

## 2.0 ALTERNATIVES

In preparation of this ~~Draft~~ Final SEIS, FHWA and DOT&PF reviewed the 2013 Draft SEIS, the 2004 FEIS, and previous engineering studies; conducted engineering and environmental studies; and obtained input from the Ketchikan community, local, state, and federal agencies, Tribal governments, and other Native organizations, to develop and evaluate the project alternatives. This chapter describes the seven project alternatives evaluated in this ~~Draft~~ SEIS (see Section 2.1) and compares the environmental consequences associated with each alternative (see Section 2.2.3.2). The chapter also identifies those alternatives that were considered during preliminary analysis but eliminated from detailed analysis, and the reason they were eliminated (see Section 2.1.42-2). As noted in the previous chapter (see Section 1.2), Alternative F1 was the preferred alternative in the 2004 FEIS and the selected alternative in the 2004 Record of Decision; however, Alternative F1 is among the alternatives eliminated from detailed analysis in this SEIS (see Section 2.1.42-2). The 2013 Draft SEIS did not identify a preferred alternative. This Final SEIS identifies Alternative G4v as the preferred alternative, with further explanation provided in Section 2.1.4.

All figures referenced in this chapter may be found at the end of the chapter.

### 2.1 Alternatives Evaluated in this ~~Draft~~ SEIS

Sections 2.1.1 through 2.1.3 describe the alternatives that are evaluated in detail in this ~~Draft~~ SEIS:<sup>1</sup>

- No Action Alternative
- Bridge alternatives (C3-4 and F3)
- Ferry alternatives (G2, G3, G4, and G4v)

Figure 2.1 shows the alignments of the proposed “action” alternatives and the existing ferry route (i.e., the No Action Alternative). All action alternatives begin with access from the North Tongass Highway/Tongass Avenue, which is part of the National Highway System (NHS), and end on Gravina Island on Seley Road, approximately at the northern end of the Airport Reserve<sup>2</sup> (these are the project termini). All action alternatives (C3-4, F3, G2, G3, G4, and G4v) include ~~maintenance and operation of the~~ previously recently constructed Gravina Island Highway, Airport Access Road, and Lewis Reef and Seley roads (to the Airport Reserve boundary, approximately). These roads were constructed subsequent to the 2004 FEIS and Record of Decision.<sup>3</sup> Each action alternative also includes replacement ~~construction~~ of the Lewis Reef Road bridge over Airport Creek (west fork), and reconstruction of a segment of Seley Road to meet DOT&PF design standards.<sup>4</sup> The existing bridge over Airport Creek is a temporary structure constructed by a private entity for access to land in the Lewis Reef development area. While the Airport Creek bridge replacement ~~creek crossing~~ was authorized by FHWA as part a component of Alternative F1, it was not included in the first phase of construction by DOT&PF.

<sup>1</sup> A Transportation System Management (TSM) Alternative was not identified or evaluated because the project does not occur in an urbanized area with a population of more than 200,000 (per FHWA Technical Advisory T6640.8a *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*).

<sup>2</sup> The Airport Reserve boundary is shown in Figure 1.1.

<sup>3</sup> FHWA’s Record of Decision, which identified Alternative F1 as the agency’s selected alternative, led to the construction of the Gravina Island Highway and Airport Access Road improvements.

<sup>4</sup> The road has been designed in accordance with the American Association of State Highway and Transportation Officials (AASHTO) Guidelines for Geometric Design of Very Low-Volume Local Roads (GDVLVLR). The design is for a 40 mph design speed.

Improved access resulting from any of the action alternatives would result in more vehicular use of some roadways or portions of roadways on Gravina Island. Therefore, the action alternatives include improvements to roadway segments connecting with Ketchikan International Airport. These improvements vary by alternative because the roadway segments connecting the bridge or ferry crossing with the airport are different for each alternative. The roadway improvements specific to each alternative are described below in the sub-section for each alternative.

Project costs presented in the 2013 Draft SEIS for each of the alternatives have been updated for this Final SEIS to reflect, when available, updated design information and inflation. For the bridge alternatives, these updates involved taking engineering information and per-square-foot unit costs developed for Alternative C3-4 in late 2013 and applying those to Alternative F3. These costs were adjusted for inflation to 2015 dollars using the Alaska Consumer Price Index. For the ferry alternatives, updated costs were developed using more detailed design information and a greater level of analysis of the different elements required to implement each of the ferry alternatives. More information on how project costs were developed has been added to this Final SEIS in the highlighted section below.

The current funding source for the project is a blend of high-priority and bridge set-aside earmarks authorized within the TEA-21 and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) transportation reauthorization legislations. When SAFETEA-LU was adopted in 2005, it contained three earmarks totaling \$223 million to construct a bridge between Revillagigedo Island and Gravina Island. One high priority project in SAFETEA-LU for \$48 million was dedicated to roadway construction on Gravina Island. Later that same year, Congress passed HR 3058 which reallocated the other two earmarks, totaling \$175 million, to DOT&PF to use for any project eligible to receive surface transportation program funds under Section 133(b) of SAFETEA-LU. In accordance with state regulations for use of unrestricted funds, 48 percent of those funds were allocated to the NHS, and then-Governor Murkowski directed DOT&PF to assign that entire allotted amount (i.e., 48 percent of \$175 million, or \$84 million) to the Gravina Access Project. Funding for complete project construction costs above what is held in reserve, both federal and state funds, is approximately \$96 million. has not yet been identified. Any improvements constructed as a result of the Gravina Access Project would become state facilities that would be maintained and operated by DOT&PF or under an agreement with the local government(s). Because the project would enhance NHS intermodal connectivity, it could be eligible for funding under the Moving Ahead for Progress in the 21st Century Act (MAP-21).

## **A REVIEW OF PROJECT COSTS**

There are several factors to consider when examining project costs. There are the initial costs associated with construction of the project. There are also the annual costs for maintenance and operation of project facilities. Lifecycle costs represent the construction costs and the annual maintenance and operational costs over the lifespan of the project, in this case 75 years. Most of the cost of the bridge alternatives is realized during construction; whereas, most of the cost of a ferry alternative stems from operations and maintenance of the facilities over the life of the project.

In October 2015, when DOT&PF announced it would recommend Alternative G4v as the state's preferred alternative to FHWA, DOT&PF recognized the need to update the cost estimates for all alternatives given the age of the previous estimate. In addition, when DOT&PF and FHWA identified Alternative G4v as the agencies' preferred alternative, they realized that more specific information for the design of the components and construction sequencing of the alternative would require a review of the overall cost estimate. Updated construction cost estimates for the individual elements comprising each of the alternatives are provided in Appendix F.

The following paragraphs provide more detail on how construction cost estimates for the Gravina Access Project alternatives were developed and updated for this Final SEIS.

### **UPDATED COSTS FOR BRIDGE ALTERNATIVES**

Considerable engineering design work was done to develop cost estimates for bridge alternatives because of the complexity of the bridge structures. After FHWA and DOT&PF selected Alternative F1 in the 2004 Record of Decision, costs for that alternative were refined and updated as part of the design and construction process, which continued through 2006. With initiation of the Draft SEIS in 2008, the refined construction costs of Alternative F1 were used as the basis for the development of the cost estimates for the SEIS alternatives. The 2006 Alternative F1 costs were updated to 2008 dollars and then the individual element costs (i.e., cost of foundations in deep water, foundations in shallow water, long span box girder, etc.) and unit costs for roadways were used to develop cost estimates for the applicable elements of all of the other alternatives evaluated in the SEIS alternative screening process (see Section 2.2.3). Those costs were then escalated to 2011 dollars for the reasonable alternatives in the 2013 Draft SEIS.

In late 2013, because of concerns that the cost estimates for the bridge alternatives were outdated, DOT&PF prepared a new cost estimate for Alternative C3-4, converted it to per-square-foot costs, and applied those unit costs to Alternative F3's design elements. The 2013 estimate for Alternative C3-4 relied on more detailed examination of design and construction requirements for the bridge structure compared with what was used in the estimate prepared for the 2013 Draft SEIS. For this Final SEIS, the costs for bridge construction have been adjusted for inflation to 2015 dollars. Overall, the costs for Alternatives C3-4 and F3 have increased by approximately 37 percent and 28 percent, respectively, based largely on the late 2013 updated cost estimate for Alternative C3-4 and, to a lesser extent, the rate of inflation.

### **UPDATED COSTS FOR FERRY ALTERNATIVES**

The engineering design of the ferry alternatives was less rigorous than the bridge alternatives in the 2013 Draft SEIS. The cost estimates for the ferry alternatives in the 2013 Draft SEIS relied mostly on prior State of Alaska construction bidding experience for similar projects in Southeast Alaska and generic concepts for ferry terminal sites and associated facilities. Updating ferry costs for the Final SEIS involved developing more detailed design information, accounting for changes to recent and planned transportation improvements in the Ketchikan Gateway Borough, adding costs for elements that had been unintentionally omitted from the original cost calculations, and adjusting all costs to 2015 dollars. With Alternative G4v identified as the preferred alternative and all elements of Alternative G4v being elements of the other ferry alternatives, DOT&PF first updated the cost of Alternative G4v to use in the cost estimates of the other ferry alternatives. Information to explain the cost variance between the 2013 Draft SEIS and Final SEIS is provided in the following paragraphs.

