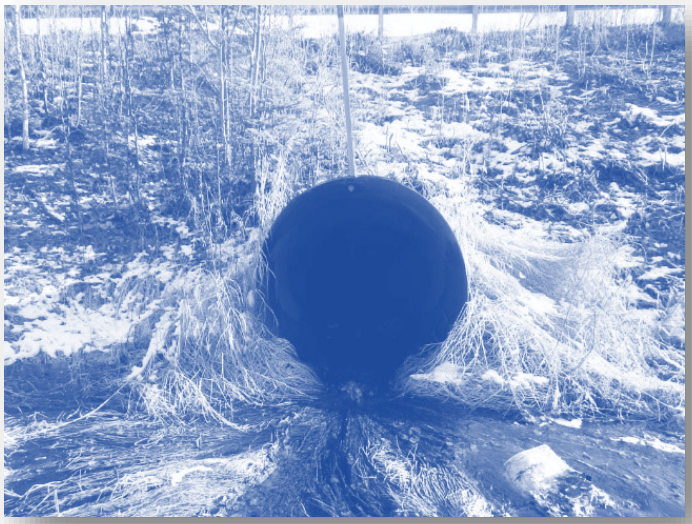
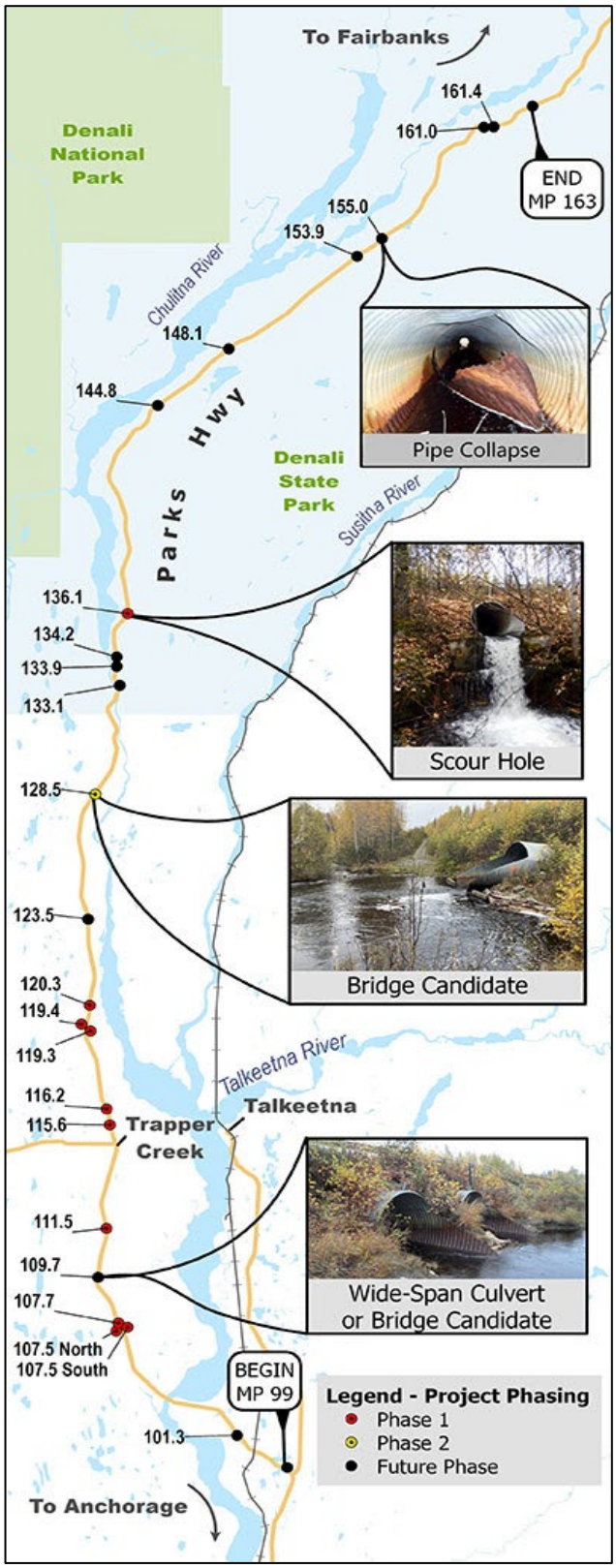
Parks Highway Fish Passage Improvement Plan

Alaska Department of Transportation and Public Facilities

Culvert AOP Grant Request

2022





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PROJECT DESCRIPTION

The Alaska Department of Transportation and Public Facilities (DOT&PF), through the assistance of the Alaska Department of Fish & Game (ADF&G) proposes using a grant from the National Culvert Removal, Replacement and Restoration Grant Program (Culvert Aquatic Organism Passage Program) to replace up to 12 deficient culverts on the Parks Highway as part of a larger drainage and fish passage culvert improvement plan.

The project area is between Mile Post 99 north of Anchorage to MP 163 outside the Denali National Park and Preserve (DNP&P). The comprehensive drainage project that this grant would support is explained in a DOT&PF Project Page.

The Parks Highway is one of the most important corridors in Alaska for commerce, recreation, tourism, and community connectivity. It is the critical north-south transportation link between the Port of Anchorage and the North Slope oilfields and serves important tourism and recreational assets such as the Denali National Park and Preserve (DNP&P).

The project would replace and upgrade culverts identified by ADF&G as needing the most critical attention to both protect free travel and address obstacles to fish spawning and rearing activities. These culverts were first installed more than 50 years ago when the Parks Highway first opened.

The FHWA AOP Culvert Grant Request would replace three culvert sites with bridges and would replace the remaining nine sites with appropriate fish passage structures. The completed project would open 51.5 miles of barrier free upstream anadromous habitat and nearly 420 acres of lake habitat.

