Gravina Access Project
Supplemental Environmental Impact Statement
HP-NCPD-922(5) / 67698

Construction Cost Estimate Report

Prepared for:

Department of Transportation and Public Facilities
Southeast Region

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August 2012

EXECUTIVE SUMMARY

The purpose of this *Construction Cost Estimate Report* for the Gravina Island Access is to present cost estimates for the reasonable alternatives to be considered in the Gravina Access Project *Supplemental Environmental Impact Statement* (SEIS).

The cost for the preferred alternative identified in the 2004 *Record of Decision* (ROD) based on the Gravina Access Project *Environmental Impact Statement* (EIS), exceeded the funding that was available for the project, or was expected to become available in the foreseeable future. In 2008, the Department of Transportation and Public Facilities, Southeast Region (Department), determined that the 2004 cost estimates associated with the alternatives evaluated in the EIS should be updated to then current (2008) dollars. These estimates were to be used in the identification of reasonable alternatives to be evaluated in the SEIS.

HDR Alaska reassessed the costs of the six bridge alternatives (C3a, C3b, C4, D1, F1, and F3) and three ferry alternatives (G2, G3, and G4) evaluated in the EIS, as well as the No Action Alternative. Costs for a movable bridge alternative (M1) and a tunnel alternative (T1) were also developed. In addition, HDR evaluated a combined C3 and C4 bridge alternative, and a design variation of Alternative F3 to investigate potential cost savings resulting from changing the design speed, adding an extended approach embankment to or beyond the water's edge (causeway fill to shorten structure length), additional encroachment into the Part 77 airspace, adjusting existing vessel tracklines, or using different component or structure types. These design variants were presented as Alternatives C3-4 and F3v. The new estimates were also to include the parts of the Gravina Island Highway yet to be constructed. Subsequently, a phased construction approach to the airport ferry alternative (G4), and an alignment modification to the movable bridge alternative (M1) were requested to be considered, and identified as Alternatives G4v and M2, respectively. All these alternatives were described in the *Construction Cost Estimate Report of the Alternatives to be Considered in the SDEIS Screening Process*, dated July 31, 2009 (SEIS_Cost_Report_73109_FINAL.pdf).

All alternatives were presented to local government and resource agencies for comment, and evaluated against screening criteria, as summarized in the *Alternatives Screening Report*, dated March 2010 (gravina_access_SEIS_screening_report_march_2010.pdf). The screening process resulted in the identification of six reasonable build alternatives to be evaluated in the SEIS, namely C3-4, F3, G2, G3, G4, and G4v, in addition to the No Action Alternative.

This *Construction Cost Estimate Report* presents the construction costs for the two bridge alternatives, C3-4 and F3-1 (so named only in this document to reflect a minor change to Alternative F3 where it connects with the existing Gravina Island Highway: for all other purposes, Alternatives F3-1 and F3 are the same); the four ferry alternatives, G2, G3, G4, and G4v; and the aforementioned No Action Alternative, updated now to 2011 construction dollars.

To ensure a true comparison of the long-term costs of the alternatives, a life-cycle cost analysis was conducted for each reasonable alternative. Life-cycle costs incorporate the owner's operation and maintenance costs, as well as revenues expected from bridge tolls or ferry revenue.

Additionally, the total-life costs for the bridges and ferries were calculated to determine what the total estimated funding requirements over time would be at the end of the 75-year design life.

Table 1 summarizes the estimated construction cost; 75-year life-cycle cost, both without and with toll revenue; and the total life-time cost, both without and with revenue, for each alternative considered in this report.

Table 1: Construction, Life-Cycle, and Total Life-time Costs (without and with revenue)

Alternative	Construction Cost	Life-Cycle Cost	Life-Cycle Cost (revenue adjusted)	Total Life-Time Cost	Total Life-Time Cost (revenue adjusted)
C3-4	$ 223 M	$ 222 M	$ 214 M	$ 391 M	$ 335 M
F3-1	276 M	286 M	280 M	576 M	531 M
G2	81 M	331 M	265 M	1,330 M	879 M
G3	70 M	314 M	247 M	1,262 M	811 M
G4	62 M	301 M	234 M	1,207 M	756 M
G4v	23 M	182 M	132 M	1,050 M	712 M
No Action	0 M	88 M	35 M	929 M	590 M

Note: Costs are in 2011 dollars

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1.0 INTRODUCTION

1.1 Purpose of this Report

The purpose of this *Construction Cost Estimate Report* is to present cost estimates for the reasonable alternatives to be considered in the Gravina Access Project SEIS. This report updates previous estimates prepared for the alternatives presented in the EIS, and includes revisions, modifications, and changes in the alternatives now identified as reasonable alternatives by the Department since the original ROD was signed in September 2004.

1.2 Project Background

The purpose of the Gravina Island Access is to improve transportation between Revillagigedo (Revilla) Island and Gravina Island, and to both encourage development and provide access to recreational lands on Gravina Island (see Figure 1). Revilla Island has steep mountainous terrain, and the majority of the developable flat land is currently occupied by residential, commercial and industrial land uses. However, expansion opportunities exist across the Tongass Narrows on the flatter Gravina and Pennock islands. Travel between the islands is possible by a ferry that primarily services the Ketchikan International Airport. Pennock Island is accessed by water taxi or private boat. The study area for possible crossing locations is about 8 miles long, from Peninsula Point near Ward Cove to northwest of Saxman, centered on Tongass Narrows.

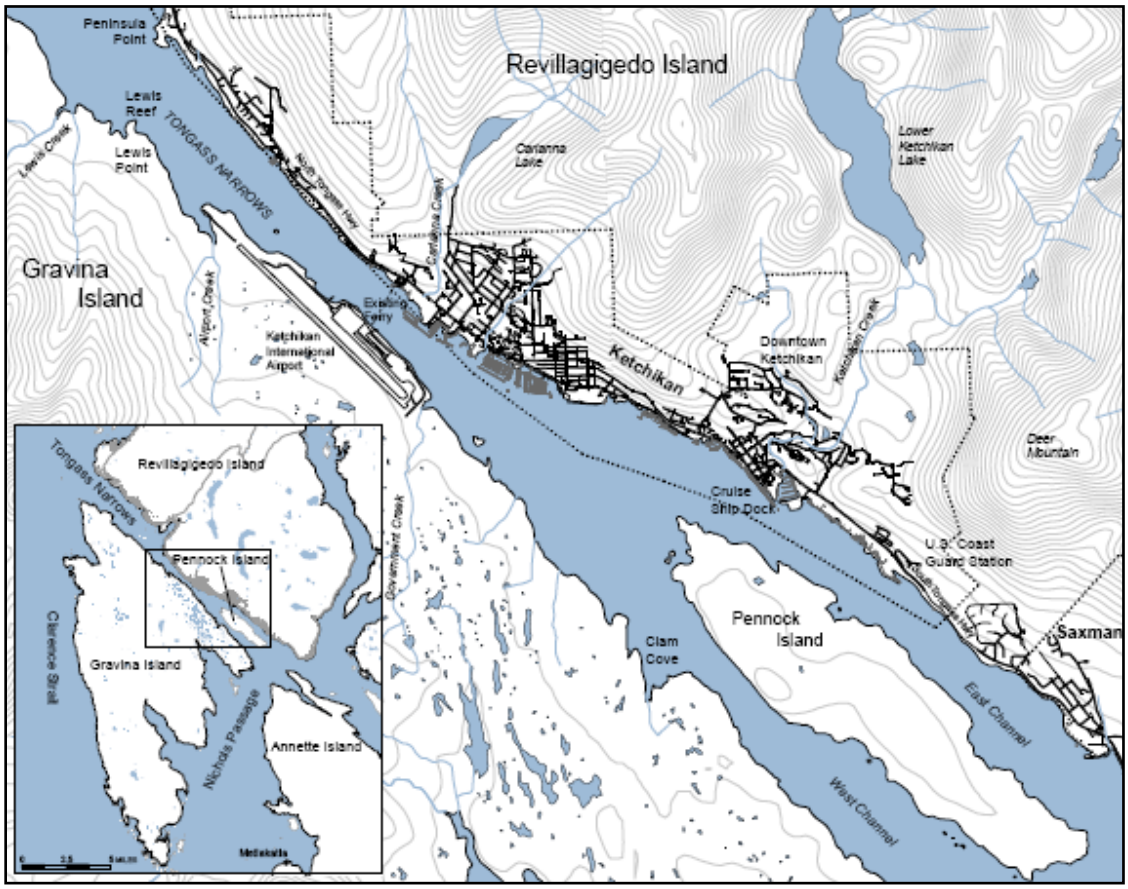

Figure 1: Gravina Island Access Vicinity Map

In 2004, the Department published an EIS that considered six bridge alternatives (C3a, C3b, C4, D1, F1, and F3), three ferry alternatives (G2, G3, and G4), and a No Action alternative to improve access between Revilla and Gravina islands. The ROD identified Alternative F1, which would cross Pennock Island and require bridges over East and West Channels, as the preferred alternative. In 2007, road construction commenced on Gravina Island as an initial phase of construction of Alternative F1 (Phase I). Subsequently, the Governor of Alaska directed the Department to cease further development of the F1 alternative and to look for the most fiscally responsible alternative for the Gravina Island Access; and in 2008, the Department and FHWA began work on the Gravina Access Project SEIS to identify whether a lower cost alternative could be found that was reasonable.

As part of this revised study, the original six bridge alternatives were supplemented with four more bridges (C3-4, F3v, M1, and M2) and a submerged tunnel (T1) crossing alternative. A more reduced scope ferry alternative (G4v) was added to the original three ferry alternatives. A passenger waiting terminal and baggage handling facilities at Charcoal Point, and a heavy freight dock and staging area on Gravina Island were incorporated into all the ferry alternatives. These costs were updated to 2008 dollars, and presented in the *Construction Cost Estimate Report of the Alternatives to be Considered in the SDEIS Screening Process*, July 31, 2009.

Subsequent to the study, the Department requested that all the build alternatives, regardless of mode, now include the replacement of the Airport Creek Bridge and the upgrade of the Seley Road to the northern airport boundary. The Department also requested that all of the ferry alternatives include replacement of the Ketchikan International Airport shuttle ferry lay-up berth.

The Department also recommended one small modification to the Alternative F3 alignment: the tangent after the last curve on Gravina Island was shifted to make better use of the existing Gravina Island Highway embankment that was constructed in 2007-08. This subtle change in centerline is identified herein as Alternative F3-1. (NOTE: for all other purposes, Alternatives F3 and F3-1 are the same.)

In early 2010, the Department produced the *Alternatives Screening Report* which identified the reasonable alternatives that would be evaluated in detail in the SEIS. These reasonable alternatives are two bridge alternatives -- C3-4 and F3, and four ferry alternatives -- G2, G3, G4, and G4v, in addition to the No Action alternative.

Additionally, direction was given to analyze the feasibility of charging tolls on the two bridge alternatives to help defray the maintenance and operational costs. This was submitted in the *Gravina Tolling and Toll Plaza Technical Memorandum*, September 29, 2010 (Appendix A).

This *Construction Cost Estimate Report* summarizes the costs for two bridge alternatives, four ferry alternatives, and the No Action Alternative, and updates costs to 2011.

2.0 DESIGN CONSIDERATIONS SUMMARY

The preliminary design criteria for the Gravina Access Project alternatives were developed during the EIS, and were formally presented for the preferred alternative, F1, in the *Design Study Report* (DSR), which was approved by the Department on August 1, 2005.

During preparation of the EIS, cost estimates developed for bridge alternatives near the airport were based on limited design information. For the SEIS, the Department commissioned the *Construction Cost Estimate Report of the Alternatives to be Considered in the SDEIS Screening Process* in which greater effort was placed on the engineering of the alternatives; ie, location, design speed, profile grade, structure types and features, navigational clearance requirements, and other similar issues. These design considerations eventually evolved into a revised set of design criteria which were approved by the Department on August 27, 2010. These design criteria are relied upon in this construction cost update.

The design considerations can be briefly summarized in subsections 2.1 through 2.10.

2.1 Traffic Volumes

Revised traffic forecasts were prepared for the SEIS and are summarized in this section. The original 2002 traffic counts have been adjusted to 2010 based on a 1 percent population growth rate. The 1990-2000 Ketchikan growth rate was approximately 2 percent; however, the Alaska Department of Labor projection for 2010-2030 indicates a decrease of about 1 percent. The 1 percent growth rate is considered a reasonable projection for the 20-year planning horizon.

Visitor traffic to Ketchikan has also flattened (or even decreased) over the past couple of years as shown in Figure 2; but the cruise industry says that more cruise ships will be placed in service and that there will be more port calls to Southeast Alaska.

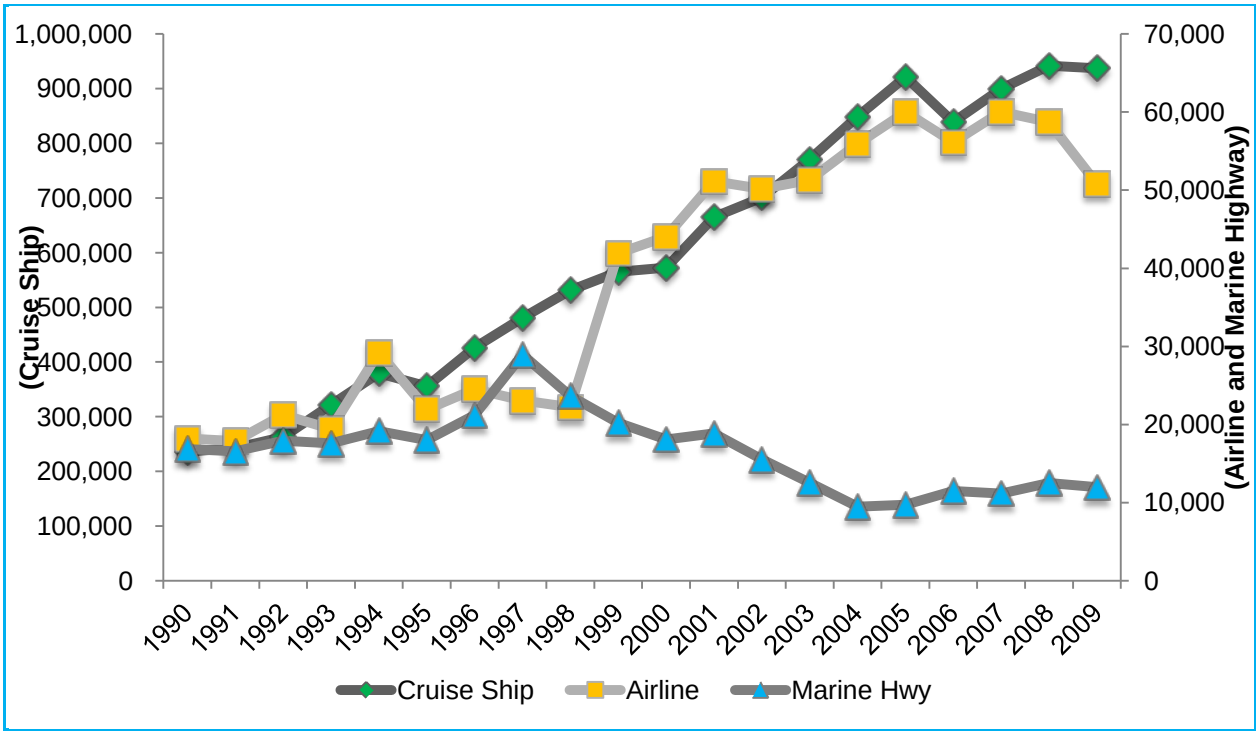

Figure 2: Visitor Traffic Trends

The traffic forecasts were developed for the bridge alternatives without and with a toll. Three toll options were considered for each bridge alternative: Option 1 assumed a rate similar to the current ferry service ($5/adults and $6/auto or light truck, or $16 for a double occupancy vehicle), Option 2 assumed a flat rate of $5, and Option 3 assumed $2 per vehicle[1]. In examining all of the different toll options, the Department considered the effect of tolling on traffic volumes.

For the ferry alternatives with new ferries and ferry terminals, the revised traffic forecasts, consistent with the 2004 Gravina Access Project FEIS, assumed that there is negligible difference in traffic flow between these ferry alternatives' location. Therefore, they were considered in one general "improved ferry alternative"[2]. Alternative G4v would offer no additional transportation service; therefore, its traffic forecast is the same as the No Action. The original traffic projections were updated and adjusted for fares, and are presented in Table 2.

Table 2: Average Daily Traffic Forecast

ALTERNATIVE	ADT Forecast*		
	2018	2030	2040
C3-4 – Airport Bridge Access (No toll)	995	2,500	2,611
F3-1 – Pennock Island Bridge Access (No toll)	1,012	2,597	2,730
C3-4 – Toll Option 3 ($2)	961	2,284	2,388
F3-1 – Toll Option 3 ($2)	977	2,373	2,495
C3-4 – Toll Option 2 ($5)	943	1,469	1,606
F3-1 – Toll Option 2 ($5)	957	1,584	1,749
C3-4 – Toll Option 1 ($16)	879	1,268	1,369
F3-1 – Toll Option 1 ($16)	883	1,350	1,471
G2, G3, and G4 -- Improved Ferry Access	256	278	282
Existing Ferry Access (No Action and Alternative G4v)	239	215	208

*DOT&PF Gravina Access Project SEIS Traffic Forecast Report, prepared by HDR, August 2012

Alternative F3-1 would encourage the most trips, mostly because it would create access to more land (Pennock Island), followed by Alternative C3-4, and then the ferry alternatives with additional ferries. The largest attractor is retail/commercial, residential development, and then air travel (see Table 3). As expected, the tolls result in a reduction in trips, with a greater trip decrease associated with increasing tolls. Without improved access, there is little encouragement for development on Gravina Island. Traffic projections for No Action and Alternative G4v, therefore, show a slight decline. Almost all development and elective trips cease at $5; only those that have to go to Gravina Island will make the trip, regardless of the cost.

The total vehicle trips across Tongass Narrows in 2040, characterized by trip purpose, are presented in Table 3.

[1] DOT&PF Gravina Access Project SEIS Traffic Forecast Report, prepared by HDR, August 2012
[2] DOT&PF Gravina Access Project SEIS Traffic Forecast Report, prepared by HDR, August 2012

Table 3: Total 2040 ADT by Trip Purpose

			No Toll		Toll Option 3 ($2)		Toll Option 2 ($5)		Toll Option 1 ($16)	
Trip Purpose*	**Existing Ferry**	**Improved Ferry**	**C3-4**	**F3-1**	**C3-4**	**F3-1**	**C3-4**	**F3-1**	**C3-4**	**F3-1**
Air Travel	132	132	515	515	498	498	489	489	458	458
Airport Business	55	55	179	179	179	179	179	179	179	179
Industrial	-	6	154	154	187	187	181	181	157	157
Retail/Commercial	-	-	979	953	841	817	-	-	--	--
Residential	4	73	750	895	651	782	726	868	547	649
Recreational	15	15	31	31	30	30	29	29	27	27
Tourism	1	1	3	3	3	3	3	3	2	2
TOTAL:		**282**	**2611**	**2730**	**2389**	**2496**	**1,606**	**1,749**	**1,369**	**1,471**

*DOT&PF Gravina Access Project SEIS Traffic Forecast Report, August 2012

For a complete discussion of the forecast assumptions, methodologies, and results, see the Gravina Access Project SEIS Traffic Forecast Report, August 2012.

2.2 Typical Section

The access roadways for each alternative require a two-lane road based on the projected traffic counts. All new construction on Revilla Island would be 40-foot wide paved roads (12-foot lanes with 8-foot shoulders). Existing roads on Gravina Island would be improved, depending on their relationship to each alternative. The approach roads to the bridge structure(s) or the ferry terminals would be on paved, 40-foot wide facilities. Other roads or road segments would either remain as 36-foot wide gravel roads (Gravina Island Highway and Lewis Reef Road), or be widened to 36-foot wide gravel roads (Airport Access Road and Seley Road). All build alternatives include the replacement of the bridge structure over Airport Creek with a 36-foot wide single span concrete girder bridge (or 40-foot wide in the case of Alternative G2). The Tongass Narrows bridge(s) would include an 8-foot walkway.

The paved roadway typical section is shown in Figure 3.

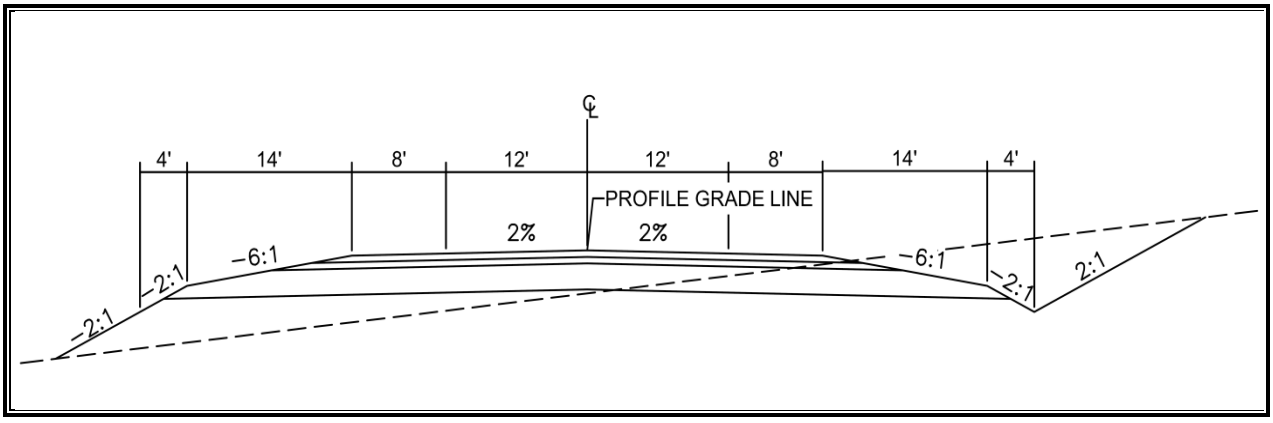

Figure 3: New Approach Roadway Typical Section

The 2005 DSR recommended acquisition in the rural area of a 300-foot wide, controlled-access corridor that would allow for frontage road access, utilities, and pathways in the future. In the urbanized area, a controlled-access right-of-way 100 feet wide should suffice, allowing for a two-lane urban roadway with provisions for future utilities and pedestrian facilities.

2.3 Design Speed

The design speed is 50 MPH for the roadways that traverse rural undeveloped lands, and a lower design speed within the urban developed street network. For the urban arterial segment, a design speed of 30 MPH would be consistent with the expected use. The roadways and structures crossing Tongass Narrows near the airport (C3-4, G4, and G4v) were designed as urban arterials with a design speed of 30 MPH; and the other crossings and Gravina Island roadways (F3-1, G2, and G3) were designed as rural highways with a design speed of 50 MPH[3].

2.4 Profile Grade

Roadway grades considered in the design of the alternatives are consistent with AASHTO standards; ie, 7 to 11 percent, depending on the local terrain (mountainous), and location (rural or urban). For the most part, the grades associated with all the alternatives are less than 6 percent, except for both the existing short hill on Misty Marie Lane at WalMart (9%) and the approach to the Ketchikan International Airport (8%) on the Alternative C3-4 bridge. Both of these roads will require close monitoring during the winter months.

2.5 Navigational Clearances

The majority of the ships calling in Southeast Alaska in 2011 was in the 800 to almost 1,000 foot long range, and carried between 1,500 and 2,600 passengers[4]. For these vessels, the Gravina Access Project EIS established the minimum vertical clearance to the lowest bridge member for alternatives designed to allow cruise ship passage at 200 feet above Mean Higher High Water (MHHW) (200 feet above MHHW equals 200.9 feet above Mean High Water [MHW], 207.4 feet above Mean Sea Level [MSL], 213.9 feet above Mean Low Water [MLW], and 215.4 feet above Mean Lower Low Water [MLLW]). This height was derived using the vertical clearance of Lions Gate Bridge in Vancouver, BC. The vertical clearance at Seymour Narrows aerial cable crossing is 185 feet, but the cable could feasibly be raised to 200 feet, matching the vertical clearance of the Lions Gate Bridge. The largest vessels currently operating in Tongass Narrows have an average air draft of approximately 165 feet, and an average gross tonnage of about 71,000 tons. A small number of ships with air drafts in excess of 200 feet and gross tonnages exceeding 100,000 tons have made port calls in Ketchikan in the past, but no such vessels called at Ketchikan in 2011[5]. In 2005, when Ketchikan port calls reached an historic peak, less than 8 percent of the port calls were ships with air drafts in excess of 200 feet and registered gross tonnages exceeding 110,000 tons. The Alaska Marine Highway System (AMHS) ferries require a minimum vertical clearance of 120 feet above MHHW based upon the current Columbia-class ferries[6].

The EIS also established horizontal navigational clearances, using 550 feet for one-way passage of cruise ships and 500 feet for two-way passage for AMHS ferries.

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[3] AASHTO Policy on Geometric Design of Highways and Streets, 2001, pages 474 and 448

[4] Reference Juneau 2011 cruise ship schedule (http://www.traveljuneau.com/downloads/Cruise_Ship_Calendar.pdf)

[5] Subsequent to a meeting with cruise ship pilots on June 14, 2010, the Department considered raising the minimum vertical clearance to accommodate the new Panamax ships that will have an air draft of almost 210-feet, and a requested new minimum height of 215-feet. Further review of the preliminary structure designs for Alternatives C3-4 and F3-1 suggest that possibly after construction, there may be 210-feet of vertical clearance, but during construction, there will only be 200-feet. A height of 215-feet may be tidally constrained, or mandate transit around Gravina Island.

[6] Glosten Reconnaissance of Vessel Navigation Requirements, May 2003 (Gravina Access Project FEIS Appendix G)

Alternative F3-1 would require dredging of the West Channel to accommodate the deeper drafts for the cruise industry. Some of the ferry options would require minor dredging only near the docks to allow for maneuvering.

The Alternative F3-1 low bridge over the East Channel would be designed to allow barge traffic with a horizontal clearance of 350 feet and a vertical clearance of 60 feet above MHHW (for comparison, the middle 250 foot opening under the Gastineau Channel Bridge in Juneau is 51 feet high at MHW, about 50 feet at MHHW[7]. The Near Island Bridge in Kodiak has about 100 feet of vertical clearance, the clearance under the Japonski Bridge in Sitka is 50 feet at MHW, and the South Channel Bridge in Unalaska is 26½ feet above MHHW).

Preliminary engineering work confirms the need for pier protection for both bridge alternatives to protect both the structure and vessel in the event of an allision.

2.6 FAA Part 77

Within the study area is the Ketchikan International Airport (KTN), which includes a paved 7,500-foot long runway capable of landing jet aircraft in most weather conditions. The Federal Aviation Administration (FAA) code in Federal Aviation Regulation (FAR) Title 14, Part 77, *Objects Affecting Navigable Airspace*, regulates adjacent height restrictions for airport environs. New penetrations into this Part 77 airspace must be approved by the FAA prior to construction. Only bridge Alternative C3-4 across Tongass Narrows at the airport penetrates the FAA Part 77 airspace. The alignment for Alternative F3-1 is just outside these limits and, with a concrete box girder type structure, would have no impact on the approach.

2.7 USCG Lighting

Roadway lighting will be coordinated with the FAA, as required by the US Coast Guard's 33 CFR 118.45, *Lighting for the Protection of Aerial Navigation*, and with the airport. The USCG's 33 CFR 118.65(a), *Lights on Fixed Bridges*, will require the channel opening below the Gravina Island bridge to be marked with clearance lighting; green (center of the channel) and red (outer margins) navigational Fresnel lanterns.

2.8 Ferries

The Ketchikan Gateway Borough currently operates shuttle ferry service from Revilla Island to Gravina Island; the Department provides for the capital improvements. The EIS analyzed three ferry alternatives that would add ferry service at different locations:

- between Peninsula Point and Lewis Point (Alternative G2),
- near downtown at Bar Point to Clump Cove (Alternative G3), and
- adjacent to the existing service at Charcoal Point and the airport dock (Alternative G4).

Alternatives G2 and G3 are intended to be closer to populations north or south of the existing ferry crossing, and to provide service to Borough-owned lands for long-term economic development and recreation.

Under each ferry alternative, the existing shuttle ferry at the airport would continue to operate, resulting in a total of four ferry passenger/vehicle terminals (two under G4) and four ferries. The ferry terminals would have limited parking (with the exception of the Charcoal Point terminal which has a long-term and a large short-term parking lots), a ticket booth and passenger shelter, and electrical power.

[7] NOAA Nautical Chart 17315 (http://www.charts.noaa.gov/OnLineViewer/17315.shtml)

All the ferry alternatives to be analyzed in the SEIS now include features not considered in the EIS. An enclosed 1500 square-foot 60 passenger waiting area with restrooms and enhanced baggage handling (two shuttle vans to carry both passengers and luggage) would be provided at Charcoal Point on Revilla Island for walk-ons to the passenger terminal at the airport. This location has the largest parking lot to accommodate people who want to leave their car (or are dropped off) and then walk to the airport; not many walkers, if any, are expected at either Peninsula Point or Bar Point, and therefore only minimal passenger waiting facilities are being provided at those locations. The cost of the Charcoal Point walk-on shuttle service would be included in the price of the ferry ticket.

The ferry alternatives also include a new heavy freight dock and ¾-acre freight terminal on Gravina Island just south of the current airport ferry berth, to be capable of landing vessels and barges carrying bulk fuel or large heavy loads that cannot be accommodated on the smaller airport shuttle ferries. The new dock would also be able to tie up the larger AMHS vessels. Dock facilities that can accommodate the large loads are presently available only on Revilla Island (AMHS terminal facilities, Saxman Seaport, Alaska Marine Lines, and Northland Services).

Additionally, this project would replace the now closed lay-up dock (I-90 floating bridge remnant) with a new floating dock and transfer bridge to support lay over and maintenance of the airport shuttle ferries (see Figure 4).

It is assumed the ferry alternatives would continue to operate at current levels: 15-minute cycles during the summer and 30-minute cycles throughout the rest of the year. In order to provide improved service, all ferry alternatives except G4v are planned to operate 16 hours per day (two shifts), with four ferries during the summer peak demand, and two for the rest of the year.

2.9 Pedestrians

While not anticipated to be a high number, there are expected to be pedestrians and cyclists interested in crossing Tongass Narrows to Gravina Island. The majority of this volume would probably be tourists walking to mid-span of a bridge crossing for the view. The proposed major bridge structures (ie, crossing Tongass Narrows) include a pedestrian walkway. The ferries also accommodate walk-ons. There are no provisions for sidewalks or separated trails off the structures at this time. Pedestrians on other segments of the new alignment would use the shoulder of the roadway. The proposed right-of-way widths for all alternatives do accommodate a future pathway system.

2.10 Utilities

The bridge alternatives would not initially have utilities on them, but the utility companies could request space on these structures from the Department. They would need to identify their needs and design criteria. The Department is planning to reserve the outer edges of the right-of-way corridor for utilities and a pathway.

