

MEMORANDUM

State of Alaska Department of Transportation & Public Facilities Northern Region Design & Engineering Services

TO: Sarah Schacher, P.E.
Preconstruction Engineer
Northern Region

DATE: 09/16/2020

FILE NO: H:\PROJECTS\CRH\CRH MP 21.5
CULVERT\6 DESIGN\2 DSR\DSR-
ABBREVIATED.DOC

THRU: Jake Allen, P.E.
Project Delivery Lead
Northern Region

TELEPHONE NO: (907)451-5357

SUBJECT: Copper River Highway
MP 21.5 Culvert Replacement
900148
Abbreviated Design Study Report

FROM: David K. Fischer, P.E.
Engineering Manager
Northern Region

Introduction/History

The previous existing culvert located at milepost 21.5 of the Copper River Highway outside of Cordova catastrophically failed in 2018 and replacement with a 60" diameter pipe was allowed under the Alaska Department of Fish and Game permit stipulation that it would be replaced with a properly sized fish pass pipe prior to December 31, 2021. This project will replace that 5 foot diameter pipe installed during the emergency repairs by M&O.

Project Description

This project replaces an existing emergency repair pipe in an un-named creek specified as important to the spawning, rearing or migration of anadromous fishes with a 10 foot diameter aluminum SPP Tier 1 fish passage pipe in accordance with stipulations in Fish Habitat Permit FH18-II-0124. This creek is known to support coho salmon and cutthroat trout.

Design Standards

The project will be developed in accordance with the following standards:

Agency	Standard
DOT&PF	<ul style="list-style-type: none">• Highway Preconstruction Manual (PCM)• Applicable Chief Engineer's Directives• Alaska Highway Drainage Manual• FHWA Hydraulic Engineering Circular No. 22, Third Edition• Alaska Traffic Manual, 2016 (ATM)• Standard Specifications for Highway Construction, 2020
AASHTO	<ul style="list-style-type: none">• A Policy on Geometric Design of Highways and Streets, 2011 (Green Book)• Roadside Design Guide, 2012

Design Exceptions and Design Waivers

There are no design exceptions or design waivers for this project.

Design Alternatives

Hydraulic flow was modeled and pipes sized accordingly. Appropriately sized aluminum and steel pipe arches and structural plate pipes were considered.

Preferred Design Alternative

A 10 foot diameter aluminum structural plate pipe was chosen as there was no need to introduce the added installation complexity associated with a pipe arch as there was acceptable cover with a round pipe. 3 layers of Type 2 reinforcement geotextile will be used in the foundation under the pipe to help prevent movement post construction. The inlet and outlet of the pipe will be armored with class 1 riprap and a low flow fish passage riprap channel will be constructed in the body of the pipe.

3R Analysis

Not applicable.

Traffic Analysis

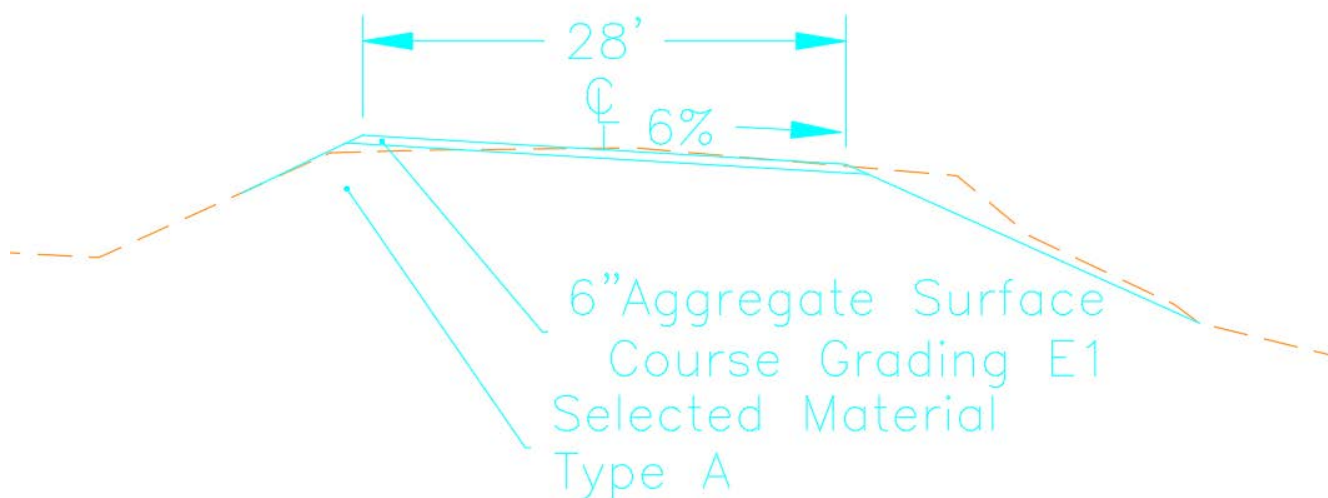
Not applicable.