REGIONAL CONTEXT

The project is located in the Susitna River Basin, which supports all five species of Pacific salmon; Chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), sockeye (*O. nerka*), pink (*O. gorbuscha*) and chum (*O. keta*). These fish provide an important food source to personal use fishers in the area and also constitute an important cultural resource to the Knik, Athabascan, Inupiat, Yup'ik, Alutiiq and Aleut peoples living within the project corridor.

The Susitna River Basin is within the Matanuska-Susitna Watershed, which supports one of the top 10 remaining sockeye populations in the world, experiencing a higher percentage increase in population abundance than in any other region of the world between 1962 and 2005[1].

The Susitna River Basin, and the creeks within this project zone that feeds it, represent an important feeding area for Cook Inlet Beluga Whales and Western Distinct Population Stellar Sea Lions (Huntington 2002, Goetz, et.al. 2012). Coho and Chinook are listed as part of the CI Beluga critical habitat (*76 FR 20180*; *50 CFR Part 226.220*).

Figure 1
Mat-Su Basin

The 320-mile Parks Highway can be seen as the literal economic spine of Alaska, running from just outside of Anchorage, where the state's deep draft port handles nearly four million tons of fuel and freight annually[2], and terminates at Fairbanks, serving nearly 70 percent of the state's population and critical state and national infrastructure.

[1] Susitna River Coalition data. Websearched January 2023.
[2] Alaska Statewide Long-Range Transportation Plan; Freight Element, pp-61 . Alaska DOT&PF. December 2016

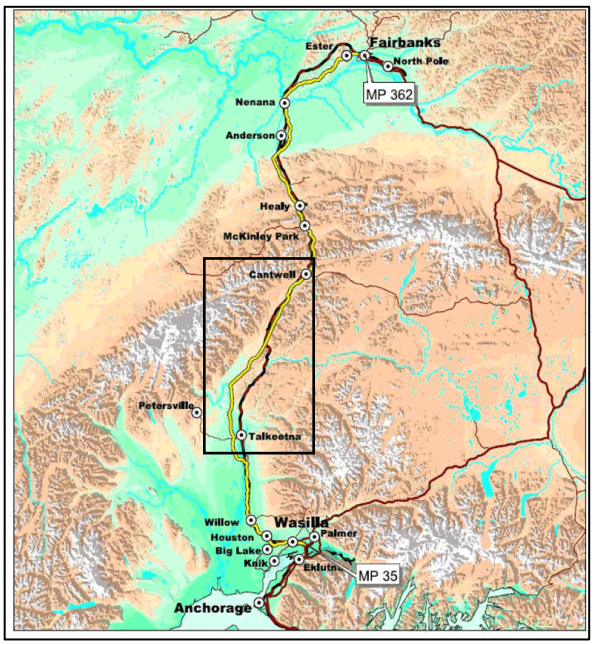

Figure 2
Project Zone

The Parks Highway is functionally classified as a rural interstate highway and is part of both the National Highway System (NHS) and the Interstate Highway System. The corridor is also designated as an Alaska State Scenic Byway and a National Scenic Byway.

The Parks Highway also a strategic asset in providing a direct surface transportation link between Elmendorf-Richardson Air Force Base, and Fort Wainwright and Fort Greely Army posts.

PROJECT LOCATION

The project zone, **Figure 2**, is located in the Matanuska-Susitna Borough. Borough population is about 90,000 and is the fastest growing area in the state (the human population has doubled in 20 years and is projected to continue growing), but the project area is sparsely inhabited.

Matanuska-Susitna Basin covers approximately 24,000 square miles in Southcentral Alaska, roughly the combined size of Vermont, New Hampshire and Massachusetts. It is bordered by the Alaska Range to the North, the Talkeetna and Chugach Mountains to the east, Cook Inlet to the south and the Aleutian Range to the west.

The culverts identified in the project area for replacement are listed below. Their general location within the project boundaries are included in an illustrated map at the DOT&PF Project Page.

Waterbody	MP	Latitude	Longitude	ADF&G Site
Rabideaux Creek tributary	MP107.5	62.21538	-150.22786	N/A
Rabideaux Creek tributary	MP107.7	62.50864	-150.25858	20501413
Unnamed Creek	MP 111.5	62.26957	-150.24330	20501411
Chulitna River tributary	MP 119.3	62.37938	-150.26729	20502152
Unnamed Creek	MP 120.3	62.39313	-150.26302	20501393
Railroad Creek*	MP 128.5	62.50864	-150.25858	20501387
Susitna River tributary	MP 101.3	62.15563	-150.09995	20501422
Unnamed Creek*	MP 109.7	62.24283	-150.25258	20501412
Chulitna River tributary	MP 123.5	62.45379	-150.27282	20501392
Chulitna River tributary	MP 133.1	62.56889	-150.23121	20502147
Horseshoe Creek*	MP 159.8	62.86738	-149.85261	20501383
Coal Creek tributary	MP 161.4	62.87653	-149.81442	20501382

**Proposed Bridge*

The borough is dominated by rolling lowlands covered with hundreds of small lakes, bogs, and clear water streams. Large rivers (including the Matanuska, Susitna, and Knik) drain glaciers in the surrounding mountains. These diverse waterscapes provide key habitats for anadromous fish species, including Pacific salmon, eulachon, lamprey, as well as other resident species including rainbow trout, Dolly Varden, Arctic grayling, several whitefish species, stickleback, and others.

SOCIOECONOMIC INFORMATION

The project area is located within Census Tract No. 2068000100 and is not in an Urbanized Zone. The census tract borders an Opportunity Zone (Census Tract 02290000200).