### **Construction Costs in the 2013 Draft SEIS**

The cost of Alternative G4v as presented in the 2013 Draft SEIS was approximately \$22.8 million (2011 dollars). This cost estimate was based on costs to construct a new passenger waiting facility and new heavy freight mooring facility, replace the ferry layup dock, reconstruct the existing airport ferry transfer bridges and ramps, replace Airport Creek Bridge, and upgrade a portion of Seley Road.

The 2013 Draft SEIS unintentionally omitted cost estimates for:

- Shuttle vans
- Reconstruction of the existing airport ferry transfer bridges and ramps
- Upgrades and improvements to shoreside pedestrian facilities

- Construction of new toll facilities

These additional costs apply to all ferry alternatives.

**Updated Costs for Alternative G4v (Preferred Alternative)**

In developing more detailed engineering information for Alternative G4v following its identification by DOT&PF and FHWA as the preferred alternative, DOT&PF evaluated the generic concepts for ferry terminal sites to develop a more comprehensive picture of the alternative and the specific elements required. New costs were added for those elements that had not been previously included in the cost estimates for ferry alternatives. The revised cost for Alternative G4v is approximately \$45.9M. Key elements affecting the alternative and its associated cost are explained in the following paragraphs.

Increased costs for ferry layup dock and reduced costs for the heavy freight mooring facility: With improved design information and escalation to 2015 dollars, the cost of the layup dock has increased considerably. The increase is largely attributed to the greater level of design information that DOT&PF developed. The design of the heavy freight mooring facility has changed, reducing costs and providing a facility that, in consultation with the Borough, is better suited for the needed freight access. The new facility is a mooring facility at the same location as the heavy freight dock proposed in the 2013 Draft SEIS.

	<u>Updated cost</u>	<u>Change from 2013 Draft SEIS</u>
<u>New heavy freight mooring facility</u>	<u>\$2.9 million</u>	<u>-\$2.5 million</u>
<u>Replacement ferry layup dock and transfer bridges</u>	<u>\$14.5 million</u>	<u>+\$8.5 million</u>

Unintentionally omitted costs for reconstruction of the existing airport ferry transfer bridges and ramps: These costs had not been included in the estimates developed for the 2013 Draft SEIS. They represent one third of the difference between the total construction cost in the 2013 Draft SEIS and this Final SEIS. The costs include improvements to pedestrian facilities on the transfer bridges and ramps.

<u>Reconstruct ferry transfer bridge and ramp on Revillagigedo Island</u>	<u>+\$4.4 million</u>
<u>Reconstruct ferry transfer bridge and ramp on Gravina Islands</u>	<u>+\$2.9 million</u>

Unintentionally omitted costs for shuttle vans: These costs had not been calculated for the 2013 Draft SEIS. Costs to provide shuttle vans are considered here as initial purchase costs and, like other costs described herein, do not include operations and maintenance, or future replacement.

<u>Two shuttle vans</u>	<u>+\$0.3 million</u>
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Increased costs for construction of upland facilities: These costs increased as a result of better design information and escalation to 2015 dollars.

	<u>Updated cost</u>	<u>Change from 2013 Draft SEIS</u>
<u>New passenger waiting facility on Revillagigedo</u>	<u>\$2.5 million</u>	<u>+\$1.1 million</u>
<u>Airport Creek Bridge Replacement, Seley Road improvements, etc.</u>	<u>\$5.8 million</u>	<u>+\$1.6 million</u>

Increased costs for project development: These costs were escalated to 2015 dollars.

	<u>Updated cost</u>	<u>Change from 2013 Draft SEIS</u>
<u>Design, utilities, right-of-way</u>	<u>\$5.6 million</u>	<u>+2.8 million</u>
<u>Construction administration, mobilization/demobilization, contingency etc.</u>	<u>\$7.0 million</u>	<u>+4.0 million</u>

The current cost estimate (2015 dollars) for Alternative G4v is approximately \$45.9 million. The total cost increase for this alternative relative to the 2013 Draft SEIS is \$23.1 million. As noted above, this increase is largely attributable to the previously unintentionally omitted costs of reconstructing the ferry transfer bridges and ramps (\$7.3 million), and the advanced design information for the layup dock (costing \$8.5 million more than originally anticipated).

**Updated Construction Costs for Alternatives G2, G3, and G4**

For the most part, revised costs for Alternative G4v were incorporated into the costs for the elements common to Alternatives G2, G3, and G4. The cost of adding two new ferries for these alternatives was adjusted for inflation to 2015 dollars from approximately \$8 million per ferry to \$10 million per ferry. Roadway costs and right-of-way acquisition costs for Alternatives G2 and G3 were escalated to 2015 dollars. The increased construction costs for these alternatives have increased by 45 percent to 50 percent.

**2.1.1 No Action Alternative**

The regulations implementing the National Environmental Policy Act (NEPA) require federal agencies to assess the effects of a No Action Alternative in an EIS (40 CFR Section 1502.14[d]) and use it as a basis for comparison of the magnitude of the environmental effects of the action alternatives.<sup>5</sup>

Under the No Action Alternative, no bridge would be constructed and no additional ferry service would be provided between Revillagigedo Island and Gravina Island. No improvements to roadways or bridges on Gravina Island would be made. The only public access between the islands would continue to be provided by the existing airport ferry service across Tongass Narrows, supplemented by private boats and floatplanes. There would be no improvements to the existing ferry terminals, located 2.8 miles north of downtown Ketchikan on Revillagigedo Island and on the waterfront, adjacent to the airport terminal on Gravina Island. The No Action Alternative is shown on Figure 2.2.

The Borough would continue to operate and maintain 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: ~~during the winter and every 15 minutes during the peak hours (8:00 a.m. to 4:00 p.m.) in summer~~ on the quarter hour from the ferry terminal on Revillagigedo Island and on the hour and half hour from the airport ferry terminal.

**Cost.** The 75-year lifecycle cost for the No Action Alternative, ~~assuming that annual revenue from ferry tolls would be \$1.5 million per year,~~ would be approximately \$35-108 million. This estimate assumes ferry replacement every 35 years, operation and maintenance (O&M) costs of the ferry facilities, and maintenance of the Gravina Island Highway and the Lewis Reef and

<sup>5</sup> Council on Environmental Quality, *Forty Most Asked Questions Concerning CEQ's NEPA Regulations*, 46 FR 18026 (March 23, 1981), as amended, 51 FR 15618 (April 25, 1986).



Seley roads. The estimated average annual O&M cost would be approximately ~~\$3.524~~ million.<sup>6</sup> (See Appendix F for detailed cost information.)

Another useful way to look at project costs is as the summation of the annual expenses and revenue over the lifetime of the facility. If all the costs were inflated over a 75-year lifespan (assuming a 2.3 percent Forward Inflation Rate<sup>7</sup>) and then added, regardless of funding source, that summation would give a true picture of the total cost of ownership. The “total life costs” therefore represent the summation of the estimated annual budget appropriations (inflation adjusted) required to fund a particular alternative over the facilities’ lifespan. For the No Action Alternative, the total life cost is approximately ~~\$929-1,024~~ million. Adjusting for revenue estimated at ~~\$339-379~~ million, the total life costs would be ~~\$590-645~~ million.

### 2.1.2 Bridge Alternatives

The FHWA and DOT&PF identified two reasonable bridge alternatives to evaluate in this ~~Draft~~ SEIS (see Figure 2.21):

- Alternative C3-4 – Airport Bridge. This alternative is a lower cost variant of two alternatives (C3[a] and C4) that were analyzed in the 2004 FEIS.
- Alternative F3 – Pennock Island Bridges. This alternative was analyzed in the 2004 FEIS, but the alignment has been slightly modified on Gravina Island to connect with the existing Gravina Island Highway. It includes two bridges crossing at Pennock Island: one bridge over the East Channel and one over the West Channel.

The preferred alternative identified in the 2004 FEIS, Alternative F1, which also involved bridges over the East and West channels at Pennock Island, was not carried forward as a reasonable alternative in this ~~Draft-Final~~ SEIS for reasons discussed in Section 2.3.

For Alternatives C3-4 and F3, the bridge structures would be designed to be consistent with the typical roadway section of the Gravina Island Highway, which was designed as part of the NHS and has one 12-foot lane and one 8-foot shoulder on each side of the centerline. The proposed bridges also would include an 8-foot-wide pedestrian walkway on one side. Typical cross-sections of the proposed roadways and bridges are shown on Figure 2.3. Under the bridge alternatives, the existing airport ferry service would be discontinued. Ferries and related assets would be decommissioned and removed. The Borough would decide how to manage the ferry terminal properties on both sides of Tongass Narrows after the facilities are decommissioned.

In 2009, then-DOT&PF Commissioner Leo von Scheben requested that the bridge alternatives be evaluated with tolls to offset, in part, the cost of constructing and operating the bridge.<sup>8</sup> With tolling, each bridge alternative would include an electronic tolling device comprised of a transponder or a radio frequency identification system that uses readers on stationary poles at the bridge approach and tags on vehicles to count the number of trips. The information would be sent electronically to an office for processing and billing.

An investigation of toll rates for the bridge alternatives considered the potential effect of a range of toll values on traffic volumes.<sup>9</sup> Revenue from each of the three toll options (\$2, \$5, and \$16) was determined using corresponding traffic projections. [Table 2-1](#) characterizes the range of

<sup>6</sup> DOT&PF, Gravina Access Project Supplemental EIS Cost Estimate Report, prepared by HDR Alaska, Inc., August 2012.