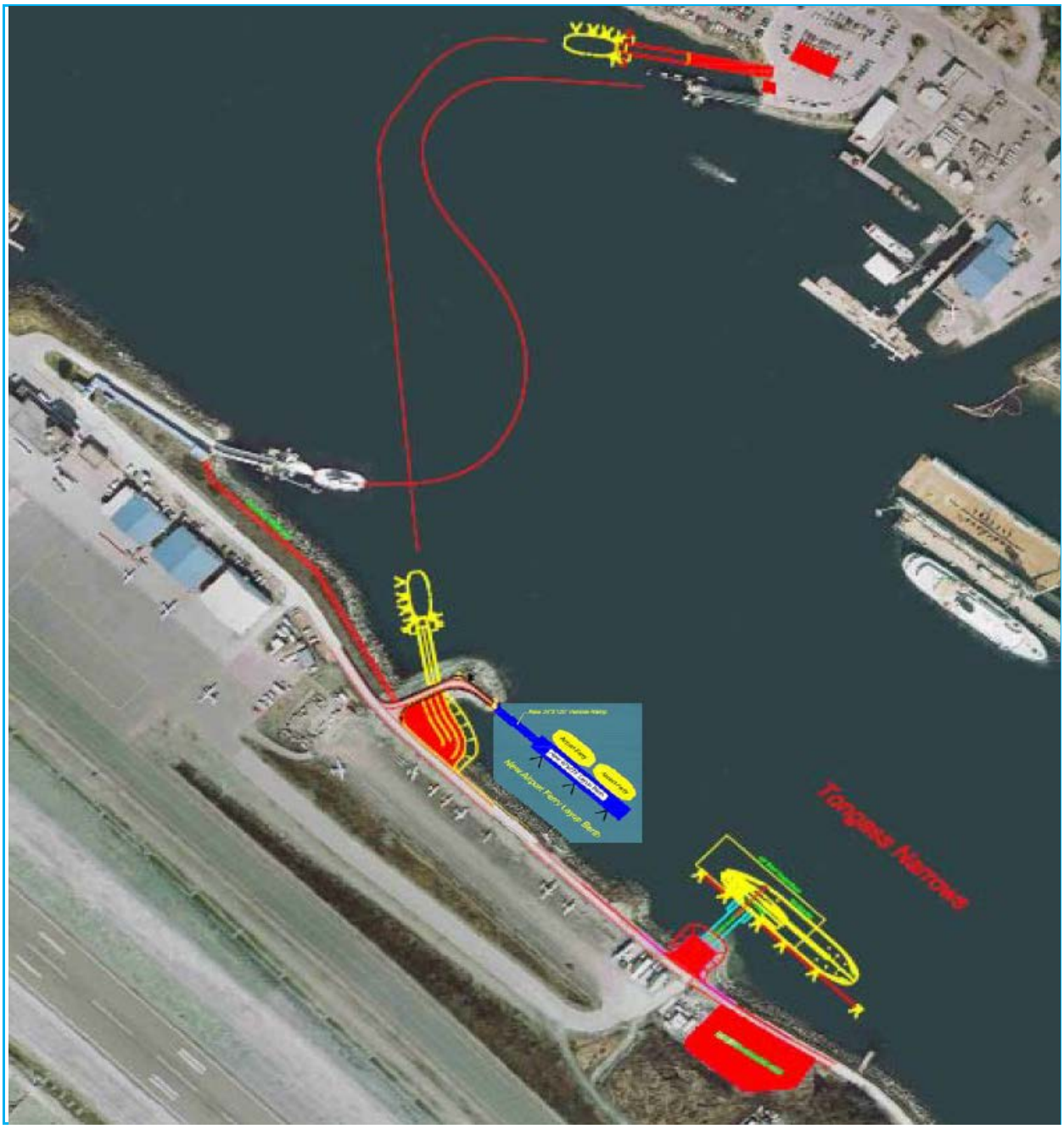


Figure 4: Waiting Area, Freight Dock and Lay-up Berth

3.0 REASONABLE ALTERNATIVES DESCRIBED

The following are the reasonable alternatives that will be evaluated in the SEIS and are included in this *Construction Cost Estimate Report* (see map on next page):

- **Alternative C3-4** -- bridge across Tongass Narrows between Bench (ByPass) Road near Signal Road and north of the airport terminal (200 foot vertical clearance)
- **Alternative F3-1** -- bridges across East and West Channels via Pennock Island (60 foot and 200 foot clearances, respectively) connecting South Tongass Highway to the airport terminal along the existing Gravina Island Highway and Airport Access Road
- **Alternative G2** -- new ferry service between Peninsula Point and Lewis Point, connecting North Tongass Highway with the airport terminal via Lewis Reef/Seley/Airport Access Roads
- **Alternative G3** -- new ferry service between downtown at Bar Point and Clump Cove, connecting downtown with the airport terminal via the existing Gravina Island Highway and Airport Access Road
- **Alternative G4** -- new ferry service between new terminals adjacent to the existing ferry terminals, connecting Charcoal Point with the airport terminal
- **Alternative G4v** – a phase-constructed variant of Alternative G4
- **No Action Alternative** -- continued existing shuttle ferry service to the airport terminal

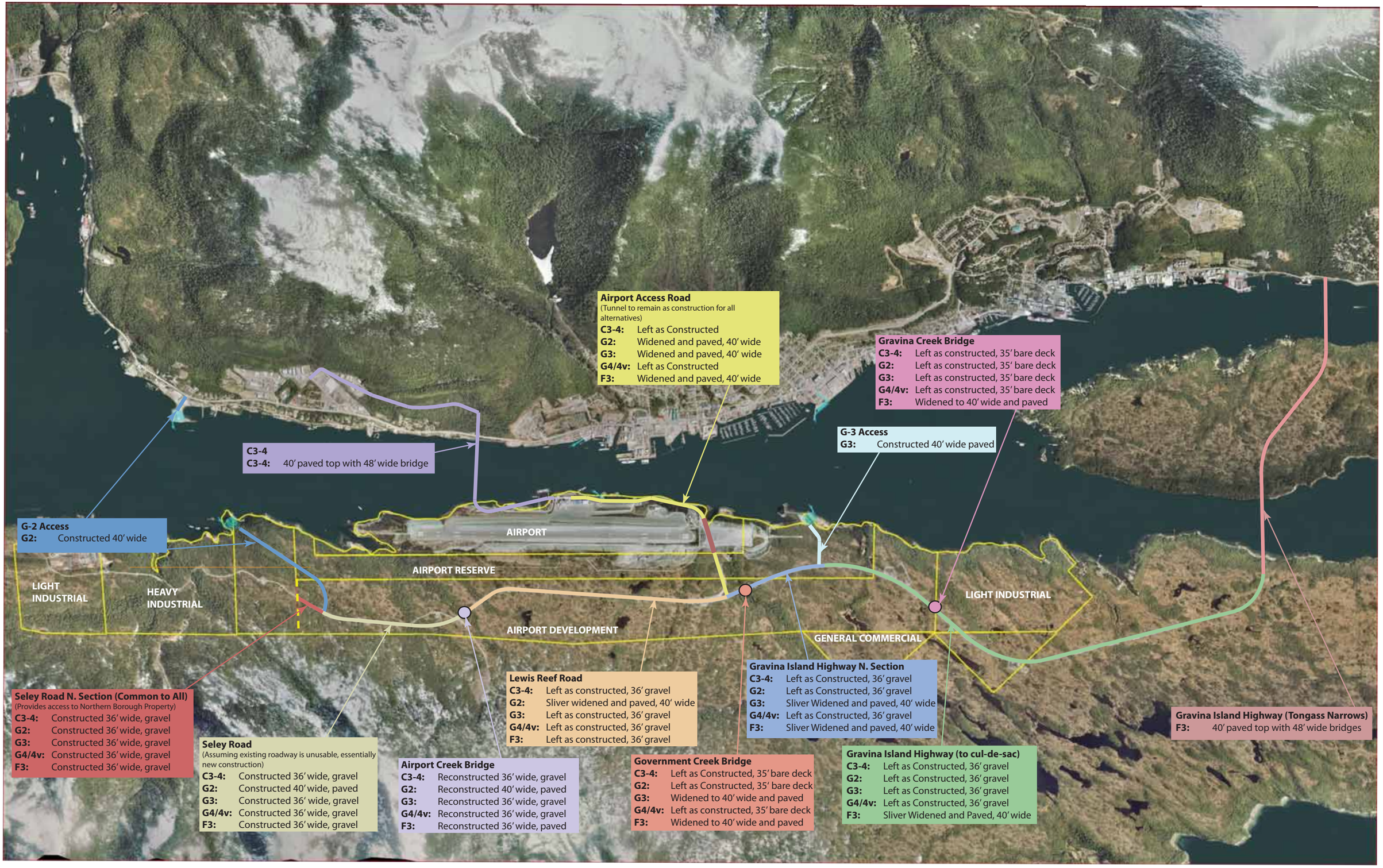
In addition to the construction cost estimates, the life-cycle and total-life costs were developed, with and without revenue adjustments to account for possible tolls. Descriptions of the alternatives are provided in the following paragraphs.

3.1 Alternative C3-4

Alternative C3-4 takes advantage of a long-planned Borough by-pass on the small topographic bench above the touchdown point on Revilla Island. A small refinement of Alternatives C3a or C4 using the proposed Bench Road to Rex Allen Drive/Misty Marie Lane/Signal Road near the WalMart parking lot rather than a large cut to North Tongass Highway would minimize costs of excavation and the curved structure on the eastern approach. The cruise ship trackline is assumed to be moved slightly to the east to match the AMHS trackline so the mainspan and backspans of the crossing would allow for the bridge to be constructed with segmental concrete box girders on tangent. With a 30 MPH design speed, the western curve associated with the Alternative C3a and C4 alignments is moved off the backspan. The curve at the transition pier and approach tangent on the west could then be constructed of 100 to 150 foot precast concrete deck bulb-T girders or even 200 foot spliced precast deck bulb-T girders.

Figure 5: Alternative C3-4 bridge from north of Wolff Point on North Tongass Highway, looking south

Alternative C3-4 is 1.86 miles long with a structure length of 4,190 feet. The navigational opening would be minimum 200 feet high and at least 550 feet wide. The navigational opening within the main span would be located over water with depths in excess of 110 feet at MLLW.


Airport Access Road
(Tunnel to remain as construction for all alternatives)
C3-4: Left as Constructed
G2: Widened and paved, 40' wide
G3: Widened and paved, 40' wide
G4/4v: Left as Constructed
F3: Widened and paved, 40' wide
Gravina Creek Bridge
C3-4: Left as constructed, 35' bare deck
G2: Left as constructed, 35' bare deck
G3: Left as constructed, 35' bare deck
G4/4v: Left as constructed, 35' bare deck
F3: Widened to 40' wide and paved
G-3 Access
G3: Constructed 40' wide paved
C3-4
C3-4: 40' paved top with 48' wide bridge
G-2 Access
G2: Constructed 40' wide
AIRPORT
AIRPORT RESERVE
LIGHT INDUSTRIAL
HEAVY INDUSTRIAL
AIRPORT DEVELOPMENT
LIGHT INDUSTRIAL
GENERAL COMMERCIAL
Seley Road N. Section (Common to All)
(Provides access to Northern Borough Property)
C3-4: Constructed 36' wide, gravel
G2: Constructed 36' wide, gravel
G3: Constructed 36' wide, gravel
G4/4v: Constructed 36' wide, gravel
F3: Constructed 36' wide, gravel
Seley Road
(Assuming existing roadway is unusable, essentially new construction)
C3-4: Constructed 36' wide, gravel
G2: Constructed 40' wide, paved
G3: Constructed 36' wide, gravel
G4/4v: Constructed 36' wide, gravel
F3: Constructed 36' wide, gravel
Lewis Reef Road
C3-4: Left as constructed, 36' gravel
G2: Sliver widened and paved, 40' wide
G3: Left as constructed, 36' gravel
G4/4v: Left as constructed, 36' gravel
F3: Left as constructed, 36' gravel
Airport Creek Bridge
C3-4: Reconstructed 36' wide, gravel
G2: Reconstructed 40' wide, paved
G3: Reconstructed 36' wide, gravel
G4/4v: Reconstructed 36' wide, gravel
F3: Reconstructed 36' wide, paved
Government Creek Bridge
C3-4: Left as Constructed, 35' bare deck
G2: Left as Constructed, 35' bare deck
G3: Widened to 40' wide and paved
G4/4v: Left as constructed, 35' bare deck
F3: Widened to 40' wide and paved
Gravina Island Highway N. Section
C3-4: Left as Constructed, 36' gravel
G2: Left as Constructed, 36' gravel
G3: Sliver Widened and paved, 40' wide
G4/4v: Left as Constructed, 36' gravel
F3: Sliver Widened and paved, 40' wide
Gravina Island Highway (to cul-de-sac)
C3-4: Left as Constructed, 36' gravel
G2: Left as Constructed, 36' gravel
G3: Left as Constructed, 36' gravel
G4/4v: Left as Constructed, 36' gravel
F3: Sliver Widened and Paved, 40' wide
Gravina Island Highway (Tongass Narrows)
F3: 40' paved top with 48' wide bridges

Due to the close proximity to the airport runway, the bridge is expected to penetrate the FAA Part 77 airspace (about elevation 290 feet actual vs 230.6 feet surface described). Since the surrounding topography already pierces significant portions of the Part 77 airspace, the infringement of the bridge is not expected to be a major issue with the FAA; and in fact, Alaska Airlines has stated that they would have no problem with the intrusion.

3.2 Alternative F3-1

Alternative F3-1 would have bridges that cross the two channels of Tongass Narrows via Pennock Island – with the higher bridge for the cruise ships over West Channel and a lower bridge suitable for barge traffic over East Channel. As noted earlier, Alternative F3-1 is identical to EIS Alternative F3, with the exception of a subtle engineering design change where the bridge alignment meets the Gravina Island Highway.

Figure 6: Alternative F3-1 bridges and Pennock Island from mid-Tongass Narrows near the airport, looking south

The West Channel bridge would be approximately 2,470 feet long and have a maximum height of about 270 feet. The bridge would have a minimum vertical navigational clearance of 200 feet above MHHW and a horizontal navigational clearance of approximately 550 feet. The bridge would be centered on and perpendicular to the AMHS trackline.

In order to improve its navigational characteristics for cruise ships transiting the West Channel, the narrowest portion of the channel under this alternative would be widened. Currently, the width of the navigable portion of West Channel, with respect to large cruise ships, is approximately 400 feet at its narrowest point with a minimum depth of 40 feet below MLLW. With the modifications, this portion of the channel would have a new channel width of 750 feet -- the center 550 feet would have a minimum depth of 40 feet below MLLW and both remaining sides would have a minimum depth of 30 feet below MLLW. The dredged quantity is approximately 213,000 cubic yards over 14.8 acres.

The East Channel bridge would be about 1,985 feet long and have a maximum height of approximately 115 feet. The bridge would have a minimum vertical navigational clearance of 60 feet above MHHW and a horizontal clearance of approximately 350 feet. The navigational opening would be perpendicular to the new trackline that would be about 445 feet west of the current cruise ship trackline. The main span would be located over water with depths in excess of 40 feet at MLLW. The primary users are anticipated to be fishing boats, and tug and barge transportation.

On Revilla Island, the East Channel bridge would connect directly to South Tongass Highway between the US Coast Guard Station and the Forest Park subdivision. From here, the bridge would rise across the East Channel and then traverse Pennock Island. From Pennock Island, the West Channel bridge would cross to Gravina Island and connect with the existing Gravina Island Highway. The Gravina Island Highway would to be widened from 36 feet to 40 feet, and paved. The improved roadway would continue northward approximately 2.99 miles to its intersection with the Airport Access Road and Lewis Reef Road. The 1.15 mile widened and paved Airport Access Road then goes down the hill, under the runway and north along the Channel to the terminal. The total road distance between Revilla Island and the airport passenger terminal is 5.87 miles.

3.3 Alternative G2

Alternative G2 would be new ferry service that would complement the existing airport ferry for vehicles and passengers between Peninsula Point near Ward Cove on Revilla Island and Lewis Point on Gravina Island, crossing Tongass Narrows approximately 2 miles north of the airport passenger terminal. The ferry crossing distance would be approximately three-quarters of a mile.

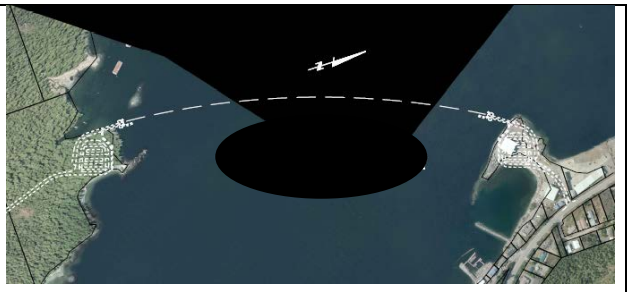


Figure 7: Alternative G2 ferry from Lewis Point to Peninsula Point

This alternative would require two new ferry vessels, as well as construction of a dock and small passenger terminal on each side of Tongass Narrows. The dredged quantity for both would be approximately 1,400 cubic yards over 0.2 acres. The terminals include minimal parking and a combination ticket booth and passenger waiting area.

Additionally, this alternative includes a new passenger waiting terminal and enhanced baggage handling facilities at Charcoal Point on Revilla Island for walk-ons to the passenger terminal at the airport. It would also include a new ferry lay-up berth, and heavy freight terminal and staging area south of the existing ferry dock on Gravina Island.

A 0.8-mile long road would be constructed on Gravina Island to connect the ferry terminal at Lewis Point with Seley Road, which would be upgraded to meet the Lewis Reef Road. The Airport Access Road would be also upgraded. All these roads would be paved 40 feet wide. The total road distance between Lewis Point and the airport passenger terminal is 4.1 miles.

3.4 Alternative G3

Alternative G3 would be new ferry service that would complement the existing airport ferry for vehicles and passengers between Bar Point at Jefferson Street (near the Plaza Mall and downtown Ketchikan) on Revilla Island and a location approximately 1.3 miles south of the airport passenger terminal on Gravina Island near Clump Cove. The sailing distance would be approximately one-half mile.

This alternative would require two new ferry vessels and the construction of a new dock and passenger terminal on each side of Tongass Narrows. The existing breakwater would be widened and extended for use as the ferry terminal pier. It is not anticipated that the new terminal would interfere with the new development in the area. Dredging was also assumed to be required to provide adequate navigational depths for the ferry dock on Gravina Island, and possibly on Revilla Island; the quantity would be approximately 18,600 cubic yards over 2.14 acres.

Figure 8: Alternative G3 ferry from Clump Cove to Bar Point

Additionally, this alternative includes a new passenger waiting terminal and enhanced baggage handling facilities at Charcoal Point on Revilla Island for walk-ons to the passenger terminal at the airport. It would also include a new ferry lay-up berth, and heavy freight terminal and staging area south of the existing ferry dock on Gravina Island.

A 40 foot wide paved road would be constructed on Gravina Island from the ferry terminal uphill past the new Runway 11/29 extension approximately 0.25 miles to the existing Gravina Island Highway, which currently connects to the airport. This segment of the Gravina Island Highway and the Airport Access Road would have to be widened and paved. The total road distance from Clump Cove to the airport passenger terminal is 1.9 miles.

3.5 Alternative G4

Alternative G4 would be providing new ferry service adjacent to the existing airport ferry route on a quarter-mile crossing of Tongass Narrows, 2.6 miles north of downtown. This alternative would require construction of two new docks (one on either side of Tongass Narrows), two new ferry vessels. The dock on Revilla Island would be parallel to the existing airport ferry dock, but the new dock on Gravina Island would be angled opposite of the existing dock so that development-bound traffic can enter and exit the ferry more conveniently. The total dredged quantity would be approximately 15,200 cubic yards over 1.22 acres.

This alternative includes a new passenger waiting terminal and enhanced baggage handling facilities at Charcoal Point on Revilla Island for walk-ons to the passenger terminal at the airport. It would also include a new ferry lay-up berth, and heavy freight terminal and staging area south of the existing ferry dock on Gravina Island.

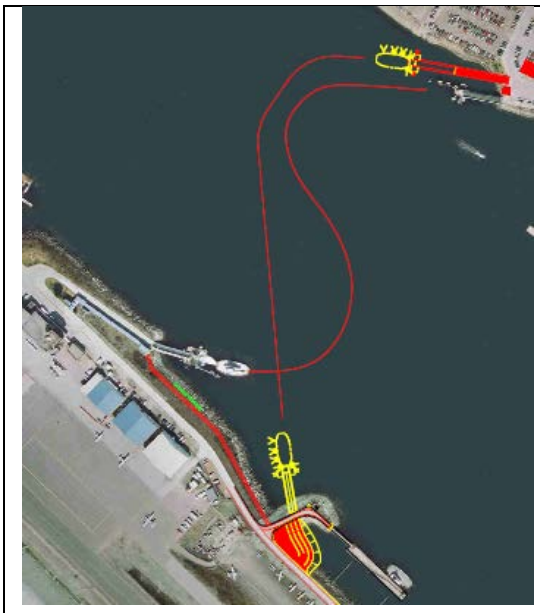


Figure 9: Alternative G4 ferry from Gravina Island to Charcoal Point

3.6 Alternative G4v

Similar to Alternative G4, Alternative G4v includes the addition of the passenger waiting facility and shuttle vans at Charcoal Point to carry pedestrians and their luggage to/from the airport terminal. It would also include a new ferry lay-up berth, and heavy freight terminal and staging area south of the existing ferry dock on Gravina Island. Unlike Alternative G4, no new docks or ferries would be constructed until ferry demand increases enough to necessitate it. When

demand approaches capacity of the existing system, the new docks and ferries associated with Alternative G4 would be constructed.

A ferry capacity analysis was performed based on Washington State Department of Transportation standards for determining level-of-service for ferry operation and a 1 percent population growth (see Appendix B). Based on that analysis, the demand-driven need for a new ferry would not occur until 2105. The life-cycle costs summary for Alternative G4v do not reflect new ferry docks or ferries during the 75 year study period[8].

3.7 No Action Alternative

The No Action Alternative consists of continued operation of the existing ferry on the present schedule. Although there are no initial construction costs, a 75-year life-cycle cost estimate was developed for the No Action Alternative based on operation and maintenance costs. Ferry replacement every 35 years and maintenance of the Gravina Island Highway and the Airport Access, Lewis Reef, and Seley Roads to the airport reserve boundary are included in those costs.

3.8 Features Common to All the Alternatives

Each alternative includes maintenance of:

- The gravel Gravina Island Highway to the southern airport reserve boundary, for a total length of approximately 3.2 miles (except for Alternative G3 at 2.6 miles);
- The gravel Lewis Reef and Seley Roads to the northern airport reserve boundary, for a total length of approximately 2.2 miles; and
- The Airport Access Road, which extends from the airport terminal, passes beneath the runway safety area in a tunnel, and then climbs the hill to its intersection with the Gravina Island Highway and Lewis Reef Road, a distance of approximately 1.15 miles.

All build alternatives include the construction of a replacement to the existing unpaved single-lane bridge over *Airport Creek* at the end of Lewis Reef Road. The upgraded bridge would be 36 feet wide to provide gravel access to the northern developable lands, except under Alternative G2 where the roadway and bridge would be paved to 40 feet wide.

The construction cost estimates do not include a vehicle parking facility at the airport terminal. The funding source for such a facility is anticipated to be FAA rather than FHWA; therefore it is not incorporated. This is a change from the EIS.

[8] For comparison purposes, HDR calculated life-cycle costs associated with Alternative G4v assuming a demand-driven need for one new ferry and corresponding docks in 35 years. These costs are provided in Appendix C.

4.0 MAINTENANCE AND OPERATIONS COSTS

Ongoing maintenance costs are a major consideration by the Department since all revenues to operate public facilities are funded using State general funds, with no federal assistance. The Department seeks measures to minimize costs with efficient infrastructure whenever possible. The Borough is currently responsible for the maintenance and operations (M&O) of the airport shuttle ferries under an operational agreement with the Department, but the Department funds the capital improvements. The recurring costs are the annual maintenance expenses for the structures, roadways, and ferry system. Periodic costs are repairs, improvements and replacements that can be expected over the life of the facility, regardless of funding source.

4.1 Bridges

Bridge structures not only have annual routine maintenance that includes drainage system cleaning and repairs, bridge deck patching, restriping, and snow removal, but also require the cleaning of expansion joints, repairs to railings, and painting of metal parts. More substantial periodic bridge maintenance expenses include pavement overlays of the wearing course, replacement of signs and illumination, changing of damaged bridge railings, expansion joint gland renewal, and occasionally replacing the whole modular expansion joint assembly. Also, bridge and underwater foundation inspections are accounted for in these expenses; a biennial above-water structure inspection, and an underwater inspection that occurs every 5 years.

4.2 Roadways

Routine roadway maintenance costs typically include drainage control, brush clearing, and snow removal, expressed as a per lane-mile (L-M)[9] expense. For paved roads, this also includes restriping and possibly pothole patching; and for gravel roads there would be constant grading of the driving surface – due to the rolling nature of Gravina Island, washboarding of the gravel surface is expected. In Southeast Alaska, this cost to the Department is approximately $5,000 to $6,500/L-M for paved and for gravel roads. Additionally, it is assumed the paved road would need an overlay about every 10 years, and gravel roads may need to be resurfaced with more crushed base material every few years.

Due to their exposure to the environment, signing and luminaire poles have a limited life span, and it is assumed this whole system would be replaced about every 15 years on average. Guardrail is another element that endures high wear and tear, especially during the winter season. To account for this, the estimates include replacing 50 percent of the roadway railing every 5 years. These costs have been developed on a per foot basis to be used on the various lengths for each alternative.

4.3 Ferries and Docks

Ferry and dock annual maintenance costs are based on the estimates prepared for the EIS inflated to 2011 dollars. Above and underwater inspections similar to bridge inspections are required. Periodic maintenance costs for the docks (for anode replacement, fendering repairs, recoating, etc) and ferry replacement costs ($8 million every 35 years) were also included.

[9] A lane-mile is defined as the width of a mile of roadway divided by 12; therefore there are 3.33 lane-miles on one mile of 40-foot wide roadway.

4.4 Annual M&O Costs

Table 4 summarizes the expected annual maintenance and operational costs for each alternative. Costs from the 2004 EIS are presented for comparison purposes.

Table 4: Annual M&O Costs

ALTERNATIVE	Cost (EIS-2004)[10]	Cost (2011)
C3-4	--	$ 244 K
F3-1	$ 110 K	188 K
G2	5 M	5.87 M
G3	5 M	5.86 M
G4	5 M	5.85 M
G4v	--	3.57 M
No-Build	2 M	3.55 M

A summary of the major categories of maintenance costs anticipated and the frequency of those costs is presented in Table 5:

[10] Gravina Access Project Final Environmental Impact Statement, July 30, 2004, pages 2-2, 2-3

Table 5: Maintenance and Repairs, Frequency and Costs

EXPENSE	CYCLE (yrs)	ESTIMATED COST
Normal and Routine Maintenance		
Annual bridge maintenance costs (w/o road cost)	1	$ 1,500/L-M ($1.14/LF)
Annual paved road maintenance costs	1	5,000/L-M ($4.29/LF)
Annual gravel road maintenance costs	1	6,500/L-M ($4.29/LF)
Annual ferry and dock maintenance costs (G2 and G3)	1	5.71 M
Annual ferry and dock maintenance costs (G4)	1	5.70 M
Annual ferry and dock maintenance costs (no-build G4v)	1	3.42 M
Periodic Repairs		
Above ground structure (bridge/dock/tunnel) inspections	2	$ 40,000
Underwater foundations (bridge/tunnel) inspections	5	40,000
Underwater foundations (dock) inspections	5	25,000
Fendering system repairs	5	50,000
Guardrail replacement	5	117/LF
Bridge rail replacement	5	23/LF
Pavement planing and overlay	10	102/LF
Heavy freight dock resurfacing	10	400,000
Anode replacement (bridge)	10	100,000
Anode replacement (ferry dock)	10	20,000
Anode replacement (heavy freight dock)	10	100,000
Neoprene gland expansion joint replacement	10	500,000
Signing and illumination replacement	15	5/LF
Recoat transfer span	15	150,000
Bridge support-float recoat	15	75,000
Expansion joint assembly replacement	25	1,400,000
Ferry replacement costs	35	8,000,000
Ferry terminal mooring structure replacement	35	1,500,000
Transfer bridge replacement costs	75	2,000,000

These values were used to develop the life-cycle costs examined in Chapter 6. See Appendix C for a full breakdown of maintenance and operational costs.

5.0 CONSTRUCTION COST ESTIMATE

The costs of the bridge alternatives presented in the 2004 EIS were derived from a preliminary cost estimate for preferred Alternative F1 and per-square-foot unit costs applied to the other bridge alternatives (F3, C3a, C3b, C4, and D1). The EIS cost estimates were updated for the 2005 DSR for Alternative F1, and the other alternatives were updated similarly. For this *Construction Cost Estimate Report*, costs for Alternative F1, including features such as piers, deck, and other elements were updated to 2008 dollars, and then the individual feature costs (ie, cost of foundation in deep water, foundation in shallow water, long span box girder, etc) were applied to Alternatives C3-4 and F3-1 to develop improved cost estimates those alternatives. Construction costs for the bridge and ferry alternatives to be evaluated in the SEIS were then updated to 2011 dollars. Details of the construction cost estimate are provided in Appendix D.

5.1 Bridge Structure

Table 6 provides the cost comparison of the major bridge structures of Alternatives C3-4 and F3-1.

Table 6: Major Structure Costs

ALTERNATIVE	Cost (EIS-2004)	Cost (2011)
C3-4	--	$ 153 M
F3-1	$ 99 M	171 M

The 2008 estimates for structures were adjusted to account for the change in construction costs. Materials made up approximately one-third of the costs (equipment and labor are the remainder), and this was adjusted to 2011 dollars the FHWA's *National Highway Construction Cost Index* (NHCCI)[11].

These costs are for the major bridges over Tongass Narrows only; they do not include the new Airport Creek Bridge ($1 Million), or the widening of the Government or Gravina Creek bridges ($1 Million total) under Alternative F3-1. The cost of widening and deepening the West Channel for improved navigation under Alternative F3-1 is $13 Million.

5.2 Roads

The estimated roadway costs for each alternative were developed with roadway quantities prepared from 2002 aerial photography. Updated unit prices were extrapolated from the Southeast Region's *Bid Tabs* from 2003 through 2010 for the larger projects of similar type work in the Panhandle. Each pay item cost was adjusted to 2011 dollars using the FHWA NHCCI.

5.3 Ferry Facilities

The costs of the ferry alternatives presented in the EIS assumed new ferries would be similar to the existing vessels, and new shelter/ticket booths and terminals would be constructed at each shoreline terminus. The costs also included the expenses for dredging at the docks. For this effort, the 2004 costs were only adjusted for inflation to 2011 dollars using the FHWA NHCCI. As discussed earlier, all the ferry alternatives now include costs for passenger waiting and

[11] FHWA *National Highway Construction Cost Index* (http://www.fhwa.dot.gov/policyinformation/nhcci.cfm and http://www.fhwa.dot.gov/ohim/nhcci/pt1.xls)

enhanced baggage handling facilities for the existing Charcoal Point ferry terminal on Revilla Island; and a single heavy freight dock and staging area, and replacement ferry lay-up berth near the airport. Costs for these facilities were provided by the Department. Updated ferry facility costs are summarized on Table 7.

Table 7: Ferry Facility Costs

ITEM	Cost (EIS-2004)	Cost (2011)
Ferry and Docks (G2)	$ 34.2 M	$ 34.9 M
Ferry and Docks (G3)	34.4 M	35.3 M
Ferry and Docks (G4)	32.8 M	33.5 M
Ferry and Docks (G4v)*	--	0.0 M
Passenger Baggage Handling	--	1.4 M
Heavy Freight Terminal	--	5.4 M
Ferry Lay-up Berth	--	6.0 M

*There are no new ferries or docks in the initial construction

5.4 Right-of-Way

The controlled-access right-of-way costs were determined by overlaying the slope limits on the Ketchikan Gateway Borough's property tax maps and assuming total acquisition for the majority of the parcels (some of the larger parcels not requiring a total take were assigned a percentage right-of-way cost commensurate with the percentage of the parcel needing to be acquired), and then computing a value based on each parcel's 2008 Borough tax-assessed values; currently, there appears to be no significant change in values. Publically-owned parcels were assumed to be obtained at no cost. The ferry alternatives assume a lump sum acquisition cost. Table 8 summarizes right-of-way costs for each alternative.

Table 8: Right-of-Way Costs

ALTERNATIVE	Cost (EIS-2004)	Cost (2011)
C3-4	--	3.8 M
F3-1	0.05 M	0.3 M
G2	1.0 M	1.0 M
G3	4.1 M*	1.0 M
G4	0.4 M	0.5 M
G4v	--	0.5 M

*Alternative G3 anticipated more on-shore property acquisition at Bar Point in 2004; whereas in 2011, more fill adjacent to current development for the terminal is planned

Based upon recent aerial photography, it is evident that there have been expansions of the quarry off Tongass Avenue and new structures are being built in the Cambria Drive and Jefferson Street areas. These recent developments could increase right-of-way acquisition costs of Alternatives C3-4 or G3. New development is on-going in Ketchikan, and the alignment of the selected alternative would be adjusted in final design to avoid or minimize impacts to the extent practicable.

5.5 Design and Construction Costs

Construction estimates are used for initial build costs, and include contingencies (15% for roadway and 20% for bridges) and 5 percent for construction administration. Developmental costs are assumed to be 7 percent of the construction amount (2% for environmental/permitting and 5% for design phases). A lump sum cost was assessed for existing utility relocation. Additionally, an annualized average ICAP (departmental overhead charge) of 5 percent was computed on the total costs.

5.6 Total Construction Costs

The construction costs (direct payments to the contractor), construction administration (cost of inspection and acceptance), developmental costs (environmental and design), utility relocation and right-of-way acquisition for the studied alternatives are summarized in Table 9.

Table 9: Total Construction Cost Estimate

ALTERNATIVE	COST (2011)					
	Construction	Construction Administration	Developmental	Utility Relocation	Right-of-Way Acquisition	ICAP
C3-4	$ 185 M	$ 9.3 M	$ 13.6 M	$ 1.0 M	$ 3.8 M	$ 10.6 M
F3-1	234 M	11.7 M	17.2 M	0.1 M	0.3 M	13.2 M
G2	67 M	3.4 M	4.9 M	1.0 M	1.0 M	3.9 M
G3	58 M	2.9 M	4.2 M	1.0 M	1.0 M	3.3 M
G4	51 M	2.6 M	3.8 M	1.0 M	0.5 M	3.0 M
G4v	18 M	0.9 M	1.3 M	1.0 M	0.5 M	1.1 M
No Action	0 M					

Developmental expenses are those costs after ATP with engineering, and include the costs of the completing the design, possible updating of environmental documents, obtaining resource permits, etc. The costs for utility relocation and right-of-way acquisition are included within their respective budget items.