The EPA Climate & Economic Justice Screening Tool indicates that this tract is considered disadvantaged because it meets more than one burden threshold and the associated socioeconomic threshold. The one Alaska Native Villages in this tract that is Federally Recognized is also considered disadvantaged

The project zone is not within an area of persistent poverty.

The U.S. Department of Transportation mapping tool for Historically Disadvantaged Communities indicates that the project is within communities or areas of Health Disadvantage and Resilience Disadvantage.

OVERALL QUALIFICATIONS OF APPLICANTS

DOT&PF owns, operates or maintains 5,500 road miles and is responsible for all bridge and culvert assessments in the state. DOT&PF has directly designed or managed consultant designs and conducted numerous refurbishments, replacements, repairs and maintenance on all state-owned roads. Most of these projects utilized federal aid. They are highly experienced and intimately familiar with this particular project's local road conditions and needs.

DOT&PF project development staff compromises 75 persons, including materials and geotechnical engineers, environmental and right of way professionals who understand all Federal requirements, including Build America stipulations.

The Department has a successful record in delivering FHWA Grant projects on time within the Scope, Schedule and Budget.

GRANT FUNDS, SOURCES, USE OF PROJECT FUNDS

Federal Funds Requested

DOT&PF estimates that the total funds needed for only fish passage culverts located within the scope of this project is $37,700,000. DOT&PF requests $20,000,000 for this bundled fish passage culvert project to fund $25,000,000 of this overall project. These funds will be used for construction of the identified anadromous sites over the three phases of this project.

The state will use any awarded funds to construct as many of these identified sites as funding allows. The state has already expended $986,000 in federal and state funding on design and environmental assessment.

Table 1
Grant Funds

	Culvert AOP Grant (80%)	*Non-Federal (20%)*	*Total (100%)*
Phase 1	$4,960,000	$1,240,000	$6,200,000
Phase 2	$7,200,000	$1,800,000	$9,000,000
Phase 3	$7,840,000	$1,960,000	$9,800,000
	$20,000,000	***$5,000,000***	***$25,000,000***

This project is currently in the State Alaska Statewide Transportation Improvement Plan and has had $3,183,950 in Federal Funds and $316,050 in State matching funds allocated in FY2022 and 2023 for Preliminary Design and Environmental, $545,820 in Federal funds and $54,180 in State matching funds for Right of Way, $272,910 in Federal Funds and $27,090 in State Matching funds for Utilities.

This project currently has $23,379,290 in Advance Construction (AC) programed for construction both drainage and fish passage culverts with $2,320,710 in State Match.

Non-Federal Match

The State of Alaska commits to contributing 20% of the total eligible project cost towards this critical state need. This amount will be matched with non-federal state funds. This will be provided by State of Alaska unrestricted general fund and referenced in the letter of commitment from Alaska DOT&PF Commissioner Anderson.

Federal Leverage ($986,183) – The following work has been done on the Parks Highway MP99-163 Drainage & Culvert Improvements project.

- Environmental Assessment – Categorical Exclusion (CE) approved November 15, 2022
- Preliminary Design on Phase 1 culverts to about the 75% level.
- Preliminary Design on Phase 2 Railroad Creek Bridge to about the 25% level
- Preliminary Design on Phase 3 culverts and bridges to about 15% level
- 2019 HSIP: Parks Highway Systemic Passing Lanes MP123.5-163: Hydrological and Hydraulic Summary Report
- 2017 DOT&PF Culvert Inventory and Inspection Summary Parks Highway Mile Post 99-163

Culvert AOP Program Funds Request

Alaska DOT&PF would replace 12 fish passage barrier culverts within the scope of the Parks Highway MP99-163 Drainage and Culvert Improvements.

Table 2
Parks AOP Grant Components

Culvert Location (Milepost)	Anticipated Improvement	Estimated Construction	Estimated Federal Share	Estimated State Match
Phase 1 – Summer/Fall 2023 Anticipated Construction Fund Obligation				
MP 107.5	Culvert	~$1,200,000	$960,000	$240,000
MP 107.7	Culvert	~$1,100,000	880,000	$220,000
MP 111.5	Culvert	~$1,300,000	$1,040,000	$260,000
MP 119.3	Culvert	~$1,200,000	$960,000	$240,000
MP 120.3	Culvert	~$1,400,000	$1,120,000	$280,000
Phase 2 – 2024 Anticipated Construction Fund Obligation				
Culvert Location (Milepost)	**Anticipated Improvement**	**Estimated Construction**	**Estimated Federal Share**	**Estimated State Match**
MP 128.5	Railroad Creek Bridge	~$9,000,000	$7,200,000	$1,800,000
Phase 3 – 2025 Anticipated Construction Fund Obligation				
Culvert Location (Milepost)	**Anticipated Improvement**	**Estimated Construction**	**Estimated Federal Share**	**Estimated State Match**
MP 101.3	Culvert	~$1,100,000	$880,000	$220,000
MP 109.7	Sawmill Creek Bridge	~$7,500,000	$6,000,000	$1,500,000
MP 123.5	Culvert	~$1,000,000	$800,000	$200,000
MP 133.1	Culvert	~$2,500,000	$2,000,000	$500,000
MP 159.8	Horseshoe Creek Bridge	~$9,000,000	$7,200,000	$1,800,000
MP 161.4	Culvert	~$1,400,000	$1,120,000	$280,000

This project will replace 9 sites with designed fish passage culverts and 3 sites with bridges. The requested funding would be used on identified sites on **Table 2** as funding allows.

