Ketchikan Bridges Project

FHWA Competitive Highway Bridge Program Grant Application

2018

Alaska Department of Transportation & Public Facilities

Cover Photo: Downtown Ketchikan during the summer.
Photo Courtesy Matt Howry, Creative Commons.

Overleaf:

Photo 1: Ward Creek Bridge, 1962. DOT&PF Archives.

Photo 2: Herring Cove Bridge, 1971. DOT&PF Archives.

Department of Transportation & Public Facilities
Statewide Design & Engineering Services Division
Phone: 907-465-8890
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MEMORANDUM

TO: Kenneth J. Fisher, P.E.
Chief Engineer

DATE: November 19, 2018

FROM: Richard Pratt, P.E.
Chief Bridge Engineer

SUBJECT: Competitive Highway Bridge Program Grant Proposal Authorization

The Competitive Highway Bridge Program is a one-time funding opportunity available to states with low population densities. We have developed three proposals for funding under this grant program, one for each of the three regions:

Region	Proposal Name	Project Budget	Proposal Amount
Central	South Seward Highway Bridges	$17,456,514	$15,880,190
Northern	Eastern Alaska Rural Deficient Bridge Upgrades	$12,485,482	$11,358,043
Southcoast	Ketchikan Bridge Rehabilitation and Replacement Project	$14,419,466	$13,117,388
	Total	$44,361,462	$40,355,621

Your authorization is required for grant submission. By submitting the grant applications through the Federal online portal, Grants.gov, your signature will be attached to the following forms:

- SF-424: Application for Federal Assistance
- SF-424D: Assurances for Construction Programs
- SF-LLL: Disclosure of Lobbying Activities

Please sign below to indicate your approbation of these three proposals:

Kenneth J. Fisher, P.E. 11-19-18
Date

cc: Marc Luiken

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Ketchikan Bridge Rehabilitation and Replacement Project

Project Abstract

The Alaska Department of Transportation and Public Facilities requests funds through the Competitive Highway Bridge Program to replace two bridges and rehabilitate another through the Ketchikan Bridge Rehabilitation and Replacement Project. The proposed project will replace two bridges and rehabilitate one bridge on the South and North Tongass Highways in Ketchikan, Alaska:

- The **Herring Cove Bridge** (NBI Bridge No. 253) is in poor condition due to advanced deterioration of the reinforced concrete deck. Highway speed limits have been seasonally restricted here due to the large number of pedestrians crowding the one-foot shoulders. The project will increase the NBI bridge rating from "poor" to "good."
- The **Hoadley Creek Bridge** (NBI Bridge No. 725) is in poor condition due to damage to the top of the bridge deck, with cantilevered deck supports also being monitored due to active cracking. The project will increase the NBI bridge rating from "poor" to "good."
- The **Ward Creek Bridge** (NBI Bridge No. 747), is in serious condition due to severe cracking of the reinforced concrete pile cap at the north abutment. The project will increase the NBI bridge rating from "poor" to "good."

The Tongass Highway is the only road that links visitor destinations, natural resources, and industrial infrastructure "out the road" to the rest of the community. Like many parts of Alaska, the transportation system in Ketchikan lacks redundancy; this is especially pronounced here, as this island community is built on a narrow sliver of relatively flat land between the ocean and steep mountain slopes.

Each of the bridges in this project is located at a key point in Ketchikan's transportation system and, therefore, its economy. The **Herring Cove Bridge** is situated between two of Ketchikan's largest visitor attractions. **Hoadley Creek Bridge** is located at the heart of the downtown district: directly between the hospital and the barge dock where all local groceries and other freight lands. The **Ward Creek Bridge** is an important structure that leads to several residential neighborhoods but also to industrial infrastructure, marine facilities, and tourism locations that draw economic activity to the borough.

This FHWA Competitive Highway Bridge Program grant enables Alaska to realize over $1 million in construction savings through bundling.

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2018

Alaska Department of Transportation and Public Facilities

FHWA Competitive Highway Bridge Program Grant Proposal

Ketchikan Bridge Rehabilitation & Replacement Project	
State Priority Ranking	**3 of 3**
Previously Incurred Project Eligible Costs	**$200,000**
Future Eligible Project Costs	**$14,419,466**
Total Project Cost	**$14,619,466**
Program Grant Request Amount	**$13,117,388**
Federal (DOT) Funding Including Program Funds Requested	**$13,299,328**

Proposal:

Rehabilitate the Ward Creek Bridge and replace the Herring Cove and Hoadley Creek bridges. Each of these three bridges is located at a vital pinch point in Ketchikan, the first port of call for approximately 1 million of Alaska's cruise ship visitors.

Funding this project will protect access to Ketchikan's hospital, natural resources, and dozens of small businesses catering to visitors. It will protect the $90 million Ketchikan fishing and seafood industries, as well as Alaska's $2 billion tourist industry. Bundling these projects will save over $1 million.

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Section 1: Project Narrative

a. Project Description

Eligibility

The Alaska Department of Transportation and Public Facilities[1] (DOT&PF) requests $13,117,388 from the FWHA Competitive Highway Bridge Program for the Ketchikan Bridge Rehabilitation and Replacement Project. The Federal/State funding ratio for Alaska is 90.97 percent / 9.03 percent in accordance with 23 U.S.C. 120(b), and the State commits to providing this match, anticipated to be $1,302,078.[2] Project bundling results in cost savings of $1,041,557 (6.7 percent of the unbundled total cost).

All documents and data referenced in this proposal are available at the DOT&PF Competitive Highway Bridge Program website.

This project will replace two bridges in "poor" condition and rehabilitate one bridge in "poor" condition[3] in Ketchikan, AK. The three bridges are located on the South and North Tongass Highways which are public roads on the federal-aid highway system and fully eligible for National Highway Performance Program (NHPP) funds. All meet the definition of a "highway" under 23 U.S.C. 101(a)(11) and a "public road" under 23 U.S.C. 101(a)(22).

- **The Herring Cove Bridge** (253) is located at approximately Milepost (MP) 10.4 of the South Tongass Highway and is in poor condition due to advanced deterioration of the reinforced concrete deck. Highway speed limits are restricted seasonally here due to the large number of pedestrians crowding the one-foot wide shoulders. The bridge will be replaced with a new structure in the same general traffic corridor, increasing the National Bridge Inventory (NBI) bridge rating from poor to good. See the Structural Inventory and Appraisal Sheet for additional information about current bridge condition.[4]

- **The Hoadley Creek Bridge** (725) is located at approximately MP 1 of the South Tongass Highway and is in poor condition due to damage to the reinforced concrete deck. The cantilevered deck supports are also being monitored due to active cracking. The bridge will be replaced with a new structure in the same general traffic corridor,

[1] The Alaska Department of Transportation and Public Facilities, as the sponsoring agency, is a cabinet-level department of the State of Alaska and a member of the FHWA formula program and so eligible to receive these grant funds. The State of Alaska is cited as a member state for the purposes of eligibility under Section C. of the Notice of Funding Opportunity for the FHWA Competitive Highway Bridge Program for Fiscal Year 2018.
[2] Form SF-424C requires use of a whole number percent for Federal match, causing a discrepancy from actual values found in this narrative.
[3] "Good," "fair," and "poor" condition as used in this proposal meet the definitions provided in 23 CFR 490.409(b). "Bridge" meets the definition in 23 CFR 650.305. "Rehabilitation" and "replacement" used in accordance with definitions in 23 CFR 650.405.
[4] Structure Inventory and Appraisal Sheet – Herring Cove Bridge.

increasing the NBI bridge rating from poor to good. See the Structural Inventory and Appraisal Sheet for additional information about current bridge condition.[5]

- **The Ward Creek Bridge** (747) is located at approximately MP 4.6 of the North Tongass Highway and is in poor condition due to advanced deterioration of the reinforced concrete pile cap at the north abutment affecting structural integrity of the bridge. DOT&PF will rehabilitate the north end abutment, including associated approach roadway and embankment repair, increasing the NBI bridge rating from poor to good. See the Structural Inventory and Appraisal Sheet for additional information about current bridge condition.[6]

The following table summarizes the NBI data for the three bridges scheduled for rehabilitation or replacement, including an overview of the condition rating, load posting information, functional classification, current AADT and current AADT-truck information to support the need for the work detailed later in this report.

Ketchikan Bridge Rehabilitation and Replacement Project Summary			
	Herring Cove	**Hoadley Creek**	**Ward Creek**
NBI Structure No.	253	725	747
Deck Rating (Item 58)	**4**	**4**	**7**
Superstructure Rating (Item 59)	**6**	**6**	**6**
Substructure Rating (Item 60)	**7**	**6**	**3**
Controlling Load Rating	HS13.0 (deck)	HS 16.2 (girder)	HS18.2 (girder)
Load Restricted (Item 41)	No	No	No
Public Road	South Tongass Hwy.	South Tongass Hwy.	North Tongass Hwy.
Roadway Functional Classification	Major Collector	Minor Arterial	Minor Arterial
Current AADT[7]	752	14,676	5,750
Percent Trucks (%)	14	23	11
Work Planned	Replacement	Replacement	Rehabilitation

All three individual bridge projects are currently included in the Statewide Transportation Improvement Program (STIP) as separate projects. By bundling them together, over $1 million in construction savings will be realized.

- The **Herring Cove Bridge** is in the current STIP under Need ID 28810; construction funding for this bridge is programmed in 2020.

[5] Structure Inventory and Appraisal Sheet – Hoadley Creek Bridge.
[6] Structure Inventory and Appraisal Sheet – Ward Creek Bridge.
[7] Alaska Department of Transportation and Public Facilities. 2017 Annual Average Daily Traffic (AADT) GIS Map. Transportation Data Programs. Accessed November 2018.

- Replacement of the **Hoadley Creek Bridge** is in the current STIP under Need ID 31718. Construction funding is not programmed in the funded years of the 2018-2021 STIP and instead shows in the STIP as 'After 2021.'
- The **Ward Creek Bridge** is in the current STIP for rehabilitation in 2019 under Need ID 18922.

The Department has begun the process of amending the STIP to combine all three bridge projects into STIP Need ID 32026. With grant funding, this bundled project is anticipated to receive final STIP approval in April 2019. DOT&PF will award the bundled project to a single contractor.

The following is a detailed description of the bridge conditions, emphasizing the deficiencies that will be addressed through replacement or rehabilitation.

Herring Cove Bridge (NBI Bridge No. 253)

The **Herring Cove Bridge** is a two-span steel beam bridge with a cast-in-place concrete deck. The bridge is 30 feet wide and 116 feet long with two 12-foot traffic lanes, one-foot shoulders, and a two-foot wide curb on each side. The most recent routine inspection was conducted June 25, 2017.[8]

Figure 1. Herring Cove Bridge

Constructed in 1952, the bridge has outlived its design service life, and the narrow width poses a safety risk for pedestrians. At this location, the South Tongass Highway is classified as a "Major Collector," with an AADT of 752 (14 percent trucks).

The reinforced concrete deck is abraded throughout with numerous spalls, pop-outs, and exposed reinforcing steel in multiple places. Delaminations and spalls cover approximately 40 percent of the deck surface, and deck joints are damaged or ineffective. The deck has an NBI rating of 4, "poor," and a controlling load rating of HS13.0. The superstructure and substructure are in satisfactory and good condition, respectively.

[8] 2017 Routine Inspection Report: Herring Cove Bridge, Manning.

Further, the bridge is located in a high-volume tourist and pedestrian traffic zone in the summer months. With no pedestrian walkways or sidewalks, pedestrians create a pinch point as they try to cross the bridge to access the wildlife viewing area at the north end of the bridge and sport fishing at the south end. As a result of this safety hazard, traffic speeds have been restricted to 25 mph between Wood Road and Powerhouse Road intersections, enveloping the bridge.

Replacement: DOT&PF will replace the Herring Cove Bridge with a single-span "Alaska-style" decked bulb-tee girder bridge with ADA accessible pathways on the outside of the guardrail on the west side from Wood Road to Powerhouse Road and on the east side between Powerhouse Road and the opposite end of the bridge. Overhead electrical and communications utilities and underground water and sewer utilities will be relocated to allow for the new bridge construction.

Herring Cove Bridge Condition after Proposed Work	
Deck – NBI Item 58	**9, Excellent**
Superstructure – NBI Item 59	**9, Excellent**
Substructure – NBI Item 60	**9, Excellent**

- New bridge will have a 75-year design life.
- Approach and bridge railings will meet modern safety standards.
- Pedestrian features will meet ADA requirements and eliminate current safety conflicts between pedestrians and motorized traffic.

Hoadley Creek Bridge (NBI Bridge No. 725)

The **Hoadley Creek Bridge**, built in 1957, is a single-span concrete girder bridge. The bridge is 45 feet long and 60 feet wide, with two traffic lanes, a center turn lane, shoulders for parking, and a pedestrian walkway on each side. The most recent routine inspection was conducted June 21, 2017.[9]

This portion of the South Tongass Highway is classified as a "Minor Arterial." At this location, the South Tongass carries high volume vehicle (AADT 14,676) and truck traffic (23 percent) year round, making this bridge a critical support for Ketchikan's economy.

Located near the city center, between the local hospital and the primary barge facility for local freight, any load limits

Figure 2. Hoadley Creek Bridge

[9] 2017 Routine Inspection Report: Hoadley Creek Bridge. Manning.

would pose immediate negative impacts on the community.

The Hoadley Creek Bridge has outlived its 50-year design life and faces three structural challenges. The deck is rated as poor due to damage to the top surface, and underneath, the soffits have spalling, leaks, efflorescence, and exposed reinforcing steel. Second, the cantilevered sidewalk support brackets attached to the girders have cracks, spalling, and exposed reinforcing steel. DOT&PF has been monitoring this continuing deterioration. Finally, the foundation was repaired in 2009 to address approach embankment undermining. However, the abutments have cracks, spalls, and exposed reinforcement.

The controlling bridge load rating is HS16.2 for the girders in shear.

Replacement: DOT&PF will replace the Hoadley Creek Bridge with a single-span concrete decked bulb-tee girder bridge designed in accordance with modern safety standards. Electrical and communications utilities are anticipated to require relocation to allow for the new bridge construction.

Hoadley Creek Bridge Condition after Proposed Work	
Deck – NBI Item 58	**9, Excellent**
Superstructure – NBI Item 59	**9, Excellent**
Substructure – NBI Item 60	**9, Excellent**

- New bridge will have a 75-year design life.
- Approach and bridge railings will meet modern safety standards.
- Pedestrian features will meet ADA requirements.

Ward Creek Bridge (NBI Bridge No. 747)

The **Ward Creek Bridge** is a three-span concrete decked bulb-tee girder bridge. The original bridge at this location, built in 1950, was removed and replaced in 1975. The replacement bridge reused the original abutment piles, and added an additional pile on the west side of each abutment. The bridge is 35.8 feet wide and 195 feet long. The most recent routine inspection was conducted June 20, 2017.[10]

Figure 3. Ward Creek Bridge

[10] 2017 Routine Inspection Report: Ward Creek Bridge. Manning.

The most serious challenge facing the Ward Creek Bridge is its substructure deterioration. The substructure was rated "serious" in 2015 due to damage caused by differential settling. As a result, the reinforced concrete north abutment has large cracks with exposed reinforcing steel. In addition, the settlement has caused cracking in multiple end diaphragms and the bottom bulb of at least one decked-bulb tee girder.

Rehabilitation: To address the challenges presented by the substructure deterioration, DOT&PF will rehabilitate the north end abutment, including associated approach roadway and embankment work. The rehabilitation will include a new outrigger pile-supported abutment cap beam that encapsulates the existing cap beam.

Figure 4. Ward Creek Bridge North Abutment Cap

The strengthened abutment will provide a new load path from the superstructure to the outrigger piles. DOT&PF will also upgrade the approach railing system with a MASH-compliant system. Overhead electrical and communications utility relocations will be required for abutment repair.

Ward Creek Bridge Condition after Proposed Work	
Deck – NBI Item 58	**7, Good**
Superstructure – NBI Item 59	**6, Satisfactory**
Substructure – NBI Item 60	**7, Good**

- The substructure component will be returned to a state of "Fair" Condition.
- Substructure rehabilitation will extend the life of the structure for decades.
- Approach railings will meet modern safety standards.

b. Project Location

The three bridges are located in the City of Ketchikan within the Ketchikan Gateway Borough on Revillagigedo Island. The borough is located in Southeast Alaska, a region known as the Panhandle. The geospatial bridge locations are listed in the table below.

Bridge	Longitude	Latitude
Herring Cove Bridge	-131.5250°	55.3265°
Hoadley Creek Bridge	-131.6868°	55.3534°
Ward Creek Bridge	-131.7810°	55.4074°

Figure 5 shows the project area with each bridge location indicated. The map provides an approximate reference to the Ketchikan waterfront district, which is the downtown commercial district, located at the cruise ship docks. The inset map in **Figure 5** shows the location of Ketchikan in the Southern Panhandle within the State of Alaska.

Ketchikan is the largest community in southern Southeast Alaska.

Local governance is provided by the City of Ketchikan (a Home Rule City) and the Ketchikan Gateway Borough. Of the 13,754 residents of Ketchikan Gateway Borough, 8,125 live in the City of Ketchikan.[11]

Revillagigedo Island is almost 700 air miles north of Seattle and 235 miles south of the Capitol City, Juneau.

At over one thousand square miles, Revillagigedo is the 12th largest island in the United States; it is separated from the Alaska mainland to the east by Behm Canal, from Prince of Wales Island to the west by Clarence Strait, and from Annette Island to the south by Revillagigedo Channel and Nichols Passage.

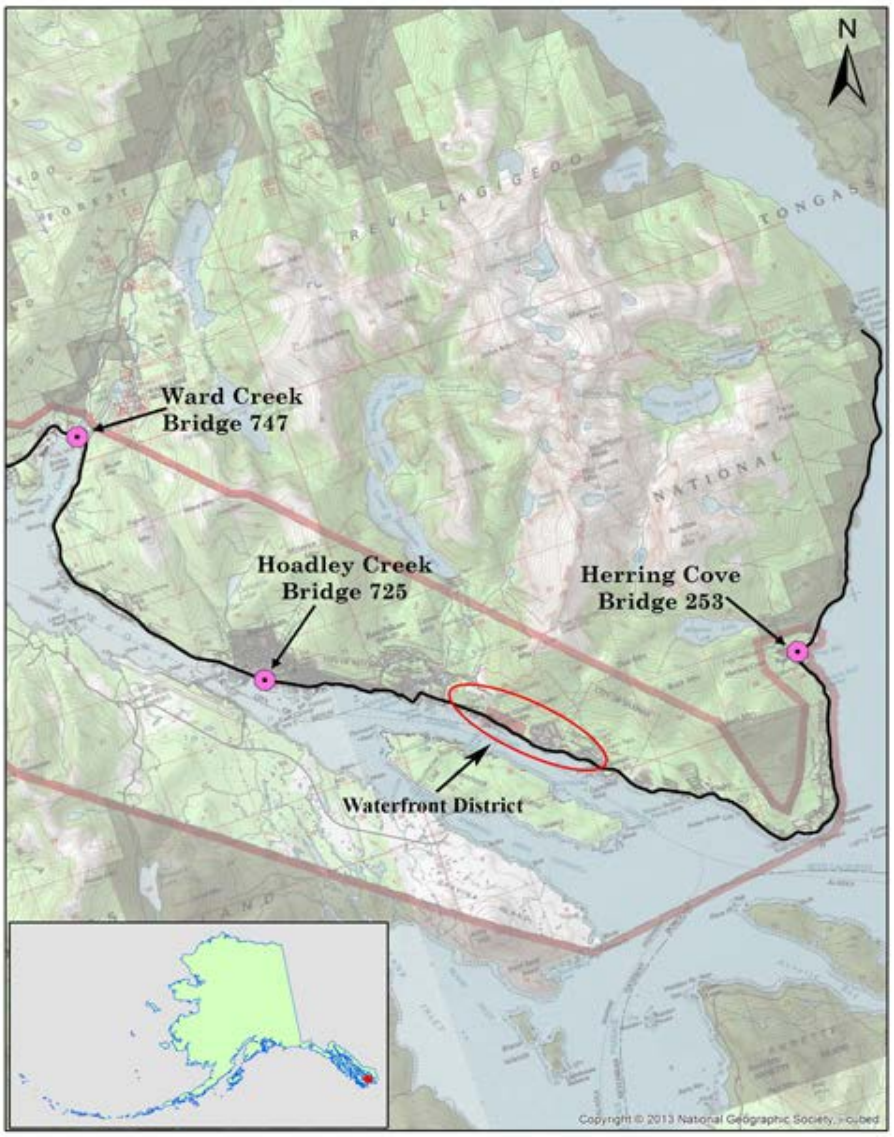

Figure 5. Ketchikan Bridge Project Locations

c. Project Parties

The Alaska Department of Transportation and Public Facilities is responsible for project direction and oversight. Alaska DOT&PF will provide the following services in support of the project:

[11] U.S. Census Data. Compiled by Alaska Department of Labor and Workforce Development.

- Primary contact with FHWA to ensure compliance with federal funding requirements
- Primary contact with federal, state and local permitting agencies
- Project management support
- Professional engineering and environmental staffing
- Construction contract administration

This project enjoys support from local organizations and governments, statewide organizations and Alaska's Congressional Delegation. Letters of support are included in Appendix B.

d. Grant Funds, Sources and Uses of Project Funds

Project Costs: Alaska DOT&PF performed the preliminary engineering and prepared engineer's estimates for all of the bridge projects between 2017 and 2018. The total bundled project cost will be $14,619,466. Of the total cost, the future eligible project cost is $14,419,466. **Table 1** shows that project bundling saves $1,041,557, which is a 6.7 percent savings over the unbundled total cost of the three projects.

