation measures for impacts to USCG facilities are discussed in Section 4.1.1.6.
4. The location of Alternative F1 would preclude use of the existing firing range because the new roadway would be within the limits of the Surface Danger Zone (SDZ) of the range – this would adversely affect all firing range users (USCG, as well as federal, state, and local law enforcement and public safety agencies).	The DOT&PF recognizes that Alternative F1 would limit current use of the firing rage because the road would be downrange of the existing facility. The DOT&PF is committed to mitigating the downrange hazard by enclosing the existing range to comply with SDZ regulations. The proposed mitigation measures for impacts to USCG facilities are discussed in Section 4.1.1.6.
5. Alternative F1 should provide access to the ISC from the eastern perimeter.	The scope of the Gravina Access Project does not include providing additional access to the USCG Station. The USCG may wish to pursue alternate access to the Station if Alternative F1 were selected.
6. USCG has concerns about storm water drainage and runoff from the new road onto the ISC property with Alternative F1.	DOT&PF will address storm water runoff and treatment during the design phase. A discussion of storm water treatment in roadway design has been added to Sections 4.12 and 4.15. Project construction will require an NPDES permit and Section 401 certification, as described in Section 4.13.
7. USCG has concerns about impacts of construction and traffic noise on residents in the barracks and housing on the upper portion of the base with Alternative F1.	As stated in Section 4.25.9.1, the project will be in compliance with local ordinances for timing of construction activities to minimize noise impacts to residential areas. Section 4.26.7.3 provides noise model results for Alternative F1, which show no impact from traffic noise at a distance greater than 46 feet from centerline of the new alignment. The closest USCG residential facility is greater than 750 feet from the centerline of Alternative F1.
8. Utilities may be affected by possible relocation of water line paralleling South Tongass Avenue with Alternative F1 or F3.	Section 4.25.20 has been revised to address possible interruptions in utility service during construction.
9. Acquisition of right-of-way from ISC for Alternative F1 would require coordination and approval from Bureau of Land Management.	All property acquisition will be done in accordance with all required regulations.
10. Alternative F3 would have less impact on ISC than Alternative F1, but would result in increased traffic on	Alternative F3 would result in movement of approximately an additional 330 vehicles past ISC during

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South Tongass Avenue, which would affect access to upper and lower portions of the ISC.	the peak hour (i.e., less than six additional cars per minute) in 2025, as compared with No Action. With installation of a traffic signal at the Alternative F3/Tongass Avenue intersection, when traffic levels warrant, as described in Section 4.26.4.3, traffic delays and congestion associated with Alternative F3 traffic would be reduced.
11. Additions (four) to the distribution list.	These contacts have been added to the EIS distribution list (see Chapter 6).
National Oceanic and Atmospheric Administration – Office of Program Planning & Integration Dated October 3, 2003	
1. The Essential Fish Habitat (EFH) Assessment (Appendix O) acknowledges that the culvert proposed for crossing the anadromous stream southeast of Government Creek would result in a direct loss of EFH, but does not explain why a culvert is being proposed instead of a bridge.	A field evaluation of all stream crossings in the project area was conducted and it was determined at the time of that field evaluation that this unnamed stream southeast of Government Creek was small and that fish passage could be maintained through the use of a Tier 1 Crossing. The discussion in the EFH Assessment (Appendix O, Section 4) and the EIS (Section 4.15.4.4) has been revised to state that, in accordance with the memorandum of agreement between DOT&PF and ADF&G, the culvert crossing would be designed to a Tier 1 stream simulation design level and would maintain natural stream conditions such as flow, substrate, and existing fish passage efficiency. There would be no permanent loss of EFH resulting from the culvert crossing. Figure 8 in the EFH Assessment shows a conceptual drawing of the culvert structure.
2. The DEIS provides the amount of eelgrass and kelp that will be impacted only for the channel modification activities in Alternative F3.	Acreages of impacts to kelps and eelgrass for all alternatives have been specified and added to Sections, 4.15.3 and 4.15.4 of the EIS, and to the EFH Assessment (Appendix O, Section 1, Table 1-1).
3. Table 1-1 (Appendix O) should specify acreage of impacts by habitat type of eelgrass, kelp, and wetlands. The table shows a wetlands category, but only a general "marine" category for all other EFH.	Table 1-1 of the EFH Assessment (Appendix O) has been revised to more fully characterize laminarian kelp and eelgrass impacts for each alternative.
4. The DEIS lacks site-specific information on the type and extent of EFH in the project area and the potential impacts of each of the alternatives on EFH.	The type and extent of EFH in the project area are discussed in Section 3.15.4.4 of the EIS and impacts to EFH are discussed in Section 4.15.4.4. Appendix O provides more detailed descriptions of impacts to EFH.
5. The DEIS does not link site-specific analyses of environmental conditions and the type and extent of fish habitat at the proposed location of each alternative to the magnitude and extent of actions associated with each alternative (pile driving, dredging, etc.).	Sections 4.15.4.4 and 4.25.12.2 have been revised to provide more detailed discussions of EFH impacts from each alternative. Also see Appendix O.
6. The DEIS does not identify the amount of dredging that may be required, the number of pilings that would need to be placed, or the amount of in-water blasting that might be required under each of the alternatives.	Some of the information requested has not been determined for the alternatives. At this stage of project development, the DOT&PF and FHWA preferred alternative does not require in-water blasting. If blasting is determined to be necessary, then the issue will be revisited. Blasting would be conducted consistent with the state blasting standard. If blasting is required, blasting will be performed such that ground vibration (particle velocity) does not exceed 2.0 inches per second and peak water overpressure (instantaneous pressure change) does not exceed 2.7 pounds per square inch. The project will employ monitoring devices to ensure