This estimate for replacement includes 11.11% Mobilization and Demobilization costs, 15% Construction Engineering, 20% Contingency, and 7.18% ICAP. Traffic maintenance and approach roadway costs are not included in the base cost estimates.

The Culvert AOP Program would fund 66% of the estimated total fish passage need ($37,700,000) within this project. The Parks Highway MP99-163 Drainage and Culvert Improvement project also includes an additional $12,700,000 for fish passage culverts in Phase 3 and $10,800,000 in drainage improvements that will be funded through the federal formula program (State match is 9%). Total project construction cost (fish passage + drainage) for the first 3 phases of this project is estimated at $48,500,000.

PROJECT SELECTION CRITERIA

Criterion 1 – Conservation Benefits to Anadromous Fish

The streams in this project proposal support Chinook, coho, sockeye, chum and pink salmon. Coho and Chinook salmon are important prey species for Cook Inlet Beluga whale and the WDP Stellar Sea Lions.

Much of the critical habitat for CI Beluga whale incudes the northern portion of Cook Inlet, while the mouth of the Susitna River is an important foraging spot during fishery runs (Huntington 2002, Goetz et al. 2012). All the proposed crossings in this project area are located within the Susitna River Watershed.

Salmon are an essential feature of CI Beluga critical habitat (*76 FR 20180*; *50 CFR Part 226.220*), and some species, most notably Chinook, have had reductions in run strength in Cook Inlet and throughout Alaska. Improving access to quality spawning and rearing habitat within the Susitna River Drainage through culvert replacement, also benefits food resources for the CI Beluga.

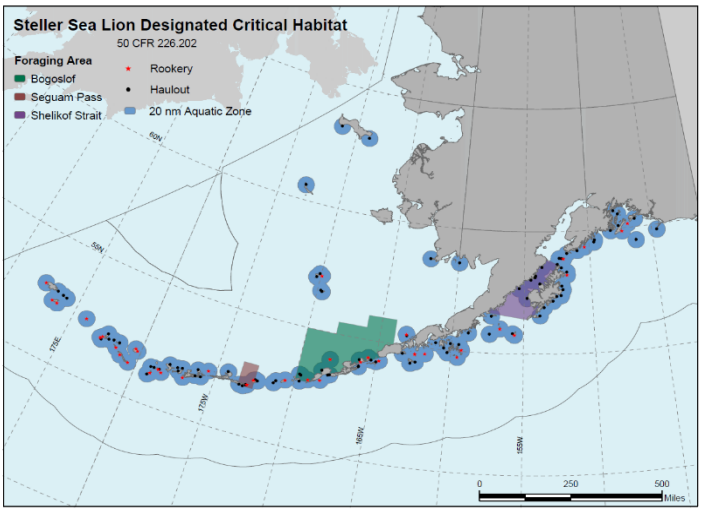

Figure 3
WDP Stellar Sea Lion Range

Upper Cook Inlet is not Critical Habitat for WDP Stellar Sea Lions, however Pacific salmon returning to the Susitna River Watershed must pass through forging habitat listed in the Stellar Sea Lions Critical Habitat. **Figure 3** delineates the range of Stellar Sea Lion critical habitat in Alaska.

This project contributes to the ecological resilience for species vulnerable to climate change by improving pristine coho and Chinook salmon habitat. Within the Cook Inlet Area, ADF&G lists five Stocks of Concern[3] and two of these include stocks located with the Susitna River Watershed, including the Chinook salmon on Alexander Creek and the East Susitna River.

This project conforms with the ADF&G's Fish Passage Improvement Program, which rates and addresses passability of culverts on fish bearing streams[4]. ADF&G identified and assessed over 580 road-stream crossing sites for fish passage throughout the Mat-Su Borough between 2009 and 2011 (O'Doherty & Eisenman 2022). In 2012, approximately 52% of these culverts were rated as Red or likely barriers to juvenile fish passage, and a further 18% as Gray or partial barriers (O'Doherty & Eisenman 2022). Those culverts impeded access to an estimated 633 miles of upstream habitat, including 214 miles catalogued Anadromous Waters (ADF&G 2012) and to an estimated 6,600 acres of lakes.

Using this data, ADF&G has created a prioritization for culverts in the Mat-Su Borough that uses the severity of the barrier, the extent of upstream habitat and the diversity of species using the stream (O'Doherty and Eisenman 2022). This project would include three of the top 50 priority sites in the Mat-Su Borough (O'Doherty and Eisenman 2022).

The potential benefits of the proposed project are great to Chinook, coho and sockeye salmon and to those who count on an abundant supply of these fish. These species spend up to three years in fresh water, and may even migrate between watersheds to exploit favorable riverine and wetland habitats. Stream crossings, especially those constructed using culverts, can significantly affect fish populations by delaying, impeding, or blocking fish migrations, and can eliminate access to entire stream systems. Unrestricted access via stream corridors to spawning, rearing and overwintering habitats is essential to maintaining salmonid production as well as healthy populations of resident trout and other fish (Jackson 2003).

[3] There are 19 Fish Stocks of Concern noted by ADF&G statewide. The Sustainable Salmon Fisheries Policy defines levels of concern based on issues of Yield, Management, and Conservation.

[4] ADF&G's Fish Passage Improvement Program rating of a culvert's ability to pass fish is determined by ADF&G's Level one assessment protocols. These protocols use a combination of physical measurements of the culvert and stream channel to classify a culvert's passablity to juvenile salmonids, using a decision matrix. These ratings are as follows: a rating of "red" indicates the culvert is likely a barrier to juvenile fish passage; a rating of "grey" indicates conditions may be inadequate for fish passage; or a "green" rating indicated conditions are likely adequate for fish passage. A 55 mm juvenile coho salmon is the model fish species for the decision matrix. Juvenile coho were chosen because they are believed to be the weakest swimmers among juvenile salmonids. Therefore, culverts that are passable by a 55 mm coho should be passable by all other fish species.