Table 1 Cost Savings through Bundling

Ketchikan Bridge Projects	
All Bridges as Separate Projects	$15,661,023
All Bridges as Combined Project	$14,619,466
Total Savings	***$1,041,557***

Includes Funds Spent To Date

Funding: Of the future eligible cost, the Alaska DOT&PF is requesting $13,117,388, and will provide $1,302,078 in match. Alaska uses a sliding scale funding formula of 90.97 percent FHWA funds to 9.03 percent state match. The table below shows each project's cost estimate presuming it as a bundled project, and what share of the grant funds would be dedicated to each bridge.

Grant Funding Request per Bridge			
Project	**Estimated Project Cost**	**FHWA Grant Share***	**State Match**
Herring Cove Bridge	$6,065,299	$5,517,603	$547,697
Hoadley Creek Bridge	$5,434,703	$4,943,950	$490,754
Ward Creek Bridge	$2,919,464	$2,655,836	$263,628
All Bridges	***$14,419,466***	***$13,117,388***	**$1,302,078**

** Alaska's sliding scale match formula is 90.97% Federal/9.03% State*

As of October 2, 2018, DOT&PF has expended $200,000 in FHWA program funds on this project. The Herring Cove Bridge funds spent to date are estimated from the total expenditure of the current combined bridge and roadway project.

Ketchikan Bridge Spending to Date			
Source	**Herring Cove Bridge**	**Hoadley Creek Bridge**	**Ward Creek Bridge**
FHWA (90.97%)	$90,970	$18,194	$72,776
State Match Funds (9.03%)	$9,030	$1,806	$7,224

Alaska DOT&PF has committed matching 9.03 percent, approximately $1.3 million, to the Competitive Highway and Bridge Program; see Appendix F: Funding Commitment Letter.

Budget: The table below outlines the overall budget for the bundled project. Costs have been consolidated by major budget categories based on engineer's estimates. It includes the estimated project costs by cost classification and the portion of that cost that will be derived from the FHWA grant request.

As shown in the table below, 91 percent of requested funds are directed to construction costs. Additional budget information is included in Appendix A: Budget Detail.

Grant Funds Apportionment (All Bridges)				
Cost Classification	**Total Cost Project Cost***	**FHWA Grant Funds**	***Grant Funded Construction Costs***	
			($)	***(%)***
Administrative and legal expenses	$427,284	$388,700	$314,757	81%
Land, structures, rights-of-way, appraisals, etc.	$400,000	$363,880	$363,880	100%
Relocation expenses and payments	$60,000	$54,582	$54,582	100%
Architectural and engineering fees	$762,539	$693,681	$0	0%
Other architectural and engineering fees	$341,590	$310,744	$310,744	100%
Project inspection fees	$1,241,680	$1,129,556	$1,129,556	100%
Site work	$450,000	$409,365	$409,365	100%
Demolition and removal	$530,000	$482,141	$482,141	100%
Construction	$6,831,800	$6,214,888	$6,214,888	100%
Equipment	$787,996	$716,840	$716,840	100%
Miscellaneous	$150,000	$136,455	$136,455	100%
Contingencies**	$2,436,578	$2,216,555	$1,773,244	80%
Total Project Costs	**$14,419,466**	**$13,117,388**	***$11,906,453***	***91%***

* *Less Project Funds Spent to Date*

** *Contingency funds apportioned to each cost classification on percentage basis. Actual spending in this category may change as per need.*

Section 2: Selection Criteria

a. Innovation

The innovative technology and project delivery methods used in the Ketchikan Bridge Rehabilitation and Replacement project will enable DOT&PF to expedite project delivery, add bridge capacity, improve bridge durability, and reduce maintenance expenses.

Due to Alaska's size, short building season, high seismicity, permafrost, and extreme temperature swings, Alaska DOT&PF has invented, refined, and institutionalized a number of technical and project delivery innovations. While several of these are associated with Accelerated Bridge Construction (ABC) practices used around the country, Alaska has seen processes and materials that are effective in the Lower 48 fail quickly under the extreme conditions of "Alaska normal."

As a result, since the 1960's DOT&PF has developed and maintained an active research portfolio to identify, test, adapt, and prove whether promising methods and materials can stand up to Alaskan extremes. Some of the innovations planned for this project are the result of this process of invention and reinvention.[12]

Innovative Technology

The superstructure at Herring Cove and Hoadley Creek Bridges will be constructed from "Alaska-style" precast, prestressed concrete decked bulb-tee girders (DBTs). Alaska first experimented with these prefabricated bridge elements (PBEs) in the 1970s, a practice that has since come to be known as Accelerated Bridge Construction. Since that initial installation of a few PBEs of varying descriptions, Alaska has embarked on a decades-long effort to develop this technology into the most versatile and cost-effective option for bridge superstructure design in the state. The Department has fully mature design standards, tools, and specifications to leverage the advantages offered by DBTs.

"Alaska-style" DBTs incorporate a monolithic deck with the prestressed girder that provides a high-quality, low-maintenance structure. Bridges can be erected in several days instead of the weeks required for conventional cast-in-place concrete bridge decks. [13]

This system will be used at the Herring Cove and Hoadley Creek Bridges. For more information about Alaska's decked bulb-tee girders, see Appendix C: Innovative Technology.

[12] Alaska spends nearly $1 million annually on transportation research projects to develop innovative ideas or adapt generally accepted project methods to our harsh environment. DOT&PF is currently investing $2 million on seven multi-year bridge projects currently. Alaska DOT&PF is a recognized transportation leader in seismic bridge engineering in cold climates. See Alaska DOT&PF Current Research Projects 2018.

[13] Daugherty, L. (2013). *Challenges of Designing and Building Bridges in Alaska.* International Bridge Conference 13-63. (p-3).

Technical Innovation Summary		
Technical Innovation	**Benefits**	**Bridge(s)**
"Alaska-style" Decked-Bulb Tee Girders	• Reduces formwork, construction time • Fewer workers needed, reducing construction expenses • Higher quality and strength concrete • Higher quality fabrication, due to controlled factory conditions • Lower maintenance	Herring Cove, Hoadley Creek

Innovative Project Delivery

National Environmental Policy Act (NEPA) Primacy

Alaska is one of seven states that have assumed NEPA authority from FHWA. The provision in the last two transportation bills that allowed a state to assume NEPA authority has been viewed as a streamlining effort to assist in faster infrastructure project delivery. By reducing the time needed to complete the NEPA process there will also be some fiscal savings as well. The state now takes the place of FHWA in most of the environmental negotiations, mitigation discussions, environmental permitting and NEPA document approvals.

Since the NEPA Assignment Program MOU was signed in November 2017, Alaska DOT&PF has approved 107 NEPA Documents, and the average time to develop the documents and approve them was 45 days. Under the traditional NEPA model that Alaska previously worked under, the average turnaround time on an environmental document was commonly six months.

At this writing, Alaska lacks adequate data to fully assess time and financial savings from this initiative. However, the program is modeled after a similar initiative that has been used by the California Department of Transportation (Caltrans) since 2007; their program was found to decrease time to draft and final Environmental Assessments by 10.9 months and to Environmental Impact Statements by 11.7 years. [14]

This environmental review model will be utilized during the environmental re-evaluation for all bridges in this bundled project.

Technical Innovation: Project Delivery		
Innovation	**Benefits**	**Bridge**
NEPA Primacy	• Takes ¼ of the time to achieve environmental documents decreasing cost and risk to project	All

[14] The California Department of Transportation (Caltrans) 2016 Report to the Legislature: NEPA Assignment July 2007-June 2014. Caltrans Division of Environmental Analysis. Jan. 1, 2016. (p-3).

Innovative Financing

DOT&PF does not foresee incorporating any innovative funding or financing activities to complete this project.

b. Support for Economic Vitality

Summary Results of the Benefit-Cost Analysis

The proposed bundled project will have a positive net economic benefit. In particular, the proposed bundled project will avoid the following negative economic impacts: 1) load limits, which would increase truck traffic by four percent, increasing costs of goods to consumers; 2) single lane operations, which will cause a delay through this section of the Tongass Highway for both personal and commercial vehicles; 3) baseline maintenance and operating costs, which are extremely high given the age and condition of the bridges included in this project; and 4) the bridges will be closed in 2019 and 2022 due to ongoing deterioration.

The Benefit-Cost Analysis Memorandum (Appendix D-1) and Benefit-Cost Analysis Spreadsheet calculations (Appendix D-2) prepared by Northern Economics, Inc. are attached to this application.

To fully understand the economic impact of the Benefit-Cost analysis conclusions, it is crucial to understand the importance of Ketchikan's role as a regional hub. The three bridges in this project enable thriving commercial activity on a regional basis, enabling many smaller communities to participate in a larger economy, enhance their skills through education at the University of Alaska Southeast, and access medical care close to home.

Regional Transportation Network

Ketchikan is a coastal community located in fjord lands, so the topography generally provides for a relatively narrow strip of flatlands near the ocean surrounded by steep slopes just inland. The North Tongass and South Tongass Highways trace the southern shore of the city, linking visitor destinations, natural resources, and industrial infrastructure "out the road" to the rest of the community.

Ketchikan supplies the surrounding villages within the southern geographical boundary of the Alexander Archipelago. Ketchikan's transportation industry includes an Alaska Marine Highway System terminal, air taxi services, and multiple seaplane bases that connect surrounding communities. The state-owned Ketchikan International Airport has daily jet service, located a 10-minute ferry ride from downtown Ketchikan on Gravina Island.

Ketchikan is also the regional hub for the small towns, logging camps, and villages located on other islands in the Alexander Archipelago (see **Table 2** below). Residents of these communities rely on Ketchikan for jobs, medical care, freight, and education.

Table 2. Communities Affected by Project

Community	2010 Population	2017 Estimate[15]	Location
Ketchikan, AK	8,050	8,125	
Saxman, AK	411	444	2 miles south by road
Metlakatla, AK	1,405	1,422	21.4 miles south by ferry
Craig, AK	1,201	1,089	75 miles west by ferry
Klawock, AK	755	833	68 miles west by road/ferry
Kasaan, AK	49	80	111 miles west via road/ferry
Hydaburg, AK	376	374	77 miles southwest by road/ferry
Hollis, AK	112	128	47.6 miles west by road/ferry
Thorne Bay, AK	471	533	101 miles northwest by road/ferry
Coffman Cove, AK	176	199	118 miles north by road/ferry

Saxman, Alaska, is an Alaska Native Village corporation and a Second-Class City with a population of 444 people, located on South Tongass Highway. Saxman has one of the largest collections of standing totem poles in the nation, and as such, attracts thousands of visitors every summer. Similarly, Ward Cove is an unincorporated community about 4 miles northwest of downtown Ketchikan that was the site of the oldest continuously operated fish cannery in Alaska and provides important access to timber, fishing, tourism, and transportation resources.

Metlakatla is on Annette Island in the Prince of Wales-Hyder Census Area. It is the only federally recognized Indian Reservation in Alaska. The reservation and coastal waters are locally controlled, and the community regulates local commercial fishing and operates its own tribal court system. The population of Metlakatla is 1,422, with 83 percent being either American Indian or Alaska Native.

Metlakatla relies on the air, freight, and ferry services all connecting it to Ketchikan. The State Ferry *Lituya* runs daily between the two towns, and all freight arrives via barge from Ketchikan. Many residents depend on the State of Alaska Marine Highway System (AMHS) ferry to import commodities, export products for sale, commute to jobs, and receive medical care in Ketchikan.[16]

The Inter-Island Ferry Authority is a public non-profit corporation that runs seasonal ferry service from Ketchikan to the community of Hollis on Prince of Wales Island (POW). The extensive road system on POW connects Hollis to Craig, Klawock, Hydaburg, Thorne Bay, Coffman Cove, and smaller communities.

All barges out of Seattle stop in Ketchikan first to transfer freight to local barges and trucks to supply the regional population with essential goods. Several barge operators have their own

[15] U.S. Census Data. Compiled by Alaska Department of Labor and Workforce Development. Additional community information found in this report from the Alaska Dept. of Commerce, Community, and Economic Development *Community Database Online (prior to 1/7/2019) and the Alaska Community Portal (after 1/7/2019).*
[16] U.S. Army Corps of Engineers; Alaska Barge Report, 2010. (p-39).

waterfront dock facilities in Ketchikan. Harbor facilities include a breakwater, a deep draft dock, five small boat harbors, a dry dock and ship repair yard, boat launch and state ferry terminal.[17]

Each of the bridges in this project is located at a key point in Ketchikan's transportation system and, therefore, vital its economy.

The **Herring Cove Bridge** is situated between two of Ketchikan's largest visitor attractions. The Alaska Rainforest Sanctuary is at the north end of the bridge, and the Whitman Lake Hatchery salmon run is at the south end. Every summer, thousands of visitors are bussed in, and many of them walk from one side of the bridge to the other. Since the structure lacks sidewalks and has only one-foot shoulders, traffic speeds have been restricted on this section of the highway during tourism season.

Figure 6. Herring Cove Bridge

Figure 7. Hoadley Creek Bridge, Hospital (left), and Ketchikan Transfer Facility (right)

Hoadley Creek Bridge is located at the heart of the downtown district: directly between the hospital and the barge dock where all local groceries and other freight lands.

Access to the emergency room at PeaceHealth Ketchikan Medical Center is to the north side of the building, which would be behind the photographer in the photo in **Figure 7**. Ambulances

[17] Ibid. (p-41).

incoming from the south, which includes the cruise ship dock, cross this structure routinely; in the event of closure, they would need to detour up steep, narrow residential streets to get to the Emergency Room entrance. Without the Hoadley Creek Bridge, freight trucks would have to make the same detour on the journey to or from the seafood processing plants, restaurants, grocery stores, and other businesses in and beyond the waterfront district.

The **Ward Creek Bridge**, located in Ward Cove, provides access to a variety of important resources including housing areas, industrial infrastructure, marine facilities, and tourism locations that draw economic activity to the borough. Ward Cove is home to the berthing and layup facilities for the State's ferry fleet. The State of Alaska Marine Highway System (AMHS) Engineering Facility is directly north of the Ward Creek Bridge, and the AMHS Headquarters building is approximately 1/4 of a mile north of the bridge.

Several subdivisions are located across the bridge at Ward Creek, including Ward Cove, Refuge Cove, Mud Bay, Port Higgens, and Clover Pass. No Census estimates are available for these communities but their populations are not insignificant. About 5,183 residents live outside the cities of Ketchikan and Saxman but within the Borough boundary.[18] The historic Ward Cove Cannery is located just south of the bridge.[19] To the north are several tour operators and the Totem Bight State Historical Park, which features 14 totem poles and a clan house and other interpretive and educational amenities.

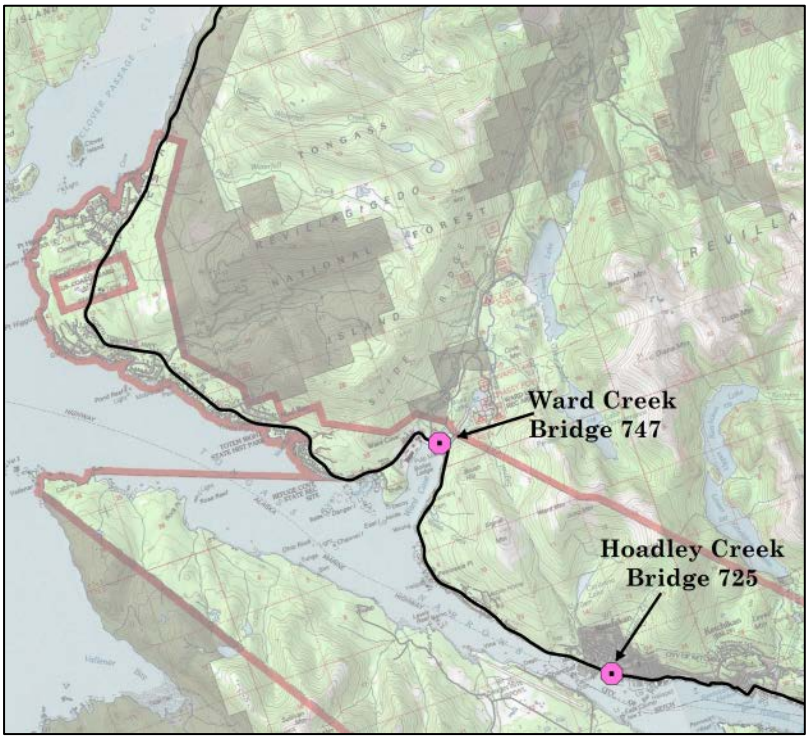

Figure 8. North Tongass Highway

Revilla Road is located approximately 400 feet north of the Ward Creek Bridge. DOT&PF is currently pursuing a $29 million project to build a 7-mile road between Revilla Road to Shelter Cove Road to improve access to public lands to benefit recreational, subsistence, tourism and

[18] U.S Census Data (line 184). Compiled by the Alaska Department of Labor and Workforce Development; generally lists communities outside organized cities and Census Designated Places as "Place FIPS 99999."
[19] Ward Cove Cannery was the oldest operating fish processing facility in Alaska, operated from 1928 to 2003. It was purchased by Boyer Towing, a 14-ship tug boat company.

economic development.[20] If the Ward Creek Bridge were to be load posted or closed, the cost and feasibility of this road construction may be in jeopardy.

Impacts on Industry

In 1997, the closure of the Ketchikan Pulp Company cost the town over 500 high-paying, year-round jobs and about 700 residents.[21] Since that time, however, Ketchikan has developed into a diverse and balanced economy.[22]

The community has rebuilt, investing in infrastructure to encourage growth in the seafood, manufacturing, visitor, and transportation industries. Ketchikan is a major hub for the region, offering the closest hospital and jet airport, an accredited University, and the Vigor Alaska Shipyard, where two of the State's new Alaska-class ferries, the *Tazlina* and the *Hubbard* were constructed in 2018. The State of Alaska moved the headquarters of the Alaska Marine Highway System, which employs approximately 1,100 people, to Ketchikan in 2004 to further strengthen the community's employment opportunities.

Ketchikan's status as a transportation and tourism hub bolster their thriving transportation, trade, and utilities industries. This economic category includes wholesale and retail trade, warehousing, and transportation workers. Nearly 1,500 people – roughly 25 percent of Ketchikan's workforce – are employed in this sector.

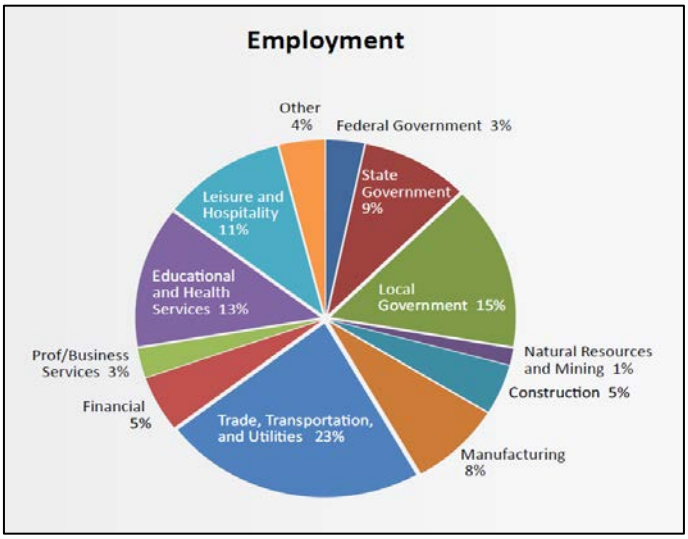

Figure 9. Ketchikan Employment Sectors

Impacts on Seafood Industry

Ketchikan's fishing industry is truly national in scope. In 2016, it was the 14th largest fishing port in the U.S. and the 6th largest in Alaska by volume.[23] In 2017, the Alaska Seafood Marketing Institute found that the value of Ketchikan's 2015/2016 catch was over $90 million, and over 900 workers were employed in the seafood industry around the borough.[24]

Whitman Lake Hatchery, located just upstream from Herring Cove Bridge, processes more than 40 million chum salmon eggs every year for release at remote sites throughout Southern Southeast Alaska. In addition, they also produce chinook and coho salmon fry for release at sites

[20] Shelter Cove Road Project No. 68405.
[21] "*The Ketchikan Gateway Borough: A Profile of the Island Community in Southeast Alaska.*" Alaska Economic Trends Magazine. January 2001.
[22] *"Ketchikan's Fluid Economy."* Alaska Economic Trends Magazine. August 2014.
[23] *Fisheries of the United States 2016,* National Marine Fisheries Service. 2017. (p13).
[24] The Economic Value of Alaska's Seafood Industry. Alaska Seafood Marketing Institute. September 2017. (p-26).

around the region. The salmon runs supported by Whitman Lake provide jobs and income to people throughout the region that accounted for about $70 million in economic output in 2017.[25]

Impacts on Tourism

Ketchikan is the first stop in Alaska for the state's all-important $2 billion visitor industry; of the 1,857,500 visitors to Alaska in 2016, nearly 1 million of them visited Ketchikan by cruise ship. The importance of the tourism sector to Ketchikan's economy cannot be overstated. According to the Alaska Department of Labor and Workforce Development, in 2016, roughly 1 in 10 Ketchikan workers are directly employed in hospitality.[26] Ketchikan has 103 times the level of employment in scenic and sightseeing transportation compared to the U.S. as a whole.[27]

On a busy day, cruise visitors can nearly double the population of the entire borough.[28] The community has successfully marketed itself as both the "Salmon Capital of the World" and the "Gateway to Alaska." This industry is extremely dependent on reliable and safe roads.

c. Life Cycle Costs and State of Good Repair

Condition of the Bundled Bridges

All three of the bridges included in this application need significant rehabilitation or replacement. The condition of these bridges has been described in detail earlier in this report (each bridge listed below has a hyperlink to that condition information.) As discussed in the project narrative, the Herring Cove Bridge is near the end of its expected service life and if not replaced is expected to close at the end of 2022. The Hoadley Creek Bridge has exceeded its expected services life and will be closed at the end of 2022 as well. The Ward Creek Bridge substructure has a "serious" rating; the bridge will be closed at the end of 2019 without rehabilitation.