Horizontal/Vertical Alignment

The pipe replacement is located midway through a 150 foot long vertical curve with a .06% grade in and a -.6% grade out, the alignment at the project location is in a 1455 foot radius horizontal curve. Less than 200 feet of roadway will be rebuilt for this pipe replacement project.

Typical Section(s)

The gravel roadway will be reconstructed through the pipe excavation section with a 28 foot top width with a 6% superelevation and 6" of surfacing aggregate placed over suitable borrow material. The pipe inlet and outlet slopes will be armored with rip rap. Fill slopes will vary with depth of fill with a 2:1 maximum slope.



Pavement Design

N/A this roadway is not paved.

Preliminary Bridge Layout

N/A there is no bridge.

Right-of-Way Requirements

All work will be completed in the existing Right-of-Way.

Maintenance Considerations

The increased hydraulic capacity of the properly sized pipe should reduce risk of future catastrophic overtopping events requiring emergency action by M&O.

Material Sources

Materials will be contractor furnished as there are private material sources available near the project.

Utility Relocation & Coordination

There were no utilities present on the project at the time of its survey. Cordova Telephone Cooperative was notified on October 31, 2019 that this culvert replacement project was scheduled for construction in 2021 at the latest, as they are currently extending a conduit run from mile 13 to mile 27 along the south shoulder of the Copper River Highway. If conflicts exists at the time of culvert installation, those will be coordinated, but at this time due to anticipated construction schedule it is not anticipated the utility would be eligible for relocation benefits.

Access Control Features

Not applicable

Pedestrian/Bicycle (ADA) Provisions

There are no specific pedestrian, bicycle or ADA features. The shoulders of the Copper River Highway will continue to accommodate pedestrians and bicycles.

Safety Improvements

No safety improvements will be made by this project.

Intelligent Transportation System Features

No ITS features are present.

Drainage

The project area is relatively flat. This project is replacing an existing 5 foot diameter pipe with a new 10 foot diameter aluminum structural plate pipe. This pipe passes an unnamed tributary creek in the McKinley Lake drainage, west to end in the Alaganik Slough.

Soil Conditions

The soils investigation and structural foundation exploration reports are both pending. This information will be used to guide the pipe foundation design.

Erosion and Sediment Control

In accordance with the Alaska Pollutant Discharge Elimination System (APDES) General Permit for Alaska, an Erosion and Sediment Control Plan (ESCP) will be provided in the contract plan set.

The area of disturbed ground is estimated to be .33 acres.

The fill slopes being constructed are the major potential erosion features. Embankment slopes will not be constructed steeper than 1.5:1. All slopes will be seeded to provide permanent erosion protection. Construction features that will require temporary or permanent erosion and sediment control measures including, but not limited to:

- Staging areas
- Embankment slopes abutting wetlands
- Disturbed areas around culvert inlets and outlets
- Disturbed roadside ditches draining from the construction site
- Stockpiles including, topsoil piles, spoil piles, and excess soil piles
- Cut/Fill slopes

Best management practices would be implemented during construction to minimize detachment and transport of sediment beyond the construction site. As necessary, in compliance with the APDES General Permit for Construction Activities, the construction contractor would issue a Notice of Intent to the ADEC for storm water discharges associated with construction activities.