6.0 LIFE-CYCLE COSTS

A life-cycle cost is defined as the overall estimated cost of a single alternative over a defined period. The *Intermodal Surface Transportation Efficiency Act of 1991* (ISTEA) required the consideration of life-cycle cost analysis in the design of pavements and bridges. *Safe, Accountable, Flexible, Efficient Transportation Equity Act -- A Legacy for Users* (SAFETEA-LU) of 2005 requires the application of value engineering methods, including the analysis of life-cycle costs, to bridge projects with an estimated total cost of $20 million or more.

All of the expenses associated with an alternative that occur during its life are used to calculate the life-cycle cost. For the Gravina Access Project, present worth[12] is used to compare the life-cycle costs of different crossing concepts. To compute the life-cycle costs, the initial construction costs, annual maintenance and operational costs, and the more substantive periodic maintenance/repair costs are estimated and forecasted for the life span of the project, including the year in which they are anticipated to occur. Taking into account inflation and discount rates, a present value is calculated. This was accomplished using the costing software for bridges, *BridgeLCC*, by the National Institute of Standards and Technology (NIST), as recommended by the FHWA (http://www.fhwa.dot.gov/infrastructure/asstmgmt/lcca.cfm). The inflation rate used is 3.77 percent (http://www.usinflationcalculator.com/inflation/current-inflation-rates or http://www.rateinflation.com/inflation-rate/usa-inflation-rate.php), the real discount rate used is 2.3 percent, and the nominal discount rate used is 4.2 percent (http://www.whitehouse.gov/omb/circulars_a094/a94_appx-c).

The life-cycle costs for all alternatives were computed in 2011 dollars. The term of the analysis is 75 years to correspond with the design life of the bridges, as required by the FHWA. Assuming construction would be completed in 2015, the final cost would occur at the end of 2090. Each of the maintenance items occurs at its respective frequency as depicted in Table 4, starting in 2015. The analysis assumes the proposed bridges have an expected life of 75 years, and 35 years for the ferries. At the end of their life span, the bridge or ferry may be rehabilitated or salvaged and replaced by a new facility. For this analysis, the salvage value at 75 years was assumed to be the cost of demolition and disposal, and therefore established as zero dollars.

Table 10 summarizes the anticipated life-cycle costs, without revenue adjustment, for the SEIS alternatives. The *Life-Cycle Cost Reports* are shown in Appendix E.

Table 10: Life-Cycle Costs

ALTERNATIVE	2004 EIS (20-Year Life-Cycle)	2011 (75-Year Life-Cycle)
C3-4	--	$ 222 M
F3-1	$ 170 M	286 M
G2	90 M	331 M
G3	100 M	314 M
G4	90 M	301 M
G4v	--	182 M
No Action	13 M	88 M

[12] The value now, if one were to start a savings account, of a series of future payments, discounted to reflect the time value of money.

7.0 TOLLS

In 2009, the Department requested an analysis of the feasibility of charging tolls on the two bridge alternatives to defray the maintenance and operation (M&O) costs of the project and possibly some of the construction costs.[13] The types of toll facilities that could be used with the bridge alternatives were explored in the *Gravina Tolling and Toll Plaza Technical Memorandum*, dated November 18, 2011 (Appendix A).

For the bridge alternatives, revenue was determined for the three toll options using corresponding traffic projections. Fares would only be charged in one direction (outbound from Gravina Island), and no distinction would be made for classification of vehicle (the percent trucks is anticipated to be very small). Table 11 characterizes the range of projected revenue from the bridge alternatives.

Table 11: Projected Bridge Revenue with Tolling Options

ALTERNATIVE	TOLL AMOUNT	2018 ADT	2018 Revenue	2030 ADT	2030 Revenue	2040 ADT	2040 Revenue
C3-4 with Tolls	$2	961	$ 0.35 M	2,284	$ 0.83 M	2,388	$ 0.87 M
	$5	943	0.86 M	1,469	1.34 M	1,606	1.47 M
	$16	879	2.57 M	1,268	3.70 M	1,369	4.00 M
F3-1 with Tolls	$2	977	0.36 M	2,373	0.87 M	2,495	0.91 M
	$5	957	0.87 M	1,584	1.45 M	1,749	1.60 M
	$16	883	2.58 M	1,350	3.94 M	1,471	4.30 M

The averaged annual bridge and approach road M&O expenses are approximately $250,000 for Alternative C3-4 and $200,000 for Alternative F3-1 (see Table 4).

Based on the projected toll revenues in Table 11, a $2 toll at bridge opening in 2018 would cover annual M&O costs for Alternatives C3-4 and F3-1. Remaining revenues could be set aside to help defray construction costs. Higher toll values would result in higher revenues, which would increase the amount available to pay off construction costs; however, as toll values increase, the number of trips across the bridge decreases.

The initial cost of tolling is approximately $85,000 for electronic toll collection. If manual toll collection facilities were used, the cost would be $250,000 for two toll booths and an additional lane (in the outbound direction) for Alternative C3-4 and $150,000 for F3-1. Annual M&O costs for electronic tolling are about $150,000, whereas manned booths have M&O costs of approximately $1 million. Because of their lower costs, the cost estimate assumed electronic toll collection facilities would be used for the bridge alternatives.

For the existing ferry alternatives (G4v and No Action), the annualized revenue was estimated based on averaged historical annual income to date of $1.5 Million. For the enhanced ferry alternatives (G2, G3 and G4), the annual revenues were prorated based upon the anticipated traffic growth described in the Gravina Access Project SEIS Cost Benefit Analysis, August 2012[14]; resulting in annual income of $2.0 Million (see Table 12). These revenues only partially cover the M&O cost (see Table 4).

[13] Memorandum from Leo von Scheben, Commissioner, DOT&PF, to Gary L. Davis, Southeast Regional Director, DOT&PF, September 17, 2009.

[14] Gravina Access Project SEIS Cost Benefit Analysis, August 2012, page 15.

Table 12: Anticipated Ferry Revenue

ALTERNATIVE	EXPECTED 2033 TRAFFIC DEMAND	ANTICIPATED ANNUAL REVENUE
G4v and No Action	208	$ 1.5 M
G2, G3 and G4	282	2.0 M

8.0 TOTAL LIFE-TIME COSTS

Another helpful way of looking at the costs for this project is the summation of the annual expenses and revenue, over the life-time of the facility – in this case 75 years. If all the costs were inflated over time (2.3% Forward Inflation Rate[15]) and then added up, regardless of funding source, it would give a true picture of the total monetary value (no present value) of each alternative -- the cost of ownership. These figures represent the sum of the estimated annual budget appropriations (inflation adjusted) required to fund the particular alternative over the facilities' lifespan.

Table 13 is a summary of the total life-time costs of the alternatives, without and with expected revenue. For purposes of this analysis, the annualized incomes of the alternatives were estimated to $250,000 for Alternative C3-4, $200,000 for Alternative F3-1, $1.5 Million for the existing ferry alternatives, and $2.0 Million for the enhanced ferry alternatives.

Table 13: Anticipated Total Life-Time Costs

ALTERNATIVE	TOTAL LIFE-TIME COSTS	TOTAL REVENUE	ADJUSTED TOTAL LIFE-TIME COSTS
C3-4	$ 391 M	$ 56 M	$ 335 M
F3-1	576 M	45 M	531 M
G2	1,330 M	451 M	879 M
G3	1,262 M	451 M	811 M
G4	1,207 M	451 M	756 M
G4v	1,050 M	338 M	712 M
No Action	929 M	339 M	590 M

The total life-time costs can also be viewed over time to see how the costs accrue. In this case, the costs of the bridge alternatives are highest, but over time, the costs of the ferry alternatives exceed the costs of the bridge alternatives. This can be attributed to labor and maintenance costs over time (see Summary in Appendix H).

[15] CBO *The Budget and Economic Outlook: An Update*, August 2011, Table B-1 (http://www.cbo.gov/ftpdocs/123xx/doc12316/08-24-BudgetEconUpdate.pdf)

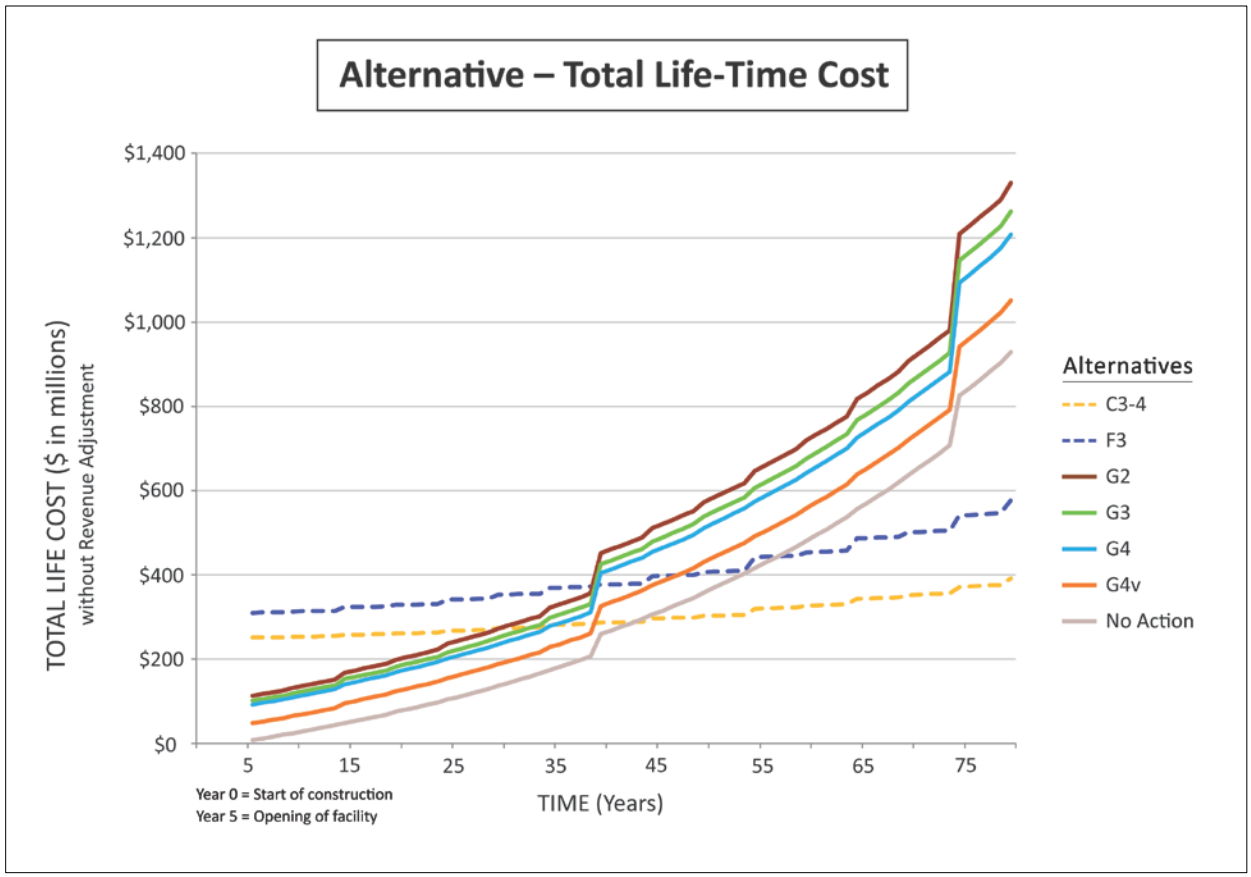


Figure 10: Total Life-Time Cost of Each Alternative

The two steep jumps for the ferry alternatives are the purchases of a replacement ferry every 35 years (note that for comparison purposes, Alternative G4v also assumes a demand-driven need for one new ferry).

9.0 CONCLUSION

The report provides an estimate of construction and related costs for the Gravina Access Project alternatives for comparison purposes. These cost estimates are not to be viewed as actual construction costs. As more design information is developed or the alternatives are modified, the estimates would be adjusted accordingly.

The bridge alternatives have high initial construction costs, ranging from about $220 million to over $275 million, and they also have high life-cycle costs due to their high initial costs.

The ferry alternatives have lower initial costs, varying up to just over $80 million; but their high annual operating costs and periodic repairs/replacements elevate their life-cycle costs substantially.

No user costs were incorporated into these estimates; life-cycle costs represent only the owner's costs.

For operations where fare or toll revenue would be received, the annualized incomes were subsequently estimated, and the life-cycle costs were then adjusted.

Finally, the total costs for the bridges and ferries were calculated to determine what the actual costs over time would be at the 75-year design life.

Table 14 summarizes these results.

Table 14: Construction, Life-Cycle, and Total Life-time Costs (without and with Revenue)

Alternative	Construction Cost	Life-Cycle Cost	Life-Cycle Cost (revenue adjusted)	Total Life-Time Cost	Total Life-Time Cost (revenue adjusted)
C3-4	$ 223 M	$ 222 M	$ 214 M	$ 391 M	$ 335 M
F3-1	276 M	286 M	280 M	576 M	531 M
G2	81 M	331 M	265 M	1,330 M	879 M
G3	70 M	314 M	247 M	1,262 M	811 M
G4	62 M	301 M	234 M	1,207 M	756 M
G4v	23 M	182 M	132 M	1,050 M	712 M
No Action	0 M	88 M	35 M	929 M	590 M

Note: Costs are in 2011 dollars

For clarification, the reason that the life-cycle cost for Alternative C3-4 is less than the construction cost (and the same is true for other alternatives too, although it is not as obvious) is that the construction amount is "paid" 5 years out at the end of construction. For comparison, the life-cycle cost for Alternative C3-4 in the Table above would be $232 Million at the construction mid-year, and $242 Million if paid in year 1.

The total life-time cost for each alternative, both without and with the toll revenue adjustment, is shown below on Figure 11:

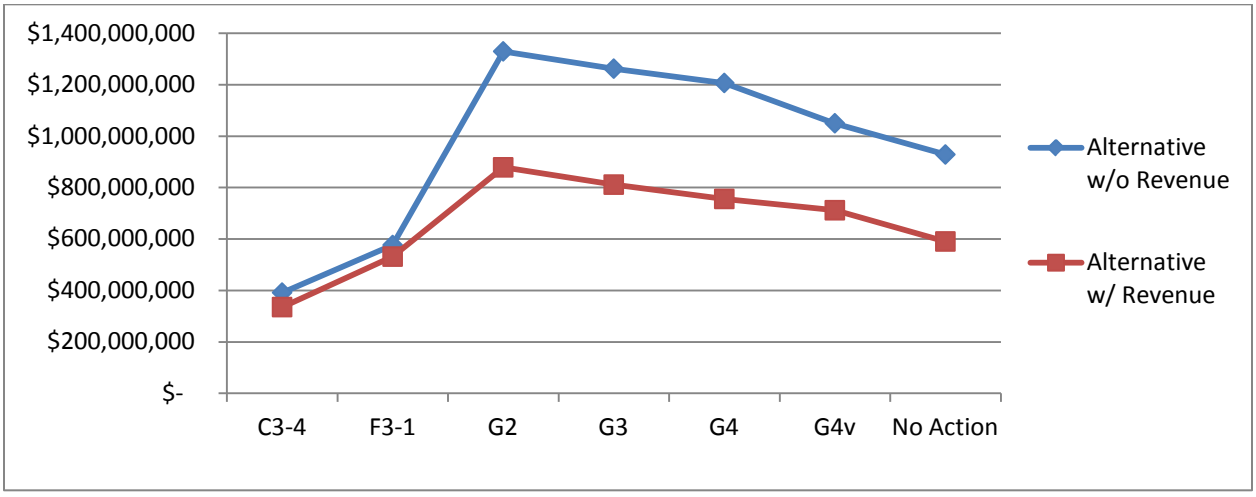


Figure 11: Total Life-Time Costs by Alternative without and with Revenue Adjustment

Appendix A

TOLLING and TOLL PLAZA TECHNICAL MEMORANDUM

Date November 18, 2011

To File

From Michael R. Tooley
Senior Transportation Engineer

Project Gravina Island Bridge Access
HP-NCPD-922(5) / 67698

Subject Tolling and Toll Plaza Technical Memorandum

M e m o r a n d u m

At the request of the Department, *HDR Alaska* investigated the feasibility of converting the current bridge crossing alternative at the Airport (C3-4) and across Pennock Island (F3-1) into revenue-generating facilities (C3-4t and F3-1t). Per instructions from the Department, any acceptable procedure for collecting tolls was open for review, but they recommended only tolling in one direction.

TOLL COLLECTION. Tolling can be accomplished by either manned collection booths, or non-stop automatic electronic toll collection (similar to *Good to Go!* in Washington, *FasTrak* in California, or the *E-ZPass* system used in the Northeast from Maine to Virginia).

Infrastructure for manned collections consists of embankment widening for the toll plaza, one or more booths, and the necessary utilities (heat, power, phone/cable, restroom, etc) to operate the system. It is assumed that the office would be located at the existing State maintenance yard at Peninsula Point on Revilla Island.

The electronic toll collection (ETC) operates continuously. It consists of specialized technologies including either a transponder or a radio frequency identification (RFID) system, vehicle classification system (if required), reader(s), and a transaction processing system. The RFID system places a tag on the vehicle and a reader pole or bridge at the plaza to count the number of trips. The information is sent electronically to an office for processing and billing, presumably located at Peninsula Point.

Figure 1, *Electronic Toll Collection Plaza Layout*

It may be that since there are not that many large truck-type vehicles[1], it would be more efficient to just have one all-inclusive class of vehicle, and that a vehicle classification system would not be required.

Typically, the RFID tags are rented with a nominal refundable deposit. Accounts with an initial balance are set up that the tolls are billed against. Credit card accounts usually do not require a balance, and sometimes the tag deposit requirement is waived. Since Ketchikan is a small community on a "closed" roadway system, an RFID tag for each car, truck and motorcycle should not be an insurmountable problem (local peer pressure will probably preclude scofflaws). It is possible to legislate that all the vehicles in the greater Ketchikan area be tagged (similar to the recently eliminated emissions requirements in Anchorage and Fairbanks). What few tourists that do drive the Ketchikan roadways could be informed to rent a one-week tag, or since they arrived on the AMHS ferry, it could be an included surcharge when the Department issues their travel ticket.

Violation enforcement for either system consists of automatic license plate recognition cameras that take pictures of the vehicle's plate. The information is then processed, and a citation is sent to the registered owner. Plate recognition can also be used for payment; a user can pass through, have their plate identified, and then call into the office and pay their fee (and administrative cost) within an allotted period of time (after which it becomes a violation).

DESIGN CRITERIA. If the tolls are manually collected at a plaza with booths, it is believed that one booth would be open all the time, and one booth would be provided for peak hour traffic and when the primary booth was receiving maintenance. The booth would be a heated enclosure, no larger than 6x10 feet; comfortable enough for an operator and a computer/cash register.

With the C3-4 design speed of 30 MPH, the posted speed limit would probably be 25 MPH across the bridge, and the average running speed would be about 20 MPH. With shy distance offsets of 2 feet each side of the booth, and a taper rate of speed to 1 (20:1), the alignment shift would occur over 200 feet ((2 + 6 + 2) x 20 = 200). The total toll plaza dimensions would be about 70 x 850 feet. All widening will occur off the bridge so that there would be no changes in the structural members.

With the F3-1 alignment, the design speed is, and the speed limit would probably be, 50 MPH across Pennock Island. However, with a toll plaza, the posted speed limit and running speed would probably be closer to 20 MPH, so the total toll plaza dimensions would be essentially the same as Alternative C3-4t. All widening will happen between

[1] *Project Design Designations*, approved initially on August 23, 2004; updated and approved on July 27, 2005; and updated and approved again on August 27, 2010, all predict 2 percent commercial trucks (ADT ≈ 50).

the opening in the controlled-access and the bridge so that no changes in the structure would be necessary.

If tolls are electronically collected, then no booths or plaza widening would be required. A pole-mounted reader however, would be required in each direction to keep people from swerving into the opposite lane to avoid being billed.

LOCATION. Next a preferable location was investigated; either on the Revilla Island side or on the Gravina Island side for alignment C3-4t, and quickly decided that the Revilla side roadway was too short to provide for the necessary widening for booths between the intersection of the Bench (ByPass) Road and the bridge abutment (about 200 feet).

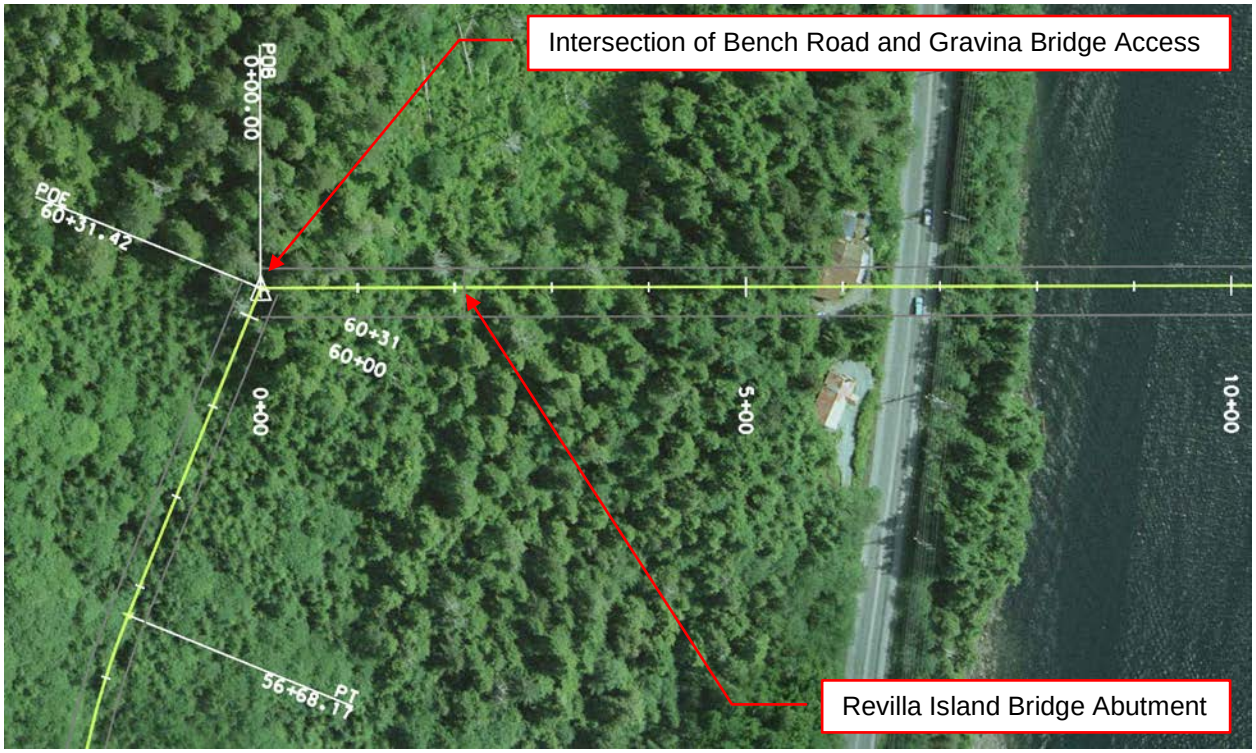


Figure 2, *West Abutment at Intersection of Gravina Island Access and Bench Road*

There is an additional concern when the Bench Road is ultimately continued southerly around town as the possibility of queuing of cars could back up onto this roadway. When the road is eventually extended towards Ketchikan, there may need to then be extra lanes installed for the backup of vehicles.

Another location would be on the Gravina Island side where there is a little more room to construct a toll plaza. It is still a very tight site, at the base of a steep hill with a lot of driver distractions coming into view at the Airport terminal. The distance between the bridge abutment and the terminal intersection is about 400 feet, adequate room for a merging lane. The access roadway down to the shuttle ferry ramp would need to be

filled in order to accommodate an extra booth, but the ferry dock was going to be removed at the completion of this project anyway.

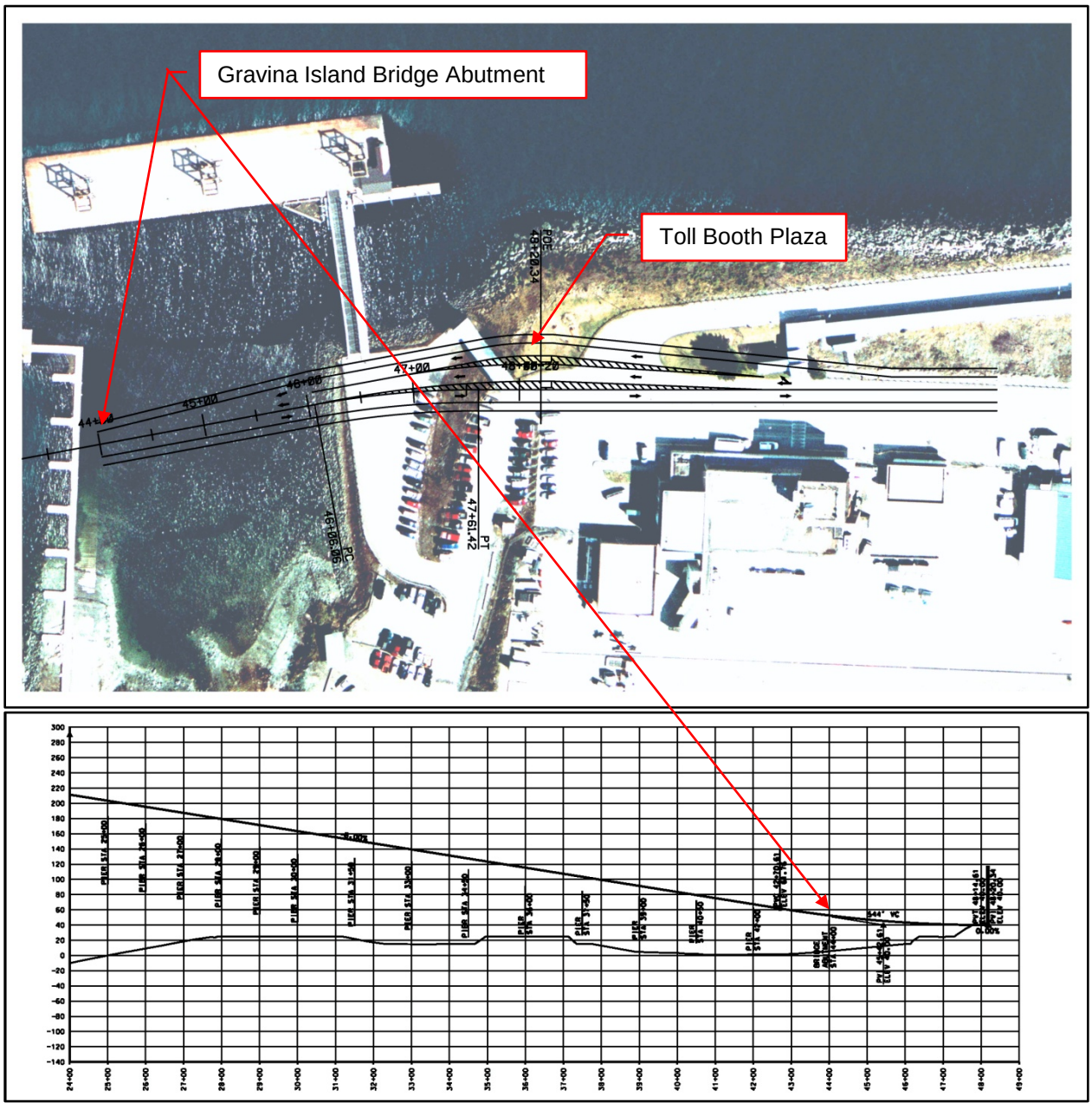


Figure 3, *East Abutment and Airport Access Road at Airport Terminal*

The lane arrangement adjacent to the terminal would need to be modified, as would the intersection that accesses the terminal parking, relocated seaplane area, and perimeter road to the west of the toll booths; but these are relatively minor changes. The new intersection would be just beyond the plaza to the south, in front of the terminal building.

An outbound direction (towards Revilla Island) was selected because of the proximity to the existing airport facilities, and the steepness of the bridge grade approaching Gravina Island (-8%). With the plaza on essentially level ground; after paying, vehicles can then start their climb up and over to Revilla Island rather than trying to slow or stop as they approach the plaza from the bridge grade.

These concerns would not be an issue if electronic collection was implemented; the readers could be installed anywhere up to the bridge abutment, or even on the bridge, thereby eliminating the stop-and-go congestion in front of the terminal.

If the F3-1t alignment was selected, the toll plaza should be located immediately after (east of) the only controlled-access opening (Sta 346+50) on Pennock Island. The terrain is essentially level, and there is sufficient room to construct the plaza before the curved approach to the East Channel bridge abutment. And as before, the tolls would be collected on the outbound traffic returning to Revilla Island.

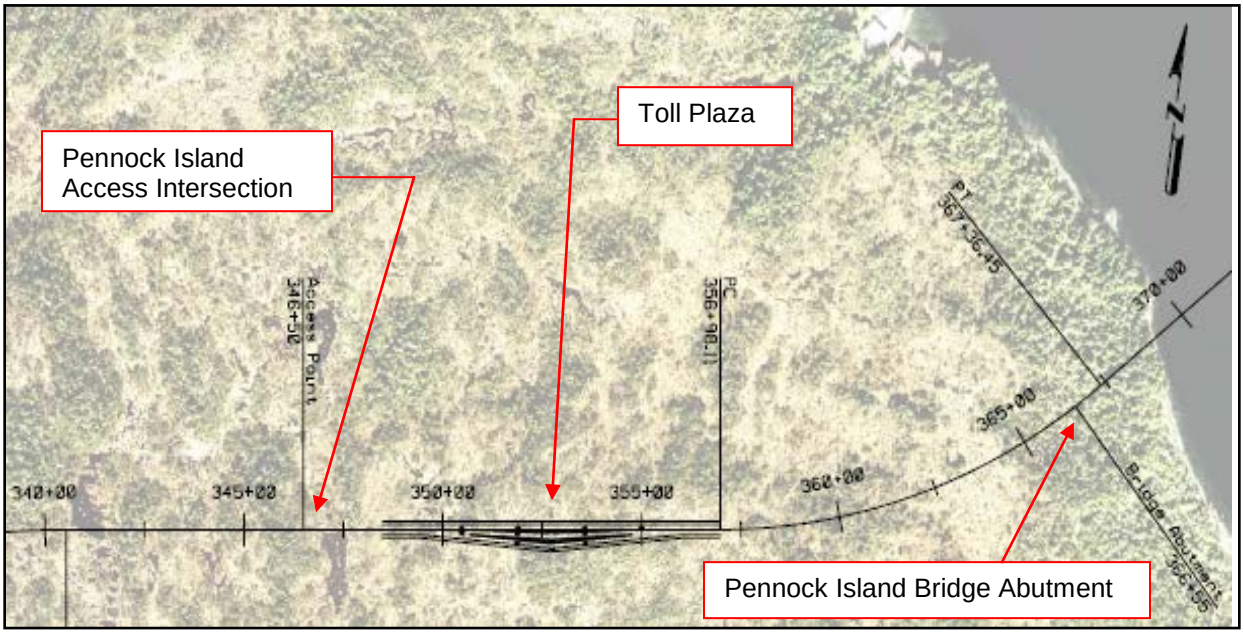


Figure 4, *Pennock Island Toll Plaza*

The one drawback to this location is that traffic commuting to/from Pennock Island with a destination of Gravina Island would be making their trip without charges. If the toll station was placed west of the intersection, then the potentially heavier Pennock-Revilla traffic would travel for free. Eventually, an additional plaza may have to be provided if outbound Pennock Island traffic increases significantly.

With automatic electronic toll collection, the readers would be placed just east of the controlled-access opening, again for both lanes. With two more readers and a more sophisticated setup, readings could be taken on both sides of the Pennock Island

intersection and the individual RFID identification numbers would be compared to identify and bill new travelers.

CONSTRUCTION COSTS. It is anticipated that the cost for widening the embankment into *Tongass Narrows* would be approximately $150,000 (10,000CY @ $15) for C3-4t, and about half that, $75,000, for F3-1t widening on Pennock Island. Paving and signing would add another $20,000. Both toll booths for each location would run about $60,000 (@ $120/SF). With contingencies, say the total cost for the manned toll plaza would be approximately $250,000 for C3-4t and $150,000 for F3-1t.