<sup>7</sup> Congressional Budget Office *The Budget and Economic Outlook: An Update*, August 2011, Table B-1 <<http://www.cbo.gov/ftpdocs/123xx/doc12316/08-24-BudgetEconUpdate.pdf>> Accessed March 3, 2012.

<sup>8</sup> Memorandum from Leo von Scheben, Commissioner, DOT&PF, to Gary L. Davis, Southeast Regional Director, DOT&PF, September 17, 2009.

<sup>9</sup> DOT&PF, Gravina Access Project Supplemental EIS Traffic Forecast, prepared by HDR Alaska, Inc., August 2012.

potential revenues from the bridge alternatives, assuming that the bridge opens for traffic starting in 2018.

**Table 2-1: Anticipated Bridge Revenue with Tolling Options**

Alternative	Toll per Vehicle (\$)	2018		2030		2040	
		Vehicles per Day	Revenue <sup>a</sup> (\$M)	Vehicles per Day	Revenue <sup>a</sup> (\$M)	Vehicles per Day	Revenue <sup>a</sup> (\$M)
C3-4	2	961	0.35	2,284	0.83	2,388	0.87
	5	943	0.86	1,469	1.34	1,606	1.47
	16	879	2.57	1,268	3.70	1,369	4.00
F3	2	977	0.36	2,373	0.87	2,495	0.91
	5	957	0.87	1,584	1.45	1,749	1.60
	16	883	2.58	1,350	3.94	1,471	4.30

<sup>a</sup> Revenue is calculated assuming the toll would be charged in one direction only for a full calendar year (i.e., 365 days).

For purposes of comparing the alternatives, DOT&PF identified a toll amount that would cover annual expenses for maintaining and operating the bridge(s) and road. The average annual bridge and approach road expenses would be approximately \$250,000 for Alternative C3-4 and \$200,000 for Alternative F3.<sup>10</sup> Considering these costs and based on anticipated traffic volumes associated with different toll amounts,<sup>11</sup> the toll amount associated with Alternative C3-4 would be \$5 for the first 4 years, reduced to \$2 in following years. For Alternative F3, the initial toll would also be \$5, reduced to \$2 after 2 to 3 years.

**2.1.2.1 Alternative C3-4: Airport Bridge**

**Alignment.** Alternative C3-4 was developed as a lower cost variant of Alternatives C3(a) and C4, which were analyzed in the 2004 FEIS. The alignment of Alternative C3-4 is shown on Figure 2.4. On Revillagigedo Island, travelers would access this alternative from North Tongass Highway by using the existing Don King Drive. The alternative would begin at the intersection of Don King Drive with Rex Allen Drive. No new construction is proposed along Don King Drive. Alternative C3-4 would follow the alignment of Rex Allen Drive around the Walmart store and continue to traverse the hillside southward along an existing topographic bench, gain elevation, and then make a right angle turn southwest, toward Gravina Island. By taking off from Don King Drive and making use of a topographic bench on Revillagigedo Island, the cost of providing a curved structure on the east side of the bridge is eliminated. The roadway would transition onto the bridge, cross over the North Tongass Highway and Tongass Narrows, and turn southward parallel to the airport runway. The bridge would cross over the seaplane facilities adjacent to the airport and ultimately touch down (reach the ground surface) on Gravina Island north of the airport terminal at the existing parking lot. The curve on the west approach to the bridge can be constructed using precast concrete girders, further reducing costs. The bridge would be supported by piers and would not require fill in Tongass Narrows other than the pier footings; i.e., there would be no fill placement in the airport seaplane basin. Bridge abutments would be constructed on fill on uplands. There would



Alternative C3-4 would follow the alignment of Rex Allen Drive around the Walmart store and continue to traverse the hillside southward along an existing topographic bench, gain elevation, and then make a right angle turn southwest, toward Gravina Island. By taking off from Don King Drive and making use of a topographic bench on Revillagigedo Island, the cost of providing a curved structure on the east side of the bridge is eliminated. The roadway would transition onto the bridge, cross over the North Tongass Highway and Tongass Narrows, and turn southward parallel to the airport runway. The bridge would cross over the seaplane facilities adjacent to the airport and ultimately touch down (reach the ground surface) on Gravina Island north of the airport terminal at the existing parking lot. The curve on the west approach to the bridge can be constructed using precast concrete girders, further reducing costs. The bridge would be supported by piers and would not require fill in Tongass Narrows other than the pier footings; i.e., there would be no fill placement in the airport seaplane basin. Bridge abutments would be constructed on fill on uplands. There would

<sup>10</sup> DOT&PF, Gravina Access Project Supplemental EIS Cost Estimate Report, prepared by HDR Alaska, Inc., August 2012.

<sup>11</sup> DOT&PF, Gravina Access Project Supplemental EIS Traffic Forecast, prepared by HDR Alaska, Inc., August 2012.

be no need to permanently relocate airport seaplane facilities; however, temporary relocation may be required during construction. The total length of the Alternative C3-4 alignment is 1.9 miles.

The following improvements would be made to Gravina Island roadways under Alternative C3-4.

- The Airport Creek Bridge would be ~~reconstructed~~ replaced with a new bridge constructed to be 36 feet wide.
- Seley Road would be constructed as a 36-foot-wide, gravel surface road from Lewis Reef Road to approximately the end of the Airport Reserve.

**Bridge Structure.** The Alternative C3-4 bridge across Tongass Narrows would be 48 feet wide and approximately 4,190 feet long. The maximum height of the bridge over the navigational channel would be approximately 280 feet above mean higher high water (MHHW). The main span of the bridge would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of 550 feet (see Figure 2.5). The design requires an adjustment of the cruise ship navigational trackline slightly to the east (i.e., toward Revillagigedo Island) so that it would be centered under the main span of the bridge.<sup>12</sup> The main span of the bridge would be over water with depths in excess of 40 feet (at low tide). These clearances would accommodate one-way passage of cruise ships (i.e., only one cruise ship could pass under the bridge at one time) and two-way passage of most other ships (including AMHS ferries).

**Cost.** The cost to construct this alternative is estimated to be ~~\$305,223~~ million. According to estimates, the 75-year lifecycle cost of this alternative would be approximately ~~\$222,322~~ million. The average annual O&M cost would be approximately \$244,000.<sup>13</sup> An electronic toll facility would add \$85,000 in construction costs and approximately \$150,000 in O&M costs. ~~Assuming a per-vehicle toll of \$5 initially and \$2 after the first 4 years, adding tolling to Alternative C3-4 would reduce the lifecycle cost to approximately \$214 million.~~<sup>14, 15</sup>

The total life cost of this alternative would be approximately ~~\$391,490~~ million. ~~With a toll, this alternative~~ Assuming a per-vehicle toll of \$5 initially and \$2 after the first 4 years, adding tolling to Alternative C3-4 would generate approximately ~~\$56,63~~ million in total revenue, which would reduce the total life cost to approximately ~~\$335,427~~ million.<sup>16</sup> (See Appendix F for detailed cost information.)

<sup>12</sup> DOT&PF assumes the AMHS ferry trackline would be the same as the cruise ship trackline.

<sup>13</sup> DOT&PF, Gravina Access Project Supplemental EIS Cost Estimate Report, prepared by HDR Alaska, Inc., August 2012.

<sup>14</sup> DOT&PF, Gravina Access Project Supplemental EIS Cost Estimate Report, prepared by HDR Alaska, Inc., August 2012.

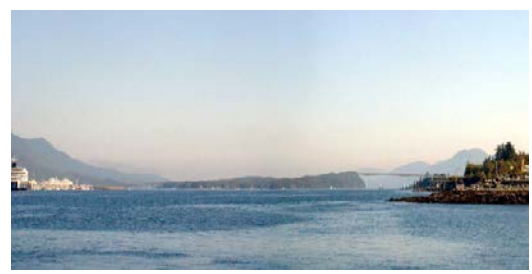
<sup>15</sup> The toll amounts are based on the revenue needed to cover annual expenses for maintaining and operating the bridge and road; i.e., \$250,000 for Alternative C3-4. As traffic volumes increase, the toll amount can be reduced (see Section 2.1.2).

<sup>16</sup> DOT&PF, Gravina Access Project Supplemental EIS Cost Estimate Report, prepared by HDR Alaska, Inc., August 2012.



### 2.1.2.2 **Alternative F3: Pennock Island Bridges**

**Alignment.** Figure 2.6 shows the Alternative F3 alignment. This is the same Alternative F3 as was analyzed in the 2004 FEIS, with a slight modification to the alignment at the Gravina Island touchdown point to connect with the existing Gravina Island Highway. The East Channel bridge would connect directly to South Tongass Highway on Revillagigedo Island 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, climbing in elevation to the West Channel bridge. The roadway on Pennock Island would be approximately 4,500 feet long between the East Channel and West Channel bridge abutments. From Pennock Island, the West Channel bridge would connect to the Gravina Island Highway, approximately 3 miles south of the airport on Gravina Island. The total road distance between Revillagigedo Island and the airport passenger terminal is 5.87 miles.



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

The following improvements would be made to Gravina Island roadways under Alternative F3.

