Ambler Mining District Access

Preliminary Hydrology Reconnaissance Memorandum

September 2011

AMBLER MINING DISTRICT ACCESS

PRELIMINARY HYDROLOGY RECONNAISSANCE MEMORANDUM

AKSAS 63812

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1.0 INTRODUCTION

1.1 Project Overview and Purpose

The Ambler Mining District Access project proposes to identify, design, and construct a transportation corridor from the Ambler mineral belt to either a port location on the west coast of Alaska or the highway system in the Alaska Interior. The corridor is intended to provide surface transportation access for exploration, development, and production of mineral resources within the Ambler mineral belt.

The Ambler mineral belt and surrounding area contain extensive mineral resources. The south flank of the Brooks Range from the Ambler mineral belt to the Dalton Highway has the most important identified resources of copper and other base metals in Alaska (Hawley and Vant, 2009). Almost $40 million has been spent on exploration of the area since the late 1950's and numerous deposits have been found. Exploration, development, and production of these deposits are limited by the lack of transportation infrastructure.

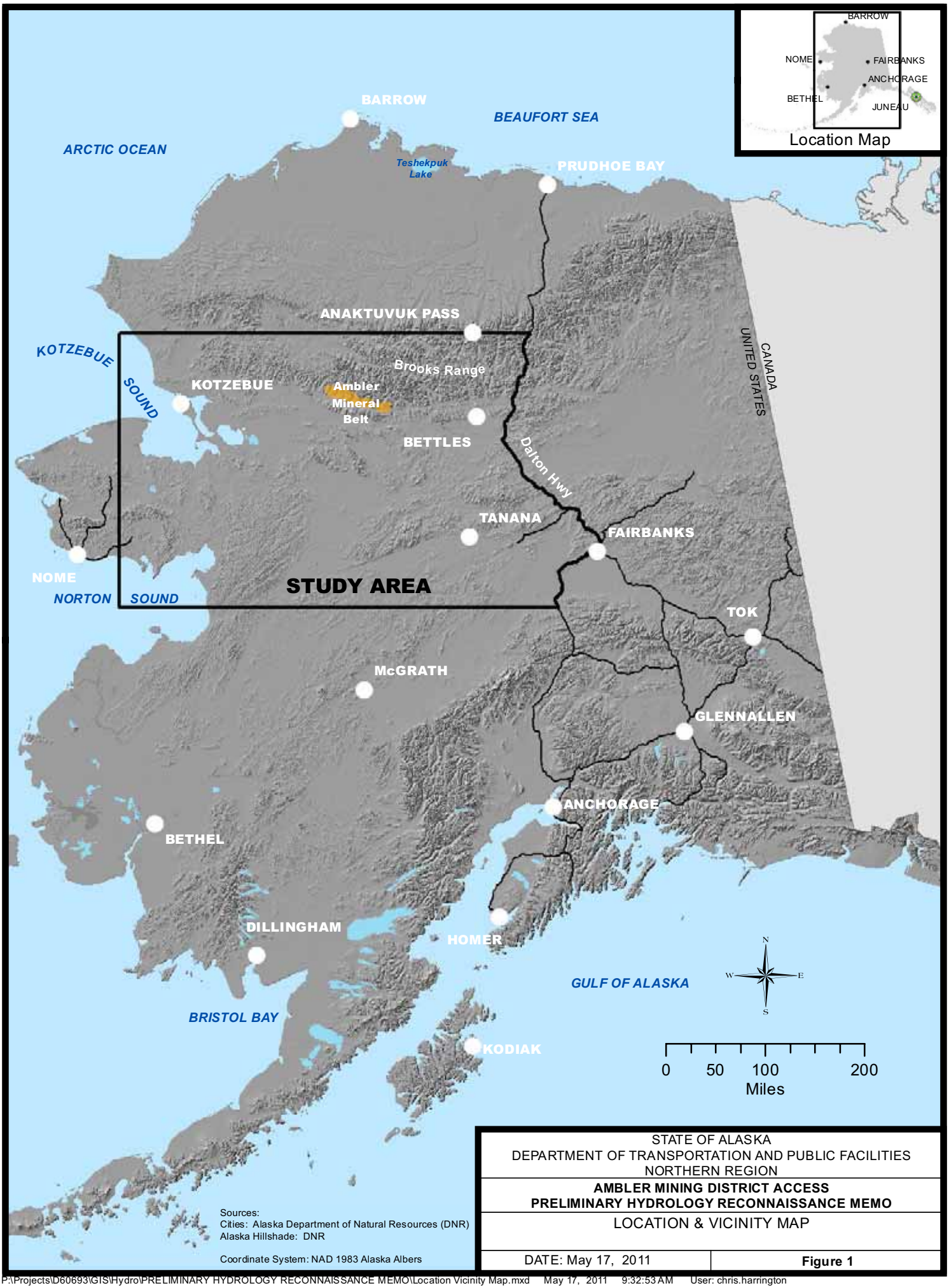
1.2 Project Study Area

The project study area extends from the Ambler mineral belt south to Nenana and from the Dalton Highway to the west coast (Figure 1). Four potential routes have been identified from the Ambler mineral belt to the west coast of Alaska, and four potential routes head east from the Ambler mineral belt to the Dalton Highway or the existing Alaska Railroad Corridor.

1.3 Objectives

The design objectives of the hydrologic components of this project are:

- Protect transportation corridor infrastructure and reduce the risks of failure;
- Protect environmental resources; and
- Minimize long-term maintenance costs.



Sources:
Cities: Alaska Department of Natural Resources (DNR)
Alaska Hillshade: DNR

Coordinate System: NAD 1983 Alaska Albers

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LOCATION & VICINITY MAP

DATE: May 17, 2011 | **Figure 1**

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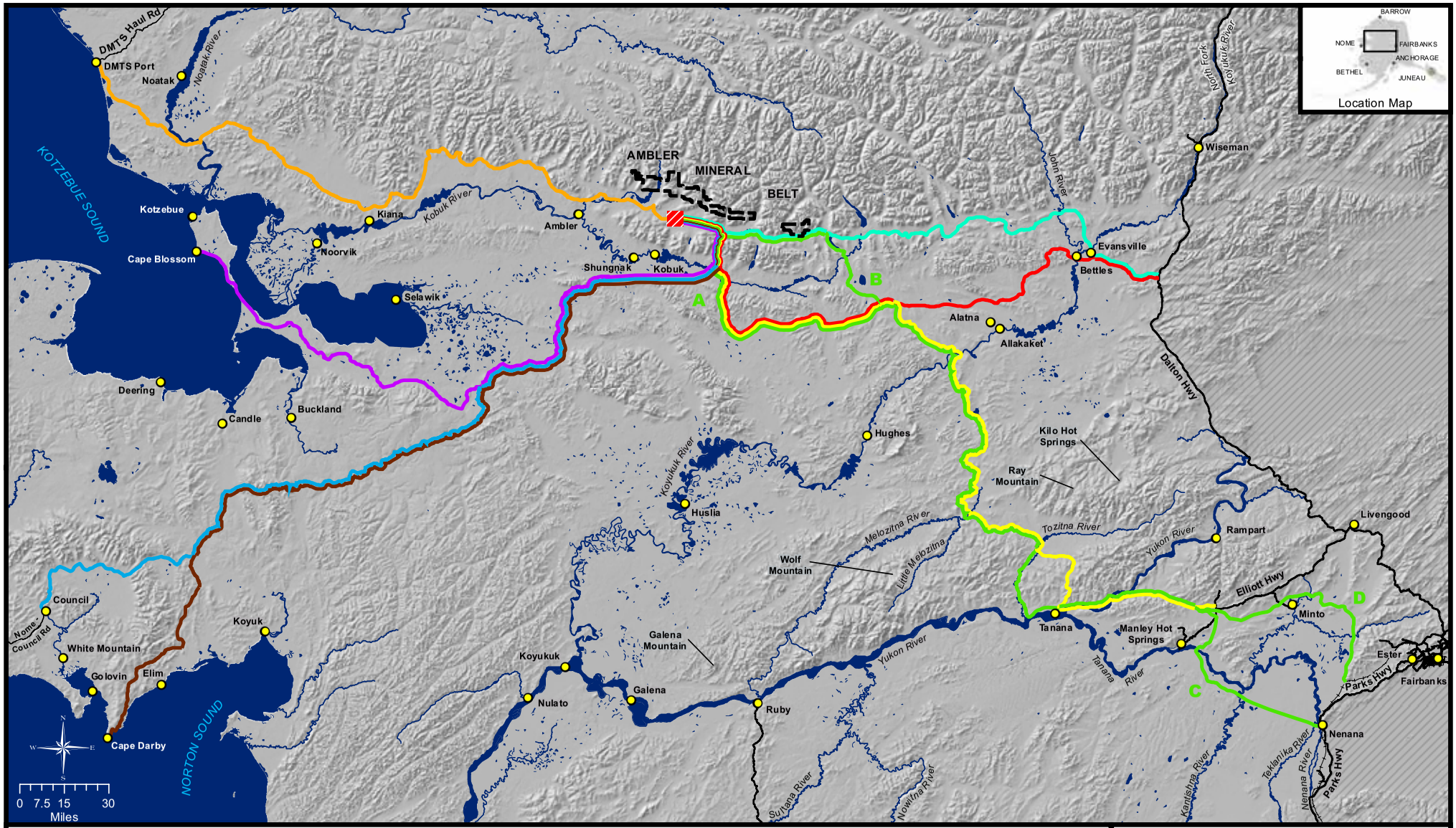
This hydrologic reconnaissance report targets these objectives by:

- Documenting hydrologic characteristics that could affect transportation infrastructure design;
- Identifying design issues related to hydrologic characteristics;
- Discussing design alternatives that minimize risks from flooding, icing, erosion, and other hazards;
- Discussing design alternatives that reduce long-term maintenance demands;
- Identifying types and sizes of drainage structures likely required along proposed corridors; and
- Identifying hydrologic data gaps and proposed field studies to address them.

Development of this report included data collection from a variety of published sources, review, and evaluation of data collected, and identification of data gaps and proposed field studies.

1.4 General Corridor Descriptions

A Corridor Development Memorandum (DOWL HKM, May 2011) was prepared to document the selection of eight potential road and rail transportation access corridors. These eight potential corridors were developed based on historic transportation routes (e.g., winter trails, tractor trails, etc.), previous access studies, topographic information, slope analyses, and aerial imagery. Four corridors start at the Ambler mineral belt and head west or southwest to existing or potential deep-water port sites on the Alaskan coast. Four corridors head east or southeast from the Ambler mineral belt to the Dalton Highway or to the existing Alaska Railroad facilities near Nenana. A detailed description of the corridors is included in the Corridor Development Memorandum and the corridors are reproduced in Figure 2 for ease of reference.



Communities and Place Names
Railroad
Existing Roads
Water
Outside of Project Study Area
Ambler Mineral Belt
Proposed Staging Area
1-Brooks East Corridor 216 Miles (Road Only)
2-Kanuti Flats Corridor 241 Miles (Road Only)
5-DMTS Port Corridor 257 Miles (Road & Rail)
3-Elliott Hwy Corridor 365 Miles (Road Only)
4-Parks Hwy RR Corridor 420-450 Miles (Rail Only)
6-Cape Blossom Corridor 245 Miles (Road & Rail)
7-Selawik Flats Corridor 331 Miles (Road & Rail)
8-Cape Darby Corridor 340 Miles (Road & Rail)

Note: An end point in the approximate center of Ambler Mining District was used as the terminus for the corridors for calculating mileage.
Sources:
Communities and Place Names: DNR, DOT&PF
Existing Roads: DOT&PF
DMTS Haul Road: NANA
Railroad: DNR

Coordinate System: NAD 1983 Alaska Albers

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PRELIMINARY CORRIDORS

DATE: May 23, 2011 | **Figure 2**

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2.0 HYDROLOGY OVERVIEW

2.1 Hydrologic Characteristics of Project Study Area

The hydrologic characteristics within the project study area vary widely due to the diverse range of geological and climatic characteristics. The general hydrologic characteristics are summarized below.

- The major watersheds in the project area include the Yukon River, Tanana River, Koyukuk River, Kobuk River, Noatak River, Selawik River, Buckland River, Tozitna River, Ambler River, Alatna River, and Koyuk River. These watersheds include numerous tributary rivers and streams.
- Flood histories and floodplains of major stream crossings are poorly defined and no 100-year floodplains are mapped in the study area.
- Numerous rivers/streams that cross the proposed corridors at higher elevations are braided channels in broad valleys with glacial alluvium and depositional features. These streams typically contain numerous longitudinal and transverse bars. Banks are usually unstable and sediment transport is significant. Bed loads generally consist of alluvial sediments and course-grained riverbed materials, such as sand, gravels, and cobbles.
- The typical large streams that flow through wide valleys at lower elevations are highly sinuous meandering channels, with substantial side channels and oxbow lakes. These split-channel rivers typically include heavily vegetated islands and banks and have narrower and deeper channels than braided rivers. These watersheds are usually more stable than braided channels.
- Stream channel gradients are steeper in the more mountainous terrain of the Brooks Range. Alluvial fans often form in stream channels where the gradient flattens dramatically over a short distance causing bed load deposition. This morphology is common where steeper tributary channels reach larger streams in valley bottoms.
- Peak runoff discharges typically occur in the spring and early summer following breakup when snowmelt runoff is high, although periods of high flow may occur later in the summer and fall seasons due to large storm events. Many streams are prone to

development of aufeis and ice dams that can dramatically raise the water surface elevation, resulting in flooding even during low discharge periods.

- Several regions in the project study area contain large muskeg and swamp features, such as ponds and sloughs. The largest swamp areas occur in the coastal regions, through the Minto Flats, and near the Kobuk River, Noatak River, and Pah River.
- Lakes and ponds are widespread throughout the project study area, with numerous small lakes and ponds being prominent in lowland areas.

2.2 United States Geological Survey Stream Gauge Data

Stream gauge data can be used to define design flood frequency peak discharges for designing bridges and culverts and evaluating scour on gauged streams. Existing stream gauge data can also be used for calibrating regression equations used to predict peak design flows on ungauged streams to reduce the standard error of the predictions.

Available stream gauge data in the project study area consists of information published by the United States Geological Survey (USGS) and is primarily limited to streams accessible along the Dalton Highway and in the vicinity of Nome. Other stream gauge data in the project area includes the Yukon River at Rampart, the Tanana River at Nenana, the Yukon River at Ruby, the Koyukuk River near Hughes, Dahl Creek near Kobuk, the Kobuk River at Ambler, and the Kobuk River near Kiana (Curran et al., 2003). The published USGS gauge data for these streams, including predicted peak stream discharges, is included in Table 1.

Table 1: Selected United States Geological Survey Stream Gauge Sites and Peak Stream Flows in Region 6 and Region 7

USGS Station No.	Station Name	USGS Region	Drainage Area	Mean Basin Elevation	Areas of Lakes and Ponds	Areas of Forest	Mean Annual Precipitation	Mean Min Jan Temp	Duration of Record	Peak Stream Flow (cfs)				
			(mi^2)	(ft)	(%)	(%)	(in)	(°F)	(yrs)	*	Q2	Q50	Q100	Q500
15468000	Yukon River at Rampart	6	199,000	2,810	3	69	15	-21	12	*Reg*	53,000	797,000	846,000	955,000
										Wtd	524,000	875,000	932,000	1,060,000
15515500	Tanana River at Nenana	6	25,600	3,920	4	56	16	-15	38	*Reg*	85,600	156,000	169,000	199,000
										Wtd	79,500	137,000	150,000	184,000
15564868	Snowden Creek near Wiseman	6	17	3,620	0	4	28	-18	23	*Reg*	398	1,220	1,420	1,910
										Wtd	367	826	917	1,130
15564872	Nugget Creek near Wiseman	6	9.5	3,036	0	16	25	-18	24	*Reg*	165	602	712	995
										Wtd	164	621	758	1,150
15564875	Middle Fork Koyukuk River Near Wiseman	6	1,200	3,390	0.6	4	25	-16	14	*Reg*	16,000	31,400	34,600	42,100
										Wtd	11,900	29,700	33,600	43,300
15564877	Wiseman Creek at Wiseman	6	49.2	2,930	0	3	25	-17	9	*Reg*	1,120	3,000	3,430	3,870
										Wtd	492	1,770	2,540	3,150
15564879	Slate Creek at Coldfoot	6	73	2,204	0	51	20	-18	19	*Reg*	727	2,390	2,790	3,790
										Wtd	1,200	6,600	8,440	14,200
15564800	Yukon River at Ruby	6	259,000	2,640	4	62	15	-19	22	*Reg*	655,000	946,000	999,000	1,120,000
										Wtd	594,000	1,030,000	1,110,000	1,260,000
15564900	Koyukuk River at Hughes	6	18,400	2,200	1	36	16	-17	22	*Reg*	93,000	167,000	181,000	215,000
										Wtd	121,000	283,000	320,000	413,000

*Peak Stream Flow Analysis Type: "Reg" = regression equation; "Wtd" = weighted

Table 1: Selected United States Geological Survey Stream Gauge Sites and Peak Stream Flows in Region 6 and Region 7 (continued)

USGS Station No.	Station Name	USGS Region	Drainage Area	Mean Basin Elevation	Areas of Lakes and Ponds	Areas of Forest	Mean Annual Precipitation	Mean Min Jan Temp	Duration of Record	Peak Stream Flow (cfs)				
			(mi^2)	(ft)	(%)	(%)	(in)	(°F)	(yrs)	*	Q2	Q50	Q100	Q500
15585000	Goldengate Creek near Nome	7	2	300	0	0	15	-2	22	*Reg*	42	132	150	193
										Wtd	36	82	89	104
15619000	Dexter Creek near Nome	7	3	512	0	0	22	-2	10	*Reg*	75	230	261	332
										Wtd	86	179	197	237
15621000	Snake River near Nome	7	86	632	0	4	30	-2	27	*Reg*	1,490	3,880	4,320	5,320
										Wtd	2,640	4,460	4,720	5,260
15668100	Star Creek near Nome	7	4	1,500	0	1	30	-4	24	*Reg*	92	280	317	403
										Wtd	72	200	224	276
15668200	Crater Creek near Nome	7	22	1,620	1	3	35	-4	25	*Reg*	440	1,230	1,380	1,720
										Wtd	843	2,260	2,530	3,150
15712000	Kuzitrin River near Nome	7	1,720	700	1	2	15	-8	10	*Reg*	21,500	48,500	53,200	63,500
										Wtd	19,900	51,000	56,400	68,000
15743850	Dahl Creek near Kobuk	7	11	1,500	0	55	18	-15	14	*Reg*	238	688	775	974
										Wtd	339	1,320	1,510	1,920
15744000	Kobuk River at Ambler	7	6,570	1,600	1	34	25	-16	13	*Reg*	71,100	150,000	163,000	192,000
										Wtd	62,800	129,000	140,000	162,000
15744500	Kobuk River near Kiana	7	9,520	1,450	1	32	25	-16	23	*Reg*	99,000	205,000	223,000	261,000
										Wtd	104,000	192,000	205,000	229,000

*Peak Stream Flow Analysis Type: "Reg" = regression equation; "Wtd" = weighted

2.3 Meteorological Data

The Western Regional Climate Center (WRCC) in partnership with the National Oceanic and Atmospheric Administration maintains a database of weather stations in the Western United States, including Alaska and Hawaii. Temperature, precipitation, and snow data for the twelve weather stations in the project study area are listed in Table 2. The available data varies per weather station and data collection periods range from 11 to 61 years, with an average of 36 years (WRCC, 2011).

In 1963, the United States Department of Commerce Weather Bureau published *Technical Paper No. 47* "Probable Maximum Precipitation and Rainfall-Frequency Data for Alaska for Areas to 400 Square Miles, Durations to 24 Hours, and Return Periods from 1 to 100 Years." Since publication, Technical Paper No. 47 has been the accepted source for short-term precipitation data for use in hydrologic modeling in the state. Information in Technical Paper No. 47 may be used to examine localized precipitation patterns, account for orthographic effects, and extrapolate precipitation data to other areas within the project study area.

3.0 HYDROLOGIC DESIGN CONSIDERATIONS

3.1 Overview of Hydrologic Design Considerations

Several hydrologic factors must be considered in evaluating proposed corridors. The number of stream crossings along each corridor, including minor and major drainages, will determine the number of bridges and culverts required. Making generalizations about stream crossings is difficult, as every river crossing is unique and will have a distinctive set of design challenges and site constraints. Channel morphology, climatic conditions, and geologic conditions affect the type of crossing structures required and associated maintenance demands. Navigable rivers must be identified to ensure crossing structures do not impact river transportation. Crossing structures on streams supporting anadromous and resident fish must be designed to facilitate fish passage. Site-specific erosion protection measures will need to be determined at each crossing location. Finally, two of the proposed corridors would cross the Yukon River, posing a unique design challenge due to the river's size.

Table 2: Summary of Climate Data from Western Region Climate Center Weather Stations

ID No.	WRCC Site Name	Period of Record	Duration of Record	Annual Average				
				Maximum Temperature	Minimum Temperature	Total Precipitation	Total Snow Fall	Snow Depth
			(yrs)	(°F)	(°F)	(in)	(in)	(in)
500260	Ambler West	12/1/1981 to 3/31/1992	11	31.9	12.1	23.06	134	15
504964	Kobuk	8/16/1953 to 12/31/1979	26	32.4	10.8	16.68	54	14
509014	Tanana FAA Airport	9/11/1949 to 9/30/2010	61	34.3	14.8	12.13	46.8	9
505051	Kotzebue 25N	11/1/1982 to 5/31/1995	13	30.1	11.2	15.42	60.6	8
505534	Livengood	9/1/1962 to 4/30/2006	44	31.1	13.4	10.63	52.3	8
506309	Nenana Municipal Airport	9/1/1949 to 4/30/2001	52	35.6	14.3	10.76	45	8
506496	Nome WSO Airport	9/1/1949 to 9/30/2010	61	33.4	19.6	15.93	62.2	6
506058	Moses Point FAA Airport	8/1/1949 to 7/31/1967	18	32	18.1	18.26	65.8	11
503765	Hughes	9/1/1949 to 1/31/1970	21	33.8	14.1	12.12	17.4	9
503910	Indian Mountain	8/1/1966 to 1/31/1985	19	32.2	16.6	18.76	112.6	8
500230	Allakaket	9/1/1949 to 5/31/1998	49	31	5.7	12.41	61.3	5
505644	Manley Hot Springs	9/1/1949 to 9/27/2010	61	36.1	13.4	14.77	57.8	8

3.2 Number of Stream Crossings

Stream crossings are divided into minor drainage crossings and major drainage crossings. Minor drainage crossings are those streams that can be conveyed with a 36-inch diameter or smaller culvert and that do not typically require a site-specific hydrologic and hydraulic analysis. Major drainage crossings are those streams that require a bridge or a culvert with a minimum diameter of 48 inches. The State of Alaska Department of Transportation and Public Facilities (DOT&PF) Alaska Highway Preconstruction Manual requires a site-specific hydrologic and hydraulic analysis for all major drainage crossings.

The number and type of stream crossings along the proposed corridors was estimated using aerial photography, USGS topographical maps, Landsat imagery, and Geographic Information System (GIS) data obtained from the Alaska Department of Natural Resources. Channel widths were estimated from the ordinary high water or bankfull channel widths as evident from changes in vegetation and substrate apparent in available imagery. These estimates are considered reasonable for evaluating the proposed corridors given the size of the project study area and the lack of high-resolution topographic data.

Determining the number of minor drainage crossings accurately along each corridor requires high-resolution imagery (such as LiDAR) or survey base map data. The number of minor drainage crossings will likely be substantial. A recent project along the Dalton Highway in an area with similar topography and hydrology encountered approximately four minor crossings per mile (Carlson and Bennett, 2005). This ratio was used for estimating minor crossings for each corridor.