Environmental Commitments

There are no environmental commitments and mitigation measures required that are unique to this project as this project is an environmental commitment of a previous emergency repair to install a properly sized fish pass pipe.

Work Zone Traffic Control

The Contractor will be required to develop an approved temporary traffic control plan. The plan will be developed to provide safety to motorists, bicyclists, pedestrians, workers and emergency vehicles as they pass through the work zone. The plan will identify and provide adequate warning, delineation and channelization to assist in guiding road users through the work zone. Replacement of this pipe is feasible using partial width construction methods, ideally a total road closure of sufficient time to install the new pipe will be permitted to allow for a faster and better installation.

Value Engineering

No value engineering is required

Cost Estimate

The estimated costs for this project are as follows:

Design	\$99,000.00
Utilities	\$0.00
Right of Way	\$0.00
Construction	\$519,375.00

(Includes 15% Engineering)

Total Cost of Project

\$618,375.00

Approved: _____
Sarah Schacher, Preconstruction Engineer Date

esb

Attachments: Preliminary Engineers Estimate
CE signature page

Copy to: Preconstruction/Project file
Robert Dunning, M&O District Superintendent
Original to: Barbara Tanner, Chief of Contracts
cc: NR Design Directive 20-01 Distribution

V. Environmental Commitments and Mitigation Measures

avoided during this time in accordance with USF&WS guidance. Canada geese and swans begin nesting April 20.

- Fish Timing window: June 1-July 31.
- The contractor will power wash equipment prior to bringing onto the project.
- The contractor will not use the McKinley Trail as a work area.

VI. Environmental Documentation Approval

N/A YES NO

1. Do any unusual circumstances exist, as described in [23 CFR 771.117\(b\)](#)? *If yes, attach consultation with the NEPA Program Manager demonstrating that a CE is appropriate.*
☐* ☒
2. The project meets the criteria of one of the following [DOT&PF Programmatic Approvals](#) authorized in the Nov. 13, 2017 "[Chief Engineer Directive – Programmatic Categorical Exclusions](#)".
 - *If yes, select the appropriate Programmatic Approval below, and the CE documentation form may be approved by the Regional Environmental Manager.*
 - *If no, the CE documentation form must be approved by a NEPA Program Manager.*
 - a. Programmatic Approval 1 ☐
 - b. Programmatic Approval 2 ☒
 - c. Programmatic Approval 3 ☐

VII. Environmental Documentation Approval Signatures

Prepared by: Kerri L. Martin Date: 09/15/2020
[Signature] Environmental Impact Analyst

Kerri L. Martin
[Print Name] Environmental Impact Analyst

Reviewed by: David K. Fischer Date: 9/15/2020
[Signature] Engineering Manager

David K. Fischer, P.E.
[Print Name] Engineering Manager

Programmatic CE

Approved by: Brett Nelson Date: 9/16/2020
Digitally signed by Brett Nelson
DN: cn=Brett Nelson, o=DOT&PF, ou=Northern
Region, email=brett.nelson@alaska.gov, c=US
Date: 2020.09.16 11:00:53 -08'00'