The costs for the electronic system are approximately:

Table 1, *ETC Estimated Costs*

DESCRIPTION	QUANTITY	TOTAL COST
Cantilever support pole for single lane	2	$ 40,000
ETC reader	2	20,000
Enforcement camera	2	10,000
ETC communications interface and antennae	1	10,000
Office processing system	1	5,000
TOTAL:		**$ 85,000**
RFID tag deposit	each	≈ $ 25

The costs for the automated toll collection would be about $25 for each vehicle tag (there are about 14,400 registered motor vehicles in Ketchikan[2]). Initial installation costs for the collection system is on the order of about $100,000.

MAINTENANCE COSTS. Manned booths that either collect cash or tokens must be physically occupied during the designated time of operation, ie; 24 hours per day year round; or it could be set up that tolling is only collected from 6am until 10pm (similar to the current ferry operation 6:15am to 9:30pm) – two complete 8-hour shifts – with the late evening shift being free under the assumption that little revenue would be collected in the middle of the night.

With around-the-clock manned tolling, it is anticipated that there would need to be a permanent staff of about eight (8) people -- one employee all the time, and one more employee for a second operation during the peak hours (4 people per 24 hour day). Assuming that this is 32 hours per day (24 + 8 = 32), the needed coverage is about 12,000 hours per year. A normal State shift year consists of almost 2,000 hours, or about six (6) people necessary to cover the operation. Add in one person extra for vacations and sick leave and one supervisor in the office managing staffing and the funds, and a minimum staffing for toll operations of eight (8) employees would be required. This would be about $840,000 per year (buffered rate at $35/hour), or say $1

[2] Alaska DOA Division of Motor Vehicles, 2009 (http://doa.alaska.gov/dmv/research/curreg09.htm)

million with incidentals. These costs do not envision an unmanned late evening shift with the road being open for free.

The main drawback to the collection booth system for a small community, is that proposed staffing would far outweigh the cost of the electronic counting system. A staffer is still necessary for billing and collection of the fares on the electronic system, and to also process any "run through" violators (run-throughs are identified on the video enforcement system).

One full-time employee responsible for the billing and collection would cost about $100,000 per year.

Normal and routine yearly maintenance for either the booths or the electronic system would probably add another $50,000 to the annual costs.

The life-cycle costs for the toll booths are almost seven times the cost of the electronic collection ($35 million vs $5 million) over the 75 year design life, due mostly to the high investment in labor.

ESTIMATED REVENUE. The design usage of the bridged connection over *Tongass Narrows* is estimated at 2,500 vehicles per day for the Airport crossing, and 2,600 vehicles for the Pennock Island crossing without fees. If we assume that a toll operation would reduce the anticipated daily usage in the design year (2030) proportionately in the amount of the toll, the following counts[3] and revenue stream can be expected:

Table 2, *Estimate Annual Gross Revenue*

OPTION	TOLL	2030 ADT	ANNUAL GROSS REVENUE (million)
Airport Access (C3-4t)	Free	2,500	$ 0.00
	$2	2,270	$ 0.83
	$5	1,454	$ 1.33
	$16	1,264	$ 3.69
Pennock Island Access (F3-1t)	Free	2,598	$ 0.00
	$2	2,368	$ 0.86
	$5	1,575	$ 1.44
	$16	1,339	$ 3.91

On average, the tolling operation could expect to collect from almost $1 to just over $3½ million per year over the expected life, regardless of the alignment; the $2 toll is expected to be the "break-even" amount where the annual maintenance and operations expenses for the bridge and approach roadways ($250,000 for C3-4 and $200,000 for

[3] HDR iTrans (draft) *Gravina Island Access Project Updated Traffic Forecast*, October 2011

F3-1) are expected to be balanced by the revenues in the opening year. The estimated revenue generation and user benefits are discussed in greater detail in the *Cost-Benefit Analysis of Gravina Access Project Alternatives* technical memorandum dated November 2011.

RECOMMENDATION. When comparing the user time delays between toll booth and electronic fare collection systems, especially with the poor location of the plaza at the base of the steep grade on the Airport crossing (C3-4), or the potential lost revenues of an unmanned late evening shift, or even the Pennock Island crossing gap, the electronic toll collection system makes the most sense. When evaluating the life-cycle costs, as expected, it is more cost effective selecting the electronic system. It is therefore recommended that electronic toll collection be implemented.

Appendix B

FERRY CAPACITY CALCULATION MEMORANDUM

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File: 2.0
Project # 6050

Memorandum

To: Carol Snead – HDR
Cc:
From: Allison Clavelle, EIT
Kate Halverson, EIT
Date: August 27, 2010
Re: **Ferry Capacity Calculations**

1. INTRODUCTION

As part of the assessment of Alternative G4v for the Gravina Access Project Supplemental Environmental Impact Statement (SEIS), the project team requires an understanding of when investment in a new ferry is required. The need for a new ferry is predicated on the maximum capacity of the existing service. This memorandum outlines the current operating frequency and capacity of the existing airport ferry service as well as the recommended level of ridership where an additional ferry may be required.

2. FREQUENCY AND CAPACITY OF EXISTING FERRY SERVICE

Ketchikan currently has two ferries (Main and Secondary) providing service to Ketchikan International Airport and Gravina Island. The following outlines the capacity and service frequency of these two ferries.

Main Ferry Capacity:
- 150 People (including 2 crew members) when there are no vehicles
- 100 People (including 2 crew members) and up to 22 passenger cars

Secondary Ferry Capacity:
- 100 people (including 2 crew members) when there are no vehicles
- 80 people (including 2 crew members) and up to 15 passenger cars

In the summer (first week of June to first week of September):
- Main Ferry runs every day – 6:15 a.m. to 9:30 p.m. twice an hour
- Secondary Ferry runs Mon-Fri 8:00 a.m. to 3:45 p.m. twice an hour (opposite the Main Ferry)

In the winter:

- Only the Main Ferry runs every day – 6:15 p.m. to 9:30 p.m. twice an hour
- Sometimes adjust the times based on Alaska airlines schedule

3. LEVEL OF SERVICE FOR FERRIES

The capacity of a ferry service is dependent on the number of vehicles and passengers that can be accommodated in one sailing and the number of sailings per day. During busy times, ferries may run at or above capacity, with some vehicles and passengers waiting for a later sailing. At other times, ferries typically run below capacity, with all passengers and vehicles accommodated with additional room available. The actual capacity at which an agency should consider increasing the number of ferries it operates on a given route depends on the acceptable level of service (LOS) for ferry operation.

The Alaska Department of Transportation and Public Facilities (DOT&PF) does not have standards or methods for determining LOS for ferries. Washington State Department of Transportation's (WSDOT) standards and methods for determining LOS for ferries could be applied to the Gravina Access Project because Washington's ferry network is used for commuter and recreational routes and its standards provide an accurate reflection of actual service to ferry users. These standards and methods for determining LOS were used in this memorandum.[1]

WSDOT measures LOS by determining the percentage of sailings that are full; i.e., at or above maximum capacity. When sailings are full, it indicates that a portion of vehicles and passengers cannot board at their preferred sailing time (i.e., vehicles and passengers are left waiting at the terminal for the next ferry because the ferry they intended to ride is full).

The WSDOT LOS standards consider the percentage of full sailing by route to determine and appropriate strategy for improving LOS. Routes that carry a large number of commuters have peak times during which there are many passengers that do not have much flexibility in their travel times, whereas routes that carry a large number of recreational travelers accommodate these travelers over a longer period because of the flexibility of their travel times. An acceptable LOS for a commuter route has a lower percentage of full sailings as compared to a route that is primarily for recreational users.

Under the WSDOT standards, there are two levels for considering LOS improvements:

- At Level 1, 25 to 35 percent of the sailing are full, depending on the route and ridership (i.e., 25 percent for a commuter route and 35 percent for a route that has more recreational riders). At this level, WSDOT recommends that planning agencies consider targeted strategies to spread demand and improve customer service.

[1] Washington State Department of Transportation, Final Long-Range Plan, Customer Service: Level of Service Standards (2009)

- At Level 2, 50 to 85 percent of the sailings are full depending on the route and ridership (i.e., 50 percent for a commuter route and 85 percent for a route that has more recreational riders). At this level, WSDOT considers the assets are being used efficiently and planning agencies should consider additional investment (e.g., adding a ferry).

4. ALTERNATIVE G4V: THRESHOLD FOR NEW FERRY DEVELOPMENT

For Alternative G4v of the Gravina Access Project, Level 2 LOS would indicate the need for investment in a new ferry. In order to determine the percentage of full sailing that would bring LOS to Level 2 with the airport ferry in Ketchikan, we considered the range of Level 2 LOS in the WSDOT standards. WSDOT Level 2 LOS ranged from 50 percent full sailings for routes with very pronounced peak trends (i.e., heavy commuter routes) to 85 percent full sailings for routes with the greatest time flexibility (i.e., largely recreational traffic). Ketchikan International Airport passengers are the largest user group for the airport ferry. Because flights are spread throughout the day, the peak periods for the ferry are also spread throughout the day. A value of 65 percent full sailings operating on the summer schedule was used as the Level 2 LOS for the airport ferry in Ketchikan.

With both the Main and Secondary ferries operating on the summer schedule, on a week day, the minimum passenger and vehicle ridership at Level 2 LOS would be:

Ferry Ridership at Level 2 LOS

	Passengers	Vehicles
Main Ferry	1,983	436
Secondary Ferry	806	151
Total ridership	2,789	587

Vehicle and pedestrian ferry volumes were forecast to 2030 as part of the traffic analysis for the No Action Alternative in the Gravina Access Project SEIS. Two population growth scenarios were used in the forecast: a base case with negligible population growth and an optimistic case that assumed 1 percent population growth into the future.

The traffic model results for the No Action Alternative indicate the following ridership levels for the existing ferry: **:**

Ferry Ridership in 2030

	Passengers	Vehicles
Base Case	934	224
Optimistic Case (1 Percent Growth Rate)	1,327	324

In the base case, if all riders were accommodated during one peak period, the number of full sailings would be 12: six of the Main Ferry and six of the Secondary Ferry. These full sailings would represent 26 percent of the total sailings for the day. This assumes that all the riders for that day are on the at-capacity sailings and other sailings are completely empty. In the optimistic growth case, if all riders were accommodated during one peak period, the number of full sailings would be 18: nine of the Main Ferry and nine of the Secondary Ferry. These full sailings would represent 39 percent of the total sailings for the day. Again, this assumes that all the riders for that day are on the at-capacity sailings and other sailings are completely empty. In reality, the ferry use would be spread throughout the day and a lower percentage of full sailings is expected.

The addition of and improvements to facilities that support the ferry system under Alternative G4v would increase passenger and vehicle use of the ferries; however, it is unlikely to boost ridership and substantially increase the percentage of ferries operating at full capacity.

By extrapolating from the 1 percent population growth curve (optimum case), reaching 65 percent full sailings (with all other sailings being empty) would not occur until 2105.

Appendix C

M&O COST MATRIX

KETCHIKAN GRAVINA ISLAND ACCESS

M&O Cost Support

July 2012

Inflation Rate:	3.77%	Design Life:	20 Years	Life-Cycle:	75 Years	RibbonCutting:	2016
Discount Rate:	2.30%	Structure Life:	75 Years	Construction:	2014	End of Life:	2091

ALIGNMENT CROSSING ALTERNATIVES SEGMENT LENGTHS

ALT №	ALIGNMENT ALTERNATIVE	TOTAL CONCEPT LENGTH (LF)	Airport Access Length	Boro Lands Access Length	Revilla Island Segments				Gravina Island Segments							
					Revilla Road Segment	Tongass Narrows/East Channel Bridge Segment	Pennock Road Segment	West Channel Bridge Segment	Gravina Road Segment	Airport Access Road	Gravina Island Highway	Lewis Reef Road	Seley Road	Airport Return Loop	G2 Connection to Lewis Point	G3 Connection to Clump Cove
C3-4	550x200-foot high connection to Airport Terminal	45,408	11,000	34,408	3,100	5,000	na	na	800	6,084	16,714	7,380	4,230	2,100	na	na
F3-1	350x60 and 550x200-foot high connections via Pennock Island	42,584	30,974	11,610	50	1,985	4,605	2,450	na	6,084	15,800	7,380	4,230	na	na	na
G2	Ferry connection from Peninsula Point with existing ferry	38,389	21,675	16,714	na	na	na	na	na	6,084	16,714	7,380	4,230	na	3,981	na
G3	Ferry connection from Downtown with existing ferry	35,734	10,180	25,554	na	na	na	na	2,770	6,084	13,944	7,380	4,230	na	na	1,344
G4	Ferry connection with existing ferry terminal	34,408	0	34,408	na	na	na	na	na	6,084	16,714	7,380	4,230	na	na	na
G4v	Ferry connection with existing ferry terminal	34,408	0	34,408	na	na	na	na	na	6,084	16,714	7,380	4,230	na	na	na
NB	No Action	30,178	0	30,178	na	na	na	na	na	6,084	16,714	7,380	na	na	na	na

(per 100LF @ 40' wide)

8% Engineering:	$	756
Existing Roadway (@ $6.50/SY):	$	963
Overlay Pavement (@ $75/ton):	$	3,800
Striping (@ $1500/mile):	$	28
10% Traffic Control:	$	479
10% Office, Survey, EroPolu:	$	479
30% Contingencies:	$	1,725
10% Mob and Demob:	$	747
15% Construction Admin:	$	1,233
Total:	$	10,212

GUARDRAIL COSTS (per 100LF)

8% Engineering:	$	1,737
Removal of Old Railing (@ $10/LF):	$	2,000
W-Beam Guardrail (@ $45/LF):	$	9,000
10% Traffic Control:	$	1,100
10% Office, Survey, EroPolu:	$	1,100
30% Contingencies:	$	3,960
10% Mob and Demob:	$	1,716
15% Construction Admin:	$	2,831
Total:	$	23,444

MODULAR EXPANSION JOINT COSTS (each)

8% Engineering:	$	51,529	$	17,311
Removal of Old Joint* (@ $100/LF):	$	5,100	$	2,550
Install New Joint* (@ $300/inch/LF):	$	321,300	$	107,100
10% Traffic Control:	$	32,640	$	10,965
10% Office, Survey, EroPolu:	$	32,640	$	10,965
30% Contingencies:	$	117,504	$	39,474
10% Mob and Demob:	$	50,918	$	17,105
15% Construction Admin:	$	84,015	$	28,224
dular Expansion Joint Replacement Total:	$	695,647		
Gland Replacement Total:			$	233,694

* assume 21" joints at bridge ends; remove old glands $50/LF, new glands $100/LF, remove old joints $100/"/LF, new joints $300/"/LF

LIFE-CYCLE COST SUMMARY*

Alt №	Paved Road	Gravel Road	Bridge	Ferry/Dock	Extras	TOTAL
C3-4						**$222,466,323**
F3-1						**$286,470,404**
G2				$315,837,698	$15,635,038	**$331,472,736**
G3				$298,544,240	$15,635,038	**$314,179,278**
G4				$285,276,643	$15,635,038	**$300,911,681**
G4v				$165,965,137	$15,635,038	**$181,600,175**
No Action						**$88,018,416**

* without revenue

Extras are the passenger waiting area, heavy freight dock and staging area, and ferry layup berth

M&O UNIT COSTS

CROSSING CONCEPT MAINTENANCE COSTS	CYCLE (Years)	PAVED ROAD	GRAVEL ROAD	BRIDGE	FERRY
		COST/LF or LUMP SUM			
Annualized General Maintenance* ** *** ****	1	$4.29	$4.29	$1.14	$5.71/5.70/3.42M
Periodic Maintenance Costs:					
Bridge inspections, above ground	2			$40,000	
Bridge inspections, underwater foundations	5			$40,000	
Rail replacement: 10% bridge 50% road	5	$117	$117	$23	
Planing and pavement overlay	10	$102		$102	
Joint neoprene gland replacement	10			$500,000	
Joint assembly replacement	25			$1,400,000	
Signing and illumination replacement*****	15	$5	$5	$5	
Ferry Replacement	40				$8.0M

* Annual Roadway Maintenance for Paved Road: $5000/lane-mile = 2 lanes with 2 shoulders = 4 lanes = $4/2-lane linear foot

** Annual Roadway Maintenance for Gravel Road: $6500/lane-mile = 2 lanes with 2 shoulders = 4 lanes = $5/2-lane linear foot

*** Annual Bridge Maintenance costs are in addition to the roadway maintenance costs: $1500/lane-mile = 2 lanes with 2 shoulders = 4 lanes = $1/2-lane linear foot

**** Annual Ferry Maintenance costs for Alternative G2 and G3 ($5.71), and G4 ($5.70M)

***** Signing and Illumination repair and/or replacement: $25,000/mile/year = $5/linear foot

****** No Action ferry maintenance is the 0.6 annual maintenance of the ferry ($3,420,000) plus the roadway costs (6,084 + 16,714 + 7,380 = 30,178 * $5/LF = $150,890) $3,570,890

M&O COST SUMMARY

ALT №	Paved Length	M&O Cost	Gravel Length	M&O Cost	Bridge Length	Bridge/Ferry M&O Cost	Total M&O Cost
C3-4	21,470	$92,091	34,408	$147,585	4,190	$4,761	**$244,437**
F3-1	30,974	$132,856	11,610	$49,798	4,435	$5,040	**$187,694**
G2	21,675	$92,970	16,714	$71,691	--	$5,710,000	**$5,874,661**
G3	10,180	$43,665	25,554	$109,608	--	$5,710,000	**$5,863,273**
G4	0	$0	34,408	$147,585	--	$5,700,000	**$5,847,585**
G4v	0	$0	34,408	$147,585		$3,420,000	**$3,567,585**
No Action	0	$0	30,178	$129,442	--	$3,420,000	**$3,549,442**

Appendix D

CONSTRUCTION COST MATRIX

Gravina Island Access

Engineer's Construction Cost Matrix

October 2011

Category	C3-4 Length or Sq Ft	C3-4 Cost	F3-1 Length or Sq Ft	F3-1 Cost	G2 Length or Sq Ft	G2 Cost	G3 Length or Sq Ft	G3 Cost	G4 Length or Sq Ft	G4 Cost	G4v Length or Sq Ft	G4v Cost
ROADWAY												
MAINLINE ROADWAY CONSTRUCTION SUBTOTAL[3]	9,888	$ 8,735,530	30,974	$ 15,255,074	21,675	$ 7,579,987	10,180	$ 2,389,634	0	$ -	0	$ -
Mainline Pavement		$ 402,637		$ 3,784,680		$ 2,901,384		$ 584,299		$ -		$ -
Seley Road Widening[4]	4,230	$ 3,156,926	4,230	$ 3,156,926	11,605	$ 3,156,926	4,230	$ 3,156,926	4,230	$ 3,156,926	4,230	$ 3,156,926
Airport Access Road Paving[2]		$ -	4,300	$ 476,064	4,300	$ 476,064	4,300	$ 476,064		$ -		$ -
Roadway Contingency (15% of Road Construction Subtotal)		$ 1,900,000		$ 3,500,000		$ 2,200,000		$ 1,000,000		$ 500,000		$ 500,000
ROADWAY CONSTRUCTION SUBTOTAL		**$ 14,195,093**		**$ 26,172,743**		**$ 16,314,361**		**$ 7,606,923**		**$ 3,656,926**		**$ 3,656,926**
STRUCTURES[5]												
Government Creek Bridge Widening (Sta 141+50 to Sta 145+00)			4,200	$ 698,169								
Gravina Creek Bridge Widening (Sta 197+40 to Sta 198+20)			960	$ 232,723								
West Channel Bridge			126,639	$ 94,896,336								
East Channel Bridge			101,731	$ 76,231,644								
Tongass Narrows Bridge	214,738	$ 152,872,961										
Airport Creek Bridge	3,060	$ 996,985	3,060	$ 996,985	3,400	$ 996,985	3,060	$ 996,985	3,060	$ 996,985	3,060	$ 996,985
Dredging for West Channel				$ 13,097,530								
STRUCTURE CONSTRUCTION SUBTOTAL		**$ 153,869,946**		**$ 186,153,388**		**$ 996,985**		**$ 996,985**		**$ 996,985**		**$ 996,985**
MOBILIZATION & DEMOBILIZATION (10% of Subtotals)		$ 16,900,000		$ 21,300,000		$ 1,800,000		$ 900,000		$ 500,000		$ 500,000
ROADWAY CONSTRUCTION SUBTOTAL		**$ 184,965,040**		**$ 233,626,131**		**$ 19,111,347**		**$ 9,503,908**		**$ 5,153,912**		**$ 5,153,912**
FERRIES												
Two New Ferries and Two New Docks						$ 34,945,030		$ 35,264,722		$ 33,527,330		
Passenger Waiting and Enhanced Baggage Handling Facility						$ 1,403,387		$ 1,403,387		$ 1,403,387		$ 1,403,387
Ferry Layup Berth						$ 5,987,786		$ 5,987,786		$ 5,987,786		$ 5,987,786
Heavy Freight Terminal and 3/4-acre Staging Area						$ 5,426,431		$ 5,426,431		$ 5,426,431		$ 5,426,431
FERRY CONSTRUCTION SUBTOTAL						**$ 47,762,634**		**$ 48,082,326**		**$ 46,344,935**		**$ 12,817,605**
SEGMENT CONSTRUCTION SUBTOTAL		**$ 184,965,040**		**$ 233,626,131**		**$ 66,873,981**		**$ 57,586,235**		**$ 51,498,846**		**$ 17,971,516**
CONSTRUCTION ADMINISTRATION (5% of Seg Const Subtotal)		$ 9,250,000		$ 11,690,000		$ 3,350,000		$ 2,880,000		$ 2,580,000		$ 900,000
TOTAL CONSTRUCTION AMOUNT		**$ 194,215,040**		**$ 245,316,131**		**$ 70,223,981**		**$ 60,466,235**		**$ 54,078,846**		**$ 18,871,516**
DESIGN (7% of Total Construction Amount)		$ 13,600,000		$ 17,180,000		$ 4,920,000		$ 4,240,000		$ 3,790,000		$ 1,330,000
UTILITIES		$ 1,000,000		$ 100,000		$ 1,000,000		$ 1,000,000		$ 1,000,000		$ 1,000,000
RIGHT-OF-WAY		$ 3,810,000		$ 220,000		$ 1,000,000		$ 1,000,000		$ 500,000		$ 500,000
PROJECT CONSTRUCTION and DEVELOPMENT SUBTOTAL		**$ 212,625,040**		**$ 262,816,131**		**$ 77,143,981**		**$ 66,706,235**		**$ 59,368,846**		**$ 21,701,516**
ICAP (5.0 % of Total)		$ 10,640,000		$ 13,150,000		$ 3,860,000		$ 3,340,000		$ 2,970,000		$ 1,090,000
GRAND TOTAL		**$ 223,265,040**		**$ 275,966,131**		**$ 81,003,981**		**$ 70,046,235**		**$ 62,338,846**		**$ 22,791,516**

Notes:

(1) Parking garage costs are not included in the above estimates. This cost is common to all alternatives at $13.1 million.

(2) The Airport Access Road was recently reconstructed under the runway extension project, to the intersection of the GIH (about Sta 138~). The costs herein are only for base and pavement for the existing 40-foot wide gravel road (Sta 17~ to 60~).

(3) Mainline Roadway Construction Subtotal includes all road construction costs (including Seley Road) for each alternative as described in the engineers estimate report from Revilla Island to the airport terminal, except for pavement (as requested by the Regional Director).

(4) The Seley Road costs are to upgrade the existing logging road between the *Airport Creek* bridge and the north Airport reserve (and G2 intersection) to match the existing 36-foot wide gravel Lewis Reef Road.

(5) All structure costs include 20 percent contingency.

(6) All costs are 2011 dollars.

(7) Historical bid tab data was used to updated the unit prices. Only information from projects with similar project location and quantities were used.

(8) FHWA NHCCI Index was used to normalize historic bid tab data in the years between 2003 and 2010

(9) In lieu of an NHCCI index for 2011 the negative trend from 2009-2010 was linearly projected to determine the 2011 index.

(10) Industry trends suggest little change in structure costs from 2008 to 2011, as such, all structure costs remain unchanged from the 2008 estimate.

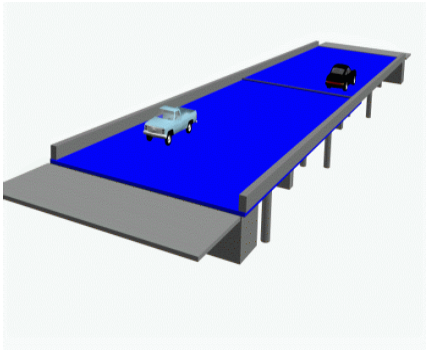
Appendix E

LIFE-CYCLE COST REPORT

BridgeLCC 2.0
Reports

Gravina Island Access -- C3-4 and F3-1 Alignments (w/ and w/o Revenues)

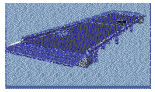
11/03/2011



Building and Fire Research Laboratory
National Institute of Standards and Technology
Gaithersburg, MD

Analysis: Summary of Life-Cycle Costs

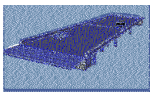
11/03/2011



	Name	Base Case	Alternative #1	Alternative #2	Alternative #3
	Total Life-Cycle Cost	**$222,466,323**	**$214,116,708**	**$286,470,404**	**$279,790,711**
By Cost Bearer:	Agency Costs	$222,466,323	$214,116,708	$286,470,404	$279,790,711
	User Costs	$ 0	$ 0	$ 0	$ 0
	Third-Party Costs	$ 0	$ 0	$ 0	$ 0
By Cost Timing:	Initial Construction Costs	$203,853,508	$203,853,508	$251,972,561	$251,972,561
	OM&R Costs	$ 18,612,815	$ 10,263,200	$ 34,497,843	$ 27,818,150
	Disposal Costs	$ 0	$ 0	$ 0	$ 0
By Cost Component:	Elemental Costs	$222,466,323	$214,116,708	$286,470,404	$279,790,711
	Non-elemental Costs	$ 0	$ 0	$ 0	$ 0
	New-Technology	$ 0	$ 0	$ 0	$ 0

Data: Description

11/03/2011



Name: Gravina Island Access -- C3-4 and F3-1 Alignments (w/ and w/o **Date:** 10/27/2011

Objective:

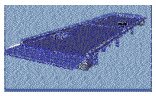
Life-cycle costs of the owner's costs, with and without consideration of their tolling income. It is assumed that the toll fares would be established to completely offset the annual maintenance and operations expenses for bridge(s) and approach roadways.

The life-cycle costs include all costs for the gravel roads serving the KGB developable lands.

Revenues collected are for the maintenance of the bridge(s) and paved approach roadways only; they do not reflect the expenses for the gravel roads.

Data: Project Parameters

11/03/2011



Study Period

Base Year	2011
Length of period	80
Last Year	2091

Currency

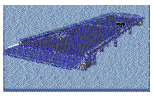
U.S. Dollars ($)

Interest Rates

Inflation	3.77%
Real Discount	2.30%

Elements

#1	Bridge
#2	Paved Road
#3	Gravel Road
#4	Ferry
#5	Dock
#6	Non-elemental
#7	New technology



C3-4 (w/o Revenue)

Lanes on	2	Area of deck (ft)	214,738.00
	0	Length of bridge (ft)	4,190.00

Alignment C3-4. Provide paved access along the KGB's Bench (ByPass) Road between North Tongass Avenue on Revilla Island and the KTN passenger terminal on Gravina Island with a single balanced cantilever cast-in-place concrete box girder bridge over Tongass Narrows that will allow for a 200 x 550-foot navigational opening.

Also included are gravel roads serving the KGB developable lands on Gravina Island.

An annual revenue stream is NOT included in these LCC calculations.

C3-4 (w/ Revenue)

Lanes on	2	Area of deck (ft)	214,738.00
	0	Length of bridge (ft)	4,190.00

Alignment C3-4. Provide paved access along the KGB's Bench (ByPass) Road between North Tongass Avenue on Revilla Island and the KTN passenger terminal on Gravina Island with a single balanced cantilever cast-in-place concrete box girder bridge over Tongass Narrows that will allow for a 200 x 550-foot navigational opening.

Also included are gravel roads serving the KGB developable lands on Gravina Island.

An anticipated annual revenue stream offsetting the cost of bridge and roadway approaches ($250,000) is included in these LCC calculations.

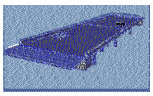
F3-1 (w/o Revenue)

Lanes on	2	Area of deck (ft)	228,319.00
	0	Length of bridge (ft)	4,455.00

Alignment F3-1. Provide paved access between South Tongass Avenue near the USCG Station on Revilla Island, across Pennock Island, and up Gravina Island to the KTN passenger terminal with two balanced cantilever cast-in-place concrete box girder bridge over Tongass Narrows. The East Channel will allow for a 60 x 350-foot navigational opening, and the West Channel will provide for a 200 x 550-foot navigational opening.

Also included are gravel roads serving the KGB developable lands on Gravina Island.

An annual revenue stream is NOT included in these LCC calculations.



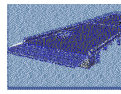
F3-1 (w/ Revenue)

Lanes on	2	Area of deck (ft)	228,319.00
	0	Length of bridge (ft)	4,455.00

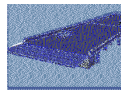
Alignment F3-1. Provide paved access between South Tongass Avenue near the USCG Station on Revilla Island, across Pennock Island, and up Gravina Island to the KTN passenger terminal with two balanced cantilever cast-in-place concrete box girder bridge over Tongass Narrows. The East Channel will allow for a 60 x 350-foot navigational opening, and the West Channel will provide for a 200 x 550-foot navigational opening.

Also included are gravel roads serving the KGB developable lands on Gravina Island.

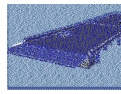
An anticipated annual revenue stream offsetting the cost of bridge and roadway approaches ($200,000) is included in these LCC calculations.