- Gravina Island Highway would be widened to 40 feet and paved along its entire length.
- The bridge over Gravina Creek would be widened to 40 feet and paved.
- The bridge over Government Creek would be widened to 40 feet and paved.
- Airport Access Road would be widened to 40 feet and paved along its entire length (the tunnel under runway safety area to remain unchanged).
- The Airport Access Road/Gravina Island Highway intersection would be reconstructed to eliminate the curve and create a straight T-intersection.
- The Airport Creek Bridge would be replaced with a new bridge constructed ~~reconstructed~~ to be 36 feet wide.
- Seley Road would be constructed as a 36-foot-wide, gravel surface road from Lewis Reef Road to approximately the end of the Airport Reserve.

**Bridge Structures.** Alternative F3 would have two bridges that cross the two channels of Tongass Narrows via Pennock Island. The East Channel bridge would be approximately 1,985 feet long and have a maximum height of approximately 115 feet. The bridge would have a vertical navigational clearance of 60 feet above MHHW and a horizontal navigational clearance of approximately 350 feet (see Figure 2.7). The main span of the bridge would be over water depths in excess of 40 feet (at low tide); however, the vertical and horizontal clearances would not accommodate cruise ships or ferries. The primary waterway users of the East Channel under Alternative F3 would be tugs and barges, USCG vessels, charter boats, and local private craft.

The West Channel bridge would be approximately 2,470 feet long and have a maximum height of approximately 270 feet. The bridge would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of approximately 550 feet (see Figure 2.7). The main span would be located over water 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, which typically use the West Channel. The bridge crossing of the West Channel would be perpendicular to the main navigational channel.

**Channel Widening.** To improve its navigational characteristics for cruise ships transiting the West Channel, the narrowest portion of the channel would be widened under Alternative F3. Currently, the navigable portion of the West Channel for large cruise ships is approximately 400 feet wide at its narrowest point, with a minimum depth of 40 feet below mean lower low water (MLLW). The proposed modifications would widen this portion of the channel to 750 feet—the center 550 feet would have a minimum depth of 40 feet at low tide and the 100 feet of channel on either side would have a minimum depth of 30 feet at low tide (see Figures 2.8 and 2.9). The deepest part of the widened channel would be centered on the navigational opening of the West Channel bridge. These modifications would require dredging approximately 213,000 cubic yards over 14.8 acres. 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 modification area, the existing channel is already wider and deeper than the proposed modified channel.

**Cost.** The cost to construct this alternative is estimated to be ~~\$354,276~~ million. Estimates indicate that the 75-year lifecycle cost of this alternative would be approximately ~~\$286–385~~ million. The estimated average annual O&M cost is approximately \$188,000. An electronic toll facility would add \$85,000 in construction costs and approximately \$150,000 in O&M costs. ~~Assuming a per vehicle toll of \$5 initially and \$2 after the first 2 to 3 years,<sup>17</sup> adding tolling to Alternative F3 would reduce the lifecycle cost to approximately \$280 million.<sup>18</sup>~~

The total life cost of this alternative would be approximately ~~\$576–675~~ million. ~~Assuming a per vehicle toll of \$5 initially and \$2 after the first 2 to 3 years, adding tolling to Alternative F3~~ With a toll, this alternative would generate approximately ~~\$45–51~~ million in total revenue, which would reduce the total life cost to approximately ~~\$534–624~~ million.<sup>19</sup> (See Appendix F for detailed cost information.)

### 2.1.3 Ferry Alternatives

The FHWA and DOT&PF identified four reasonable ferry alternatives to evaluate in this ~~Draft~~ SEIS (see Figure 2.21):

- Alternative G2 – Peninsula Point to Lewis Point Ferry
- Alternative G3 – Downtown to South of Airport Ferry
- Alternative G4 – New Ferry Adjacent to Existing Ferry
- Alternative G4v – Lower Cost Variant of Alternative G4 Ferry

~~Each ferry alternative includes purchase of two new ferry vessels and construction of a new ferry terminal on each side of Tongass Narrows, as well as continued operation and maintenance of the existing airport ferry service under its current schedule and along its existing route.~~ The ferry locations of a Alternatives G2, G3, and G4 are shown in Figures 2.10, 2.11, and 2.12. These are the same ferry routes as those studied in the 2004 FEIS. Alternatives G2, G3, and G4 include purchase of two new ferry vessels and construction of a new ferry terminal on each side of Tongass Narrows, as well as continued operation and maintenance of the existing airport ferry service under its current schedule and along its existing route. The additional ferry service and road improvements associated with Alternatives G2 and G3 would open up access and accommodate traffic to developable lands on Gravina Island while the existing ferry

<sup>17</sup> The toll amounts are based on the revenue needed to cover annual expenses for maintaining and operating the bridge and road; i.e., \$200,000 for Alternative F3. As traffic volumes increase, the toll amount can be reduced (see Section 2.1.2).

<sup>18</sup> DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.

<sup>19</sup> DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.

continues to provide direct access to the airport. Under Alternative G4, the two new ferries would run adjacent to the existing ferry, providing increased capacity at that location to service airport travelers, as well as travelers accessing other lands on Gravina Island. Alternative G4v was added as a lower cost variant of Alternative G4 during the development of the 2013 Draft SEIS to account for a potential slower increase in demand for access. Like Alternative G4, Alternative G4v would involve the continued operation and maintenance of the existing airport ferry service under its current schedule and along its existing route; however, Under Alternative G4v, a new ferries and y and new ferry terminals berths would be purchased and constructed for Alternative G4v would be purchased and constructed adjacent to the existing ferry only when ferry demand increases enough to warrant it in future years. Based on traffic projections prepared during the development of the 2013 Draft SEIS, however, such demand this would not occur within the 75-year lifecycle of the project.<sup>20</sup> Therefore, for purposes of this Draft SEIS, Alternative G4v does not include the addition of new ferries or ferry berths terminals or ferries.

The schedule of the new ferry service with any of the ferry a Alternatives G2, G3, and G4 would be similar to that of the existing ferry service: one vessel would operate during the winter (operating 16 hours per day, crossing every 30 minutes (on the quarter hour from the ferry terminal on Revillagigedo Island and on the hour and half hour from the airport ferry terminal), and both vessels would operate during the summer (one ferry operating 8 hours per day from approximately 6:00 a.m. to 8:00 a.m. and from 4:00 p.m. to 10:00 p.m., crossing every 30 minutes; and two ferries operating 8 hours per day from approximately 8:00 a.m. to 4:00 p.m., crossing every 15 minutes). The cost estimates assume that the ferry vessels would be replaced after 35 years.

**Note that descriptions of the ferry alternatives have been revised in this SEIS to clarify terminology: “ferry terminal” refers to the site that includes all shoreside facilities at a given location, and “ferry berth” refers to the transfer bridge and ramp where a ferry vessel would moor to load and unload passengers.**

Toll collection would continue at the existing rates for travel on all ferries under all ferry alternatives. Table 2-2 and Table 2-3 illustrate the 2016 tolls for pedestrians and vehicles using the existing ferry service.

**Table 2-2: 2016 One-Way Airport Ferry Passenger Tolls [New]**

<u>Age</u>	<u>Toll</u>
<u>12 and Older</u>	<u>\$6.00</u>
<u>6 to 11</u>	<u>\$3.00</u>
<u>5 and Under</u>	<u>Free</u>

Source: Ketchikan Gateway Borough Alaska website, “Airport Ferry.”  
<http://www.borough.ketchikan.ak.us/147/Airport-Ferry> (accessed on: January 6, 2017).

**Table 2-3: One-Way Airport Ferry Vehicle Tolls [New]**

<u>Vehicle Type</u>	<u>Toll</u>
<u>Cars, Light Trucks, Vans</u>	<u>\$7.00</u>
<u>Motorcycles, Scooters</u>	<u>\$3.00</u>

<sup>20</sup> DOT&PF, Gravina Access Project Supplemental EIS Cost Estimate Report, prepared by HDR Alaska, Inc., August 2012.

<u>Vehicle Type</u>	<u>Toll</u>
<u>Box trucks, Box Vans, Buses up to 35 feet</u>	<u>\$10.00</u>
<u>Oversized Vehicles – over 35 feet long or 8.5 feet wide</u>	<u>\$38.00</u>
<u>Vehicles over 80 feet</u>	<u>Not Permitted</u>

Source: Ketchikan Gateway Borough Alaska website, "Airport Ferry."  
<http://www.borough.ketchikan.ak.us/147/Airport-Ferry> Accessed on: January 6, 2017.

All ferry alternatives include a ~~60~~-new passenger waiting facility with restrooms at the existing ferry terminal on Revillagigedo Island and other improvements to the terminal site, including:

- Expansion of paved parking areas<sup>21</sup>
- Lighting
- Security (including security cameras)
- Water
- Sewer
- Covered walkways
- Fencing, landscaping
- Parking meter system
- Sidewalks
- Tongass Highway access improvements

All ferry alternatives would require two shuttle vans to carry both pedestrians and their luggage from the existing ferry terminal on Revillagigedo Island to the airport terminal on Gravina Island, in addition to:

- A new heavy freight ~~dock mooring facility on a 2.5-acre site~~ near the airport, just to the south of the existing airport ferry layout berth dock to provide heavy freight access to Gravina Island for highway loads that cannot be accommodated by the shuttle ferry (see Figure 2.13). This facility would be capable of landing vessels and barges carrying large loads such as construction equipment and materials, transit mixers, fuel tankers, and fire trucks. The ~~dock~~ heavy freight mooring facility would also be capable of accommodating AMHS-class vessels needing temporary layout. Dock facilities that can accommodate the large loads are currently available on the Revillagigedo Island side of Tongass Narrows.
- Reconstruction of the existing airport ferry transfer bridges and ramps to meet current design standards (see Figures 2.14 and 2.15). These facilities are inspected regularly by DOT&PF and would need to be replaced twice during the 75-year lifecycle.
- Upgrades and improvements to all sidewalks and wheelchair ramps associated with the airport ferry facilities to meet applicable standards.
- Construction of new ~~and maintenance of existing~~ toll facilities. Toll collection would continue at the existing rate for all ferry routes and toll revenue would be used to offset the costs of operation and maintenance of the ferry system. The cost estimates assume annual revenue of \$1.5 million per year from ferry tolls.
- Replacement of the existing ferry layout dock and transfer bridge<sup>22</sup> to support layout and maintenance of the airport ferry system (see Figure 2.13).