Movement of juvenile salmon and resident trout has been observed in response to a variety of environmental factors, including high and low flow events, changes in stream temperature, predation pressure, population densities and the availability of food or shelter (Gowan et al. 1994; Robison et al. 1999; Kahler and Quinn 1998). Studies in coastal Washington streams documented the movement of juvenile Coho salmon, steelhead trout and coastal cutthroat trout and determined that movers grew faster than non-movers (Taylor and Love 2003). Most fish passage barriers in the Mat-Su Borough primarily affect the movement of juvenile fish but undersized culverts are often barriers to adults at low and high flow.

The fish produced in streams within the Susitna River Watershed not only support food sources for federally recognized marine mammals and supply a growing commercial, sport, and recreational fishing industry that contributes in excess of several hundred million dollars to the southcentral Alaska economy. The Susitna River supports Alaska's fourth largest Chinook salmon population and the second largest recreational Chinook salmon fishery.

The following figures discuss qualitative and quantitative evidence supporting the proposed project benefits to conservation and to the ecosystem.

Figure 4
Site 20501413

These pictures of the culvert crossing at the Rabideux Creek tributary show the low constriction ratio and condition of the culvert. Replacing this culvert with a fish friendly structure will allow juvenile coho and Chinook better access to 3 miles of upstream habitat and 8.3 acres of lake habitat.

Figure 5
Site 20501422

This culvert feeds a tributary to Susitna River near Talkeetna, at Parks Highway MP 101.3, and impeded access to approximately 6.5 km of mapped stream habitat and extensive wetlands. This pipe is currently a barrier to both adults and juvenile salmon. There is a beaver fence on the downstream site. The condition of the pipe has resulted in a compound gradient inside the pipe, and an inlet perch.

Figure 6
Site 20501387

This culvert on Railroad Creek is located at Parks Highway MP 128.5 and is a tributary to the Chulitna River. The pipe is too small for the system and hydrologic flows exceed the capacity of the pipe, as evident by the large sediment wedge and collection of woody debris on the upstream side of the pipe and scour pool on the downstream end of the pipe. A compound gradient inside the pipe adds to the potential difficulty for juvenile coho passage during certain flows. This is currently the only known barrier on this system and would open up roughly 19 miles upstream habitat and 272 acres of lake habitat for coho and pink salmon.

Figure 7
Site 20501422

This culvert feeds a tributary to Susitna River near Talkeetna, at Parks Highway MP 101.3, and impeded access to approximately 6.5 km of mapped stream habitat and extensive wetlands. This pipe is currently a barrier to both adults and juvenile salmon. There is a beaver fence on the downstream site. The condition of the pipe has resulted in a compound gradient inside the pipe, and an inlet perch.

Figure 8
Site 20501392

This culvert is part of the Chulitna River tributary located at MP 123.5 of the Parks Highway. It impedes access to approximately 7.72 miles of mapped stream habitat and 69 acres of lake habitat in an entirely undeveloped area. The outfall height of this culvert is 0.87 feet.

Figure 9
Site 20502152

This culvert, on an unnamed tributary of the Chulitna River located at Parks Highway MP 119.3, shows damage to the inlet and outlet and is sagging in the middle. The severe bend of the inlet has caused it to separate from the rest of the pipe and created a 10-foot long compound gradient. The maximum grade is estimated at 10% and the length of bent up pipe is 10 feet. Beaver dams above and below culvert create large elevation

Figure 10
Site 20501393

This culvert feeds a tributary to the Chulitna River on the Parks Highway MP 120.3. Replacing this culvert would open up 1.67 miles upstream habitat and 22 acres of lake habitat.

Figure 5
Site 20501411

This culvert is in an unnamed tributary to Rabideaux Creek at Parks Highway MP 111.5. The inlet side of the culvert is blocked by a beaver dam. If replaced it would open up 1.91 miles of upstream habitat.

Figure 6
Site 20501412

A battery of culverts at Parks Highway MP 109.7. Replacing these pipes with a bridge would improve hydraulic transport. This site would improve passage for coho and Chinook salmon giving access to 15 miles of upstream habitat.

Figure 7
Site 20501383

This culvert on Horseshoe Creek at Parks Highway MP 159.8 shows constriction at low and high flows and sediment wedge at the inlet. This site impedes access to approximately 8.29 miles of mapped stream habitat and extensive wetlands in an entirely undeveloped area. This culvert is undersized and has an outfall of 1.42 feet.

Criterion 2 -- Regional and Watershed Context

Chinook, coho, sockeye, pink, and chum salmon all return in great numbers to the streams and lakes of the Mat-Su Basin each summer to spawn. Yet rapid growth and urbanization in the Mat-Su Basin is threatening the fish habitat necessary to sustain healthy salmon populations.

The current pace of population growth in the region, combined with the current regulatory framework, enforcement, and common development and recreation practices, have many people concerned that these life-quality values cannot be maintained. The greatest risk to habitat for salmon and other freshwater fish in the Mat-Su Basin may be many small actions that compound over time to degrade riparian habitat, block fish passage, and impact water quality, quantity and flow.

After six years of falling below escapement goals, the Alaska Board of Fisheries listed Susitna sockeye salmon as a Stock of Concern in 2008. The Chulitna River Chinook salmon stock has been listed as an ADF&G Stock of Concern since 2010[5].Many of the culverts to be replaced are tributaries to the Chulitna River.