For this Preliminary Hydrology Reconnaissance Memorandum, structure sizes are estimated based on the perceived need to provide floodplain transport. Active floodplains were used in the estimates, where they could be identified. All braided streams were assumed to be crossed with bridges, due to the high likelihood of culvert failure from shifting channels over the design life of the project. Bridges were sized to span the entire floodplain of braided rivers.

Major stream crossings are divided into five categories based on the size and type of drainage structure necessary at each stream. The five categories of structures are:

- Small culverts (4- to 10-foot diameter)

- Large culverts (10- to 20-foot diameter)
- Small bridges (20- to 50-foot total length)
- Medium bridges (50- to 140-foot total length)
- Large bridges (greater than 140-foot total length)

3.3 Risk of Lateral Channel Migration

Lateral channel migration refers to stream channels moving and adjusting over time due to changes in sediment load and stream discharges. The potential for lateral channel migration must be evaluated at stream crossings to reduce the risk of failure at the crossings. Bridges and culverts become static points along the stream, and if the channel moves or attempts to move away from these static points, there is a high risk for structure failure from erosion and flooding. Many of the streams in the project area are subject to significant lateral adjustment and migration. Detailed stability analyses will need to be conducted at each major crossing to define the risk of lateral channel migration.

Streams with braided channels are prone to active lateral adjustment within the floodplain, as channels change location seasonally and during periods of high discharge. Large braided channels are very difficult to convey through culverts. Highly sinuous streams are also prone to lateral channel migration, as is evident from the presence of oxbow lakes and remnant channels visible on aerial imagery. The rate of lateral adjustment for sinuous streams is typically less than for braided channels. The tendency to migrate laterally is greatest at the meanders of highly sinuous streams, so crossing structures should be located at relatively straight channel segments between meanders. Stream crossings should be located with the road crossing as perpendicular to the stream channel as possible.

The proposed corridors also cross alluvial fans, where streams may have a high tendency to shift laterally between several channels. Bed transport is substantial in alluvial fans, which can lead to maintenance and capacity issues, and stream flows are prone to shift channels during storm events. Where corridors must cross alluvial streams, the crossing should be located above the change in gradient where the alluvial fan begins when possible to reduce the risk of lateral channel migration and maintenance costs associated with sediment transport.

3.4 Glacial Effects

Glacial effects should be considered for all stream crossings in Alaska. Ice dams often form below the lakes at glaciers, creating a larger storage that has the potential to drain suddenly when the ice dam gives way. These lake dumps have the potential to release large flood flows, which may also convey significant debris and sediment. Topographic mapping indicates that no glaciers are present in any of the watersheds draining to the project study area.

3.5 Lakes and Ponds

Lakes and ponds are widespread in the project study area, with these water bodies consisting of small ponds and sloughs located in extensive expanses of wetland, lowland areas. Several large lakes (greater than 5 miles long) are located along the south Brooks Range and intermittently through the rest of the project study area. Lakes and ponds provide important storage for flood waters during storm events, attenuate flows and reduce downstream peaks, and are necessary to maintain healthy ecosystems. As lakes and ponds typically collect sediment, soil conditions around these water bodies can generally be expected to be poor for construction purposes. Wherever possible, the proposed corridors should avoid crossing lakes and ponds. If it is necessary for the proposed corridors to encroach on lakes or ponds, possible fluctuations in water surface elevations due to storm events should be considered during design to reduce risks to corridor infrastructure. Wave action on lakes and ponds and the associated threat to the structural stability of the corridor must be considered. Riprap armoring should be placed as necessary to minimize risks imparted by wave action. The hydrologic continuity of the lakes and ponds with interconnected streams and wetland areas should be adequately maintained through installation of drainage crossing structures.

3.6 Icing Hazards

Icing hazards threaten roads and drainage structures, cause additional maintenance concerns, and should be avoided when possible. Potential icing hazards include aufeis formation, ice dams, ice scour, and seasonal ice flows.

Aufeis potential is widespread along the proposed corridors. Aufeis refers to large sheets of ice that form during freezing temperatures due to surfacing groundwater or overflow from ice dams. Many small stream systems freeze solid, causing groundwater to flow around the ice and surface

at cracks and edges, forming successive ice layers. Aufeis has the potential to block stream channels and dramatically increase floodplains when runoff has to flow around accumulated ice.

Factors influencing aufeis formation include snow cover, temperature, channel slope, groundwater flow, weather patterns, and streambed load. Poorly designed culverts or bridges may facilitate the development of aufeis by blocking stream flows, potentially leading to extensive flooding and damage to the roadway and drainage structure. Aufeis accumulation has been an annual occurrence along Grizzly Creek near the village of Ambler (R&M Consultant, Inc. [R&M], 2005). Aufeis has repeatedly plugged the bridge on the airport access road, resulting in water overtopping the road. It is reasonable to expect similar aufeis accumulation along other drainages in the project area.

Many streams have seasonal periods of ice flow when large chunks of ice are transported down the river. This occurs primarily during freeze up in the fall and during breakup in the spring. Bridges constructed at streams with seasonal ice flows need to provide sufficient scour and impact protection at piers and abutments to withstand icing conditions. Ice flows also need to be considered when evaluating the height of bridge decks to ensure ice can pass freely.

Flooding is a regular occurrence along the Kobuk River near the village of Kobuk due to the formation of ice jams in the spring (R&M, 1995). Village residents state that ice jamming and subsequent flooding can be expected every two to five years (DOT&PF, 1981). The potential for similar icing events on other river systems in the project area needs to be evaluated.

Proposed corridors should avoid areas with icing hazards to the greatest extent possible. Where areas with icing hazards cannot be avoided, structures must be designed to reduce potential icing-related damage. Installation of thaw pipe is one option for reducing icing hazards and is standard practice for culverts installed in aufeis-prone areas along the Dalton Highway (Carlson and Bennett, 2005). Another option in lieu of or in combination with thaw pipe is installation of additional overflow culverts at higher elevations to prevent washouts of the roadway or damage to the culvert structures. Where aufeis formation may result in backwatering of streams, increasing the corridor height can provide additional storage capacity to reduce the risk of overtopping flows.

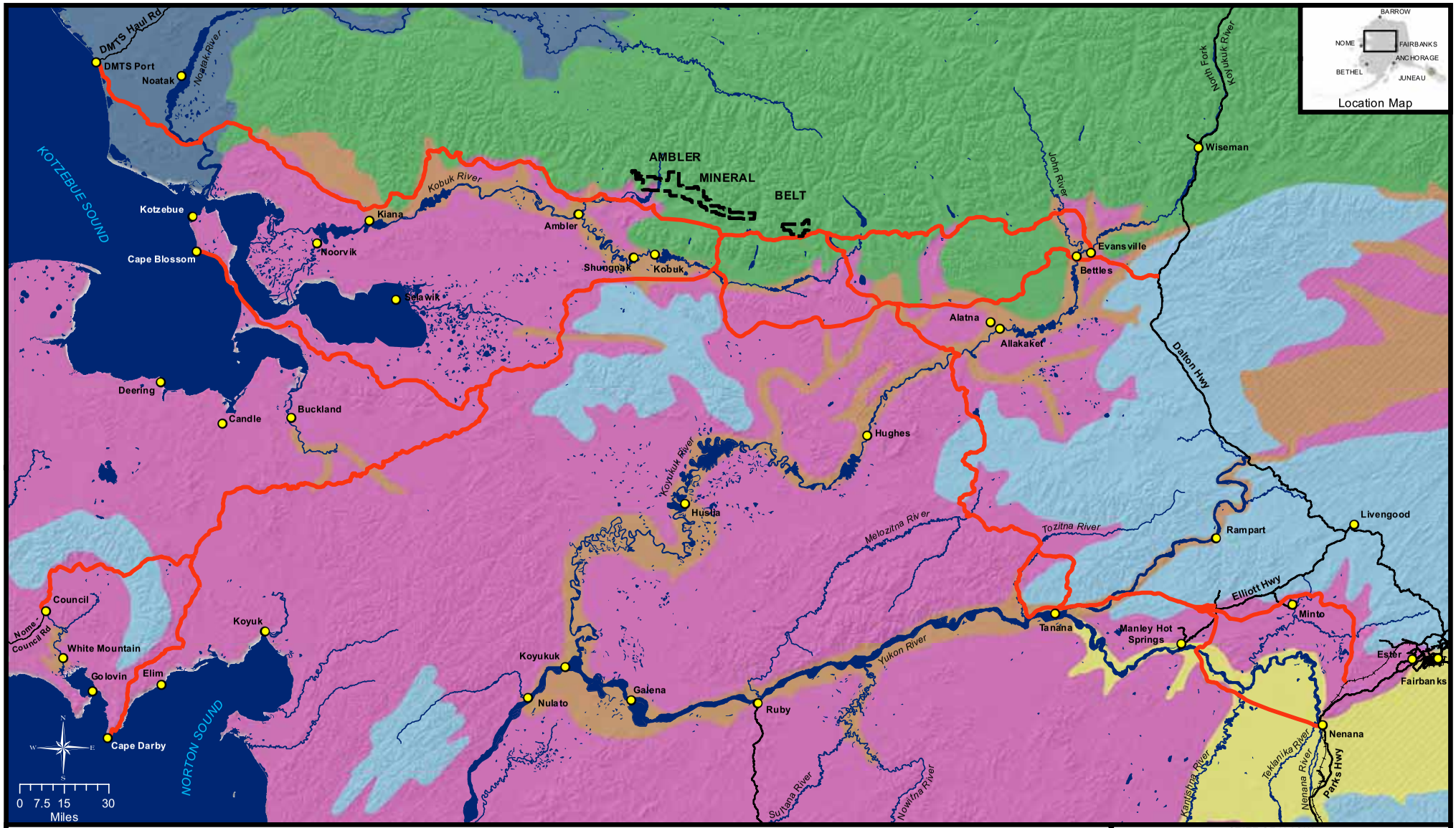
Field investigations are needed to identify areas prone to icing hazards along the proposed corridors. The potential for icing hazards will have to be determined from field observations and consultations with area residents who can describe historical trends regarding ice conditions. It may also be possible to use satellite radar interferometry to identify areas where aufeis typically develops and to track the formation of river ice.

3.7 Permafrost

Permafrost consists of underground soils that remain frozen for years at a time. Typically, there is a layer of soil above the permafrost, called the "active layer," that is seasonally frozen, but thaws during seasonal periods of high temperature. Areas of continuous, discontinuous, and isolated masses of permafrost are widespread in the project area as shown in Figure 3. Corridors within areas of permafrost are susceptible to frost heave and settling that could potentially damage roads, rails, bridges, and culverts. Frost heave results from the development of ice lenses when freezing water underground causes soils to expand upward. The thawing of frozen soils can cause significant settling and dramatically reduce the bearing capacity of the soil.

Typically, the preferred strategy for reducing permafrost-caused failure along a corridor is to keep permafrost frozen. However, this may not be realistic south of the Brooks Range with current warming trends. Pre-thawing so that consolidation takes place during the construction process may be a better strategy for addressing permafrost along the proposed corridors, especially where warm permafrost is present.

A transportation corridor has the potential to act as a frost curtain or dam, interrupting the active soil layer and unfrozen soil layer between seasonal frost and permafrost. This can cause winter icing uphill of the road and the formation of ice mounds under the organic mat. This has happened along the Dalton Highway and small ponds have formed as the mounds have receded (Carlson and Bennett, 2005). These ponds then become heat sinks further degrading the permafrost under the roadway resulting in the settling, deformation, and failure of culverts.



Communities and Place Names
Existing Roads
Railroad
Water
Outside of Project Study Area
Ambler Mineral Belt
Preliminary Corridors
Mountainous Area underlain by continuous permafrost
Mountainous Area underlain by discontinuous permafrost
Lowland and Upland Area underlain by thick permafrost
Lowland and Upland Area underlain by moderately thick to thin permafrost
Lowland and Upland Area underlain by discontinuous permafrost
Lowland and Upland Area underlain by numerous isolated masses of permafrost

Source:
Permafrost: National Snow and Ice Data Center

Coordinate System: NAD 1983 Alaska Albers

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PERMAFROST

DATE: May 24, 2011 | **Figure 3**

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Efforts must be made to avoid using culverts in places where aufeis accumulation could cause runoff to backup and thaw larger areas of permafrost. The use of thaw pipe should be considered for culvert installations where permafrost is present to reduce the risk of ponded water acting as a heat sink. Installing rigid board insulation in the structural bedding under the proposed culverts may reduce the risk of thaw settlement but may not be practical where warm permafrost is present and insulation could potentially trap heat and prevent soils from cooling. Additional overflow culverts at higher elevations can also be used where aufeis is anticipated to reduce the risk of upstream ponding that may thaw permafrost and damage drainage structures or the structural section. Other design options and protection techniques that can be considered to address permafrost include embankment thickening, thermal berms, pre-thawing and consolidation, and excavation/replacement.

3.8 Navigability

River navigability is also an important consideration in determining the type and size of crossing structure required. The project study area has a limited overland transportation system; barges are the primary means for delivering seasonal supplies of dry cargo and bulk fuel to communities located along navigable rivers in Northwest Alaska. Where rivers cannot be navigated due to shallow waters, supplies must typically be delivered by air cargo at substantially elevated costs (CH2M Hill, 2004). The extent of navigability on each river varies throughout the year and as river levels fluctuate. Major rivers in the project study area are generally navigable from mid-June to mid-September. Navigability is highest during the spring breakup and periods of high precipitation in the fall (R&M, 2005).

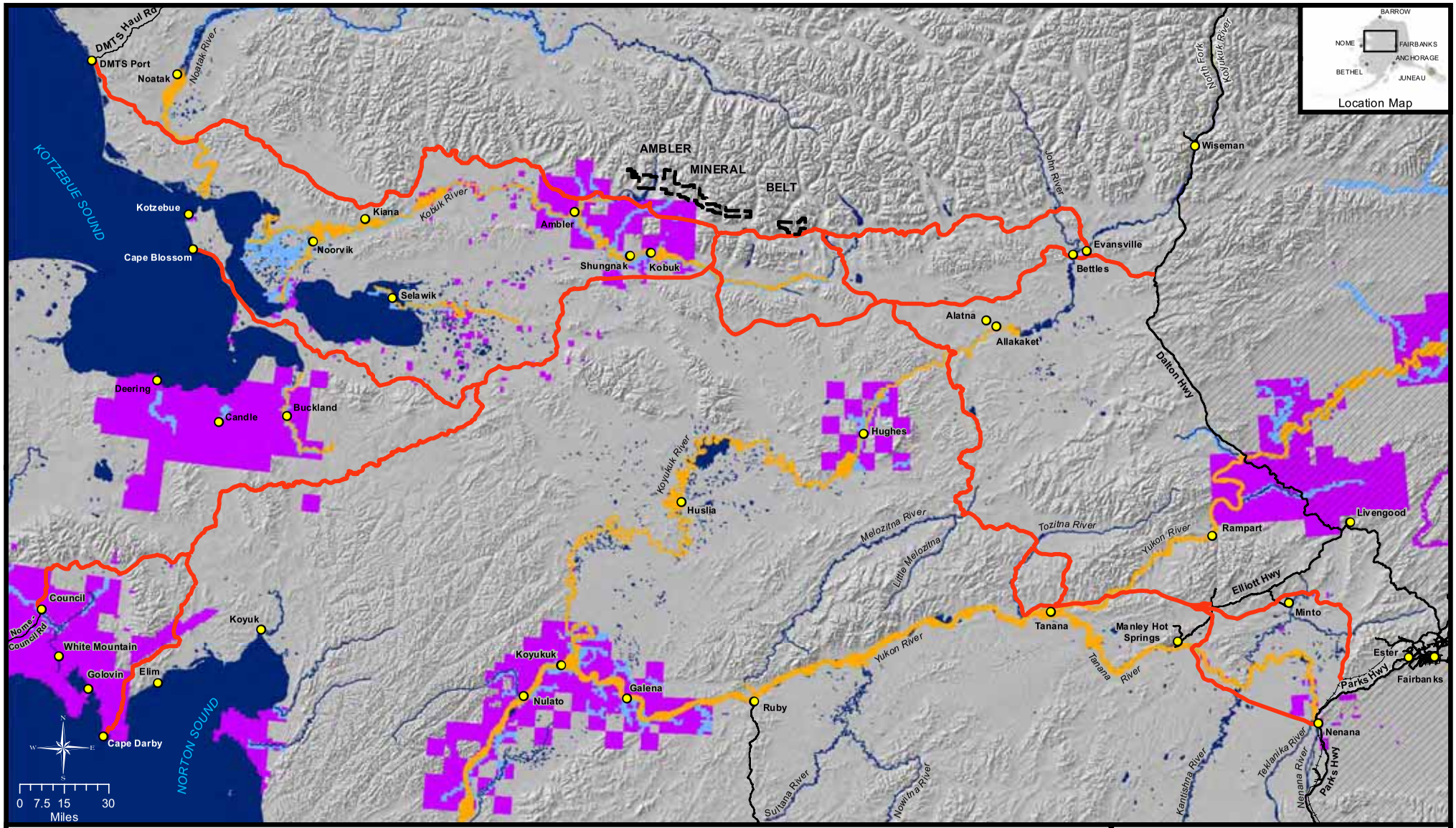
Navigable waters will likely require bridges due to their larger size and the need to provide for barges and other river transportation. Bridges at navigable river crossings must provide sufficient clearance for barges to pass under the bridge deck. Higher bridge decks may require larger abutments and increased fill at approaches to achieve the required elevation gain. Increased span lengths can be used to minimize the number of piers in the river, reducing potential impacts on river traffic. These requirements result in higher costs for bridges over navigable waters.

Section 9 of the Rivers and Harbors Act of 1899 requires a permit from the United States Coast Guard (USCG) for construction of a structure over navigable water. The United States Army Corps of Engineers (USACE) also requires a permit for construction in or over any navigable water or any other work affecting the course, location, condition, or capacity of a navigable water.

Both state and federal agencies make determinations of navigability, and sometimes their findings are inconsistent. The USACE lists the Kobuk, Koyukuk, Noatak, Selawik, and Yukon Rivers as navigable (Figure 4). The Bureau of Land Management (BLM) has also defined the Ambler River as navigable. The State of Alaska's navigable waters program lists the Noatak and Buckland Rivers as navigable waters. It is likely that existing mapping does not adequately address the use of smaller boats by area residents, such as for subsistence purposes and moving goods.

3.9 Anadromous Streams

Anadromous waters are considered of particular importance because they sustain fish populations crucial to subsistence communities. Anadromous fish identified in the project study area include king salmon, chum salmon, coho salmon, Dolly Varden, whitefish (various species), and sheefish. The Alaska Department of Fish and Game (ADF&G) Anadromous Waters Catalog (AWC) was consulted to identify anadromous waters in the project study area. ADF&G estimates that current AWC mapping contains less than 50% of anadromous streams in the state, and that more than 20,000 additional anadromous waters across the state have not been identified or included in the AWC (ADF&G, 2010). The majority of anadromous waters identified and mapped by ADF&G are in the state's more developed regions accessible by Alaska's limited roadway system. Limited mapping of anadromous waters has occurred in the more remote regions of the state, including the project study area.



Communities and Place Names
Existing Roads
Railroad
Water
Outside of Project Study Area
Ambler Mineral Belt
Preliminary Corridors
USACE Navigable Rivers
BLM Navigable Rivers
Navigable
Non-Navigable

Sources:
USACE Navigable Rivers: USACE
BLM Navigable Waters: BLM

Coordinate System: NAD 1983 Alaska Albers

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NAVIGABLE RIVERS

DATE: May 23, 2011 | **Figure 4**

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Anadromous waters mapped in the ADF&G AWC are typically large main-stem rivers in the project study area. Little mapping data is available for anadromous fish in tributary streams or smaller watershed systems. Smaller tributary streams in upper watersheds provide the most productive spawning and rearing habitats for a diverse range of fish populations (Bates, 1999). Ephemeral (seasonal) streams may also act as migration corridors allowing fish to access upstream water bodies. Therefore, providing fish passage at these smaller crossings may be needed to maintain the ecological connectivity needed for healthy fish populations.

The likelihood of anadromous fish presence in unmapped streams can be estimated by comparing the gradients of mapped streams to interconnected unmapped streams. For fish to move upstream, the swimming velocity of the fish (and power required to obtain this swimming velocity) must be great enough to overcome the velocity and energy of the water flowing downstream (Behlke, 1991). This is the basis of the FISHPASS software developed by DOT&PF and ADF&G for evaluating fish passage culverts. The velocity of the water is dependent on the gradient, channel shape and roughness, and flow of the stream.

Stream gradients can be predicted using the available topographic data to a much greater extent than the other factors affecting fish habitat, such as water quality (temperature, dissolved oxygen, salinity, etc.), substrate type, and cover requirements. Stream gradient is directly tied to streambed load and grain size, which in turn affects spawning habitat and is a defining force in the development of different stream morphologies (Rosgen, 1996; Bates, 2008). For this analysis, we assumed that channel shape and roughness as well as flow fluctuations are approximately equivalent across various streams within the upper levels of a watershed, as no significant data is available to compare channel morphology.

GIS analysis was used to estimate the general stream gradients of the AWC mapped anadromous streams in the project study area. The upper portions of the AWC mapped streams typically had a maximum gradient of approximately 8%. The 8% gradient does not represent the maximum stream gradient that can be accessed by anadromous fish, which may be higher; but it is the typical maximum gradient of AWC mapped stream reaches in the project study area. The digital elevation model used for this analysis has a pixel resolution of 60 meters by 60 meters, so there is an inherent error in determining stream gradients, especially for smaller streams. Gradients

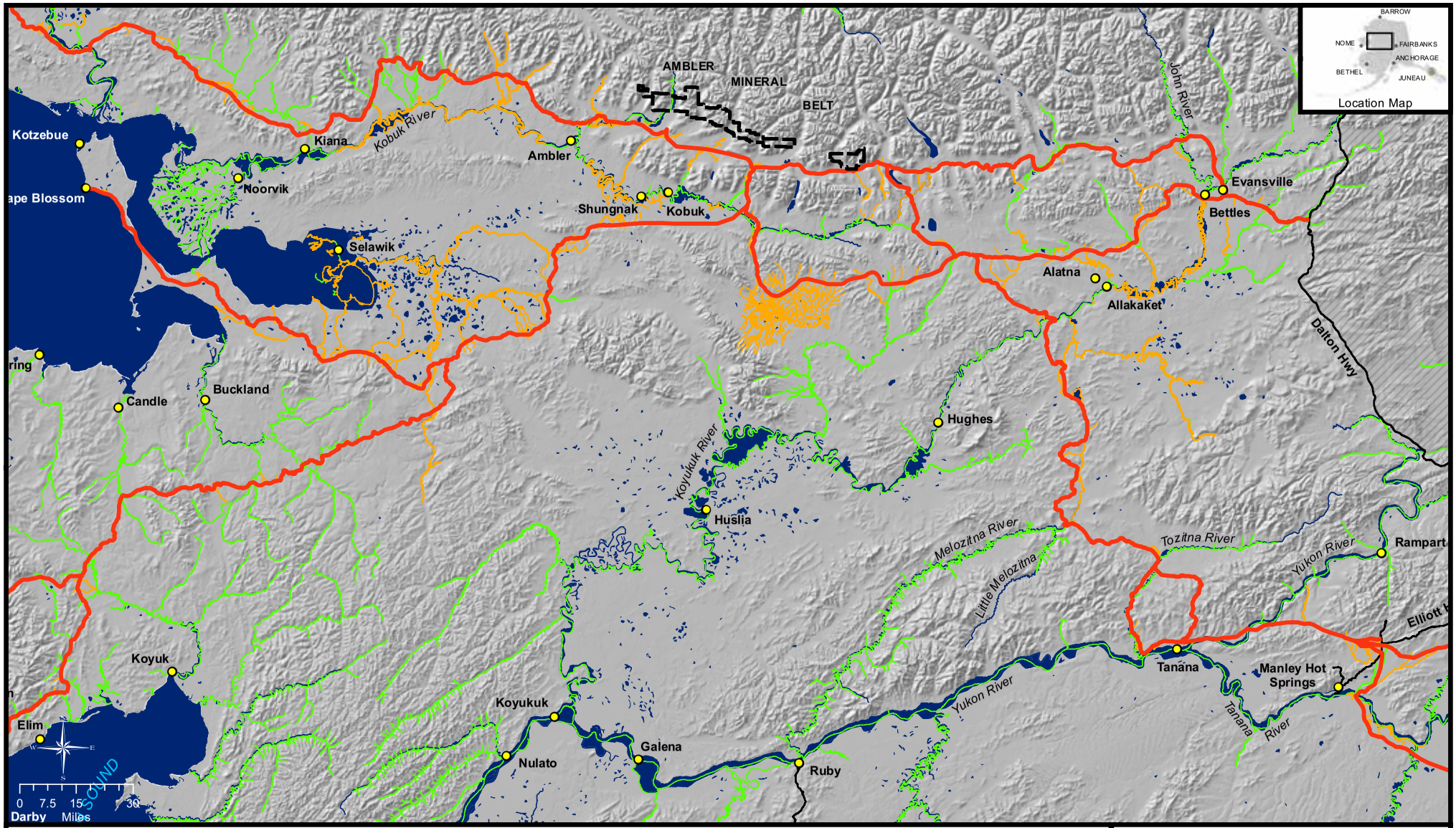
were then determined for unmapped streams using the same digital elevation model data, and an analysis was completed to identify all unmapped streams with gradients of 8% or less that are connected to mapped anadromous waters.