Anticipated Cost Savings through Bundling

The FHWA Competitive Highway Bridge Program grant program will allow Alaska to realize over $1 million in construction savings (seven percent of the total cost) through bundling these three bridge projects. The savings are detailed in the tables below. The Table "Cost Savings through Bundling by Bridge" is a comparison of the estimated total cost of each bridge project as an individual project, and the savings to each bridge through bundling.

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[25] Economic Impacts of the Southern Southeast Regional Aquaculture Association. McDowell Group. August 2017 (p-3).
[26] Ketchikan Employment and Wages. Compiled by Alaska Department of Labor and Workforce Development Research and Analysis Section. Accessed September 27, 2018.
[27] *Ketchikan's Fluid Economy: Alaska's Gateway City, from Mining and Timber to Fishing and Tourism*." Connor Bell. *Alaska Economic Trends.* Alaska Department of Labor and Workforce Development. August 2014. (p-14).
[28] 2018 Cruise Ship Calendar. Ketchikan Visitors Bureau.

Cost Savings through Bundling by Bridge			
	Cost Estimate Individual	**Cost Estimate Bundled**	**Percent Savings**
Herring Cove Bridge	$6,568,192	$6,165,299	6%
Hoadley Creek Bridge	$5,827,525	$5,454,703	6%
Ward Creek Bridge	$3,265,306	$2,999,464	8%
All Bridges Total	***$15,661,023***	***$14,619,466***	***7%***

Includes Project Funds Expended to Date

Table "Cost Savings through Bundling (Project Overview)" includes the total estimated cost of each project component of the three bridges, first examined individually, and then as a bundled project. Tables for each specific bridge are included thereafter.

Cost Savings Through Bundling (Project Overview)			
Cost Classification	**Individual Project Costs**	**Total Cost ($) Bundled**	**Savings**
Administrative and legal expenses	$465,652	$434,684	7%
Land, structures, rights-of-way, appraisals, etc.	$400,000	$400,000	0%
Relocation expenses and payments	$60,000	$60,000	0%
Architectural and engineering fees	$1,006,816	$955,139	5%
Other architectural and engineering fees	$349,090	$341,590	2%
Project inspection fees	$1,510,224	$1,241,680	18%
Site work	$450,000	$450,000	0%
Demolition and removal	$630,000	$530,000	16%
Construction	$6,981,800	$6,831,800	2%
Equipment	$1,047,270	$787,996	25%
Miscellaneous	$150,000	$150,000	0%
Contingencies	$2,610,170	$2,436,578	7%
Total	**$15,661,023**	***$14,619,466***	***7%***

Includes Project Funds Expended to Date

The following tables detail the cost savings through bundling by cost classification for each of the bridges. These planning-level estimates are for replacement bridges at Herring Cove and Hoadley Creek and a rehabilitation project at Ward Creek.

Herring Cove Bridge Replacement			
Cost Classification	**Individual Project Cost**	**Bundling Cost**	**Savings**
Administrative and legal expenses	$195,293	$183,314	6%
Land, structures, rights-of-way, appraisals, etc.	$200,000	$200,000	0%
Relocation expenses and payments	$30,000	$30,000	0%
Architectural and engineering fees	$422,256	$402,800	5%
Other architectural and engineering fees	$143,440	$140,940	2%

Herring Cove Bridge Replacement			
Cost Classification	**Individual Project Cost**	**Bundling Cost**	**Savings**
Project inspection fees	$633,384	$523,639	17%
Site work	$200,000	$200,000	0%
Demolition and removal	$300,000	$250,000	17%
Construction	$2,868,800	$2,818,800	2%
Equipment	$430,320	$338,256	21%
Miscellaneous	$50,000	$50,000	0%
Contingencies	$1,094,699	$1,027,550	6%
Total	***$6,568,192***	***$6,165,299***	***6%***

Includes Project Funds Expended to Date

Hoadley Creek Bridge Replacement			
Cost Classification	**Individual Project Cost**	**Bundling Cost**	**Savings**
Administrative and legal expenses	$173,271	$162,186	6%
Land, structures, rights-of-way, appraisals, etc.	$200,000	$200,000	0%
Relocation expenses and payments	$30,000	$30,000	0%
Architectural and engineering fees	$374,640	$356,374	5%
Other architectural and engineering fees	$123,600	$121,100	2%
Project inspection fees	$561,960	$463,286	18%
Site work	$200,000	$200,000	0%
Demolition and removal	$300,000	$250,000	17%
Construction	$2,472,000	$2,422,000	2%
Equipment	$370,800	$290,640	22%
Miscellaneous	$50,000	$50,000	0%
Contingencies	$971,254	$909,117	6%
Total	***$5,827,525***	***$5,454,703***	***6%***

Includes Project Funds Expended to Date

Ward Creek Bridge Rehabilitation			
Cost Classification	**Individual Project Cost**	**Bundling Cost**	**Savings**
Administrative and legal expenses	$97,088	$89,184	8%
Land, structures, rights-of-way, appraisals, etc.	$0	$0	0%
Relocation expenses and payments	$0	$0	0%
Architectural and engineering fees	$209,920	$195,965	7%
Other architectural and engineering fees	$82,050	$79,550	3%
Project inspection fees	$314,880	$254,755	19%
Site work	$50,000	$50,000	0%
Demolition and removal	$30,000	$30,000	0%

Ward Creek Bridge Rehabilitation			
Cost Classification	**Individual Project Cost**	**Bundling Cost**	**Savings**
Construction	$1,641,000	$1,591,000	3%
Equipment	$246,150	$159,100	35%
Miscellaneous	$50,000	$50,000	0%
Contingencies	$544,218	$499,911	8%
Total	***$3,265,306***	***$2,999,464***	***8%***

Includes Project Funds Expended to Date

All information from the tables is taken from the Budget Detail found in Appendix A. DOT&PF anticipates saving over $1 million dollars in overall project costs by bundling these projects together; the table below outlines the overall expected savings anticipated for each bridge in each category. The bulk of the savings anticipated is related to mobilization, demobilization and project inspection fees. Bundling the projects would allow cost savings by realizing the following efficiencies:

- Minimize the number of pieces of equipment mobilized to town; the same equipment can be used for all projects in the vicinity
- Minimize the number of personnel needed to complete the work
- Administer one contract (rather than three separate contracts)
- Eliminate duplicative inspection tasks such as SWPPP and Scheduling
- Bundling the projects will result in a shorter construction duration

Projected Construction Savings through Bundling				
	Herring Cove Replace	**Hoadley Creek Replace**	**Ward Creek Rehab**	**Total Savings**
Administrative and legal expenses	$11,979	$11,085	$7,904	$30,969
Land, structures, rights-of-way, appraisals, etc.	$0	$0	$0	$0
Relocation expenses and payments	$0	$0	$0	$0
Architectural and engineering fees	$19,456	$18,266	$13,955	$51,677
Other architectural and engineering fees	$2,500	$2,500	$2,500	$7,500
Project inspection fees	$109,745	$98,674	$60,126	$268,544
Site work	$0	$0	$0	$0
Demolition and removal	$50,000	$50,000	$0	$100,000
Construction	$50,000	$50,000	$50,000	$150,000
Equipment	$92,064	$80,160	$87,050	$259,274
Miscellaneous	$0	$0	$0	$0
Contingencies	$67,149	$62,137	$44,307	$173,593
TOTAL	***$402,893***	***$372,822***	***$265,842***	***$1,041,557***

Includes Project Funds Expended to Date

d. Project Readiness

Project Feasibility

DOT&PF has already completed several tasks that increase the feasibility of completing this project by October 31, 2021.

Engineering and design phases: DOT&PF does not anticipate any delays in completing construction of the bridges on schedule.

- The **Herring Cove Bridge Replacement** project is currently in the final design phase with a 75 percent level review scheduled for April 2019 and 95 percent design review scheduled for November 2019. Additional geotechnical exploration is scheduled for December 2018. The project is currently scheduled for advertisement for construction bidding November 2019. Completion of the environmental document for the Herring Cove Bridge is anticipated to be April 2019.

- The **Hoadley Creek Bridge Replacement** project is currently in the conceptual design phase. A bridge type selection report has been completed and the geometry has been identified. We estimate that the final design of this project can be completed by April 2020.

- The **Ward Creek Bridge Replacement** project will include the bridge replacement and approximately 1,500 feet of adjacent roadway reconstruction work. Currently this project is in the preliminary design phase and is approximately 50 percent complete; 95 percent design review is scheduled for April 2019. The Environmental Document was approved in July 2018. The project is currently scheduled for advertisement for construction bidding November 2019.

Basis for cost estimate: The cost estimates provided are based on recent historic bid data for projects of similar scope and locations. The estimate includes $1.2 million in contingency funds, which is consistent with the level of design and the individual bridge risk profile.

Scope, schedule, and budget risk-mitigation measures: Following is a brief summary of how DOT&PF has planned to mitigate high and medium risks to the scope, schedule, and budget.

All three of the bridges included in this project face several risks rated as “medium” for which mitigation strategies have been developed to ensure on-time completion of this project: funding uncertainties (DOT&PF will ask the Commissioner to work with Legislature to understand the importance of grant deadlines; and as a last resort, delay the project), unusually severe weather delays (DOT&PF will delay or add compensation).

- The **Herring Cove Bridge Replacement** project faces several unique “medium” risks for which mitigation strategies have been developed to ensure on-time completion of this project: individual USACE permit or USCG permit delays (DOT&PF will increase

consultation early); project environmental document not approved in time (DOT&PF will conduct regular project meetings with environmental groups and track progress).

- The **Hoadley Creek Bridge Replacement** project faces two "high" risks for which mitigation strategies have been developed to ensure on-time completion of this project: existing large water line adjacent to the bridge on upstream side and design/construction with current ROW tightly constrained on all four corners of existing bridge. For both of these risks, DOT&PF will coordinate with landowners to determine where to locate utilities and/or for potential ROW acquisition. In addition this bridge replacement also faces the following unique "medium risks: unanticipated utility relocation (DOT&PF will develop construction phasing plan to account for unforeseen delays), construction changing stream flow causing scour to downstream structures supported by piles in the creek bed (DOT&PF will leave existing bridge abutments in place and span over them with a new structure), existing overhead powerline above bridge (DOT&PF coordinate with power company to relocate lines prior to construction), construction during summer tourist season with heavy traffic (DOT&PF will plan detours or design phased construction accordingly), and existing bridge continues to deteriorate and requires load restrictions (DOT&PF will reduce width to signalized one-lane bridge or install modular truss bridge).

- The **Ward Creek Bridge Rehabilitation** faces only one unique "medium" risk for which mitigation strategies have been developed to ensure on-time completion of this project: pile overruns for abutment foundation (DOT&PF will locate foundation test holes as close to planned foundation locations as possible).

Project Schedule

The table below is the Milestone Schedule that indicates DOT&PF's best estimate for the date by which the listed task will be completed.

Milestone Schedule

Task	Herring Cove Bridge	Hoadley Creek Bridge	Ward Creek Bridge
Original Project Development Authorization	July 2016	June 2014	April 2017
Environmental Document Approved	April 2019	August 2019	7/17/2018
FHWA Authority to Proceed to Final Design	May 2019	Sept. 2019	8/17/2018
Local Planning Approval	July 2019	Jan. 2020	Jan. 2019
95% Design Review	Nov. 2019	April 2020	April 2019
Final Stamped Plans • **Design Completion**	Jan. 2020	July 2020	June 2019

Milestone Schedule			
Task	**Herring Cove Bridge**	**Hoadley Creek Bridge**	**Ward Creek Bridge**
• **Approval of Plans, Specifications, & Estimates**			
All Permits Issued • **USACE** • **NWP** • **ADF&G Fish Habitat**	Jan. 2020	Aug. 2020	June 2019
ROW Acquired	Jan. 2020	Aug. 2020	N/A
Utility Agreements Executed	Jan. 2020	Aug. 2020	Sept. 2019
FHWA Authority to Advertise Received (Obligate Funds)	Oct. 2020	Oct. 2020	Oct. 2020
Construction Contract Awarded	Jan. 2021	Jan. 2021	Jan. 2021
Physical Construction Complete	Oct. 2021	Oct. 2021	Sept. 2021

The anticipated construction timeline is 2 years, with approximately one year allocated for project closeout activities. The majority of work for a single bridge can be completed in one season; however establishing final stabilization typically takes a second season in Alaska. This schedule assumes that the bridge replacement projects will be completed sequentially and not concurrently, since this is the most conservative assumption. It is possible that all three bridges could be constructed in one and a half years.

Although not anticipated at this time, if multi-span detour structures are required, then a second full construction season may be required and is accounted for in the schedule provided.

Section 3: Benefit-Cost Analysis (BCA)

The BCA for this project determined that there will be a cost savings by implementing the bundled bridge project. All bridges, including the bundled project, were found to have a positive net present value (NPV) and benefit-cost (B/C) ratio greater than one.

The Benefit-Cost Analysis Memorandum (Appendix D-1) and Benefit-Cost Analysis Spreadsheet calculations (Appendix D-2) are available at the DOT&PF Competitive Highway Bridge Program webpage. Both are also located at the DOT&PF Competitive Highway Bridge Program website. The BCA results of the proposed bridge projects are presented in Table 3. As a bundle, the estimated cost savings in present value terms amount to $1.0 million (2018 dollars).

The table below summarizes the findings from the BCA.

Table 3. Net Present Values of Proposed Southcoast Region Project's Benefits and Costs

Category	Net Present Value (*in millions of 2018$*)				
Project Benefits	**Herring Cove**	**Hoadley Creek**	**Ward Creek**	**All Bridges (Separate)**	**All Bridges (Bundled)**
Avoidance of Load Limit Costs	$0.08	$0.30	$0.00	$0.37	$0.37
Avoidance of Single Lane Operation	$0.45	$9.40	$0.00	$9.85	$9.85
Avoidance of Bridge Closure	$72.03	$149.04	$742.08	$963.15	$963.15
Avoidance of M&O Costs until Bridge Closure	$0.00	$0.00	$0.00	$0.00	$0.00
Residual Value of Bridge	$0.38	$0.29	$0.14	$0.81	$0.81
Avoided Emissions Costs	$0.51	$1.95	$0.45	$2.92	$2.92
Total Project Benefits	**$72.95**	**$159.03**	**$742.21**	**$977.11**	**$977.11**
Project Costs					
Capital Expenditures	$5.22	$3.95	$2.77	$11.93	$10.60
M&O Expenditures	$0.02	$0.01	$0.02	$0.05	$0.05
Total Project Costs	**$5.24**	**$3.95**	**$2.79**	**$11.98**	**$10.64**
Net Benefits	**$67.71**	**$155.07**	**$739.42**	**$965.13**	**$966.46**
B/C Ratio	**14**	**40**	**266**	**82**	**92**

Source: Northern Economics estimates based on the BCA spreadsheet model developed for this study.

The benefits of the projects were quantified by monetizing the effects of the avoided costs of the load limits, single lane operations, and bridge closures under the baseline or no-build scenario. These effects include vehicle operating costs, the value of the travel time of motorists, maintenance and operating costs, and emissions costs.

The avoided costs of the bridge closures are significant when there are no available road detours. Motorists would have to travel by ferry and landing craft, and additional infrastructure would have to be developed to provide this service. The avoided costs for the Ward Creek Bridge are the most significant because it has higher AADT than Herring Cove Bridge. Project costs include the estimated capital costs and maintenance and operating costs of the upgraded facilities. The residual values of the bridges were also included.

Section 4: Assessment of Project Risks and Mitigation Strategies

The overall risk of this project is low. Based on a risk assessment conducted by DOT&PF design, planning, and construction staff for the bundled project, a Risk Register was compiled that identifies the material risks to the bundled project and to each specific bridge project. The risk register calculates a "risk rating", based on the risk matrix below. The risk assessment also identified strategies to mitigate each of the identified risks. The Risk Register can be found in Appendix E of this report.

Risk Matrix							
Definition of Impacts and Probability of Occurrence for Risk Register			Probability of Occurrence				
			Rare	**Unlikely**	**Possible**	**Likely**	**Almost Certain**
			Highly infrequent or unlikely event	May occur but not frequently or likely	Approximate 50% chance of occurrence	Higher chance of occurring or occurring frequently	At least 90% chance of occurring or likely to occur frequently
Impact	**Catastrophic**	All-encompass-ing that cannot be avoided	Medium	Medium	High	Very High	Extreme
	Major	Impact threatens to serious damage or delay	Low	Medium	Medium	High	Very High
	Moderate	Noticeable impact with material effect on resource	Low	Medium	Medium	Medium	High
	Minor	Noticeable impact, but not a significant one	Low	Low	Low	Medium	Medium
	Insignificant	Almost no impact	Low	Low	Low	Low	Medium

Environmental approvals are complete for the Ward Creek Bridge, and approvals for Hoadley Creek and Herring Cove bridges are anticipated to be completed by mid-2019. All three environmental documents are categorical exclusions, which greatly reduces risk from environmental concerns.

Bridge design is anticipated to be completed by May 2020 at the latest.

The required regulatory permits are minor, with typical timelines of two weeks to six months from submission of application to approval based on similar permits recently acquired in Southcoast Region. Project design will utilize predominantly in-house resources, giving the Department full control over costs and allocation of resources to ensure timelines are met.

The proposed rehabilitation and replacement work involves minimal earthwork materials. All required materials are routinely used in Alaska. More in-depth, bridge-specific Project Risk Analyses can be found in the Risk Register at Appendix E.

Citations

The following list contains links to each report and external website cited in the proposal.

Footnote	Reference
4	Herring Cove Bridge (253) Structure Inventory and Appraisal Sheet. DOT&PF Bridge Section. Accessed September 26, 2018.
5	Hoadley Creek Bridge (725) Structure Inventory and Appraisal Sheet. DOT&PF Bridge Section. Accessed September 26, 2018.
6	Ward Creek Bridge (747) Structure Inventory and Appraisal Sheet. DOT&PF Bridge Section. Accessed September 26, 2018.
7	Alaska Department of Transportation and Public Facilities. 2017 Annual Average Daily Traffic (AADT) GIS Map. Transportation Data Programs. Accessed November 2018.
8	2017 Routine Inspection Report: Herring Cove Bridge. DOT&PF Bridge Section. June 25, 2017.
9	2017 Routine Inspection Report: Hoadley Creek Bridge. DOT&PF Bridge Section. June 21, 2017.
10	2017 Routine Inspection Report: Ward Creek Bridge. DOT&PF Bridge Section. June 20, 2017.
11	U.S. Census Data. Compiled by Alaska Department of Labor and Workforce Development.
12	Alaska DOT&PF Current Bridge Research Projects 2018. Unpublished Report, Prepared by DOT&PF Research, Development & Technology Transfer Section.
13	Research Report: *Challenges of Designing and Building Bridges in Alaska*. L. Daugherty, International Bridge Conference, 2013 (p-3).
14	*The California Department of Transportation (Caltrans) 2016 Report to the Legislature NEPA Assignment -- July 2007-June 2014*. Caltrans Division of Environmental Analysis. January 1, 2016 (p-3).
15	U.S. Census Data. Compiled by Alaska Department of Labor and Workforce Development. Additional community information found in this report from the Alaska Dept. of Commerce, Community, and Economic Development *Community Database Online (prior to 1/7/2019) and the Alaska Community Portal (after 1/7/2019).*
16	Alaska Barge Landing System Assessment & Design Report: Statewide Phase 2. Executive Summary. US Army Corps of Engineers. November 2010 (p-39).
17	Ibid. (p-41).
18	U.S. Census Data. Compiled by Alaska Department of Labor and Workforce Development. (Line 184).
20	Project Page: Shelter Cove Road Project No. 68405. DOT&PF. Accessed November 2018.
21	*"The Ketchikan Gateway Borough: A Profile of the Island Community in Southeast Alaska"*, Rachel Baker, Labor Economist. *Alaska Economic Trends* . Alaska Department of Labor and Workforce Development. January 2001.
22	*Ketchikan's Fluid Economy: Alaska's Gateway City, from Mining and Timber to Fishing and Tourism."* Connor Bell. *Alaska Economic Trends.* Alaska Department of Labor and Workforce Development. August 2014.

23	*Fisheries of the United States 2016*, Office of Science and Technology, Fisheries Statistics Division. National Marine Fisheries Service. 2017 (p-13)
24	The Economic Value of Alaska's Seafood Industry. Alaska Seafood Marketing Institute. September 2017 (p-26).
25	Economic Impacts of the Southern Southeast Regional Aquaculture Association. The McDowell Group, Inc. Prepared for the Southern Southeast Regional Aquaculture Association. August 2017 (p-3).
26	Ketchikan Gateway Borough Employment. Compiled by the Alaska Department of Labor and Workforce Development Research and Analysis Section. Accessed September 27, 2018.
27	*Ketchikan's Fluid Economy: Alaska's Gateway City, from Mining and Timber to Fishing and Tourism."* Connor Bell. *Alaska Economic Trends.* Alaska Department of Labor and Workforce Development. August 2014. (p-14).
28	2018 Cruise Ship Calendar. Ketchikan Visitors Bureau.