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	adherence to these standards, unless the need for blasting is small and NOAA Fisheries agrees monitoring is not necessary (Appendix O Chapter 5.0 and EIS Section 4.25.12.3). The amounts of dredging required for Alternatives G2, G3, and G4 and potentially required for Alternative F3 are included in EIS Section 4.15.4.4 and EFH Assessment (Appendix O), Section 4. Section 4.0 of the EFH Assessment discusses proposed in-water work requirements including blasting, dredging, drilling, and pile driving. Refer to NOAA Fisheries comment 26 for in-water blasting response.
7. The proposed locations of pile driving, dredging, and blasting are not identified and no discussion of EFH within the impacted areas is provided.	Proposed locations for piers (and associated drilling), dredging, and blasting are approximated for all alternatives. Preliminary bridge and pier foundation locations are shown in Figures 2.6 – 2.11 and 2.17 – 2.19. Refer to the EFH Assessment (Appendix O) for potential dredging and blasting locations for Alternative F3. A more detailed discussion of EFH in the proposed areas of dredging, blasting, and drilling for pilings is located in Section 4 of the EFH Assessment. .
8. Without more specific information on the particle size of the substrate being dredged and the currents in the project area, the conclusion that the impact of dredging on biota will be minimal appears to be largely conjecture.	Discussion of substrate to be dredged and temporary impacts to the currents in the project area are included in Section 4.0 of the EFH Assessment (Appendix O).
9. The DEIS needs to identify the scope and extent of potential impact to EFH from pile driving, dredging, blasting, and other activities; the probable locations of these activities; the environmental conditions (currents, substrates, etc.) in the vicinity of these activities, and the EFH that could be affected.	Sections 4.15.4.4 and 4.25.12.3 have been revised to include more discussion of potential impacts on EFH to reflect additional details as requested in NOAA Fisheries comments 4 – 8.
10. Conclusions regarding construction and operational impacts on EFH should be provided for each alternative.	Construction and operational impacts are discussed in Chapter 4 of the EIS and in the EFH Assessment (Appendix O, Section 4.0, 18). In accordance with a November 3, 1999, DOT&PF and NMFS agreement on EFH consultations (EFH Assessment Attachment A) for projects involving an EIS, DOT&PF, on behalf of the FHWA, has determined that this project may cause permanent and temporary adverse effects to EFH (Appendix O).
11. The revised EIS should include detailed information on the activities that may affect marine mammals and should differentiate the magnitude of the effects among alternatives.	Sections 4.15.4.1, 4.25.12, and 4.25.15 have been revised to reflect that the potential for impact is greatest during construction. Also refer to Marine Environment Impact Assessment Technical Memorandum (Appendix N) for a discussion of impacts to marine wildlife. Mitigation measures detailed in Section 4.25.12 include provisions for monitoring marine mammal activity and construction work windows to avoid construction activity when these animals are present.
12. The EIS should state how construction impacts or other associated project activities that may result in harassment of marine mammals (as defined at 50 CFR 216.3) would be mitigated.	A discussion of construction impacts on marine mammals and mitigation measures is included in Sections 4.25.12.3 and 4.25.15. These sections recognize there could be harassment of marine mammals (as defined at 50 CFR 216.3) if certain activities took place while mammals were present, but that measures to avoid harassment of marine mammals would be implemented. It is also noted in the text that an Incidental Harassment Authorization (IHA) could be

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	required if impacts could not be avoided. The measures to avoid harassment of marine mammals are described in Section 4.25.12.3.
13. If disruption of marine mammal behavior (such as feeding or migration) cannot be avoided, Section 101(a)5 of the Marine Mammal Protection Act contains provisions for obtaining a permit authorizing harassment of marine mammals incidental to specific activities.	The project team discussed permit authorization with Ken Hollingshead of NMFS. Section 4.25.15 contains language that recognizes that there could be harassment of marine mammals (as defined at 50 CFR 216.3) if certain activities occurred while mammals were present and that an Incidental Harassment Authorization could be required if impacts could not be avoided.
14. More detailed information on the length of the construction period for each alternative is necessary before the impacts to marine mammals can be adequately assessed.	A discussion on the approximate duration of construction activities for specific water body modification activities was added to Sections 4.25.12.3 and 4.25.15. In addition, specific construction timeframes for blasting, drilling, and potential dredging activities for Alternative F3 can be found in the EFH Assessment (Appendix O). Refer to Appendix N for additional information on impacts to marine mammals.
15. The DEIS should be revised to contain more in-depth information on the population status and trends of marine mammals that occur in the project area.	Discussion of the status and trends of marine mammals that occur within the project area are addressed in Section 3.15.4.1. For status and trends of threatened and endangered species, see Section 3.20. Information for status and trends was obtained, in part, from the NOAA Fisheries' Stock Assessment Reports.
16. FHWA should request consultation with NMFS under Section 7 of the ESA.	Formal consultation is not required. Since publication of the DEIS, as continued informal consultation, DOT&PF sent to Brandee Gerke at NOAA Fisheries a biological assessment that includes status and trend information for listed species in the project area, as well as a finding that the project would not likely have an adverse effect on threatened and endangered species,. FHWA sent a letter January 26, 2004 requesting concurrence that the project is not likely to result in an adverse effect on T&E species, and NOAA Fisheries concurred on February 17.
17. If adverse effects to listed species are identified, NMFS and FHWA may try to eliminate those effects by revising the proposed action.	This comment is noted, and no action is required at this time.
18. Adverse effects on listed species may be avoided by the use of seasonal work windows and observers to monitor the presence of listed species and suspended action until the animals have cleared the area.	See response to NOAA Fisheries comment 11, above.
19. The DEIS needs to be revised to include information on the approximate number of Steller sea lions in order to adequately assess the impacts of the proposed action on this species and to facilitate the consultation process.	Refer to Sections 3.15.4.1 and 3.20.2 for a discussion of Steller Sea Lion population status in the project area.
20. The DEIS should be revised to include the following humpback whale information: - the International Whaling Commission (IWC) first protected the species from commercial whaling in 1965 - they were listed as endangered under the ESA in 1973 - commercial whaling of humpback whales in the North Pacific ceased in 1965 with protection from the IWC.	The EIS has been revised to include the additional humpback whale information (Section 3.20.1).

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21. The DEIS should provide additional discussion of the need for proposed fill in Government Creek (i.e., why is it only required for Alternatives G2, G3, and G4 if all alternatives have the same roadway crossing of Government Creek?).	The statement that all alternatives would cross Government Creek and require fill in Government Creek is not accurate. Alternatives C3(a), C3(b), C4, D1, G2, and G4 would not cross Government Creek. Alternatives F1, F3, and G3, approaching the airport from the south, would cross Government Creek using a clear span bridge to avoid fill and EFH impact. The EIS has been revised to clarify these impacts. See Sections 4.15.1.2; 4.15.1.3, 4.15.1.4, 4.15.4.2, and 4.15.4.3.
22. The DEIS does not indicate the type of pile driving equipment that is proposed for use, number of piles to be driven under the various alternatives, the depth to which the piles will be driven, the amount of time needed to drive the piles, or the nature of the substrate into which the piles will be driven. No mitigation is proposed for adverse impacts to EFH from pile driving.	All alternatives may require limited pile driving to penetrate any existing sediment in the area and enable the pile to bear on or within rock. In these locations, a vibratory hammer would be used to advance the steel pile through the existing sediment until it reached bedrock, and then reverse rotary drilling would be employed to penetrate the rock and/or install the piling or rock anchors in the rock formation (see Section 4.15.4.4). Table 4-1 of the EFH Assessment and Section 4.15.4.2 of the EIS identify the number of bridge piers required for each alternative. Refer to the EFH Assessment (Appendix O, Section 4.0) for descriptions of the effects of pile driving and drilling piles on EFH. The following conservation recommendations will be followed with respect to pile driving: - A vibratory hammer would be used to drive steel piles instead of an impact hammer. - Piles should be driven during low tide when in intertidal and subtidal areas. - All pile driving activities would be conducted between November 1 and February 28.
23. Impacts to EFH from pile driving need to be evaluated based on - size and force of hammer strike - distance of fish from pile - depth of water around the pile - bottom substrate composition and texture - size and species of fish in the project area	The DEIS discussed use of an impact hammer for pile driving. This will not be necessary. A vibratory hammer will be used, if needed, to advance piles through soft sediments to rock. A reverse rotary drill will be used to drill shafts for piles into rock. Therefore the EIS does not discuss the size and force of hammer strike. The exact locations, depth of water, and precise bottom surface at piling locations will not be known until design. Fish habitat is assumed in for any in-water work, and all bridge alternatives involve piers both in shallow and deeper waters. The EIS in Section 4.15.4.4 and the EFH Assessment address the types of fish and habitats likely to be found in the vicinity of the various alternatives and the impacts of the alternatives.
24. Consider the provided list of EFH conservation measures for pile driving for all alternatives (five items listed).	The EIS now explains that any pile driving would make use of a vibratory hammer. The referenced conservation measures have been considered, and applicable recommendations have been added to the EFH Assessment (Appendix O, Section 5) and EIS. The conservation recommendations listed above under response to comment #23 will be followed with respect to pile driving. Based on consultation, because an impact hammer will not be used, a bubble curtain will not be necessary.
25. Consider the provided list of marine mammal conservation measures for pile driving for all alternatives (four items listed).	The EIS now explains that any pile driving would make use of a vibratory hammer, not an impact hammer, eliminating much of the concern for high sound pressure