The Matanuska-Susitna Basin Salmon Habitat Partnership (MSBSHP) was formed to address increasing impacts on salmon habitat from human use and development in the Mat-Su Basin with a collaborative, cooperative, and non-regulatory approach. Officially recognized as a National Fish Habitat Partnership in 2008, the partnership includes 65 organizations that represent federal, state, local, and Tribal governments, non-profits, business and fishing interests. Both, DOT&PF and ADF&G are members of the partnership.

The MSBSHP[6] Strategic Plan identifies as a goal the need to address culverts that block or impede fish passage. The 2019 Strategic Action Plan sets an objective of increasing catalogues miles of anadromous waters by 10 percent and address fish passage in 15 culverts by 2023[7]. This project would help achieve this goal (MSBSHP 2019).

Criterion 3 – Ecosystem Benefits

This project would preserve ecological connectivity in the project area by replacing traditional pipe culverts with culverts that meet stream-simulation design criteria. Stream simulation culverts are the preferred method in constructing small road-stream culvert crossings in Alaska, with over 300 having been installed since 2005. Approximately 160 of those have been located in the Mat-Su Borough, Municipality of Anchorage, and West Cook Inlet.

For much of this stretch of highway, culverts are the only barriers along the intersecting streams. Perched culvert outlets, excessive water velocities, constricted stream channels, debris plugged culverts or culverts with inadequate water depth often impact fish passage by delaying or impeding fish movements. The proposed design supports hydrogeomorphic processes that would maintain or improve habitat both upstream and downstream of the culvert.

[5] State of Alaska Special Status Species: Fish Stocks of Concern. Websearched January 2023.
[6] Mat-Su Basin Salmon Habitat Partnership Website.
[7] Conserving Salmon Habitat in the Mat-Su Basin: Organizational Focus and Updated Conservation Strategies of the Mat-Su Basin Salmon Habitat Partnership. Addendum to the 2013 Partnership Strategic Action Plan. June, 2019.

Stream simulated culverts would be designed, constructed, and maintained so as to provide for ecological functioning of the stream, including connectivity of wetlands and riparian areas adjacent to stream channels to allow for the unrestricted movement of water, all species of fish and wildlife, nutrient, sediment and woody debris, to the greatest extent possible. In this way the physical, chemical and biological processes that sustain rivers and floodplain ecosystems would be positively affected.

Native aquatic and terrestrial species would benefit by the unrestricted access via stream corridors to spawning, rearing, and overwintering populations of anadromous fish and salmonoids, as well as healthy populations of resident trout and other fish (Jackson 2003).

Criterion 4 -- Project Design and Delivery Methods

DOT&PF will collaborate with the ADF&G and be responsible to complete all AOP culvert crossing designs and specifications. DOT&PF will be responsible for securing and managing construction contractors through a competitive bid process. Work will be done in accordance with the Highway Preconstruction Manual (HPCM), Alaska Construction Manual (ACM) and the Alaska Highway Drainage Manual (AHDM) that follow both national AASHTO design standards and best practices specific to Alaskan conditions.

DOT&PF will partner with the ADF&G and use guidelines and procedures identified in our Memorandum of Agreement (MOA) to ensure that appropriate stream crossing culverts are designed to provide efficient passage for all fish life stages to freely migrate through the culvert crossings.

DOT uses AASHTO Fish passage design guidelines for developing and designing fish passage culverts (Hydraulic Engineering Circular No. 26 – Culvert Design for Aquatic Organism Passage).

These criteria address both the hydrological needs and the aquatic organism needs with a design meant to help stabilize both upstream and downstream hydrological functions and allow unrestricted fish passage at most flows and avoid the detrimental effects that undersized and over steepened culverts have on stream erosion and fish passage.

Criterion 5 – Project Monitoring and Evaluation

The project contributed to the Project Monitoring and Evaluation Criteria because it includes data collection and monitoring components. The data collection and monitoring will occur before, during, and after construction.

Implementation monitoring metrics are anticipated to be:

- Construction Survey including as-built survey;
- Visual observations and counts of presence/absence of adult and juvenile salmon, dolly varden char and coastal cutthroat trout (within a month after project completion or as fish migrations are occurring); and
- Inspection during construction by DOT&PF to provide oversight during implementation to ensure the project is constructed correctly.

Observations of fish presence and passage will be part of the inspections conducted by ADF&G staff. The project will generate environmental data and information, including the status of fish passage at the crossing before and after construction (using ADF&G fish passage criteria – red, green, grey, black), and documentation of the fish species and life stages present and their visual observation of successful passage through the culvert structure after construction.

All fish data will be submitted to the ADF&G Alaska Freshwater Fish Inventory (AFFI) and the Anadromous Waters Catalog (AWC), as a stipulation in the Fish Habitat permit issued by that agency.

Post-construction topographic data will be collected by the construction contractor or sub-contractor within one year of implementation. Topographic data will be collected via standard survey techniques and the data will be available no later than 2 years after project completion.

All future sub-awardees not identified in this plan will have as a condition of their contract acceptance of this data sharing plan. Any additional data sharing stipulations for future sub-awardees may be outlined at that time and described in their contract.

ADF&G can resurvey the culverts using as-built surveys in the future using their recently developed culvert stability assessment protocols (O'Doherty 2021). These protocols were modified from the Western Federal Lands Highway Division protocols for monitoring AOP culverts and bridges (WFLHD 2020).