Any streams identified through this analysis are believed to have a high likelihood of supporting anadromous fish populations and are assumed to be anadromous streams for the purpose of this study. The GIS analysis of stream gradients was completed to assist in narrowing down the proposed corridor alternatives based on anadromous fish presences. Ultimately, the analysis will need to be validated against empirical data.

Cataloged AWC anadromous streams and unmapped streams assumed to be anadromous are shown in Figure 5. Consultation with ADF&G biologists and field investigations will be necessary to confirm the presence of anadromous fish and the associated level of fish passage required at each stream crossing. Field studies will have to verify the presence of anadromous fish (or lack thereof) through seasonal trapping and sampling efforts to account for the life cycle migration of various species. The design fish species at each crossing will have to be determined based on consultation with ADF&G biologists.

3.10 Resident Fish Populations

Many streams in the project study area also support resident (non-anadromous) fish populations. This includes ephemeral (seasonal) channels that may be used to provide access to upstream water bodies or seasonal spawning and rearing habitat. Resident fish species are important subsistence resources for area residents and essential to maintaining healthy, ecologically-diverse watersheds. Resident fish identified in the project study area include Arctic grayling, Dolly Varden, Arctic char (non-anadromous stream and lake forms), burbot, northern pike, whitefish (various species), sheefish, and slimy sculpins. Streams supporting populations of resident fish will likely require fish passage culverts and ADF&G Fish Habitat Permits. The 1978 ADF&G Alaska's Fisheries Atlas Volume II maps resident fish populations; however, this mapping is dated and is not comprehensive. Resident fish populations are widespread across waters of the Brooks Range and interior Alaska, and resident fish may occupy the majority of the streams in the project study area.



Communities and Place Names
Existing Roads
Railroad
Water
Outside of Project Study Area
Ambler Mineral Belt
Preliminary Corridors
Cataloged Anadromous Streams
Assumed Anadromous Streams

Sources:
Cataloged Anadromous Streams: ADF&G
Land Ownership: DNR

Coordinate System: NAD 1983 Alaska Albers

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ANADROMOUS STREAMS

DATE: May 23, 2011 | **Figure 5**

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Consultation with ADF&G biologists and field investigations will be necessary to identify waters supporting populations of resident fish and the associated level of fish passage required. To determine the presence of resident fish, it is likely that the presence of resident fish will need to be verified for all previously unstudied streams. Year-round trapping efforts, possibly coupled with electroshock sampling, are potential options for determining fish presence. The design fish species at each crossing will have to be determined based on consultation with ADF&G biologists.

3.11 Erosion and Scour

Erosion is a major concern at stream crossings as the loss of structural fill can lead to increased maintenance demands and potential catastrophic failure at crossing structures. Longitudinal encroachment to floodplains, where the corridor is aligned approximately parallel to a stream channel, must also be considered during design. Beyond potential damage to the corridor, erosion can also have detrimental effects on the natural stream channel and ecosystem through changes in bed load consistency and quantity.

Bridges will require armoring of foreslopes as determined by a site-specific scour analysis, which must address the potential for ice scour and erosion during periods of river ice flow. Erosion protection is typically accomplished through the use of riprap protection. Riprap inlet and outlet aprons are required for all major drainage culverts (48-inch diameter and larger) per the Alaska Highway Preconstruction Manual. Riprap aprons should also be considered for minor drainage culverts (less than 48-inch diameter) where the potential for erosion is significant, as determined on a site-specific basis.

Longitudinal encroachment to stream floodplains should be avoided where practical. Costs associated with protecting the corridor from erosion at these locations, typically accomplished through riprap armoring of the embankment, can be substantial. Riprap revetments should also be considered as an option for providing flood protection in areas where the corridor is at risk of flooding due to longitudinal encroachment and bank protection should be adequate to withstand anticipated parallel flows.

3.12 Debris Potential

The design of drainage crossing structures should consider potential debris loads. High flows during storm events have potential to carry significant debris in addition to bed load transport. Anticipated debris includes trees, logs, brush, and other woody debris, which has potential to catch in crossing structures, potentially reducing structure capacity and building up headwater that can lead to structure failure. Debris potential should be considered on a per-crossing basis and oversized structures should be considered in areas with high debris potential.

3.13 River Mining

Rivers are potential material sources along the length of the proposed corridors, with active bed loads having potential to replace mined material periodically during periods of high flow. Characterization of streambed substrate is necessary to evaluate the material for construction purposes. The hydraulic effects of removing material should be considered with regards to effects on crossing structures. The potential for headcuts developing must be considered, as mining downstream of the corridor may result in a headcut moving upstream and undercutting drainage structures. Mining upstream may result in increased bed loads, the effect of which must be considered on downstream drainage structures. River mining may be accomplished in consultation with fisheries biologists to improve aquatic habitat. River mining operations must be carried out in compliance with appropriate environmental permitting.

3.14 Yukon River Crossing

Crossing of the Yukon River would present the largest drainage-related design challenge and single most expensive crossing structure for a transportation corridor in the project study area. The challenge in crossing the Yukon River stems from the size of the structure required, with a total span length of approximately one-half mile, and the potential risks associated with scour, sediment transport, ice flows, debris, and drastic fluctuations in flow levels. Due to the high costs anticipated with designing and constructing a bridge of this magnitude, all the influencing factors must be well studied and understood so that risks can be appropriately addressed.

The idea of crossing the Yukon River in the vicinity of Tanana has been studied repeatedly since 1906 (Tudor-Kelly-Shannon, 1970). All of these studies were evaluating a route north to the North Slope, as opposed to a route to the northwest towards the Ambler mineral belt. These

studies evaluated potential crossing locations primarily on the shortest crossing span distance and did not explore other crossing locations that would require a longer bridge, but be more accessible to existing transportation infrastructure. The results of previous studies are summarized as follows.

- Studies conducted in 1906 and 1942 by the United States Army concluded that the Rampart Rapids, located approximately 30 miles east of Tanana, was the only feasible crossing location. This location has a confined channel that is unlikely to migrate laterally and the river width is minimal.
- A rail corridor study conducted by the Alaska Department of Highways in 1967 proposed two other crossing locations: one at Jordan Creek approximately 4 miles downstream of the Rampart Rapids, and one at Six-mile Island approximately 6 miles east of Tanana. The crossing at Six-mile Island was preferred due to generally flat terrain in the crossing vicinity, even though the river width was approximately double the width at Jordan Creek.
- The North Commission Rail Corridor Study in 1968 again recommended crossing the Yukon River at the Rampart Rapids - - approaching the crossing from Nenana instead of Dunbar. The North Commission Rail Corridor Study proposed the idea of crossing the Minto Flats and then bridging the Tanana River near Baker and proceeding north up the Baker Creek valley.
- In 1969, the Alaska Railroad Corporation (ARRC) evaluated the Minto Flats area and recommended using the "sporadically distributed sand dune fields" to the extent practicable and avoiding areas along the Tanana River prone to erosion and lateral migration of the river channel. ARRC's report concluded that avoiding the "highly frost susceptible, poorly drainage silty alluvium . . . containing permafrost of moderate to high ice content" present in Minto Flats was not feasible.

The hydrologic and hydraulic analyses necessary in support of a successful new crossing structure at the Yukon River will be a sizeable undertaking. Field investigations will have to examine in depth the bed load and composition, design flows and floodplain impacts, geologic conditions at proposed abutments and pier locations, and scour potential. A seismic evaluation

of the proposed crossing location would also be advisable, as the Yukon River follows a prominent fault line at least so far downstream as the Rampart Rapids. The environmental impacts, including how the bridge would affect river navigability, will need to be well understood to facilitate permitting efforts and satisfy regulatory agencies.

4.0 HYDROLOGIC DESIGN ASSUMPTIONS

The primary criteria for comparing the proposed corridor alternatives are the number of stream crossings and associated drainage structure sizes. The number of large bridge crossings and associated total bridge lengths are of special significance, as over 50% of the total cost of the project is in river and stream crossings. Cost estimates for this report assume that hydraulic drainage structures, including bridges and culverts, are designed consistent with the DOT&PF Alaska Highway Preconstruction Manual (APCM) and Alaska Highway Drainage Manual (AHDM).

The APCM and AHDM list a 50-year return period (2% exceedance probability) as the design flood for bridges on all highways and culverts on primary highways and secondary highways of high importance. Culverts and bridges in designated flood hazard areas are designed for the 100-year return period (1% exceedance probability); however, no Flood Hazard areas are mapped in the project study area. Scour protection will be designed for the 100-year return period and checked at the 500-year return period (0.2% exceedance probability) as required by the APCM and AHDM.

Drainage structure sizes were estimated for minor drainage crossings and major drainage crossings based on the apparent width of the stream at the approximate crossing location as estimated from stream channel widths visible on high-resolution aerial photographs and Landsat imagery (where aerial photographs were not available). Since every major stream crossing is likely to require fish passage, culvert widths (diameters or spans) are assumed to be at least 90% of the ordinary high water width of the stream consistent with Tier I design criteria in the 2001 Memorandum of Understanding. Bridge total span lengths are assumed to be at least equal to the stream channel width to minimize potential scour, provide hydraulically efficient structures, reduce maintenance, lessen icing effects, and minimize impacts to fish habitat and river navigation and facilitate environmental permitting.

The major drainage crossings along each corridor were classified into five categories:

- Small culverts (4- to 10-foot diameter);
- Large culverts (10- to 20-foot diameter);
- Small bridges (20- to 50-foot total length);
- Medium bridges (50- to 140-foot total length); and
- Large bridges (greater than 140-foot total length).

4.1 Roadway Bridge Design Assumptions

Details and conceptual drawings for bridge alternatives assumed for this reconnaissance study are included in Appendix A. Conceptual bridge designs for roadway corridors assumed a design live load based on the AASHTO HL-93 live load and a project-specific inventory (or permit) load. Span lengths and total length of bridges are important parameters in evaluating capacity to support inventory loading. Shorter bridge spans may carry only part of the total load at any one time, whereas longer bridge spans carry the entire load at once; thus, gross vehicle weight and geometry must be considered. Regardless of gross weight, load geometry is critical for completing any analysis and/or design. The DOT&PF's bridge design group recommended evaluating bridges for an inventory load multiplied by a 1.35 load factor (verbal communication, Elmer Marx, DOT&PF). In the absence of a specific inventory load, or as a comparison to the inventory load, the HL-93 loading multiplied by a 1.75 load factor could be used in evaluating any bridge of any size (verbal communication, Elmer Marx, DOT&PF). Bridges should be designed for whichever load is greater.

Three types of bridges are assumed in the cost estimates: pre-cast concrete bulb tee bridges, steel girder with pre-cast concrete deck bridges, and prefabricated modular steel bridges. The AHDM was used to develop conceptual bridge designs for the pre-cast concrete bulb tee bridges and the steel girder with pre-cast concrete deck bridges using the DOT&PF Alaska bridge construction pricing information. Conceptual bridge design options, including unit costs, for prefabricated modular steel bridges are proprietary in nature and were obtained from the manufacturer.

The pre-cast concrete bulb tee bridges are preferred for medium and large bridges, while prefabricated modular steel bridges are often more cost-effective for small crossings. Typically

140-foot spans are considered the maximum span for individual bridge sections, due to shipping and transportation constraints.

The DOT&PF's bridge design group was consulted regarding use of removable bridge railings to accommodate excessively wide loads. Use of these railings depends on the potential for federal funding, as the Federal Highway Administration requires crash-tested bridge railings and no removable bridge railings currently meet this criteria. The use of removable bridge rails will be investigated further during later design phases.

4.2 Roadway Culvert Design Assumptions

The APCM requires 24-inch or greater diameters for cross-drainage culverts and 36-inch or greater for culverts over 100 feet long. A minimum diameter of 36 inches is also recommended where aufeis and settlement are likely. Culverts shall be designed for a maximum headwater to depth (HW/D) ratio of 1.0 at the design flood flow per the AHDM. Corrugated steel pipe culverts with spans (diameters) up to 20 feet are assumed for smaller stream crossings. Corrugated steel pipe structures are typically more cost effective than aluminum or plastic structures; however, steel is more prone to corrosion if corrosive soils and/or runoff are present. Other pipe options should be evaluated as necessary during later design phases. Rolled pipe culverts and structural plate pipe culverts were evaluated as available for various culvert diameters. Structures with spans less than 20 feet have significantly less initial cost, maintenance, and inspection costs than bridges, so culverts are preferred for crossing small streams.

Minimum and maximum cover heights for culverts will need to be in accordance with the DOT&PF Standard Drawing D-04.21 Pipe and Arch Tables. Additionally, it is recommended that extra pipe cover be provided to account for maintenance activities and oversized loads. Due to the harsh climatic conditions and unpaved roadway surface, periodic grading will be necessary and could potentially reduce the cover over culverts, so an additional buffer thickness of at least one foot is recommended above culverts. Cover requirements will need to be determined on a site-specific basis during design.

The AHDM requires end restraints where culverts may be subject to buoyant failure. Buoyancy risk increases with steepness of slope, depth of potential headwater, upstream fill slope flatness, and fill height. End restraints are also recommended where there is high risk of aufeis accumulation or debris blockage and for culverts with 7-foot or greater diameters. Restraints can consist of headwalls, endwalls, or deadmen depending on site-specific conditions. Culvert end restraint needs will be determined on a site-specific basis during design, however deadmen are typically considered to be better suited for Arctic applications and are generally the preferred restraint. Because headwalls are larger and extend deeper below the culvert, they have a greater likelihood of acting as heat sinks and affect (i.e., thawing) permafrost, resulting in detrimental settlement.

Erosion protection requirements for culverts are assumed based on recent DOT&PF Northern Region design methodology (Carlson and Bennett, 2005; Boles et al., 2011). Riprap inlet aprons should be constructed to a length equal to one culvert diameter/span, or 10 feet minimum, upstream from the inlet. Riprap outlet aprons should be constructed to a length equal to three culvert diameters/spans downstream from the outlet. Riprap aprons should extend a minimum of one culvert diameter/span to each side of the culvert at both the inlet and outlet. Riprap aprons must be excavated into the channel so there is no significant reduction in channel width, depth, or function. Top of riprap aprons should be at the channel bottom elevation. Riprap will need to be placed on the inlet foreslope of major drainage culverts to the anticipated backwater elevation at the 100-year peak discharge or to an elevation 3 feet above the top of the culvert, whichever is greater. Place riprap on the outlet foreslope to the top of the culvert. The lateral extent of the foreslope riprap is 5 diameters/spans, centered on the culvert.

4.3 Railway Hydraulic Design Assumptions

Design criteria for rail drainage structures, including bridges, culverts, and hydrologic calculations used in sizing crossing structures, are consistent with the ARRC design practice and the American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering guidelines. APCM and AHDM criteria were also considered, with priority given to the most restrictive criteria when there were conflicts.

A 100-year recurrence interval (1% exceedance probability) was assumed for sizing all structures at stream crossings, including bridges and culverts, as recommended by AREMA. Scour at bridges will be designed for the 100-year return period and checked at the 500-year return period (0.2% exceedance probability).

The design live load is based on a Cooper E-80 load or the Alternative Live Load, which are represented by number of axles of a given spacing and load values. Conceptual level bridge designs were developed for standardized short (roughly 28 feet long) and long (150 feet long) spans. Conceptual bridges constructed with standardized short spans have driven pile foundations and are not very tall. Large span bridges include tall, custom structures that typically require large foundations, which leads to lengthening the span to the practicable limit (assumed to be 150 feet). The bridge size is determined from the size of the element being crossed. Stream geomorphology and hydraulics will dictate the bridge opening width necessary to pass storm flows and provide adequate bed transport while meeting criteria for rise of the backwater.

Standard bridge elements, typically steel or precast concrete deck beams, will be prepared in the design phase to provide similar structures throughout the project. This provides economical approach due to savings from material fabrication, actual construction, and also future maintenance or replacement activities.

Culvert designs will comply with AREMA criteria using a 100-year design flood frequency. Minimum and maximum cover heights for culverts will comply with Table 1-4-29 Minimum and Maximum Height of Cover in Feet of the AREMA Manual for Railway Engineering. Corrugated steel pipe culverts with diameters up to 20 feet are assumed for smaller stream crossings. Rolled pipe culverts and structural plate pipe culverts are included as available for various culvert diameters. Culvert gauges for rail culverts may need to be increased from those assumed for roadway culverts due to higher design loads, but this will have to be determined on a per-crossing basis during later design phases.

4.4 Fish Passage Design Assumptions

Proposed corridors cross a number of water bodies containing anadromous and/or resident fish (ADF&G, 2010). Crossing anadromous or resident fish-bearing streams and rivers will require ADF&G fish habitat permits and may require fish passage culverts. Fish passage culverts have additional costs for both design and construction. The additional costs are associated with additional survey, geotechnical analysis, geomorphic investigations, design, material costs, and increased labor. Culvert diameters at fish passage crossings are typically based on ordinary high water stream widths. Culvert corrugation of 6 inches by 2 inches or 9 inches by 2.5 inches are recommended to increase roughness and better retain placed substrate.

The 2001 Memorandum of Understanding between ADF&G and the DOT&PF for the Design, Permitting, and Construction of Culverts for Fish Passage details the state's commitment to maintenance and conservation of its fisheries resources and outlines specific guidelines for fish passage culverts. Culvert design guidelines in the Memorandum of Understanding are tiered to encourage use of stream simulation design principles over hydraulic design principles. The tiers are summarized below.

Tier 1. Stream Simulation Design. Tier 1 applies to new or replacement structures and calls for replicating natural stream conditions by maintaining the existing form and function of the stream channel. This design method applies to streams with gradients of 6% or less. Culvert widths must be 90% or more of ordinary high water width, or 75% or more if the stream gradient is less than 1% and the culvert is installed at 0.5% or less. Culverts must be embedded and filled with dynamically-stable substrate at the 50-year flood discharge.

Tier 2. FISHPASS Program Design. ADF&G's review process for Tier 2 is more complex than for Tier 1. Tier 2 applies to retrofitting existing culverts (not applicable for this project) or crossings where Tier 1 is not preferred. This design method is applicable for gradients up to 10% with use of baffled culverts. Typically, this design approach is applicable for steeper channels or where habitat upstream is limited. The culvert design must be evaluated with FISHPASS for a design fish species (agreed upon by ADF&G and the DOT&PF) at a fish passage design flow.

Tier 3. Hydraulic Engineering Design. Tier 3 is used when site-specific conditions (including gradient, upstream habitat value, and species present) preclude the use of Tier 1 or Tier 2 guidelines. This design method can be used for gradients exceeding 10% in conjunction with baffled culverts. Hydraulic calculations must support the ability of the design fish to pass upstream at the fish passage design flow. This level of design requires the most detailed evaluation of the crossing parameters during the ADF&G permit review.

Fish passage culverts are assumed to be required for AWC-mapped anadromous streams and streams assumed to be anadromous. This assumption will need to be verified through field research and consultation with agencies. Cost estimates for both road and rail corridors assumed fish passage culverts designed to Tier 1 guidelines.

5.0 DRAINAGE COST ESTIMATES AND ASSUMPTIONS

Cost estimates for drainage structures along road and rail corridors were developed using the hydraulic design assumptions described above. Historical bid tabulations for Dalton Highway projects and other Northern Region projects were used to determine unit costs. Unit prices for conceptual bridge and culvert designs were developed on a "per crossing" basis and multiplied by the quantity of major drainage crossings along each corridor based on the five categories of structures. Unit prices for minor drainage crossings were developed on a "per mile" basis and applied to overall corridor lengths. Assumptions used in determining the estimates are documented herein and the attached detailed summaries of stream crossings, quantities, and cost estimates.

5.1 Roadway Corridor Drainage Costs

Drainage cost estimates for the road corridors are summarized in Table 3 (rail corridors are presented later in the report.)

Cost estimates were developed for two types of bridges: pre-cast concrete bulb tee bridges and steel girder with pre-cast concrete deck bridges. Span lengths of 50 and 100 feet, with total bridge lengths of up to 300 feet, were used to derive unit costs for evaluating proposed corridors. Prefabricated modular steel bridge costs for small crossing structures were provided by manufacturers for modular bridge spans of 40 to 150 feet.

Table 3: Summary of Baseline Drainage Structure Costs for Road Corridors

Corridor	Drainage Structure Category Costs							Total Corridor Cost
	Minor Crossings	Culvert Small (4' to 10')	Culvert Large (10' to 20')	Bridge Small (20' to 50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Fish Passage Culverts	
1-Brooks East Corridor	$18,200,000	$11,800,000	$3,700,000	$2,200,000	$14,700,000	$57,000,000	$1,100,000	$108,500,000
2-Kanuti Flats Corridor	$20,300,000	$16,200,000	$3,000,000	$4,300,000	$20,400,000	$62,100,000	$2,400,000	$128,500,000
3-Elliott Hwy Corridor	$30,700,000	$18,200,000	$4,600,000	$8,200,000	$27,200,000	$84,000,000	$2,600,000	$175,200,000
5-DMTS Port Corridor	$21,600,000	$12,000,000	$14,500,000	$1,300,000	$13,600,000	$96,300,000	$6,300,000	$165,400,000
6-Cape Blossom Corridor	$20,600,000	$11,200,000	$16,800,000	$900,000	$15,900,000	$105,500,000	$6,700,000	$177,300,000
7-Selawik Flats Corridor	$27,900,000	$9,700,000	$9,700,000	$3,100,000	$23,800,000	$85,200,000	$4,200,000	$163,300,000
8-Cape Darby Corridor	$28,600,000	$8,700,000	$12,500,000	$3,500,000	$24,900,000	$90,000,000	$4,600,000	$172,500,000

Driven H-piles and pre-cast concrete abutments were assumed for all bridge types. It is likely that some cast-in-place work will be required, even if pre-cast abutments are used, but this was neglected for the purpose of cost estimating. Conceptual bridge cost estimates are based on items listed in the DOT&PF Standard Specifications for Highway Construction.