<sup>21</sup> DOT&PF does not assume property will be purchased and developed for parking facilities.

Figure 2.3 shows typical cross-sections of the proposed new roadways connecting the ferry terminal sites for Alternatives G2 and G3 on Gravina Island with the existing road network.

### 2.1.3.1 Alternative G2: Peninsula Point to Lewis Point Ferry

Alternative G2 entails continued operation of the existing airport ferry and new ferry service for vehicles and passengers between Peninsula Point on Revillagigedo Island and Lewis Point on Gravina Island (see Figure 2.10).



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

**Ferry Facilities and Roadway Connections.** This alternative would cross Tongass Narrows approximately 2.0 miles north of the airport passenger terminal from Peninsula Point to Lewis Point and would have a sailing distance of approximately 0.8 mile. Two new ferry vessels and construction of a new ferry terminal on each side of Tongass Narrows would be required for this alternative. Dredging may be required to provide adequate navigational depth for the ferry berth on Gravina Island: approximately 1,400 cubic yards of material would be removed from an area of approximately 0.3 acre.

A 0.8-mile-long, 40-foot-wide paved access road would be constructed on Gravina Island to connect the ferry terminal site to Seley Road. The following improvements would be made to Gravina Island roadways under Alternative G2:

- Seley Road would be constructed as a 36-foot-wide, gravel road north from the ferry terminal access road to approximately the Airport Reserve boundary.
- Seley Road would be constructed as a 40-foot-wide, paved road from the ferry terminal access road to Lewis Reef Road.
- The Airport Creek Bridge would be replaced with a new bridge constructed ~~reconstructed~~ to be 40 feet wide and paved.
- Lewis Reef Road would be widened to 40 feet and paved from Seley Road to Airport Access Road.
- The Airport Access Road/Gravina Island Highway intersection would be reconstructed to eliminate the curve and create a straight T-intersection.
- Airport Access Road would be widened to 40 feet and paved along its entire length (the tunnel under runway safety area to remain unchanged).

**Cost.** The cost to construct this alternative is estimated to be ~~\$122~~<sup>81</sup> million. The estimated 75-year lifecycle cost of this alternative is approximately ~~\$331~~<sup>338</sup> million, and its estimated average annual O&M cost is approximately \$5.9 million.<sup>23</sup>

The total life cost of this alternative, which includes the cost to build and operate the new ferry facilities as well as continued operation of the existing airport ferry, would be approximately

<sup>22</sup> The existing layup dock was originally a segment of the State of Washington I-90 floating bridge. It was recycled for use as the Borough's dock. It has always had a slight list that cannot be corrected with ballasting, and it is not long enough to tie up the new ferries. The transfer bridge between the shore and dock has been regularly inspected by DOT&PF and is in such a state of disrepair that its load-carrying capabilities have been steadily downgraded and is now closed to public access.

<sup>23</sup> DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.



~~\$1,330-2,017~~ million. Over the life of the project, the total revenue would be approximately ~~\$505~~ ~~451~~ million, which would reduce the total life cost to approximately ~~\$879~~ 1,512 million.<sup>24</sup> (See [Appendix F for detailed cost information.](#))

### 2.1.3.2 **Alternative G3: Downtown to South of Airport Ferry**

Alternative G3 entails continued operation of the existing airport ferry and new ferry service for vehicles and passengers between Ketchikan (near the Plaza Mall at Bar Point) on Revillagigedo Island and a location near Clump Cove on Gravina Island (see Figure 2.11).

**Facilities and Roadway.** This alternative would cross Tongass Narrows approximately 1.3 miles south of the airport passenger terminal and would have a crossing distance of approximately 1.3 miles. This alternative would require construction of a new ferry terminal on each side of Tongass Narrows and two new ferry vessels. ~~No~~ ~~dredging would~~ may be required to provide adequate navigational depth for the ferry ~~terminal~~ berths on Revillagigedo Island and Gravina Island: approximately 18,600 cubic yards of material in total would be removed from an area of approximately 2.2 acres. The existing breakwater would be incorporated into the design of the ferry terminal parking lot and pier.



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

A 0.2-mile-long, 40-foot-wide paved access road would be constructed on Gravina Island to connect the ferry terminal site to the Gravina Island Highway. The following improvements would be made to Gravina Island roadways under Alternative G3:

- Gravina Island Highway would be widened to 40 feet and paved from the ferry access road to the intersection with the Airport Access Road.
- The bridge over Government Creek would be widened to 40 feet and paved.
- The Airport Access Road/Gravina Island Highway intersection would be reconstructed to eliminate the curve and create a straight T-intersection.
- Airport Access Road would be widened to 40 feet and paved along its entire length (the tunnel under runway safety area to remain unchanged).
- The Airport Creek Bridge would be replaced with a new bridge constructed ~~reconstructed~~ to be 36 feet wide.
- Seley Road would be constructed as a 36-foot-wide, gravel surface road from Lewis Reef Road to approximately the end of the Airport Reserve.

**Cost.** The cost to construct this alternative is estimated to be ~~\$10770~~ million. The estimated 75-year lifecycle cost of this alternative is approximately ~~\$314-316~~ million, and its estimated average annual O&M cost is approximately \$5.9 million.<sup>25</sup>

The total life cost of this alternative, which includes the cost to build and operate the new ferry facilities as well as continued operation of the existing airport ferry, would be approximately ~~\$1,942~~ 262 million. Over the life of the project, the total revenue would be approximately

<sup>24</sup> DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.

<sup>25</sup> DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.

~~\$506451~~ million, which would reduce the total life cost to approximately ~~\$811~~1,436 million.<sup>26</sup>  
(See Appendix F for detailed cost information.)

### 2.1.3.3 **Alternative G4: New Ferry Adjacent to Existing Ferry**

Alternative G4 would include continued operation of the existing airport ferry for vehicles and passengers and new ferry service adjacent to that operation. New ferry ~~terminals~~berths would be located ~~at adjacent to~~ the existing airport ferry terminals adjacent to the existing ferry berths and new ferries would operate on an adjacent ferry route from Charcoal Point on Revillagigedo Island to the airport on Gravina Island (see Figure 2.12).

**Facilities and Roadway.** This alternative would cross Tongass Narrows approximately 2.8 miles north of downtown. The crossing distance is approximately 0.25 miles. This alternative would require two new ferry vessels and construction of a new ferry ~~terminal~~berth on each side of Tongass Narrows adjacent to the existing airport ferry ~~terminals~~berths. No dredging would be needed for the ferry berths. The following improvements would be made to Gravina Island roadways under Alternative G4:

- The Airport Creek Bridge would be replaced with a new bridge constructed ~~reconstructed~~ to be 36 feet wide.
- Seley Road would be constructed as a 36-foot-wide, gravel surface road from Lewis Reef Road to approximately the end of the Airport Reserve.

**Cost.** The cost to construct this alternative is estimated to be ~~\$9162~~ million. The estimated 75-year lifecycle cost of this alternative is approximately ~~\$301~~294 million, and its estimated average annual O&M cost is approximately \$5.9 million.<sup>27</sup>

The total life cost of this alternative, which includes the cost to build and operate the new ferry facilities as well as continued operation of the existing airport ferry, would be approximately ~~\$1,872~~207 million. Over the life of the project, the total revenue would be approximately ~~\$506451~~ million, which would reduce the total life cost to approximately ~~\$756~~1,633 million.<sup>28</sup>  
(See Appendix F for detailed cost information.)

### 2.1.3.4 **Alternative G4v (Preferred Alternative): Lower Cost Variant of Alternative G4**

Alternative G4v was added as a lower cost alternative to Alternative G4 to address immediate needs for improved shoreside facilities for airport travelers and heavy freight movement. ~~With Alternative G4v, would include the continued operation of the existing airport ferry for vehicles and passengers with no additional ferry vessels providing service across Tongass Narrows and no new ferry berths however, additional ferry service and terminals adjacent to the existing ferry service and terminals would be provided only when increased demand warrants additional service.~~

Like the other ferry alternatives, Alternative G4v includes the passenger waiting facility, shuttle vans, new heavy freight deck mooring facility, reconstructed airport ferry transfer bridges, upgraded sidewalks and ramps, continued toll collection, and replacement of the ferry layout dock. Improved access would only relate to the benefits provided by shoreside amenities.

**Facilities and Roadway.** This alternative would cross Tongass Narrows approximately 2.8 miles north of downtown. The crossing distance is approximately 0.25 mile. There would be no reduction in travel time.

<sup>26</sup> DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.

<sup>27</sup> DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.

<sup>28</sup> DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.