Criterion 6 – Climate Change, Sustainability and Resilience

Climate change is predicted to dramatically change hydrologic processes across Alaska. Numerous studies have demonstrated shifts in the timing and magnitude of total precipitation and river discharge, a decreasing trend in snow cover, melting of glaciers, thawing of permafrost, earlier river ice-cover breakup, and changes in many geomorphological processes (Alaska Drainage Manual, Chapter 8: Hydrology). Chinook, coho and sockeye salmon populations are most vulnerable to expected environmental shifts with climate change, which include both high and low flows and warming oceans and rivers[8].

High water temperatures are detrimental to fish that depend on cool, clean, well oxygenated water. Changes in hydrology, such as reduced baseflows could potentially exacerbate these conditions.

Removing barriers to upstream migration and restoring stream flow regimes can increase cold water refuges and reduce erosion and sediment delivery.

Culvert installations can significantly decrease the probability of aquatic organism movement between habitat patches. Common obstructions include excessive water velocities, drops at culvert inlets and outlets, physical barriers such as weirs, baffles or debris caught in the culvert barrel, excessive turbulence caused by inlet contraction and low flows that provide too little depth for fish to swim. (Culvert Design for Aquatic Organism Passage)

During storm events, road–stream crossings may fail catastrophically when floodwaters exceed the hydraulic capacity of a culvert and/or sediment and debris plug the culvert. Stream simulation designs are recognized as more effective in facilitating juvenile and adult fish and other AOP than traditional culvert designs. (Gillespie, et.al.)

Alaska incorporates AASHTO design standards on culverts through the Alaska Drainage Manual and designs culverts in consultation with ADF&G to generally sustain stream health in a multitude of water conditions and promote species resilience. DOT&PF follows HEC-26 Hydraulic Engineering Circular guidelines for AOP.

Culverts used in stream crossings will be designed and constructed to provide ecological functioning of the stream, including connectivity to wetlands and adjacent riparian areas for unrestricted movement of water, all species of sigh and wildlife, nutrients, sediment and woody debris to the greatest extent possible.

Each of the culverts in this grant request will be designed for 100-year flows to prevent clogging and withstand large water events. Fish passage culverts will be designed to mimic natural stream characteristics to prevent clogging and hold sediment in place. Where appropriate, the size of the culvert will be not less than 1.0 times the bankfull width of the channel to maintain channel features and provide adequate headroom for debris.

Criterion 7 -- Equity and Barriers to Opportunity

[8] West Coast Salmon Vulnerable to Climate Change, but Some Show Resilience to Shifting Environment. NOAA Publication. July, 25, 2019.

All Alaska Native tribes are recognized as underserved communities by the federal government. This project is found within the traditional lands of the Ahtna Athabascan people, who today are represented by Ahtna, Inc.[9].

Traditional fisheries management strategies have for centuries been important in teaching young Athabascans to respect their relationships with salmon and with other members of their local clan (Carothers, et.al., 2021). Access to abundant stocks of salmon continue to be a priority for Athabaskan people today as a way to exercise their sovereignty (Ahtna Kanas, 2017).

Subsistence and personal use fisheries provide important source of protein and an economic benefit to underserved communities in the project area. Fishers harvest about 115,000 Chinook and coho salmon from Mat-Su basin streams each year. Harvest of fish and wildlife for subsistence purposes in the Mat-Su regions is, on average, 27-40 pounds annually per person compared to Anchorage where it is 16-35 pounds per person (Leask et. al. 2001).

Alaska sets its minimum rates of pay for DOT&PF projects above Davis-Bacon wage rates, creating a level playing field or all employees to enjoy high paying jobs on both federal and nonfederal construction projects. This project will support the hiring and retention of historically underrepresented groups of workers. DOT&PF has a vibrant Disadvantaged Business Enterprise Program and a DBE Utilization Goal of 8.63 percent for federally funded projects. The Department's policy against discrimination includes prohibitions from discriminating against anyone in the areas of contracting, purchasing, design and planning (P&P 01.02.020).

This project will also support use of local and economic hiring preferences when possible and applicable, workforce development programs and registered apprenticeships, and labor management partnerships. The Department's On-The-Job Training program works closely with the Alaska Works Partnership, Alaska Procurement Technical Assistance Program to identify minority, women and other disadvantaged populations to benefit from careers in the construction trades. The Department employed approximately 70 apprentices through the DOT&PF OJT program in 2020.

In addition, the Department has done outreach with the Alaska Native Science and Engineering Program to recruit minority interns interested in civil engineering careers in the Transportation Industry. The Design and Engineering Services Section recently participated in an Equity Peer Exchange with Kentucky, Minnesota and Wisconsin hosted by FHWA with the intention of formulating an Equity and Inclusion Plan.

PROJECT READINESS AND ENVIRONMENTAL REVIEW AND PERMITTING RISK

Technical feasibility:

The site characteristics at this location support the proposed approach to providing fish passage. The proposed approach for providing AOP passage is feasible from both biological and engineering perspectives. The designs are based on a standard DOT&PF designs modified to meet site geology and culvert and bridge configurations. Typically, DOT&PF projects can be accomplished in under a five-year time frame. The proposed approach for providing AOP improvements was selected in collaboration with the Alaska DF&G and therefore represents the best approach for the site and species or life stage(s) targeted by the project.

Environmental permits anticipated to include the U.S. Army Corps of Engineers Section 10/404 permit, Clean Water Act Section Water Quality Certification, a Section 106 review, Formal Consultation under Section 7 of the Endangered Species Act, an NMFS Incidental Harassment Authorization (IHA), an Essential Fish Habitat Consultation with NMFS under the Magnuson-Stevens Act, and coordination with ADF&G and the Alaska Department of Environmental Conservation and USFWS. All necessary project partners are State agencies with long-standing cooperative status.

[9] Ahtna, Inc. is one of 13 Alaska Native Regional Corporations established by Congress under the terms of the Alaska Native Claims Settlement Act of 1971.