Proposed corridors' overall bridge costs were estimated using unit prices for the three categories of bridge sizes (small, medium, and large). Unit costs per linear foot were developed for several conceptual and proprietary bridge designs to obtain a range of individual bridge costs. Understanding that bridge costs will vary at each crossing location based on site specific constraints, a representative value was selected from within the range of derived bridge costs. The 65th percentile cost, defined as the cost 65% up the price range from lowest to highest, was selected for determining unit costs. After deriving unit costs per linear foot for the three bridge categories, these unit costs were applied to the span lengths of the small (50-foot) and medium (140-foot) bridge categories to arrive at "per crossing" bridge costs. Large bridges are evaluated on a lineal foot basis.

Culvert costs were considered for rolled (<48-inch diameter) and structural plate corrugated steel pipe culverts ranging from 4-feet to 20-feet in diameter. Welded seams are required for rolled pipe in DOT&PF Northern Region. Fish passage culverts should be structural plate pipe with 6-inch-by-2-inch corrugations or larger. Culverts with various wall thicknesses (gauges) were considered to account for varying cover requirements, with 8- to 16-gauge culverts evaluated for the small culverts (less than 10-foot diameter) and 5- to 12-gauge culverts evaluated for the large culverts (10-foot to 20-foot diameter). A minimum 10-gauge pipe thickness is recommended where aufeis formation is anticipated. Material costs per crossing were derived assuming a 95-foot-long culvert. The culvert length of 95-feet was assumed after examining average culvert lengths for major drainage structures for a similar project on the Dalton Highway. Required culvert lengths may increase if thermal berms are used to address permafrost conditions.

A 36-inch minimum culvert diameter was assumed for all minor drainage culverts to account for potential icing and aufeis conditions. Minor drainage crossings are estimated assuming an 80-foot-long culvert based on average cross-culvert lengths on the Dalton Highway. Four minor

drainage culverts are assumed per mile, based on the frequency of minor drainage crossings on the Dalton Highway.

After compiling unit cost per stream crossing for various culvert options, the 65th percentile cost was selected as a representative material cost. Material costs were increased by 10% to account for recent increases in the price of steel. Recent increases in oil costs also affect material costs. Construction costs for each culvert were assumed equal to the material costs. The resultant unit prices were consistent with recent culvert bid costs on a similar project along the Dalton Highway. After establishing estimates for unit culvert costs, additional costs were figured into the estimate to account for deadmen, erosion protection riprap, culvert marker posts, thaw pipe, and rigid board insulation.

Corridor drainage costs are derived from unit costs for minor crossing structures and the five categories of major crossing structures. Unit costs are per crossing for the five smaller categories (minor drainage culvert, small culvert, large culvert, small bridge, medium bridge) and per linear foot of bridge for large bridges due to the high variability in total bridge lengths and the substantial costs associated with these crossings.

Estimated unit prices for roadway crossing structures are:

- $21,000 per minor drainage culvert (36-inch diameter)
- $103,000 per small culvert (less than 10-foot diameter);
- $230,000 per large culvert (10- to 20-foot diameter);
- $430,000 per small bridge (less than 50-foot total length);
- $1,130,000 per medium bridge (50- to 140-foot total length); and
- $11,400 per linear foot for large bridges (greater than 140-foot total length).

5.2 Railway Bridge Cost Estimates

Drainage cost estimates for the rail corridors are summarized in Table 4.

Unit costs for railway bridges are estimated to range from $8,000 per track foot for standardized short spans (roughly 28 feet long) to $25,000 per track foot for larger spans (150 feet). Multiple short spans were used to calculate unit costs per structure for small and medium bridges, with the $25,000 per track foot unit price being used to estimate the cost of large bridges.

Table 4: Summary of Baseline Drainage Structure Costs for Rail Corridors

Corridor	Drainage Structure Category Costs							TOTAL Corridor Cost
	Minor Crossings	Culvert Small (4' to 10')	Culvert Large (10' to 20')	Bridge Small (20' to 50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Fish Passage Culverts	
4-Parks Hwy Corridor	$21M-$38M	$13.1M-18.1M	$6.2M-$12.0M	$12.6M-21.2M	$59.4M-$82.1M	$187M-$267M	$2.9M-$3.6M	$335M-23M
4-Parks Hwy Corridor A	$36,200,000	$13,100,000	$12,000,000	$18,900,000	$65,100,000	$186,800,000	$3,000,000	$334,900,000
4-Parks Hwy Corridor B	$37,800,000	$17,800,000	$11,100,000	$21,200,000	$82,100,000	$193,300,000	$3,700,000	$366,700,000
4-Parks Hwy Corridor C	$35,300,000	$13,500,000	$7,200,000	$12,600,000	$59,500,000	$260,300,000	$2,900,000	$391,100,000
4-Parks Hwy Corridor D	$37,000,000	$18,200,000	$6,300,000	$14,900,000	$76,500,000	$266,800,000	$3,600,000	$422,900,000
5-DMTS Port Corridor	$21,600,000	$12,000,000	$14,500,000	$1,400,000	$34,000,000	$211,000,000	$6,300,000	$300,600,000
6-Cape Blossom Corridor	$20,600,000	$11,200,000	$16,800,000	$900,000	$39,700,000	$231,300,000	$6,700,000	$326,900,000
7-Selawik Flats Corridor	$27,900,000	$9,700,000	$9,700,000	$3,200,000	$59,500,000	$186,800,000	$4,200,000	$300,700,000
8-Cape Darby Corridor	$28,600,000	$8,700,000	$12,500,000	$3,600,000	$62,300,000	$197,300,000	$4,600,000	$317,300,000

Culvert costs for railway corridors were determined in the same manner as for roadway corridors, and unit costs are considered equivalent for road and rail corridors. Although increased rail loads and fill heights may require using heavier gauge culverts, resulting in higher costs, this will have to be addressed on a site-by-site basis and was not included in the cost comparisons.

Rail corridor drainage costs are estimated from unit costs for the five categories of crossing structures. Unit costs are per crossing for the five smaller categories (minor drainage culvert, small culvert, large culvert, small bridge, medium bridge) and per linear foot of bridge for the large bridges due to high variability in total bridge lengths and the substantial costs associated with these crossings.

Estimated unit costs for railroad crossing structures are:

- $21,000 per minor drainage culvert (36-inch diameter)
- $103,000 per small culvert (4- to 10-foot diameter);
- $230,000 per large culvert (10- to 20-foot diameter);
- $450,000 per small bridge (20- to 50-foot total length);
- $2,830,000 per medium bridge (50- to 140-foot total length); and
- $25,000 per linear foot for large bridges (greater than 140-foot total length).

5.3 Fish Passage Culverts

The majority of AWC-listed anadromous streams in the study area are relatively large main-stem streams requiring bridge crossings. Bridge costs are not as affected by fish passage concerns as they typically provide adequate fish passage.

Corridor culvert crossings requiring fish passage will incur additional costs associated with the design of fish passage structures and increased construction costs resulting from channel bed materials, bank stabilization, and increased labor. Design and bid costs for several recent fish passage projects around the state were investigated to estimate the increase in construction cost compared to non-fish passage culverts. Items in the evaluated bid costs not specific to construction of the fish passage crossing that would be included in other items of the overall project cost (mobilization, embankment fill, etc.) were subtracted. The increase in construction

costs for fish passage culverts ranges from approximately $40,000 to $150,000 for the projects examined, with an average increase of approximately $80,000.

Substantial costs are also associated with the design of fish passage culverts, including additional survey, geomorphic investigations, geotechnical investigations, agency coordination, permitting, and hydraulic analysis. Design costs are high, as each stream crossing requires a unique design solution that takes into account the geomorphic conditions at the site. A single "cookie-cutter" design cannot be applied to several fish passage crossings in an effort to reduce design costs. The additional costs for fish passage design range from approximately $15,000 to $80,000 for the projects examined, with an average approximate cost of $50,000 per crossing.

To be conservative in estimating the impacts of fish passage crossings on corridor costs, a cost of $130,000 is added to culvert crossings that are assumed to require fish passage. Details for the development of these costs are included in Appendix A.

5.4 Drainage Cost Assumptions

Other general assumptions for the unit cost estimates for major and minor drainage crossings include:

- Pre-construction, construction engineering, and overhead costs are not included.
- Hydrology and hydraulics preparation costs (or hydrology and hydraulics summary for culverts) are considered incidental to drainage structure costs.
- A minimum 35-foot-wide bridge deck was assumed, with two 12-foot travel lanes and two 5.5-foot-wide shoulders for road corridor bridges.
- Approaches are not included in the unit bridge costs.
- Removable bridge railing costs are not included.
- Bridge site accessibility factors are not incorporated in the cost estimates.
- Temporary bridges or cofferdams are not included in these estimates.
- Bridge unit prices assume there will be some economy of scale in this size project, and that individual bridge costs will decrease as the number of bridges fabricated increases.

Alternatively, costs per bridge may increase if fabricated individually or in smaller numbers, which could occur if the project is constructed in phases over several years.

- Conceptual bridge crossing locations do not consider geological conditions. Poor geologic or soil conditions may require additional pier and abutment costs or relocation of the crossing to a wider location requiring a longer structure.
- The hydrologic, geomorphic, and geotechnical data necessary to evaluate scour potential at crossing locations is not available. Bridges and culverts have not been evaluated with regard to potential scour. Bridges on streams with high potential for scour may require larger and/or deeper abutments or piers, resulting in increased costs. Culverts may require energy dissipation basins rather than aprons.
- Detailed data for evaluating icing hazards on a regional or per-crossing basis is not available. Icing hazards have not been evaluated for individual stream crossings. Crossings in areas subject to icing hazards may require additional reinforcement of abutments and piers or increased structure spans, increasing costs.
- Areas prone to aufeis may require additional overflow culverts, increasing costs. Thaw pipes increase culvert costs 1 to 7% and are included in the corridor drainage cost estimates. The use of thicker gauge pipe (10-gauge minimum) and welded seams was not included in cost comparisons.
- Bridges across navigable waters will have increased costs resulting from higher bridge decks and increased span distances to accommodate barge traffic. Costs associated with navigable rivers cannot be estimated in a meaningful manner until detailed hydrologic data, site survey information, and more defined river use information (including type of barges, boats, and public needs) are available.
- Culverts are corrugated steel pipe with galvanized finish. Corrugations vary from standard 2-2/3-inch-by-1/2-inch (16-gauge) to 6-inch-by-2-inch (fish passage pipes), depending on culvert diameter. Both rolled pipe and structural plate pipe would be used as dictated by availability for various culvert sizes, knowing crossing requirements will vary based on cover/load depths and hydraulic requirements. Rolled pipe is typically only available for 12-foot and smaller diameters, but culvert availability varies by gauge

thickness, manufacturer, and regional availability. Structural plate pipes typically require increased labor, but may have reduced freight costs.

- Erosion protection for minor drainage culverts is assumed to be incidental to culvert installation costs.
- Freight from Seattle, Washington to Fairbanks was estimated at $6,000 per 45,000-pound truckload for culvert and bridge alternatives fabricated outside of Alaska, including proprietary bridges and all culverts.
- Cost estimates do not include freight from Fairbanks or unloading at the project site.

6.0 HYDROLOGIC CHARACTERISTICS OF PROPOSED CORRIDORS

6.1 Criteria for Corridor Comparison

The primary criteria for comparing the proposed corridor alternatives are the number of stream crossings and associated drainage structure sizes. The number of large bridge crossings and associated total bridge lengths are of special significance, as over 50% of the total drainage structure costs are attributed to large bridges for each corridor alternative. The number of crossings at anadromous streams and navigable rivers are an important consideration due to permitting requirements and increased costs of drainage structures. The presence of permafrost is also important, due to the potential for damage to the road or rail structural sections and drainage structures.

Preliminary cost estimates were developed based on the number of crossings, structure sizing, and the number of anadromous and/or navigable streams. More detail on the assumptions used for the cost analysis is included in Appendix A.

A summary comparison of the corridors based on hydrologic criteria is presented in Table 13.

6.2 Brooks East Corridor (Road)

Brooks East Corridor is the shortest corridor at 216 miles (Figure 6). The geometry of this corridor is only suitable for a road.

Stream Crossing Structures

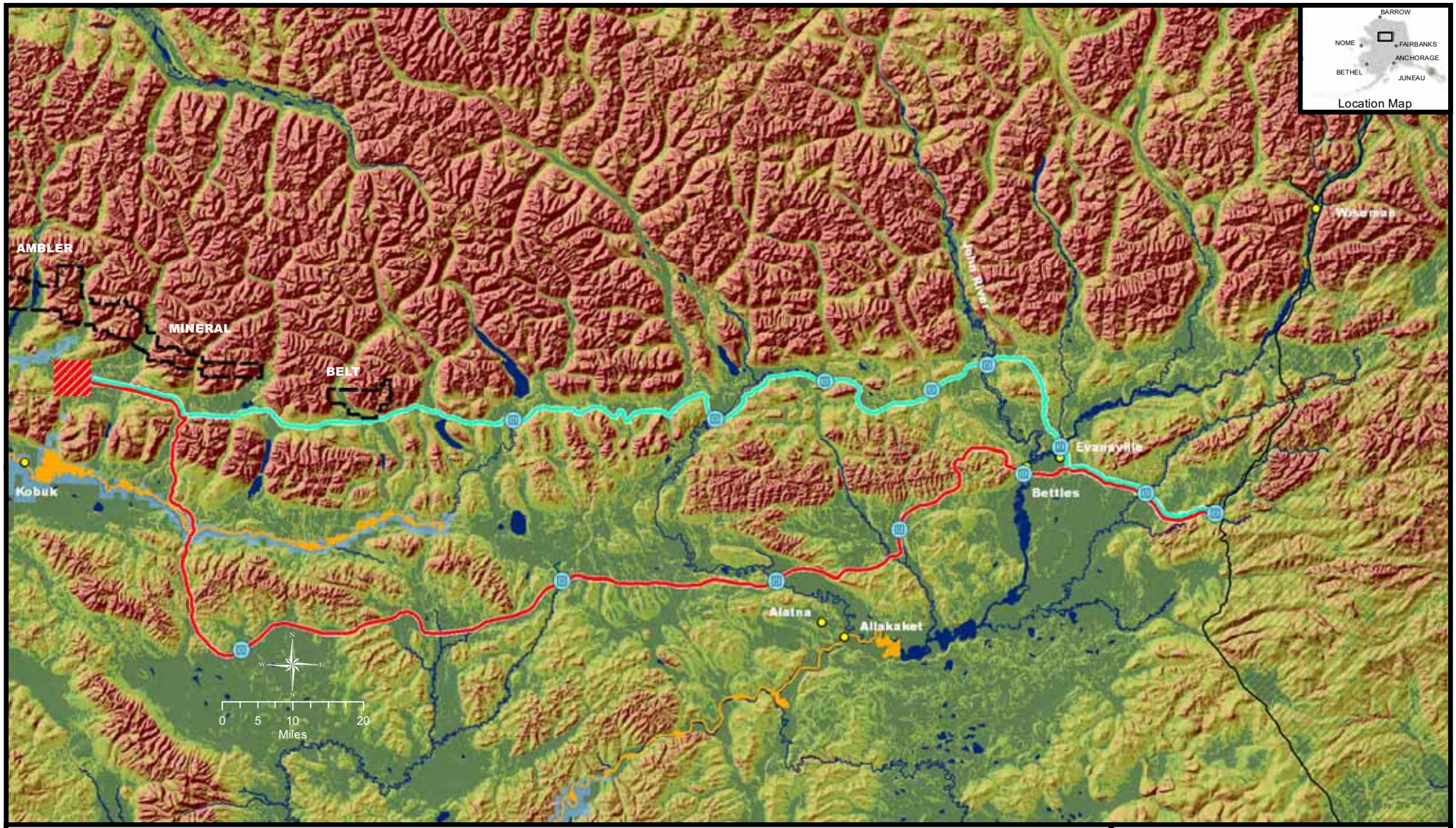
Brooks East Corridor crosses the fewest streams (1,025). It has 864 minor drainage crossings and 161 major stream crossings. The estimated number of required crossing structures is:

- 864 minor crossings (36-inch diameter);
- 114 small culvert culverts (4- to 10-foot diameter);
- 16 large culverts (10- to 20-foot diameter);
- 5 small bridges (20- to 50-foot span);
- 13 medium bridges (50- to 140-foot span); and
- 13 large bridges (greater than 140-foot span).

The total length of large bridges required is 5,000 feet. The largest stream crossings along this corridor, sorted from longest to shortest bridge length, are shown in Table 5. Large bridge locations for this corridor are shown on Figure 6. The total estimated cost for crossing structures on Brooks East Corridor is $108.5 million - - the lowest cost for any proposed corridor.

Table 5: Summary of Large Bridge Crossings for Brooks East Corridor

Stream Name	Large Bridge Length (ft)
Koyukuk River	600
John River	560
Alatna River	500
Kogoluktuk River	480
South Fork Koyukuk River	440
Kobuk River	440
Malamute Fork John River	400
Reed River	320
Mauneluk River	320
Shungnak River	280
Jim River	240
South Fork Bedrock Creek	240
Beaver Creek	180
Total	**5,000**



Communities and Place Names
Existing Roads
Water
Outside of Project Study Area
Ambler Mineral Belt
Proposed Staging Area
1-Brooks East Corridor 216 Miles (Road Only)
2-Kanuti Flats Corridor 241 Miles (Road Only)
Large Bridges
USACE Navigable Rivers
BLM Navigable Rivers

Slope
0 - 10%
10 - 20%
20 - 50%
50 - 100%
> 100%

Coordinate System: NAD 1983 Alaska Albers

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION

AMBLER MINING DISTRICT ACCESS
PRELIMINARY HYDROLOGY RECONNAISSANCE MEMO

LARGE BRIDGE CROSSINGS
EAST CORRIDORS

DATE: May 23, 2011 | **Figure 6**

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Anadromous Waters

Brooks East Corridor crosses five streams listed in ADF&G's AWC; only the Cape Blossom Corridor crosses fewer mapped anadromous streams. Brooks East Corridor crosses 21 other streams that have high potential to be anadromous based on stream gradients and proximity to mapped streams. With 26 mapped and potential anadromous streams, this corridor has the lowest total number of anadromous stream crossings. Eighteen of these crossing appear to require bridges and eight crossings are estimated to require fish passage culverts. Note that numerous other streams may contain anadromous and/or resident fish and may require fish passage crossings. Field studies and consultation with ADF&G biologists are required to refine these estimates.

Navigability

Brooks East Corridor does not cross any rivers that have been determined to be navigable by the state or federal agencies. This corridor and Kanuti Flats Corridor are the only corridors that do not cross designated navigable rivers.

Permafrost

The majority of this corridor is underlain by continuous permafrost in the mountainous areas with sporadic regions of moderately thick to thin permafrost and discontinuous permafrost in lowland and upland areas.

6.3 Kanuti Flats Corridor (Road)

Kanuti Flats Corridor is 241 miles long, the second shortest route (Figure 6). The geometry of this corridor is also only suitable for a road.

Stream Crossings

Kanuti Flats Corridor has 1,176 total stream crossings: 964 minor stream crossings and 212 major stream crossings. The estimated number of required crossing structures is:

- 964 minor crossing culverts (36-inch diameter);
- 157 small culverts (4- to 10-foot diameter);
- 13 large culverts (10- to 20-foot diameter);
- 10 small bridges (20- to 50-foot span);

- 18 medium bridges (50- to 140-foot span); and
- 14 large bridges (greater than 140-foot span).

The total length of large bridges required is 5,440 feet. The largest stream crossings along this corridor, sorted from longest to shortest span, are shown in Table 6. Kanuti Flats Corridor large bridge locations are shown on Figure 6. The total estimated cost for drainage structures on this corridor is $128.5 million.

Anadromous Waters

Kanuti Flats Corridor crosses 14 streams listed in ADF&G's AWC as well as 41 potentially anadromous streams, based on stream gradients and proximity to mapped streams. Of these 55 anadromous streams, 27 are estimated to require bridges and 18 are likely to require fish passage culverts. Thus, Kanuti Flats Corridor has the second lowest number of mapped and potentially anadromous streams (55).

Table 6: Summary of Large Bridge Crossings for Kanuti Flats Corridor

Stream Name	Large Bridge Length (ft)
Koyukuk River	840
Alatna River	680
Kobuk River	640
Kogoluktuk River	480
South Fork Koyukuk River	440
Pah River Confluence	360
Hogatza River	320
Mauneluk River	320
Koyukuk Side Channel	280
Shungnak River	280
Jim River	240
Koyukuk Side Channel	200
Henshaw Creek East Fork	200
Unnamed Tributary	160
Total	**5,440**

Navigability

This corridor does not cross any rivers documented as navigable rivers.

Permafrost

Large portions of this corridor are underlain by continuous permafrost in mountainous areas and moderately thick to thin permafrost in lowland and upland areas with isolated regions of discontinuous permafrost in lowland and upland areas.

6.4 Elliott Highway Corridor (Road)

Elliott Highway Corridor is 365 miles long and is the longest road corridor (Figure 7).

Stream Crossings

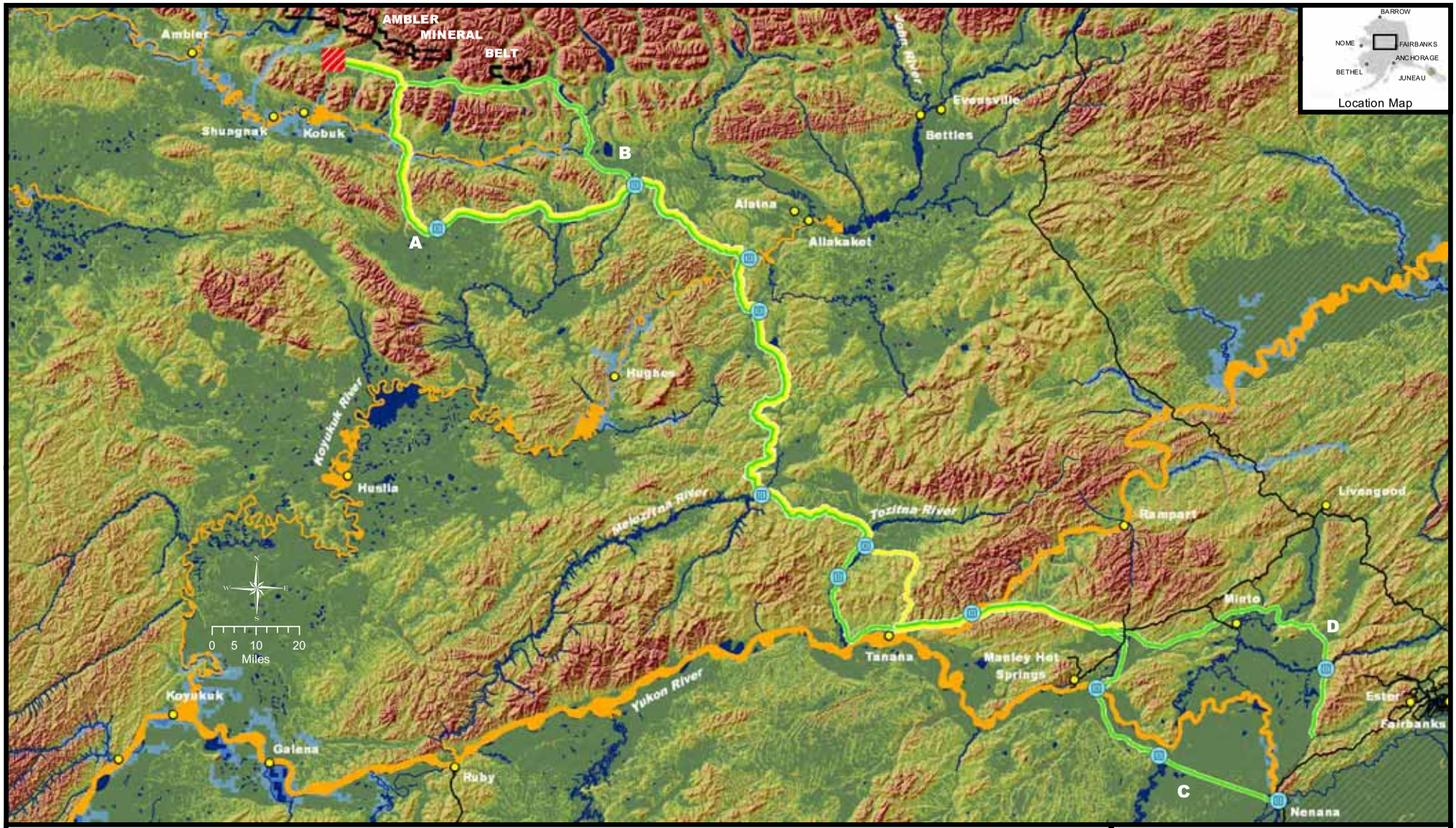
Elliott Highway Corridor crosses 1,711 streams: 1,460 minor stream crossings, and 251 major stream crossings. The estimated number of required crossing structures is:

- 1,460 minor crossing culverts (36-inch diameter);
- 176 small culverts (4- to 10-foot diameter);
- 20 large culverts (10- to 20-foot diameter);
- 19 small bridges (20- to 50-foot span);
- 24 medium bridges (50- to 140-foot span); and
- 12 large bridges (greater than 140-foot span).