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	impacts to mammals. Use of timing to avoid marine mammals' higher use periods is the primary mitigation commitment for marine pile driving. This is described in 4.25.15.
26. The DEIS does not contain any information on the amount of blasting that may be required for each alternative, duration of blasting, size of charge, detonation velocity of charge, etc.	At the current stage of design, only Alternative F3 is certain to require blasting, and then only if the channel widening modifications in West Channel were implemented. Dredging for Alternatives G2, G3, and G4 may require a small amount of blasting (refer to EFH Assessment, Appendix O). A discussion of blasting durations, charges, and impacts is contained in the EFH Assessment (Appendix O). If blasting were required, it would be performed such that ground vibration (particle velocity) would not exceed 2.0 inches per second and peak water overpressure (instantaneous pressure change) would not exceed 2.7 pounds per square inch.
27. The DEIS does not contain an evaluation of the specific EFH and fishery resources in the vicinity of the proposed blasting operations.	No site-specific surveys of fish likely to be present in the vicinity of dredging and blasting are available, nor were any conducted. A discussion of specific EFH resources that are likely to be present in the area of blasting has been added to the EFH Assessment (Appendix O) and the EIS, Section 4.15.4.4.
28. To adequately evaluate the potential impact of possible blasting activities on EFH and to design mitigation measures to reduce adverse impacts, site-specific data on the marine resources in the vicinity of potential blasting areas should be collected and included in the revised EFH assessment.	A discussion of marine resources that are likely to be present in the vicinity of blasting was added to the EFH Assessment (Appendix O) and the EIS, Section 4.15.4.4.
29. The type of dredging equipment to be used and the potential for entrainment of fish in the dredging equipment is not addressed.	Use of a clamshell dredge is the most likely method of dredging. A discussion of clamshell dredges and their potential for entrainment of fish is included in the EFH Assessment (Appendix O, Section 4).
30. The DEIS does not contain any conservation recommendations with respect to dredging, other than the use of BMPs when placing fill next to streams.	Additional conservation recommendations with respect to dredging have been incorporated into the EFH Assessment (Appendix O, Section 5) and EIS. Dredge timing windows would be incorporated into the dredging program to eliminate potential effects to sensitive life stages of fish and invertebrates. The dredged debris would be placed onto a barge where it would enter a settling basin and be disposed of according to normal dredge disposal regulations. Disposal of dredged and blasted material would follow the Environmental Protection Agency's (EPA) Guidelines for disposing of dredged and blasted material (40 CFR Parts 220-238) (Ocean Dumping) and would be consistent with the regulations of Clean Water Act (CWA) Section 404(b)(1) [disposal of dredged materials into waters of the U.S.] and the Marine Protection, Research, and Sanctuaries Act (MPRSA) Sections 102 and 103. All dredging activities would be conducted between November 1 and February 28 only, with the possible exception of mid-channel locations, based on further consultation with NOAA Fisheries. NOAA Fisheries may alter these timing window based on additional details developed during the design and permitting phase.
31. Site-specific information is needed on the environmental conditions, including the potential for any	The type and extent of fish habitat that occurs in the areas potentially affected by dredging that may be

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contaminated sediments, and the type and extent of fish habitat in the areas where dredging may occur.	required under Alternative F3 and the ferry alternatives is discussed in Sections 4.15.3.7, 4.15.3.8, and 4.15.3.9 of the EIS, and in the EFH Assessment (Appendix O, Section 4). The Alaska Department of Environmental Conservation list of contaminated sites does not show any contamination in this area of Tongass Narrows. No other sampling of substrate is known that would indicate potential for contaminated sediments in this area.
32. The revised EFH assessment should also identify the magnitude and extent of dredging associated with each alternative, the type of dredging equipment that will be used, and options for disposing of dredged material.	Currently, Alternatives G2, G3, and G4 will require dredging and Alternative F3 is likely to require dredging. The EFH Assessment (Appendix O, Section 4) discusses the magnitude and extent of dredging and the guidelines for disposing of dredged and blasted materials. A discussion of clamshell dredges and their impacts also are included in Chapter 4 of the EIS and in the EFH Assessment (Appendix O, Section 4).
33. The following conservation recommendations should be considered with respect to dredging for all alternatives: - dredge timing windows should be incorporated to eliminate potential effects to sensitive life cycle stages of fish and invertebrates - a dredge barge should be used to retain dredged material to minimize turbidity - presence of fish and invertebrates should be monitored during dredging; dredging should be curtailed if significant numbers of fish/invertebrates appear in spoils - if suction dredges are used, the draghead shall be operated with the intake at or below the surface of material to be dredged	These conservation recommendations have been incorporated into the EFH Assessment (Appendix O, Section 5), where applicable. Dredge timing windows and disposal operations are discussed in the EFH Assessment (Appendix O, Section 5) and EIS. See response to comment #30 above. Suction dredges could be used in areas where thick layers of loose sands and soft silts are found (i.e., near the ferry terminals), in which case the draghead intake would be operated below the surface of the material to be dredged.
U.S. Department of the Interior Dated October 6, 2003	
1. The FEIS should evaluate alternatives that potentially minimize harm to Section 4(f) resources: - include a chapter titled “Section 4(f) Evaluation” in the FEIS - include maps depicting Section 4(f) properties and resources - proximity of the project public recreational lands and numerous historic and archeological properties may affect Section 4(f) resources	None of the alternatives would affect Section 4(f) resources. New Sections 3.1.3 and 4.1.3 were added to address Section 4(f) properties. Because there is no Section 4(f) property used by an alternative or even close to an alternative, there is no need for a “Section 4(f) Evaluation” as a chapter of the EIS or as a separate document. A new figure, Fig. 4.1, shows 4(f) properties in relation to the alternatives. An explicit determination has been added to clarify the status of Section 4(f) lands: “FHWA has determined that no land would be taken from any park, recreation area, wildlife refuge, or historic site subject to Section 4(f) and that a Section 4(f) evaluation therefore is not necessary for the project.”
2. The USFWS recommends that the EIS include an analysis of important and productive habitat near Lewis Reef, which would be affected by Alternative G2.	Additional detailed discussions of the habitat near Lewis Reef have been included in the EIS in Sections 3.15.3.1, 3.15.7, and 4.15.3.7.
3. If a ferry is selected as the preferred alternative, DOI recommends Alternatives G3 and G4 be given preference over G2 to avoid impacts to Lewis Reef habitat.	This comment is noted.
U.S. Army Corps of Engineers, Alaska District – Regulatory Branch Dated October 6, 2003	
1. The proposed action requires Department of Army authorization under Section 10 of the Rivers and Harbors	The appropriate text has been added to the Summary and Sections 3.13 and 4.13.