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Appendix A

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All Bridges (No.'s 747, 725, & 253)			
Cost Classification	**Total Cost ($) Individual**	**Total Cost ($) Bundled**	***Percent change***
1. Administrative and legal expenses	458,252	427,284	-7%
2. Land, structures, rights-of-way, appraisals, etc.	400,000	400,000	0%
3. Relocation expenses and payments	60,000	60,000	0%
4. Architectural and engineering fees	814,216	762,539	-6%
5. Other architectural and engineering fees	349,090	341,590	-2%
6. Project inspection fees	1,510,224	1,241,680	-18%
7. Site work	450,000	450,000	0%
8. Demolition and removal	630,000	530,000	-16%
9. Construction	6,981,800	6,831,800	-2%
10. Equipment	1,047,270	787,996	-25%
11. Miscellaneous	150,000	150,000	0%
12. SUBTOTAL (sum of lines 1-11)	**12,850,852**	**11,982,888**	-7%
13. Contingencies	2,610,170	2,436,578	-7%
14. SUBTOTAL	**15,461,023**	**14,419,466**	-7%
15. Project (program) income	0	0	
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**15,461,023**	**14,419,466**	**-7%**

Project	Total Cost ($) Indiv	Total Cost ($) Bundled	Cost Savings	% Change	Expended to Date
747 Ward Creek Bridge	$ 3,185,306	$ 2,919,464	$ 265,842	8%	$ 80,000.00
725 Hoadley Creek Bridge	$ 5,807,525	$ 5,434,703	$ 372,822	6%	$ 20,000.00
253 Herring Cove Bridge	$ 6,468,192	$ 6,065,299	$ 402,893	6%	$ 100,000.00
All Bridges (Ward, Hoadley, Herring)	**$ 15,461,023**	**$ 14,419,466**	**$ 1,041,557**	**7%**	**$ 200,000.00**

Project	Total Cost ($) Indiv
All Bridges As Separate Projects	$ 15,461,022.88
All Bridges As Combined Project	$ 14,419,466.03
Total Savings	**$ 1,041,556.85**

Project	Total Project Cost	Grant Share	State Share
747 Ward Creek Bridge	$ 2,919,464	$ 2,655,836	$ 263,628
725 Hoadley Creek Bridge	$ 5,434,703	$ 4,943,950	$ 490,754
253 Herring Cove Bridge	$ 6,065,299	$ 5,517,603	$ 547,697
All Bridges (Ward, Hoadley, Herring)	**$ 14,419,466**	**$ 13,117,388**	**$ 1,302,078**

All Bridges (No.'s 747, 725, & 253)				
Cost Classification	**Total Bundled Project cost**	**Grant funds**	***Grant Funded Construction Costs***	
			($)	***(%)***
1. Administrative and legal expenses	$ 427,284	$ 388,700	$ 314,757	81%
2. Land, structures, rights-of-way, appraisals, etc.	$ 400,000	$ 363,880	$ 363,880	100%
3. Relocation expenses and payments	$ 60,000	$ 54,582	$ 54,582	100%
4. Architectural and engineering fees	$ 762,539	$ 693,681	$ -	0%
5. Other architectural and engineering fees	$ 341,590	$ 310,744	$ 310,744	100%
6. Project inspection fees	$ 1,241,680	$ 1,129,556	$ 1,129,556	100%
7. Site work	$ 450,000	$ 409,365	$ 409,365	100%
8. Demolition and removal	$ 530,000	$ 482,141	$ 482,141	100%
9. Construction	$ 6,831,800	$ 6,214,888	$ 6,214,888	100%
10. Equipment	$ 787,996	$ 716,840	$ 716,840	100%
11. Miscellaneous	$ 150,000	$ 136,455	$ 136,455	100%
13. Contingencies	$ 2,436,578	$ 2,216,555	$ 1,773,244	80%
Total Project Costs	**$ 14,419,466**	**$ 13,117,388**	**$ 11,906,453**	**91%**

	Ward Creek				Hoadley				Herring				Total Delta
Cost Classification	**Ind.**	**Bundled**	**Percent Savings**	**Savings**	**Ind.**	**Bundled**	**Percent Savings**	**Savings**	**Ind.**	**Bundled**	**Percent Savings**	**Savings**	
1. Administrative and legal expenses	$ 94,128.00	$ 86,223.67	8%	$ 7,904.33	$ 172,531.00	$ 161,445.81	6%	$ 11,085.19	$ 191,593.40	$ 179,614.10	6%	$ 11,979.30	$ 30,968.82
2. Land, structures, rights-of-way, appraisals, etc.	$ -	$ -	0%	$ -	$ 200,000.00	$ 200,000.00	0%	$ -	$ 200,000.00	$ 200,000.00	0%	$ -	$ -
3. Relocation expenses and payments	$ -	$ -	0%	$ -	$ 30,000.00	$ 30,000.00	0%	$ -	$ 30,000.00	$ 30,000.00	0%	$ -	$ -
4. Architectural and engineering fees	$ 132,880.00	$ 118,925.00	11%	$ 13,955.00	$ 355,380.00	$ 337,114.00	5%	$ 18,266.00	$ 325,956.00	$ 306,499.60	6%	$ 19,456.40	$ 51,677.40
5. Other architectural and engineering fees	$ 82,050.00	$ 79,550.00	3%	$ 2,500.00	$ 123,600.00	$ 121,100.00	2%	$ 2,500.00	$ 143,440.00	$ 140,940.00	2%	$ 2,500.00	$ 7,500.00
6. Project inspection fees	$ 314,880.00	$ 254,754.50	19%	$ 60,125.50	$ 561,960.00	$ 463,286.20	18%	$ 98,673.80	$ 633,384.00	$ 523,639.48	17%	$ 109,744.52	$ 268,543.82
7. Site work	$ 50,000.00	$ 50,000.00	0%	$ -	$ 200,000.00	$ 200,000.00	0%	$ -	$ 200,000.00	$ 200,000.00	0%	$ -	$ -
8. Demolition and removal	$ 30,000.00	$ 30,000.00	0%	$ -	$ 300,000.00	$ 250,000.00	17%	$ 50,000.00	$ 300,000.00	$ 250,000.00	17%	$ 50,000.00	$ 100,000.00
9. Construction	$ 1,641,000.00	$ 1,591,000.00	3%	$ 50,000.00	$ 2,472,000.00	$ 2,422,000.00	2%	$ 50,000.00	#########	$ 2,818,800.00	2%	$ 50,000.00	$ 150,000.00
10. Equipment	$ 246,150.00	$ 159,100.00	35%	$ 87,050.00	$ 370,800.00	290,640.00	22%	$ 80,160.00	$ 430,320.00	$ 338,256.00	21%	$ 92,064.00	$ 259,274.00
11. Miscellaneous	$ 50,000.00	$ 50,000.00	0%	$ -	$ 50,000.00	50,000.00	0%	$ -	$ 50,000.00	$ 50,000.00	0%	$ -	$ -
13. Contingencies	$ 544,217.60	$ 499,910.63	8%	$ 44,306.97	$ 971,254.20	909,117.20	6%	$ 62,137.00	#########	$ 1,027,549.84	6%	$ 67,148.84	$ 173,592.81
Total Project Costs	**$ 3,185,305.60**	**$ 2,919,463.81**	**8%**	**$ 265,841.79**	**$ 5,807,525.20**	**5,434,703.21**	**6%**	**$ 372,821.99**	#########	##########	**6%**	**$ 402,893.07**	##########

Herring Cove Bridge Replacement-Individual				
Cost Classification	**Total Cost ($)**	**Construction cost**		**Spent to date**
		$	**%**	**$ 100,000.00**
1. Administrative and legal expenses	$ 195,293.40	$ 156,234.72	80%	$ 3,700.00
2. Land, structures, rights-of-way, appraisals, etc.	$ 200,000.00	$ 200,000.00	100%	$ -
3. Relocation expenses and payments	$ 30,000.00	$ 30,000.00	100%	$ -
4. Architectural and engineering fees	$ 422,256.00	$ -	0%	$ 96,300.00
5. Other architectural and engineering fees	$ 143,440.00	$ 143,440.00	100%	
6. Project inspection fees	$ 633,384.00	$ 633,384.00	100%	$ -
7. Site work	$ 200,000.00	$ 200,000.00	100%	$ -
8. Demolition and removal	$ 300,000.00	$ 300,000.00	100%	$ -
9. Construction	$ 2,868,800.00	$ 2,868,800.00	100%	$ -
10. Equipment	$ 430,320.00	$ 430,320.00	100%	$ -
11. Miscellaneous	$ 50,000.00	$ 50,000.00	100%	$ -
12. SUBTOTAL (sum of lines 1-11)	**$ 5,473,493.40**	**$ 5,012,178.72**	92%	$ 100,000.00
13. Contingencies	$ 1,094,698.68	$ 875,758.94	80%	$ -
14. SUBTOTAL	**$ 6,568,192.08**	**$ 5,887,937.66**	90%	$ 100,000.00
15. Project (program) income	$ -	$ -		$ -
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 6,568,192.08**	**$ 5,887,937.66**	**90%**	**$ 100,000.00**

Hoadley Creek Bridge Replacement-Individual				
Cost Classification	**Total Cost ($)**	**Construction cost**		**Spent to date**
		$	**%**	**$ 20,000.00**
1. Administrative and legal expenses	$ 173,271.00	$ 138,616.80	80%	$ 740.00
2. Land, structures, rights-of-way, appraisals, etc.	$ 200,000.00	$ 200,000.00	100%	$ -
3. Relocation expenses and payments	$ 30,000.00	$ 30,000.00	100%	$ -
4. Architectural and engineering fees	$ 374,640.00	$ -	0%	$ 19,260.00
5. Other architectural and engineering fees	$ 123,600.00	$ 123,600.00	100%	
6. Project inspection fees	$ 561,960.00	$ 561,960.00	100%	$ -
7. Site work	$ 200,000.00	$ 200,000.00	100%	$ -
8. Demolition and removal	$ 300,000.00	$ 300,000.00	100%	$ -
9. Construction	$ 2,472,000.00	$ 2,472,000.00	100%	$ -
10. Equipment	$ 370,800.00	$ 370,800.00	100%	$ -
11. Miscellaneous	$ 50,000.00	$ 50,000.00	100%	$ -
12. SUBTOTAL (sum of lines 1-11)	**$ 4,856,271.00**	**$ 4,446,976.80**	92%	$ 20,000.00
13. Contingencies	$ 971,254.20	$ -	0%	$ -
14. SUBTOTAL	**$ 5,827,525.20**	**$ 4,446,976.80**	76%	$ 20,000.00
15. Project (program) income	$ -	$ -		$ -
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 5,827,525.20**	**$ 4,446,976.80**	**76%**	**$ 20,000.00**

Herring Cove Bridge Replacement-Bundled				
Cost Classification	**Total Cost ($)**	**Construction cost**		**Spent to date**
		$	%	**$ 100,000.00**
1. Administrative and legal expenses	$ 183,314.10	$ 149,035.85	81%	$ 3,700.00
2. Land, structures, rights-of-way, appraisals, etc.	$ 200,000.00	$ 200,000.00	100%	$ -
3. Relocation expenses and payments	$ 30,000.00	$ 30,000.00	100%	$ -
4. Architectural and engineering fees	$ 402,799.60	$ -	0%	$ 96,300.00
5. Other architectural and engineering fees	$ 140,940.00	$ 140,940.00	100%	$ -
6. Project inspection fees	$ 523,639.48	$ 523,639.48	100%	$ -
7. Site work	$ 200,000.00	$ 200,000.00	100%	$ -
8. Demolition and removal	$ 250,000.00	$ 250,000.00	100%	$ -
9. Construction	$ 2,818,800.00	$ 2,818,800.00	100%	$ -
10. Equipment	$ 338,256.00	$ 338,256.00	100%	$ -
11. Miscellaneous	$ 50,000.00	$ 50,000.00	100%	$ -
12. SUBTOTAL (sum of lines 1-11)	$ 5,137,749.18	$ 4,700,671.33	91%	$ 100,000.00
13. Contingencies	$ 1,027,549.84	$ 822,039.87	80%	$ -
14. SUBTOTAL	$ 6,165,299.01	$ 5,522,711.20	90%	$ 100,000.00
15. Project (program) income	$ -	$ -		$ -
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 6,165,299.01**	**$ 5,522,711.20**	**90%**	**$ 100,000.00**

Hoadley Creek Bridge Replacement- Bundled				
Cost Classification	**Total Cost ($)**	**Construction cost**		**Spent to date**
		$	**%**	**$ 20,000.00**
1. Administrative and legal expenses	$ 162,185.81	$ 131,858.38	81%	$ 740.00
2. Land, structures, rights-of-way, appraisals, etc.	$ 200,000.00	$ 200,000.00	100%	$ -
3. Relocation expenses and payments	$ 30,000.00	$ 30,000.00	100%	$ -
4. Architectural and engineering fees	$ 356,374.00	$ -	0%	$ 19,260.00
5. Other architectural and engineering fees	$ 121,100.00	$ 121,100.00	100%	$ -
6. Project inspection fees	$ 463,286.20	$ 463,286.20	100%	$ -
7. Site work	$ 200,000.00	$ 200,000.00	100%	$ -
8. Demolition and removal	$ 250,000.00	$ 250,000.00	100%	$ -
9. Construction	$ 2,422,000.00	$ 2,422,000.00	100%	$ -
10. Equipment	$ 290,640.00	$ 290,640.00	100%	$ -
11. Miscellaneous	$ 50,000.00	$ 50,000.00	100%	$ -
12. SUBTOTAL (sum of lines 1-11)	**$ 4,545,586.01**	**$ 4,158,884.58**	91%	$ 20,000.00
13. Contingencies	$ 909,117.20	$ 727,293.76	80%	$ -
14. SUBTOTAL	**$ 5,454,703.21**	**$ 4,886,178.34**	90%	$ 20,000.00
15. Project (program) income	$ -	$ -		$ -
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 5,454,703.21**	**$ 4,886,178.34**	**90%**	**$ 20,000.00**

Ward Creek Bridge Rehabilitation - Individual				
Cost Classification	**Total Cost ($)**	**Construction cost**		**Spent to date**
		$	%	**$ 80,000.00**
1. Administrative and legal expenses	$ 97,088.00	$ 77,670.40	80%	$ 2,960.00
2. Land, structures, rights-of-way, appraisals, etc.	$ -	$ -	0%	$ -
3. Relocation expenses and payments	$ -	$ -	0%	$ -
4. Architectural and engineering fees	$ 209,920.00	$ -	0%	$ 77,040.00
5. Other architectural and engineering fees	$ 82,050.00	$ 82,050.00	100%	
6. Project inspection fees	$ 314,880.00	$ 314,880.00	100%	$ -
7. Site work	$ 50,000.00	$ 50,000.00	100%	$ -
8. Demolition and removal	$ 30,000.00	$ 30,000.00	100%	$ -
9. Construction	$ 1,641,000.00	$ 1,641,000.00	100%	$ -
10. Equipment	$ 246,150.00	$ 246,150.00	100%	$ -
11. Miscellaneous	$ 50,000.00	$ 50,000.00	100%	$ -
12. SUBTOTAL (sum of lines 1-11)	**$ 2,721,088.00**	**$ 2,491,750.40**	92%	$ 80,000.00
13. Contingencies	$ 544,217.60	$ 435,374.08	80%	$ -
14. SUBTOTAL	**$ 3,265,305.60**	**$ 2,927,124.48**	90%	$ 80,000.00
15. Project (program) income	$ -	$ -		$ -
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 3,265,305.60**	**$ 2,927,124.48**	**90%**	**$ 80,000.00**

Ward Creek Bridge Rehabilitation- Bundled				
Cost Classification	**Total Cost ($)**	**Construction cost**		**Spent to date**
		$	%	**$ 80,000.00**
1. Administrative and legal expenses	$ 89,183.67	$ 72,507.05	81%	$ 2,960.00
2. Land, structures, rights-of-way, appraisals, etc.	$ -	$ -		$ -
3. Relocation expenses and payments	$ -	$ -		$ -
4. Architectural and engineering fees	$ 195,965.00	$ -	0%	$ 77,040.00
5. Other architectural and engineering fees	$ 79,550.00	$ 79,550.00	100%	$ -
6. Project inspection fees	$ 254,754.50	$ 254,754.50	100%	$ -
7. Site work	$ 50,000.00	$ 50,000.00	100%	$ -
8. Demolition and removal	$ 30,000.00	$ 30,000.00	100%	$ -
9. Construction	$ 1,591,000.00	$ 1,591,000.00	100%	$ -
10. Equipment	$ 159,100.00	$ 159,100.00	100%	$ -
11. Miscellaneous	$ 50,000.00	$ 50,000.00	100%	$ -
12. SUBTOTAL (sum of lines 1-11)	**$ 2,499,553.17**	**$ 2,286,911.55**	91%	$ 80,000.00
13. Contingencies	$ 499,910.63	$ 399,928.51	80%	$ -
14. SUBTOTAL	**$ 2,999,463.81**	**$ 2,686,840.06**	90%	$ 80,000.00
15. Project (program) income	$ -	$ -		$ -
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 2,999,463.81**	**$ 2,686,840.06**	**90%**	**$ 80,000.00**

Total Project cost minus Spent to Date						
	Individual	Construction cost	Individual Ward Ck		Hoadley	Herring
1. Administrative and legal expenses	$ 458,252.40	$ 369,561.92	$ 94,128		$ 172,531	$ 191,593
2. Land, structures, rights-of-way, appraisals, etc.	$ 400,000.00	$ 400,000.00	$ -		$ 200,000	$ 200,000
3. Relocation expenses and payments	$ 60,000.00	$ 60,000.00	$ -		$ 30,000	$ 30,000
4. Architectural and engineering fees	$ 814,216.00	$ -	$ 132,880		$ 355,380	$ 325,956
5. Other architectural and engineering fees	$ 349,090.00	$ 349,090.00	$ 82,050		$ 123,600	$ 143,440
6. Project inspection fees	$ 1,510,224.00	$ 1,510,224.00	$ 314,880		$ 561,960	$ 633,384
7. Site work	$ 450,000.00	$ 450,000.00	$ 50,000		$ 200,000	$ 200,000
8. Demolition and removal	$ 630,000.00	$ 630,000.00	$ 30,000		$ 300,000	$ 300,000
9. Construction	$ 6,981,800.00	$ 6,981,800.00	$ 1,641,000		$ 2,472,000	$ 2,868,800
10. Equipment	$ 1,047,270.00	$ 1,047,270.00	$ 246,150		$ 370,800	$ 430,320
11. Miscellaneous	$ 150,000.00	$ 150,000.00	$ 50,000		$ 50,000	$ 50,000
12. SUBTOTAL (sum of lines 1-11)	**$ 12,850,852.40**	**$ 11,870,905.92**	$ 2,641,088		$ 4,836,271	$ 5,373,493
13. Contingencies	$ 2,610,170.48	$ 1,311,133.02	$ 544,218		$ 971,254	$ 1,094,699
14. SUBTOTAL	**$ 15,461,022.88**	**$ 13,182,038.94**	$ 3,185,306		$ 5,807,525	$ 6,468,192
15. Project (program) income	$ -	$ -	$ -		$ -	$ -
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 15,461,022.88**	**$ 13,182,038.94**	**$ 3,185,306**		**$ 5,807,525**	**$ 6,468,192**

Total Project cost minus Spent to Date									
Cost Classification	Bundled Total	Construction cost	Bundled Ward Ck	% Saving	Bundled Hoadley	% Savings	Bundled Herring	% Savings	total
1. Administrative and legal expenses	$ 427,283.58	$ 346,001.28	$ 86,224	-8%	$ 161,446	-6%	$ 179,614	-6%	$ 427,284
2. Land, structures, rights-of-way, appraisals, etc.	$ 400,000.00	$ 400,000.00	$ -	0%	$ 200,000	0%	$ 200,000	0%	$ 400,000
3. Relocation expenses and payments	$ 60,000.00	$ 60,000.00	$ -	0%	$ 30,000	0%	$ 30,000	0%	$ 60,000
4. Architectural and engineering fees	$ 762,538.60	$ -	$ 118,925	-11%	$ 337,114	-5%	$ 306,500	-6%	$ 762,539
5. Other architectural and engineering fees	$ 341,590.00	$ 341,590.00	$ 79,550	-3%	$ 121,100	-2%	$ 140,940	-2%	$ 341,590
6. Project inspection fees	$ 1,241,680.18	$ 1,241,680.18	$ 254,755	-19%	$ 463,286	-18%	$ 523,639	-17%	$ 1,241,680
7. Site work	$ 450,000.00	$ 450,000.00	$ 50,000	0%	$ 200,000	0%	$ 200,000	0%	$ 450,000
8. Demolition and removal	$ 530,000.00	$ 530,000.00	$ 30,000	0%	$ 250,000	-17%	$ 250,000	-17%	$ 530,000
9. Construction	$ 6,831,800.00	$ 6,831,800.00	$ 1,591,000	-3%	$ 2,422,000	-2%	$ 2,818,800	-2%	$ 6,831,800
10. Equipment	$ 787,996.00	$ 787,996.00	$ 159,100	-35%	$ 290,640	-22%	$ 338,256	-21%	$ 787,996
11. Miscellaneous	$ 150,000.00	$ 150,000.00	$ 50,000	0%	$ 50,000	0%	$ 50,000	0%	$ 150,000
12. SUBTOTAL (sum of lines 1-11)	**$ 11,982,888.36**	**$ 10,946,467.46**	$ 2,419,553	-8%	$ 4,525,586	-6%	$ 5,037,749	-6%	$ 11,982,888
13. Contingencies	$ 2,436,577.67	$ 1,949,262.14	$ 499,911	-8%	$ 909,117	-6%	$ 1,027,550	-6%	$ 2,436,578
14. SUBTOTAL	**$ 14,419,466.03**	**$ 12,895,729.60**	$ 2,919,464	-8%	$ 5,434,703	-6%	$ 6,065,299	-6%	$ 14,419,466
15. Project (program) income	$ -	$ -	$ -		$ -		$ -		$ -
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 14,419,466.03**	**$ 12,895,729.60**	**$ 2,919,464**	**-8%**	**$ 5,434,703**	**-6%**	**$ 6,065,299**	**-6%**	**$ 14,419,466**