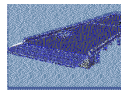
Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Base Case									
Agency									
Initial Construction									
Construction cost	<no event>	5	5	1.0000	1.000	LS	$223,265,040	$223,265,040	.
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.
O, M, and R									
M&O Bridge	<no event>	5	80	1.0000	4190.000	Length of	$ 1	$ 4,819	
M&O Paved Road	<no event>	5	80	1.0000	9842.000	LS	$ 4	$ 42,321	
M&O Gravel Road	<no event>	5	80	1.0000	34408.000	LS	$ 4	$ 147,954	
Inspection Above Gound	<no event>	7	80	2.0000	1.000	LS	$ 40,000	$ 40,000	
Inspection Underwater	<no event>	10	80	5.0000	1.000	LS	$ 40,000	$ 40,000	
Guardrail Bridge	<no event>	10	80	5.0000	4190.000	Length of	$ 23	$ 96,370	
Guardrail Paved Road	<no event>	10	80	5.0000	2826.000	LS	$ 117	$ 330,642	
Guardrail Gravel Road	<no event>	10	80	5.0000	3441.000	LS	$ 117	$ 402,597	
Replace Pavement Bridge	<no event>	15	80	10.0000	4190.000	Length of	$ 102	$ 427,380	
Replace Pavement Paved	<no event>	15	80	10.0000	5652.000	LS	$ 102	$ 576,504	
Anode Replacement	<no event>	15	80	10.0000	1.000	LS	$ 100,000	$ 100,000	
Joint Gland Replacement	<no event>	15	80	10.0000	1.000	LS	$ 500,000	$ 500,000	
Signs/Illumination Bridge	<no event>	20	80	15.0000	4190.000	Length of	$ 5	$ 20,950	
Signs/Illumination Paved	<no event>	20	80	15.0000	2826.000	LS	$ 5	$ 14,130	
Signs/Illumination Gravel	<no event>	20	80	15.0000	6881.000	LS	$ 5	$ 34,405	
Joint Assembly Replacement	<no event>	30	80	25.0000	1.000	LS	$ 1,400,000	$ 1,400,000	
Alternative #2									
Agency									
Initial Construction									



Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Construction cost	<no event>	5	5	1.0000	1.000	LS	$275,966,131	$275,966,131	.
O, M, and R									
M&O Bridge	<no event>	5	80	1.0000	4455.000	Length of	$ 1	$ 5,123	
M&O Paved Road	<no event>	5	80	1.0000	30973.000	LS	$ 4	$ 133,184	
M&O Gravel Road	<no event>	5	80	1.0000	11610.000	LS	$ 4	$ 49,923	
Inspection Above Ground	<no event>	7	80	2.0000	2.000	LS	$ 40,000	$ 80,000	
Inspection Underwater	<no event>	10	80	5.0000	2.000	LS	$ 40,000	$ 80,000	
Guardrail Bridge	<no event>	10	80	5.0000	4455.000	Length of	$ 23	$ 102,465	
Guardrail Paved Road	<no event>	10	80	5.0000	13259.000	LS	$ 117	$ 1,551,303	
Guardrail Gravel Road	<no event>	10	80	5.0000	1161.000	LS	$ 117	$ 135,837	
Replace Pavement Bridge	<no event>	15	80	10.0000	4455.000	Length of	$ 102	$ 454,410	
Replace Pavement Road	<no event>	15	80	10.0000	26518.000	LS	$ 102	$ 2,704,836	
Anode Replacement	<no event>	15	80	10.0000	2.000	LS	$ 100,000	$ 200,000	
Joint Gland Replacement	<no event>	15	80	10.0000	2.000	LS	$ 500,000	$ 1,000,000	
Signs/Illumination Bridge	<no event>	20	80	15.0000	4455.000	Length of	$ 5	$ 22,275	
Signs/Illumination Paved	<no event>	20	80	15.0000	13259.000	LS	$ 5	$ 66,295	
Signs/Illumination Gravel	<no event>	20	80	15.0000	2322.000	LS	$ 5	$ 11,610	
Joint Assembly Replacement	<no event>	30	80	25.0000	2.000	LS	$ 1,400,000	$ 2,800,000	
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.
Alternative #3									
Agency									
Initial Construction									
Construction cost	<no event>	5	5	1.0000	1.000	LS	$275,966,131	$275,966,131	.
O, M, and R									
M&O Bridge	<no event>	5	80	1.0000	4455.000	Length of	$ 1	$ 5,123	



Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
M&O Paved Road	<no event>	5	80	1.0000	30973.000	LS	$ 4	$ 133,184	
M&O Gravel Road	<no event>	5	80	1.0000	11610.000	LS	$ 4	$ 49,923	
Inspection Above Ground	<no event>	7	80	2.0000	2.000	LS	$ 40,000	$ 80,000	
Inspection Underwater	<no event>	10	80	5.0000	2.000	LS	$ 40,000	$ 80,000	
Guardrail Bridge	<no event>	10	80	5.0000	4455.000	Length of	$ 23	$ 102,465	
Guardrail Paved Road	<no event>	10	80	5.0000	13259.000	LS	$ 117	$ 1,551,303	
Guardrail Gravel Road	<no event>	10	80	5.0000	1161.000	LS	$ 117	$ 135,837	
Replace Pavement Bridge	<no event>	15	80	10.0000	4455.000	Length of	$ 102	$ 454,410	
Replace Pavement Road	<no event>	15	80	10.0000	26518.000	LS	$ 102	$ 2,704,836	
Anode Replacement	<no event>	15	80	10.0000	2.000	LS	$ 100,000	$ 200,000	
Joint Gland Replacement	<no event>	15	80	10.0000	2.000	LS	$ 500,000	$ 1,000,000	
Signs/Illumination Bridge	<no event>	20	80	15.0000	4455.000	Length of	$ 5	$ 22,275	
Signs/Illumination Paved	<no event>	20	80	15.0000	13259.000	LS	$ 5	$ 66,295	
Signs/Illumination Gravel	<no event>	20	80	15.0000	2322.000	LS	$ 5	$ 11,610	
Joint Assembly Replacement	<no event>	30	80	25.0000	2.000	LS	$ 1,400,000	$ 2,800,000	
Toll Revenue	<no event>	5	80	1.0000	1.000	LS	$ -200,000	$ -200,000	
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.
Alternative #1									
Agency									
Initial Construction									
Construction cost	<no event>	5	5	1.0000	1.000	LS	$223,265,040	$223,265,040	.
O, M, and R									
M&O Bridge	<no event>	5	80	1.0000	4190.000	Length of	$ 1	$ 4,819	
M&O Paved Road	<no event>	5	80	1.0000	9842.000	LS	$ 4	$ 42,321	
M&O Gravel Road	<no event>	5	80	1.0000	34408.000	LS	$ 4	$ 147,954	

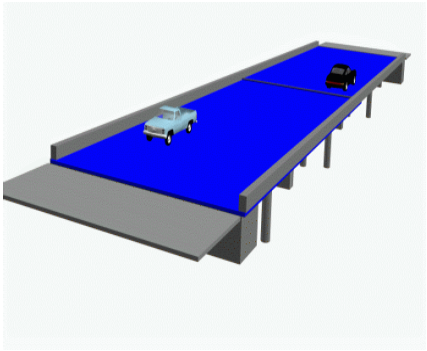


Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Inspection Above Gound	<no event>	7	80	2.0000	1.000	LS	$ 40,000	$ 40,000	
Inspection Underwater	<no event>	10	80	5.0000	1.000	LS	$ 40,000	$ 40,000	
Guardrail Bridge	<no event>	10	80	5.0000	4190.000	Length of	$ 23	$ 96,370	
Guardrail Paved Road	<no event>	10	80	5.0000	2826.000	LS	$ 117	$ 330,642	
Guardrail Gravel Road	<no event>	10	80	5.0000	3441.000	LS	$ 117	$ 402,597	
Replace Pavement Bridge	<no event>	15	80	10.0000	4190.000	Length of	$ 102	$ 427,380	
Replace Pavement Paved	<no event>	15	80	10.0000	5652.000	LS	$ 102	$ 576,504	
Anode Replacement	<no event>	15	80	10.0000	1.000	LS	$ 100,000	$ 100,000	
Joint Gland Replacement	<no event>	15	80	10.0000	1.000	LS	$ 500,000	$ 500,000	
Signs/Illumination Bridge	<no event>	20	80	15.0000	4190.000	Length of	$ 5	$ 20,950	
Signs/Illumination Paved	<no event>	20	80	15.0000	2826.000	LS	$ 5	$ 14,130	
Signs/Illumination Gravel	<no event>	20	80	15.0000	6881.000	LS	$ 5	$ 34,405	
Joint Assembly Replacement	<no event>	30	80	25.0000	1.000	LS	$ 1,400,000	$ 1,400,000	
Toll Revenue	<no event>	5	80	1.0000	1.000	LS	$ -250,000	$ -250,000	
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.

BridgeLCC 2.0
Reports

Ketchikan Gravina Island Access -- G Alignments (w/o Revenue)

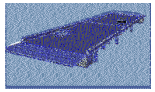
07/06/2012



Building and Fire Research Laboratory
National Institute of Standards and Technology
Gaithersburg, MD

Analysis: Summary of Life-Cycle Costs

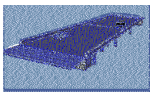
07/06/2012



	Name	Base Case	Alternative #1	Alternative #2	Alternative #3	Alternative #4	Alternative #5
	Total Life-Cycle Cost	**$315,837,698**	**$298,544,240**	**$285,276,643**	**$ 15,635,038**	**$165,965,137**	**$168,355,201**
By Cost Bearer:	Agency Costs	$315,837,698	$298,544,240	$285,276,643	$ 15,635,038	$165,965,137	$168,355,201
	User Costs	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Third-Party Costs	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
By Cost Timing:	Initial Construction Costs	$ 73,961,179	$ 63,956,143	$ 56,918,864	$ 11,703,192	$ 20,809,933	$ 20,728,308
	OM&R Costs	$241,876,518	$234,588,098	$228,357,779	$ 3,931,846	$145,155,204	$147,626,894
	Disposal Costs	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
By Cost Component:	Elemental Costs	$315,837,698	$298,544,240	$285,276,643	$ 15,635,038	$165,965,137	$168,355,201
	Non-elemental Costs	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	New-Technology	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0

Data: Description

07/06/2012



Name: Ketchikan Gravina Island Access -- G Alignments (w/o **Date:** 07/06/2012

Objective:

Life-cycle costs of the owner's costs, without consideration of any income revenue. The average annual income revenue stream from ferry fares is NOT included in these LCC calculations for any G alternative.

Each of the G alternatives (Base Case and Alternatives #1 and #2) do not include the new amenities -- passenger waiting area, heavy freight dock and staging area, and ferry layup berth. The life-cycle costs of the new passenger waiting area, heavy freight dock and staging area, and ferry layup berth have been computed separately (Alternative #3). The total life-cycle costs would be the addition of the G alternatives and the amenities:

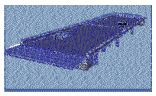
G2: $331,472,736
G3: $314,179,278
G4: $300,911,681

A modified G4 alternative (G4v) was analized, both without a new ferry during the 75 year analysis, and with one ferry added in 2050; Alternatives #4 and #5, respectively. Alternative #4 (without ferry) is used in the cost report. With the amenities, the total life-cycle cost is:

G4v: $181,600,175

Data: Project Parameters

07/06/2012



Study Period

Base Year	2011
Length of period	80
Last Year	2091

Currency

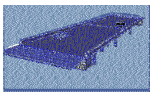
U.S. Dollars ($)

Interest Rates

Inflation	3.77%
Real Discount	2.30%

Elements

#1	Ferry
#2	Dock
#3	Paved Road
#4	Gravel Road
#5	
#6	Non-elemental
#7	New technology



G2 (Peninsula Point)

Number of Ferries	4	Area of Deck (ft)	0.00
Number of Docks	4	Length of Bridge (ft)	0.00

Alignment G2. In addition to the existing two (2) ferries and ferry terminals, provide two (2) new ferries and ferry terminals at Peninsula Point on Revilla Island and Lewis Point on Gravina Island. Included is a new paved road from Lewis Point up the hill to the Seley Road, and then an upgraded and paved Seley Road, and a paved Lewis Reef and Airport Access Roads to the KTN passenger terminal. Also included is the gravel Gravina Island Highway serving the KGB developable lands on Gravina Island.

G3 (Bar Point)

Number of Ferries	4	Area of Deck (ft)	0.00
Number of Docks	4	Length of Bridge (ft)	0.00

Alignment G3. In addition to the existing two (2) ferries and ferry terminals, provide two (2) new ferries and ferry terminals at Bar Point on Jefferson Street near downtown Ketchikan on Revilla Island and near Clump Cove on Gravina Island. Included is a new paved road from Clump Cove up the hill to the Gravina Island Highway, and then across and down the Airport Access Roads to the KTN passenger terminal. Also included are the gravel Gravina Island Highway, Lewis Reef Road and Seley Road serving the KGB developable lands on Gravina Island.

G4 (Charcoal Point)

Number of Ferries	4	Area of Deck (ft)	0.00
Number of Docks	4	Length of Bridge (ft)	0.00

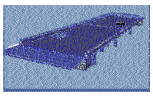
Alignment G4. In addition to the existing two (2) ferries and ferry terminals, provide two (2) new ferries and ferry terminals adjacent to the existing terminals on Revilla and Gravina island at the crossing of Tongass Narrows to the KTN passenger terminal. Also included are the gravel Gravina Island Highway, Lewis Reef Road and Seley Road serving the KGB developable lands on Gravina Island.

Waiting Area, Freight Dock & Ferry Layup Berth

Number of Ferries	0	Area of Deck (ft)	0.00
Number of Docks	2	Length of Bridge (ft)	0.00

This work includes construction of a passenger waiting terminal and baggage handling facility (including shuttle vans, etc) at Charcoal Point.

Included in the work is a new heavy freight dock and 2.5-acre staging area on Gravina Island for oversize and overweight loads that cannot be accommodated on the current shuttle ferries, at a location just south



of the existing ferry terminal. This dock will also be capable of laying over AMHS-class ferries.

Additionally, the replacement of the currently closed I-90 floating dock with a new floating dock that will allow for tying off the airport shuttle ferries. This berth will be located between the Gravina Island ferry dock and the heavy freight dock.

G4v (Charcoal Point) w/o new Ferry

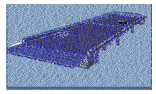
Number of Ferries	2	Area of Deck (ft)	0.00
Number of Docks	2	Length of Bridge (ft)	0.00

Alignment G4v. Continuation of operation of the existing two (2) ferries and ferry terminals. Two (2) new ferries and ferry terminals adjacent to the existing terminals on Revilla and Gravina island at the crossing of Tongass Narrows to the KTN passenger terminal will be added at some future date WHEN TRAFFIC WARRANTS a system expansion -- beyond the term of this analysis. Also included are the gravel Gravina Island Highway, Lewis Reef Road and Seley Road serving the KGB developable lands on Gravina Island.

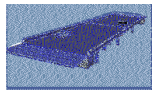
G4v (Charcoal Point) w/ new Ferry

Number of Ferries	3	Area of Deck (ft)	0.00
Number of Docks	4	Length of Bridge (ft)	0.00

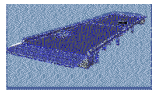
Alignment G4v. Continuation of operation of the existing two (2) ferries and ferry terminals. Two (2) new ferries and ferry terminals adjacent to the existing terminals on Revilla and Gravina islands at the crossing of Tongass Narrows to the KTN passenger terminal will be added at some future date when traffic warrants a system expansion -- one (1) new ferry and two (2) ferry terminals are assumed to be ADDED AT THE MID-LIFE (2050), for a total of three (3) ferries operating together between four (4) terminals. Also included are the gravel Gravina Island Highway, Lewis Reef Road and Seley Road serving the KGB developable lands on Gravina Island.



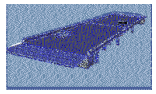
Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Base Case									
Agency									
Initial Construction									
Construction cost	<no event>	5	5	1.0000	1.000	LS	$ 81,003,981	$ 81,003,981	.
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.
O, M, and R									
M&O Ferry and Dock	<no event>	5	80	1.0000	1.000	LS	$ 5,800,000	$ 5,800,000	
M&O Paved Road	<no event>	5	80	1.0000	21675.000	LS	$ 4	$ 93,203	
M&O Gravel Road	<no event>	5	80	1.0000	16714.000	LS	$ 4	$ 71,870	
Inspection Above Ground	<no event>	7	80	2.0000	4.000	LS	$ 40,000	$ 160,000	
Inspection Underwater	<no event>	10	80	5.0000	4.000	LS	$ 25,000	$ 100,000	
Guardrail Paved Road	<no event>	10	80	5.0000	10838.000	LS	$ 117	$ 1,268,046	
Guardrail Gravel Road	<no event>	10	80	5.0000	1671.000	LS	$ 117	$ 195,507	
Fendering System Repairs	<no event>	10	80	5.0000	4.000	LS	$ 50,000	$ 200,000	
Pavement Replacement Road	<no event>	15	80	10.0000	21675.000	LS	$ 102	$ 2,210,850	
Anode Replacement	<no event>	15	80	10.0000	4.000	LS	$ 20,000	$ 80,000	
Signs/Illumination Paved	<no event>	20	80	15.0000	10838.000	LS	$ 5	$ 54,190	
Signs/Illumination Gravel	<no event>	20	80	15.0000	3343.000	LS	$ 5	$ 16,715	
Recoat Transfer Span	<no event>	20	80	15.0000	4.000	LS	$ 150,000	$ 600,000	
Bridge Support-Float Recoat	<no event>	20	80	15.0000	4.000	LS	$ 75,000	$ 300,000	
Mooring Structure	<no event>	40	80	35.0000	4.000	LS	$ 1,500,000	$ 6,000,000	
Ferry Replacement	<no event>	40	80	35.0000	3.000	LS	$ 8,000,000	$ 24,000,000	
Transfer Bridge Replacement	<no event>	15	80	75.0000	2.000	LS	$ 2,000,000	$ 4,000,000	
Alternative #5									
Agency									



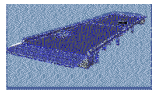
Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Initial Construction									
Initial Construction Costs	<no event>	5	5	1.0000	1.000	LS	$ 9,027,000	$ 9,027,000	
Two More Docks Construction	<no event>	40	80	75.0000	1.000	LS	$ 18,700,000	$ 18,700,000	New Docks
One More Ferry Construction	<no event>	40	80	35.0000	1.000	LS	$ 8,000,000	$ 8,000,000	New Ferry
O, M, and R									
M&O Ferry and Dock	<no event>	5	80	1.0000	1.000	LS	$ 3,600,000	$ 3,600,000	
M&O Gravel Road	<no event>	5	80	1.0000	34408.000	LS	$ 4	$ 147,954	
Inspection Above Ground	<no event>	7	80	2.0000	3.000	LS	$ 40,000	$ 120,000	Quantity assumes
Inspection Underwater	<no event>	10	80	5.0000	3.000	LS	$ 25,000	$ 75,000	Quantity assumes
Guardrail Gravel Road	<no event>	10	80	5.0000	3441.000	LS	$ 117	$ 402,597	
Fendering System Repairs	<no event>	10	80	5.0000	3.000	LS	$ 50,000	$ 150,000	Quantity assumes
Anode Replacement	<no event>	15	80	10.0000	3.000	LS	$ 20,000	$ 60,000	Quantity assumes
Signs/Illumination Gravel	<no event>	20	80	15.0000	6882.000	LS	$ 5	$ 34,410	
Recoat Transfer Span	<no event>	20	80	15.0000	3.000	LS	$ 150,000	$ 450,000	Quantity assumes
Bridge Support-Float Recoat	<no event>	20	80	15.0000	3.000	LS	$ 75,000	$ 225,000	Quantity assumes
Mooring Structure	<no event>	40	80	35.0000	3.000	LS	$ 1,500,000	$ 4,500,000	Quantity assumes
Ferry Replacement	<no event>	40	80	35.0000	2.000	LS	$ 8,000,000	$ 16,000,000	
Transfer Bridge Replacement	<no event>	15	80	75.0000	2.000	LS	$ 2,000,000	$ 4,000,000	
Disposal									
Disposal Cost	<no event>	1	1	1.0000	1.000	LS	$ 0	$ 0	
Alternative #4									
Agency									
Initial Construction									
Initial Construction Costs	<no event>	5	5	1.0000	1.000	LS	$ 22,791,516	$ 22,791,516	
O, M, and R									
M&O Ferry and Dock	<no event>	5	80	1.0000	1.000	LS	$ 3,600,000	$ 3,600,000	



Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
M&O Gravel Road	<no event>	5	80	1.0000	34408.000	LS	$ 4	$ 147,954	
Inspection Above Ground	<no event>	7	80	2.0000	2.000	LS	$ 40,000	$ 80,000	
Inspection Underwater	<no event>	10	80	5.0000	2.000	LS	$ 25,000	$ 50,000	
Guardrail Gravel Road	<no event>	10	80	5.0000	3441.000	LS	$ 117	$ 402,597	
Fendering System Repairs	<no event>	10	80	5.0000	2.000	LS	$ 50,000	$ 100,000	
Anode Replacement	<no event>	15	80	10.0000	2.000	LS	$ 20,000	$ 40,000	
Signs/Illumination Gravel	<no event>	20	80	15.0000	6882.000	LS	$ 5	$ 34,410	
Recoat Transfer Span	<no event>	20	80	15.0000	2.000	LS	$ 150,000	$ 300,000	
Bridge Support-Float Recoat	<no event>	20	80	15.0000	2.000	LS	$ 75,000	$ 150,000	
Mooring Structure	<no event>	40	80	35.0000	2.000	LS	$ 1,500,000	$ 3,000,000	
Ferry Replacement	<no event>	40	80	35.0000	2.000	LS	$ 8,000,000	$ 16,000,000	
Transfer Bridge Replacement	<no event>	15	80	75.0000	2.000	LS	$ 2,000,000	$ 4,000,000	
Disposal									
Disposal Cost	<no event>	1	1	1.0000	1.000	LS	$ 0	$ 0	
Alternative #2									
Agency									
Initial Construction									
Construction cost	<no event>	5	5	1.0000	1.000	LS	$ 62,338,846	$ 62,338,846	.
O, M, and R									
M&O Ferry and Dock	<no event>	5	80	1.0000	1.000	LS	$ 5,800,000	$ 5,800,000	
M&O Gravel Road	<no event>	5	80	1.0000	34408.000	LS	$ 4	$ 147,954	
Inspection Above Ground	<no event>	7	80	2.0000	4.000	LS	$ 40,000	$ 160,000	
Inspection Underwater	<no event>	10	80	5.0000	4.000	LS	$ 25,000	$ 100,000	
Guardrail Gravel Road	<no event>	10	80	5.0000	3441.000	LS	$ 117	$ 402,597	
Fendering System Repairs	<no event>	10	80	5.0000	4.000	LS	$ 50,000	$ 200,000	
Anode Replacement	<no event>	15	80	10.0000	4.000	LS	$ 20,000	$ 80,000	



Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Signs/Illumination Gravel	<no event>	20	80	15.0000	6882.000	LS	$ 5	$ 34,410	
Recoat Transfer Span	<no event>	20	80	15.0000	4.000	LS	$ 150,000	$ 600,000	
Bridge Support-Float Recoat	<no event>	20	80	15.0000	4.000	LS	$ 75,000	$ 300,000	
Mooring Structure	<no event>	40	80	35.0000	4.000	LS	$ 1,500,000	$ 6,000,000	
Ferry Replacement	<no event>	40	80	35.0000	3.000	LS	$ 8,000,000	$ 24,000,000	
Transfer Bridge Replacement	<no event>	15	80	75.0000	2.000	LS	$ 2,000,000	$ 4,000,000	
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.
Alternative #3									
Agency									
Initial Construction									
Freight Dock Construction	<no event>	5	5	1.0000	1.000	LS	$ 5,426,431	$ 5,426,431	
Passenger Waiting Area	<no event>	5	5	1.0000	1.000	LS	$ 1,403,387	$ 1,403,387	
Ferry Layup Berth	<no event>	5	5	1.0000	1.000	LS	$ 5,987,786	$ 5,987,786	
O, M, and R									
M&O Freight Dock	<no event>	5	80	1.0000	1.000	LS	$ 0	$ 0	
Inspection Above Ground	<no event>	7	80	2.0000	1.000	LS	$ 40,000	$ 40,000	
Inspection Underwater	<no event>	10	80	5.0000	1.000	LS	$ 40,000	$ 40,000	
Fendering System Repairs	<no event>	10	80	5.0000	1.000	LS	$ 50,000	$ 50,000	
Freight Dock Resurfacing	<no event>	15	80	10.0000	1.000	LS	$ 400,000	$ 400,000	
Anode Replacement	<no event>	15	80	10.0000	1.000	LS	$ 100,000	$ 100,000	
Recoat Transfer Span	<no event>	20	80	15.0000	1.000	LS	$ 150,000	$ 150,000	
Bridge Support-Float Recoat	<no event>	20	80	15.0000	1.000	LS	$ 75,000	$ 75,000	
Mooring Structure	<no event>	40	80	35.0000	1.000	LS	$ 1,500,000	$ 1,500,000	
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	

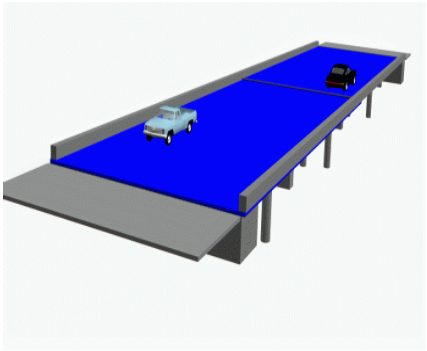


Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Alternative #1									
Agency									
Initial Construction									
Construction cost	<no event>	5	5	1.0000	1.000	LS	$ 70,046,235	$ 70,046,235	.
O, M, and R									
M&O Ferry and Dock	<no event>	5	80	1.0000	1.000	LS	$ 5,800,000	$ 5,800,000	
M&O Paved Road	<no event>	5	80	1.0000	10180.000	LS	$ 4	$ 43,774	
M&O Gravel Road	<no event>	5	80	1.0000	25554.000	LS	$ 4	$ 109,882	
Inspection Above Ground	<no event>	7	80	2.0000	4.000	LS	$ 40,000	$ 160,000	
Inspection Underwater	<no event>	10	80	5.0000	4.000	LS	$ 25,000	$ 100,000	
Guardrail Paved Road	<no event>	10	80	5.0000	5090.000	LS	$ 117	$ 595,530	
Guardrail Gravel Road	<no event>	10	80	5.0000	2555.000	LS	$ 117	$ 298,935	
Fendering System Repairs	<no event>	10	80	5.0000	4.000	LS	$ 50,000	$ 200,000	
Pavement Replacement Road	<no event>	15	80	10.0000	10180.000	LS	$ 102	$ 1,038,360	
Anode Replacement	<no event>	15	80	10.0000	4.000	LS	$ 20,000	$ 80,000	
Signs/Illumination Paved	<no event>	20	80	15.0000	5090.000	LS	$ 5	$ 25,450	
Signs/Illumination Gravel	<no event>	20	80	15.0000	5111.000	LS	$ 5	$ 25,555	
Recoat Transfer Span	<no event>	20	80	15.0000	4.000	LS	$ 150,000	$ 600,000	
Bridge Support-Float Recoat	<no event>	20	80	15.0000	4.000	LS	$ 75,000	$ 300,000	
Mooring Structure	<no event>	40	80	35.0000	4.000	LS	$ 1,500,000	$ 6,000,000	
Ferry Replacement	<no event>	40	80	35.0000	3.000	LS	$ 8,000,000	$ 24,000,000	
Transfer Bridge Replacement	<no event>	15	80	75.0000	2.000	LS	$ 2,000,000	$ 4,000,000	
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.

BridgeLCC 2.0
Reports

Ketchikan Gravina Island Access -- G Alignments (w/Revenue)

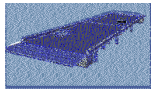
07/09/2012



Building and Fire Research Laboratory
National Institute of Standards and Technology
Gaithersburg, MD

Analysis: Summary of Life-Cycle Costs

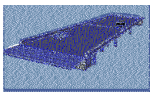
07/09/2012



	Name	Base Case	Alternative #1	Alternative #2	Alternative #3	Alternative #4	Alternative #5
	Total Life-Cycle Cost	**$249,040,777**	**$231,747,320**	**$218,479,722**	**$ 15,635,038**	**$115,867,446**	**$118,257,511**
By Cost Bearer:	Agency Costs	$249,040,777	$231,747,320	$218,479,722	$ 15,635,038	$115,867,446	$118,257,511
	User Costs	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Third-Party Costs	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
By Cost Timing:	Initial Construction Costs	$ 73,961,179	$ 63,956,143	$ 56,918,864	$ 11,703,192	$ 20,809,933	$ 20,728,308
	OM&R Costs	$175,079,598	$167,791,177	$161,560,858	$ 3,931,846	$ 95,057,513	$ 97,529,203
	Disposal Costs	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
By Cost Component:	Elemental Costs	$249,040,777	$231,747,320	$218,479,722	$ 15,635,038	$115,867,446	$118,257,511
	Non-elemental Costs	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	New-Technology	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0

Data: Description

07/09/2012



Name: Ketchikan Gravina Island Access -- G Alignments (w/Revenue) **Date:** 07/03/2012

Objective:

Life-cycle costs of the owner's costs, including their tolling income. The average annual income revenue stream from ferry fares ($2.0 million for G2, G3 and G4; and $1.5 million for G4v and No Action) has been subtracted from the annual M&O expenses ($5.8 million for G2, G3 and G4; and $3.6 million for G4v and No Action) for each G alternative.

The G alternatives (Base Case, and Alternatives #1 and #2) do not include the costs for the new amenities -- passenger waiting area, heavy freight dock and staging area, and ferry layup berth. The life-cycle costs of the new passenger waiting area, heavy freight dock and staging area, and ferry layup berth have been computed separately (Alternative #3). The total life-cycle costs would be the addition of the G alternatives and the amenities:

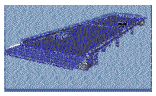
G2: $264,675,815
G3: $247,382,358
G4: $234,114,760

A modified G4 alternative (G4v) was analized, both without a new ferry during the 75 year analysis, and with one ferry added in 2050; Alternative #4 and #5, respectively. Alternative #4 (without ferry) is used in the cost report. With amenities, the total life-cycle cost is:

G4v: $131,502,484

Data: Project Parameters

07/09/2012



Study Period

Base Year	2011
Length of period	80
Last Year	2091

Currency

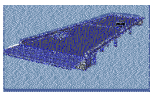
U.S. Dollars ($)

Interest Rates

Inflation	3.77%
Real Discount	2.30%

Elements

#1	Ferry
#2	Dock
#3	Paved Road
#4	Gravel Road
#5	
#6	Non-elemental
#7	New technology



G2 (Peninsula Point)

Number of Ferries	4	Area of deck (ft)	0.00
Number of Docks	4	Length of bridge (ft)	0.00

Alignment G2. In addition to the existing two (2) ferries and ferry terminals, provide two (2) new ferries and ferry terminals at Peninsula Point on Revilla Island and Lewis Point on Gravina Island. Included is a new paved road from Lewis Point up the hill to the Seley Road, and then an upgraded and paved Seley Road, and a paved Lewis Reef and Airport Access Roads to the KTN passenger terminal. Also included is the gravel Gravina Island Highway serving the KGB developable lands on Gravina Island.

G3 (Bar Point)

Number of Ferries	4	Area of deck (ft)	0.00
Number of Docks	4	Length of bridge (ft)	0.00

Alignment G3. In addition to the existing two (2) ferries and ferry terminals, provide two (2) new ferries and ferry terminals at Bar Point on Jefferson Street near downtown Ketchikan on Revilla Island and near Clump Cove on Gravina Island. Included is a new paved road from Clump Cove up the hill to the Gravina Island Highway, and then across and down the Airport Access Roads to the KTN passenger terminal. Also included are the gravel Gravina Island Highway, Lewis Reef Road and Seley Road serving the KGB developable lands on Gravina Island.

G4 (Charcoal Point)

Number of Ferries	4	Area of deck (ft)	0.00
Number of Docks	4	Length of bridge (ft)	0.00

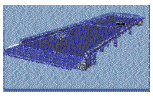
Alignment G4. In addition to the existing two (2) ferries and ferry terminals, provide two (2) new ferries and ferry terminals adjacent to the existing terminals on Revilla and Gravina islands at the crossing of Tongass Narrows to the KTN passenger terminal. Also included are the gravel Gravina Island Highway, Lewis Reef Road and Seley Road serving the KGB developable lands on Gravina Island.

Waiting Area, Freight Dock & Layup Berth

Number of Ferries	0	Area of deck (ft)	0.00
Number of Docks	1	Length of bridge (ft)	0.00

This work includes construction of a passenger waiting terminal and baggage handling facility (including shuttle vans, etc) at Charcoal Point.

Included in the work is a heavy freight dock and 2.5 acre staging area on Gravina Island for oversize and overweight loads that cannot be accomodated on the current shuttle ferries, at a location just south of the



existing ferry terminal. This dock will also be capable of laying over AMHS-class ferries.

Additionally, the replacement of the current I-90 floating dock with a new floating dock that will allow for tying off the airport shuttle ferries. The berth will be located between the Gravina Island ferry dock and the heavy freight dock.

G4v (Charcoal Point) w/o new Ferry

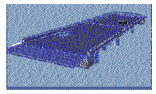
Number of Ferries	2	Area of deck (ft)	0.00
Number of Docks	2	Length of bridge (ft)	0.00

Alignment G4v. Continuation of operation of the existing two (2) ferries and ferry terminals. Two (2) new ferries and ferry terminals adjacent to the existing terminals on Revilla and Gravina islands at the crossing of Tongass Narrows to the KTN passenger terminal will be added at some future date WHEN TRAFFIC WARRANTS a system expansion -- beyond the term of this analysis. Also included are the gravel Gravina Island Highway, Lewis Reef Road and Seley Road serving the KGB developable lands on Gravina Island.

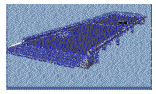
G4v (Charcoal Point) w/ new Ferry

Number of Ferries	3	Area of deck (ft)	0.00
Number of Docks	2	Length of bridge (ft)	0.00

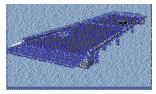
Alignment G4v. Continuation of operation of the existing two (2) ferries and ferry terminals. Two (2) new ferries and ferry terminals adjacent to the existing terminals on Revilla and Gravina islands at the crossing of Tongass Narrows to the KTN passenger terminal will be added at some future date when traffic warrants a system expansion -- one (1) new ferry and two (2) ferry terminals are assumed to be ADDED AT THE MID-LIFE (2050), for a total of three (3) ferries operating together between four (4) terminals. Also included are the gravel Gravina Island Highway, Lewis Reef Road and Seley Road serving the KGB developable lands on Gravina Island.