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Act of 1899 and Section 404 of the Clean Water Act.	
2. There is insufficient project and alternative description to determine if a permit from the Department of Army is required under Section 103 of the Marine Protection, Research, and Sanctuaries Act.	Alternatives G2, G3, and G4 would require dredging and ocean disposal of dredged material and Alternative F3 could (as mitigation for navigation impacts in West Channel) require dredging and ocean disposal of dredged material. Since publication of the draft EIS, DOT&PF has consulted with EPA and COE and determined that such activities would be permitted under Section 103 of the Marine Protection, Research, and Sanctuaries Act and Section 404 of the Clean Water Act. Revisions have been made to Sections 3.13 and 4.13 to describe this requirement.
3. The DEIS does not accurately describe the COE jurisdiction and coordination requirements (pages 3-50 and 4-51). Section 3.14.1 should include the Clean Water Act, as amended.	Sections 3.13 and 4.13 have been revised to accurately describe COE jurisdiction and coordination requirements. Section 3.14.1 has been revised to include a reference to the Clean Water Act.
4. The DEIS lacks project design information necessary to establish environmental impacts and develop mitigation concepts (need more information on project locations, habitats affected, fill footprints, fill and dredging quantities, disposal sites, and temporary fills in waters of the U.S.). The FEIS should have sufficient information and evaluation to make a permit decision under Section 404.	The EIS identifies wetland types and areas potentially filled under each of the alternatives, primarily in Chapter 4 in separate sections on direct permanent impacts, direct construction impacts, secondary impacts, and cumulative impacts. Habitats affected and fill footprints are also presented in Appendix M. Appendix L provides a rewritten draft Section 404(b)(1) evaluation and draft Sections 404/10 permit. Information has been added to Appendix L and Section 4.25.11 regarding temporary impacts to wetlands, including temporary fill. Dredge and fill quantities have been calculated in conservative terms and added to Section 4.14. Characteristics of dredged materials, location of dredged material disposal, and impacts at disposal sites would be determined if an alternative requiring dredging were selected. The DOT&PF would seek COE authorization for the location and use of dredged material disposal sites in accordance with Section 404(b)(1) (disposal of dredged materials into waters of the U.S.) and Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA), as described in Sections 3.13 and 4.13. Conceptual compensatory mitigation has been added and is addressed in the Summary, 4.14 and 4.30.
5. Appendix L should be entitled “Draft 404(b)(1) Evaluation.” Appendix L does not comply with EPA regulations 40 CFR 230, “Guidelines for Specification of Disposal Sites for Dredged or Fill Material.”	Appendix L has been re-titled to properly identify the Draft 404(b)(1) evaluation. DOT&PF has prepared a completely reformatted and rewritten Draft 404(b)(1) evaluation in consultation with the COE.
6. The preliminary preferred alternative should be referred to as the “DOT&PF Preferred Alternative.”	The sections that describe the selection of the DOT&PF and FHWA preferred alternative (i.e., the Summary and Section 2.1.4) clearly state that Alternative F1 is DOT&PF’s and FHWA’s preferred alternative and not that of other agencies. In headings and other references, it is clarified as the DOT&PF and FHWA preferred alternative.
7. The term “build alternative” should be replaced with “action alternative.”	The EIS uses the terms “action alternative” and “build alternative,” in accordance with FHWA guidance. The term “build alternative” is interchangeable with “action alternative,” used by other agencies.
8. Chapter 2 should include a summary of alternatives including environmental consequences.	Chapter 2 now includes a summary of the environmental impacts associated with each of the alternatives. Table

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	2-2 provides more information on characteristics under COE jurisdiction. These sections are not typically part of Chapter 2 in FHWA EISs but have been included for the use of this Cooperating Agency.
9. The DEIS should have an "Environmentally Preferred Alternative" and designation of a "Least Environmentally Damaging Alternative," as required by EPA 404(b)(1) Guidelines.	The identification of the "Environmentally Preferred Alternative," G4, has been added to Chapter 2, under discussion of the DOT&PF and FHWA preferred Alternative. FHWA requirements call for an "only practicable alternative" finding based on executive order 11990. This serves the same purposes as the COE's requirement to identify the "Least Environmentally Damaging Practicable Alternative" (LEDPA). Alternative F1 is the only practicable alterative, as described in Section 4.14. Designation using the COE's LEDPA terminology can be added to the 404(b)(1) evaluation.
10. The proposed discharge of dredged or fill material may not contain all appropriate and practicable steps to minimize potential impacts of the discharge on the aquatic ecosystem, nor does it appear to be the least environmentally damaging practicable alternative.	The DOT&PF/FHWA preferred alternative, Alternative F1, would not require placement of dredged material into the aquatic ecosystem. Some of the other alternatives, particularly F3, would involve ocean disposal of dredged material, and this has been further described in Chapters 2 and 4, including the permit section 4.13. As now described in the EIS, disposal of dredged and blasted material would follow the Environmental Protection Agency's (EPA) Guidelines for disposing of dredged and blasted material (40 CFR Parts 220-238) (Ocean Dumping) and would be consistent with the regulations of Clean Water Act (CWA) Section 404(b)(1) [disposal of dredged materials into waters of the U.S.] and Marine Protection, Research, and Sanctuaries Act (MPRSA) Section 103.
11. The DEIS should identify the "scope of analysis," including the area of secondary and cumulative impacts.	The "scope of analysis" for secondary and cumulative impacts is described in the introductory paragraphs of Sections 4.26 and 4.27. Baseline information on resources subject to secondary and cumulative impacts is provided in Chapter 3 of the EIS.
12. The DEIS should include significant issues of the wetland impacts, rather than just referencing Appendix M.	Text has been added to Section 4.14.1 Wetlands to describe the importance of wetland impacts: discussions from Appendix M have been incorporated.
13. The DEIS should include significant elements of Appendix L.	Text has been added to Section 4.14 Wetlands to describe the wetland impacts: discussions from Appendix L have been incorporated. Information in the appendices parallels that in the EIS. Cross referencing is provided in the EIS so readers know about the appendix material.
14. Chapter 4 omits discussions on hydrology and if culverts or small bridges would be utilized with the project design for fish-bearing streams.	Sections 4.15.1 and 4.15.4 include discussions of impacts to stream hydrology for stream crossings, and specify where culverts and bridges would be used for crossing fish-bearing streams. Bridges would be used for all fish-bearing streams except one, and this small stream would be crossed with an embedded, fish-passage culvert.
15. The delineation of impacts to aquatic and marine resources under Department of Army jurisdiction is deficient.	Revisions to Chapter 2 and to Sections 4.15 and 4.25.12 of Chapter 4 have been made to better describe impacts to these resources. In accordance with the Clean Water Act, all waters of the U.S., including wetlands within the project area, are assumed to be subject to COE jurisdiction.