Herring Cove Bridge Replacement-Individual		
Cost Classification	**Total Cost ($)**	**Construction cost**
1. Administrative and legal expenses	$ 195,293.40	$ 156,234.72
2. Land, structures, rights-of-way, appraisals, etc.	$ 200,000.00	$ 200,000.00
3. Relocation expenses and payments	$ 30,000.00	$ 30,000.00
4. Architectural and engineering fees	$ 422,256.00	$ -
5. Other architectural and engineering fees	$ 143,440.00	$ 143,440.00
6. Project inspection fees	$ 633,384.00	$ 633,384.00
7. Site work	$ 200,000.00	$ 200,000.00
8. Demolition and removal	$ 300,000.00	$ 300,000.00
9. Construction	$ 2,868,800.00	$ 2,868,800.00
10. Equipment	$ 430,320.00	$ 430,320.00
11. Miscellaneous	$ 50,000.00	$ 50,000.00
12. SUBTOTAL (sum of lines 1-11)	$ 5,473,493.40	$ 5,012,178.72
13. Contingencies	$ 1,094,698.68	$ 875,758.94
14. SUBTOTAL	$ 6,568,192.08	$ 5,887,937.66
15. Project (program) income		
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 6,568,192.08**	**$ 5,887,937.66**

Herring Cove Bridge Replacement-Bundled		
Cost Classification	**Total Cost ($)**	**Construction cost**
1. Administrative and legal expenses	$ 183,314.10	$ 149,035.85
2. Land, structures, rights-of-way, appraisals, etc.	$ 200,000.00	$ 200,000.00
3. Relocation expenses and payments	$ 30,000.00	$ 30,000.00
4. Architectural and engineering fees	$ 402,799.60	$ -
5. Other architectural and engineering fees	$ 140,940.00	$ 140,940.00
6. Project inspection fees	$ 523,639.48	$ 523,639.48
7. Site work	$ 200,000.00	$ 200,000.00
8. Demolition and removal	$ 250,000.00	$ 250,000.00
9. Construction	$ 2,818,800.00	$ 2,818,800.00
10. Equipment	$ 338,256.00	$ 338,256.00
11. Miscellaneous	$ 50,000.00	$ 50,000.00
12. SUBTOTAL (sum of lines 1-11)	**$ 5,137,749.18**	**$ 4,700,671.33**
13. Contingencies	$ 1,027,549.84	$ 822,039.87
14. SUBTOTAL	**$ 6,165,299.01**	**$ 5,522,711.20**
15. Project (program) income		
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 6,165,299.01**	**$ 5,522,711.20**

Herring Cove Bridge 253- Replacement **DATE** **10/10/2018**
Individual

ESTIMATE OF QUANTITIES AND COST **CALC BY** **LKG**

FOR CONCEPT DEVELOPMENT ONLY

Item No.	Pay Item	Unit	Unit Price	Quantity	Amount
	Bridge Replacement	EA	$ 1,468,800.00	1	$ 1,468,800.00
	Waterline relocate	EA	$ 100,000.00	1	$ 100,000.00
	Utility Relocate	EA	$ 350,000.00	1	$ 350,000.00
	Resurfacing	EA	$ 200,000.00	1	$ 200,000.00
	Traffic Control- Detour	EA	$ 600,000.00	1	$ 600,000.00
	Traffic control	EA	$ 150,000.00	1	$ 150,000.00
	SUBTOTAL				**$ 2,868,800.00**
	Land, structures, rights-of-way, appraisals, etc.		$ 200,000.00		$ 200,000.00
	Relocation expenses and payments		$ 30,000.00		$ 30,000.00
	Other Arch engr Fees		5%		$ 143,440.00
	Site work		$ 200,000.00		$ 200,000.00
	Demo and Removal		$ 300,000.00		$ 300,000.00
	Equipment		15%		$ 430,320.00
	Misc.		$ 50,000.00		$ 50,000.00
	SUBTOTAL				$ 4,222,560.00
	ICAP	LS	3.7%		$ 195,293.40
	Engineering	LS	10%		$ 422,256.00
	Construction Engineering	LS	15.0%		$ 633,384.00
	SUBTOTAL				**$ 5,473,493.40**
	Contingency	LS	20%		$ 1,094,698.68
	TOTAL				**$ 6,568,192.08**

Herring Cove Bridge 253- Replacement **DATE** **10/10/2018**
Bundled

ESTIMATE OF QUANTITIES AND COST **CALC BY** **LKG**

FOR CONCEPT DEVELOPMENT ONLY

Item No.	Pay Item	Unit	Unit Price	Quantity	Amount
	Bridge Replacement	EA	$ 1,468,800.00	1	$ 1,468,800.00
	Waterline relocate	EA	$ 100,000.00	1	$ 100,000.00
	Utility Relocate	EA	$ 300,000.00	1	$ 300,000.00
	Resurfacing	EA	$ 200,000.00	1	$ 200,000.00
	Traffic Control- Detour	EA	$ 600,000.00	1	$ 600,000.00
	Traffic control	EA	$ 150,000.00	1	$ 150,000.00
	SUBTOTAL				**$ 2,818,800.00**
	Land, structures, rights-of-way, appraisals, etc.		$ 200,000.00		$ 200,000.00
	Relocation expenses and payments		$ 30,000.00		$ 30,000.00
	Other Arch engr Fees		5%		$ 140,940.00
	Site work		$ 200,000.00		$ 200,000.00
	Demo and Removal		$ 250,000.00		$ 250,000.00
	Equipment		12%		$ 338,256.00
	Misc.		$ 50,000.00		$ 50,000.00
	SUBTOTAL				**$ 4,027,996.00**
	ICAP	LS	3.7%		$ 183,314.10
	Engineering	LS	10%		$ 402,799.60
	Construction Engineering	LS	13.0%		$ 523,639.48
	SUBTOTAL				**$ 5,137,749.18**
	Contingency	LS	20%		$ 1,027,549.84
	TOTAL				**$ 6,165,299.01**

Option 4: Bridge Replacement with Concrete Bulb-Tee Girders

Item No.	Item Description	Estimating Unit	Unit Price	Quantity	Price
640(1)	Replace Bridge	SF	$225	6528	$1,468,800
	Mobilization and Demobilization	LS	10%		$146,880
	Contingencies		20%		$323,136
	Construction engineering		15%		$290,822
	ICAP		4.79%		$106,800
	Total				$2,336,438

Hoadley Creek Bridge Replacement-Individual		
Cost Classification	**Total Cost ($)**	**Construction cost**
1. Administrative and legal expenses	$ 173,271.00	$ 138,616.80
2. Land, structures, rights-of-way, appraisals, etc.	$ 200,000.00	$ 200,000.00
3. Relocation expenses and payments	$ 30,000.00	$ 30,000.00
4. Architectural and engineering fees	$ 374,640.00	$ -
5. Other architectural and engineering fees	$ 123,600.00	$ 123,600.00
6. Project inspection fees	$ 561,960.00	$ 561,960.00
7. Site work	$ 200,000.00	$ 200,000.00
8. Demolition and removal	$ 300,000.00	$ 300,000.00
9. Construction	$ 2,472,000.00	$ 2,472,000.00
10. Equipment	$ 370,800.00	$ 370,800.00
11. Miscellaneous	$ 50,000.00	$ 50,000.00
12. SUBTOTAL (sum of lines 1-11)	**$ 4,856,271.00**	**$ 4,446,976.80**
13. Contingencies	$ 971,254.20	$ -
14. SUBTOTAL	**$ 5,827,525.20**	**$ 4,446,976.80**
15. Project (program) income		
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 5,827,525.20**	**$ 4,446,976.80**

HOADLEY CREEK 725 **DATE** **10/10/2018**

Individual Project

ESTIMATE OF QUANTITIES AND COST **CALC BY** **LKG**

FOR CONCEPT DEVELOPMENT ONLY

Item No.	Pay Item	Unit	Unit Price	Quantity	Amount
	Bridge Replacement	EA	$1,432,000	1	$1,432,000
	Waterline relocate	EA	$100,000	1	$100,000
	Utility Relocate	EA	$300,000	1	$300,000
	Resurfacing	EA	$100,000	1	$100,000
	Traffic Control (Staged Const)	EA	$400,000	1	$400,000
	Traffic control	EA	$140,000	1	$140,000
	Construction				$2,472,000
	Land, structures, rights-of-way, appraisals, etc.		$200,000		$ 200,000.00
	Relocation expenses and payments		$30,000		$ 30,000.00
	Other Arch engr Fees		5%		$ 123,600.00
	Site work		$ 200,000.00		$ 200,000.00
	Demo and Removal		$ 300,000.00		$ 300,000.00
	Equipment		15%		$ 370,800.00
	Misc.		$ 50,000.00		$ 50,000.00
	SUBTOTAL				**$ 3,746,400.00**
	ICAP	LS	3.7%		$ 173,271.00
	Engineering	LS	10%		$ 374,640.00
	Construction Engineering	LS	15.0%		$ 561,960.00
	SUBTOTAL				**$ 4,856,271.00**
	Contingency	LS	20%		$ 971,254.20
	TOTAL				**$ 5,827,525.20**

STATE OF ALASKA DOT/PF
COMPUTATIONS

Hoadley Creek Bridge
60ft x 45ft single-span concrete deck bulb tee
ESTIMATE OF QUANTITIES AND COST

Bridge Basis of Estimate

Item No.	Item	Unit	Unit Price	Quantity	Total
202(23)	Removal of Existing Bridge No. 725	LS-SF	$75	2,700	$202,500
205(3)	Structural Fill	CY	$50	30	$1,500
501(1)	Class A Concrete	LS-CY	$2,000	325	$650,000
501(7)	Precast Concrete Member (45'x3' Decked Bulb-Tee)	EA	$35,000	9	$315,000
503(1)	Reinforcing Steel	LS-LBS	$2.00	57,000	$114,000
503(2)	Epoxy-Coated Reinforcing Steel	LS-LBS	$2.50	43,000	$107,500
507(1)	Steel Bridge Railing	LF	$300	90	$27,000
508(1)	Waterproofing Membrane	SY	$30	100	$3,000
606(16)	Transition Rail	EA	$3,000	4	$12,000
	SUBTOTAL				**$1,432,500**
640(1)	Mobilization and Demobilization	LS	10%	$ 159,167	$1,591,667
	Construction Engineering		15%	$ 238,750	$1,830,417
	ICAP		4.44%	$ 81,271	$1,911,687
	Contingencies		30%	$ 573,506	$2,485,193
	TOTAL				**$2.49M**

Hoadley Creek Bridge Replacement- Bundled		
Cost Classification	**Total Cost ($)**	**Construction cost**
1. Administrative and legal expenses	$ 162,185.81	$ 131,858.38
2. Land, structures, rights-of-way, appraisals, etc.	$ 200,000.00	$ 200,000.00
3. Relocation expenses and payments	$ 30,000.00	$ 30,000.00
4. Architectural and engineering fees	$ 356,374.00	$ -
5. Other architectural and engineering fees	$ 121,100.00	$ 121,100.00
6. Project inspection fees	$ 463,286.20	$ 463,286.20
7. Site work	$ 200,000.00	$ 200,000.00
8. Demolition and removal	$ 250,000.00	$ 250,000.00
9. Construction	$ 2,422,000.00	$ 2,422,000.00
10. Equipment	$ 290,640.00	$ 290,640.00
11. Miscellaneous	$ 50,000.00	$ 50,000.00
12. SUBTOTAL (sum of lines 1-11)	**$ 4,545,586.01**	**$ 4,158,884.58**
13. Contingencies	$ 909,117.20	$ 727,293.76
14. SUBTOTAL	**$ 5,454,703.21**	**$ 4,886,178.34**
15. Project (program) income	$ -	
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 5,454,703.21**	**$ 4,886,178.34**

HOADLEY CREEK 725 **DATE** **10/10/2018**

Bundled Project

ESTIMATE OF QUANTITIES AND COST **CALC BY** **LKG**

FOR CONCEPT DEVELOPMENT ONLY

Item No.	Pay Item	Unit	Unit Price	Quantity	Amount
	Bridge Replacement	EA	$ 1,432,000.00	1	$ 1,432,000.00
	Waterline relocate	EA	$ 100,000.00	1	$ 100,000.00
	Utility Relocate	EA	$ 250,000.00	1	$ 250,000.00
	Resurfacing	EA	$ 100,000.00	1	$ 100,000.00
	Traffic Control (Staged Const)	EA	$ 400,000.00	1	$ 400,000.00
	Traffic control	EA	$ 140,000.00	1	$ 140,000.00
	Constuction				**$ 2,422,000.00**
	Land, structures, rights-of-way, appraisals, etc		$ 200,000.00		$ 200,000.00
	Relocation expenses and payments		$ 30,000.00		$ 30,000.00
	Other Arch engr Fees		5%		$ 121,100.00
	Site work		$ 200,000.00		$ 200,000.00
	Demo and Removal		$ 250,000.00		$ 250,000.00
	Equipment		12%		$ 290,640.00
	Misc.		$ 50,000.00		$ 50,000.00
	SUBTOTAL				**$ 3,563,740.00**
	ICAP	LS	3.7%		$ 162,185.81
	Engineering	LS	10%		$ 356,374.00
	Construction Engineering	LS	13.0%		$ 463,286.20
	SUBTOTAL				**$ 4,545,586.01**
	Contingency	LS	20%		$ 909,117.20
	TOTAL				**$ 5,454,703.21**

Ward Creek Bridge Rehabilitation- Individual		
Cost Classification	**Total Cost ($)**	**Construction cost**
1. Administrative and legal expenses	$ 97,088.00	$ 77,670.40
2. Land, structures, rights-of-way, appraisals, etc.	$ -	$ -
3. Relocation expenses and payments	$ -	$ -
4. Architectural and engineering fees	$ 209,920.00	$ -
5. Other architectural and engineering fees	$ 82,050.00	$ 82,050.00
6. Project inspection fees	$ 314,880.00	$ 314,880.00
7. Site work	$ 50,000.00	$ 50,000.00
8. Demolition and removal	$ 30,000.00	$ 30,000.00
9. Construction	$ 1,641,000.00	$ 1,641,000.00
10. Equipment	$ 246,150.00	$ 246,150.00
11. Miscellaneous	$ 50,000.00	$ 50,000.00
12. SUBTOTAL (sum of lines 1-11)	**$ 2,721,088.00**	**$ 2,491,750.40**
13. Contingencies	$ 544,217.60	$ 435,374.08
14. SUBTOTAL	**$ 3,265,305.60**	**$ 2,927,124.48**
15. Project (program) income	$ -	
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 3,265,305.60**	**$ 2,927,124.48**

WARD CREEK BRIDGE NO. 747 **DATE** **10/10/2018**

Individual Project

ESTIMATE OF QUANTITIES AND COST **CALC BY** **LKG**

FOR CONCEPT DEVELOPMENT ONLY

Item No.	Pay Item	Unit	Unit Price	Quantity	Amount
	Bridge Abutment Repair	EA	$ 941,000.00	1	$ 941,000.00
	Rip Rap	EA	$ 200,000.00	1	$ 200,000.00
	Utility Relocate	EA	$ 300,000.00	1	$ 300,000.00
	Resurfacing	EA	$ 100,000.00	1	$ 100,000.00
	Traffic Control	EA	$ 100,000.00	1	$ 100,000.00
	Construction				**$ 1,641,000.00**
	Land, structures, rights-of-way, appraisals, etc.		$ -		$ -
	Relocation expenses and payments		$ -		$ -
	Other Arch engr Fees		5%		$ 82,050.00
	Site work		$ 50,000.00		$ 50,000.00
	Demo and Removal		$ 30,000.00		$ 30,000.00
	Equipment		15%		$ 246,150.00
	Misc.		$ 50,000.00		$ 50,000.00
	SUBTOTAL				**$ 2,099,200.00**
	ICAP	LS	3.7%		$ 97,088.00
	Engineering	LS	10%		$ 209,920.00
	Construction Engineering	LS	15.0%		$ 314,880.00
	SUBTOTAL				**$ 2,721,088.00**
	Contingency	LS	20%		$ 544,217.60
	TOTAL				**$ 3,265,305.60**

STATE OF ALASKA DOT/PF
COMPUTATIONS

WARD CREEK BRIDGE
OPTION 1 - Retrofit Abutment

DATE 2/1/2017
BRIDGE No. 747
CALC. BY EEM

ESTIMATE OF QUANTITIES & COST

For concept development only

Item No.	PAY ITEM	UNIT	UNIT PRICE	QUANTITY	AMOUNT
203(3)	Unclassified Excavation	CY	$10	250	$2,500
205(6)	Structural Fill	CY	$50	250	$12,500
501(1)	Class A Concrete	LS-CY	$2,000	150	$300,000
501(8)	Coring Concrete	LF	$100	105	$10,500
502(1)	Post-Tensiong (Cast-In-Place Concrete)	EACH	$1,000	42	$42,000
503(1)	Reinforcing Steel	LS-LBS	$2.25	36,000	$81,000
503(2)	Epoxy-Coated Reinforcing Steel	LS-LBS	$2.50	18,000	$46,000
503(3)	Drill and Bond Dowels	EACH	$50	100	$5,000
504(1)	Structural Steel	LS-LBS	$10	3,000	$30,000
505(5)	Furnish Strucutral Steel Piles (4'-0" dia. x 1" pipe)	LF	$500	200.0	$100,000
505(6)	Drive Strucutral Steel Piles (4'-0" dia. x 1" pipe)	EACH	$50,000	2	$100,000
505(9)	Structural Steel Sheet Piles (construction staging)	SF	$65	600	$39,000
512(1)	Falsework (girder end support during repairs)	LS	$100,000	1	$100,000
520(1)	Temporary Crossings (one-lane ramp over abutment hole)	LS-SF	$125	320	$40,000
608(10)	Transition Rail	EACH	$3,500	4	$14,000
611(1)	Riprap, Class II	CY	$75	250	$18,750
631(2)	Geotextile, Erosion Control, Class 1	SY	$3	250	$750
	SUBTOTAL				$941,000
640(1)	Mobilization & Demobilization	LS	11%		$104,556
	SUBTOTAL				$1,046,556
	Contingency	LS	35%		$365,044
	SUBTOTAL				$1,411,600
	ICAP	LS	4.96%		$70,010
	SUBTOTAL				$1,481,610
	Construction Engineering	LS	15%		$222,227
	TOTAL				$1,703,737

Add 400ft Gav Utility Reloc. 100ft Gav Resurfacing & Ann. Rail + 200 Gav Rip

Ward Creek Bridge Rehabilitation- Bundled		
Cost Classification	**Total Cost ($)**	**Construction cost**
1. Administrative and legal expenses	$ 89,183.67	$ 72,507.05
2. Land, structures, rights-of-way, appraisals, etc.	$ -	$ -
3. Relocation expenses and payments	$ -	$ -
4. Architectural and engineering fees	$ 195,965.00	$ -
5. Other architectural and engineering fees	$ 79,550.00	$ 79,550.00
6. Project inspection fees	$ 254,754.50	$ 254,754.50
7. Site work	$ 50,000.00	$ 50,000.00
8. Demolition and removal	$ 30,000.00	$ 30,000.00
9. Construction	$ 1,591,000.00	$ 1,591,000.00
10. Equipment	$ 159,100.00	$ 159,100.00
11. Miscellaneous	$ 50,000.00	$ 50,000.00
12. SUBTOTAL (sum of lines 1-11)	**$ 2,499,553.17**	**$ 2,286,911.55**
13. Contingencies	$ 499,910.63	$ 399,928.51
14. SUBTOTAL	**$ 2,999,463.81**	**$ 2,686,840.06**
15. Project (program) income	$ -	
16. TOTAL PROJECT COSTS (subtract #15 from #14)	**$ 2,999,463.81**	**$ 2,686,840.06**

WARD CREEK BRIDGE NO. 747 **DATE** **10/10/2018**

Bundled Project

ESTIMATE OF QUANTITIES AND COST **CALC BY** **LKG**

FOR CONCEPT DEVELOPMENT ONLY

Item No.	Pay Item	Unit	Unit Price	Quantity	Amount
	Bridge Abutment Repair	EA	$ 941,000.00	1	$ 941,000.00
	Rip Rap	EA	$ 200,000.00	1	$ 200,000.00
	Utility Relocate	EA	$ 250,000.00	1	$ 250,000.00
	Resurfacing	EA	$ 100,000.00	1	$ 100,000.00
	Traffic Control	EA	$ 100,000.00	1	$ 100,000.00
	Construction				$ 1,591,000.00
	Land, structures, rights-of-way, appraisals, etc.		$ -		$ -
	Relocation expenses and payments		$ -		$ -
	Other Arch engr Fees		5%		$ 79,550.00
	Site work		$ 50,000.00		$ 50,000.00
	Demo and Removal		$ 30,000.00		$ 30,000.00
	Equipment		10%		$ 159,100.00
	Misc.		$ 50,000.00		$ 50,000.00
	SUBTOTAL				**$ 1,959,650.00**
	ICAP	LS	3.7%		$ 89,183.67
	Engineering	LS	10%		$ 195,965.00
	Construction Engineering	LS	13.0%		$ 254,754.50
	SUBTOTAL				**$ 2,499,553.17**
	Contingency	LS	20%		$ 499,910.63
	TOTAL				**$ 2,999,463.81**

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Appendix B

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LISA MURKOWSKI
ALASKA

COMMITTEES:
ENERGY AND NATURAL RESOURCES
CHAIRMAN

APPROPRIATIONS
SUBCOMMITTEE ON INTERIOR, ENVIRONMENT, AND RELATED AGENCIES
CHAIRMAN

HEALTH, EDUCATION, LABOR, AND PENSIONS

INDIAN AFFAIRS

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851 EAST WESTPOINT DRIVE, SUITE 307
WASILLA, AK 99654–7142
(907) 376–7665

November 27, 2018

The Honorable Elaine L. Chao
Secretary of Transportation
US Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Secretary Chao:

I am writing to express support for three Competitive Highway Bridge Program (CHBP) grant proposals from the Alaska Department of Transportation & Public Facilities (DOT&PF). These proposals target the rehabilitation or replacement of bridges in Alaska which are listed in the National Bridge Inventory as "structurally deficient" or have otherwise outlived their service life. Please see pertinent details on each of the affected bridge projects within the enclosed fact sheets describing each grant proposal.