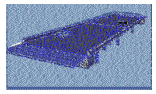
Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Base Case									
Agency									
Initial Construction									
Construction cost	<no event>	5	5	1.0000	1.000	LS	$ 81,003,981	$ 81,003,981	.
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.
O, M, and R									
M&O Paved Road	<no event>	5	80	1.0000	21675.000	LS	$ 4	$ 93,203	
M&O Gravel Road	<no event>	5	80	1.0000	16714.000	LS	$ 4	$ 71,870	
Inspection Above Ground	<no event>	7	80	2.0000	4.000	LS	$ 40,000	$ 160,000	
Inspection Underwater	<no event>	10	80	5.0000	4.000	LS	$ 25,000	$ 100,000	
Guardrail Paved Road	<no event>	10	80	5.0000	10838.000	LS	$ 117	$ 1,268,046	
Guardrail Gravel Road	<no event>	10	80	5.0000	1671.000	LS	$ 117	$ 195,507	
Fendering System Repairs	<no event>	10	80	5.0000	4.000	LS	$ 50,000	$ 200,000	
Pavement Replacement Road	<no event>	15	80	10.0000	21675.000	LS	$ 102	$ 2,210,850	
Anode Replacement	<no event>	15	80	10.0000	4.000	LS	$ 20,000	$ 80,000	
Signs/Illumination Paved	<no event>	20	80	15.0000	10838.000	LS	$ 5	$ 54,190	
Signs/Illumination Gravel	<no event>	20	80	15.0000	3343.000	LS	$ 5	$ 16,715	
Recoat Transfer Span	<no event>	20	80	15.0000	4.000	LS	$ 150,000	$ 600,000	
Bridge Support Float Recoat	<no event>	20	80	15.0000	4.000	LS	$ 75,000	$ 300,000	
Mooring Structure	<no event>	40	80	35.0000	4.000	LS	$ 1,500,000	$ 6,000,000	
Ferry Replacement	<no event>	40	80	35.0000	3.000	LS	$ 8,000,000	$ 24,000,000	
Transfer Bridge Replacement	<no event>	15	80	75.0000	2.000	LS	$ 2,000,000	$ 4,000,000	
M&O Ferry and Dock	<no event>	5	80	1.0000	1.000	LS	$ 5,800,000	$ 5,800,000	
Toll Revenue	<no event>	5	80	1.0000	1.000	LS	$ -2,000,000	$ -2,000,000	
Alternative #5									



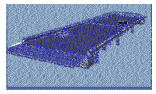
Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Agency									
Initial Construction									
Initial Construction Cost	<no event>	5	5	1.0000	1.000	LS	$ 9,027,000	$ 9,027,000	
Two More Docks Construction	<no event>	40	80	75.0000	1.000	LS	$ 18,700,000	$ 18,700,000	
One More Ferry Construction	<no event>	40	80	35.0000	1.000	LS	$ 8,000,000	$ 8,000,000	
O, M, and R									
M&O Ferry and Dock	<no event>	5	80	1.0000	1.000	LS	$ 3,600,000	$ 3,600,000	
M&O Gravel Road	<no event>	5	80	1.0000	34408.000	LS	$ 4	$ 147,954	
Inspection Above Ground	<no event>	7	80	2.0000	3.000	LS	$ 40,000	$ 120,000	Quantity assumes
Inspection Underwater	<no event>	10	80	5.0000	3.000	LS	$ 25,000	$ 75,000	Quantity assumes
Guardrail Gravel Road	<no event>	10	80	5.0000	3441.000	LS	$ 117	$ 402,597	
Fendering System Repairs	<no event>	10	80	5.0000	3.000	LS	$ 50,000	$ 150,000	Quantity assumes
Anode Replacement	<no event>	15	80	10.0000	3.000	LS	$ 20,000	$ 60,000	Quantity assumes
Signs/Illumination Gravel	<no event>	20	80	15.0000	6882.000	LS	$ 5	$ 34,410	
Recoat Transfer Span	<no event>	20	80	15.0000	3.000	LS	$ 150,000	$ 450,000	Quantity assumes
Bridge Support Float Recoat	<no event>	20	80	15.0000	3.000	LS	$ 75,000	$ 225,000	Quantity assumes
Mooring Structure	<no event>	40	80	35.0000	3.000	LS	$ 1,500,000	$ 4,500,000	Quantity assumes
Ferry Replacement	<no event>	40	80	35.0000	2.000	LS	$ 8,000,000	$ 16,000,000	
Transfer Bridge Replacement	<no event>	15	80	75.0000	2.000	LS	$ 2,000,000	$ 4,000,000	
Toll Revenue	<no event>	5	80	1.0000	1.000	LS	$ -1,500,000	$ -1,500,000	
Disposal									
Disposal Cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	
Alternative #4									
Agency									
Initial Construction									
Initial Construction Cost	<no event>	5	5	1.0000	1.000	LS	$ 22,791,516	$ 22,791,516	



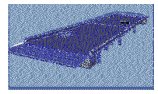
Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
O, M, and R									
M&O Ferry and Dock	<no event>	5	80	1.0000	1.000	LS	$ 3,600,000	$ 3,600,000	
M&O Gravel Road	<no event>	5	80	1.0000	34408.000	LS	$ 4	$ 147,954	
Inspection Above Ground	<no event>	7	80	2.0000	2.000	LS	$ 40,000	$ 80,000	
Inspection Underwater	<no event>	10	80	5.0000	2.000	LS	$ 25,000	$ 50,000	
Guardrail Gravel Road	<no event>	10	80	5.0000	3441.000	LS	$ 117	$ 402,597	
Fendering System Repairs	<no event>	10	80	5.0000	2.000	LS	$ 50,000	$ 100,000	
Anode Replacement	<no event>	15	80	10.0000	2.000	LS	$ 20,000	$ 40,000	
Signs/Illumination Gravel	<no event>	20	80	15.0000	6882.000	LS	$ 5	$ 34,410	
Recoat Transfer Span	<no event>	20	80	15.0000	2.000	LS	$ 150,000	$ 300,000	
Bridge Support Float Recoat	<no event>	20	80	15.0000	2.000	LS	$ 75,000	$ 150,000	
Mooring Structure	<no event>	40	80	35.0000	2.000	LS	$ 1,500,000	$ 3,000,000	
Ferry Replacement	<no event>	40	80	35.0000	2.000	LS	$ 8,000,000	$ 16,000,000	
Transfer Bridge Replacement	<no event>	15	80	75.0000	2.000	LS	$ 2,000,000	$ 4,000,000	
Toll Revenue	<no event>	5	80	1.0000	1.000	LS	$ -1,500,000	$ -1,500,000	
Disposal									
Disposal Cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	
Alternative #2									
Agency									
Initial Construction									
Construction cost	<no event>	5	5	1.0000	1.000	LS	$ 62,338,846	$ 62,338,846	.
O, M, and R									
M&O Ferry and Dock	<no event>	5	80	1.0000	1.000	LS	$ 5,800,000	$ 5,800,000	
M&O Gravel Road	<no event>	5	80	1.0000	34408.000	LS	$ 4	$ 147,954	
Inspection Above Ground	<no event>	7	80	2.0000	4.000	LS	$ 40,000	$ 160,000	
Inspection Underwater	<no event>	10	80	5.0000	4.000	LS	$ 25,000	$ 100,000	



Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Guardrail Gravel Road	<no event>	10	80	5.0000	3441.000	LS	$ 117	$ 402,597	
Fendering System Repairs	<no event>	10	80	5.0000	4.000	LS	$ 50,000	$ 200,000	
Anode Replacement	<no event>	15	80	10.0000	4.000	LS	$ 20,000	$ 80,000	
Signs/Illumination Gravel	<no event>	20	80	15.0000	6882.000	LS	$ 5	$ 34,410	
Recoat Transfer Span	<no event>	20	80	15.0000	4.000	LS	$ 150,000	$ 600,000	
Bridge Support Float Recoat	<no event>	20	80	15.0000	4.000	LS	$ 75,000	$ 300,000	
Mooring Structure	<no event>	40	80	35.0000	4.000	LS	$ 1,500,000	$ 6,000,000	
Ferry Replacement	<no event>	40	80	35.0000	3.000	LS	$ 8,000,000	$ 24,000,000	
Transfer Bridge Replacement	<no event>	15	80	75.0000	2.000	LS	$ 2,000,000	$ 4,000,000	
Toll Revenue	<no event>	5	80	1.0000	1.000	LS	$ -2,000,000	$ -2,000,000	
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.
Alternative #3									
Agency									
Initial Construction									
Freight Dock Construction	<no event>	5	5	1.0000	1.000	LS	$ 5,426,431	$ 5,426,431	
Passenger Waiting Area	<no event>	5	5	1.0000	1.000	LS	$ 1,403,387	$ 1,403,387	
Ferry Layup Berth	<no event>	5	5	1.0000	1.000	LS	$ 5,987,786	$ 5,987,786	
O, M, and R									
M&O Freight Dock	<no event>	5	80	1.0000	1.000	LS	$ 0	$ 0	
Inspection Above Ground	<no event>	7	80	2.0000	1.000	LS	$ 40,000	$ 40,000	
Inspection Underwater	<no event>	10	80	5.0000	1.000	LS	$ 40,000	$ 40,000	
Fendering System Repairs	<no event>	10	80	5.0000	1.000	LS	$ 50,000	$ 50,000	
Freight Dock Resurfacing	<no event>	15	80	10.0000	1.000	LS	$ 400,000	$ 400,000	
Anode Replacement	<no event>	15	80	10.0000	1.000	LS	$ 100,000	$ 100,000	
Recoat Transfer Span	<no event>	20	80	15.0000	1.000	LS	$ 150,000	$ 150,000	



Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Bridge Support-Float Recoat	<no event>	20	80	15.0000	1.000	LS	$ 75,000	$ 75,000	
Mooring Structure	<no event>	40	80	35.0000	1.000	LS	$ 1,500,000	$ 1,500,000	
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	
Alternative #1									
Agency									
Initial Construction									
Construction cost	<no event>	5	5	1.0000	1.000	LS	$ 70,046,235	$ 70,046,235	.
O, M, and R									
M&O Ferry and Dock	<no event>	5	80	1.0000	1.000	LS	$ 5,800,000	$ 5,800,000	
M&O Paved Road	<no event>	5	80	1.0000	10180.000	LS	$ 4	$ 43,774	
M&O Gravel Road	<no event>	5	80	1.0000	25554.000	LS	$ 4	$ 109,882	
Inspection Above Ground	<no event>	7	80	2.0000	4.000	LS	$ 40,000	$ 160,000	
Inspection Underwater	<no event>	10	80	5.0000	4.000	LS	$ 25,000	$ 100,000	
Guardrail Paved Road	<no event>	10	80	5.0000	5090.000	LS	$ 117	$ 595,530	
Guardrail Gravel Road	<no event>	10	80	5.0000	2555.000	LS	$ 117	$ 298,935	
Fendering System Repairs	<no event>	10	80	5.0000	4.000	LS	$ 50,000	$ 200,000	
Pavement Replacement Road	<no event>	15	80	10.0000	10180.000	LS	$ 102	$ 1,038,360	
Anode Replacement	<no event>	15	80	10.0000	4.000	LS	$ 20,000	$ 80,000	
Signs/Illumination Paved	<no event>	20	80	15.0000	5090.000	LS	$ 5	$ 25,450	
Signs/Illumination Gravel	<no event>	20	80	15.0000	5111.000	LS	$ 5	$ 25,555	
Recoat Transfer Span	<no event>	20	80	15.0000	4.000	LS	$ 150,000	$ 600,000	
Bridge Support Float Recoat	<no event>	20	80	15.0000	4.000	LS	$ 75,000	$ 300,000	
Mooring Structure	<no event>	40	80	35.0000	4.000	LS	$ 1,500,000	$ 6,000,000	
Ferry Replacement	<no event>	40	80	35.0000	3.000	LS	$ 8,000,000	$ 24,000,000	
Transfer Bridge Replacement	<no event>	15	80	75.0000	2.000	LS	$ 2,000,000	$ 4,000,000	

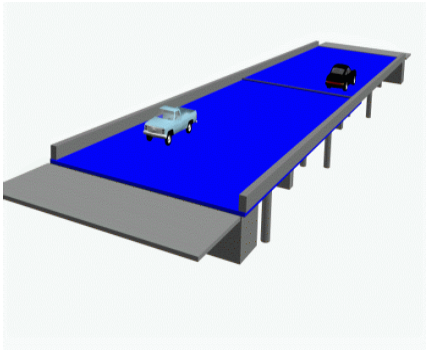


Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Toll Revenue	<no event>	5	80	1.0000	1.000	LS	$ -2,000,000	$ -2,000,000	
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.

BridgeLCC 2.0
Reports

Ketchikan Gravina Island Access -- No-Build (w/o Revenue)

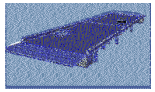
11/03/2011



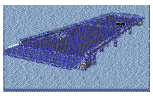
Building and Fire Research Laboratory
National Institute of Standards and Technology
Gaithersburg, MD

Analysis: Summary of Life-Cycle Costs

11/03/2011



	Name	Base Case
	Total Life-Cycle Cost	**$ 88,018,416**
By Cost Bearer:	Agency Costs	$ 88,018,416
	User Costs	$ 0
	Third-Party Costs	$ 0
By Cost Timing:	Initial Construction Costs	$ 0
	OM&R Costs	$ 88,018,416
	Disposal Costs	$ 0
By Cost Component:	Elemental Costs	$ 88,018,416
	Non-elemental Costs	$ 0
	New-Technology	$ 0



Name: Ketchikan Gravina Island Access -- No-Build (w/o Revenue) **Date:** 10/07/2011

Objective:

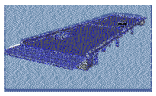
No-Build Alternative. Under the no-build, there will be no improvements to the existing ferry system service. Maintenance will continue at its present level, but no system expansion wil be made other than normal repairs and replacements.

Also indluded will be the continuing normal and routine maintenance of the gravel Gravina Island Highway, Lewis Reef Road and Seley Road accesses to the KGB developable lands on Gravina Island.

This analysis does not include revenue collected from ferry fares.

Data: Project Parameters

11/03/2011



Study Period

Base Year	2011
Length of period	80
Last Year	2091

Currency

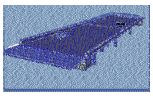
U.S. Dollars ($)

Interest Rates

Inflation	3.77%
Real Discount	2.30%

Elements

#1	Ferry
#2	Dock
#3	Gravel Road
#4	
#5	
#6	Non-elemental
#7	New technology



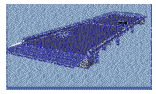
No-Build (w/o Revenue)

Lanes on	2	Area of deck (ft)	0.00
Lanes under	0	Length of bridge (ft)	0.00

No-Build Alternative. Under the no-build, there will be no improvements to the existing ferry system service. Maintenance will continue at its present level, but no system expansion will be made other than normal repairs and replacements.

Also included will be the continuing normal and routine maintenance of the gravel Gravina Island Highway, Lewis Reef Road and Seley Road accesses to the KGB developable lands on Gravina Island.

This analysis does not include revenue collected from ferry fares.

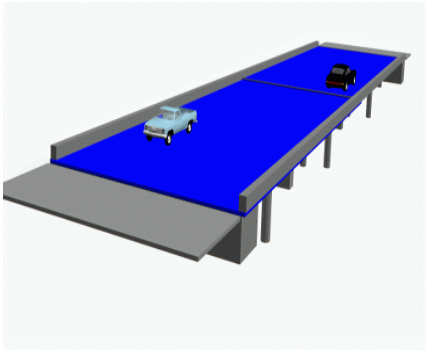


Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Base Case									
Agency									
Initial Construction									
Construction cost	<no event>	3	3	1.0000	1.000	LS	$ 0	$ 0	.
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.
O, M, and R									
M&O Ferry and Dock	<no event>	3	80	1.0000	1.000	LS	$ 1,800,000	$ 1,800,000	
M&O Gravel Road	<no event>	3	80	1.0000	34408.000	LS	$ 4	$ 147,954	
Inspection Above Ground	<no event>	5	80	2.0000	2.000	LS	$ 40,000	$ 80,000	
Inspection Underwater	<no event>	8	80	5.0000	2.000	LS	$ 25,000	$ 50,000	
Guardrail Gravel Road	<no event>	8	80	5.0000	3441.000	LS	$ 117	$ 402,597	
Fendering System Repairs	<no event>	8	80	5.0000	2.000	LS	$ 50,000	$ 100,000	
Anode Replacement	<no event>	13	80	10.0000	2.000	LS	$ 20,000	$ 40,000	
Sign/Illumination Replacement	<no event>	18	80	15.0000	6882.000	LS	$ 5	$ 34,410	
Recoat Transfer Span	<no event>	18	80	15.0000	2.000	LS	$ 150,000	$ 300,000	
Bridge Support Float Recoat	<no event>	18	80	15.0000	2.000	LS	$ 75,000	$ 150,000	
Mooring Structure	<no event>	38	80	35.0000	2.000	LS	$ 1,500,000	$ 3,000,000	
Ferry Replacement	<no event>	35	80	35.0000	2.000	LS	$ 8,000,000	$ 16,000,000	
Transfer Bridge Replacement	<no event>	78	80	75.0000	2.000	LS	$ 2,000,000	$ 4,000,000	

BridgeLCC 2.0
Reports

Ketchikan Gravina Island Access -- No-Build (w/ Revenue)

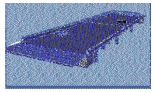
11/03/2011



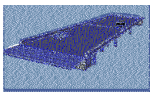
Building and Fire Research Laboratory
National Institute of Standards and Technology
Gaithersburg, MD

Analysis: Summary of Life-Cycle Costs

11/03/2011



	Name	Base Case
	Total Life-Cycle Cost	**$ 35,086,028**
By Cost Bearer:	Agency Costs	$ 35,086,028
	User Costs	$ 0
	Third-Party Costs	$ 0
By Cost Timing:	Initial Construction Costs	$ 0
	OM&R Costs	$ 35,086,028
	Disposal Costs	$ 0
By Cost Component:	Elemental Costs	$ 35,086,028
	Non-elemental Costs	$ 0
	New-Technology	$ 0



Name: Ketchikan Gravina Island Access -- No-Build (w/ Revenue) **Date:** 10/07/2011

Objective:

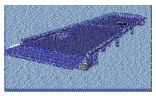
No-Build Alternative. Under the no-build, there will be no improvements to the existing ferry system service. Maintenance will continue at its present level, but no system expansion will be made other than normal repairs and replacements.

The maintenance costs reflected herein includes the revenue obtained from ticket sales ($1,500,000).

Also included will be the continuing normal and routine maintenance of the gravel Gravina Island Highway, Lewis Reef Road and Seley Road accesses to the KGB developable lands on Gravina Island.

Data: Project Parameters

11/03/2011



Study Period

Base Year	2011
Length of period	80
Last Year	2091

Currency

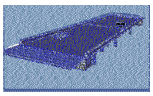
U.S. Dollars ($)

Interest Rates

Inflation	3.77%
Real Discount	2.30%

Elements

#1	Ferry
#2	Dock
#3	Gravel Road
#4	
#5	
#6	Non-elemental
#7	New technology



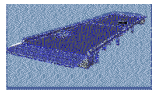
No-Build (w/Revenue)

Lanes on	2	Area of deck (ft)	0.00
Lanes under	0	Length of bridge (ft)	0.00

No-Build Alternative. Under the no-build, there will be no improvements to the existing ferry system service. Maintenance will continue at its present level, but no system expansion will be made other than normal repairs and replacements.

The maintenance costs reflected herein includes the revenue obtained from ticket sales ($1,500,000).

Also included will be the continuing normal and routine maintenance of the gravel Gravina Island Highway, Lewis Reef Road and Seley Road accesses to the KGB developable lands on Gravina Island.

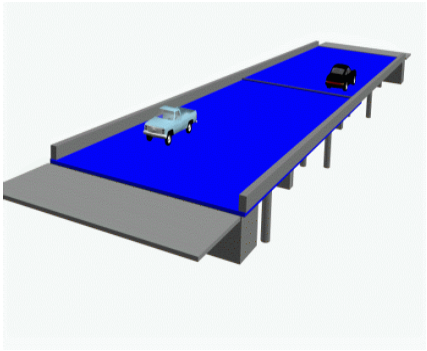


Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Base Case									
Agency									
Initial Construction									
Construction cost	<no event>	3	3	1.0000	1.000	LS	$ 0	$ 0	.
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.
O, M, and R									
M&O Ferry and Dock	<no event>	3	80	1.0000	1.000	LS	$ 1,800,000	$ 1,800,000	
M&O Gravel Road	<no event>	3	80	1.0000	34406.000	LS	$ 4	$ 147,946	
Inspection Above Ground	<no event>	5	80	2.0000	2.000	LS	$ 40,000	$ 80,000	
Inspection Underwater	<no event>	8	80	5.0000	2.000	LS	$ 25,000	$ 50,000	
Guardrail Gravel Road	<no event>	8	80	5.0000	3441.000	LS	$ 117	$ 402,597	
Fendering System Repairs	<no event>	8	80	5.0000	2.000	LS	$ 50,000	$ 100,000	
Anode Replacement	<no event>	13	80	10.0000	2.000	LS	$ 20,000	$ 40,000	
Sign/Illumination Replacement	<no event>	18	80	15.0000	6882.000	LS	$ 5	$ 34,410	
Recoat Transfer Span	<no event>	18	80	15.0000	2.000	LS	$ 150,000	$ 300,000	
Bridge Support Float Recoat	<no event>	18	80	15.0000	2.000	LS	$ 75,000	$ 150,000	
Mooring Structure	<no event>	38	80	35.0000	2.000	LS	$ 1,500,000	$ 3,000,000	
Ferry Replacement	<no event>	35	80	35.0000	2.000	LS	$ 8,000,000	$ 16,000,000	
Transfer Bridge Replacement	<no event>	78	80	75.0000	2.000	LS	$ 2,000,000	$ 4,000,000	
Toll Revenue	<no event>	3	80	1.0000	1.000	LS	$ -1,500,000	$ -1,500,000	

BridgeLCC 2.0
Reports

Ketchikan Gravina Island Access -- Toll Collection

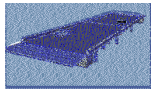
11/03/2011



Building and Fire Research Laboratory
National Institute of Standards and Technology
Gaithersburg, MD

Analysis: Summary of Life-Cycle Costs

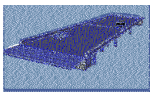
11/03/2011



	Name	Base Case	Alternative #1	Alternative #2
	Total Life-Cycle Cost	**$ 35,249,397**	**$ 35,176,991**	**$ 5,082,174**
By Cost Bearer:	Agency Costs	$ 35,249,397	$ 35,176,991	$ 5,082,174
	User Costs	$ 0	$ 0	$ 0
	Third-Party Costs	$ 0	$ 0	$ 0
By Cost Timing:	Initial Construction Costs	$ 181,013	$ 108,608	$ 72,405
	OM&R Costs	$ 35,068,383	$ 35,068,383	$ 5,009,769
	Disposal Costs	$ 0	$ 0	$ 0
By Cost Component:	Elemental Costs	$ 0	$ 0	$ 0
	Non-elemental Costs	$ 35,249,397	$ 35,176,991	$ 5,082,174
	New-Technology	$ 0	$ 0	$ 0

Data: Description

11/03/2011



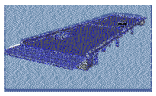
Name: Ketchikan Gravina Island Access -- Toll Collection **Date:** 10/07/2011

Objective:

The addition of toll collection to the bridged crossings C3-4 and F3-1. The collection methodology will be either manned toll booths or an electron fare collection system. Toll booths will require an additional outbound lane; electronic collection requires no additional laneage. Both options will require an administrative office to handle billings and enforcement notices.

Data: Project Parameters

11/03/2011



Study Period

Base Year	2011
Length of period	80
Last Year	2091

Currency

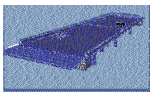
U.S. Dollars ($)

Interest Rates

Inflation	3.77%
Real Discount	2.30%

Elements

#1	
#2	
#3	
#4	
#5	
#6	Non-elemental
#7	New technology



C3-4 Toll Booth Collection

Lanes on	3	(ft)	0.00
	0	(ft)	0.00

The widening of the Revilla Island bound lane for toll booths at the base of the Tongass Narrows bridge approach. Work includes an additional lane and two collection booths. A small administrative office will also be needed at the Department's M&O yard.

F3-1 Toll Booth Collection

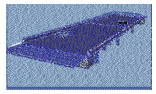
Lanes on	3	(ft)	0.00
	0	(ft)	0.00

The widening of the Revilla Island bound lane for toll booths between the Pennock Island access intersection and the East Channel bridge aboutment. Work includes an additional lane and two collection booths. A small administrative office will also be needed at the Department's M&O yard.

Electronic Toll Collection

Lanes on	2	(ft)	0.00
	0	(ft)	0.00

The construction of an electronic collection system on either the C3-4 or F3-1 bridge approachs. Work includes installation of pole-mounted readers and "run through" violation enforcement cameras. A small administrative office will also be needed at the Department's M&O yard.



Item	Event	Start Year	End Year	Frequency	Qtty	Unit of Measure	Unit Cost	Total	Remarks
Base Case									
Agency									
Initial Construction									
Construction cost	<no event>	5	5	1.0000	1.000	LS	$ 198,250	$ 198,250	.
O, M, and R									
OM&R cost	<no event>	5	80	1.0000	1.000	LS	$ 1,050,000	$ 1,050,000	.
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.
Alternative #2									
Agency									
Initial Construction									
Construction cost	<no event>	5	5	1.0000	1.000	LS	$ 79,300	$ 79,300	.
O, M, and R									
OM&R cost	<no event>	5	80	1.0000	1.000	LS	$ 150,000	$ 150,000	.
Disposal									
Disposal cost		80	80	1.0000	1.000	LS	$ 0	$ 0	.
Alternative #1									
Agency									
Initial Construction									
Construction cost	<no event>	5	5	1.0000	1.000	LS	$ 118,950	$ 118,950	.
O, M, and R									
OM&R cost	<no event>	5	80	1.0000	1.000	LS	$ 1,050,000	$ 1,050,000	.
Disposal									
Disposal cost	<no event>	80	80	1.0000	1.000	LS	$ 0	$ 0	.

Appendix F

COST of OWNERSHIP SUMMARY

Gravina Island Access

TOTAL LIFE-TIME COST SUMMARY

July 2012

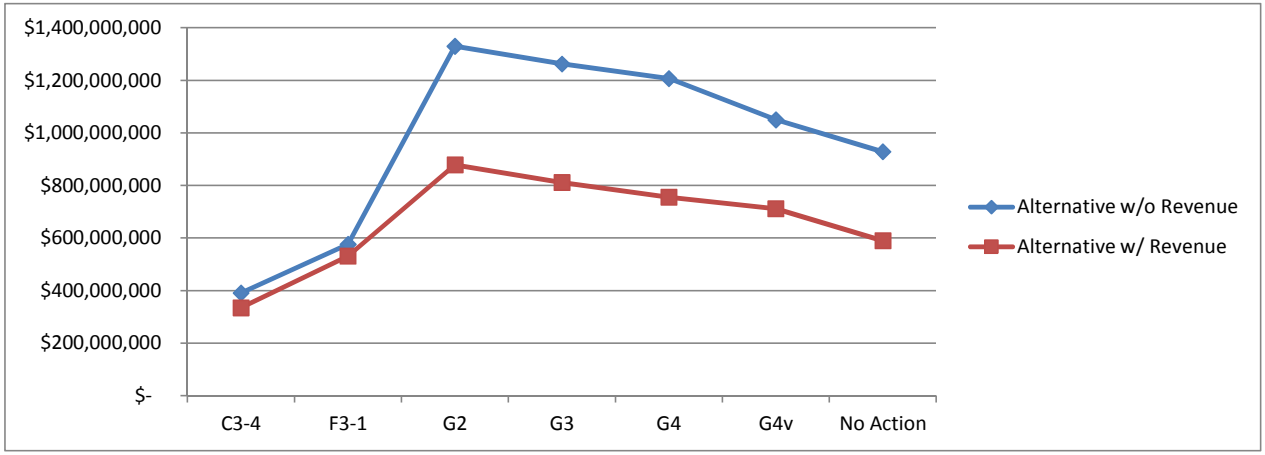
	ALTERNATIVE (w/o Revenue Adjustment)						
	C3-4	*F3-1*	*G2*	*G3*	*G4*	*G4v*	*No Action*
Total Life-Time Cost	$ 391,366,380	$ 576,449,260	$ 1,261,761,827	$ 1,194,577,579	$ 1,138,895,390	$ 982,133,753	$ 928,545,840
Passenger Waiting Terminal, Heavy Freight Dock and Staging Area, and Ferry Layup Berth			$ 67,917,639	$ 67,917,639	$ 67,917,639	$ 67,917,639	
TOTAL:	**$ 391,366,380**	**$ 576,449,260**	**$ 1,329,679,466**	**$ 1,262,495,218**	**$ 1,206,813,029**	**$ 1,050,051,392**	**$ 928,545,840**

	ALTERNATIVE (w/ Revenue Adjustment)						
	C3-4	*F3-1*	*G2*	*G3*	*G4*	*G4v*	*No Action*
Total Life-Time Cost (Revenue Adjusted)	$ 391,366,380	$ 576,449,260	$ 1,261,761,827	$ 1,194,577,579	$ 1,138,895,390	$ 982,133,753	$ 928,545,840
Passenger Waiting Terminal, Heavy Freight Dock and Staging Area, and Ferry Layup Berth			$ 67,917,639	$ 67,917,639	$ 67,917,639	$ 67,917,639	
Bridge/Ferry Toll	-$56,392,284	-$45,113,828	-$451,138,275	-$451,138,275	-$451,138,275	-$338,353,707	-$338,353,707
TOTAL:	**$ 334,974,096**	**$ 531,335,433**	**$ 878,541,191**	**$ 811,356,942**	**$ 755,674,754**	**$ 711,697,685**	**$ 590,192,133**

Note: All values are for 75 year life, beginning at the completion of the construction (2020).

Forward Inflation Rate = 2.3% (*http://www.cbo.gov/ftpdocs/123xx/doc12316/08-24-BudgetEconUpdate.pdf* , Table B-1).

Annual tolls revenues are $250,000 for C3-4; $200,000 for F3-1; $2,000,000 for G2, G3 and G4; and $1,500,000 for the existing ferries and No Action alternatives.