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16. The description and analysis of construction impacts requires further design information for the impact analysis of areas under Department of Army jurisdiction.	Sections 4.25.11 and 4.25.12, describing impacts on waters of the U.S., have been revised to include additional information on construction impacts and mitigation measures.
17. The DEIS statement that "A definitive quantification of affected wetland acreage would be determined for the selected alternative during the design phase" is totally unacceptable and contrary to previous agreements between the FHWA and COE.	This has been discussed with the COE. The information presented in the EIS is based on preliminary engineering and uses standard methods for determination of wetlands acreage. It is the best data available at this time. If fill quantities and affected wetland acreage change as a result of final design, then the COE permit would be modified to reflect these changes. Section 4.14 has been revised to explain this approach.
18. A remaining unresolved issue regarding this EIS is the COE's role as either Cooperating Agency or commenting agency.	Based on previous correspondence between the Corps and DOT&PF the Corps has agreed to be a Cooperating Agency. This has been reiterated in recent meetings with the COE, and the EIS has been revised to better respond to COE's needs, while remaining formatted as an FHWA document, per FHWA's status as the lead federal agency.
STATE AGENCIES	
Department of Natural Resources – Office of Parks and Outdoor Recreation – Office of History and Archaeology Dated August 22, 2003	
1. SHPO will defer concurrence on DOT&PF's determination of effect until the preferred alternative has been selected and final project plans are available for review. An intensive-level archaeological survey may be warranted once the area of potential effect has been more narrowly defined.	FHWA has transmitted a letter to the SHPO regarding Alternative F1 (DOT&PF and FHWA preferred) and its realignment over East and West Channels. These minor shifts in alignment, meant to improve ship navigation, moved the alignment away from KET-774 and KET-775, and the letter presents FHWA's finding of "no historic properties affected" for Alternative F1. DOT&PF and FHWA commit to sending an archaeologist into the field during design once the alignment is staked to help ensure no sites have been overlooked.
Department of Natural Resources – Office of Habitat Management and Permitting – Prince of Wales Area Office Dated October 6, 2003	
1. The Division of Habitat Restoration has been transferred from ADF&G to ADNR and is now known as the Office of Habitat Management and Permitting. The authority delegated under Title 16.05 has also been transferred under Title 41.14.	References to the new authority of DNR have been made in Sections 3.13, 3.15.4.3, and 3.15.4.4.
2. There are two catalogued anadromous streams (Airport Creek East and West) that will be directly affected by all proposed alternatives (excluding No Action).	Alternatives C3(a/b), C4, D1, F1, F3, G2, G3, and G4 would include a roadway that would cross two channels of Airport Creek, which would be crossed with a clear-span bridge. See Sections 4.15.1.2, 4.15.1.3, 4.15.1.4, and 4.15.1.5.
3. In addition to Airport Creek East and West, four additional catalogued streams (Government Creek and three unnamed streams) will be directly affected by the preferred alternative, and Clam Creek will be indirectly affected.	Alternative F1 would require a culvert crossing at an unnamed anadromous fish stream southeast of Government Creek. In accordance with the memorandum of agreement between DOT&PF and ADF&G, the culvert crossing would be designed to a Tier 1 stream simulation design level and would maintain natural stream conditions. Impacts to these streams are described in Sections 4.15.1.3, 4.15.1.4, and 4.15.1.5.
4. Any in-stream activity, including equipment crossings, could jeopardize egg-to-fry survival.	Tables 3-21 and 3-22 show the species (and their life stages) that occur in Tongass Narrows, Government

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	Creek, Airport Creek, and two other unnamed anadromous fish streams. NMFS, ADF&G, and DNR will be consulted to determine seasonal work windows for in-water construction activities to avoid impacting egg-to-fry survival, if a build alternative is selected. For the Ketchikan area, salmon fry emerge in the spring from April 15th to May 15th and the adults move into the streams by August 1st and remain through October 31st. The recommended time period for in-stream construction work is November 1st to April 14th and May 16th to July 31st. In-stream construction activities should completely avoid August 1st to October 31st and April 15th to May 15th. These measures will be incorporated into the permit required under Title 41.14. These timing windows may be changed based on additional details developed during the design and permitting phase.
5. Timing restrictions for in-water construction will be placed on all fish-stream crossings based on the species present.	NMFS, ADF&G, and DNR have been consulted to determine seasonal work windows for in-water construction activities, if a build alternative is selected. These work windows would be incorporated into the permit required under Title 41.14. For the Ketchikan area, salmon fry emerge in the spring from April 15th to May 15th and the adults move into the streams by August 1st and remain through October 31st. The recommended time period for in-stream construction work is November 1st to April 14th and May 16th to July 31st. In-stream construction activities should completely avoid August 1st to October 31st and April 15th to May 15th. These timing windows may be changed based on additional details developed during the design and permitting phase.
6. Since many small fish-bearing streams do not show up on the Atlas and Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes or maps, ADF&G recommends additional stream surveys be conducted on any other streams or tributaries not included in the DEIS in order to determine if there are any other fish-bearing streams that may be affected by the proposed project.	A stream survey was completed on June 11 and 12, 2002 to investigate presence/absence of fish (see Appendix O). Many of these streams are ephemeral and not likely to support fish year round.
7. Measures to minimize sediment production and to maximize containment of sediment produced during construction will be important considerations during project design and construction.	Erosion and sediment control efforts are described in mitigation portions of the construction impacts sections for Geological Resources (4.25.7), Water Quality (4.25.10), Wetlands (4.25.11), Marine Habitat (4.25.12.2), and Wildlife-Aquatic Animals (4.25.12.3). Text has been added indicating that the construction contractor is responsible for developing erosion and sediment control and storm water pollution prevention plans to meet ADEC and EPA requirements of the Clean Water Act (i.e., Section 401 certification and NPDES permits).
8. Waste disposal areas need to be carefully placed to avoid wetlands and other highly productive areas to the extent possible.	Section 4.25.11 Wetlands has been revised to include provisions for waste disposal areas.
9. Loss of habitat from creating the road will directly reduce wildlife habitat on Gravina Island, particularly low elevation winter habitat for deer.	This comment is currently reflected in Section 4.15.7.1, which describes impacts to Sitka black-tailed deer.
10. Road access will increase access to wildlife and could increase harvest of deer and wolves through	This comment is currently reflected in Section 4.26.10.2,