The total length of large bridges required is 7,360 feet. The largest stream crossings along this corridor, sorted from longest to shortest total length, are shown in Table 7. Large bridge locations on this corridor are shown on Figure 7. The total estimated baseline drainage cost for this corridor is $175.2 million.

Anadromous Waters

This corridor crosses 8 streams listed in ADF&G's AWC and 48 streams assumed to be anadromous based on stream gradients and proximity to mapped streams. The number of stream crossings meeting the criteria for fish passage culverts is estimated at 18 and the remaining 38 will require bridges.



Place Names
Existing Roads
Railroad
Water
Outside of Project Study Area
Ambler Mineral Belt
Proposed Staging Area
3-Elliott Hwy Corridor 365 Miles (Road Only)
4-Parks Hwy RR Corridor 420-450 Miles (Rail Only)
Large Bridges
USACE Navigable Rivers
BLM Navigable Rivers

Slope
0 - 10%
10 - 20%
20 - 50%
50 - 100%
> 100%

Coordinate System: NAD 1983 Alaska Albers

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION

AMBLER MINING DISTRICT ACCESS
PRELIMINARY HYDROLOGY RECONNAISSANCE MEMO

LARGE BRIDGE CROSSINGS
SOUTHEAST CORRIDORS

DATE: May 23, 2011 | **Figure 7**

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Table 7: Summary of Large Bridge Crossings for Elliott Highway Corridor

Stream Name	Large Bridge Length (ft)
Yukon River	2,720
Koyukuk River	1,320
Kobuk River	640
Kogoluktuk River	480
Tozitna River	400
Pah River Confluence	360
Hogatza River	320
Mauneluk River	320
Shungnak River	280
Melozitna River	180
Mentanontli River	180
Unnamed Tributary	160
Total	**7,360**

Navigability

This corridor crosses rivers documented as navigable, the Koyukuk and the Yukon River. The Yukon River is the longest navigable river system in Alaska, with seasonal barge traffic extending to the Alaska-Yukon border. During periods of high flow, the Koyukuk River is navigable upstream to the village of Allakaket, although there have been periods of several years when barges could not reach the village due to low flows (RoEn Design Associates, 1977). However, the Koyukuk River is considered navigable up to the village of Allakaket for the purpose of evaluating the proposed corridors. Proposed crossings on these rivers must not impede barge traffic.

Permafrost

Large portions of this corridor are underlain by discontinuous permafrost in mountainous areas and moderately thick to thin permafrost in lowland and upland areas. Isolated regions of discontinuous permafrost are present in lowland and upland areas and continuous permafrost in mountainous areas.

6.5 Parks Highway Railroad Corridor (Rail)

Parks Highway Railroad Corridor is a rail corridor and ranges from 420 to 450 miles long depending on the options taken at the north and south ends of the corridor (Figure 7). This corridor is the longest of any of the proposed corridors. There are four sub-options for this rail

corridor combining two alternative alignments at the north end (Options A and B) and two alternative alignments at the south end (Options C and D). The four sub-options for this corridor are listed below:

Parks Highway Railroad Corridor A = Options B and D
Parks Highway Railroad Corridor B = Options A and D
Parks Highway Railroad Corridor C = Options B and C
Parks Highway Railroad Corridor D = Options A and C

Stream Crossings

Parks Highway Railroad Corridor crosses the largest number of streams, although the exact number crossed depends on which alignment options are selected at the south and north ends. The number of minor stream crossings ranges from 1,680 to 1,800, and the number of major stream crossings ranges from 228 to 309. The estimated number of required crossing structures is:

- 1,680 to 1,800 minor crossing culverts (36-inch diameter);
- 127 to 176 small culverts (4- to 10-foot diameter);
- 27 to 52 large culverts (10- to 20-foot diameter);
- 28 to 47 small bridges (20- to 50-foot span);
- 21 to 29 medium bridges (50- to 140-foot span); and
- 13 to 17 large bridges (greater than 140-foot span).

The total length of large bridges required ranges from 7,470 to 10,670 feet. The largest stream crossings along this corridor, sorted from longest to shortest total length, are shown in Table 8. Large bridge locations for this corridor are shown on Figure 7. The total estimated baseline drainage cost for this corridor ranges from $334.9 to $422.9 million.

Anadromous Waters

Depending on which alignment options are selected at the south and north ends, this corridor crosses 8 to 13 listed anadromous streams. Another 53 to 72 streams are assumed to be anadromous. The number of stream crossings meeting criteria for fish passage culverts is estimated at 22 to 28, with the remaining 31 to 50 streams requiring bridges.

Table 8: Summary of Large Bridge Crossings for Parks Highway Railroad Corridor

Corridor A		Corridor B		Corridor C		Corridor D	
Stream Name	**Large Bridge Length (ft)**	**Stream Name**	**Large Bridge Length (ft)**	**Stream Name**	**Large Bridge Length (ft)**	**Stream Name**	**Large Bridge Length (ft)**
Yukon River	2,720	Yukon River	2,720	Yukon River	2,720	Yukon River	2,720
Koyukuk River	1,320	Koyukuk River	1,320	Tanana River	1,400	Tanana River	1,400
Tozitna River	520	Kobuk River	640	Koyukuk River	1,320	Koyukuk River	1,320
Kogoluktuk River	480	Tozitna River	520	Kantishna River	900	Kantishna River	900
Kobuk River	400	Kogoluktuk River	480	Tozitna River	520	Kobuk River	640
Hogatza River	320	Pah River Confluence	360	Nenana River	480	Tozitna River	520
Reed River	320	Hogatza River	320	Kogoluktuk River	480	Nenana River	480
Mauneluk River	320	Mauneluk River	320	Kobuk River	400	Kogoluktuk River	480
Shungnak River	280	Shungnak River	280	Hogatza River	320	Pah River Confluence	360
Tolzitna River	250	Tolzitna River	250	Reed River	320	Hogatza River	320
Melozitna River	180	Melozitna River	180	Mauneluk River	320	Mauneluk River	320
Mentanontli River	180	Mentanontli River	180	Shungnak River	280	Shungnak River	280
Beaver Creek	180	Unnamed Tributary	160	Tolzitna River	250	Tolzitna River	250
				Melozitna River	180	Melozitna River	180
				Mentanontli River	180	Mentanontli River	180
				Beaver Creek	180	Unnamed Tributary	160
				Unnamed Tributary	160	Unnamed Tributary	160
Total	**7,470**	**Total**	**7,730**	**Total**	**10,410**	**Total**	**10,670**

Permafrost

Large portions of this corridor are underlain by thick permafrost and moderately thick to thin permafrost in lowland and upland areas. Isolated regions of discontinuous permafrost occur in lowland and upland areas and continuous permafrost in mountainous areas.

6.6 Delong Mountain Transportation System Corridor (Road/Rail)

The DMTS Port Corridor is 257 miles long and could accommodate a road or rail corridor (Figure 8).

Stream Crossings

The DMTS Port Corridor crosses 1,241 streams: 1,028 small stream crossings, and 213 major stream crossings. The estimated number of required crossing structures is:

- 1,028 minor crossing culverts (36-inch diameter);
- 116 small culverts (4- to 10-foot diameter);
- 63 large culverts (10- to 20-foot diameter);
- 3 small bridges (20- to 50-foot span);
- 12 medium bridges (50- to 140-foot span); and
- 19 large bridges (greater than 140-foot span).

The total length of large bridges required is 8,440 feet. The largest stream crossings along this corridor, sorted from longest to shortest total length, are shown in Table 9. Figure 8 shows the locations of large bridges for this corridor. The total estimated baseline drainage cost for this corridor is $165.4 million for a road corridor and $300.6 million for a rail corridor.

Anadromous Waters

This corridor crosses 13 listed anadromous streams and 63 additional streams deemed to be anadromous based on gradient and proximity to mapped streams. The number of stream crossings meeting the criteria for fish passage culverts is estimated at 48 with the remaining 28 streams requiring bridges.

Communities and Place Names
Existing Roads
Water
Ambler Mining District
Proposed Staging Area
5-DMTS Port Corridor 257 Miles (Road & Rail)
6-Cape Blossom Corridor 245 Miles (Road & Rail)
Large Bridges
USACE Navigable Rivers
BLM Navigable Rivers
0 - 10%
10 - 20%
20 - 50%
50 - 100%
> 100%

Coordinate System: NAD 1983 Alaska Albers

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION

AMBLER MINING DISTRICT ACCESS
PRELIMINARY HYDROLOGY RECONNAISSANCE MEMO

LARGE BRIDGE CROSSINGS
WEST CORRIDORS

DATE: May 23, 2011 | **Figure 8**

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Table 9: Summary of Large Bridge Crossings for Delong Mountain Transportation System Corridor

Stream Name	Large Bridge Length (ft)
Noatak River	1,560
Ambler River	960
Unnamed Tributary	800
Squirrel River	640
Kallarichuk River	600
Tutuksuk River	440
Kallarichuk River	360
Salmon River	360
Agashashok Tributary	320
Hunt River	320
Rabbit Creek	280
Squirrel River Tributary	280
Tutuksuk River Tributary	280
Redstone River	280
Nekakte Creek	240
Akillik River	200
Cross Creek	200
Unnamed Tributary	160
Kaligurichеark River	160
Total	**8,440**

Navigability

The DMTS Port Corridor crosses two navigable rivers: the Noatak and the Ambler. Changing channel conditions sometimes limit the navigability of the Noatak River, but it is typically navigable by shallow-draft boats from June to October. Historically, barges can only reach Noatak during a short period in early June, and in recent years, even this has not been possible due to shifts in the river channel (Noatak, 2003). However, the Noatak River is considered navigable for this corridor evaluation. The BLM has determined much of the Ambler River to be navigable.

Permafrost

Large portions of this corridor are underlain by discontinuous permafrost in mountainous areas and moderately thick to thin permafrost in lowland and upland areas. Isolated regions of discontinuous permafrost occur in lowland and upland areas, and continuous permafrost in mountainous areas.

6.7 Cape Blossom Corridor (Road/Rail)

Cape Blossom Corridor is 245 miles and is suitable for either road or rail use (Figure 8).

Stream Crossings

Cape Blossom Corridor crosses 1,201 streams: 980 small stream crossings, and 221 major stream crossings. The estimated number of required crossing structures is:

- 980 minor crossing culverts (36-inch diameter);
- 108 small culverts (4- to 10-foot diameter);
- 73 large culverts (10- to 20-foot diameter);
- 2 small bridges (20- to 50-foot span);
- 14 medium bridges (50- to 140-foot span); and
- 24 large bridges (greater than 140-foot span).

The total length of large bridges required is 9,250 feet. The largest stream crossings along this corridor, sorted from longest to shortest total length, are shown in Table 10. Large bridge locations for this corridor are shown on Figure 8. The total estimated baseline drainage cost for this corridor is $177.3 million for a road and $326.9 million for rail.

Anadromous Waters

Cape Blossom Corridor crosses the lowest number of listed anadromous streams (2), but crosses the largest number of streams assumed to be anadromous (83). The number of stream crossings meeting the criteria for fish passage culverts is estimated at 48, leaving 37 of the streams to be crossed with bridges.

Navigability

This corridor crosses only one navigable river, the Kobuk. Barge traffic on the Kobuk River provides service to communities including Noorvik, Kiana, Ambler, Shungnak, and Kobuk. The Kobuk River is navigable during the summer months, although shallow stretches in the river, such as near the Onion Portage downstream of Ambler, make the river impassible to barge traffic during low flows (R&M, 2005). This evaluation assumes that the Kobuk River is navigable up to the city of Kobuk.

Table 10: Summary of Large Bridge Crossings for Cape Blossom Corridor

Stream Name	Large Bridge Length (ft)
Unnamed Tributary	1,120
Kobuk River	760
Unnamed Tributary	750
Unnamed Tributary	600
Unnamed Tributary	500
Unnamed Tributary	480
Rabbit River	480
Lomen Creek Tributary	440
Tagagawik River	440
Lomen Creek	400
Unnamed Tributary	400
Unnamed Tributary	300
Ingruksukruk Creek	280
Selawik River	280
Shungnak River	280
Unnamed Tributary	240
Kauk River Tributary	240
Mangoak River Tributary	240
Mangoak River Tributary	200
Unnamed Tributary	180
Unnamed Tributary	160
Hunt Creek	160
Unnamed Tributary	160
Unnamed Tributary	160
Total	**9,250**

Permafrost

The majority of this corridor is underlain by moderately thick to thin permafrost in lowland and upland areas with isolated regions of discontinuous permafrost in lowland and upland areas and continuous permafrost in mountainous areas.

6.8 Selawik Flats Corridor (Road/Rail)

Selawik Flats Corridor is 331 miles and is suitable for road or rail use (Figure 9).

Stream Crossings

This corridor crosses a total of 1,509 streams: 1,324 minor stream crossings, and 185 major stream crossings. The estimated number of required crossing structures is:

- 331 minor crossing culverts (36-inch diameter);
- 94 small culverts (4- to 10-foot diameter);
- 42 large culverts (10- to 20-foot diameter);
- 7 small bridges (20- to 50-foot span);
- 21 medium bridges (50- to 140-foot span); and
- 21 large bridges (greater than 140-foot span).

The total length of large bridges required is 7,470 feet. The largest stream crossings along this corridor, sorted from longest to shortest total length, are shown in Table 11. Figure 9 shows the locations of large bridges for this corridor. The total estimated baseline drainage cost for this corridor is $163.3 million for a road and $300.7 million for rail.

Anadromous Waters

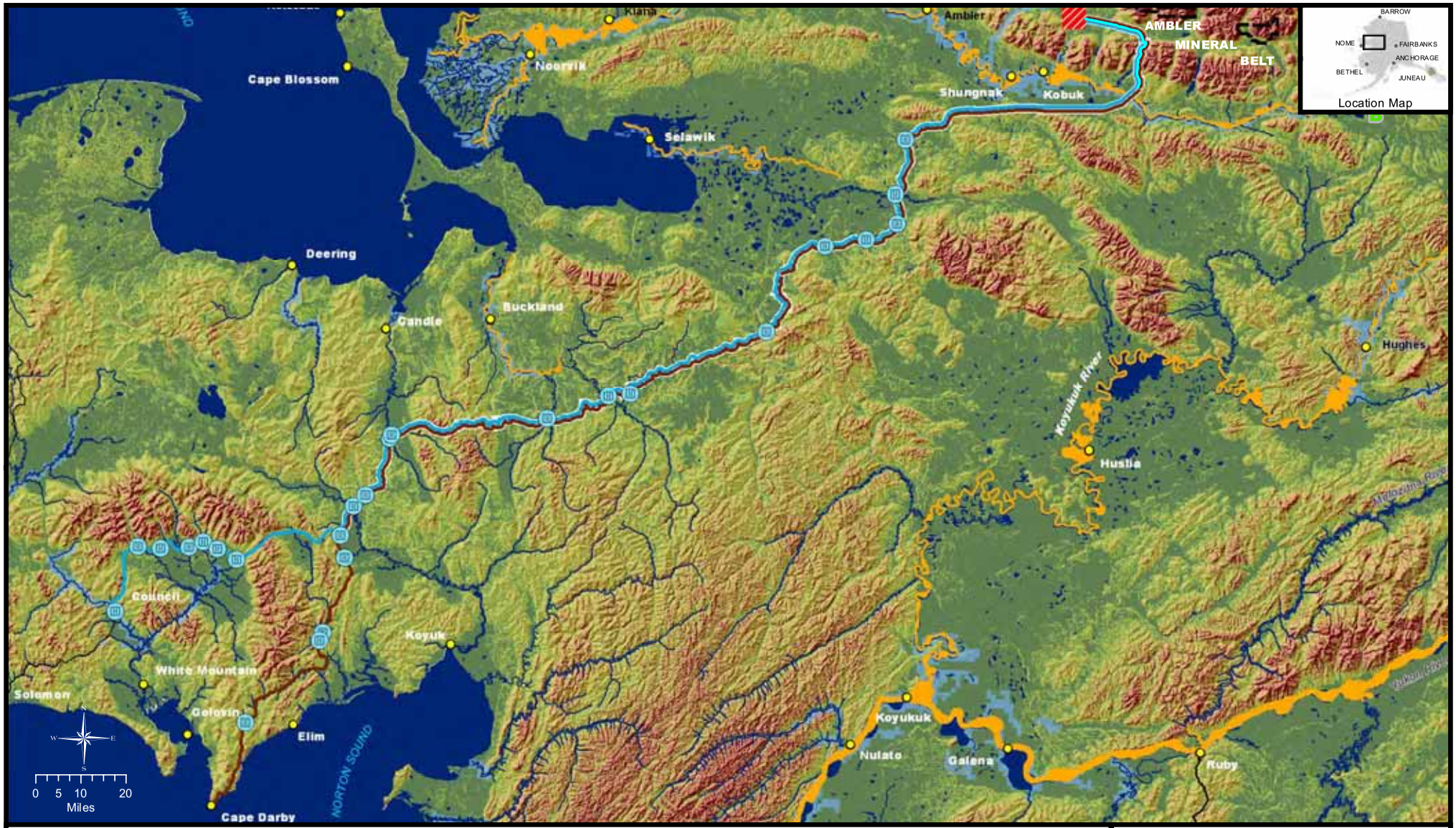
This corridor crosses the second highest number of listed anadromous streams (23) and another 48 streams assumed to be anadromous based on gradient and proximity. The number of stream crossings meeting the criteria for fish passage culverts is estimated at 32 and the remaining 29 are estimated to require bridges.

Navigability

The Selawik Flats Corridor crosses only one navigable river, the Kobuk.

Permafrost

The majority of this corridor is underlain by moderately thick to thin permafrost in lowland and upland areas with isolated regions of discontinuous permafrost in lowland and upland areas and continuous permafrost in mountainous areas.



Communities and Place Names
Existing Roads
Water
Ambler Mining District
Proposed Staging Area
7-Selawik Flats Corridor 340 Miles (Road & Rail)
8-Cape Darby Corridor 331 Miles (Road & Rail)
Large Bridges
USACE Navigable Rivers
BLM Navigable Rivers

Slope
0 - 10%
10 - 20%
20 - 50%
50 - 100%
> 100%

Coordinate System: NAD 1983 Alaska Albers

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION

AMBLER MINING DISTRICT ACCESS
PRELIMINARY HYDROLOGY RECONNAISSANCE MEMO

LARGE BRIDGE CROSSINGS
SOUTHWEST CORRIDORS

DATE: May 23, 2011 | **Figure 9**

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Table 11: Summary of Large Bridge Crossings for Selawik Flats Corridor

Stream Name	Large Bridge Length (ft)
Kobuk River	760
Baker Creek	580
Quartz Creek	570
Rabbit River	480
First Chance Creek	440
Kiwalik River	400
Unnamed Tributary	400
Fish River	380
Oregon Creek	320
Buckland River	320
North Fork Buckland River	320
Niukluk River	300
Koyuk River	280
Ingruksukruk Creek	280
Selawik River	280
Shungnak River	280
Lava Creek	240
Telephone Creek East	240
West Fork Buckland River	240
Tagagawik River	200
Unnamed Tributary	160
Total	**7,470**

6.9 Cape Darby Corridor (Road/Rail)

Cape Darby Corridor is 340 miles long and is suitable for road or rail use (Figure 9).

Stream Crossings

The corridor crosses a total of 1,553 streams, second only to the southeast corridors. Selawik Flats Corridor has 1,360 minor stream crossings and 193 major stream crossings. The estimated number of required crossing structures is:

- 1,360 minor crossing culverts (36-inch diameter);
- 84 small culverts (4- to 10-foot diameter);
- 54 large culverts (10- to 20-foot diameter);
- 8 small bridges (20- to 50-foot span);
- 22 medium bridges (50- to 140-foot span); and
- 25 large bridges (greater than 140-foot span).

The total length of large bridges required is 7,890 feet. The largest stream crossings along this corridor, sorted from longest to shortest total length, are shown in Table 12. Large bridge locations for the corridor are shown on Figure 9. The total estimated baseline drainage cost for this corridor is $172.5 million for a road and $317.3 million for rail.

Anadromous Waters

This corridor crosses the highest number of listed anadromous streams (26). Another 51 streams are assumed to be anadromous. Of these 77 anadromous crossings, 42 are estimated to be bridges and the remaining 35 meet the criteria for fish passage culverts.

Navigability

Selawik Flats Corridor crosses only one river documented as navigable, the Kobuk.

Permafrost

The majority of this corridor is underlain by moderately thick to thin permafrost in lowland and upland areas with isolated regions of discontinuous permafrost in lowland and upland areas and continuous and discontinuous permafrost in mountainous areas. The use of rigid board insulation below all culverts is recommended where permafrost is present.

Table 12: Summary of Large Bridge Crossings for Cape Darby Corridor

Stream Name	Large Bridge Length (ft)
Kobuk River	760
Quartz Creek	570
Rabbit River	480
Tubutulik River	440
First Chance Creek	440
Kwiniuk River	400
Kiwalik River	400
Unnamed Tributary	400
June Creek	320
Buckland River	320
North Fork Buckland River	320
Koyuk River	280
Ingruksukruk Creek	280
Selawik River	280
Shungnak River	280
Copper Creek	240
West Fork Buckland River	240
Kwiniuk River Tributary	200
Kwiniuk River Tributary	200
Chukajak Creek	200
Tagagawik River	200
Kwiniuk River Tributary	160
Kwiniuk River Tributary	160
Kwiniuk River Tributary	160
Unnamed Tributary	160
Total	**7,890**

6.10 Summary of Corridor Comparison

The corridors heading east from the Ambler mineral belt generally have the most favorable hydrologic characteristics. These corridors cross fewer anadromous streams and fewer streams overall, and require fewer large bridges. The west and southwest corridors cross the highest number of anadromous streams and require more and longer large bridges. The southeast rail corridor has the least favorable hydrologic characteristics, including a crossing of the Yukon River. The number of minor drainage crossings, major drainage crossings, anadromous streams, navigable rivers, and baseline costs for each corridor are shown in Table 13.