prelim Project Engineer's Estimate

State Project Number: NFHWY00494

Federal Project Number: 0851071

Project Description: COPPER RIVER HWY MP 21.5 CULVERT REPLACEMENT

Project Line #	Proposal Line #	Item #	Description	Unit	Qty.	Price	Ext. Amount	Owner Furnished Material
Category: Basic Bid								
10		201.0009.0000	Clearing and Grubbing	LS	All Required	5,000.00	5,000.00	
20		202.0001.0000	Removal of Structures and Obstructions	LS	All Required	40,000.00	40,000.00	
30		203.0005.000A	Borrow, Type A	CY	1,300.00	40.00	52,000.00	
40		203.0019.0000	Unclassified Excavation	LS	All Required	10,000.00	10,000.00	
50		205.0005.0000	Controlled Low-Strength Material	CY	100.00	75.00	7,500.00	
60		205.2000.0000	Cofferdam	LS	All Required	5,000.00	5,000.00	
70		301.0004.00E1	Aggregate Surface Course, Grading E-1	CY	71.00	100.00	7,100.00	
80		304.0002.000F	Subbase, Grading F	CY	200.00	75.00	15,000.00	
90		602.0001.0120	Structural Plate Pipe 120" Diameter, 10	LF	85.00	1,500.00	127,500.00	
100		611.0001.0001	Riprap, Class I	CY	300.00	110.00	33,000.00	
110		613.0002.0000	Culvert Marker Post	EACH	2.00	250.00	500.00	
120		628.2001.0000	Fish Passage Riprap	LS	All Required	15,000.00	15,000.00	
130		630.0003.0002	Geotextile, Reinforcement - Type 2	SY	425.00	3.00	1,275.00	
140		631.0002.0001	Geotextile, Erosion Control, Class 1	SY	425.00	3.00	1,275.00	
150		640.0001.0000	Mobilization and Demobilization	LS	All Required	40,000.00	40,000.00	
160		640.0004.0000	Worker Meals and Lodging, or Per Diem	LS	All Required	25,000.00	25,000.00	
170		641.0001.0000	Erosion, Sediment and Pollution Control Administration	LS	All Required	5,000.00	5,000.00	
180		641.0002.0000	Temporary Erosion, Sediment and Pollution Control	CS	All Required	1.00	1.00	
190		641.0004.0000	Temporary Erosion, Sediment and Pollution Control Additives	CS	All Required			
200		641.0005.0000	Temporary Erosion, Sediment and Pollution Control by Directive	CS	All Required			
210		641.0006.0000	Withholding	CS	All Required			
220		642.0001.0000	Construction Surveying	LS	All Required	10,000.00	10,000.00	
230		643.0002.0000	Traffic Maintenance	LS	All Required	20,000.00	20,000.00	
240		643.0021.0000	Road Closure	DAY	5.00	1,000.00	5,000.00	

prelim Project Engineer's Estimate

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Project Line #	Proposal Line #	Item #	Description	Unit	Qty.	Price	Ext. Amount	Owner Furnished Material
250		643.2005.0000	Public Information Program	LS	All Required	5,000.00	5,000.00	
260		643.2013.0000	Portable Changeable Message Board Sign	EACH	1.00	1,000.00	1,000.00	
270		644.0001.0000	Field Office	LS	All Required	10,000.00	10,000.00	
280		644.0006.0000	Vehicle	LS	All Required	5,000.00	5,000.00	
290		644.2001.0000	Engineering Communications, Mobile Hotspots	LS	All Required	3,000.00	3,000.00	
Category Basic Bid Total:							\$449,151.00	
Minus Contractor Furnished CENG Items:							\$18,000.00	
Exc Subtotal:							\$431,151.00	
Construction Engineering Percent/Amount: 15%							\$64,672.65	
Minus Contractor Furnished CENG Items:							\$18,000.00	
State Forces CENG Amount:							\$46,672.65	
Basic Bid Owner Furnished Material Total:							\$0.00	
Category Subtotal (Pay Items + SF CENG + Furn Materials):							\$495,823.65	
Indirect Cost Allocation Plan (ICAP) Percent/Amount: 4.75%							\$23,551.62	
Category Basic Bid Estimate Total:							\$519,375.27	

prelim Project Engineer's Estimate

State Project Number: NFHWY00494

Federal Project Number: 0851071

Project Description: COPPER RIVER HWY MP 21.5 CULVERT REPLACEMENT

Project Line #	Proposal Line #	Item #	Description	Unit	Qty.	Price	Ext. Amount	Owner Furnished Material
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Pay Item Total: NFHWY00494 **\$449,151.00** **29 Items**

SF CENG Amount: \$46,672.65

Owner Furnished Materials (Not part of the Contract): \$0.00

ICAP Amount: \$23,551.62

Project Estimate Total: \$519,375.27

Estimate Bid Contingency Percent/Amount: % \$0.00

Project Estimate Total + Estimate Bid Contingency: \$519,375.27