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hunting.	which describes secondary impacts to wildlife.
11. An increase in deer harvest would likely have a significant impact on the Gravina Island wolf pack and may lead to the elimination of the pack through displacement due to reduced prey populations.	This comment is currently reflected in Section 4.27.9.2, which describes cumulative impacts to wildlife. A description of impacts to wolf from reduced prey populations has been added to Section 4.26.10.2, which describes secondary impacts to wildlife.
12. ADF&G may require implementation of more restrictive hunting regulations. For example: - close seasons by Emergency Order - reduce hunting/trapping where access is easy by having - access restrictions - vehicle registrations - sex-specific seasons - shortened seasons, etc.	This comment is noted.
13. Wildlife will likely be killed directly through collisions with vehicles (game and non-game species).	This comment is currently reflected in Section 4.15.7 (Wildlife-Land Mammals).
14. Increased human activity on Gravina Island will most likely result in an increase in bear mortality due to encounters with humans.	The potential impact of increased bear mortality due to encounters with humans has been added to Section 4.26.10.2, which describes secondary impacts to wildlife.
15. With a direct link to Gravina Island, the cost of logging operations will be reduced resulting in more pressure to increase timber harvest, which will result in loss of wildlife habitat and reduced carrying capacity for game and non-game species.	Section 4.26.1 has been revised to include effects of the project on logging. No increase in logging is anticipated with the Gravina Access Project; therefore, no additional impacts to wildlife habitat and species are expected.
16. User conflicts will increase because subsistence users and hunters will have easier access to populations of game species like deer and bear.	Descriptions of user conflicts have been added to Section 4.26.2, which describes secondary impacts to social groups.
17. The cumulative effects of this project will undoubtedly lead to reduced populations of game and non-game species and long-term wildlife loss resulting from reduced carrying capacity	Sections 4.26.10 and 4.27.9 have been revised to acknowledge that the build alternatives would likely result in a reduction in carrying capacity for game and non-game species.
18. The FEIS should further consider the long-term effects to wildlife and to users of these resources.	The EIS considers the long-term effects to wildlife and users of these resources in Sections 4.26.2, 4.26.10, and 4.27.9
19. The DEIS text considers the Steller sea lion and the humpback whale, but other listed species are only briefly mentioned. ADNR recommends the FEIS consider the full range of sensitive marine mammals that may be affected by the project.	The data presented in the EIS represents the results of coordination with federal and state resource agencies (i.e., USFWS, NOAA/NMFS, ADF&G, and DNR) throughout the development of technical studies on which the EIS is based.
20. The sections of the DEIS referring to subsistence are sufficient. ADNR has more information concerning the use of Gravina and Pennock Islands by residents of Saxman and Metlakatla should DOT&PF decide it is needed.	This comment is noted.
21. ADNR recommends a summary of all mitigative measures together in one section or subsection of the final document.	A section on mitigation and other commitments is included in the EIS as Section 4.30 (complete compilation) and in the Summary.
22. ADNR recommends the following additional mitigation measures: - bridge crossings for Government, Airport, and Lewis Creeks	The EIS does propose to bridge Government, Airport, and Lewis Creeks. Culverts will be sized appropriately for natural flow (including storm water flows), and to allow fish passage. Access through Tongass Narrows for smaller vessels such as the ones noted should be

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- culverts and bridges sized for increased runoff rates expected with development of Gravina Island - use native vegetation (no invasives) for slope stabilization and reclamation of disturbed areas. - construction timing for Tongass Narrows bridge crossings should consider economic impacts from disruption of large charter boats and commercial fishing fleets, and noncharter sport fishers.	maintained during construction. The intent is to maintain access through some portion of Tongass Narrows at all times. Larger vessels, such as cruise ships, may have to change their operating pattern during construction, and these impacts have been accounted for in the economic impact analysis.
23. The FEIS should describe and evaluate using a bridge structure to suspend/carry cables rather than the need for submarine cables and substations. The environmental consequences of submarine cables and substations should be analyzed.	Section 4.26.17.2 has been revised to reflect that cables could be suspended from the bridge(s) for Alternatives C3(a), C3(b), C4, D1, F1, and F3. Substations would be required regardless of how the cables cross Tongass Narrows. Given the area of impact associated with the cables and substations, negligible impacts to the environment are expected (see Section 4.26.17.2).
24. ADNR appreciates the availability of the DEIS in electronic format (on CD) and the previous technical reports on the website.	This comment is noted.
KETCHIKAN GATEWAY BOROUGH – PLANNING COMMISSION DATED OCTOBER 1, 2003	
1. The EIS should show how the preferred Pennock alternative could be designed to accommodate a future project that would enable traffic to bypass the downtown core (i.e., extension of new 3rd Avenue bypass along Schoenbar Road to bridgehead near Coast Guard base).	While it is not in the scope of the Gravina Access Project to build the bypass road, DOT&PF has verified that neither Alternative F1 nor F3 would preclude the future of the planned bypass connection. The planned road has been added to Figure 3-3.
2. Conceptual design alternatives and cost estimates for access to and from Pennock Island should be incorporated into the FEIS.	While it is not in the scope of the Gravina Access Project to provide access to Pennock Island, DOT&PF has been in close consultation with the Ketchikan Gateway Borough Planning Department regarding future potential development on Pennock Island with the selection of Alternative F1 or F3. In addition, the Ketchikan Gateway Borough Planning Department has indicated they intend to complete a Pennock Island plan similar to the recently completed Gravina Island Plan, with the selection of Alternative F1 or F3. Access to Pennock Island is contingent on the Borough's completion of land use planning for the area. The Borough requested DOT&PF participation in this planning process, however DOT&PF will not participate because of funding.
INDIVIDUAL PUBLIC COMMENTS AND PUBLIC HEARING TESTIMONY	
1. Support of any bridge alternative	This comment is noted.
2. Support of a bridge that will not impede cruise ships	This comment is noted.
3. Support of Alternative C3(a) or C4	This comment is noted.
4. Support of Alternative F1	This comment is noted.
5. Concern that Alternative F1 would funnel more traffic to an already busy downtown	The traffic analysis confirms that more traffic would be directed through downtown with both Alternatives F1 and F3 (Section 4.26.4.3). Adverse impacts would be mitigated through installation of traffic signals. Section 4.26.4.3 has been revised to include peak hour volumes through downtown for each alternative.
6. A bridge would not enhance long-term economic development in Ketchikan	This comment is noted. The economic impacts of the project are discussed in Sections 4.5, 4.26.3, 4.27.3, and Appendix D.
7. Access to developable lands on Gravina and Pennock	The effect on property taxes for land on Gravina and