The CHBP is provided for under Division L of the Consolidated Appropriations Act of 2018 (Public Law 115-141) and intended to assist states with a population density of less than 100 people per square mile. Alaska's transportation system generally lacks the redundancy which Lower 48 states enjoy and so many of our roadways serve as a "lifelines" in the truest sense. These bridge projects are critical to the transportation infrastructure, as well as the local economies of the Alaskan communities surrounding these vital, often exclusive, transportation links.

Thank you in advance to FHWA staff for their careful consideration of DOT&PF's CHBP grant proposals. Consistent with all relevant rules, laws, and regulation, I respectfully request that all due consideration be given to all eligible Alaska-based applications. Thank you for the opportunity to bring these applications to your attention.

Sincerely,

Lisa Murkowski
United States Senator

DAN SULLIVAN
ALASKA

SUITE 702
HART SENATE OFFICE BUILDING
WASHINGTON, DC 20510

United States Senate

November 30, 2018

COMMITTEES

ARMED SERVICES
COMMERCE, SCIENCE, AND TRANSPORTATION
ENVIRONMENT AND PUBLIC WORKS
VETERANS' AFFAIRS

The Honorable Elaine Chao
US Department of Transportation
1200 New Jersey Avenue, SE
Washington, D.C. 20590

Dear Secretary Chao,

As you may know, the Alaska Department of Transportation & Public Facilities (DOT&PF) has recently applied for federal grant funding under the Competitive Highway Bridge Program (CHBP). Our nation's transportation infrastructure is critical to this country's economic growth and our way of life, particularly in rural Alaska. The CHBP will provide flexibility from federal one-size-fits all mandates for several proposals put forth by Alaska's DOT&PF.

It is to my understanding that the DOT&PF proposals target the rehabilitation and replacement of bridges in Alaska that the National Bridge Inventory has listed as "structurally deficient." The bridges in need of repairs span from Eastern Alaska, to Ketchikan and to Seward where bridges are vital to connect rural communities.

So many of Alaska's roadways serve as lifelines in the truest sense. These bridge projects are critical to the transportation infrastructure, as well as the local economies of the Alaskan communities surrounding these vital, often exclusive, transportation links. For example, the bridge projects in Eastern Alaska will allow native communities to continue subsistence activities and provide safer travel for those who support the Trans-Alaska Pipeline System. In Seward, modernizing the Seward Highway, a critical transportation corridor, will provide a link for goods shipped from the Port of Alaska located in Anchorage. And in Ketchikan, communities rely on a dependable transit network to support tourism and fishing, which bolster the local economy.

I am honored to represent all Alaskans, and I ask that you give all due consideration to any Alaskan organization being considered for these grants. Thank you for considering funding this project, and consistent with all relevant rules, laws and regulations, I respectfully ask that all due consideration be given to this request.

Sincerely,

Dan Sullivan
United States Senator

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KETCHIKAN GATEWAY BOROUGH

1900 First Avenue, Suite 210, Ketchikan, Alaska 99901
• telephone: (907) 228-6625 • fax (907) 228-6684
Office of the Borough Manager

November 1, 2018

Commissioner Marc Luiken
Alaska Department of Transportation & Public Facilities
3132 Channel Drive
Juneau, AK 99801

RE: Letter of Support

Commissioner Luiken –

I am very pleased to provide a letter in support of the Ketchikan Bridge Rehabilitation and Replacement Project's application for funding under the Federal Highway Administration's Competitive Highway Bridge Program. This project will rehabilitate the Ward Creek Bridge and replace the bridges at Herring Cove and Hoadley Creek, each of which is a key component of the Tongass Highway transportation corridor.

As you know, Ketchikan is an island community with limited ground transportation options, and the Tongass Highway is the main transportation corridor. All freight shipping, emergency medical and fire services, and commerce relies upon these bridges to remain safe, free-flowing, and open year round.

Because of this, I am particularly pleased with the three structures the Department has chosen for this project. All three bridges are located at absolutely critical locations for the economic vitality of our community. Were any of these bridges to be closed, it would devastate our tourism, seafood, freight, and construction industries, as well as potentially endangering lives by preventing access to emergency medical and fire services.

I urge the Federal Highway Administration to approve the Alaska Department of Transportation and Public Facilities' proposal for funding of these critical projects.

Sincerely,

Ruben Duran
Borough Manager, ICMA-CM

KETCHIKAN

Our lifestyle, your reward

November 27, 2018

Commissioner Marc Luiken
AK Dept. of Transportation and Public Facilities
3132 Channel Drive
Juneau, AK 99801

Dear Commissioner Luiken:

The Ketchikan Visitors Bureau would like to offer our support for your department's proposal to the Federal Highway Administration for the Ketchikan Bridge Rehabilitation and Replacement Project.

Ketchikan hosts over 1 million visitors a year, traveling by cruise ship, airline and ferry. According to our estimations, almost 70% of the tours and attractions visited each year operate outside of Ketchikan's central business district and require travel over one and often two of the bridges scheduled for rehabilitation. Additionally, there are hotels, fishing lodges, vacation rental properties and B&Bs that are also located in areas where one or more bridges must be crossed for access.

Cruise visitors departing for activities located north must travel over Hoadley Creek bridge, and those on tour excursions located in Ward Cove or farther north also rely on access across the Ward Cove Bridge. South of Ketchikan hundreds of visitors each day will cross the Herring Cove bridge to or from activities.

Considering the age of these structures and the fact that all three are located on the Tongass Highway and provide the only access to points beyond, we are extremely concerned about the impact that a forced closure of any of these bridges would have on commerce, not to mention the inconvenience and safety of our visitors and residents alike. Please feel free to share this

KETCHIKAN VISITORS BUREAU
50 Front St., Suite 203 Ketchikan, AK 99901
PHONE 907.225.6166 FACSIMILE 907.225.4250
EMAIL info@visit-ketchikan.com WEB www.visit-ketchikan.com

letter with any interested parties. If there is any additional information or assistance we can provide, don't hesitate to contact us.

Sincerely,

Patti Mackey, President & CEO
Ketchikan Visitors Bureau

Matt Hagan, Chairman,
Ketchikan Visitors Bureau
Board of Directors

C: Ketchikan City Council
Ketchikan Gateway Borough Assembly

City of Ketchikan

PUBLIC WORKS DEPARTMENT
Administrative Offices / Engineering
2930 Tongass Avenue, Ketchikan, AK 99901
PH (907) 228-4727 / FX (907) 225-8721

November 21, 2018

Alaska Department of Transportation & Public Facilities
Commissioner Marc Luiken
P.O. Box 112500
3132 Channel Drive
Juneau, AK 99811-2500

Dear Commissioner Luiken,

As the Mayor of the City of Ketchikan, I am pleased to express the City of Ketchikan's enthusiastic support for the Alaska Department of Transportation and Public Facilities Ketchikan Bridge Rehabilitation and Replacement Project. As a remote coastal town on a mountainous island, our infrastructure hugs the coast. In the case of transportation, the roadway system lacks much redundancy, necking down to individual bridges at two of the three locations of this project. It is hard to understate the critical importance of this project given that there is absolutely no way for our residents to get to either key or routine destinations without the Herring Cove Bridge and the Ward Cove Bridge. Further, there is no adequate way around the Hoadley Creek Bridge given the type and volume of vehicles that use that bridge. The proposed project would maintain and improve some of the most important transportation infrastructure of Ketchikan, thereby enabling our economy to function.

Each of these structures has its own important place in Ketchikan's transportation system:

Herring Cove Bridge connects our central business district, airport, and cruise ship berths to several of our main visitor attractions, including the bears and eagles at Alaska Rainforest Sanctuary and the salmon run at Herring Cove. The proposed new bridge would alleviate the significant pedestrian safety and capacity issues at this site.

Hoadley Creek Bridge is within feet of Ketchikan's downtown freight port and our hospital. Were this bridge to close, the only alternative route for freight headed south of the port requires a detour through steep residential streets; similarly, emergency vehicles transporting patients from the south would have a longer route around the hospital to get to the one emergency entrance on the island, on its north side.

Ward Cove Bridge connects downtown Ketchikan to the Shelter Cove area, the Alaska Marine Highway facility, the Ward Cove industrial area, and the Alaska State Troopers. It also connects the cruise ship berths to heavily used tourist destinations north of town. It is critical to address the foundation and deck problems at this bridge before structural deficiencies restrict community access to these resources.

The Tongass Highway transportation corridor sees heavy use by busses filled with visitors on the trip of their lifetimes, construction vehicles developing our infrastructure, and freight haulers, as well as passenger vehicles and pedestrians.

Please do not hesitate to contact me if I can provide additional assistance or information to help move this project forward.

Sincerely,

Robert Sivertsen, Mayor

CC: Karl R. Amylon, City Manager
Lacey Simpson, Assistant City Manager
Mark Hilson, P.E., Public Works Director

Ketchikan Area Fire Chiefs

November 8, 2018

Commissioner Marc Luiken
AK Department of Transportation & Public Facilities
3132 Channel Drive, Suite 300
Juneau, AK 99801

Dear Commissioner Luiken,

Fire, rescue, and emergency medical services in the Ketchikan Gateway Borough including the cities of Ketchikan and Saxman, Alaska are provided by North Tongass Volunteer Fire Department, Ketchikan Fire Department, and South Tongass Volunteer Fire Department. As the first responders for our community, it is extremely important to us to have consistent and safe access to all parts of our service area.

Therefore, we are in full support of the Ketchikan Bridge Replacement and Rehabilitation Project, and we commend the AK Dept. of Transportation & Public Facilities for seeking grant funding to make it happen. We urge the Federal Highway Administration to fully fund the Department's application for this project.

The three bridges that the Department has selected for this project represent three potential choke points for access to different parts of the greater Ketchikan area. A closure of any of them would have serious consequences for response time to significant portions of our population.

Two of these bridges, Ward Cove and Herring Cove, are completely non-redundant: if we lose one of them, there is no other land transportation option for transporting an EMS patient to PeaceHealth, our hospital. The third bridge, Hoadley Creek, is actually located directly outside of PeaceHealth.

Thank you for pursuing the resources needed to address these important infrastructure needs in Ketchikan. Please do not hesitate to contact us if we can provide additional information or support.

Sincerely,

Jerry Kiffer, Fire Chief
North Tongass VFD

Abner Hoage, Fire Chief
Ketchikan Fire Department

Steve Rydeen, Fire Chief
South Tongass VFD

Greater Ketchikan Chamber of Commerce
2417 Tongass Avenue, Suite 223A
Ketchikan, AK 99901

November 1, 2018

Commissioner Marc Luiken
Alaska Department of Transportation and Public Facilities
3132 Channel Drive
Juneau, AK 99801

Commissioner Luiken,

As the Executive Director of the Greater Ketchikan Chamber of Commerce, I am delighted to offer our organization's support for the Department of Transportation and Public Facilities grant application to the Federal Highway Administration for the Ketchikan Bridge Replacement and Rehabilitation Project.

The Department will be replacing two bridges that have exceeded their useful life:

- the Hoadley Creek Bridge located between the PeaceHealth Medical Center and Ketchikan's main freight shipping facility, and
- the Herring Cove Bridge located directly between the Whitman Lake Hatchery and the Alaska Rainforest Sanctuary, two of Ketchikan's largest visitor attractions

In addition, the Department will rehabilitate the Ward Cove Bridge, which has experienced extensive foundation damage. This bridge provides access to Ward Cove, an important industrial area in and of itself, but this bridge is also on the only route to a major new resource area currently being opened at Shelter Cove and a large number of small businesses are dependent on the bridge for customer access.

The ability to provide critical transportation infrastructure is necessary for attracting and retaining industries, ensuring public safety, and encouraging tourism in our rural community.
Please do not hesitate to contact me if you have any questions or concerns with this project.

Sincerely,

Carrie Starkey
Executive Director

Alaska Trucking Association, Inc.
3443 Minnesota Drive · Anchorage, Alaska 99503 · Phone (907) 276-1149 · Fax (907) 274-1946
www.aktrucks.org
The authoritative voice of the trucking industry in Alaska

November 2, 2018

Commissioner Marc Luiken
Alaska Department of Transportation and Public Facilities
3132 Channel Drive #300
Juneau, AK 99801

To Whom it May Concern:

The Alaska Trucking Association (ATA) has served the Alaska trucking industry for over 60 years, and we know that trucking is the lifeblood of Alaska's everyday economy. Whether a community is on the road system or only accessible by air or sea, commercial highway trucks are a vital link in Alaskan commerce. And commercial trucking depends on safe, unrestricted, and open roads to do our job.

For these reasons and on behalf of the 200 member company ATA, I support the Alaska Department of Transportation and Public Facilities' grant application to the Federal Highway Administration for the Ketchikan Bridge Rehabilitation and Replacement Project.

As you may know, Ketchikan is on an island, and all freight must be shipped into town via barge or air before it can be distributed by truck. This project is especially important to the community because one of the bridges slated for replacement is located directly outside of the town's freight dock, where the majority of all food sold in stores arrives. In addition, the bridge planned for rehabilitation is between the shipping dock and one of the main industrial areas.

This grant will allow the Department to look ahead to avoid possible closures in these aging and deteriorated structures. I encourage the FHWA to approve your grant application and fund the Ketchikan Bridge Rehabilitation and Replacement Project.

Sincerely,

Aves Thompson
Executive Director

ALASKA TRUCKING ASSOCIATION

ASSOCIATED GENERAL CONTRACTORS of ALASKA

8005 SCHOON STREET, SUITE 100 • ANCHORAGE, ALASKA 99518
TELEPHONE (907) 561-5354 • FAX (907) 562-6118

November 13, 2018

Commissioner Marc Luiken
Alaska Department of Transportation & Public Facilities
P. O. Box 112500
Juneau, AK 99811-2500

Commissioner Luiken,

The Associated General Contractors (AGC) of Alaska is a construction trade association representing over 640 contractors, specialty contractors, suppliers and manufacturers in Alaska. For seventy years, we have represented the industry through many aspects that help support the overall economy of the State.

Alaska is both blessed and cursed by its geography: blessed by the abundant beauty and natural resources; cursed, because as a young state, our transportation system has many shortcomings. We offer strong support for the Alaska Department of Transportation and Public Facilities' grant application to the Federal Highway Administration for the Ketchikan Bridge Rehabilitation and Replacement Project. Under the project, the Department will replace the Hoadley Creek and Herring Cove Bridges, which are both in poor condition. It will also replace the Ward Creek Bridge, a structure in serious condition due to damage to its foundation. As with so many Alaskan towns, Ketchikan has a non-redundant system; not only is there no alternative road access, the geography of Ketchikan means there is no place to put an alternative road.

Each of these bridges is critical to Ketchikan's economy and quality of life. For example, the local hospital and primary freight shipping facilities in Ketchikan are located across the street from each other, and the Hoadley Creek Bridge is at that point. The other two bridges are at pinch points on either side of town, and they are necessary links to major economic areas and future growth. By addressing these structural issues proactively, the Department will avoid the potential for emergency closures of these vital structures.

On behalf of AGC of Alaska, our 640 members and our 70 years representing the industry, we urge the Federal Highway Administration to fully fund the Ketchikan Bridge Rehabilitation and Replacement Project.

Sincerely,

John MacKinnon, Executive Director
Associated General Contractors of Alaska

DON YOUNG
CONGRESSMAN FOR ALL ALASKA
WASHINGTON OFFICE:
2314 RAYBURN BUILDING
WASHINGTON, DC 20515
202–225–5765

Congress of the United States
House of Representatives
Washington, D.C. 20515

COMMITTEE ON
NATURAL RESOURCES
CHAIRMAN EMERITUS

COMMITTEE ON
TRANSPORTATION & INFRASTRUCTURE

REPUBLICAN
POLICY COMMITTEE

CANADA–U.S.
INTER-PARLIAMENTARY GROUP

November 27, 2018

The Honorable Elaine L. Chao
Secretary of Transportation
US Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Secretary Chao:

I am writing to express support for three Competitive Highway Bridge Program (CHBP) grant proposals from the Alaska Department of Transportation & Public Facilities (DOT&PF). These proposals target the rehabilitation or replacement of bridges in Alaska which are listed in the National Bridge Inventory as "structurally deficient" or have otherwise outlived their service life. Please see pertinent details on each of the affected bridge projects within the enclosed fact sheets describing each grant proposal.

The CHBP is provided for under Division L of the Consolidated Appropriations Act of 2018 (Public Law 115-141) and intended to assist states with a population density of less than 100 people per square mile. Alaska's transportation system generally lacks the redundancy which Lower 48 states enjoy and so many of our roadways serve as "lifelines" in the truest sense. These bridge projects are critical to the transportation infrastructure, as well as the local economies of the Alaskan communities surrounding these vital, often exclusive, transportation links.

Thank you in advance to FHWA staff for their careful consideration of DOT&PF's CHBP grant proposals. Consistent with all relevant rules, laws, and regulations, I respectfully request that all due consideration be given to all eligible Alaska-based applications. Thank you for the opportunity to bring these applications to your attention.

Sincerely,

Don Young

DON YOUNG
Congressman for All Alaska

Enclosures

CC: Sandra Garcia-Aline, Division Administrator, Alaska Division, FHWA
Brandye Hendrickson, Acting Federal Highway Administrator, FHWA
Marc Luiken, Commissioner, DOT&PF

VISIT OUR WEBSITE
HTTP://DONYOUNG.HOUSE.GOV

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907–456–0210

CALL TOLL-FREE
1–866–990–5979

Appendix C

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Appendix C - INNOVATIVE TECHNOLOGIES

The Alaska Department of Transportation and Public Facilities is a recognized leader in remote, cold climate, and seismic bridge engineering. Our current $2.6 million research portfolio includes partnerships with North Carolina State University, Texas A&M Transportation Institute, and the University of Alaska, with project topics ranging from material properties to examination of shear capacity of longitudinal keyways in decked bulb-tee girders.[1]

This emphasis on investigation stems from the fact that bridge design in Alaska's environment must consider multiple concurrent severe hazards and limitations. This combination of challenges makes extremes the "Alaska normal." Out of necessity, Accelerated Bridge Construction (ABC) has been standard practice in Alaska for decades. The challenges of design and construction in Alaska are presented below followed by summaries of the innovations applied to this project to address these challenges.

Alaska Challenges

Geography. Alaska DOT&PF manages an inventory of approximately 1,000 bridges, spread over 570,641 square miles; to put this in perspective, total land area of the next three largest states combined (California, Montana, and Texas) is only 562,557 square miles.[2] Many bridges are in communities only reachable by air or water; even those on the main NHS road system might be several hundred miles from the nearest gas station or other commercial services.

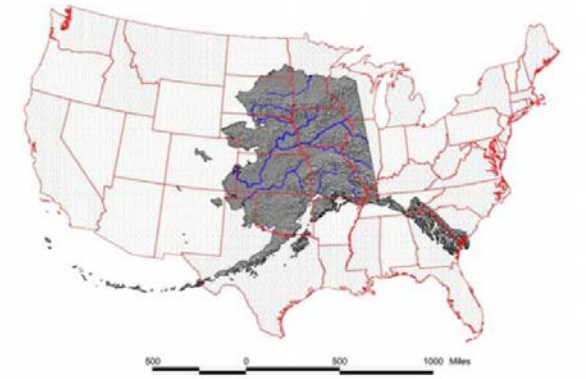

Figure 1 Alaska Superimposed over Contiguous U.S.

Extreme Seismicity. Alaska has the highest seismicity in the nation: epicenters of 9 of the 10 largest earthquakes in the North America since 1900 are in Alaska.[3]

Non-Redundancy. Most of Alaska's highways – and therefore, communities – do not have detour routes, because there is generally only one road in or out. When a bridge is out of service, traveling hours out of the way is the best case scenario; the worst case involves chartering a plane or helicopter or simply waiting until water has frozen thick enough for an ice road.

Short Construction Season. Excluding the most extreme areas, the Alaskan construction season is approximately May through September. Cold weather construction – generally considered to

[1] See Alaska DOT&PF Current Bridge Research Projects 2018. Unpublished Report, Prepared by DOT&PF Research, Development & Technology Transfer Section.
[2] Land area from U.S. Census Bureau, "State Area Measurements and Internal Point Coordinates", Accessed November 15, 2018.
[3] Research Query: Largest North America Earthquakes since 1900. USGS Earthquake Catalog. Accessed November 13, 2018.

be after October or before April – increases the costs of work to such an extent that contractors avoid it when possible. This is one of the prime reasons that Alaska is at the forefront of research and implementation of Accelerated Bridge Construction innovations.