Table 13: Summary of Corridor Comparison

Corridor	Brooks East Corridor	Kanuti Flats Corridor	Elliott Highway Corridor	Parks Highway Railroad Corridor	DMTS Port Corridor	Cape Blossom Corridor	Selawik Flats Corridor	Cape Darby Corridor
Length	**216**	**241**	**365**	**420-450**	**257**	**245**	**331**	**340**
Major Stream Crossings	161	212	251	228-309	213	221	185	193
Minor Stream Crossings	864	964	1,460	1,680-1,800	1,028	980	1,324	1,360
Total Stream Crossings	1,025	1,176	1,711	1,201-1,553	1,241	1,201	1,509	1,553
Minor Culverts	864	964	1,460	1,680-1,800	1,028	980	1,324	1,360
Small Culverts (<10 feet)	114	157	176	127-176	116	108	94	84
Large Culverts (10-20 feet)	16	13	20	27-52	63	73	42	54
Small Bridges	5	10	19	28-47	3	2	7	8
Medium Bridges	13	18	24	21-29	12	14	21	22
Large Bridges	13	14	12	13-17	19	24	21	25
Total Large Bridge Spans	5,000	5,440	7,360	7,470-10,670	8,440	9,250	7,470	7,890
Anadromous Streams	5 M/21 P	14 M/41 P	8 M/48 P	8-13 M/53-72 P	13 M/63 P	2 M/83 P	23 M/48 P	26 M/51 P
Fish Passage Culverts Required	8	18	20	22-28	48	51	32	35
Crossing Structure Costs (millions)	$109	$129	$175	$335-$423	$165 R/$301 RR	$177 R/$327 RR	$163 R/$301 RR	$173 R/$317 RR
Navigable Rivers	0	0	2	2-3	2	1	1	1

7.0 DATA GAPS/PROPOSED FIELDWORK

This Preliminary Hydrology Reconnaissance Memorandum was developed using existing published information. No fieldwork was performed to confirm or update the available data. Field studies and data collection are needed to complete the hydrologic and hydraulic analyses required to refine any proposed corridors or design appropriate crossing structures. This section documents data gaps and recommends fieldwork required to fill these gaps. Additional fieldwork may be identified through stakeholder and agency consultation and as preliminary engineering work uncovers new data gaps.

7.1 Drainage Structure Sizing

The most pressing data gap for the purpose of refining drainage structure types and sizes is corridor mapping.

Stream channel widths for this report were measured from high-resolution aerial photography, where available. Where high-resolution aerial photography was not available, channel widths were estimated using Landsat imagery. The relatively low resolution of Landsat imagery increases the potential for errors in determining channel widths. Where only Landsat imagery was available, bridge and culvert sizes need to be confirmed and revised with improved aerial imagery and/or contour mapping.

Photogrammetric mapping and LiDAR are two options for obtaining contour data for large areas. Photogrammetry offers the potential for digital orthophotos and contour mapping to 5-foot accuracy, and is typically used for planning-level studies. LiDAR offers improved accuracy, as low as 2-foot contours, and would be more beneficial for design efforts. Ground-based data is required in some areas, such as water crossings, but satellite or plane-obtained data (e.g. LiDAR) would provide cost-effective coverage for a wide access corridor. Alignment shifts are also common during design, and having contour data available would be beneficial to designers relocating crossings as alignment shifts occur.

7.2 Drainage Structure Locations

Detailed site information is not available for proposed crossing locations. Proposed bridge locations, types, lengths, and configurations need to be evaluated and optimized using river cross

sections, flood data, and geotechnical data. Crossing locations for major drainage structures need to be determined based on field observations and a detailed analysis of construction feasibility and cost. This would be particularly important for a large river crossing, such as the Yukon River.

A site-specific stream stability analysis is needed for each major drainage crossing. The stability analysis should include an investigation of channel morphology, bed load, channel incision, and potential for lateral stream movements. Crossing structure locations need to be confirmed or revised based on stream stability and geotechnical conditions.

7.3 Hydrologic Analyses

A preliminary hydrologic analysis estimating peak stream discharges is needed to verify estimated structure sizes. Of course, estimating peak discharges also requires that drainage basins be defined for all streams along the proposed corridors. Although AWSHED data for hydrologic unit code 5th and 6th level watersheds may help in the definition of drainage basins, basin boundaries need to be verified using topographic data, aerial photography, and other available high-resolution mapping. Estimates of peak stream discharges will be based on the defined drainage basins and used to refining structure types and sizes.

The use of USGS regional regression equations will likely be sufficient for smaller drainage crossings (i.e., culverts), but may not be sufficient for determining design flows for large bridges. Stream gauges could be installed along streams in the project study area to collect hydrologic data. Several years of stream flow data (on the order of 10 years or more) is typically needed to reduce the standard error of predictions to a level meaningful for design efforts. Installation of stream gauges should also be considered for smaller streams to assist in calibrating the regional regression equations for smaller drainage structures.

7.4 Meteorological Data

Meteorological data within the project study area is limited, primarily to WRCC weather stations. Accurate meteorological data, including precipitation, snowfall, temperature variations, and wind speeds, would be useful in evaluating proposed corridors and determining where additional design consideration is necessary. Accurate meteorological data may also prove beneficial to environmental studies and permitting. Installation of meteorological stations at

selected sites along the proposed corridors would be valuable in predicting hydrologic conditions, including peak runoff flows, the prevalence of permafrost, and potential icing hazards.

7.5 Stream Crossing Surveys

Following determination of preliminary crossing locations, a hydraulic site survey should be completed for all major stream crossing locations. The hydraulic site survey must include determination of the ordinary high water mark and provide cross-sections of the stream channel at the specified intervals. The survey should include a thalweg survey used to investigate the longitudinal profile of the stream.

7.6 Hydraulic Analyses

The APCM requires 48-inch and larger culverts be evaluated for failure potential during a design discharge. Failure can occur due to hydrostatic and hydrodynamic forces, plugging by debris, erosion, or other site-specific conditions. A detailed site-specific hydraulic analysis summarized in a Hydrologic and Hydraulic Report must be provided for these drainage structures per the APCM as part of the design process. The hydraulic analysis should be based on detailed design flood frequency discharges estimated during the hydrologic analysis described above. The Hydrology and Hydraulics Summary can be used as the report for culverts (less than 20 feet in span). The APCM specifies the information that must be included in the Hydrology and Hydraulics Report, which includes, but is not limited to, the following items:

- Drainage shed - contributing drainage area at the site, storage area, stream slope, mean elevation, and area of glaciers;
- Geometry - limiting factors such as road elevation, backwater constraints, private property, and access requirements;
- Frequency - a flood frequency analysis predicting 2-, 50-, 100-, 200-, and 500-year flood flows and associated water surface elevations;
- Fish passage - evaluation of proposed culverts in fish-bearing streams at the 2-year, 2-day fish passage design flow;

- Backwater - a backwater analysis for the proposed structure during a 100-year flood event;
- Overtopping flood - approximated exceedance probability and water surface elevation;
- Scour - general, pier, and abutment scour potential for proposed bridges at the 100- and 500-year flood flows; and
- Hydraulic design - hydraulic features of the design, alternate designs and their features, and a discussion of limitations of the alternates and why they were rejected.

Bridge designs and larger, more complicated culvert designs should be analyzed using the USACE Hydrologic Engineering Center's River Analysis System (HEC-RAS) software program or an appropriate 2D modeling program for hydraulic modeling. The use of the Federal Highway Administration (FHWA) HY-8 culvert analysis software program is recommended for modeling new fish passage culverts, as the model allows for culvert inverts to be depressed. Fish passage crossings designed to the Tier II level require an analysis using the FISHPASS software program. The USFS has developed a FishXing software program that may be helpful in analyzing fish passage designs, but it is not yet approved by the DOT&PF and ADF&G.

7.7 Geotechnical Investigations

7.7.1 Bridges

Many major stream bridges may need to be supported on pile foundations due to permafrost, high silt levels, significant sediment transport, and risks associated with scour and ice flows. Geotechnical investigations consisting of at least one drive-sampled boring should be completed at each proposed pier and abutment location after bridge locations have been confirmed and bridge designs developed. Typical DOT&PF practice is to provide one test hole and one penotrometer at each substructure unit.

7.7.2 Culverts

Large culverts and small culverts with special considerations should have at least one test hole to identify foundation conditions such as bedrock, fine-grained soils, permafrost depth, and potential seismic effects.

7.8 Anadromous Waters

Anadromous waters mapped in the AWC are typically large main-stem rivers. Limited data is available for anadromous fish in tributary streams within the project study area. A GIS analysis of stream gradients was used to estimate which streams may support anadromous fish populations for the purpose of comparing corridors, but these assumptions will need to be verified by area biologists or through field investigations. Year-round trapping and sampling efforts may be necessary to account for seasonal migrations and to identify spawning and rearing habitat. Coordination with ADF&G biologists is needed to verify the level of crossing required (Tier 1, Tier II, or Tier III per the 2001 Memorandum of Understanding design criteria) for each anadromous stream.

ADF&G announced impending changes to the AWC in February 2011. The changes include identifying levels of importance for spawning, rearing, and migration of anadromous fish for various reaches of anadromous waters. Revisions and updates to the AWC are out for comment until March 21, 2011. The impact of the proposed revisions on permitting and design costs for the proposed corridors is not known.

7.9 Resident Fish Populations

Resident fish populations are widespread across waters of the Brooks Range and interior Alaska, and may occupy the majority of the streams crossed by proposed corridors. The presence of resident fish and the level of fish passage required at each crossing need to be confirmed through consultations with ADF&G biologists and field investigations. Year-round trapping and sampling efforts may be necessary to account for seasonal migrations of various fish species potentially present.

7.10 Navigable Waters

Navigable water assumptions need to be confirmed through consultation with appropriate agencies (USACE, USCG, and Alaska Department of Natural Resources) and local use of various rivers needs to be further investigated. In addition to using the river systems for importing fuel and dry cargo via barge traffic, local residents use the rivers to access subsistence fishing and hunting areas. This use may include many of the smaller tributary rivers and channels flowing into the main-stem navigable rivers.

Navigable waters may result in higher bridge costs (higher bridge decks and increased span distances) to accommodate barge or other river traffic. Additional study of river uses is needed to develop bridge concepts with adequate deck clearance and total bridge lengths. Bridge costs can be refined once bridge concepts are developed in more detail.

7.11 Icing Hazards

Icing hazards include areas subject to large river ice flows during breakup, the formation of aufeis, and/or development of ice dams resulting in subsequent flooding. Areas prone to icing need to be identified, as these areas can pose significant hazards to drainage structures and require additional maintenance and design costs stemming from options such as increased embankment height, thaw pipe, overflow culverts, and increased scour protection. Field observations and consultations with area residents are required to identify icing hazards and historic icing conditions along proposed corridors. Aerial surveys conducted in the spring can be used to delineate aufeis-prone areas. It may also be possible to collect or obtain satellite radar interferometry data for identifying aufeis-prone areas and tracking river ice formation within the project study area. It is also important to access the potential for new icing hazards that may result from corridor embankments and drainage structures.

Breakup monitoring for selected sites throughout the project study area would be beneficial to understanding river ice flows and potential ice-related flooding. Characterizing the size of ice chunks being transported downstream would assist in designing scour protection and provide insight on required bridge spans and deck elevations. Monitoring should examine the potential for ice jamming and the effect on river flows. Breakup monitoring would also be useful in determining seasonable navigability of rivers.

7.12 Permafrost

Detailed mapping of permafrost areas, especially where permafrost is discontinuous, is needed to identify areas that may pose significant hazards to drainage structures and require additional maintenance and design costs. Areas of warm permafrost should be identified, so that pre-thawing and consolidation during construction can be considered. Field observations and geotechnical data, such as test borings, are required to identify the type and extent of permafrost in the project study area. Often discontinuous permafrost can be identified by vegetation. The

presence of continuous (cold), discontinuous (warm), and isolated permafrost will dictate which design and protection techniques are applicable.

7.13 River Mining

Potential material sources in and along rivers need to be identified to initiate environmental permitting and assist in determining overall material needs for construction of the proposed corridors. Characterization of riverbed loads is necessary to understand the type of materials available and substrate properties, including particle grain distribution and material hardness.

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APPENDIX A

Conceptual Bridge Designs and Baseline Costs

	Structure Classification							Anadromous Streams		
Corridor	Minor Crossings	**Culvert Small (4' to 10')**	**Culvert Large (10' to 20')**	**Bridge Small (20' to 50')**	**Bridge Medium (50' to 140')**	**Bridge Large (>140')**	Bridge Large Total Span	AWC Cataloged Anadromous	Assumed Anadromous	Fish Passage Culverts Req'd
	(EA)	(EA)	(EA)	(EA)	(EA)	(EA)	(LF)	(EA)	(EA)	(EA)
1-Brooks East Corridor	864	114	16	5	13	13	5000	5	21	8
2-Kanuti Flats Corridor	964	157	13	10	18	14	5440	14	41	18
3-Elliott Hwy Corridor	1460	176	20	19	24	12	7360	8	48	20
5-DMTS Port Corridor	1028	116	63	3	12	19	8440	13	63	48
6-Cape Blossom Corridor	980	108	73	2	14	24	9250	2	83	51
7-Selawik Flats Corridor	1324	94	42	7	21	21	7470	23	48	32
8-Cape Darby Corridor	1360	84	54	8	22	25	7890	26	51	35
Unit Costs:	$ 21,000	$ 103,000	$ 230,000	$ 430,000	$ 1,130,000		$ 11,400			$ 130,000
Per:	EA	EA	EA	EA	EA		LF			EA

	Drainage Structure Category Costs								
Corridor	**Minor Crossings**	**Culvert Small (4' to 10')**	**Culvert Large (10' to 20')**	**Bridge Small (20' to 50')**	**Bridge Medium (50' to 140')**	**Bridge Large (>140')**	**Fish Passage Culverts**	**TOTAL Corridor Cost**	**Rank**
1-Brooks East Corridor	$ 18,144,000	$ 11,742,000	$ 3,680,000	$ 2,150,000	$ 14,690,000	$ 57,000,000	$ 1,040,000	$ 108,446,000	1
2-Kanuti Flats Corridor	$ 20,244,000	$ 16,171,000	$ 2,990,000	$ 4,300,000	$ 20,340,000	$ 62,016,000	$ 2,340,000	$ 128,401,000	2
3-Elliott Hwy Corridor	$ 30,660,000	$ 18,128,000	$ 4,600,000	$ 8,170,000	$ 27,120,000	$ 83,904,000	$ 2,600,000	$ 175,182,000	6
5-DMTS Port Corridor	$ 21,588,000	$ 11,948,000	$ 14,490,000	$ 1,290,000	$ 13,560,000	$ 96,216,000	$ 6,240,000	$ 165,332,000	4
6-Cape Blossom Corridor	$ 20,580,000	$ 11,124,000	$ 16,790,000	$ 860,000	$ 15,820,000	$ 105,450,000	$ 6,630,000	$ 177,254,000	7
7-Selawik Flats Corridor	$ 27,804,000	$ 9,682,000	$ 9,660,000	$ 3,010,000	$ 23,730,000	$ 85,158,000	$ 4,160,000	$ 163,204,000	3
8-Cape Darby Corridor	$ 28,560,000	$ 8,652,000	$ 12,420,000	$ 3,440,000	$ 24,860,000	$ 89,946,000	$ 4,550,000	$ 172,428,000	5

Corridor	Structure Classification							Anadromous Streams		
	Minor Crossings	**Culvert Small (4' to 10')**	**Culvert Large (10' to 20')**	**Bridge Small (20' to 50')**	**Bridge Medium (50' to 140')**	**Bridge Large (>140')**	Bridge Large Total Span	AWC Cataloged Anadromous	Assumed Anadromous	Fish Passage Culverts Req'd
	(EA)	(EA)	(EA)	(EA)	(EA)	(EA)	(LF)	(EA)	(EA)	(EA)
4-Parks Hwy Corridor	1680-1800	127-176	27-52	28-47	21-29	13-17	7470-10670	8-13	53-72	22-28
4-Parks Hwy Corridor A	1720	127	52	42	23	13	7470	8	63	23
4-Parks Hwy Corridor B	1800	172	48	47	29	13	7730	12	72	28
4-Parks Hwy Corridor C	1680	131	31	28	21	17	10410	9	53	22
4-Parks Hwy Corridor D	1760	176	27	33	27	17	10670	13	62	27
5-DMTS Port Corridor	1028	116	63	3	12	19	8440	13	63	48
6-Cape Blossom Corridor	980	108	73	2	14	24	9250	2	83	51
7-Selawik Flats Corridor	1324	94	42	7	21	21	7470	23	48	32
8-Cape Darby Corridor	1360	84	54	8	22	25	7890	26	51	35
Unit Costs:	$ 21,000	$ 103,000	$ 230,000	$ 450,000	$ 2,830,000		$ 25,000			$ 130,000
Per:	EA	EA	EA	EA	EA		LF			EA

Corridor	Drainage Structure Category Costs							**TOTAL CORRIDOR COST**	**Rank**
	Minor Crossings	**Culvert Small (4' to 10')**	**Culvert Large (10' to 20')**	**Bridge Small (20' to 50')**	**Bridge Medium (50' to 140')**	**Bridge Large (>140')**	Fish Passage Culverts		
4-Parks Hwy Corridor	$21M-$38M	$13.1M-$18.1M	$6.2M-$12.0M	$12.6M-$21.2M	$59.4M-$82.1M	$187M-$267M	$2.9M-$3.6M	$335M-$423M	
4-Parks Hwy Corridor A	$ 36,120,000	$ 13,081,000	$ 11,960,000	$ 18,900,000	$ 65,090,000	$ 186,750,000	$ 2,990,000	$ 334,891,000	5
4-Parks Hwy Corridor B	$ 37,800,000	$ 17,716,000	$ 11,040,000	$ 21,150,000	$ 82,070,000	$ 193,250,000	$ 3,640,000	$ 366,666,000	6
4-Parks Hwy Corridor C	$ 35,280,000	$ 13,493,000	$ 7,130,000	$ 12,600,000	$ 59,430,000	$ 260,250,000	$ 2,860,000	$ 391,043,000	7
4-Parks Hwy Corridor D	$ 36,960,000	$ 18,128,000	$ 6,210,000	$ 14,850,000	$ 76,410,000	$ 266,750,000	$ 3,510,000	$ 422,818,000	8
5-DMTS Port Corridor	$ 21,588,000	$ 11,948,000	$ 14,490,000	$ 1,350,000	$ 33,960,000	$ 211,000,000	$ 6,240,000	$ 300,576,000	1
6-Cape Blossom Corridor	$ 20,580,000	$ 11,124,000	$ 16,790,000	$ 900,000	$ 39,620,000	$ 231,250,000	$ 6,630,000	$ 326,894,000	4
7-Selawik Flats Corridor	$ 27,804,000	$ 9,682,000	$ 9,660,000	$ 3,150,000	$ 59,430,000	$ 186,750,000	$ 4,160,000	$ 300,636,000	2
8-Cape Darby Corridor	$ 28,560,000	$ 8,652,000	$ 12,420,000	$ 3,600,000	$ 62,260,000	$ 197,250,000	$ 4,550,000	$ 317,292,000	3

Small Bridge Cost Comparison - 50' Max Bridge Span							
Bridge	Source	Span	Total Length	$/LF	Width	$/SF	Total Cost
Steel Girder with Pre-Cast Deck supported on H-Piles	MJM, Alaska DOT Bridge Guide	50	50	$15,751	35	$450	$787,550
Big R Bridge two-piece prefabricated Weathering Steel	Big R Bridge, MJM	40	40	$10,269	32	$321	$410,740
Big R Bridge two-piece prefabricated Weathering Steel	Big R Bridge, MJM	50	50	$8,687	32	$271	$434,350
			Minimum:	**$8,687**		**$271**	**$410,740**
			Average:	**$9,478**		**$296**	**$422,545**
			65% Cost:	**$9,715**		**$388**	**$426,087**
Note: Steel Girder not used to calculate unit cost to provide more economical bridge cost.						**Design Unit Cost**	**$430,000**

Medium Bridge Cost Comparison - 50' to 140' Bridge Span							
Bridge	Source	Span	Total Length	$/LF	Width	$/SF	Total Cost
Steel Girder with Pre-Cast Deck supported on H-Piles	MJM, Alaska DOT Bridge Guide	50	100	$14,051	35	$401	$1,405,094
Pre-Cast Concrete Bulb Tee with Drive H-Piles	MJM, Alaska DOT Bridge Guide	100	100	$9,363	35	$268	$936,260
Big R Bridge two-piece prefabricated Weathering Steel	Big R Bridge, MJM	60	60	$7,873	32	$246	$472,380
Big R Bridge four-piece prefabricated Weathering Steel	Big R Bridge, MJM	80	80	$7,578	32	$237	$606,260
Big R Bridge four-piece prefabricated Weathering Steel	Big R Bridge, MJM	100	100	$7,402	32	$231	$740,160
Big R Bridge four-piece prefabricated Weathering Steel	Big R Bridge, MJM	125	125	$7,801	32	$244	$975,090
			Minimum:	**$7,402**		**$231**	**$472,380**
			Average:	**$9,011**		**$271**	**$855,874**
			65% Cost:	**$11,724**		**$342**	**$1,125,502**
						Design Unit Cost	**$1,130,000**

Large Bridge Cost Comparison - 140' Minimum Bridge Span							
Bridge	Source	Span	Total Length	$/LF	Width	$/SF	Total Cost
Steel Girder with Pre-Cast Deck supported on H-Piles	MJM, Alaska DOT Bridge Guide	50	150	$13,484	35	$385	$2,022,666
Pre-Cast Concrete Bulb Tee with Drive H-Piles	MJM, Alaska DOT Bridge Guide	100	200	$8,368	35	$239	$1,673,682
Pre-Cast Concrete Bulb Tee with Drive H-Piles	MJM, Alaska DOT Bridge Guide	100	300	$8,037	35	$230	$2,411,103
Big R Bridge four-piece prefabricated Weathering Steel	Big R Bridge, MJM	125	250	$7,402	32	$231	$1,850,400
Big R Bridge six-piece prefabricated Weathering Steel	Big R Bridge, MJM	150	150	$7,801	32	$244	$1,170,108
			Minimum:	**$7,402**		**$230**	**$1,170,108**
			Average:	**$9,018**		**$266**	**$1,825,592**
			65% Cost:	**$11,355**		**$331**	**$1,976,755**
			Design Unit Cost	**$11,400**			

Small Bridge Cost Comparison - 50' Max Bridge Span					
Bridge	**Source**	**Span**	**Total Length**	**$/LF**	**Total Cost**
Railroad Bridge	DM, Hanson Inc.	28	56	$8,000	$448,000
				Design Unit Cost	**$450,000**

Medium Bridge Cost Comparison - 50' to 140' Bridge Span					
Bridge	**Source**	**Span**	**Total Length**	**$/LF**	**Total Cost**
Railroad Bridge	DM, Hanson Inc.	28	140	$8,000	$1,120,000
Railroad Bridge	DM, Hanson Inc.	150	150	$25,000	$3,750,000
				Minimum:	**$8,000**	**$1,120,000**
				Average:	**$16,500**	**$2,435,000**
				65% Cost:	**$19,050**	**$2,829,500**
				Design Unit Cost	**$2,830,000**

Large Bridge Cost Comparison - 140' Minimum Bridge Span					
Bridge	**Source**	**Span**	**Total Length**	**$/LF**	**Total Cost**
Railroad Bridge	DM, Hanson Inc.	150	150	$25,000	$3,750,000
				Design Unit Cost	**$25,000**

Material and Installation of Pipe

Minor Drainage Culvert Cost Comparison - 36" Diameter									
Culvert	**Gauge**	**Source**	**$/LF**	**Total Length**	**Total Cost**	**WT / LF (pounds)**	**Total WT (pounds)**	**Shipping Cost**	**Total Cost w/ Shipping**
36" CSP	16	Big R Bridge	$34	80	$2,700	25	2022	$270	$2,970
36" CSP	14	Big R Bridge	$42	80	$3,390	32	2560	$341	$3,732
36" CSP	12	Big R Bridge	$58	80	$4,666	44	3554	$474	$5,140
36" CSP	16	Ferguson	$95	80	$7,594	25	2022	$270	$7,863
							Material cost:	**Average:**	**$4,926**
							Material cost:	**65% Cost:**	**$6,150**
							Multiplier for steel cost contingency:	**1.1**	**$6,765**
							Multiplier for installation:	**2**	**$13,531**
								Design Unit Cost	**$14,000**
36" CSP		Dalton Hwy Bid Cost:	$160					**Dalton Hwy Cost Check**	**$12,800**