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Islands will increase the value of these lands and increase property taxes.	Pennock Islands has been considered and is discussed in Sections 4.25.4 and 4.26.3.5, and in Appendix D—Economic Impact Assessment.
8. Pennock Island residents do not want a bridge to Pennock Island.	This comment is noted. The project staff met with Pennock and Gravina Island residents in May of 2001 to discuss the Gravina Access Project (see Section 3.3.2.2).
9. Gravina Island residents do not want a bridge to Gravina Island.	This comment is noted. The project staff met with Pennock and Gravina Island residents in May of 2001 to discuss the Gravina Access Project (see Section 3.3.2.2).
10. There is developable land already available on the existing road system that is closer to Ketchikan.	This comment is noted. The purpose of the project is to "improve surface transportation between Revillagigedo Island and Gravina Island" (see Section 1.3).
11. Support of any ferry alternative	This comment is noted.
12. Support of Alternative F1 or F3	This comment is noted.
13. Support of a tunnel alternative	This comment is noted.
14. Winter winds will cause bridge closures to ensure safety, which will cause delays	Section 4.7.3.7 Effects of Wind-All Alternatives, addresses this comment. Bridge closures would be minimized through design to include wind-reducing appurtenances.
15. Adverse impacts reported for ferry alternatives were crafted to boost argument in favor of a hard link.	The EIS presents all alternatives and impacts fairly and comprehensively.
16. The DEIS does not accurately depict travel times for ambulances traveling to and from (round trip) the airport using the existing ferry versus Alternative F1.	Travel time data for emergency vehicles has been added to Section 4.3.3.
17. Support of the Gravina Access Project (no specific alternative mentioned)	This comment is noted.
18. Section 3.1.1 does not mention Annette Island, Alaska's only Indian Reservation, which is directly across Nichols Passage from Gravina Island and that Gravina Island is a traditional subsistence area for Alaska Native people from Annette and Revillagigedo Islands.	Section 3.3.7 and Section 4.26.2 have been revised to include more information on subsistence use on Metlakatla .
19. Section 3.1.12 contains no mention of Native burial grounds on Pennock Island. Grave sites have been established on Pennock Island as recently as 1994.	The burial grounds on Pennock Island are mentioned in Section 4.26.14.3. Information also has been added to Section 7.2.1.4.
20. Printed copies of the DEIS should have been made available to the public free of charge.	This comment is noted. The DEIS was widely available for free in CD form and on the web in order to reduce the amount of money spent on reproduction. A hard copy was available for review in Ketchikan at the Ketchikan Gateway Borough Planning Office, the Ketchikan Library, and was available in the Ketchikan project office until October 2. Each DEIS set cost in excess of $95 to produce. This amount prohibited the State from providing the document for free.
21. The public comment period for the DEIS should be extended.	The comment period was effectively extended beyond the required 45-day period to 60 days to allow adequate time for public review and comment.
22. Support for Alternative G4.	This comment is noted.
23. A bridge will increase risks to boats and planes.	These risks have been assessed in Sections 4.7.1 and 4.7.2, and considered in the selection of a DOT&PF and FHWA preferred alternative (Summary and Section

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	2.1.4).
24. None of the project documents provide a good discussion of the impact of a bridge on subsistence. The EIS should discuss the different levels of impact the alternatives will have on subsistence.	The text in Section 4.3.7 has been revised to include more information on the impacts on subsistence.
25. The Alaska Native population may be affected far more than other groups by decline in subsistence resources, which is possibly an environmental justice issue.	Section 3.3.1 discusses the population and social groups potentially affected by the project. Subsistence impacts are discussed in Section 4.3.7 and Section 4.26.2. The text has been revised in Section 4.26.2 to provide additional information on subsistence impacts on Native populations.
26. The EIS should discuss the different levels of impact the alternatives will likely have on wildlife, particularly deer and wolves.	Section 4.26.10.2 has been revised to describe the relative impacts of the alternatives on wildlife, including deer and wolves, based on projected development. A quantitative evaluation of impacts on these resources based on projected development would be speculative.
27. Concerning projections for future development on Gravina Island, the EIS should discuss how likely it is that events in the high economic growth scenario would actually occur.	Since there is no way to know which development scenario would occur, three different scenarios have been presented to provide a range of future development. See Appendix D, Economic Impact Assessment, for more detailed information on the projected development on Gravina Island. The secondary impact analysis in Section 4.26 considers medium economic growth in the region as a point of comparison for all alternatives.
28. The travel time analysis does not necessarily support a bridge alternative.	Travel time is considered with many other factors in the selection of a DOT&PF and FHWA preferred alternative (Section 2.1.4).
29. The EIS does not indicate there is a real problem with lack of 24-hour access to Gravina Island.	The EIS considers three alternatives that do not offer 24-hour access to Gravina Island, i.e., Alternatives G2, G3, and G4. According to the economic analysis presented in Section 4.26.3.7, these alternatives would not create the same level of economic development for the region as the bridge alternatives due largely to the characteristics of ferry service, including lack of 24-hour access.
30. The ferry alternatives are more consistent with the federal legislation designed to protect wetlands	This comment is noted. The EIS accurately characterizes the ferry alternatives as having a lesser impact on wetlands than the DOT&PF and FHWA preferred alternative (see Section 4.14).
31. The FEIS should accurately present the negative impacts associated with Alternatives F1 and F3: - impacts to wetlands, marine habitat, and anadromous streams - visual obstruction - increased traffic downtown - increased air pollution from increased car usage - project cost, increased O&M for DOT&PF - navigation safety issues - encourages single vehicle use	The adverse impacts on these resources have been accurately presented in Sections 4.5.1, 4.7.2.4, 4.7.2.5, 4.14.1.2, 4.15.3.5, 4.15.3.6, 4.15.4.2, 4.23.6, 4.23.7, 4.26.4.3, 4.26.3, and 4.26.6, based on the best available information obtained through field investigation, literature review, computer modeling, state and federal databases, and agency and public input.
32. Figure 3.17 does not correctly show locations of eelgrass beds.	The locations of eelgrass beds as depicted in Figure 3.17 are based on field survey presented in Appendix N. The figure does not purport to show the locations of all eelgrass in Tongass Narrows – only those in proximity to

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	the route of alternatives analyzed.
33. Placing the road on wetlands will have significant impacts to water quality where freshwater drains into the marine waters of Tongass Narrows.	Section 4.12 discusses impacts on water quality in Tongass Narrows and freshwater creeks, and Section 4.14 describes impacts on wetlands from roadway construction.
34. The cumulative effects of the road and other development on Gravina Island would drive development on fragile wetlands and could demolish the fragile balance of the intricate water system on the Island and in Tongass Narrows.	Effects on wetlands from development on Gravina Island are presented in the secondary and cumulative impacts discussions (Sections 4.26.9 and 4.27.8). Locations of potential future development on Gravina Island as depicted in Borough planning documents (see Appendix S) consider existing natural resources protection.
35. The high costs and environmental impacts of widening and deepening the West Channel are so severe that all alternatives requiring such dredging/blasting should be immediately eliminated.	The environmental impacts of channel widening are presented in Section 4.15.3.6 and were considered in the selection of the preferred alternative (Summary and Section 2.1.4).
36. The EIS should stress that impacts to wetlands can be minimized by selecting a route that goes directly to the airport.	Relative impacts to wetlands from the alternatives are described in Section 4.14.1.2.
37. The EIS should state that impacts to wetlands can be minimized by selecting a ferry alternative, which would use existing parking facilities on Revillagigedo Island rather than require more parking and wetlands filling on Gravina Island.	Section 2.1.3 describes the ferry alternatives and requirements for new facilities on Revillagigedo Island. Amount of wetland fill required is most strongly related to amount of roadway development associated with each alternative (Section 4.14.1.2).
38. Alternatives F1 and F3 would likely require more than one employee to maintain the new facilities.	The DOT&PF would evaluate the need for maintenance and operations staff for all facilities under their control in Ketchikan to determine the appropriate number of employees. More than one new maintenance employee is anticipated if either alternative F1 or F3 are constructed.
39. The summary should clearly state that Alternatives F1 and F3 would eliminate 200 and 100 flights per year, respectively.	The Summary has been revised to reflect the number of flights that would be eliminated (based on 2,000 SVFR operations per year) for each alternative, rather than percentage of SVFR operations potentially affected.
40. The modification of West Channel would change currents and elevations and have an effect on marine habitat throughout and probably beyond the channel.	The dredging potentially required in the West Channel under Alternative F3 would not noticeably change flow through West Channel (see Sections 4.15.1.4 and 4.15.3.6). A description of the effects of construction on marine habitat outside of the dredged area is provided in Section 4.25.12.2.
41. The remote passenger terminal on Revillagigedo Island described in the Ketchikan International Airport Master Plan should be included in the ferry alternatives.	All of the ferry alternatives include maintaining the existing ferry terminal. If a remote passenger terminal were added to the existing ferry terminal on Revillagigedo Island as part of the airport master plan, it would be maintained if a ferry alternative were selected. The remote terminal concept is not specifically part of the ferry alternatives. The terminal would not, however, be precluded by the selection of a ferry alternative.
42. The summary of impacts does not accurately describe impacts to EFH (as stated in Appendix O).	The summary of impacts was updated in the EIS Summary to include impacts to EFH resources as updated in the EFH Assessment, Appendix O.
43. The fact that crossing Pennock Island is not consistent with the Pennock/Gravina Neighborhood Plan should be given greater weight; there has been no public plan or vote to override the existing plan.	The Ketchikan Gateway Borough Planning Department has indicated they plan to complete a Pennock Island plan similar to the recently completed Gravina Island Plan, with the selection of Alternative F1 or F3.