Environmental Constraints. Alaska produces the highest volume of fish and seafood of any state in the United States.[4] Subsequently, protection of streams is critical to the economy, but permitted "fish windows" – time periods during which in-stream work is allowed – also constrain the amount of time contractors can accomplish in-stream work.

Climate. According to the National Oceanic and Atmospheric Administration, Alaska's record low temperature (-80° F) occurred less than 150 miles from its record high temperature (100° F),[5] and as a result, DOT&PF bridge design practice calls for standard temperature ranges of up to 160° F.[6] Material properties can change over a temperature range of this magnitude, which is particularly relevant to seismic design.

For example, frozen soils behave differently from unfrozen soils, changing the location of the plastic hinge in pile foundations. Permanently frozen soils often underlie unfrozen or seasonally frozen soils, and each soil scenario alters seismic demand and response.

Limited Industrial Capacity. Alaska has no steel manufacturing, a small skilled labor pool, and limited options for construction equipment and materials.

DOT&PF design and construction staff regularly addresses all of these factors, and the innovations described below represent some of the resulting adaptations. Both the ABC and Every Day Counts initiatives have identified Prefabricated Bridge Elements (PBEs) as key tools for reducing construction time. Alaska DOT&PF has been using PBEs for decades and likely leads the nation in use of precast, prestressed concrete decked bulb-tee girders with installations at more than 300 locations.

[4] *Fisheries of the United States 2016*. NOAA National Marine Fisheries Service. August 30, 2017 (p-12).
[5] State Climate Extremes Committee. NOAA National Centers for Environmental Information. Accessed November 16, 2018.
[6] *Alaska Bridges and Structures Manual*. DOT&PF Bridge Section. Chapter 19: Expansion Joints and Bearings. September 2017 (p 19-1, Table 19-1).

Appendix C - INNOVATIVE TECHNOLOGIES

Innovative Technology: Precast Prestressed Concrete Decked Bulb-Tee Girders (DBTs)

Summary of Benefits
• Expedited project delivery – saves 50% to 75% of deck construction time compared to a conventional Cast-In-Place concrete bridge decks • Expedited project delivery – design, fabrication and construction standards are mature in Alaska • Added bridge capacity – superior overload capacity (operating load rating) due to zero tension design standard • Improved bridge durability – high quality plant-cast concrete eliminates inadequate reinforcing cover, the leading cause of premature deck deterioration in the state

This innovation will be applied to the following structures in this project: Herring Cove Bridge (NBI No. 253), Hoadley Creek Bridge (NBI No. 725).

Description

Precast, prestressed concrete decked bulb-tee girders leverage traditional technology into a single innovation addressing multiple construction challenges. A standard precast concrete bulb-tee girder is fabricated with the final deck installed. Edge girders are cast with curb hardware.

Decked bulb-tee girders are connected by a combination of cast-in-place concrete diaphragms, welded steel connection “tabs” embedded in the edges of the top flanges, and grouted keyway longitudinal joints. “Alaska-style” DBT decks can be used as a riding surface as soon as the grout cures, or a waterproofing membrane with asphalt overlay can be added.

DOT&PF design policy further extends the advantages of DBTs. Girders are designed for zero tension under all loads which results in very high operating load ratings in flexure. To optimize these capacities, enough additional reinforcing is provided so the shear operating rating is roughly equal to the flexure rating resulting in efficient girders with optimal overload capacity.

Capacity to Implement

Alaska DOT&PF first used prototype DBTs in the late 1970s, and since then, they have become the most commonly used bridge superstructure in the state. DBTs are almost always the lowest cost bridge type in Alaska when geometric limitations can be met. Maximum DBT span lengths are typically limited 120 to 140 feet due to shipping and handling concerns.

Figure 2 "Alaska-Style" Prestressed Girder Installation

Example Financial and Time Savings

DBT bridges can be two to three times faster to construct than structures with conventional cast-in-place concrete decks. A comparison of typical deck construction sequences is detailed below.

Construction Time Comparison			
Conventional CIP Deck		**Decked Bulb-Tee Girders**	
Construct soffit forms	2 weeks	Place girders with integral deck	0.5 weeks
Place reinforcing steel	2 weeks	Weld & grout keyways	0.5 weeks
Place & cure concrete	1 week	Form & cast diaphragms & curbs	1 week
Strip forms	1 week	Install waterproofing membrane & asphalt overlay	0.5 weeks
Total	**6 weeks**	**Total**	**2.5 weeks**

Appendix D

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Memorandum

Date: November 21, 2018

To: ADOT&PF

From: Patrick Burden and Leah Cuyno

Re: Benefit-Cost Analysis of Southcoast Region Bridge Rehabilitation and Replacement

This memorandum is provided in support of the Alaska Department of Transportation and Public Facilities (ADOT&PF) Bridge Section's application for grant funding for the FHWA's Competitive Highway Bridge Program for Fiscal Year 2018.

This memorandum describes the benefit-cost analysis (BCA) conducted for the proposed bridge projects in ADOT&PF's Southcoast Region. A BCA spreadsheet model was developed to determine the net present value (NPV) of the expected benefits of three proposed bridge projects in the Southcoast Region. The analysis also considered the cost effectiveness of bundling the projects during construction to generate cost savings.

Net Present Value and Benefit-Cost (B/C) Ratio

The following table summarizes the expected outcomes with respect to benefits and costs of the three proposed bridge projects in the ADOT&PF's Southcoast Region. Constructing the three bridge rehabilitation projects as a bundle would be more cost effective, with an estimated construction cost savings of about $1.0 million.

Table 1. Expected Net Benefits (in millions of 2018 $) and B/C Ratio of the Proposed Southcoast Region Bridge Rehabilitation Projects

Southcoast Region Projects	Present Value of Estimated Benefits	Present Value of Estimated Costs	Net Present Value	B/C Ratio
Herring Cove (#253)	$73.01	$6.06	$66.95	12
Hoadley Creek (#725)	$159.09	$4.75	$154.34	34
Ward Creek (#747)	$742.22	$3.00	$739.22	247
Total (*as separate projects*)	$974.32	$13.81	$960.51	71
Total (as *bundled*)	$974.32	$12.88	$961.44	76

Source: Northern Economics estimates based on the B/C model developed for this study.

Proposed Bridge Rehabilitation and Replacement Projects in the Southcoast Region

The proposed project will replace or rehabilitate three rural bridges in the Southcoast Region of Alaska: Herring Cove Bridge (253), the Hoadley Creek Bridge (725), and the Ward Creek Bridge (747).

The Herring Cove Bridge, at approximately Milepost 10.4 of the South Tongass Highway was first constructed in 1952 and is currently rated in the National Bridge Inventory (NBI) as "poor condition". The existing two-lane bridge has no pedestrian walkways or sidewalks and,

due to high volume of tourist and other pedestrian traffic during the summer, it creates a pinch point for pedestrians. This bridge would be completely replaced.

The Hoadley Creek Bridge, at approximately Milepost 1 of the South Tongass Highway, was constructed in 1957 and is also currently rated in poor condition in the NBI. This bridge sits next to the Ketchikan Transfer facility on the city's main thoroughfare. The latest recorded traffic count on this route, measured as annual average daily traffic, was 13,836 vehicles. This bridge would also be replaced.

The Ward Creek Bridge, at approximately Milepost 4.6 of the North Tongass Highway, was constructed in 1975 and is currently rated as a "poor condition" bridge in the NBI. This bridge would be rehabilitated in advance of a larger separate future ADOT&PF project to extend Revilla Road to Shelter Cove Road on Carroll Inlet. The Ward Creek Bridge requires rehabilitation to the north end abutment to mitigate the differential settlement in the pile cap beam that has caused large vertical and diagonal cracking of the section. Retrofit will include a new outrigger pile-supported abutment cap beam that encapsulates the existing cap beam. The retrofitted abutment will provide a new load path from the superstructure to the outrigger piles. Work will also include associated approach roadway and embankment repair and new approach guardrail.

The Tongass Highway is a 37-mile stretch of state-owned and maintained roadway which extends north and south of the City of Ketchikan. This main thoroughfare provides critical access to goods, services and recreational and subsistence activities for residents, visitors, and business owners in the community. Ketchikan is not connected to any regional or statewide road system and relies on the Tongass Highway and other local roads for all transportation needs. Topographic constraints have made it impossible to establish alternative transportation corridors in Ketchikan, with the community bordered to the east by a series of low mountain ranges and the Inside Passage waterway to the west. It is important that the North and South Tongass Highway be maintained and operated to be safe and accessible year-round.

Assumptions and Values of Key Input Parameters

All benefits and costs in the analysis are presented in 2018 dollars. The analysis uses 2018 as the base year and all future benefits and costs are discounted to 2018 dollars using a 7 percent real discount rate. The Alaska Consumer Price Index (CPI) is used as the cost deflator. [The Alaska CPI and the 2018 Deflator is shown in the *Alaska CPI* tab of the BC spreadsheet model].

General model assumptions used in the BCA are shown in Table 2 below.

Table 2. General Model Assumptions used in the Benefit Cost Analysis

B/C Model Parameters	Value
Year of dollar values in the model	2018
Discount Rate (Real), percent	7
Design Life of New Bridge, # of years	75
Design Life of Rehabilitated Bridge, # of years	50
Occupancy rate for personal vehicles, # of persons	1.7

B/C Model Parameters	Value
Occupancy rate for buses, # of persons	10.7
Occupancy rate for commercial vehicles, # of persons	1.0
Replacement Year for Polyester Concrete Overlay	30
Operating Period for this Analysis, # of years	30

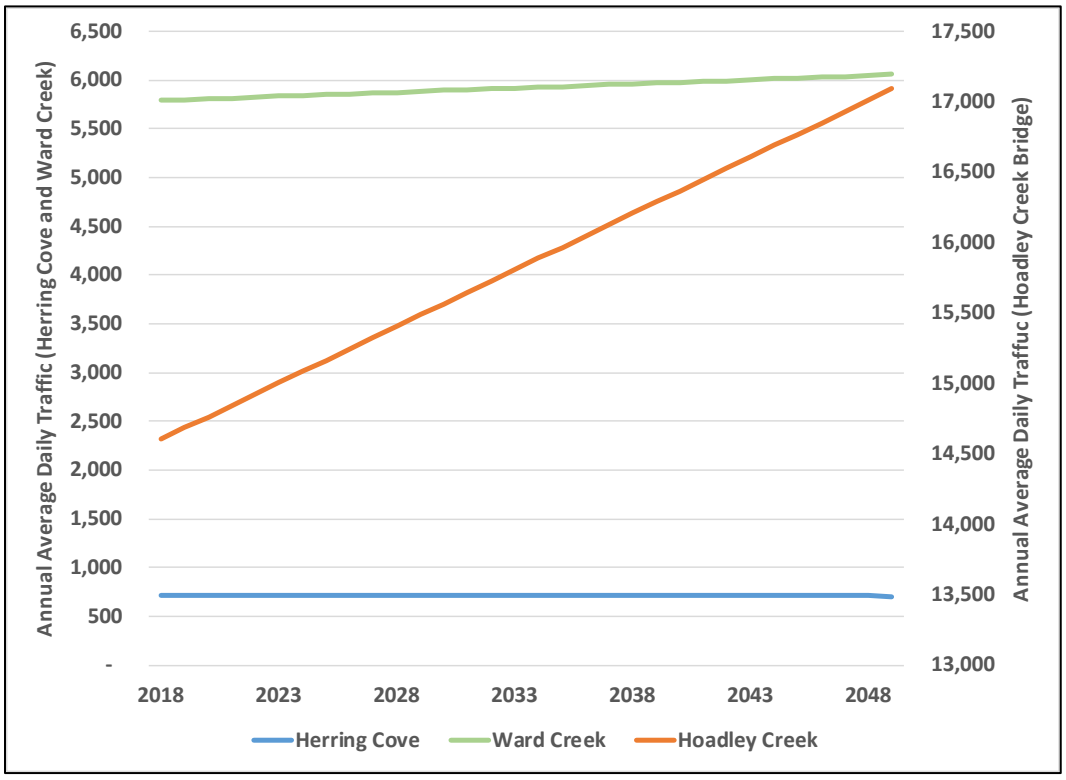
Sources:

1) Discount rate is based on the Office of Management and Budget Circular A-94.
2) Occupancy rates for personal vehicles and for buses are from "Average Vehicle Occupancy Factors for Computing Travel Time April 2018." https://www.fhwa.dot.gov/tpm/guidance/avo_factors.pdf. Accessed on Oct. 20, 2018.
3) Design life of a new/rehabilitated bridge is based on AASHTO bridge code, provided by ADOT&PF.

The projected traffic volumes, measured as annual average daily traffic (AADT), used in this BCA analysis were based on historical data provided by ADOT&PF. The projected traffic volumes were determined using a simple regression of the past 10 years of data. Figure 1 shows the projected traffic volumes for the various bridges. [The data and calculations are shown in the *Traffic* tab of the BC spreadsheet model].

Traffic counts were measured on Milepost 10 of the South Tongass Highway (Herring Cove Bridge), Milepost 1 of the South Tongass Highway (Hoadley Creek Bridge), and Milepost 4.8 of the North Tongass Highway (Ward Creek Bridge).

Figure 1. Projected Annual Average Daily on the Herring Cove, Hoadley Creek and Ward Creek Bridges



Source: Alaska Department of Transportation and Public Facilities.

The total projected AADT counts shown above were allocated to different types of vehicles according to the percentages shown in the table below.

Table 3. Allocation of Traffic Volume per Type of Vehicle, Percent of Annual Average Daily Traffic

Types of Vehicles	Herring Cove Bridge	Hoadley Creek Bridge	Ward Creek Bridge
Commercial vehicles			
Trucks (Classes 5-13)	16.0	16.0	6.3
Buses (Class 4)	2.8	2.8	0.5
Other Business Travel	4.6	4.6	4.6
Personal	76.6	76.6	88.6

Sources:

1) Commercial vehicle estimates are from the Alaska Department of Transportation and Public Facilities.
2) Other Business Travel vehicle estimates are based on 2016 estimate for local business travel.

Baseline (No Build) Description

The following describes the baseline conditions, which is the basis for determining or quantifying the effects of the no build case. If the bridges are not replaced or rehabilitated, load limits and single-lane operations will be imposed, and the bridges will eventually be closed to traffic.

The assumptions and calculations associated with the baseline conditions for each of the bridges are shown in the *253 Baseline* tab, *725 Baseline* tab, and the *747 Baseline* tab.

Herring Cove Bridge No. 253

This bridge is a two-span, steel girder bridge with a concrete deck constructed in 1952 and located near milepost (MP) 10 of South Tongass Highway.

The 253 bridge deck is near the end of its expected service life. Currently, the bridge deck has an NBI rating of 4.

Given this current NBI rating, the following are assumed under the No Build scenario for this analysis:

- The bridge deck will have 2.6 years at NBI rating 3 before closure at NBI rating 2.
- The bridge deck will fall to rating 3 at the next inspection in 2019.
- Load limits will be imposed the year after a rating 3 is reached (Year 2020).
- In the third year of the NBI rating 3 (year 2022), single lane operations will be put in place. Single lane operations will result in an average delay of 4 minutes per vehicle.
- The bridge will be closed at the end of year 2022.

Hoadley Creek Bridge No. 725

The Hoadley Creek Bridge is a single-span concrete girder bridge originally constructed in 1957 and is located near MP 1 of the South Tongass Highway. The superstructure is comprised of pre-stressed concrete beams with a reinforced concrete deck and asphalt

wearing surface. The bridge is 45 feet long and 60feet wide, consisting of two traffic lanes, a center turn lane, shoulders for public parking, and a pedestrian walkway on each side.

The Hoadley Creek bridge deck has exceeded its expected service life. Its current NBI rating is a 4.

Given this current NBI rating, the following are assumed under the No Build scenario:

- The bridge deck will have an expected 2.6 years at NBI rating 3 before closure at rating 2.
- The bridge deck will drop to rating 3 at the next inspection in 2019
- At NBI rating 3, load limits are imposed in year 2020.
- In the third year of the NBI rating 3 (2022), single lane operations will be put in place.
- The bridge will be closed at the end of 2022.

Ward Creek Bridge No. 747

The Ward Creek Bridge is a three-span concrete girder bridge with a monolithic concrete deck located near MP 4.8 of the North Tongass Highway. It is 30 feet wide and 160 feet long and was constructed in 1975 with no significant alterations since original construction.

The substructure is nearing its expected service life. It has an NBI rating of 3 and has been at that level for 2 years.

Given this current NBI rating, the following are assumed under the Baseline:

- The substructure has about 6 months of service life remaining based on the deterioration model.
- The bridge substructure will drop to an NBI rating of 2 in the next inspection cycle (2019).
- Bridge 747 will be closed at the end of year 2019.

Project Benefits

The benefits of the project are evaluated based on the avoided costs associated with imposing the no build or baseline conditions described above.

1) **Avoided Costs of Load Limits**

Load limits imposed on the bridges will result in an increase in truck traffic by 4 percent, as some loads will have to be split between trucks to stay within the load limits. This increases operating costs and travel time of affected trucks.

The marginal costs of operating a truck per hour are based on the published report by the American Transportation Research Institute (ATRI)-- *An Analysis of the Operational Costs of Trucking* released in October 2018. The operating costs include fuel, repair and maintenance, insurance, permits/licenses, and tires. [Assumptions and calculations for vehicle operating costs are shown in *Vehicle Opg Cost* tab in the BC spreadsheet model].

The value of travel time for truck drivers are based on hourly compensation of heavy and tractor-trailer and light truck or delivery service drivers as published by the Bureau of Labor Statistics (BLS). [Wage and income data are shown in the *Wage & Income* tab in the BC spreadsheet model].

Load limits on Bridges 253 and 725 will be in effect from 2020 through 2022. No load limits are imposed on Bridge 747.

Table 4. Estimated Net Effects of Load Limits Imposed on the 253 Bridge, in 2018 $

Category	Net Present Value	2019	2020	2021	2022
Increased Truck Operating Cost	$33,035	$0	$13,470	$13,469	$13,468
Increased Driver Travel Time	$42,278	$0	$17,239	$17,238	$17,237
Total	**$75,314**	**$0**	**$30,709**	**$30,707**	**$30,705**

Source: Northern Economics estimates based on the BC model developed for this study.

Table 5. Estimated Net Effects of Load Limits Imposed on the 725 Bridge, in 2018 $

Category	Net Present Value	2019	2020	2021	2022
Increased Truck Operating Cost	$81,086	$0	$32,890	$33,069	$33,248
Increased Driver Travel Time	$217,924	$0	$88,395	$88,875	$89,355
Total	**$299,010**	**$0**	**$121,285**	**$121,944**	**$122,602**

Source: Northern Economics estimates based on the BC model developed for this study.

2) Avoided Costs of Single Lane Operations

Single lane operations will take effect on the Bridge 253 and the Bridge 725 in year 2022. Single lane operations will not be imposed on Bridge 747.

Single lane operations will cause a 4-minute delay on both Bridges 253 and 725. The time delay was quantified for each type of vehicle using the appropriate compensation or wage data for the type of travel [see *Wage & Income* tab in the BC spreadsheet model].

Table 6 presents the estimated effects of the single lane operations imposed on the two bridges.

Table 6. Net Present Value of Estimated Effects of Single Lane Operations on Bridges 253 and 725, in 2018 $

Type of Travel	Herring Cove (253)	Hoadley Creek (725)
Truck Drivers	$85,474	$1,772,378
Bus Drivers	$11,769	$244,045
Bus (Passengers)	$56,847	$1,178,777
Other Business Travel Time	$25,472	$528,183
Personal Travel Time	$273,533	$5,671,965
Total	**$453,094**	**$9,395,348**

Source: Northern Economics estimates based on the BC model developed for this study.

3) Avoided Costs of Bridge Closures

As noted in the baseline description above, Bridge 253 and Bridge 725 will be closed at the end of year 2022, and Bridge 747 will be closed at the end of year 2019.

The following travel scenarios are assumed following these bridge closures:

Bridge 253 Closure

The bridge route assumes travel is from the Ketchikan's Visitor's Bureau in downtown Ketchikan to Power House Road (on the east side of Herring Cove across the bridge). No road or highway detour is available with this bridge closure. Instead, ferries and landing craft will be used to transport people and vehicles from Saxman to an area just past Power House Road.

Besides the ferry/landing craft fares that travelers will have to incur, additional costs will be incurred for improvements to the existing dock at Saxman (worth $150,000), new launch facilities (estimated to cost $1 million) east of Herring Cove, and annual land and dock rental payments of about $120,000 per year.

The incremental travel costs for motorists take into account the vehicle operating cost savings associated with the reduction in the distance traveled by road (vehicles will have to drive 2.6 miles after the ferry ride to Power House Road but will avoid the 8.4 miles of driving on the bridge route) and the additional ferry fares that will be incurred. The net effect results in an increase in vehicle operating costs.

Operating costs for the ferries and landing craft were based on 2017 data on the Ketchikan airport ferry (updated to 2018 $). Fares represent the amount required to cover the ferry operating expenses given the number of daily passengers that are expected. The analysis assumes that trucks and buses are charged about twice the average fare.

Bridge 725 Closure

After closure of Bridge 725, motorists will have to take a detour, which will add 1 mile to the trip distance, 4 minutes to the travel time. This results in additional operating costs and higher driver and passenger time values.