Gravina Island Access

TOTAL LIFE COST SUMMARY

October 2011

Bridge Alternative *C3-4*

YEAR	Number of Periods	Construction Cost	M&O Bridge	M&O Paved Road	M&O Gravel Road	Inspection Above Ground	Inspection Underwater	Guardrail Bridge	Guardrail Paved Road	Guardrail Gravel Road	Fendering System Repairs	Replace Pavement Bridge	Replace Pavement Road	Anode Replacement	Replace Joint Gland	Signs/Illumination Bridge	Signs/Illumination Paved Roa	Signs/Illumination Gravel Roa	Joint Assembly	Recoat Transfer Span	Bridge Supprt-Float Recoat	Mooring Structure	Ferry Replacement	Transfer Bridge Replacement
Initial Cost:		$ 223,265,040	$ 4,777	$ 42,222	$ 147,610	$ 40,000	$ 40,000	$ 96,370	$ 330,642	$ 402,597	$ -	$ 427,380	$ 576,504	$ 100,000	$ 500,000	$ 20,950	$ 14,130	$ 34,405	$ 1,400,000	$ -	$ -	$ -	$ -	$ -
2015																								
2016	1																							
2017	2																							
2018	3																							
2019	4																							
2020	5	$ 250,149,070	$ 5,352	$ 47,306	$ 165,385																			
2021	6		5,475	48,394	169,188																			
2022	7		5,601	49,507	173,080	$ 46,902																		
2023	8		5,730	50,646	177,061																			
2024	9		5,861	51,811	181,133	49,084																		
2025	10		5,996	53,003	185,299		$ 50,213	$ 120,976	$ 415,063	$ 505,390	$ -													
2026	11		6,134	54,222	189,561	51,368																		
2027	12		6,275	55,469	193,921																			
2028	13		6,420	56,745	198,381	53,758																		
2029	14		6,567	58,050	202,944																			
2030	15		6,718	59,385	207,611	56,259	56,259	135,543	465,042	566,246	-	$ 601,103	$ 810,843	$ 140,648	$ 703,242									$ -
2031	16		6,873	60,751	212,386																			
2032	17		7,031	62,148	217,271	58,877																		
2033	18		7,193	63,577	222,269																			
2034	19		7,358	65,040	227,381	61,617																		
2035	20		7,527	66,535	232,611		63,034	151,864	521,040	634,429	-					$ 33,014	$ 22,267	$ 54,217		$ -	$ -			
2036	21		7,700	68,066	237,961	64,483																		
2037	22		7,877	69,631	243,434																			
2038	23		8,059	71,233	249,033	67,484																		
2039	24		8,244	72,871	254,760																			
2040	25		8,434	74,547	260,620	70,624	70,624	170,150	583,780	710,823	-	754,580	1,017,872	176,559	882,797									
2041	26		8,628	76,262	266,614																			
2042	27		8,826	78,016	272,746	73,910																		
2043	28		9,029	79,810	279,019																			
2044	29		9,237	81,646	285,437	77,349																		
2045	30		9,449	83,524	292,002		79,128	190,639	654,074	796,415	-								$ 2,769,472					
2046	31		9,666	85,445	298,718	80,948																		
2047	32		9,889	87,410	305,588																			
2048	33		10,116	89,420	312,617	84,714																		
2049	34		10,349	91,477	319,807																			
2050	35		10,587	93,581	327,163	88,656	88,656	213,594	732,833	892,314	-	947,243	1,277,761	221,640	1,108,198	46,433	31,318	76,255		-	-			
2051	36		10,830	95,733	334,688																			
2052	37		11,079	97,935	342,385	92,781																		
2053	38		11,334	100,188	350,260																			
2054	39		11,595	102,492	358,316	97,098																		
2055	40		11,862	104,849	366,557		99,331	239,314	821,076	999,760	-											$ -	$ -	
2056	41		12,134	107,261	374,988	101,616																		
2057	42		12,414	109,728	383,613																			
2058	43		12,699	112,252	392,436	106,344																		
2059	44		12,991	114,833	401,462																			
2060	45		13,290	117,475	410,696	111,292	111,292	268,130	919,944	1,120,145	-	1,189,098	1,604,005	278,230	1,391,149									
2061	46		13,596	120,177	420,142																			
2062	47		13,908	122,941	429,805	116,470																		
2063	48		14,228	125,768	439,691																			
2064	49		14,555	128,661	449,803	121,889																		
2065	50		14,890	131,620	460,149		124,693	300,416	1,030,718	1,255,025	-					65,308	44,048	107,251		-	-			
2066	51		15,233	134,647	470,732	127,561																		
2067	52		15,583	137,744	481,559																			
2068	53		15,941	140,912	492,635	133,496																		
2069	54		16,308	144,153	503,966																			
2070	55		16,683	147,469	515,557	139,708	139,708	336,590	1,154,830	1,406,146	-	1,492,705	2,013,549	349,269	1,746,344				4,889,764					
2071	56		17,067	150,861	527,415																			
2072	57		17,459	154,331	539,545	146,208																		
2073	58		17,861	157,880	551,955																			
2074	59		18,272	161,511	564,650	153,011																		
2075	60		18,692	165,226	577,637		156,530	377,120	1,293,886	1,575,464	-													
2076	61		19,122	169,026	590,922	160,130																		
2077	62		19,562	172,914	604,514																			
2078	63		20,012	176,891	618,417	167,581																		
2079	64		20,472	180,959	632,641																			
2080	65		20,943	185,121	647,192	175,378	175,378	422,530	1,449,687	1,765,171	-	1,873,831	2,527,659	438,446	2,192,230	91,854	61,952	150,847		-	-			
2081	66		21,425	189,379	662,077																			
2082	67		21,917	193,735	677,305	183,539																		
2083	68		22,421	198,191	692,883																			
2084	69		22,937	202,749	708,819	192,078																		
2085	70		23,465	207,413	725,122		196,496	473,409	1,624,248	1,977,720	-													
2086	71		24,004	212,183	741,800	201,016																		
2087	72		24,556	217,063	758,861																			
2088	73		25,121	222,056	776,315	210,369																		
2089	74		25,699	227,163	794,170																			
2090	75		26,290	232,388	812,436	220,157	220,157	530,413	1,819,829	2,215,864	-	2,352,268	3,173,035	550,393	2,751,963							-	-	
2091	76		26,895	237,733	831,122																			
2092	77		27,513	243,200	850,238	230,401																		
2093	78		28,146	248,794	869,793																			
2094	79		28,793	254,516	889,799	241,121																		
2095	80		29,456	260,370	910,264		246,667	594,282	2,038,960	2,482,683	-					129,192	87,135	212,164	8,633,338	-	-			
TOTAL:		$ 250,149,070	$ 1,077,454	$ 9,524,021	$ 33,296,333	$ 4,415,275	$ 1,878,165	$ 4,524,970	$ 15,525,010	$ 18,903,595	$ -	$ 9,210,827	$ 12,424,724	$ 2,155,184	$ 10,775,922	$ 365,801	$ 246,720	$ 600,735	$ 16,292,574	$ -	$ -	$ -	$ -	$ -
TOTAL:		**$ 391,366,380**																						

Gravina Island Access

TOTAL LIFE COST SUMMARY

October 2011

Bridge Alternative *F3-1*

YEAR	Number of Periods	Construction Cost	M&O Bridge	M&O Paved Road	M&O Gravel Road	Inspection Above Ground	Inspection Underwater	Guardrail Bridge	Guardrail Paved Road	Guardrail Gravel Road	Fendering System Repairs	Replace Pavement Bridge	Replace Pavement Road	Anode Replacement	Replace Joint Gland	Signs/Illumination Bridge	Signs/Illumination Paved Road	Signs/Illumination Gravel Road	Joint Assembly	Recoat Transfer Span	Bridge Support-Float Recoat	Mooring Structure	Ferry Replacement	Transfer Bridge Replacement
Initial Cost:		$ 275,966,131	$ 5,079	$ 132,874	$ 49,807	$ 80,000	$ 80,000	$ 102,465	$ 1,551,303	$ 135,837	$ -	$ 454,410	$ 2,704,836	$ 200,000	$ 1,000,000	$ 22,275	$ 66,295	$ 11,610	$ 2,800,000	$ -	$ -	$ -	$ -	$ -
2015																								
2016	1																							
2017	2																							
2018	3																							
2019	4																							
2020	5	$ 309,196,062	$ 5,690	$ 148,874	$ 55,804																			
2021	6		5,821	152,298	57,088																			
2022	7		5,955	155,801	58,401	$ 93,804																		
2023	8		6,092	159,384	59,744																			
2024	9		6,232	163,050	61,118	98,168																		
2025	10		6,375	166,800	62,524		$ 100,426	$ 128,627	$ 1,947,390	$ 170,520	$ -													
2026	11		6,522	170,637	63,962	102,736																		
2027	12		6,672	174,561	65,433																			
2028	13		6,826	178,576	66,938	107,516																		
2029	14		6,983	182,684	68,478																			
2030	15		7,143	186,885	70,053	112,519	112,519	144,115	2,181,881	191,052	-	$ 639,120	$ 3,804,306	$ 281,297	$ 1,406,483									$ -
2031	16		7,307	191,184	71,664																			
2032	17		7,475	195,581	73,312	117,754																		
2033	18		7,647	200,079	74,998																			
2034	19		7,823	204,681	76,723	123,233																		
2035	20		8,003	209,389	78,488		126,067	161,469	2,444,608	214,058	-					$ 35,102	$ 104,470	$ 18,296		$ -	$ -			
2036	21		8,187	214,205	80,293	128,967																		
2037	22		8,376	219,131	82,140																			
2038	23		8,568	224,171	84,029	134,968																		
2039	24		8,765	229,327	85,962																			
2040	25		8,967	234,602	87,939	141,248	141,248	180,912	2,738,971	239,833	-	802,304	4,775,642	353,119	1,765,594									
2041	26		9,173	239,998	89,961																			
2042	27		9,384	245,518	92,030	147,820																		
2043	28		9,600	251,165	94,147																			
2044	29		9,821	256,941	96,313	154,698																		
2045	30		10,047	262,851	98,528		158,256	202,696	3,068,779	268,712	-								$ 5,538,945					
2046	31		10,278	268,897	100,794	161,895																		
2047	32		10,514	275,081	103,112																			
2048	33		10,756	281,408	105,484	169,428																		
2049	34		11,003	287,880	107,910																			
2050	35		11,256	294,502	110,392	177,312	177,312	227,103	3,438,300	301,068	-	1,007,152	5,994,985	443,279	2,216,395	49,370	146,936	25,732		-	-			
2051	36		11,515	301,275	112,931																			
2052	37		11,780	308,205	115,528	185,562																		
2053	38		12,051	315,293	118,185																			
2054	39		12,328	322,545	120,904	194,196																		
2055	40		12,612	329,964	123,684		198,662	254,449	3,852,317	337,321	-											$ -	$ -	
2056	41		12,902	337,553	126,529	203,231																		
2057	42		13,199	345,316	129,439																			
2058	43		13,502	353,259	132,416	212,688																		
2059	44		13,813	361,384	135,462																			
2060	45		14,130	369,695	138,578	222,584	222,584	285,088	4,316,186	377,939	-	1,264,304	7,525,658	556,459	2,782,297									
2061	46		14,455	378,198	141,765																			
2062	47		14,788	386,897	145,025	232,940																		
2063	48		15,128	395,796	148,361																			
2064	49		15,476	404,899	151,773	243,779																		
2065	50		15,832	414,212	155,264		249,386	319,416	4,835,911	423,448	-					69,438	206,663	36,192		-	-			
2066	51		16,196	423,738	158,835	255,122																		
2067	52		16,569	433,484	162,488																			
2068	53		16,950	443,455	166,226	266,992																		
2069	54		17,340	453,654	170,049																			
2070	55		17,738	464,088	173,960	279,415	279,415	357,878	5,418,218	474,436	-	1,587,113	9,447,150	698,538	3,492,688				9,779,528					
2071	56		18,146	474,762	177,961																			
2072	57		18,564	485,682	182,054	292,416																		
2073	58		18,991	496,852	186,241																			
2074	59		19,427	508,280	190,525	306,022																		
2075	60		19,874	519,970	194,907		313,060	400,972	6,070,642	531,565	-													
2076	61		20,331	531,930	199,390	320,261																		
2077	62		20,799	544,164	203,976																			
2078	63		21,277	556,680	208,667	335,162																		
2079	64		21,767	569,483	213,467																			
2080	65		22,267	582,582	218,376	350,757	350,757	449,254	6,801,627	595,572	-	1,992,343	11,859,247	876,892	4,384,461	97,664	290,668	50,904		-	-			
2081	66		22,780	595,981	223,399																			
2082	67		23,303	609,689	228,537	367,077																		
2083	68		23,839	623,711	233,794																			
2084	69		24,388	638,057	239,171	384,157																		
2085	70		24,949	652,732	244,672		392,993	503,350	7,620,632	667,287	-													
2086	71		25,522	667,745	250,299	402,031																		
2087	72		26,109	683,103	256,056																			
2088	73		26,710	698,814	261,945	420,738																		
2089	74		27,324	714,887	267,970																			
2090	75		27,953	731,330	274,133	440,314	440,314	563,960	8,538,256	747,637	-	2,501,039	14,887,215	1,100,785	5,503,925							-		
2091	76		28,596	748,150	280,439																			
2092	77		29,253	765,358	286,889	460,801																		
2093	78		29,926	782,961	293,487																			
2094	79		30,615	800,969	300,237	482,242																		
2095	80		31,319	819,391	307,143		493,334	631,868	9,566,373	837,662	-					137,363	408,819	71,595	17,266,676	-	-			
TOTAL:		$ 309,196,062	$1,145,598	$29,972,312	$ 11,234,899	$ 8,830,550	$ 3,756,331	$ 4,811,156	$ 72,840,094	$ 6,378,109	$ -	$ 9,793,373	$ 58,294,203	$ 4,310,369	$ 21,551,844	$ 388,937	$ 1,157,556	$ 202,719	$ 32,585,148	$ -	$ -	$ -	$ -	$ -
TOTAL:		**$ 576,449,260**																						

Gravina Island Access

TOTAL LIFE COST SUMMARY

October 2011

Ferry Alternative *G2*

YEAR	Number of Periods	Construction Cost	M&O Ferry and Dock	M&O Paved Road	M&O Gravel Road	Inspection Above Ground	Inspection Underwater	Guardrail Bridge	Guardrail Paved Road	Guardrail Gravel Road	Fendering System Repairs	Replace Pavement Bridge	Replace Pavement Road	Anode Replacement	Replace Joint Gland	Signs/Illumination Bridge	Signs/Illumination Paved Road	Signs/Illumination Gravel Road	Joint Assembly	Recoat Transfer Span	Bridge Support-Float Recoat	Mooring Structure	Ferry Replacement	Transfer Bridge Replacement
Initial Cost:		$ 81,003,981	$ 3,200,000	$ 92,986	$ 71,703	$ 160,000	$ 100,000	$ -	$ 1,268,046	$ 195,507	$ 200,000	$ -	$ 2,210,850	$ 80,000	$ -	$ -	$ 54,190	$ 16,715	$ -	$ 600,000	$ 300,000	$ 6,000,000	$ 24,000,000	$ 4,000,000
2015																								
2016	1																							
2017	2																							
2018	3																							
2019	4																							
2020	5	$ 90,757,919	$ 3,585,322	$ 104,182	$ 80,337																			
2021	6		3,667,784	106,579	82,185																			
2022	7		3,752,143	109,030	84,075	$ 187,607																		
2023	8		3,838,443	111,538	86,009																			
2024	9		3,926,727	114,103	87,987	196,336																		
2025	10		4,017,041	116,727	90,011		$ 125,533	$ -	$ 1,591,810	$ 245,425	$ 251,065													
2026	11		4,109,433	119,412	92,081	205,472																		
2027	12		4,203,950	122,159	94,199																			
2028	13		4,300,641	124,968	96,365	215,032																		
2029	14		4,399,556	127,843	98,582																			
2030	15		4,500,746	130,783	100,849	225,037	140,648	-	1,783,485	274,977	281,297	$ -	$ 3,109,523	$ 112,519	$ -									$ 5,625,932
2031	16		4,604,263	133,791	103,169																			
2032	17		4,710,161	136,868	105,542	235,508																		
2033	18		4,818,495	140,016	107,969																			
2034	19		4,929,320	143,236	110,452	246,466																		
2035	20		5,042,694	146,531	112,993		157,584	-	1,998,240	308,088	315,168					$ -	$ 85,395	$ 26,340		$ 945,505	$ 472,753			
2036	21		5,158,676	149,901	115,592	257,934																		
2037	22		5,277,326	153,349	118,250																			
2038	23		5,398,704	156,876	120,970	269,935																		
2039	24		5,522,875	160,484	123,752																			
2040	25		5,649,901	164,175	126,598	282,495	176,559	-	2,238,854	345,186	353,119	-	3,903,463	141,248	-									
2041	26		5,779,848	167,951	129,510																			
2042	27		5,912,785	171,814	132,489	295,639																		
2043	28		6,048,779	175,766	135,536																			
2044	29		6,187,901	179,808	138,654	309,395																		
2045	30		6,330,223	183,944	141,843		197,819	-	2,508,442	386,751	395,639								$ -					
2046	31		6,475,818	188,175	145,105	323,791																		
2047	32		6,624,762	192,503	148,442																			
2048	33		6,777,131	196,930	151,857	338,857																		
2049	34		6,933,005	201,460	155,349																			
2050	35		7,092,464	206,093	158,922	354,623	221,640	-	2,810,491	433,321	443,279	-	4,900,117	177,312	-	-	120,106	37,047		1,329,837	664,919			
2051	36		7,255,591	210,833	162,578																			
2052	37		7,422,470	215,682	166,317	371,123																		
2053	38		7,593,186	220,643	170,142																			
2054	39		7,767,830	225,718	174,055	388,391																		
2055	40		7,946,490	230,909	178,059		248,328	-	3,148,911	485,498	496,656											$ 14,899,668	$ 59,598,673	
2056	41		8,129,259	236,220	182,154	406,463																		
2057	42		8,316,232	241,653	186,344																			
2058	43		8,507,505	247,211	190,629	425,375																		
2059	44		8,703,178	252,897	195,014																			
2060	45		8,903,351	258,714	199,499	445,168	278,230	-	3,528,081	543,959	556,459	-	6,151,242	222,584	-									
2061	46		9,108,128	264,664	204,088																			
2062	47		9,317,615	270,752	208,782	465,881																		
2063	48		9,531,920	276,979	213,584																			
2064	49		9,751,154	283,349	218,496	487,558																		
2065	50		9,975,431	289,867	223,522		311,732	-	3,952,908	609,458	623,464					-	168,928	52,106		1,870,393	935,197			
2066	51		10,204,866	296,533	228,663	510,243																		
2067	52		10,439,578	303,354	233,922																			
2068	53		10,679,688	310,331	239,302	533,984																		
2069	54		10,925,321	317,468	244,806																			
2070	55		11,176,603	324,770	250,436	558,830	349,269	-	4,428,890	682,845	698,538	-	7,721,810	279,415	-				-					
2071	56		11,433,665	332,240	256,196																			
2072	57		11,696,639	339,881	262,089	584,832																		
2073	58		11,965,662	347,699	268,117																			
2074	59		12,240,872	355,696	274,284	612,044																		
2075	60		12,522,412	363,877	280,592		391,325	-	4,962,186	765,069	782,651													
2076	61		12,810,428	372,246	287,046	640,521																		
2077	62		13,105,068	380,808	293,648																			
2078	63		13,406,484	389,566	300,402	670,324																		
2079	64		13,714,833	398,526	307,311																			
2080	65		14,030,275	407,692	314,379	701,514	438,446	-	5,559,698	857,193	876,892	-	9,693,385	350,757	-	-	237,594	73,286		2,630,676	1,315,338			
2081	66		14,352,971	417,069	321,610																			
2082	67		14,683,089	426,662	329,007	734,154																		
2083	68		15,020,800	436,475	336,574																			
2084	69		15,366,279	446,514	344,315	768,314																		
2085	70		15,719,703	456,784	352,235		491,241	-	6,229,158	960,410	982,481													
2086	71		16,081,256	467,290	360,336	804,063																		
2087	72		16,451,125	478,038	368,624																			
2088	73		16,829,501	489,032	377,102	841,475																		
2089	74		17,216,580	500,280	385,775																			
2090	75		17,612,561	511,787	394,648	880,628	550,393	-	6,979,230	1,076,056	1,100,785	-	12,168,353	440,314	-							33,023,552	132,094,206	
2091	76		18,017,650	523,558	403,725																			
2092	77		18,432,056	535,600	413,011	921,603																		
2093	78		18,855,993	547,918	422,510																			
2094	79		19,289,681	560,520	432,228	964,484																		
2095	80		19,733,343	573,412	442,169		616,667	-	7,819,621	1,205,627	1,233,334					-	334,172	103,076	-	3,700,002	1,850,001			
TOTAL:		$ 90,757,919	$ 721,821,241	$ 20,974,715	$ 16,173,997	$ 17,661,101	$ 4,695,414	$ -	$ 59,540,006	$ 9,179,862	$ 9,390,827	$ -	$ 47,647,894	$ 1,724,148	$ -	$ -	$ 946,195	$ 291,855	$ -	$ 10,476,414	$ 5,238,207	$ 47,923,220	$ 191,692,879	$ 5,625,932
TOTAL:		**$ 1,261,761,827**																						

Gravina Island Access

TOTAL LIFE COST SUMMARY

October 2011

Ferry Alternative *G3*

YEAR	Number of Periods	Construction Cost	M&O Ferry and Dock	M&O Paved Road	M&O Gravel Road	Inspection Above Ground	Inspection Underwater	Guardrail Bridge	Guardrail Paved Road	Guardrail Gravel Road	Fendering System Repairs	Replace Pavement Bridge	Replace Pavement Road	Anode Replacement	Replace Joint Gland	Signs/Illumination Bridge	Signs/Illumination Paved Road	Signs/Illumination Gravel Road	Joint Assembly	Recoat Transfer Span	Bridge Support-Float Recoat	Mooring Structure	Ferry Replacement	Transfer Bridge Replacement
Initial Cost:		$ 70,046,235	$ 3,200,000	$ 43,672	$ 109,627	$ 160,000	$ 100,000	$ -	$ 595,530	$ 298,935	$ 200,000	$ -	$ 1,038,360	$ 80,000	$ -	$ -	$ 25,450	$ 25,555	$ -	$ 600,000	$ 300,000	$ 6,000,000	$ 24,000,000	$ 4,000,000
2015																								
2016	1																							
2017	2																							
2018	3																							
2019	4																							
2020	5	$ 78,480,718	$ 3,585,322	$ 48,931	$ 122,827																			
2021	6		3,667,784	50,056	125,652																			
2022	7		3,752,143	51,208	128,542	$ 187,607																		
2023	8		3,838,443	52,385	131,499																			
2024	9		3,926,727	53,590	134,523	196,336																		
2025	10		4,017,041	54,823	137,617		$ 125,533	$ -	$ 747,584	$ 375,261	$ 251,065													
2026	11		4,109,433	56,084	140,782	205,472																		
2027	12		4,203,950	57,374	144,020																			
2028	13		4,300,641	58,693	147,333	215,032																		
2029	14		4,399,556	60,043	150,721																			
2030	15		4,500,746	61,424	154,188	225,037	140,648	-	837,603	420,447	281,297	$ -	$ 1,460,436	$ 112,519	$ -									$ 5,625,932
2031	16		4,604,263	62,837	157,734																			
2032	17		4,710,161	64,282	161,362	235,508																		
2033	18		4,818,495	65,761	165,074																			
2034	19		4,929,320	67,273	168,870	246,466																		
2035	20		5,042,694	68,820	172,754		157,584	-	938,461	471,074	315,168					$ -	$ 40,105	$ 40,271		$ 945,505	$ 472,753			
2036	21		5,158,676	70,403	176,728	257,934																		
2037	22		5,277,326	72,023	180,792																			
2038	23		5,398,704	73,679	184,951	269,935																		
2039	24		5,522,875	75,374	189,204																			
2040	25		5,649,901	77,107	193,556	282,495	176,559	-	1,051,464	527,798	353,119	-	1,833,322	141,248	-									
2041	26		5,779,848	78,881	198,008																			
2042	27		5,912,785	80,695	202,562	295,639																		
2043	28		6,048,779	82,551	207,221																			
2044	29		6,187,901	84,450	211,987	309,395																		
2045	30		6,330,223	86,392	216,863		197,819	-	1,178,074	591,352	395,639								$ -					
2046	31		6,475,818	88,379	221,851	323,791																		
2047	32		6,624,762	90,412	226,953																			
2048	33		6,777,131	92,491	232,173	338,857																		
2049	34		6,933,005	94,619	237,513																			
2050	35		7,092,464	96,795	242,976	354,623	221,640	-	1,319,930	662,558	443,279	-	2,301,416	177,312	-	-	56,407	56,640		1,329,837	664,919			
2051	36		7,255,591	99,021	248,564																			
2052	37		7,422,470	101,299	254,281	371,123																		
2053	38		7,593,186	103,628	260,130																			
2054	39		7,767,830	106,012	266,113	388,391																		
2055	40		7,946,490	108,450	272,233		248,328	-	1,478,867	742,339	496,656											$ 14,899,668	$ 59,598,673	
2056	41		8,129,259	110,945	278,495	406,463																		
2057	42		8,316,232	113,496	284,900																			
2058	43		8,507,505	116,107	291,453	425,375																		
2059	44		8,703,178	118,777	298,156																			
2060	45		8,903,351	121,509	305,014	445,168	278,230	-	1,656,941	831,726	556,459	-	2,889,026	222,584	-									
2061	46		9,108,128	124,304	312,029																			
2062	47		9,317,615	127,163	319,206	465,881																		
2063	48		9,531,920	130,087	326,548																			
2064	49		9,751,154	133,079	334,058	487,558																		
2065	50		9,975,431	136,140	341,742		311,732	-	1,856,459	931,877	623,464					-	79,336	79,663		1,870,393	935,197			
2066	51		10,204,866	139,272	349,602	510,243																		
2067	52		10,439,578	142,475	357,643																			
2068	53		10,679,688	145,752	365,868	533,984																		
2069	54		10,925,321	149,104	374,283																			
2070	55		11,176,603	152,533	382,892	558,830	349,269	-	2,080,001	1,044,087	698,538	-	3,626,668	279,415	-				-					
2071	56		11,433,665	156,042	391,698																			
2072	57		11,696,639	159,631	400,707	584,832																		
2073	58		11,965,662	163,302	409,924																			
2074	59		12,240,872	167,058	419,352	612,044																		
2075	60		12,522,412	170,900	428,997		391,325	-	2,330,460	1,169,809	782,651													
2076	61		12,810,428	174,831	438,864	640,521																		
2077	62		13,105,068	178,852	448,958																			
2078	63		13,406,484	182,966	459,284	670,324																		
2079	64		13,714,833	187,174	469,847																			
2080	65		14,030,275	191,479	480,654	701,514	438,446	-	2,611,078	1,310,669	876,892	-	4,552,649	350,757	-	-	111,585	112,045		2,630,676	1,315,338			
2081	66		14,352,971	195,883	491,709																			
2082	67		14,683,089	200,388	503,018	734,154																		
2083	68		15,020,800	204,997	514,588																			
2084	69		15,366,279	209,712	526,423	768,314																		
2085	70		15,719,703	214,536	538,531		491,241	-	2,925,486	1,468,490	982,481													
2086	71		16,081,256	219,470	550,917	804,063																		
2087	72		16,451,125	224,518	563,588																			
2088	73		16,829,501	229,682	576,551	841,475																		
2089	74		17,216,580	234,964	589,811																			
2090	75		17,612,561	240,369	603,377	880,628	550,393	-	3,277,753	1,645,316	1,100,785	-	5,715,056	440,314	-							33,023,552	132,094,206	
2091	76		18,017,650	245,897	617,255																			
2092	77		18,432,056	251,553	631,451	921,603																		
2093	78		18,855,993	257,338	645,975																			
2094	79		19,289,681	263,257	660,832	964,484																		
2095	80		19,733,343	269,312	676,031		616,667	-	3,672,437	1,843,433	1,233,334					-	156,942	157,589	-	3,700,002	1,850,001			
TOTAL:		$ 78,480,718	$ 721,821,241	$ 9,851,100	$ 24,728,391	$ 17,661,101	$ 4,695,414	$ -	$ 27,962,597	$ 14,036,235	$ 9,390,827	$ -	$ 22,378,573	$ 1,724,148	$ -	$ -	$ 444,375	$ 446,208	$ -	$ 10,476,414	$ 5,238,207	$ 47,923,220	$ 191,692,879	$ 5,625,932

TOTAL: $ 1,194,577,579

Gravina Island Access

TOTAL LIFE COST SUMMARY

October 2011

Ferry Alternative *G4*

YEAR	Number of Periods	Construction Cost	M&O Ferry and Dock	M&O Paved Road	M&O Gravel Road	Inspection Above Ground	Inspection Underwater	Guardrail Bridge	Guardrail Paved Road	Guardrail Gravel Road	Fendering System Repairs	Replace Pavement Bridge	Replace Pavement Road	Anode Replacement	Replace Joint Gland	Signs/Illumination Bridge	Signs/Illumination Paved Road	Signs/Illumination Gravel Road	Joint Assembly	Recoat Transfer Span	Bridge Suppt-Float Recoat	Mooring Structure	Ferry Replacement	Transfer Bridge Replacement
Initial Cost:		$ 62,338,846	$ 3,200,000	$ -	$ 147,610	$ 160,000	$ 100,000	$ -	$ -	$ 402,597	$ 200,000	$ -	$ -	$ 80,000	$ -	$ -	$ -	$ 34,410	$ -	$ 600,000	$ 300,000	$ 6,000,000	$ 24,000,000	$ 4,000,000
2015																								
2016	1																							
2017	2																							
2018	3																							
2019	4																							
2020	5	$ 69,845,258	$ 3,585,322	$ -	$ 165,385																			
2021	6		3,667,784	-	169,188																			
2022	7		3,752,143	-	173,080	$ 187,607																		
2023	8		3,838,443	-	177,061																			
2024	9		3,926,727	-	181,133	196,336																		
2025	10		4,017,041	-	185,299		$ 125,533	$ -	$ -	$ 505,390	$ 251,065													
2026	11		4,109,433	-	189,561	205,472																		
2027	12		4,203,950	-	193,921																			
2028	13		4,300,641	-	198,381	215,032																		
2029	14		4,399,556	-	202,944																			
2030	15		4,500,746	-	207,611		225,037	140,648	-	-	566,246	281,297	$ -	$ -	$ 112,519	$ -									$ 5,625,932
2031	16		4,604,263	-	212,386																			
2032	17		4,710,161	-	217,271	235,508																		
2033	18		4,818,495	-	222,269																			
2034	19		4,929,320	-	227,381	246,466																		
2035	20		5,042,694	-	232,611		157,584	-	-	634,429	315,168					$ -	$ -	$ 54,225		$ 945,505	$ 472,753			
2036	21		5,158,676	-	237,961	257,934																		
2037	22		5,277,326	-	243,434																			
2038	23		5,398,704	-	249,033	269,935																		
2039	24		5,522,875	-	254,760																			
2040	25		5,649,901	-	260,620	282,495	176,559	-	-	710,823	353,119	-	-	141,248	-									
2041	26		5,779,848	-	266,614																			
2042	27		5,912,785	-	272,746	295,639																		
2043	28		6,048,779	-	279,019																			
2044	29		6,187,901	-	285,437	309,395																		
2045	30		6,330,223	-	292,002		197,819	-	-	796,415	395,639								$ -					
2046	31		6,475,818	-	298,718	323,791																		
2047	32		6,624,762	-	305,588																			
2048	33		6,777,131	-	312,617	338,857																		
2049	34		6,933,005	-	319,807																			
2050	35		7,092,464	-	327,163	354,623	221,640	-	-	892,314	443,279	-	-	177,312	-	-	-	76,266		1,329,837	664,919			
2051	36		7,255,591	-	334,688																			
2052	37		7,422,470	-	342,385	371,123																		
2053	38		7,593,186	-	350,260																			
2054	39		7,767,830	-	358,316	388,391																		
2055	40		7,946,490	-	366,557		248,328	-	-	999,760	496,656											$ 14,899,668	$ 59,598,673	
2056	41		8,129,259	-	374,988	406,463																		
2057	42		8,316,232	-	383,613																			
2058	43		8,507,505	-	392,436	425,375																		
2059	44		8,703,178	-	401,462																			
2060	45		8,903,351	-	410,696	445,168	278,230	-	-	1,120,145	556,459	-	-	222,584	-									
2061	46		9,108,128	-	420,142																			
2062	47		9,317,615	-	429,805	465,881																		
2063	48		9,531,920	-	439,691																			
2064	49		9,751,154	-	449,803	487,558																		
2065	50		9,975,431	-	460,149		311,732	-	-	1,255,025	623,464					-	-	107,267		1,870,393	935,197			
2066	51		10,204,866	-	470,732	510,243																		
2067	52		10,439,578	-	481,559																			
2068	53		10,679,688	-	492,635	533,984																		
2069	54		10,925,321	-	503,966																			
2070	55		11,176,603	-	515,557	558,830	349,269	-	-	1,406,146	698,538	-	-	279,415	-				-					
2071	56		11,433,665	-	527,415																			
2072	57		11,696,639	-	539,545	584,832																		
2073	58		11,965,662	-	551,955																			
2074	59		12,240,872	-	564,650	612,044																		
2075	60		12,522,412	-	577,637		391,325	-	-	1,575,464	782,651													
2076	61		12,810,428	-	590,922	640,521																		
2077	62		13,105,068	-	604,514																			
2078	63		13,406,484	-	618,417	670,324																		
2079	64		13,714,833	-	632,641																			
2080	65		14,030,275	-	647,192	701,514	438,446	-	-	1,765,171	876,892	-	-	350,757	-	-	-	150,869		2,630,676	1,315,338			
2081	66		14,352,971	-	662,077																			
2082	67		14,683,089	-	677,305	734,154																		
2083	68		15,020,800	-	692,883																			
2084	69		15,366,279	-	708,819	768,314																		
2085	70		15,719,703	-	725,122		491,241	-	-	1,977,720	982,481													
2086	71		16,081,256	-	741,800	804,063																		
2087	72		16,451,125	-	758,861																			
2088	73		16,829,501	-	776,315	841,475																		
2089	74		17,216,580	-	794,170																			
2090	75		17,612,561	-	812,436	880,628	550,393	-	-	2,215,864	1,100,785	-	-	440,314	-							33,023,552	132,094,206	
2091	76		18,017,650	-	831,122																			
2092	77		18,432,056	-	850,238	921,603																		
2093	78		18,855,993	-	869,793																			
2094	79		19,289,681	-	889,799	964,484																		
2095	80		19,733,343	-	910,264		616,667	-	-	2,482,683	1,233,334					-	-	212,195	-	3,700,002	1,850,001			
TOTAL:		$ 69,845,258	$ 721,821,241	$ -	$ 33,296,333	$ 17,661,101	$ 4,695,414	$ -	$ -	$ 18,903,595	$ 9,390,827	$ -	$ -	$ 1,724,148	$ -	$ -	$ -	$ 600,822	$ -	$ 10,476,414	$ 5,238,207	$ 47,923,220	$ 191,692,879	$ 5,625,932