Environmental studies and documentation will include a Section 106 Programmatic Allowance, a Biological Assessment in support of Section 7 Formal Consultation, an IHA permit application, an EFH Assessment for the EFH Consultation, and other analysis is support of the Federal Environmental NEPA document.

The scope of work is well defined and understood. Risk mitigation during design will primarily include time and supply chain considerations. Careful attention is needed for scheduling and environmental permitting activities to be completed on time to advertise for construction bids and construct the project. Risk mitigation is described in the risk register.

Cost estimates employ itemized quantities and adjusted historical costs based on past bid results and includes contingency levels and risk mitigation measures. Our confidence in the cost estimating work to date is relatively high. Project funds will be obligated sufficiently in advance of the statutory deadline for the AOP. DOT&PF is committed to providing a 20% match and a letter to that effect is posted to the project page.

The timeline provides sufficient time to handle any unexpected delays. There is no ROW acquisition associated with the project and permitting and approvals are identified and consistent with project timeline.

Project schedule:

This project has been divided into three phases. With this grant, Phase 1 would replace 5 culverts on anadromous streams with fish passage culverts. These sites are at the 75% design phase and is anticipated to be advertised in the summer of 2023 with construction beginning in late 2023/early 2024.

Phase 2 would replace a fish passage barrier culvert on Railroad Creek with a bridge. This phase is at about 25% design and is anticipated to ready for construction in late 2024/2025.

Phase 3 would replace four culverts with fish passage culverts and two bridges. These culverts and bridges are currently at the 10% design stage and construction is anticipated in the 2025/2026 construction season.

Table 3
Project Schedule

Project Schedule	2021	2022	2023	2024	2025	2026
Project Phase 1						
Environmental NEPA	■	■				
Design		■	■			
Construction			■	■	■	
Project Phase 2						
Environmental NEPA	■	■				
Design		■	■	■		
Construction				■	■	
Project Phase 3						
Environmental NEPA	■	■				
Design				■	■	
Construction					■	■

This project is in the 2020-2023 Alaska STIP and funds have been obligated for this project for Design, ROW, and Utilities.

Environmental permits and reviews

All appropriate ADF&G and Army Corps of Engineer (ACOE) permits will be secured once designs are finalized. At this time appropriate NEPA, Endangered Species Act and Historical Preservation Act consultations will be completed to ensure project success. There are currently no known endangered species in the project area. DOT&PF routinely permits these types of projects as routine maintenance activities. Permitting is anticipated to take 3 months.

The existing culverts are within the State's right-of-way (ROW). The replacement bridge structure would also be assumed to largely be within existing ROW. Design of the bridge and culvert structures would be designed by contracted consultants and approved by DOT&PF engineers.

State and local approvals

Temporary construction permits (TCP) will be developed and coordinated with the adjacent property owners prior to construction. These TCPs allow the construction contractor to work. Acquiring these

permits takes coordination with and education of the property owner as to the impacts and benefits of the project.

Assessment of Project Risks and Mitigation Strategies

The project is low risk for schedule delays. The DOT&PF has successfully replaced similar culverts, and mitigation strategies have been thought through and are anticipated to be quickly implemented with the SHPO. Right-of-way acquisition is not expected, but all DOT&PF projects that any necessary ROW is acquired prior to awarding the construction project. The project's risk register includes risks identified – supply chain and workforce, mainly, as well as environmental approval delays – with mitigation strategies that will be undertaken if necessary.

Item	Discipline	Risk Description	Comment / Calculation	Mitigation Comments	Mitigation Metho	Probability
1	Project Management	Limited labor resources within region. Work schedule will require outside labor.	Pay premium cost for skilled labor, schedule impacts if crews cannot be adequately staffed.	Look into alternative delivery methods such as CMGC to ensure availablity of Contractor	DIRECT COST	High
2	Project Management	Cost Above Available Funding	Project wouldn't get built, current safety and mobility issues remain. Schedule could be affected by the timing of funding throughout the project.	Work with stakeholders to develop cost-saving alternative solutions that meet project goals within budget. Look into alternative delviery methods such as CMGC to ensure accurate estimates throughout the project.	MANAGE DURING EXECUTION	Medium
3	Project Management	Estimate deviations	Steel and other items are rising in price and historic data is not accurate for estimating future prices.	Perform both historic costs (EE) and bottom up pricing (ICE). Reach out to suppliers early and track material costs during design to try to predict the future value.	MANAGE DURING EXECUTION	High
4	Environmental Project Management	Unknown permit requirements that could limit or constrain operations and or means/methods.	Impacts to access, work windows and restricted work areas could affect productivity, schedule and cost.	Permitting coordinator will facilitate upfront engagement with resource agencies to understand likely restrictions and educate them on construction methodology. Leverage relationships with local/state/federal agencies and experience working with them.	MANAGE DURING EXECUTION	Low
5	Environmental	Section 106 and 4(f) environmental impacts	The whole project area has not been evaluated as of yet. Depending on the findings it could be difficult to set the new alignment.	Conduct thorough 106 survey and 4(f) processes, identify and mitigate issues early in project life cycle	MANAGE DURING EXECUTION	Medium
6	Project Management	Weather Impacts		Include weather days in schedule calendars. Re-sequence work, add additional resources.	MANAGE DURING EXECUTION	Low
7	Project Management	Material availability	There may not be enough quality material in close proximity to the project area which would mean higher costs to get it imported.	Identify known material sources early and secure necessary permits/agreements. If there is not sufficient material close use innovative means, such as the train, to haul material in from other locations.	MANAGE DURING EXECUTION	Low

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