Small Culvert Cost Comparison - 4' to 10' Diameter									
Culvert	**Gauge**	**Source**	**$/LF**	**Total Length**	**Total Cost**	**WT / LF (pounds)**	**Total WT (pounds)**	**Shipping Cost**	**Total Cost w/ Shipping**
48" CSP	16	Big R Bridge	$46	95	$4,326	34	3240	$432	$4,758
48" CSP	14	Big R Bridge	$56	95	$5,349	43	4038	$538	$5,887
48" CSP	12	Big R Bridge	$77	95	$7,358	59	5603	$747	$8,105
48" CSP	16	Ferguson	$124	95	$11,815	34	3240	$432	$12,247
60" CSP	16	Ferguson	$115	95	$10,905	55	5225	$697	$11,602
72" CSP	16	Ferguson	$138	95	$13,085	66	6270	$836	$13,921
84" CSP	16	Ferguson	$161	95	$15,268	77	7315	$975	$16,244
96" CSP	16	Ferguson	$182	95	$17,251	87	8265	$1,102	$18,353
120" CSP	14	Ferguson	$197	95	$18,755	134	12682.5	$1,691	$20,446
60" CSP	16	Contech	$158	95	$15,010	55	5225	$697	$15,707
72" CSP	12	Big R Bridge	$216	95	$20,520	137	13015	$1,735	$22,255
96" CSP	10	Big R Bridge	$315	95	$29,925	223	21185	$2,825	$32,750
120" CSP	8	Big R Bridge	$442	95	$41,990	332	31540	$4,205	$46,195
							Material cost:	**Average:**	**$17,575**
							Material cost:	**65% Cost:**	**$34,088**
							Multiplier for steel cost contingency:	**1.1**	**$37,496**
							Multiplier for installation:	**2**	**$74,993**
								Design Unit Cost	**$75,000**
60" CSP		Dalton Hwy Bid Cost:	$800					**Dalton Hwy Cost Check**	**$76,000**

Large Culvert Cost Comparison - 10' to 20' Diameter									
Culvert	**Gauge**	**Source**	**$/LF**	**Total Length**	**Total Cost**	**WT / LF (pounds)**	**Total WT (pounds)**	**Shipping Cost**	**Total Cost w/ Shipping**
19' x 9' Steel Plate Arch	12	Big R (Eccles)	$579	95	$54,958	700	66500	$8,867	$63,824
22' x 7' Steel Plate Pipe Arch	10	Contech	$670	95	$63,650	800	76000	$10,133	$73,783
14' x 9' Steel Plate Pipe Arch	12	Contech	$568	95	$53,960	300	28500	$3,800	$57,760
144" CSP	10	Contech	$612	95	$58,140	323	30685	$4,091	$62,231
12' CSP	8	Big R Bridge	$510	95	$48,450	394	37430	$4,991	$53,441
15' CSP	7	Big R Bridge	$665	95	$63,175	528	50160	$6,688	$69,863
18' CSP	5	Big R Bridge	$940	95	$89,300	745	70775	$9,437	$98,737
							Material cost:	**Minimum:**	**$53,441**
							Material cost:	**Average:**	**$68,520**
							Material cost:	**65% Cost:**	**$82,883**
							Multiplier for steel cost contingency:	**1.1**	**$91,171**
							Multiplier for installation:	**2**	**$182,343**
								Design Unit Cost	**$182,000**
144" CSP		Dalton Hwy Bid Cost:	$2,000					**Dalton Hwy Cost Check**	**$190,000**

Dalton Highway MP 175-209 Culverts				
Minor Drainage Structures		Major Drainage Structures		
24"	36"	48"	60"	8'10"x6'1"
Length (FT)		Length (FT)		
50	94	124	102	86
80	82	88	96	
50	80	92		
70	70	84		
73	76	80		
78	76	76		
82	76	84		
72	86	100		
82	60	110		
84	70	94		
46	70	84		
64	78	108		
66	76	80		
76	96	122		
84	84	78		
68	84	122		
62	74	88		
70	76			
70	78			
	78			
	86			
	92			
	92			
	80			
	100			
	90			
	114			
	90			
	90			
	62			
	96			
	62			
	94			
	64			

Average:	**77**	**Average:**	**95**
Design Unit Length	**80**	**Design Unit Length**	**95**

Culvert Cost Comparison: Material to Bid Cost			
Culvert	**$/LF**	**Bid Cost**	**Ratio**
24" CSP	$23	$61	2.7
24" CSP	$28	$61	2.1
24" CSP	$39	$70	1.8
24" CSP	$44	$90	2.0
36" CSP	$34	$80	2.4
36" CSP	$42	$81	1.9
36" CSP	$58	$105	1.8
36" CSP	$95	$105	1.1
48" CSP	$46	$155	3.4
48" CSP	$56	$155	2.8
48" CSP	$77	$200	2.6
48" CSP	$124	$200	1.6
60" CSP	$115	$200	1.7
60" CSP	$158	$280	1.8
72" CSP	$138	$360	2.6
72" CSP	$216	$740	3.4
84" CSP	$161	$550	3.4
96" CSP	$182	$404	2.2
120" CSP	$197	$440	2.2
120" CSP	$442	$740	1.7
11' x 7' Steel Plate Pipe Arch	$568	$900	1.6
		Average	2.2
		Design Unit Cost	**2**

Dalton Highway MP 197-209 Rehabilitation					
Component	**Quantity**	**Total Cost**	**Unit Cost**		**Cost/Crossing**
Deadman	4	$ 68,000	$ 17,000	EA	$ 34,000
Riprap, Class I	284	$ 17,028	$ 60	CY	$ 540
Riprap, Class II	1248	$ 81,120	$ 65	CY	$ 1,300
Riprap, Class IV	380	$ 26,600	$ 70	CY	$ 4,200
Culvert Marker Post	154	$ 19,250	$ 125	EA	$ 250
3/4 Inch Diameter Thaw Pipe	77	$ 115,500	$ 1,500	EA	$ 1,500
Insulation Board	209.54	$ 157,155	$ 750	MBM	$ 7,500

Minor Crossing Culvert - 36" Diameter	
Component	**Unit Cost / Crossing**
Culvert	$14,000
Riprap, Class I	$540
Culvert Marker Post	$250
3/4 Inch Diameter Thaw Pipe	$1,500
Insulation Board	$3,750
TOTAL:	**$21,000**

Small Culvert Cost Comparison - 4' to 10' Diameter	
Component	**Unit Cost / Crossing**
Culvert	$75,000
Headwall/Deadman	$17,000
Riprap, Class II	$1,300
Culvert Marker Post	$250
3/4 Inch Diameter Thaw Pipe	$1,500
Insulation Board	$7,500
TOTAL:	**$103,000**

Large Culvert Cost Comparison - 10' to 20' Diameter	
Component	**Unit Cost / Crossing**
Culvert	$182,000
Headwall/Deadman	$34,000
Riprap, Class IV	$4,200
Culvert Marker Post	$250
3/4 Inch Diameter Thaw Pipe	$1,500
Insulation Board	$7,500
TOTAL:	**$230,000**

Alaska D.O.T. Bridge Construction
Pricing Information as of 02/01/2011 (Ambler Mine Access)

Alaska DOT Bid Item #	Description	Unit	Unit Costs Low	Unit Costs High	Juneau Cost	Comment
205(3)	Select Fill Type A	CY	$19.50	$39.00		Processed Aggregate from bottom of footing to pavement; from backwall ahead or back on line 50 feet.
501(1)	Class A Concrete	CY	$1,300.00	$1,950.00	$1,625.00	See Alaska Spec.
501(2)	Class AA Concrete	CY	$1,625.00	$2,210.00	$1,820.00	See Alaska Spec.
501(7)	Pre-Cast Concrete Member (Bulb Tee)	LB	$0.55	$0.60		Item number can be followed by an A,B,D… for different sizes.
	Pre-Cast Deck Planks	LB	$0.85	$1.30		
503(1)	Plain Reinforcing Steel	LB	$2.60	$0.68		
503(2)	Epoxy Coated Rebar	LB	$2.25	$2.50		Sometimes epoxy bids lower than plain.
505(5)	Furnish Structural Steel Pile	LB	$0.72			ASTM A 36 H-pile
505(5)	Furnish Structural Steel Pile	LB	$1.30			API 5L Pipe Pile, 4' Dia. Max.
505(6)	Drive Str. Steel Pile	EA	$4,550.00	$6,500.00		H-pile including (1) splice. Additional splices bid and treated under a different bid item #.
505(6)	Drive Str. Steel Pile	EA	$4,550.00	$6,500.00		Pipe pile with reinforced concrete fill - 12" dia.
"	"	EA	$6,500.00	$9,750.00		Pipe pile with reinforced concrete fill - 24" dia.
"	"	EA	$19,500.00			Pipe pile with reinforced concrete fill - 30" dia.
"	"	EA	$22,750.00			Pipe pile with reinforced concrete fill - 36" dia.
"	"	EA	$26,000.00			Pipe pile with reinforced concrete fill - 42" dia.
"	"	EA	$32,500.00			Pipe pile with reinforced concrete fill - 48" dia.
	Steel Girders	LB	$3.00	$4.00		
507(1)	Steel Traffic Barrier	Lin Ft.	$227.50	$260.00		Wide flange post with two (2) HSS rails.
507(4)	Concrete Barrier Rail	Lin Ft.	$292.50	$325.00		
508(1)	Waterproofing membrane	SF	$3.90			Placed under AC overlay on driveable deck surface; none under pedestrian path or railing
606(12)	Guardrail/Bridge Rail Connection	EA	$3,900.00			One at each corner of the bridge.
611(1)	Riprap Class II	CY	$26.00	$130.00	$71.50	Class II is most common size used for bridge work.
631(2)	Geotextile/Erosion Control Class 2	SY	$3.90			Class varies; refer to Alaska DOT spec.

Notes:

1 Bulb tee is the most popular bridge girder in Alaska. Suppliers include Agg-Pro in Anchorage and Concrete Tech of Tacoma, WA. Depths and span lengths for HL-93 loading are as follows:

Agg-Pro Depth	Wt./foot	Conc. Tech Depth	Wt./foot	Allowable Span
42"		41"	950	90'
54"		53"	1030	120'
66"		65"	1100	140'

Weights/foot are based on a 72" flange width.

2 Diaphragms for bulb tees are constructed of cast-in-place concrete with one (1) each each end and one (1) at mid-span regardless of girder span length.

3 If other girder section is used (AASHTO Type IV or Steel Plate Girder), the cost of a C.I.P. overlay is about $50.00/square foot.

4 Pile tip reinforcing is typically specifed for both H-piles and pipe piles although pipe piles can be driven open ended. Open ended piles have a potential to "run" during installation causing additional pieces and splicing that may not be necessary if an end cap is used. End caps can be a conical point, hemisphere or a flat plate. An advantage of using an open ended pile is if you encounter large cobbles and boulders, the interior of the pipe can be accessed to demolish the obstruction and continue driving.

Bridge Type	Steel Girder with Pre-Cast Deck supported on H-Piles
Span Length (feet)	50
Number of Spans	1
Total Bridge Length (feet)	50

Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	180	$ 260.00	$ 46,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
501(7)	Pre-Cast Deck Planks	LB	200885	$ 1.30	$ 261,150.50	9.5" deep
504(2)	Steel Girders	LB	49350	$ 4.00	$ 197,400.00	(7) W33x141 Wide Flange
501(2)	Pile Caps	CY	24	$ 3,000.00	$ 72,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	102200	$ 0.72	$ 73,584.00	HP14x73, 100 ft long
505(6)	Drive Steel Piling	EA	14	$ 6,500.00	$ 91,000.00	
501(7)	Pre-Cast Back Wall	CY	10	$ 3,000.00	$ 30,000.00	
					$ -	
					$ -	
				Total:	$ 787,534.50	

		Cost/SF	$ 450.02
Deck Width	35 ft		
Deck Length	50 ft	Cost/LF	$ 15,751
Deck Area	1750 sq. ft		

Bridge Type	Steel Girder with Pre-Cast Deck supported on H-Piles
Span Length (feet)	50
Number of Spans	2
Total Bridge Length (feet)	100

Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	280	$ 260.00	$ 72,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
501(7)	Pre-Cast Deck Planks	LB	401770	$ 1.30	$ 522,301.00	
504(2)	Steel Girders	LB	98700	$ 4.00	$ 394,800.00	(7) W33x141 Wide Flange
501(2)	Pile Caps	CY	36	$ 3,000.00	$ 108,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	173740	$ 0.72	$ 125,092.80	HP14x73, 100 ft & 140 ft long
505(6)	Drive Steel Piling	EA	21	$ 6,500.00	$ 136,500.00	
501(7)	Pre-Cast Back Wall	CY	10	$ 3,000.00	$ 30,000.00	
					$ -	
					$ -	
				Total:	$ 1,405,093.80	

		Cost/SF	$ 401.46
Deck Width	35 ft		
Deck Length	100 ft	Cost/LF	$ 14,050.94
Deck Area	3500 sq. ft		

Bridge Type	Steel Girder with Pre-Cast Deck supported on H-Piles
Span Length (feet)	50
Number of Spans	3
Total Bridge Length (feet)	150

Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	380	$ 260.00	$ 98,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
501(7)	Pre-Cast Deck Planks	LB	602665	$ 1.30	$ 783,464.50	
504(2)	Steel Girders	LB	148050	$ 4.00	$ 592,200.00	(7) W33x141 Wide Flange
501(2)	Pile Caps	CY	48	$ 3,000.00	$ 144,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	245280	$ 0.72	$ 176,601.60	HP14x73, 100 ft & 140 ft long
505(6)	Drive Steel Piling	EA	28	$ 6,500.00	$ 182,000.00	
501(7)	Pre-Cast Back Wall	CY	10	$ 3,000.00	$ 30,000.00	
					$ -	
					$ -	
				Total:	$ 2,022,666.10	

		Cost/SF	$ 385.27
Deck Width	35 ft		
Deck Length	150 ft	Cost/LF	$ 13,484.44
Deck Area	5250 sq. ft		

Bridge Type	Pre-Cast Concrete Bulb Tee with Driven H-Piles
Span Length (feet)	100
Number of Spans	1
Total Bridge Length (feet)	100

Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	280	$ 260.00	$ 72,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
501(7)	Pre-Cast Bulb Tee Girders	LB	618000	$ 0.80	$ 494,400.00	6 girders 54" deep 72" flange width
501(2)	Pile Caps	CY	24	$ 3,000.00	$ 72,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	140400	$ 1.15	$ 161,460.00	HP14x117, 100 ft long
505(6)	Drive Steel Piling	EA	12	$ 7,000.00	$ 84,000.00	
501(7)	Pre-Cast Back Wall	CY	12	$ 3,000.00	$ 36,000.00	
					$ -	
					$ -	
				Total:	$ 936,260.00	

		Cost/SF	$ 267.50
Deck Width	35 ft		
Deck Length	100 ft	Cost/LF	$ 9,362.60
Deck Area	3500 sq. ft		

Bridge Type	Pre-Cast Concrete Bulb Tee with Driven H-Piles
Span Length (feet)	100
Number of Spans	2
Total Bridge Length (feet)	200

Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	480	$ 260.00	$ 124,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
501(7)	Pre-Cast Bulb Tee Girders	LB	1236000	$ 0.80	$ 988,800.00	6 girders 54" deep 72" flange width
501(2)	Pile Caps	CY	36	$ 3,000.00	$ 108,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	238680	$ 1.15	$ 274,482.00	HP14x117 100' & 140' long
505(6)	Drive Steel Piling	EA	18	$ 7,000.00	$ 126,000.00	
501(7)	Pre-Cast Back Wall	CY	12	$ 3,000.00	$ 36,000.00	
					$ -	
					$ -	
				Total:	$ 1,673,682.00	

		Cost/SF	$ 239.10
Deck Width	35 ft		
Deck Length	200 ft	Cost/LF	$ 8,368.41
Deck Area	7000 sq. ft		

Bridge Type	Pre-Cast Concrete Bulb Tee with Driven H-Piles
Span Length (feet)	100
Number of Spans	3
Total Bridge Length (feet)	300

Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	680	$ 260.00	$ 176,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
501(7)	Pre-Cast Bulb Tee Girders	LB	1854000	$ 0.80	$ 1,483,200.00	6 girders 54" deep 72" flange width
501(2)	Pile Caps	CY	48	$ 3,000.00	$ 144,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	336960	$ 1.15	$ 387,504.00	HP14x117 100' & 140' long
505(6)	Drive Steel Piling	EA	24	$ 7,000.00	$ 168,000.00	
501(7)	Pre-Cast Back Wall	CY	12	$ 3,000.00	$ 36,000.00	
					$ -	
					$ -	
				Total:	$ 2,411,104.00	

		Cost/SF	$ 229.63
Deck Width	35 ft		
Deck Length	300 ft	Cost/LF	$ 8,037.01
Deck Area	10500 sq. ft		

Bridge Type	Big R Bridge
Span Length (feet)	40
Number of Spans	1
Total Bridge Length (feet)	40

Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	80	$ 260.00	$ 20,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
504(2)	Prefab Steel Bridge	LS	1	$ 75,600.00	$ 75,600.00	F.O.B to AK Interior
501(2)	Pile Caps	CY	30	$ 3,000.00	$ 90,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	87600	$ 1.15	$ 100,740.00	HP14x73, 100 ft long
505(6)	Drive Steel Piling	EA	12	$ 7,000.00	$ 84,000.00	
501(7)	Pre-Cast Back Wall	CY	8	$ 3,000.00	$ 24,000.00	
					$ -	
					$ -	
				Total:	$ 410,740.00	

		Cost/SF	$ 320.89
Deck Width	32 ft		
Deck Length	40 ft	Cost/LF	$ 10,268.50
Deck Area	1280 sq. ft		

Bridge Type	Big R Bridge
Span Length (feet)	50
Number of Spans	1
Total Bridge Length (feet)	50

Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	80	$ 260.00	$ 20,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
504(2)	Prefab Steel Bridge	LS	1	$ 95,300.00	$ 95,300.00	F.O.B to AK Interior
501(2)	Pile Caps	CY	30	$ 3,000.00	$ 90,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	87600	$ 1.15	$ 100,740.00	HP14x73, 100 ft long
505(6)	Drive Steel Piling	EA	12	$ 7,000.00	$ 84,000.00	
501(7)	Pre-Cast Back Wall	CY	9.3	$ 3,000.00	$ 27,900.00	
					$ -	
					$ -	
				Total:	$ 434,340.00	

		Cost/SF	$ 271.46
Deck Width	32 ft		
Deck Length	50 ft	Cost/LF	$ 8,687
Deck Area	1600 sq. ft		

Bridge Type	Big R Bridge
Span Length (feet)	60
Number of Spans	1
Total Bridge Length (feet)	60

Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	80	$ 260.00	$ 20,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
504(2)	Prefab Steel Bridge	LS	1	$ 131,240.00	$ 131,240.00	F.O.B to AK Interior
501(2)	Pile Caps	CY	30	$ 3,000.00	$ 90,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	87600	$ 1.15	$ 100,740.00	HP14x73, 100 ft long
505(6)	Drive Steel Piling	EA	12	$ 7,000.00	$ 84,000.00	
501(7)	Pre-Cast Back Wall	CY	10	$ 3,000.00	$ 30,000.00	
					$ -	
					$ -	
				Total:	$ 472,380.00	

		Cost/SF	$ 246.03
Deck Width	32 ft		
Deck Length	60 ft	Cost/LF	$ 7,873.00
Deck Area	1920 sq. ft		

Bridge Type	Big R Bridge
Span Length (feet)	80
Number of Spans	1
Total Bridge Length (feet)	80

Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	80	$ 260.00	$ 20,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
504(2)	Prefab Steel Bridge	LS	1	$ 222,100.00	$ 222,100.00	F.O.B to AK Interior
501(2)	Pile Caps	CY	30	$ 3,000.00	$ 90,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	122400	$ 1.15	$ 140,760.00	HP14x102, 100 ft long
505(6)	Drive Steel Piling	EA	12	$ 7,000.00	$ 84,000.00	
501(7)	Pre-Cast Back Wall	CY	11	$ 3,000.00	$ 33,000.00	
					$ -	
					$ -	
				Total:	$ 606,260.00	

		Cost/SF	$ 236.82
Deck Width	32 ft		
Deck Length	80 ft	Cost/LF	$ 7,578.25
Deck Area	2560 sq. ft		

Bridge Type	Big R Bridge
Span Length (feet)	100
Number of Spans	1
Total Bridge Length (feet)	100

Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	80	$ 260.00	$ 20,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
504(2)	Prefab Steel Bridge	LS	1	$ 330,800.00	$ 330,800.00	F.O.B to AK Interior
501(2)	Pile Caps	CY	30	$ 3,000.00	$ 90,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	140400	$ 1.15	$ 161,460.00	HP14x117, 100 ft long
505(6)	Drive Steel Piling	EA	12	$ 7,000.00	$ 84,000.00	
501(7)	Pre-Cast Back Wall	CY	12.5	$ 3,000.00	$ 37,500.00	
					$ -	
					$ -	
				Total:	$ 740,160.00	

		Cost/SF	$ 231.30
Deck Width	32 ft		
Deck Length	100 ft	Cost/LF	$ 7,401.60
Deck Area	3200 sq. ft		

Bridge Type	Big R Bridge
Span Length (feet)	125
Number of Spans	1
Total Bridge Length (feet)	125

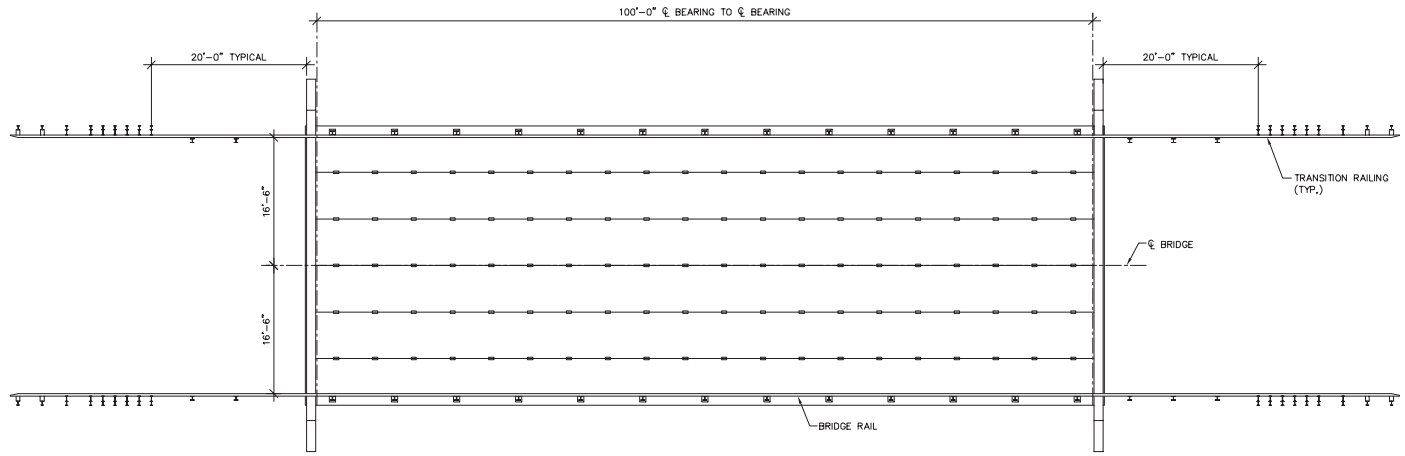
Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	80	$ 260.00	$ 20,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
504(2)	Prefab Steel Bridge	LS	1	$ 564,230.00	$ 564,230.00	F.O.B to AK Interior
501(2)	Pile Caps	CY	30	$ 3,000.00	$ 90,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	140400	$ 1.15	$ 161,460.00	HP14x117, 100 ft long
505(6)	Drive Steel Piling	EA	12	$ 7,000.00	$ 84,000.00	
501(7)	Pre-Cast Back Wall	CY	13	$ 3,000.00	$ 39,000.00	
					$ -	
					$ -	
				Total:	$ 975,090.00	