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44. The project should stay on schedule.	This comment is noted.
45. Gravina Island could present enhanced business and industrial opportunities if accessible by hard link, including new and relocated industry, natural resources extraction, resource development (commercial and residential), and outdoor recreation.	These potential economic development opportunities were considered in the evaluation of alternatives in the EIS (Section 4.26.3).
46. The bridge should be named after Ralph Bartholomew	This comment is noted.
47. Lack of hard link access to the airport restricts economic opportunities in Ketchikan.	The economic analysis presented in Section 4.26.3 characterizes the effects of the alternatives on economic development in Ketchikan.
48. Alternative F1 should have a 200ft bridge over West Channel for less restriction to navigation.	Alternative F1 was developed in consultation with the USCG in an effort to minimize impacts to marine navigation. The USCG has agreed with the evaluation of navigation impacts of Alternative F1 as they are presented in Section 4.7.2.4.
49. The bridge should be perpendicular to the channel to reduce navigational risks.	DOT&PF has modified the design of the bridges of the DOT&PF and FHWA preferred alternative, Alternative F1, to be perpendicular to the channels in response to concerns expressed by the navigation community. See Section 2.1.2.5
50. Ferry maintenance can affect the ability to respond to emergencies.	This issue is noted in Section 1.3.2.3, Improved Convenience and Reliability of Access for Emergency Personnel and Equipment, as part of the need for action.
51. The EIS should address travel time for ambulances with Alternatives F1 and F3 and consider road conditions: grade/incline, effects of weather, traffic through downtown (especially summer tourist congestion).	Travel times for emergency vehicles have been added to Section 4.3.3 (Table 4-1). The effects of Alternatives F1 and F3 on traffic congestion downtown are addressed in Section 4.26.4.3. Effects of wind on vehicle travel are disclosed in Section 4.7.3.7. The incline of bridges and bridge approaches would meet DOT&PF design standards.
52. Concern that access for bikes would not improve.	The measure of improved access is based primarily on travel time, which depends on origination and destination. The travel time analysis in Section 4.8 (Considerations Relating to Pedestrians and Bicyclists) provides the travel time for bicyclists traveling to the airport or developable land on Gravina Island from three points of origin for each of the alternatives. All alternatives would provide new access to recreation and developable lands on Gravina Island and, in the case of Alternatives F1 and F3, Pennock Island.
53. The designs shown are unimaginative and do not improve our natural landscape.	This comment is noted. The EIS in Chapter 4.23 provides an evaluation of the visual effects of the different alternatives.
54. The EIS should consider how Pennock Island will be developed, including access from the alternative.	The Ketchikan Gateway Borough Planning Department has indicated they plan to complete a Pennock Island plan similar to the recently completed Gravina Island Plan, with the selection of Alternative F1 or F3. Absent a current planning document for Pennock Island, the potential environmental effects of future development on the island are based solely on the amount and type of future development projected in the *Gravina Access Project Traffic Projections Technical Memorandum* (see Section 4.26).

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55. Alternative F1 would have navigational impacts from the additional constriction of the bridge in East Channel (along with constrictions from California and Idaho rocks).	This impact is described in Section 4.7.2.4, which evaluates the impacts of Alternative F1 on cruise ship navigation.
56. A bridge over Pennock Island would make airport access much longer and less safe.	Sections 4.7.3 (Vehicles) and 4.8 (Considerations Relating to Pedestrians and Bicyclists) describe the effects of Alternatives F1 and F3 on travel time. Safety associated with each alternative is addressed in Section 4.3.5 (Accessibility).
57. Increased car access to the airport would make the airport less safe from a security standpoint.	Any improvements on airport property would meet federal guidelines under 49 CFR 1542 administered by the Transportation Security Administration. Section 2.1 has been revised to include this reference.
58. The bridge option is too expensive.	Cost was a major consideration in the selection of reasonable alternatives. Refer to Section 2.4 (Determination of Reasonable Alternatives: A Brief History).
59. The ferry schedule is not a factor in people missing flights	Section 1.3.2.1 Improved Convenience and Reliability of Access for Passengers identifies unanticipated delays (mechanical difficulty, having to wait for a later ferry due to high passenger volume in peak season, etc.) as a compounding effect leading to missed flights.
60. A bridge would not provide long-term employment opportunities for residents.	Each of the project alternatives would provide long-term employment benefits through annual operations and maintenance jobs in the Borough, as described in Section 4.5.2 (Employment) and Section 4.26.3.7 (Regional Economic Development).
61. Support of Alternative F3	This comment is noted.
62. A bridge would provide long-term employment opportunities for residents.	Each of the project alternatives would provide long-term employment benefits through annual operations and maintenance jobs in the Borough, as described in Section 4.5.2 Employment and Section 4.26.3.7 Regional Economic Development.
63. Relying on a ferry greatly inconveniences the traveling public.	This is part of the purpose and need discussion provided in Section 1.3.2 (Need for Improved Access to Airport).
64. A bridge would improve accessibility for emergency response personnel.	This comment is noted.
65. Concern that current costs to get to the airport are too high.	This comment is noted.

REFERENCES

FEDERAL ACTS

Clean Water Act

Endangered Species Act

Marine Mammal Protection Act

Migratory Bird Treaty Act

National Environmental Policy Act

National Historic Preservation Act

Subtitle F (High-Priority Projects). Section 1602 (Project Authorizations).

Transportation Equity Act for the 21st Century (TEA-21); Public Law 105-178

Uniform Relocation Assistance and Real Property Acquisition Policies Act

U.S. Department of Transportation Act of 1966

EXECUTIVE ORDERS

E.O. 1520

E.O. 11593

E.O. 11988

E.O. 11990

E.O. 12898

ALASKA STATE CODES AND STATUTES

18 AAC 50.070

29 AS 65

U.S. CODES AND REGULATIONS

16 USC 470

16 USC 760 c-g

49 USC Section 303

14 CFR 91

14 CFR 93. 151-155, Subpart M

14 CFR 135

23 CFR 771

23 CFR 772

33 CFR 162.240

36 CFR 60, 63, 800

40 CFR 122.3(a)

40 CFR 220-238

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40 CFR 1502.14(e)

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