The following improvements would be made to Gravina Island roadways under Alternative G4v:

- The Airport Creek Bridge would be replaced with a new bridge constructed to be 36 feet wide.
- Seley Road would be constructed as a 36-foot-wide, gravel surface road from Lewis Reef Road to approximately the end of the Airport Reserve. DOT&PF might choose to construct this road in phases: the first phase would be construction of a 14-foot-wide gravel surface road and the second phase would widen the road to 36 feet. This SEIS discloses the impacts that would result from construction of the 36-foot-wide road.

**Cost.** The cost to construct facilities associated with this alternative is estimated to be \$~~4623~~ million. According to estimates, the 75-year lifecycle cost of alternative G4v would be approximately \$~~182-171~~ million, and its average annual O&M cost would be approximately \$3.6 million.<sup>29</sup>

The total life cost of this alternative would be approximately \$1,~~163,050~~ million. Over the life of the project, the total revenue would be approximately \$~~338-379~~ million, which would reduce the total life cost to approximately \$~~742-784~~ million.<sup>30</sup> (See Appendix F for detailed cost information.)

Figure 2.44-~~16~~ compares total life costs of each of the alternatives over a 75-year period, following a 5-year construction period. Note that the ferry alternatives show sharp increases in cost every 35 years due to replacement of the ferry vessels.

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

All reasonable alternatives under consideration (including the No Action Alternative) have been developed to a similar level of detail in this SEIS and their comparative merits have been evaluated. Based on the analyses in the 2013 Draft SEIS and considering public and agency input, the DOT&PF and FHWA determined Alternative G4v to be the preferred alternative. Alternative G4v meets the immediate needs of improving access to Ketchikan International Airport and developable land on Gravina Island by improving shoreside facilities for travelers. It partially meets the need of promoting environmentally sound, planned long-term economic development on Gravina Island by providing and improving roads to developable lands (i.e., Gravina Island Highway as constructed and Seley Road/Airport Creek Bridge improvements). Alternative G4v would have the least impact to natural habitat as compared with other build alternatives, would not affect historic properties, and would not require relocation of any residences or businesses.

The bridge alternatives in this SEIS have the highest construction costs of all reasonable alternatives. In addition to cost, the findings of this SEIS show that the reasonable bridge alternatives would have adverse impacts to air navigation (Alternative C3-4) and marine navigation (Alternatives C3-4 and F3):

- In 2014, the Federal Aviation Administration (FAA) conducted an aeronautical study under the provisions of 14 CFR Part 77 concerning the potential hazard of the Alternative C3-4 bridge with respect to navigable airspace at Ketchikan International Airport. Based on that study, FAA determined that Alternative C3-4 would have substantial adverse effect on the safe and efficient utilization of the airport's navigable airspace.

<sup>29</sup> DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.

<sup>30</sup> DOT&PF, *Gravina Access Project Supplemental EIS Cost Estimate Report*, prepared by HDR Alaska, Inc., August 2012.

- During development of the 2004 FEIS, the USCG indicated that closing East Channel to large vessel traffic with Alternative F3 would not meet the reasonable needs of navigation in Tongass Narrows.<sup>31</sup> With Alternative F3, vessels requiring more than 60 feet of vertical clearance would need to transit under the West Channel bridge or enter and exit Tongass Narrows from the north. Either option would have an adverse effect on cruise ship operations because it would require additional maneuvering and increased sailing time. Safety concerns for large ships navigating under either proposed bridge alternative (C3-4 or F3) were also noted by cruise ship lines and marine pilots in scoping comments and comments on the 2013 Draft SEIS. Longer ships would have an increased risk of allision with bridge piers and taller ships would have to schedule transiting under the bridge with lower tides to have clearance under the bridge deck.

In its comments on the 2013 Draft SEIS, the City of Ketchikan expressed concern for potential impacts to the local economy from changes to cruise ship travel patterns with the bridge alternatives (see City of Ketchikan comments on the 2013 Draft SEIS at Table 7-6 of this SEIS). The Southeast Alaska Pilots Association recommended against selection of Alternative C3-4 or F3, identifying safety of marine navigation and efficiency of maritime transportation as major concerns.

With identification of Alternative G4v as their preferred alternative, FHWA and DOT&PF meet the State of Alaska's objective "to identify the most fiscally responsible alternative" and would avoid impacts on the airspace of Ketchikan International Airport and marine navigation through Tongass Narrows.

## **2.2 Alternatives Previously Considered but Eliminated From Further Consideration**

To identify alternatives to be considered in this ~~Draft~~ SEIS, FHWA and DOT&PF, with input from stakeholder agencies and the public, developed a screening process to examine all of the possible alternatives for ~~this~~ the 2013 Draft SEIS. The purpose of the screening process was to identify a range of reasonable alternatives and eliminate those that could not be considered reasonable based on cost, the manner in which they address the purpose and need for the project, or the possibility that they would cause unacceptable adverse impacts to the human and natural environment. This section describes the full range of alternatives initially considered in the process of developing ~~this~~ the 2013 Draft SEIS and why some were eliminated from further consideration and detailed analysis in ~~this~~ the 2013 Draft SEIS.

### **2.2.1 Reasonable Alternatives Identified in the 2004 FEIS**

In developing possible alternatives for consideration in ~~this~~ the 2013 Draft SEIS, FHWA and DOT&PF first considered the nine reasonable action alternatives from the 2004 FEIS: six bridge alternatives (C3a, C3b, C4, D1, F1, and F3) and three ferry alternatives (G2, G3, and G4). The nine reasonable action alternatives from the 2004 FEIS are described as follows:

#### **2.2.1.1 Bridge Alternatives**

**Alternative C3a** would consist of a bridge across Tongass Narrows approximately 2,500 feet north of the airport passenger terminal that connects to Signal Road on Revillagigedo Island. The alignment would be 2.2 miles long, including the 6,800-foot-long bridge and a 0.3-mile Airport Return Loop. The main bridge span would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of at least 550 feet. These navigational clearances would accommodate one-

<sup>31</sup> Letter from J.N. Helfinstine, USCG Bridge Section Chief, to David Miller, FHWA Alaska Division Administrator, October 9, 2008.

way passage of cruise ships and two-way passage of most other ships including the largest AMHS ferries. The maximum height of the bridge would be approximately 265 feet above MHHW. The bridge would penetrate Part 77 airspace.

**Alternative C3b** would include a bridge across Tongass Narrows approximately 3,600 feet north of the airport passenger terminal that connects to Signal Road on Revillagigedo Island. The alignment would be about 2.2 miles long, with a bridge that would be approximately 4,250 feet long and a 0.3-mile Airport Return Loop. The main span of this bridge would have a vertical navigational clearance of 120 feet above MHHW and a horizontal navigational clearance of approximately 500 feet. These navigational clearances would accommodate passage of ships as large as AMHS ferries. The maximum height of the bridge would be approximately 175 feet above MHHW, which would not penetrate Part 77 airspace.

**Alternative C4** would include a bridge across Tongass Narrows approximately 2,500 feet north of the airport passenger terminal. The bridge is generally on the same alignment as Alternative C3a, but the Revillagigedo Island approach connects near Cambria Drive. This alignment would be 2.1 miles long, with a bridge that would be approximately 5,000 feet long and a 0.4-mile Airport Return Loop. The main span of this bridge would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of over 550 feet. These navigational clearances would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries. The maximum height of the bridge would be approximately 260 feet above MHHW. The bridge would penetrate into Part 77 airspace.

**Alternative D1** would include a bridge that would cross Tongass Narrows directly east of the airport passenger terminal. The alignment would be about 1.6 miles long, and the bridge would be approximately 3,600 feet long with a 0.4-mile Airport Return Loop. The main span of this bridge would have a vertical navigational clearance of 120 feet above MHHW and a horizontal navigational clearance of approximately 500 feet. These navigational clearances would accommodate passage of ships as large as the AMHS ferries. The maximum height of the bridge would be approximately 165 feet above MHHW, which would not penetrate Part 77 airspace.

**Alternative F1** would be approximately 7.0 miles long and would cross Tongass Narrows with two bridges via Pennock Island. The access would begin along Stedman Street just to the south of Deermount Street and cross the East Channel to Pennock Island and the West Channel to Gravina Island. The East Channel bridge would be approximately 3,400 feet long, and have a maximum height of approximately 285 feet above MHHW. It would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of approximately 550 feet, which 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 2,465 feet long and have a maximum height of approximately 160 feet above MHHW. The bridge would have a vertical navigational clearance of 120 feet above MHHW and a horizontal navigational clearance of approximately 500 feet, which would accommodate passage of ships as large as the AMHS ferries, but not the largest cruise ships.

**Alternative F3** would be approximately 5.9 miles long and would cross Tongass Narrows with two bridges via Pennock Island. The access would begin at South Tongass Highway south of the USCG Station and cross the East Channel to Pennock Island and the West Channel to Gravina Island. The East Channel bridge would be approximately 1,985 feet long and have a maximum height of approximately 115 feet above MHHW.



The bridge would have a vertical navigational clearance of 60 feet above MHHW and a horizontal clearance of approximately 350 feet. These clearances would not accommodate cruise ship, AMHS ferries, or tall freight barges that currently use the East Channel as their primary navigational route. The primary users of the East Channel are anticipated to be smaller tugs and barges, and commercial and recreational vessels with air drafts less than 60 feet. The West Channel bridge would be approximately 2,470 feet long and have a maximum height of approximately 270 feet above MHHW. The bridge would have a vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of approximately 550 feet, which would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries. This alternative requires dredging the West Channel to improve its navigational characteristics.