Bridge 747 Closure

The bridge route assumes that travel is from the Ketchikan Visitor's Center to Ward Cove Industrial Park just across Ward Creek Bridge. No road or highway detour is available with this bridge closure so a mix of ferries and landing craft will be used to transport people and vehicles between Ward Cove Industrial Park to industrial lands/docks on the south side of Ward Cove.

Besides the ferry/landing craft fares that travelers will have to incur, additional costs will be incurred for dock improvements on both the north and south sides of Ward Cove ($500,000) and annual land and dock rental payments of about $240,000 per year.

The incremental travel costs for motorists consider the vehicle operating cost savings associated with the reduction in the distance traveled by road (vehicles will have to drive 6.5 miles after the ferry ride but will avoid the 7.4 miles of driving on the bridge route) and the additional ferry or landing craft fares that will be incurred. The net effect results in an increase in vehicle operating costs.

Operating costs for the ferries and landing craft were based on 2017 data on the Ketchikan airport ferry (updated to 2018 $). Fares represent the amount required to cover the ferry

operating expenses given the number of daily passengers that are expected. The analysis assumes that trucks and buses are charged 2.5 times the fare for cars and pick-ups.

Table 7, Table 8, and Table 9 show the net present values of the estimated costs of the bridge closures.

Table 7. Net Present Value of Estimated Effect of the 253 Bridge Closure, *in millions* of 2018 $

Category	Net Present Value
Increased Truck Operating Cost	$7.98
Increased Truck Driver Travel Time	$8.36
Increased Bus Operating Cost	$1.39
Increased Bus Driver Travel Time	$1.20
Increased Bus Passenger Travel Time	$5.78
Increased Other Business Vehicle Operating Cost	$0.85
Increased Other Business Travel Time	$2.59
Increased Personal Vehicle Operating Cost	$14.10
Increased Personal Travel Time	$27.81
Required Dock Improvements and New Facilities	$0.88
Land and Dock Rental Payments	$1.10
Total:	**$72.03**

Source: Northern Economics estimates based on the BC model developed for this study.

Table 8. Net Present Value of Estimated Effect of the 725 Bridge Closure, *in millions* of 2018 $

Category	Net Present Value
Increased Truck Operating Cost	$8.23
Increased Truck Driver Travel Time	$22.11
Increased Bus Operating Cost	$1.43
Increased Bus Driver Travel Time	$3.17
Increased Bus Passenger Travel Time	$15.29
Increased Other Business Vehicle Operating Cost	$1.04
Increased Other Business Travel Time	$6.85
Increased Personal Vehicle Operating Cost	$17.34
Increased Personal Travel Time	$73.58
Total:	**$149.04**

Source: Northern Economics estimates based on the BC model developed for this study.

Table 9. Net Present Value of Estimated Effect of the 747 Bridge Closure, *in millions* of 2018 $

Category	Net Present Value
Increased Truck Operating Cost	$23.91
Increased Truck Driver Travel Time	$29.21
Increased Bus Operating Cost	$1.89
Increased Bus Driver Travel Time	$1.90
Increased Bus Passenger Travel Time	$9.19
Increased Other Business Vehicle Operating Cost	$17.98
Increased Other Business Travel Time	$22.97
Increased Personal Vehicle Operating Cost	$346.31
Increased Personal Travel Time	$285.26
Required Dock Improvements	$0.47
Land and Dock Rental Payments	$2.98
Total:	**$742.076**

Source: Northern Economics estimates based on the BC model developed for this study.

The assumptions, data, and calculations for the various avoided costs associated with the bridge closures are provided in the *253 Baseline* tab, *725 Baseline* tab, and the *747 Baseline tab* in the BC spreadsheet model.

4) Avoided Baseline Maintenance and Operating Costs

Table 10 shows the net present values and the future avoided maintenance and operating costs for the three bridges. These baseline costs are based on historical maintenance costs provided by ADOT&PF. The baseline costs are quantified only until the last year the bridges will be open to motorists.

The data, assumptions, and calculations are shown in the *M&O* tab in the BC spreadsheet model.

Table 10. Net Present Value of the Estimated Baseline Maintenance and Operating Costs for the 253, 725, and 747 Bridges, in 2018 $

Bridge/Cost Category	NPV	2019	2020	2021	2022
Herring Cove (253)					
Pavement	$38	$0	$0	$0	$49
Bridge	$705	$208	$208	$208	$208
Total	$743	$208	$208	$208	$257
Hoadley Creek (725)					
Pavement	$0	$0	$0	$0	$0
Bridge	$190	$56	$56	$56	$56
Total	$190	$56	$56	$56	$56
Ward Creek (747)					
Pavement	$0	$0			
Bridge	$402	$430			
Total	$402	$430			

Source: Northern Economics estimates based on the BC spreadsheet model developed for this study; ADOT&PF provided historical maintenance costs for the bridges.

5) Residual Value of Bridge

The residual values for the bridges were quantified and included in the BCA. For this calculation, it is assumed that the value (=capital cost) of the bridge depreciates in a linear manner over its service life. The design life for a rehabilitated bridge is 50 years and the design life of a new bridge is 75 years, while the operating period assumed for this analysis is 30 years. The discounted residual values for the three bridges are shown in the table below.

Table 11. Estimated Discounted Residual Values of Bridge 253, 725, and 747, in 2018 $

Bridge	Present Value
Herring Cove (253)	$445,301
Hoadley Creek (725)	$349,216
Ward Creek (747)	$146,194

Source: Northern Economics estimates based on the BC spreadsheet model developed for this study; ADOT&PF provided capital costs of the bridge rehabilitation and replacement projects.

6) Avoided Emissions Costs

This analysis evaluated the net costs of emissions under the *no build baseline conditions* (without the bridge projects) and under the *with bridge project scenarios*. This includes the differences in emissions associated with the detour route or the alternative mode of travel, and the bridge route.

The costs of emissions are based on the recommended monetized values provided in the U.S. DOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs. The Guidance only provided monetized costs for volatile organic compounds (VOCs), nitrogen oxides (NO_x), particulate matter (PM), and sulfur dioxide (SO_2). According to the document, DOT does not currently have a recommended value for the damage costs from CO_2 emissions; hence CO_2 emissions cost were not monetized. SO_2 emissions were also not monetized since there are no data on SO_2 emissions from passenger vehicles and trucks.

The data, assumptions, and calculations for the costs of emissions are in provided in the *253 Emissions* tab, *725 Emissions* tab, and the *747 Emissions* tab of the BC spreadsheet model.

Table 12. Estimated Monetized Effects of Net Emissions, in 2018 $

Bridge	Net Present Value
Herring Cove (253)	$513,840
Hoadley Creek (725)	$1,954,224
Ward Creek (747)	$451,846

Source: Northern Economics estimates based on the BC spreadsheet model developed for this study

Project Costs

Total project costs in this BCA include the estimated costs of upgrading and replacing the bridges, as well as the future maintenance and operations of the bridges.

1) **Capital Costs**

The undiscounted project capital costs for each bridge project are shown in Table 13. The table also compares the total costs for all the bridges if they were implemented separately versus the total costs for all the bridges if they were implemented together (or bundled).

Table 13. Estimated Project Costs of the 253, 725, and 747 Bridges, Undiscounted, in 2018 $

Bridge	Amount: Stand-Alone	Amount: Bundled
Herring Cove (253)	$6,468,192	$6,065,299
Hoadley Creek (725)	$5,807,525	$5,434,703
Ward Creek (747)	$3,185,306	$2,919,464
Total	**$15,461,023**	**$14,419,466**

Source: Alaska Department of Transportation and Public Facilities (ADOT&PF).

The BC spreadsheet model provides a detailed break-down of the cost information in the *Construction Cost Estimate* tab.

2) Maintenance and Operations Costs

New bridges in Alaska are designed to be resilient structures with limited maintenance due to logistical challenges associated with short construction seasons and remote locations. Besides wearing surface replacement and minor upkeep, maintenance and operations work is assumed to be minimal. The table below shows the discounted estimated maintenance costs of the new and upgraded bridges.

Data, assumptions, and calculations are provided in the *M&O* tab in the BC spreadsheet model.

Table 14. Present Value of Maintenance & Operating Costs of the New 253 and 725 Bridges, and the Rehabilitated 747 Bridge, in 2018 $

Bridge/Cost Category	Present Value
Herring Cove (253)	
Pavement	$9,481
Bridge	$7,408
Total	$16,889
Hoadley Creek (725)	
Pavement	$3,273
Bridge	$3,008
Total	$6,281
Ward Creek (747)	
Pavement	$14,761
Bridge	$7,870
Total	$22,631

Source: Based on Alaska Department of Transportation and Public Facilities (ADOT&PF) Transportation Asset Management Plan and historical data on maintenance and operating costs, and Northern Economics assumptions about minor annual activities.

Summary Results: Benefit-Cost Analysis

The BCA results of the proposed bridge projects in the Southcoast Region are presented in Table 15. All of the bridge projects have a B/C ratio greater than 1. As a bundle, the estimated cost savings in present value terms amount to $1.0 million (2018 $).

Table 15. Net Present Values of Proposed Southcoast Region Bridge Projects' Benefits and Costs

Category	Net Present Value (*in millions of 2018$*)				
Project Benefits	Herring Cove	Hoadley Creek	Ward Creek	All Bridges (Separate)	All Bridges (Bundled)
Avoidance of Load Limit Costs	$0.08	$0.30	$0.00	$0.37	$0.37
Avoidance of Single Lane Operation	$0.45	$9.40	$0.00	$9.85	$9.85
Avoidance of Bridge Closure	$72.03	$149.04	$742.08	$963.15	$963.15
Avoidance of M&O Costs until Bridge Closure	$0.00	$0.00	$0.00	$0.00	$0.00
Residual Value of Bridge	$0.45	$0.35	$0.15	$0.94	$0.94
Avoided Emissions Costs	$0.51	$1.95	$0.45	$2.92	$2.92
Total Project Benefits	$73.01	$159.09	$742.22	$977.24	$977.24
Project Costs					
Capital Expenditures	$6.05	$4.74	$2.98	$13.76	$12.83
M&O Expenditures	$0.02	$0.01	$0.02	$0.05	$0.05
Total Project Costs	$6.06	$4.75	$3.00	$13.81	$12.88
Net Benefits	$66.95	$154.34	$739.22	$963.43	$964.36
B/C Ratio	12	34	247.5	71	76

Source: Northern Economics estimates based on the BC spreadsheet model developed for this study.

Appendix D-2 can be found at the Competitive Highway Bridge Program grant page.

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Appendix E

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Risk Register						
Bridge No(s).	**Risks**	**Mitigation Strategy**	**Probability (1 low/5 high)**	**Severity (1 low/5 high)**	**Risk Rating**	**Category**
ALL	State funds not available for match.	Have Commissioner work with Legislature to understand importance of Grant deadlines. As a last resort, delay project	1	5	Medium	Funding Uncertainties
253	Individual USACE permit or USCG permit delays	Increase consultation early. Avoid, minimize, mitigate.	2	3	Medium	Environmental Uncertainties
725	Unanticipated Utility relocation required.	Develop construction phasing plan to account for unforeseen delays	2	3	Medium	Construction Risks
253	Unusually severe weather	Delay or add compensation	3	3	Medium	Construction Risks
ALL	Competing support group resources impact project schedule (e.g. can't get Statewide Foundations out in time)	conduct regular project meetings with support groups and track progress using MS Project	1	3	Low	Procurement Delays
ALL	Cost inflation due to lack of information (e.g. no foundation drilling conducted yet or utility impacts not known).	Include contingency.	1	2	Low	Cost Uncertainties
725	Cost inflation due to real estate price increase.	Seek additional funding or delay the project.	2	2	Low	Procurement Delays
ALL	Legislative approval not granted.	Delay project	1	2	Low	Procurement Delays
ALL	Material escalation due to limited suppliers and competing work.	Add funds or delay project.	1	2	Low	Cost Uncertainties
ALL	Material escalation due to tariffs or inflation.	Add funds or delay project.	1	2	Low	Cost Uncertainties
ALL	Other (e.g. STIP or State) funds required for portions of work that do not meet grant program requirements (e.g. significant roadway realignment needed to meet geometric standards).	Other funds already identified.	1	2	Low	Funding Uncertainties
ALL	Project environmental document not approved in time.	conduct regular project meetings with EV groups and track progress using MS Project	1	3	Low	Environmental Uncertainties
253	Project located in area of high environmental scrutiny or with special environmental/regulatory area of concern (e.g. 4(f) resources, T&E species)	Increase consultation early	1	3	Low	Environmental Uncertainties

Risk Register						
Bridge No(s).	**Risks**	**Mitigation Strategy**	**Probability (1 low/5 high)**	**Severity (1 low/5 high)**	**Risk Rating**	**Category**
725	Existing large water line adjacent to bridge on upstream side. Current location creates a geometric constraint of bridge/construction footprint.	Coordinate with owner to determine where to locate proposed utility.	5	3	High	Other Risks
725	Design/Construction with current ROW tightly constrained on all 4 corners of existing bridge.	Coordinate with land owners early for potential ROW acquisition.	5	3	High	Other Risks
725	State funds not available for match.	Have Commissioner work with Legislature to understand importance of Grant deadlines. As a last resort, delay project	1	5	Medium	Funding Uncertainties
725	Unanticipated utility relocation required.	Develop construction phasing plan to account for unforeseen delays	2	3	Medium	Construction Risks
725	Construction changing stream flow causing scour to downstream structures supported by piles in creek bed.	Leave existing bridge abutments in place and span over them with new structure so streamflow remain unaffected. Document condition of existing downstream foundations prior to construction. Coordinate with owners to create a scour protection plan.	4	3	Medium	Other Risks
725	Existing overhead powerline above bridge with foundations cast into approaching sidewalk.	Coordinate with power company to relocate lines prior to construction.	5	2	Medium	Other Risks
725	Construction during summer tourist season with heave traffic along Tongass Ave.	Plan detours or design phased construction accordingly to allow passage of traffic.	5	2	Medium	Other Risks
725	Existing bridge continues to deteriorate and requires load restrictions (similar to what occurred at the nearby First Waterfall Creek Bridge)	Reduce width to signalized one-lane bridge or install modular truss bridge	2	5	Medium	Other Risks
725	Competing support group resources impact project schedule (e.g. can't get Statewide Foundations out in time)	Conduct regular project meetings with support groups and track progress using MS Project	1	3	Low	Procurement Delays
725	Cost inflation due to lack of information (e.g. no foundation drilling conducted yet or utility impacts not known).	Include contingency.	1	2	Low	Cost Uncertainties
725	Cost inflation due to real estate price increase.	Seek additional funding or delay the project.	2	2	Low	Procurement Delays
725	Individual USACE permit or USCG permit delays	Increase consultation early. Avoid, minimize, mitigate.	1	3	Low	Environmental Uncertainties
725	Legislative approval not granted.	Delay project	1	2	Low	Funding Uncertainties
725	Material escalation due to limited suppliers and competing work.	Add funds or delay project.	1	3	Low	Cost Uncertainties
725	Material escalation due to tariffs or inflation.	Add funds or delay project.	1	3	Low	Cost Uncertainties
725	Other (e.g. STIP or State) funds required for portions of work that do not meet grant program requirements (e.g. significant roadway realignment needed to meet geometric standards).	Other funds already identified.	1	2	Low	Funding Uncertainties
725	Project environmental document not approved in time.	Conduct regular project meetings with EV groups and track progress using MS Project	1	3	Low	Environmental Uncertainties
725	Project located in area of high environmental scrutiny or with special environmental/regulatory area of concern (e.g. 4(f) resources, T&E species)	Increase consultation early	1	3	Low	Environmental Uncertainties
725	Unusually severe weather slows construction	Delay or add compensation	1	1	Low	Construction Risks
725	Fish window creating construction delays	Plan construction event accordingly	2	2	Low	Construction Risks

Risk Register						
Bridge No(s).	**Risks**	**Mitigation Strategy**	**Probability (1 low/5 high)**	**Severity (1 low/5 high)**	**Risk Rating**	**Category**
253	State funds not available for match.	Have Commissioner work with Legislature to understand importance of Grant deadlines. As a last resort, delay project	1	5	Medium	Funding Uncertainties
253	Individual USACE permit or USCG permit delays	Increase consultation early. Avoid, minimize, mitigate.	2	3	Medium	Environmental Uncertainties
253	Project environmental document not approved in time.	Conduct regular project meetings with EV groups and track progress using MS Project	2	3	Medium	Environmental Uncertainties
253	Unusually severe weather delays construction	Delay or add compensation	3	3	Medium	Construction Risks
253	Competing support group resources impact project schedule (e.g. can't get Statewide Foundations out in time)	Conduct regular project meetings with support groups and track progress using MS Project	1	3	Low	Procurement Delays
253	Cost inflation due to lack of information (e.g. no foundation drilling conducted yet or utility impacts not known).	Include contingency.	1	2	Low	Cost Uncertainties
253	Cost inflation due to real estate price increase.	Not necessary. Project has minor ROW costs.	1	2	Low	Cost Uncertainties
253	Legislative approval not granted.	Delay project	1	2	Low	Funding Uncertainties
253	Material escalation due to limited suppliers and competing work.	Add funds or delay project.	1	3	Low	Cost Uncertainties
253	Material escalation due to tariffs or inflation.	Add funds or delay project.	1	3	Low	Cost Uncertainties
253	Other (e.g. STIP or State) funds required for portions of work that do not meet grant program requirements (e.g. significant roadway realignment needed to meet geometric standards).	Other funds already identified.	1	2	Low	Funding Uncertainties
253	Project located in area of high environmental scrutiny or with special environmental/regulatory area of concern (e.g. 4(f) resources, T&E species)	Increase consultation early	1	3	Low	Environmental Uncertainties
253	Unanticipated Utility relocation required.	Develop construction phasing plan to account for unforeseen delays	1	3	Low	Construction Risks

Risk Register						
Bridge No(s).	**Risks**	**Mitigation Strategy**	**Probability (1 low/5 high)**	**Severity (1 low/5 high)**	**Risk Rating**	**Category**
747	State funds not available for match.	Have Commissioner work with Legislature to understand importance of Grant deadlines. As a last resort, delay project	1	5	Medium	Funding Uncertainties
747	Pile overruns for abutment foundations	Locate foundation test hold as close to planned foundation locations as possible.	2	4	Medium	Construction Risks
747	Competing support group resources impact project schedule (e.g. can't get Statewide Foundations out in time)	Conduct regular project meetings with support groups and track progress using MS Project	1	3	Low	Procurement Delays
747	Cost inflation due to lack of information (e.g. no foundation drilling conducted yet or utility impacts not known).	Include contingency.	1	2	Low	Cost Uncertainties
747	Cost inflation due to real estate price increase.	Not necessary. Project has minor ROW costs.	1	1	Low	Cost Uncertainties
747	Individual USACE permit or USCG permit delays	Increase consultation early. Avoid, minimize, mitigate.	1	3	Low	Environmental Uncertainties
747	Legislative approval not granted.	Delay project	1	2	Low	Funding Uncertainties
747	Material escalation due to limited suppliers and competing work.	Add funds or delay project.	1	3	Low	Cost Uncertainties
747	Material escalation due to tariffs or inflation.	Add funds or delay project.	1	3	Low	Cost Uncertainties
747	Other (e.g. STIP or State) funds required for portions of work that do not meet grant program requirements (e.g. significant roadway realignment needed to meet geometric standards).	Other funds already identified.	1	2	Low	Funding Uncertainties
747	Project environmental document not approved in time.	Conduct regular project meetings with EV groups and track progress using MS Project	1	2	Low	Environmental Uncertainties
747	Project located in area of high environmental scrutiny or with special environmental/regulatory area of concern (e.g. 4(f) resources, T&E species)	Increase consultation early	1	3	Low	Environmental Uncertainties
747	Unanticipated Utility relocation required.	Develop construction phasing plan to account for unforeseen delays	1	3	Low	Construction Risks
747	Unusually severe weather	Delay or add compensation	1	1	Low	Construction Risks
747	Construction staging doesn't allow overloads to use bridge	Alert MS&CVE for public outreach	2	2	Low	Construction Risks

Appendix F

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THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

OFFICE OF THE COMMISSIONER
Marc Luiken, Commissioner

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November 21, 2018

The Honorable Elaine L. Chao
Secretary, United States Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Secretary Chao:

This letter serves as evidence of assurance by the State of Alaska Department of Transportation and Public Facilities (ADOT&PF) that matching funds for the Competitive Highway Bridge Program application "Ketchikan Bridge Rehabilitation and Replacement Project" submitted by ADOT&PF are committed and will be provided.

ADOT&PF's matching share of the Competitive Highway and Bridge Program request is approximately $1,310,000. We are committed to providing the 9.03% matching funds to the Federal funds awarded.

Sincerely,

Marc Luiken
Commissioner

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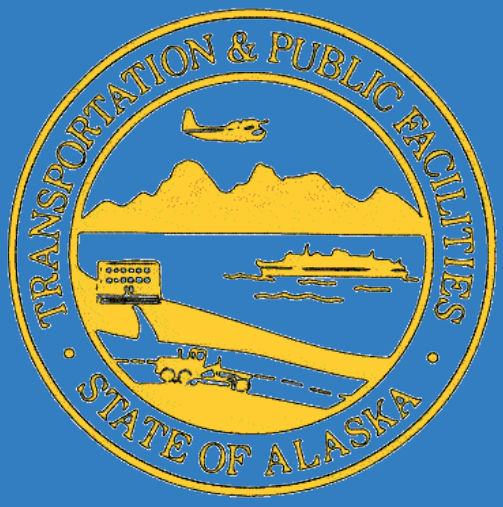

Alaska Department of Transportation & Public Facilities