TOTAL: $ 1,138,895,390

Gravina Island Access

TOTAL LIFE COST SUMMARY

October 2011

Ferry Alternative *G4v*

YEAR	Number of Periods	Construction Cost	M&O Ferry and Dock	M&O Paved Road	M&O Gravel Road	Inspection Above Ground	Inspection Underwater	Guardrail Bridge	Guardrail Paved Road	Guardrail Gravel Road	Fendering System Repairs	Replace Pavement Bridge	Replace Pavement Road	Anode Replacement	Replace Joint Gland	Signs/Illumination Bridge	Signs/Illumination Paved Road	Signs/Illumination Gravel Road	Joint Assembly	Recoat Transfer Span	Bridge Suppt-Float Recoat	Mooring Structure	Ferry Replacement	Transfer Bridge Replacement
Initial Cost:		$ 22,791,516	$ 3,200,000	$ -	$ 147,610	$ 80,000	$ 50,000	$ -	$ -	$ 402,597	$ 100,000	$ -	$ -	$ 40,000	$ -	$ -	$ -	$ 34,410	$ -	$ 300,000	$ 150,000	$ 3,000,000	$ 16,000,000	$ 4,000,000
2015																								
2016	1																							
2017	2																							
2018	3																							
2019	4																							
2020	5	$ 25,535,913	$ 3,585,322	$ -	$ 165,385																			
2021	6		3,667,784	-	169,188																			
2022	7		3,752,143	-	173,080	$ 93,804																		
2023	8		3,838,443	-	177,061																			
2024	9		3,926,727	-	181,133	98,168																		
2025	10		4,017,041	-	185,299		$ 62,766	$ -	$ -	$ 505,390	$ 125,533													
2026	11		4,109,433	-	189,561	102,736																		
2027	12		4,203,950	-	193,921																			
2028	13		4,300,641	-	198,381	107,516																		
2029	14		4,399,556	-	202,944																			
2030	15		4,500,746	-	207,611	112,519	70,324	-	-	566,246	140,648	$ -	$ -	$ 56,259	$ -									$ 5,625,932
2031	16		4,604,263	-	212,386																			
2032	17		4,710,161	-	217,271	117,754																		
2033	18		4,818,495	-	222,269																			
2034	19		4,929,320	-	227,381	123,233																		
2035	20		5,042,694	-	232,611		78,792	-	-	634,429	157,584					$ -	$ -	$ 54,225		$ 472,753	$ 236,376			
2036	21		5,158,676	-	237,961	128,967																		
2037	22		5,277,326	-	243,434																			
2038	23		5,398,704	-	249,033	134,968																		
2039	24		5,522,875	-	254,760																			
2040	25		5,649,901	-	260,620	141,248	88,280	-	-	710,823	176,559	-	-	70,624	-									
2041	26		5,779,848	-	266,614																			
2042	27		5,912,785	-	272,746	147,820																		
2043	28		6,048,779	-	279,019																			
2044	29		6,187,901	-	285,437	154,698																		
2045	30		6,330,223	-	292,002		98,910	-	-	796,415	197,819								$ -					
2046	31		6,475,818	-	298,718	161,895																		
2047	32		6,624,762	-	305,588																			
2048	33		6,777,131	-	312,617	169,428																		
2049	34		6,933,005	-	319,807																			
2050	35		7,092,464	-	327,163	177,312	110,820	-	-	892,314	221,640	-	-	88,656	-	-	-	76,266		664,919	332,459			
2051	36		7,255,591	-	334,688																			
2052	37		7,422,470	-	342,385	185,562																		
2053	38		7,593,186	-	350,260																			
2054	39		7,767,830	-	358,316	194,196																		
2055	40		7,946,490	-	366,557		124,164	-	-	999,760	248,328											$ 7,449,834	$ 39,732,449	
2056	41		8,129,259	-	374,988	203,231																		
2057	42		8,316,232	-	383,613																			
2058	43		8,507,505	-	392,436	212,688																		
2059	44		8,703,178	-	401,462																			
2060	45		8,903,351	-	410,696	222,584	139,115	-	-	1,120,145	278,230	-	-	111,292	-									
2061	46		9,108,128	-	420,142																			
2062	47		9,317,615	-	429,805	232,940																		
2063	48		9,531,920	-	439,691																			
2064	49		9,751,154	-	449,803	243,779																		
2065	50		9,975,431	-	460,149		155,866	-	-	1,255,025	311,732					-	-	107,267		935,197	467,598			
2066	51		10,204,866	-	470,732	255,122																		
2067	52		10,439,578	-	481,559																			
2068	53		10,679,688	-	492,635	266,992																		
2069	54		10,925,321	-	503,966																			
2070	55		11,176,603	-	515,557	279,415	174,634	-	-	1,406,146	349,269	-	-	139,708	-				-					
2071	56		11,433,665	-	527,415																			
2072	57		11,696,639	-	539,545	292,416																		
2073	58		11,965,662	-	551,955																			
2074	59		12,240,872	-	564,650	306,022																		
2075	60		12,522,412	-	577,637		195,663	-	-	1,575,464	391,325													
2076	61		12,810,428	-	590,922	320,261																		
2077	62		13,105,068	-	604,514																			
2078	63		13,406,484	-	618,417	335,162																		
2079	64		13,714,833	-	632,641																			
2080	65		14,030,275	-	647,192	350,757	219,223	-	-	1,765,171	438,446	-	-	175,378	-	-	-	150,869		1,315,338	657,669			
2081	66		14,352,971	-	662,077																			
2082	67		14,683,089	-	677,305	367,077																		
2083	68		15,020,800	-	692,883																			
2084	69		15,366,279	-	708,819	384,157																		
2085	70		15,719,703	-	725,122		245,620	-	-	1,977,720	491,241													
2086	71		16,081,256	-	741,800	402,031																		
2087	72		16,451,125	-	758,861																			
2088	73		16,829,501	-	776,315	420,738																		
2089	74		17,216,580	-	794,170																			
2090	75		17,612,561	-	812,436	440,314	275,196	-	-	2,215,864	550,393	-	-	220,157	-							16,511,776	88,062,804	
2091	76		18,017,650	-	831,122																			
2092	77		18,432,056	-	850,238	460,801																		
2093	78		18,855,993	-	869,793																			
2094	79		19,289,681	-	889,799	482,242																		
2095	80		19,733,343	-	910,264		308,333	-	-	2,482,683	616,667					-	-	212,195	-	1,850,001	925,000			
TOTAL:		$ 25,535,913	$ 721,821,241	$ -	$ 33,296,333	$ 8,830,550	$ 2,347,707	$ -	$ -	$ 18,903,595	$ 4,695,414	$ -	$ -	$ 862,074	$ -	$ -	$ -	$ 600,822	$ -	$ 5,238,207	$ 2,619,103	$ 23,961,610	$ 127,795,253	$ 5,625,932
TOTAL:		**$ 982,133,753**																						

Gravina Island Access

TOTAL LIFE COST SUMMARY

October 2011

Passenger Waiting Terminal, Heavy Freight Dock and Staging Area, and Ferry Layup Berth

YEAR	Number of Periods	Waiting Area Construction Cost	Freight Dock Construction Cost	Layup Berth Construction Cost	M&O Freight Dock	M&O Paved Road	M&O Gravel Road	Inspection Above Ground	Inspection Underwater	Guardrail Bridge	Guardrail Paved Road	Guardrail Gravel Road	Fendering System Repairs	Replace Pavement Bridge	Replace Dock Surfacing	Anode Replacement	Replace Joint Gland	Signs/Illumination Bridge	Signs/Illumination Paved Road	Signs/Illumination Gravel Road	Joint Assembly	Recoat Transfer Span	Bridge Supprt-Float Recoat	Mooring Structure	Ferry Replacement	Transfer Bridge Replacement
Initial Cost:		$ 1,403,387	$ 5,426,431	$ 5,987,786	$ 10,000	$ -	$ -	$ 40,000	$ 40,000	$ -	$ -	$ -	$ 50,000	$ -	$ 400,000	$ 100,000	$ -	$ -	$ -	$ -	$ -	$ 150,000	$ 75,000	$ 1,500,000	$ -	$ 2,000,000
2015																										
2016	1																									
2017	2																									
2018	3																									
2019	4																									
2020	5	$ 1,572,373	$ 6,079,844	$ 6,708,794	$ 11,204	$ -	$ -																			
2021	6				11,462	-	-																			
2022	7				11,725	-	-	$ 46,902																		
2023	8				11,995	-	-																			
2024	9				12,271	-	-	49,084																		
2025	10				12,553	-	-		$ 50,213	$ -	$ -	$ -	$ 62,766													
2026	11				12,842	-	-	51,368																		
2027	12				13,137	-	-																			
2028	13				13,440	-	-	53,758																		
2029	14				13,749	-	-																			
2030	15				14,065	-	-	56,259	56,259	-	-	-	70,324	$ -	$ 562,593	$ 140,648	$ -									
2031	16				14,388	-	-																			
2032	17				14,719	-	-	58,877																		
2033	18				15,058	-	-																			
2034	19				15,404	-	-	61,617																		
2035	20				15,758	-	-		63,034	-	-	-	78,792					$ -	$ -	$ -		$ 236,376	$ 118,188			
2036	21				16,121	-	-	64,483																		
2037	22				16,492	-	-																			
2038	23				16,871	-	-	67,484																		
2039	24				17,259	-	-																			
2040	25				17,656	-	-	70,624	70,624	-	-	-	88,280	-	706,238	176,559	-									
2041	26				18,062	-	-																			
2042	27				18,477	-	-	73,910																		
2043	28				18,902	-	-																			
2044	29				19,337	-	-	77,349																		
2045	30				19,782	-	-		79,128	-	-	-	98,910								$ -					
2046	31				20,237	-	-	80,948																		
2047	32				20,702	-	-																			
2048	33				21,179	-	-	84,714																		
2049	34				21,666	-	-																			
2050	35				22,164	-	-	88,656	88,656	-	-	-	110,820	-	886,558	221,640	-	-	-	-	-	332,459	166,230			
2051	36				22,674	-	-																			
2052	37				23,195	-	-	92,781																		
2053	38				23,729	-	-																			
2054	39				24,274	-	-	97,098																		
2055	40				24,833	-	-		99,331	-	-	-	124,164											$ 3,724,917	$ -	$ 4,966,556
2056	41				25,404	-	-	101,616																		
2057	42				25,988	-	-																			
2058	43				26,586	-	-	106,344																		
2059	44				27,197	-	-																			
2060	45				27,823	-	-	111,292	111,292	-	-	-	139,115	-	1,112,919	278,230	-									
2061	46				28,463	-	-																			
2062	47				29,118	-	-	116,470																		
2063	48				29,787	-	-																			
2064	49				30,472	-	-	121,889																		
2065	50				31,173	-	-		124,693	-	-	-	155,866					-	-	-		467,598	233,799			
2066	51				31,890	-	-	127,561																		
2067	52				32,624	-	-																			
2068	53				33,374	-	-	133,496																		
2069	54				34,142	-	-																			
2070	55				34,927	-	-	139,708	139,708	-	-	-	174,634	-	1,397,075	349,269	-				-					
2071	56				35,730	-	-																			
2072	57				36,552	-	-	146,208																		
2073	58				37,393	-	-																			
2074	59				38,253	-	-	153,011																		
2075	60				39,133	-	-		156,530	-	-	-	195,663													
2076	61				40,033	-	-	160,130																		
2077	62				40,953	-	-																			
2078	63				41,895	-	-	167,581																		
2079	64				42,859	-	-																			
2080	65				43,845	-	-	175,378	175,378	-	-	-	219,223	-	1,753,784	438,446	-	-	-	-	-	657,669	328,835			
2081	66				44,853	-	-																			
2082	67				45,885	-	-	183,539																		
2083	68				46,940	-	-																			
2084	69				48,020	-	-	192,078																		
2085	70				49,124	-	-		196,496	-	-	-	245,620													
2086	71				50,254	-	-	201,016																		
2087	72				51,410	-	-																			
2088	73				52,592	-	-	210,369																		
2089	74				53,802	-	-																			
2090	75				55,039	-	-	220,157	220,157	-	-	-	275,196	-	2,201,570	550,393	-							8,255,888	-	11,007,851
2091	76				56,305	-	-																			
2092	77				57,600	-	-	230,401																		
2093	78				58,925	-	-																			
2094	79				60,280	-	-	241,121																		
2095	80				61,667	-	-		246,667	-	-	-	308,333					-	-	-	-	925,000	462,500			
TOTAL:		$ 1,572,373	$ 6,079,844	$ 6,708,794	$ 2,255,691	$ -	$ -	$ 4,415,275	$ 1,878,165	$ -	$ -	$ -	$ 2,347,707	$ -	$ 8,620,738	$ 2,155,184	$ -	$ -	$ -	$ -	$ -	$ 2,619,103	$ 1,309,552	$ 11,980,805	$ -	$ 15,974,407
TOTAL:		**$ 67,917,639**																								

Gravina Island Access

TOTAL LIFE COST SUMMARY

October 2011

***No-Build* Alternative**

YEAR	Number of Periods	Construction Cost	M&O Ferry and Dock	M&O Paved Road	M&O Gravel Road	Inspection Above Ground	Inspection Underwater	Guardrail Bridge	Guardrail Paved Road	Guardrail Gravel Road	Fendering System Repairs	Replace Pavement Bridge	Replace Pavement Road	Anode Replacement	Replace Joint Gland	Signs/Illumination Bridge	Signs/Illumination Paved Road	Signs/Illumination Gravel Road	Joint Assembly	Recoat Transfer Span	Bridge Support-Float Recoat	Mooring Structure	Ferry Replacement	Transfer Bridge Replacement
Initial Cost:		$ -	$ 3,200,000	$ -	$ 129,464	$ 80,000	$ 50,000	$ -	$ -	$ 353,083	$ 50,000	$ -	$ -	$ 50,000	$ -	$ -	$ -	$ 150,890	$ -	$ 150,000	$ 75,000	$ 1,500,000	$ 16,000,000	$ -
2015																								
2016	1																							
2017	2																							
2018	3																							
2019	4																							
2020	5	$ -	$ 3,585,322	$ -	$ 145,053																			
2021	6		3,667,784	-	148,389																			
2022	7		3,752,143	-	151,802	$ 93,804																		
2023	8		3,838,443	-	155,293																			
2024	9		3,926,727	-	158,865	98,168																		
2025	10		4,017,041	-	162,519		$ 62,766	$ -	$ -	$ 443,234	$ 62,766													
2026	11		4,109,433	-	166,257	102,736																		
2027	12		4,203,950	-	170,081																			
2028	13		4,300,641	-	173,993	107,516																		
2029	14		4,399,556	-	177,995																			
2030	15		4,500,746	-	182,088	112,519	70,324	-	-	496,605	70,324	$ -	$ -	$ 70,324	$ -									$ -
2031	16		4,604,263	-	186,276																			
2032	17		4,710,161	-	190,561	117,754																		
2033	18		4,818,495	-	194,944																			
2034	19		4,929,320	-	199,427	123,233																		
2035	20		5,042,694	-	204,014		78,792	-	-	556,402	78,792					$ -	$ -	$ 237,779		$ 236,376	$ 118,188			
2036	21		5,158,676	-	208,707	128,967																		
2037	22		5,277,326	-	213,507																			
2038	23		5,398,704	-	218,417	134,968																		
2039	24		5,522,875	-	223,441																			
2040	25		5,649,901	-	228,580	141,248	88,280	-	-	623,401	88,280	-	-	88,280	-									
2041	26		5,779,848	-	233,838																			
2042	27		5,912,785	-	239,216	147,820																		
2043	28		6,048,779	-	244,718																			
2044	29		6,187,901	-	250,346	154,698																		
2045	30		6,330,223	-	256,104		98,910	-	-	698,466	98,910								$ -					
2046	31		6,475,818	-	261,995	161,895																		
2047	32		6,624,762	-	268,021																			
2048	33		6,777,131	-	274,185	169,428																		
2049	34		6,933,005	-	280,491																			
2050	35		7,092,464	-	286,943	177,312	110,820	-	-	782,571	110,820	-	-	110,820	-	-	-	334,432		332,459	166,230			
2051	36		7,255,591	-	293,542																			
2052	37		7,422,470	-	300,294	185,562																		
2053	38		7,593,186	-	307,200																			
2054	39		7,767,830	-	314,266	194,196																		
2055	40		7,946,490	-	321,494		124,164	-	-	876,802	124,164											$ 3,724,917	$ 39,732,449	
2056	41		8,129,259	-	328,889	203,231																		
2057	42		8,316,232	-	336,453																			
2058	43		8,507,505	-	344,191	212,688																		
2059	44		8,703,178	-	352,108																			
2060	45		8,903,351	-	360,206	222,584	139,115	-	-	982,381	139,115	-	-	139,115	-									
2061	46		9,108,128	-	368,491																			
2062	47		9,317,615	-	376,966	232,940																		
2063	48		9,531,920	-	385,637																			
2064	49		9,751,154	-	394,506	243,779																		
2065	50		9,975,431	-	403,580		155,866	-	-	1,100,672	155,866					-	-	470,373		467,598	233,799			
2066	51		10,204,866	-	412,862	255,122																		
2067	52		10,439,578	-	422,358																			
2068	53		10,679,688	-	432,072	266,992																		
2069	54		10,925,321	-	442,010																			
2070	55		11,176,603	-	452,176	279,415	174,634	-	-	1,233,208	174,634	-	-	174,634	-				-					
2071	56		11,433,665	-	462,576																			
2072	57		11,696,639	-	473,215	292,416																		
2073	58		11,965,662	-	484,099																			
2074	59		12,240,872	-	495,234	306,022																		
2075	60		12,522,412	-	506,624		195,663	-	-	1,381,702	195,663													
2076	61		12,810,428	-	518,276	320,261																		
2077	62		13,105,068	-	530,197																			
2078	63		13,406,484	-	542,391	335,162																		
2079	64		13,714,833	-	554,866																			
2080	65		14,030,275	-	567,628	350,757	219,223	-	-	1,548,077	219,223	-	-	219,223	-	-	-	661,571		657,669	328,835			
2081	66		14,352,971	-	580,684																			
2082	67		14,683,089	-	594,039	367,077																		
2083	68		15,020,800	-	607,702																			
2084	69		15,366,279	-	621,679	384,157																		
2085	70		15,719,703	-	635,978		245,620	-	-	1,734,486	245,620													
2086	71		16,081,256	-	650,606	402,031																		
2087	72		16,451,125	-	665,569																			
2088	73		16,829,501	-	680,878	420,738																		
2089	74		17,216,580	-	696,538																			
2090	75		17,612,561	-	712,558	440,314	275,196	-	-	1,943,340	275,196	-	-	275,196	-							8,255,888	88,062,804	
2091	76		18,017,650	-	728,947																			
2092	77		18,432,056	-	745,713	460,801																		
2093	78		18,855,993	-	762,864																			
2094	79		19,289,681	-	780,410	482,242																		
2095	80		19,733,343	-	798,359		308,333	-	-	2,177,344	308,333					-	-	930,489	-	925,000	462,500			
SUBTOTAL:		$ -	$ 721,821,241	$ -	$ 29,202,997	$ 8,830,550	$ 2,347,707	$ -	$ -	$ 16,578,689	$ 2,347,707	$ -	$ -	$ 1,077,592	$ -	$ -	$ -	$ 2,634,643	$ -	$ 2,619,103	$ 1,309,552	$ 11,980,805	$ 127,795,253	$ -

TOTAL: $ 928,545,840

Gravina Island Access

TOTAL LIFE COST SUMMARY

July 2012

Gravina TOTAL LIFE-TIME COSTS

Tolling

YEAR	Number of Periods	$1,500,000 Ferry Toll G4v and No-Action	$2,000,000 Ferry Toll G2, G3 and G4	$250,000 C3-4 Bridge Toll	$200,000 F3-1 Bridge Toll
	Initial Cost:	$ 1,500,000	$ 2,000,000	$ 250,000	$ 200,000
2015					
2016	1				
2017	2				
2018	3				
2019	4				
2020	5	$ 1,680,620	$ 2,240,826	$ 280,103	$ 224,083
2021	6	1,719,274	2,292,365	286,546	229,237
2022	7	1,758,817	2,345,090	293,136	234,509
2023	8	1,799,270	2,399,027	299,878	239,903
2024	9	1,840,653	2,454,204	306,776	245,420
2025	10	1,882,988	2,510,651	313,831	251,065
2026	11	1,926,297	2,568,396	321,049	256,840
2027	12	1,970,602	2,627,469	328,434	262,747
2028	13	2,015,926	2,687,901	335,988	268,790
2029	14	2,062,292	2,749,723	343,715	274,972
2030	15	2,109,725	2,812,966	351,621	281,297
2031	16	2,158,248	2,877,664	359,708	287,766
2032	17	2,207,888	2,943,851	367,981	294,385
2033	18	2,258,669	3,011,559	376,445	301,156
2034	19	2,310,619	3,080,825	385,103	308,083
2035	20	2,363,763	3,151,684	393,961	315,168
2036	21	2,418,130	3,224,173	403,022	322,417
2037	22	2,473,747	3,298,329	412,291	329,833
2038	23	2,530,643	3,374,190	421,774	337,419
2039	24	2,588,847	3,451,797	431,475	345,180
2040	25	2,648,391	3,531,188	441,398	353,119
2041	26	2,709,304	3,612,405	451,551	361,241
2042	27	2,771,618	3,695,491	461,936	369,549
2043	28	2,835,365	3,780,487	472,561	378,049
2044	29	2,900,579	3,867,438	483,430	386,744
2045	30	2,967,292	3,956,389	494,549	395,639
2046	31	3,035,540	4,047,386	505,923	404,739
2047	32	3,105,357	4,140,476	517,560	414,048
2048	33	3,176,780	4,235,707	529,463	423,571
2049	34	3,249,846	4,333,128	541,641	433,313
2050	35	3,324,593	4,432,790	554,099	443,279
2051	36	3,401,058	4,534,744	566,843	453,474
2052	37	3,479,283	4,639,043	579,880	463,904
2053	38	3,559,306	4,745,741	593,218	474,574
2054	39	3,641,170	4,854,894	606,862	485,489
2055	40	3,724,917	4,966,556	620,820	496,656
2056	41	3,810,590	5,080,787	635,098	508,079
2057	42	3,898,234	5,197,645	649,706	519,764
2058	43	3,987,893	5,317,191	664,649	531,719
2059	44	4,079,615	5,439,486	679,936	543,949
2060	45	4,173,446	5,564,594	695,574	556,459
2061	46	4,269,435	5,692,580	711,573	569,258
2062	47	4,367,632	5,823,509	727,939	582,351
2063	48	4,468,088	5,957,450	744,681	595,745
2064	49	4,570,854	6,094,471	761,809	609,447
2065	50	4,675,983	6,234,644	779,331	623,464
2066	51	4,783,531	6,378,041	797,255	637,804
2067	52	4,893,552	6,524,736	815,592	652,474
2068	53	5,006,104	6,674,805	834,351	667,480
2069	54	5,121,244	6,828,326	853,541	682,833
2070	55	5,239,033	6,985,377	873,172	698,538
2071	56	5,359,531	7,146,041	893,255	714,604
2072	57	5,482,800	7,310,400	913,800	731,040
2073	58	5,608,904	7,478,539	934,817	747,854
2074	59	5,737,909	7,650,545	956,318	765,055
2075	60	5,869,881	7,826,508	978,313	782,651
2076	61	6,004,888	8,006,517	1,000,815	800,652
2077	62	6,143,000	8,190,667	1,023,833	819,067
2078	63	6,284,289	8,379,053	1,047,382	837,905
2079	64	6,428,828	8,571,771	1,071,471	857,177
2080	65	6,576,691	8,768,922	1,096,115	876,892
2081	66	6,727,955	8,970,607	1,121,326	897,061
2082	67	6,882,698	9,176,931	1,147,116	917,693
2083	68	7,041,000	9,388,000	1,173,500	938,800
2084	69	7,202,943	9,603,924	1,200,491	960,392
2085	70	7,368,611	9,824,814	1,228,102	982,481
2086	71	7,538,089	10,050,785	1,256,348	1,005,079
2087	72	7,711,465	10,281,953	1,285,244	1,028,195
2088	73	7,888,829	10,518,438	1,314,805	1,051,844
2089	74	8,070,272	10,760,362	1,345,045	1,076,036
2090	75	8,255,888	11,007,851	1,375,981	1,100,785
2091	76	8,445,773	11,261,031	1,407,629	1,126,103
2092	77	8,640,026	11,520,035	1,440,004	1,152,003
2093	78	8,838,747	11,784,996	1,473,124	1,178,500
2094	79	9,042,038	12,056,051	1,507,006	1,205,605
2095	80	9,250,005	12,333,340	1,541,667	1,233,334
	SUBTOTAL:	**$ 338,353,707**	**$ 451,138,275**	**$ 56,392,284**	**$ 45,113,828**

YEAR	ALT C3-4		ALT F3-1		G2		G3		G4		G4v		Wait & Dock & Berth						No Action	
	ANNUAL TOTALS	TOTALS	ANNUAL TOTALS	TOTALS	ANNUAL TOTALS	TOTALS	ANNUAL TOTALS	TOTALS	ANNUAL TOTALS	TOTALS	ANNUAL TOTALS	TOTALS	ANNUAL TOTALS	TOTALS	w/ G2	w/ G3	w/ G4	w/ G4v	ANNUAL TOTALS	TOTALS
5	250,369,138		309,408,455		94,529,786		82,239,822		73,597,990		29,288,644		14,372,215						3,732,400	
6	225,085	250,594,222	217,234	309,625,689	3,858,575	98,388,361	3,845,520	86,085,342	3,839,000	77,436,989	3,839,000	33,127,644	11,462	14,383,677	112,772,038	100,469,019	91,820,666	47,511,321	3,818,200	7,550,600
7	277,119	250,871,341	315,989	309,941,678	4,134,884	102,523,245	4,121,529	90,206,871	4,114,859	81,551,848	4,021,056	37,148,699	58,627	14,442,304	116,965,549	104,649,176	95,994,153	51,591,003	3,999,778	11,550,378
8	235,467	251,106,808	227,251	310,168,930	4,038,020	106,561,265	4,024,358	94,231,229	4,017,534	85,569,382	4,017,534	41,166,233	11,995	14,454,299	121,015,564	108,685,528	100,023,682	55,620,533	3,995,767	15,546,144
9	289,922	251,396,730	330,602	310,499,531	4,327,186	110,888,451	4,313,209	98,544,438	4,306,229	89,875,611	4,208,061	45,374,294	61,355	14,515,655	125,404,106	113,060,093	104,391,266	59,889,949	4,185,793	19,731,937
10	1,337,975	252,734,706	2,584,697	313,084,229	6,439,648	117,328,099	5,710,959	104,255,397	5,086,363	94,961,975	4,898,065	50,272,359	125,533	14,641,187	131,969,286	118,896,584	109,603,162	64,913,546	4,750,362	24,482,299
11	303,322	253,038,027																	4,380,463	28,862,762
12	257,704	253,295,731																	4,376,070	33,238,832
13	317,344	253,613,075																	4,584,191	37,823,023
14	269,604	253,882,678																	4,579,594	42,402,617
15	3,810,945	257,693,623																	5,504,975	47,907,592
16	282,057	257,975,680																	4,792,586	52,700,178
17	347,376	258,323,056																	5,020,525	57,720,703
18	295,089	258,618,145																	5,015,489	62,736,192
19	363,448	258,981,593																	5,254,033	67,990,226
20	1,788,592	260,770,185																	6,555,093	74,545,319
21	380,267	261,150,452																	5,498,407	80,043,726
22	323,001	261,473,454																	5,492,892	85,536,618
23	397,869	261,871,322																	5,754,151	91,290,768
24	337,939	262,209,261																	5,748,379	97,039,147
25	4,783,474	266,992,735																	6,910,033	103,949,180
26	353,570	267,346,305																	6,015,753	109,964,933
27	435,567	267,781,872																	6,301,889	116,266,823
28	369,930	268,151,802																	6,295,568	122,562,391
29	455,741	268,607,543																	6,595,018	129,157,408
30	4,876,778	273,484,321																	7,484,687	136,642,096
31	476,854	273,961,175																	6,901,785	143,543,881
32	404,966	274,366,141																	6,894,861	150,438,742
33	498,949	274,865,089																	7,222,825	157,661,567
34	423,716	275,288,806																	7,215,579	164,877,147
35	6,158,315	281,447,121																	9,506,954	174,384,101
36	443,338	281,890,459																	7,551,220	181,935,321
37	546,270	282,436,729																	7,910,414	189,845,735
38	463,873	282,900,602																	7,902,478	197,748,213
39	571,594	283,472,196																	8,278,384	206,026,597
40	2,644,844	286,117,041																	52,852,575	258,879,172
41	598,096	286,715,137																	8,663,476	267,542,648
42	507,854	287,222,991																	8,654,784	276,197,432
43	625,832	287,848,822																	9,066,485	285,263,917
44	531,390	288,380,212																	9,057,389	294,321,306
45	7,536,850	295,917,062																	10,887,971	305,209,277
46	556,021	296,473,083																	9,478,726	314,688,003
47	685,233	297,158,316																	9,929,631	324,617,634
48	581,798	297,740,114																	9,919,668	334,537,302
49	717,022	298,457,136																	10,391,552	344,928,854
50	3,536,233	301,993,369																	12,965,300	357,894,154
51	750,290	302,743,659																	10,874,967	368,769,121
52	637,006	303,380,665																	10,864,055	379,633,176
53	785,106	304,165,771																	11,380,873	391,014,049
54	666,550	304,832,321																	11,369,454	402,383,503
55	14,350,446	319,182,767																	13,667,430	416,050,933
56	697,469	319,880,236																	11,898,368	427,949,301
57	859,672	320,739,908																	12,464,400	440,413,701
58	729,827	321,469,735																	12,451,892	452,865,593
59	899,577	322,369,312																	13,044,261	465,909,854
60	4,166,691	326,536,003																	14,804,199	480,714,053
61	941,338	327,477,341																	13,651,102	494,365,155
62	799,128	328,276,469																	13,637,403	508,002,558
63	985,042	329,261,511																	14,286,179	522,288,737
64	836,215	330,097,726																	14,271,843	536,560,579
65	12,180,367	342,278,093																	18,804,625	555,365,205
66	875,028	343,153,121																	14,935,801	570,301,006
67	1,078,645	344,231,765																	15,646,355	585,947,361
68	915,646	345,147,412																	15,630,653	601,578,014
69	1,128,737	346,276,149																	16,374,268	617,952,282
70	5,230,028	351,506,176																	18,583,562	636,535,845
71	1,181,160	352,687,336																	17,136,050	653,671,895
72	1,002,640	353,689,976																	17,118,854	670,790,749
73	1,236,022	354,925,998	1,410,368	503,935,172	18,539,272	919,039,135	18,479,369	865,532,216	18,449,452	821,637,411	18,028,715	731,548,057	262,961	42,368,786	961,407,922	907,901,003	864,006,198	773,916,844	17,933,277	688,724,026
74	1,049,195	355,975,193	1,012,345	504,947,516	18,104,798	937,143,934	18,043,518	883,575,734	18,012,913	839,650,324	18,012,913	749,560,970	53,802	42,422,588	979,566,522	925,998,323	882,072,912	791,983,558	17,915,280	706,639,306
75	14,907,357	370,882,549	35,759,025	540,706,542	206,834,678	1,143,978,612	197,186,473	1,080,762,208	188,732,904	1,028,383,228	126,703,666	876,264,636	22,786,251	65,208,839	1,209,187,450	1,145,971,046	1,093,592,066	941,473,475	117,855,219	824,494,525
76	1,097,917	371,980,466	1,059,351	541,765,893	18,947,100	1,162,925,711	18,882,968	1,099,645,176	18,850,939	1,047,234,167	18,850,939	895,115,575	56,305	65,265,144	1,228,190,855	1,164,910,320	1,112,499,310	960,380,719	18,748,764	843,243,289
77	1,353,521	373,333,987	1,544,470	543,310,363	20,304,438	1,183,230,149	20,238,832	1,119,884,008	20,206,065	1,067,440,232	19,745,264	914,860,839	288,001	65,553,145	1,248,783,294	1,185,437,152	1,132,993,377	980,413,984	19,640,739	862,884,027
78	1,148,905	374,482,892	1,108,545	544,418,908	19,828,592	1,203,058,742	19,761,477	1,139,645,485	19,727,957	1,087,168,189	19,727,957	934,588,796	58,925	65,612,070	1,268,670,811	1,205,257,555	1,152,780,259	1,000,200,866	19,621,028	882,505,056
79	1,416,403	375,899,295	1,616,236	546,035,143	21,249,086	1,224,307,828	21,180,427	1,160,825,912	21,146,137	1,108,314,326	20,663,895	955,252,691	301,401	65,913,471	1,290,221,299	1,226,739,383	1,174,227,797	1,021,166,162	20,554,506	903,059,561
80	15,626,685	391,525,980	30,573,717	576,608,860	37,613,600	1,261,921,427	33,911,267	1,194,737,179	30,740,664	1,139,054,990	27,040,662	982,293,353	2,004,168	67,917,639	1,329,839,066	1,262,654,818	1,206,972,629	1,050,210,992	25,645,878	928,705,440
	391,525,980		576,608,860		1,261,921,427		1,194,737,179		1,139,054,990		982,293,353		67,917,639						928,705,440