### 2.2.1.2 **Ferry Alternatives**

**Alternative G2** would include a new ferry service that would complement the existing airport ferry for vehicles and passengers between Peninsula Point on Revillagigedo Island and Lewis Point on Gravina Island. This alternative would cross Tongass Narrows approximately 2.0 miles north of the airport passenger terminal and would have a sailing distance of approximately 0.8 miles. Two new ferry vessels and construction of a new ferry terminal on each side of Tongass Narrows would be required for this alternative. A 0.8-mile long road would be constructed on Gravina Island to connect the ferry terminal at Lewis Point with Seley Road.

**Alternative G3** would include new ferry service that would complement the existing airport ferry for vehicles and passengers between downtown Ketchikan at Jefferson Street (near the Plaza Mall at Bar Point) on Revillagigedo Island and a location approximately 1.3 miles south of the airport passenger terminal on Gravina Island near Clump Cove. The crossing distance would be approximately 1.3 miles. 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 depth for the ferry terminals on Revillagigedo Island and Gravina Island. The existing breakwater could also be widened and extended for use as the ferry terminal pier. A paved road would be constructed on Gravina Island from the ferry terminal past the new Runway 11/29 extension approximately 0.2 miles to the Gravina Island Highway.

**Alternative G4** would consist of new ferry service for vehicles and passengers adjacent to the existing airport ferry route between Charcoal Point on Revillagigedo Island and the existing airport ferry lay-up berth on Gravina Island on a quarter-mile crossing of Tongass Narrows, approximately 2.6 miles north of downtown. This alternative would require two new ferry vessels and construction of a new ferry terminal berth on each side of Tongass Narrows adjacent to the existing airport ferry berths terminals.

### 2.2.2 **Alternatives Identified During SEIS Scoping**

During the scoping process for the SEIS,<sup>32</sup> several commenters suggested additional alternatives or features for FHWA and DOT&PF to consider in the Gravina Access Project. Additional comments regarding alternatives were received during the review of alternatives

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<sup>32</sup> FHWA and DOT&PF initiated agency scoping on July 1, 2008. Public scoping was initiated with the Notice of Intent published in the Federal Register (FR) on July 2, 2008. Public scoping meetings were held in Ketchikan on July 22, 2008.

proposed for screening.<sup>33</sup> These ideas were either incorporated into one or more of the alternatives for screening or dismissed because they did not meet the purpose of and satisfy the needs for the project. The alternatives and features that were dismissed from further consideration and the reasons for their dismissal are characterized below:

- Provide a baggage and/or passenger check-in terminal at the existing ferry terminal on Revillagigedo Island. Arrangements for baggage and passenger check-in are coordinated by the airlines under FAA regulations, and are not a surface transportation issue.<sup>34</sup> The difficulty for pedestrians with baggage using the ferry would be addressed with shuttle vans, as described above.
- Use aerial cable trams for access between Revillagigedo Island and Gravina Island. A tram would not provide vehicular access between the islands and would not promote long-term economic development on Gravina Island.
- Relocate AMHS operations to Ward Cove or Gravina Island. This option would not improve the linkage between Revillagigedo and Gravina islands.
- Construct additional roads on Pennock Island (6.5 miles) and Gravina Island (7.75 miles). This option would add substantial cost to the alternatives and would not improve the linkage between Revillagigedo and Gravina islands.
- Build four small boat harbors on Pennock and Gravina Islands. This option would add substantial cost to the alternatives and would not improve the linkage between Revillagigedo and Gravina islands.
- Build out the electrical system along the new road system. Utilities could be expanded along the existing and proposed road network; however, improved access between Revillagigedo and Gravina islands is not dependent on this feature.
- Develop a heavy freight terminal on Revillagigedo Island adjacent to the existing airport ferry terminal. Heavy freight facilities exist on Revillagigedo Island. There is no need for new heavy freight handling facilities.
- Pay outstanding debt for the motor vessel (MV) Oral Freeman and other Ketchikan International Airport improvements. This does not meet the purpose and need for the project because it is not an element that would improve surface transportation between Revillagigedo and Gravina islands.<sup>35</sup>
- Establish a “Gravina Access Permanent Fund” with monies provided by the State of Alaska to pay for operating costs of the airport ferry system. A fund to defray ferry operating costs is outside the scope of this project because it does not pertain to the purpose of and need for the project.<sup>36</sup>
- Remove I-90 Floating Bridge Dock and construct a new boat dock on Gravina Island to handle vessels up to 100 feet long. Replacement of the deficient existing ferry layup dock and transfer bridge (consisting of a section of the old I-90 floating bridge) to support future layup and maintenance of the airport ferry system is a reasonable component of the ferry alternatives. Each of the ferry alternatives will include a layup dock so that maintenance layup can occur without blocking use of a ferry terminal. Constructing an additional length of dock for public use would not address the purpose of improving surface transportation

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<sup>33</sup> *Gravina Access Project Pre-screening Alternatives Memorandum*, dated February 6, 2009; distributed to cooperating, participating, and interested agencies on February 10, 2009, with a request for comments by March 9, 2009; distributed to the public on March 5, 2009, with a request for comments by April 6, 2009.

<sup>34</sup> Letter from David Miller, FHWA Alaska Division Administrator, to Dan Bockhorst, Ketchikan Gateway Borough Manager, July 23, 2009.

<sup>35</sup> Letter from David Miller, FHWA Alaska Division Administrator, to Dan Bockhorst, Ketchikan Gateway Borough Manager, July 23, 2009.

<sup>36</sup> Letter from David Miller, FHWA Alaska Division Administrator, to Dan Bockhorst, Ketchikan Gateway Borough Manager, July 23, 2009.

between Revillagigedo and Gravina islands for vehicles, bicycles, and pedestrians. In the past, joint use (ferry and public tie-up) docks have been built in other communities with the municipality providing funds for the public portion of the dock. [The Draft SEIS discusses the possibility of constructing a longer dock with a public use section if the Borough acquires the required funds.](#)

- Relocate the existing seaplane pullout approximately 100 yards to the west. This is not an element that would improve surface transportation between Revillagigedo and Gravina islands for vehicles, bicycles, and pedestrians. Relocating the seaplane pullout to improve seaplane operations is an FAA airport layout issue. Seaplane pullout relocation would only be included in a Gravina Access Project alternative if the physical layout of the alternative required it.

DOT&PF explored potential cost savings by changing some of the design parameters of previously considered alternatives and incorporating alternatives and features identified in the SEIS scoping process to develop variations for consideration in the screening process. This led to DOT&PF's identification of the following six new or revised alternatives:

**Alternative C3-4** is a variant of C3a and C4 that would remove a curve from the bridge main span and make use of existing roadway to the Rex Allen Drive/Don King Road intersection near Walmart, rather than requiring a large cut to Rex Allen Drive from the North Tongass Highway. This alternative is described in Section 2.1.2.1.

**Alternative F3v** is a variant of Alternative F3 that would reduce the length of the bridge structures by creating embankments with fill for the bridge approaches and would use a cable-stayed structure over East Channel. The intent was to achieve overall cost saving compared to Alternative F3.

**Alternative G4v** is a variant of Alternative G4 and was added as a lower cost alternative to Alternative G4 to address immediate needs for improved facilities for airport travelers and heavy freight movement, as described in Section 2.1.3.4.

**Alternative M1** would include a moveable bridge over Tongass Narrows near the quarry on Tongass Avenue and the existing ferry terminal on Gravina Island. In the lowered position, the vertical clearance would be 20 feet above MHHW, allowing passage of very small commercial vessels and recreation craft. In the raised position, the lift span would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries. The lift towers would penetrate Part 77 airspace.

**Alternative M2** would include a moveable bridge over Tongass Narrows near the two existing ferry terminals on Revillagigedo and Gravina islands. In the lowered position, the vertical clearance would be approximately 60 feet above MHHW, which would allow passage of most barges, commercial vessels, and many recreational craft. In the raised position, the lift span would accommodate one-way passage of cruise ships and two-way passage of most other ships, including AMHS ferries. The lift towers would penetrate Part 77 airspace.

**Alternative T1** is a modification of one of the tunnel alternatives presented in the 2004 FEIS. Alternative T1 would be a 3,200-foot submersed tunnel crossing between Peninsula Point on Revillagigedo Island and Lewis Point on Gravina Island at the location of Alternative G2. The crossing distance would be approximately 0.5 miles long. A 0.8-mile-long new road would be constructed on Gravina Island to connect the tunnel with Seley Road.

### **2.2.3 Screening of Alternatives**

The alternatives evaluated in the 2004 EIS and the alternatives identified during scoping comprise the 15 action alternatives that DOT&PF, in consultation with FHWA, evaluated in the

screening process to identify reasonable alternatives for the SEIS. [This screening process is described in detail in the March 2010 Alternatives Screening Report, which can be viewed on the project website \(http://dot.alaska.gov/sereg/projects/gravina\\_access/index.shtml\).](http://dot.alaska.gov/sereg/projects/gravina_access/index.shtml)

### 2.2.3.1 Screening Criteria

The screening factors for alternatives include cost, purpose and need, Section 4(f) impacts, and environmental or social impacts that would be unacceptable or unpermissible as defined by agencies having regulatory authority over those resources. The screening criteria are described in [Table 2-4](#).

**Table 2-4: Screening Criteria for Gravina Access Project SEIS Alternatives**

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**Criterion 1—Costs:** Each alternative was screened on the basis of construction costs.<sup>37</sup> FHWA and DOT&PF have determined that an alternative with estimated construction costs in excess of \$305 million is not reasonable, based on potentially available funds.<sup>38</sup>

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**Criterion 2—Purpose and Need:** The purpose of the Gravina Access Project is to improve surface transportation between Revillagigedo Island and Gravina Island. Alternatives screened under Criterion 2 were examined in the following context:

- Convenience and efficiency to users in the form of travel time to the airport and land that is or could be developed for residential, recreational, or commercial uses
- Reliability of transit across Tongass Narrows; e.g., frequency of access closures for any reason
- Ability to support Ketchikan Gateway Borough planned economic development on Gravina Island, expressed in terms of areas or road extensions likely to be developed, as conceived in the Borough's *Gravina Island Plan*

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**Criterion 3—Environmental or Socioeconomic Impacts Large Enough to Preclude Consideration:** This criterion focuses on the environmental or social impacts that would be unacceptable or unpermissible as defined by agencies having regulatory authority over those resources. Three primary impact categories were considered: impacts to wildlife and/or habitat, impacts to marine navigation, and impacts to aviation.

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**Criterion 4—Section 4(f) Impacts:** FHWA and other federal DOT agencies generally avoid the use of land from publicly owned parks, recreation areas, wildlife or waterfowl refuges, or historic sites unless:

- There is no feasible and prudent alternative to the use of land.
- The action includes all possible planning to minimize harm to the property resulting from use.

If at least one otherwise reasonable alternative avoids all Section 4(f) properties, or can be modified to avoid such properties, an alternative that does use Section 4(f) property was eliminated as not reasonable.

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### 2.2.3.2 Screening Process

A two-phased approach was used for the screening analysis. Alternatives were broadly screened for all criteria in the first phase. Alternatives that were clearly unreasonable based on the first phase of the screening were removed from further analysis. Alternatives that satisfied the first phase of screening were carried forward for consideration under a more detailed screening analysis. If an alternative did not satisfy one or more screening criteria in the second phase of the analysis, it was removed from further consideration. In this process, the alternatives that satisfied all four screening criteria were considered reasonable alternatives for evaluation in the SEIS.

[Table 2-5](#) characterizes the 15 action alternatives relative to the screening criteria in the first phase. Shaded cells in the table indicate areas where an alternative did not pass the screen.

<sup>37</sup> Construction costs used in the screening process were derived from the July 2009 *Construction Cost Estimate Report of the Alternatives to be Considered in the SDEIS Screening Process*, which is available on the project website ([http://dot.alaska.gov/sereg/projects/gravina\\_access/index.shtml](http://dot.alaska.gov/sereg/projects/gravina_access/index.shtml)).

<sup>38</sup> See Appendix A for letter from DOT&PF Commissioner dated September 17, 2009.

The paragraphs following the table provide further explanation of the first-phase screening results.

**Table 2-5: First Phase Screening Summary**

<b>Alternative</b>	<b>Criterion 1 Costs</b>  <i>Cost (in \$M) relative (+ or -) to \$305 million threshold</i>	<b>Criterion 2 Purpose and Need</b>  <i>Improved convenience, efficiency, and reliability of access to Gravina Island</i>	<b>Criterion 3 Unreasonable Environmental or Socioeconomic Impacts</b>	<b>Criterion 4 Section 4(f) impacts</b>
<b>Bridge Alternatives</b>				
C3a	<b>+158</b>	Achieved via unrestricted access	—	—
C3b	<b>+47</b>	Achieved via unrestricted access	<b>Impacts to marine navigation</b>	—
C4	<b>+136</b>	Achieved via unrestricted access	—	—
C3-4	-82	Achieved via unrestricted access	—	—
D1	-14	Achieved via unrestricted access	<b>Impacts to marine navigation</b>	—
F1	<b>+70</b>	Achieved via unrestricted access	—	—
F3	-29	Achieved via unrestricted access	—	—
F3v	<b>+44</b>	Achieved via unrestricted access	—	—
<b>Ferry Alternatives</b>				
G2	-224	Achieved via more frequent ferry service and alternative locations of access	—	—
G3	-235	Achieved via more frequent ferry service and alternative locations of access	—	—
G4	-243	Achieved via more frequent ferry service and new roads to developable lands	—	—
G4v	-282	Partially achieved via new roads to developable lands	—	—
<b>Movable Bridge Alternatives</b>				
M1	<b>+70</b>	Partially achieved; bridge raisings for marine traffic would cause unacceptable delays	—	—
M2	<b>+108</b>	Partially achieved; bridge raisings for marine traffic would cause unacceptable delays	—	—
<b>Tunnel Alternative</b>				
T1	<b>+112</b>	Achieved via unrestricted access	—	—

— = None identified

The results of the first phase of the screening process clearly indicate that Alternatives C3a, C3b, C4, F1, F3v, M1, M2, and T1 would have costs that are well beyond anticipated funding. In addition, Alternatives M1 and M2 also failed to meet the need for improved reliability of access because bridge raisings for marine traffic would cause unacceptable delays. In particular, scheduled bridge raises would be frequent in the summer and would severely inhibit traffic movement between Revillagigedo and Gravina islands with up to 30-minute delays, much longer than the delays in the No Action Alternative. Alternative C3b (in addition to exceeding the



cost criterion) and Alternative D1 did not meet the reasonable needs of navigation because they would preclude the passage of large cruise ships through Tongass Narrows. Given these results, Alternatives C3a, C3b, C4, D1, F1, F3v, M1, M2, and T1 were eliminated from further consideration in the Gravina Access Project SEIS. The remaining alternatives (Alternatives C3-4, F3, G2, G3, G4, and G4v) were carried forward and examined in greater detail in the second phase of the screening analysis.

With the cost threshold and Section 4(f) criteria strictly applied in the first phase, no further analysis of these factors was needed in the second phase of screening. Rather, the second phase of the screening process looked more closely at the alternatives relative to the criteria for purpose and need and environmental and socioeconomic impacts.

In reviewing Alternatives C3-4, F3, G2, G3, G4, and G4v relative to Criterion 2, it is clear that Alternatives C3-4 and F3 fully meet the project's purpose and need because they would provide free-flowing access across Tongass Narrows, 24 hours a day, 7 days a week. Bridge alternatives near the airport would maximize convenience, reliability, travel time reduction, and development support. Alternatives G2, G3, and G4 provide some improvement to the reliability of access, but little or no improvement to efficiency in terms of reduced travel times. Initially, Alternative G4v would not provide more sailings to improve the reliability of access, but the facilities on Revillagigedo Island would address the need for improved convenience of access for airport users and the heavy freight mooring deck facility would address the need for improved freight transportation, as would the other ferry alternatives. Alternatives C3-4, F3, G2, G3, G4, and G4v would all support Ketchikan Gateway Borough planned economic development on Gravina Island with improved access provided to developable lands by the Gravina Island Highway and the Lewis Reef Road. Alternatives C3-4, F3, G2, G3, G4, and G4v would sufficiently address one or more parts of the project purpose and need, and none were eliminated in the second phase of the screening process under Criterion 2.

For Criterion 3, Alternatives C3-4, F3, G2, G3, G4, and G4v were evaluated relative to aviation and marine navigation impacts, since none of the alternatives were identified as being unacceptable or unpermissible based on impacts to fish, wildlife, and water resources in the first phase of the screening process. At the time of the screening analysis, cConsultation with the FAA concerning the potential hazards associated with bridging Tongass Narrows revealed that, with appropriate marking and lighting, Alternative C3-4 would not be a hazard to air navigation and Alternative F3 would neither penetrate any airspace surfaces nor have any effect on approaches or departures from Ketchikan International Airport. While these bridge alternatives would affect seaplane operations, the impacts on seaplane operations would not preclude Alternatives C3-4 and F3 from consideration as reasonable alternatives.

Concerning marine navigation, Alternative C3-4 would be designed with navigational clearances that would support passage of all vessels currently transiting Tongass Narrows. DOT&PF modified Alternative F3 in response to USCG concerns over potentially hazardous navigation conditions in the West Channel for large cruise ships. With these modifications, DOT&PF considers Alternative F3 a reasonable alternative with respect to marine navigation through West Channel.

The ferry alternatives (Alternatives G2, G3, G4, and G4v) would have no effect on aviation or marine navigation other than adding a minor amount of cross-channel traffic in Tongass Narrows. Given the regular gaps in the ferry schedules, ferry maneuverability, and the past compatibility of the ferry service with seaplanes and other marine traffic in Tongass Narrows, these alternatives would not have unacceptable adverse effects on aviation or marine navigation.

Alternatives C3-4, F3, G2, G3, G4, and G4v satisfied Criterion 3 and passed the second phase of screening under Criterion 4.

**2.2.3.3 Screening Results**

Based on the results of this screening process, Alternatives C3a, C3b, C4, D1, F1, F3v, M1, M2, and T1 were eliminated from further consideration as reasonable alternatives for the Gravina Access Project. Alternatives C3-4, F3, G2, G3, G4, and G4v are reasonable alternatives and are evaluated in detail in this Gravina Access Project SEIS, along with the No Action Alternative.

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