		Cost/SF	$ 243.77
Deck Width	32 ft		
Deck Length	125 ft	Cost/LF	$ 7,800.72
Deck Area	4000 sq. ft		

Bridge Type	Big R Bridge
Span Length (feet)	150
Number of Spans	1
Total Bridge Length (feet)	150

Item	Description	Bid Unit	Quantity	Unit Cost	Cost	Remarks
507(1)	Bridge Railing	LF	80	$ 260.00	$ 20,800.00	Steel Bridge Rail
606(12)	Bridge to Guardrail Connection	EA	4	$ 3,900.00	$ 15,600.00	
504(2)	Prefab Steel Bridge	LS	1	$ 888,100.00	$ 888,100.00	F.O.B to AK Interior
501(2)	Pile Caps	CY	30	$ 3,000.00	$ 90,000.00	Class AA Concrete
505(5)	Furnish Steel Piling	LB	140400	$ 1.15	$ 161,460.00	HP14x117, 100 ft long
505(6)	Drive Steel Piling	EA	12	$ 7,000.00	$ 84,000.00	
501(7)	Pre-Cast Back Wall	CY	16.3	$ 3,000.00	$ 48,900.00	
					$ -	
					$ -	
				Total:	$ 1,308,860.00	

		Cost/SF	$ 272.68
Deck Width	32 ft		
Deck Length	150 ft	Cost/LF	$ 8,725.73
Deck Area	4800 sq. ft		



PLAN

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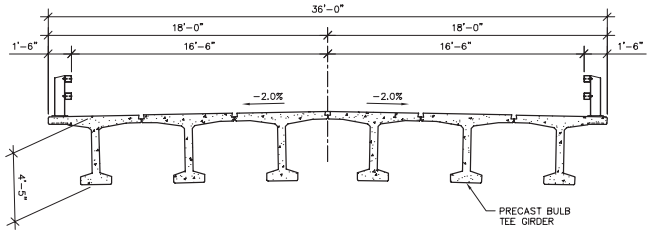
scale feet



TYPICAL SECTION

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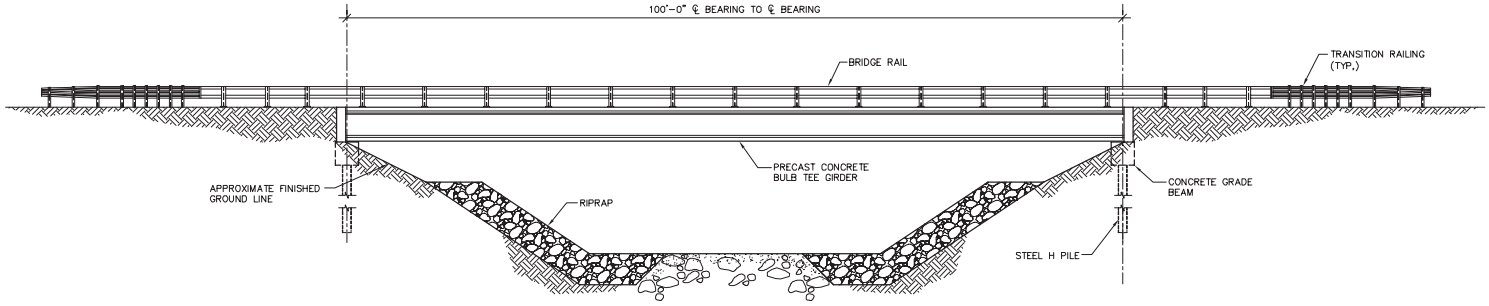

ELEVATION

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scale feet

● Project No. 1124.60693.01 ● Bridge Exhibits.dwg ● Date Feb. 2011 ● Designed MJM ● Drawn DNM ● Checked ● Approved

No.	Revision	By	Date

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

AMBLER MINING DISTRICT ACCESS CORRIDOR STUDY

PRE-STRESSED CONCRETE BRIDGE CONCEPT

DOWL HKM
GRANITE TOWER BUILDING
222 N. 32ND ST., SUITE 700
P.O. BOX 31318
BILLINGS, MT 59107-1318
406-656-5399
406-656-6399 (FAX)
DOWLHKM.COM

Sheet No.

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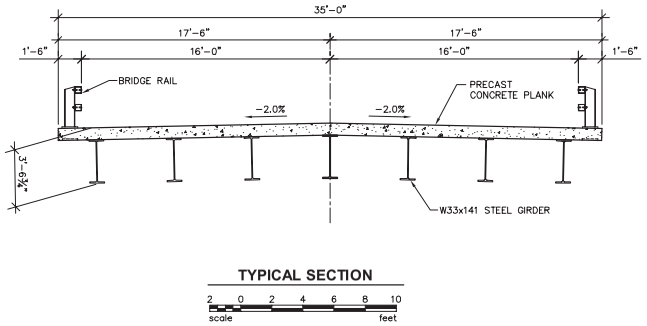

TYPICAL SECTION

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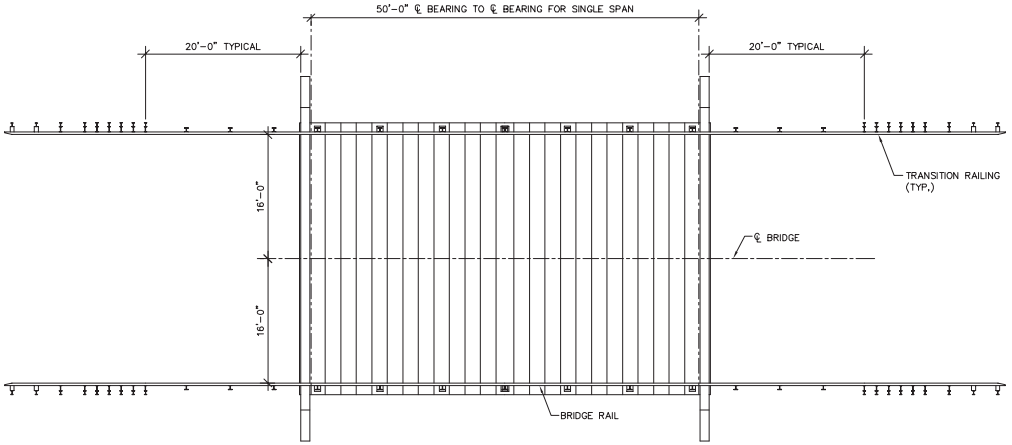
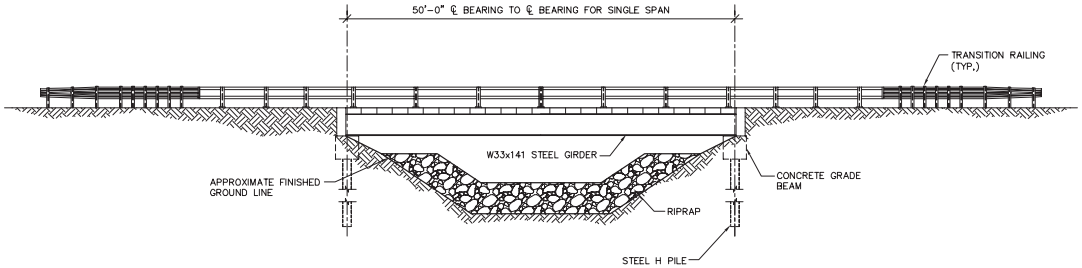


PLAN



ELEVATION

● Project No. 1124.60693.01 ● Bridge Exhibits.dwg ● Date Feb. 2011 ● Designed MJM ● Drawn DNM ● Checked ● Approved

No.	Revision	By	Date

WARNING
0 1/2 1
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AMBLER MINING DISTRICT ACCESS CORRIDOR STUDY

STEEL BRIDGE CONCEPT

DOWL HKM
GRANITE TOWER BUILDING
222 N. 32ND ST., SUITE 700
P.O. BOX 31318
BILLINGS, MT 59107-1318
406-656-6399
406-656-6398 (FAX)
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Sheet No.

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Pribyl, Richard

From: Mettler, Matthew
Sent: Thursday, February 03, 2011 10:16 AM
To: Pribyl, Richard
Cc: Melocik, Bradley; Dailey, Ronald
Subject: FW: Ambler Mine Access - Bridge Costs
Attachments: Bridge Alternatives Estimates.xlsx

Guys:

As seen below, Elmer and I have corresponded regarding bridge costs and I have followed through with his suggestions. Updated estimates are attached for your review and use. I am confident we all understand Elmer's last comment and that mobilization, general requirements, etc. are not included in the bridge estimates attached but will be added later to the overall project cost summary. I also understand we will have to develop a separate estimate for bridge crossings that have to accommodate barge traffic and that issues related to navigability are still being investigated.

If you have any questions or wish to discuss anything further please contact me at your earliest convenience.

Sincerely,
Matt

From: Marx, Elmer E (DOT) [mailto:elmer.marx@alaska.gov]
Sent: Thursday, February 03, 2011 10:09 AM
To: Mettler, Matthew
Subject: RE: Ambler Mine Access - Bridge Costs

Hello Matt,

I am available at 9:00AM.

I have quickly reviewed the bridge cost estimates and offer the following comments:

1. The $/CY of the CIP concrete may be low – I suggest something closer to $3000/CY unless there is sufficient quantity to justify a lower value of about $2500/CY
2. If the AKDOT Standard Specifications for Highway Construction will be used as the contract for this project, I recommend including the pay item numbers and names defined in that document. This will help DOT reviewers since the names and number will be what they are used to seeing.
3. You have the same cost per linear foot for the smaller and larger H-Piles. The $/LF of the smaller HP sections looks correct but the larger HP14X117 should be increased proportionately.
4. Our standard waterproofing membrane is used under 3" to 4" of asphalt. If the road is planned to be paved then our standard waterproofing membrane would be appropriate. However, if the road is not planned to be paved you would either (1) remove the waterproofing membrane and drive on the bare deck or (2) specify one of the new "spray-on" type membranes. Option 1 is the more common approach used by the Department but we have been considering option 2 for recent project – but have not used any to date.
5. The unit price or the decked bulb tee girders may be a bit low for remote locations. As noted above, perhaps with enough girders specified for the job, your price is good but out recent, smaller jobs have been bid at higher values. As a side note, if a bare deck is planned for the decked bulb tee girders, we typically add one inch of sacrificial concrete to the top flange – that is, the deck is 7" thick.

6 As we discussed earlier, it is important for the decision-makers to know that your proposed bridge costs do not include mobilization, construction engineering, design engineering, ICAP or any contingencies. Often times, this fact gets overlooked and everyone acts surprised when "more money" is required.

Talk to you later,

Elmer
907-465-6941

From: Mettler, Matthew [mailto:mmettler@dowlhkm.com]
Sent: Thursday, February 03, 2011 7:43 AM
To: Marx, Elmer E (DOT)
Subject: Ambler Mine Access - Bridge Costs

Elmer:

If you are available and willing, I would like to briefly discuss the attached estimate to obtain your opinion on whether it is reasonable.

I have a meeting with our president, Stewart Osgood, at 10:00 a.m. and hope to be done by 11:00 a.m. This should be about 9:00 a.m. your time

Sincerely,

Matthew J. Mettler, P.E.
Manager, Structural Engineering
DID: 406-869-6384 CELL: 406-861-3585

DOWL HKM
(406) 656-6399 | Fax (406) 656-6398 | 222 N. 32nd Street, Suite 700 | Billings, Montana 59101 | www.dowlhkm.com

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COMPUTATIONS	Project #:
Client Name:	Sheet 1 of 2
Project Name: Ambler Access	Prepared by: Date / Checked by: Date

CONVERSATION W/ GARY MARX

STATE HIGHWAY

ISSUES - COST IN REMOTE AREAS

$550 TO $600 PER S.F. TOTAL PROJECT

BID ITEM COST

OX CREEK BRIDGE $2 MILLION 365 $/S.F. 140' x 28'

ENG. EST LOW BY 60% OF BID PRICES

- BRIDGE W/ ROAD ~~[illegible]~~ PROJECT
- BULB TEE DESIGN

BLAP UNIT PRICES 28% TO 30%

STEEL BRIDGE EXAMPLE

WOOD RIVER BRIDGE NEAR DILLINGHAM

STEEL GIRDER COST $2.50 TO $3.00 /lb {$4.00 AMBLER}

PRE-CAST PLANKS $1.00 PLANK TO $0.65 /lb

$6.00 /lb SMALL QUANTITY AND/OR LABOR INTENSIVE

OVERSIZED LOADING
+ 25%

DOWL HKM

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COMPUTATIONS	Project #:
Client Name:	Sheet 2 of 2

Project Name:	Prepared by: Date	Checked by: Date

PERMIT LOADS X 1.35

>> HL-93 X 1.75

• DESIGN FOR GREATER LOAD CASE

Fish Passage - Additional Cost Estimate	
Project	**Engineers Estimate**
Sunrise Creek - ML021	$42,800
Sunrise Creek - ML024	$69,800
Hatchery Creek	$84,300
Eccles Creek	$149,900
Whiskey Creek	$59,500
Average:	$81,260

Fish Passage - Design Cost Estimate	
Project	**Engineers Estimate**
Sunrise Creek - ML021	$56,660
Sunrise Creek - ML024	$56,660
Hatchery Creek	$83,815
Eccles Creek	$79,543
Good River Road	$23,260
Berry Driveway	$14,951
Average:	$52,482

Total Cost Increase	$133,742
Rounded	**$130,000**

Sunrise Road Culvert Replacements, ML 021 Engineers Estimate of Construction Costs, Final Submittal

Item No.	Work Description	Quantity ML021	Quantity Total	Unit	Unit price	Total
611(1)	RIPRAP, CLASS II	110	110	CUBIC YARD	$100.00	$11,000.00
621(2)	PLANTING TREES AND SHRUBS	1	1	LUMP SUM	$2,000.00	$2,000.00
633(1)	SILT FENCE	600	600	LINEAR FOOT	$5.00	$3,000.00
641(1)	EROSION AND POLLUTION CONTROL ADMINISTRATION	1	1	LUMP SUM	$4,000.00	$4,000.00
671(1)	SIMULATION STREAMBED MIX	140	140	CUBIC YARD	$120.00	$16,800.00
800(1)	STREAM DIVERSION & DEWATERING	1	1	LUMP SUM	$6,000.00	$6,000.00
					TOTAL	$42,800.00

Sunrise Road Culvert Replacements, ML 024 Engineers Estimate of Construction Costs, Final Submittal

Item No.	Work Description	Quantity		Unit	Unit price	Total
		ML024	Total			
611(1)	RIPRAP, CLASS II	190	190	CUBIC YARD	$100.00	$19,000.00
621(2)	PLANTING TREES AND SHRUBS	1	1	LUMP SUM	$2,000.00	$2,000.00
633(1)	SILT FENCE	800	800	LINEAR FOOT	$5.00	$4,000.00
641(1)	EROSION AND POLLUTION CONTROL ADMINISTRATION	1	1	LUMP SUM	$4,000.00	$4,000.00
671(1)	SIMULATION STREAMBED MIX	290	290	CUBIC YARD	$120.00	$34,800.00
800(1)	STREAM DIVERSION & DEWATERING	1	1	LUMP SUM	$6,000.00	$6,000.00
					TOTAL	$69,800.00

ENGINEER'S ESTIMATE -- Plans in Hand SUBMITTAL

STATE OF ALASKA -- DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES -- NORTHERN REGION

Project Number: D60369

PROJECT NAME: Culvert Design on Power Creek Road at Hatchery Creek

Item No.	Pay Item	Pay Unit	Unit Price	Quantity	Amount
	========== BASIC BID ==========				
203(19)	STREAM DIVERSION & DEWATERING (INCLUDING TEMPORARY PIPE)	LUMP SUM	$17,500.00	ALL REQUIRED	$17,500
203(20)	ROCKERY WALL	LUMP SUM	$7,500	ALL REQUIRED	$7,500
611(1)	RIPRAP, CLASS 1	CUBIC YARD	$100	75	$7,500
618(4)	LANDSCAPING	LUMP SUM	$5,000	ALL REQUIRED	$5,000
619(2)	SOIL STABILIZATION, MATTING	SQUARE YARD	$10		$0
633(1)	SILT FENCE	LINEAR FOOT	$10		$0
641(1)	EROSION AND POLLUTION CONTROL ADMINISTRATION	LUMP SUM	$10,000	ALL REQUIRED	$10,000
641(2)	TEMPORARY EROSION AND POLLUTION CONTROL	CONTINGENT SUM	$5,000	ALL REQUIRED	$5,000
671(1)	ROCK RIB, INSTREAM	EACH	$1,000	5	$5,000
671(2)	HABITAT ROCK	EACH	$100	20	$2,000
671(3A)	CULVERT INFILL	CUBIC YARD	$275	90	$24,750
		Total Basic Bid (BB):			$84,300

Eccles

ENGINEER'S ESTIMATE -- FINAL PS&E SUBMITTAL

Project Number: D60259

PROJECT NAME: Fish Passage Restoration and Design at Eccles Creek

Item No.	Pay Item	Pay Unit	Unit Price	Quantity	Amount
	========== BASIC BID ==========				
203(19)	STREAM DIVERSION & DEWATERING (INCLUDING TEMPORARY PIPE)	LUMP SUM	$17,500.00	ALL REQUIRED	$17,500
203(20)	ROCKERY WALL	LUMP SUM	$7,500	ALL REQUIRED	$7,500
611(1)	RIPRAP, CLASS II	CUBIC YARD	$100	30	$3,000
619(2)	SOIL STABILIZATION, MATTING	SQUARE YARD	$10	200	$2,000
633(1)	SILT FENCE	LINEAR FOOT	$7.5	1,100	$8,250
641(1)	EROSION AND POLLUTION CONTROL ADMINISTRATION	LUMP SUM	$10,000	ALL REQUIRED	$10,000
641(2)	TEMPORARY EROSION AND POLLUTION CONTROL	CONTINGENT SUM	$5,000	ALL REQUIRED	$5,000
671(1)	ROCK RIB, INSTREAM	EACH	$750	10	$7,500
671(2)	HABITAT ROCK	EACH	$80	20	$1,600
671(3A)	CULVERT INFILL, ECCLES CREEK	CUBIC YARD	$250	350	$87,500
		Total Basic Bid (BB):			$149,900

Prepared by: _____ _____ Date: __/__/__ Checked by: _____ Date: __/__/__

Whiskey

ENGINEER'S ESTIMATE -- FINAL PS&E SUBMITTAL

Project Number: D60259

PROJECT NAME: Fish Passage Restoration and Design at Eccles Creek

Item No.	Pay Item	Pay Unit	Unit Price	Quantity	Amount
	========== BASIC BID ==========				
203(19)	STREAM DIVERSION & DEWATERING (INCLUDING TEMPORARY PIPE)	LUMP SUM	$17,500.00	ALL REQUIRED	$17,500
203(20)	ROCKERY WALL	LUMP SUM	$7,500	ALL REQUIRED	$7,500
611(1)	RIPRAP, CLASS II	CUBIC YARD	$100	30	$3,000
619(2)	SOIL STABILIZATION, MATTING	SQUARE YARD	$10	200	$2,000
633(1)	SILT FENCE	LINEAR FOOT	$7.5	1,100	$8,250
641(1)	EROSION AND POLLUTION CONTROL ADMINISTRATION	LUMP SUM	$10,000	ALL REQUIRED	$10,000
641(2)	TEMPORARY EROSION AND POLLUTION CONTROL	CONTINGENT SUM	$5,000	ALL REQUIRED	$5,000
671(3B)	CULVERT INFILL, WHISKEY CREEK	CUBIC YARD	$250	25	$6,250
		Total Basic Bid (BB):			$59,500

Prepared by: _____ _____ Date: __/__/__ Checked by: _____ Date: __/__/__

DOWL HKM			
ESTIMATE FOR PROFESSIONAL SERVICES			
PROJEC	**Gustavus Fish Passage Improvement Pr**	WO#	D60811
		DATE:	23-Mar-11
		Prepared by	RDP
CLIENT:	City of Gustavus		

Tasks	**Basic Services (Lump Sum)**	**Total Fees**
	Good River Road	
Task 1	Survey and Site Inve	$6,565
Task 2	65% Draft Design	$8,205
Task 3	95% Final Design	$4,530
Task 4	100% Approved Submittal	$3,960
	Total for Good River Road	$23,260
	Berry Driveway	
Task 5	Survey and Site Inve	$3,431
Task 6	65% Draft Design	$4,725
Task 7	95% Final Design	$3,105
Task 8	100% Approved Submittal	$3,690
	Total for Berry Driveway	$14,951

APPENDIX B

Stream Crossings per Corridor

Summary of Bridge Crossings for Corridor Alternatives

Corridor	Structure Classification					
	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span
	(EA)	(EA)	(EA)	(EA)	(EA)	(LF)
1-Brooks East Corridor	114	16	5	13	13	5000
2-Kanuti Flats Corridor	157	13	10	18	14	5440
3-Elliott Hwy Corridor	176	20	19	24	12	7360
4-Parks Hwy RR Corridor	127-176	27-52	28-47	21-29	13-17	7470-10670
4-Parks Hwy RR Corridor A	127	52	42	23	13	7470
4-Parks Hwy RR Corridor B	172	48	47	29	13	7730
4-Parks Hwy RR Corridor C	131	31	28	21	17	10410
4-Parks Hwy RR Corridor D	176	27	33	27	17	10670
5-DMTS Port Corridor	116	63	3	12	19	8440
6-Cape Blossom Corridor	108	73	2	14	24	9250
7-Selawik Flats Corridor	94	42	7	21	21	7470
8-Cape Darby Corridor	84	54	8	22	25	7890

Summary of Anadromous Crossings for Corridor Alternatives

Corridor	Anadromous Streams		
	AWC Cataloged Anadromous	Assumed Anadromous	Fish Passage Culverts
	(EA)	(EA)	(EA)
1-Brooks East Corridor	5	21	8
2-Kanuti Flats Corridor	14	41	18
3-Elliott Hwy Corridor	8	48	20
4-Parks Hwy RR Corridor	8-13	53-72	22-28
4-Parks Hwy RR Corridor A	8	63	23
4-Parks Hwy RR Corridor B	12	72	28
4-Parks Hwy RR Corridor C	9	53	22
4-Parks Hwy RR Corridor D	13	62	27
5-DMTS Port Corridor	13	63	48
6-Cape Blossom Corridor	2	83	51
7-Selawik Flats Corridor	23	48	32
8-Cape Darby Corridor	26	51	35

1-Brooks East Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
1	Jim River	1		Bridge	130	220	240					1	240	0
2	Unnamed Trib			Culvert	?	?	10	1						0
3	Unnamed Trib			Culvert	?	?	20		1					0
4	Unnamed Trib			Culvert	?	?	10	1						0
5	Unnamed Trib		1	Culvert	?	?	10	1						1
6	Unnamed Trib			Culvert	?	?	10	1						0
7	Unnamed Trib			Culvert	?	?	20		1					0
8	Unnamed Trib			Culvert	?	?	20		1					0
9	Unnamed Trib		1	Culvert	?	?	10	1						1
10	Unnamed Trib		1	Culvert	?	?	10	1						1
11	South Fork Koyukuk River	1		Bridge	170	410	440					1	440	0
12	Unnamed Trib			Culvert	?	?	10	1						0
13	Unnamed Trib			Culvert	?	?	10	1						0
14	Unnamed Trib			Culvert	?	?	10	1						0
15	Unnamed Trib			Culvert	?	?	10	1						0
16	Unnamed Trib			Culvert	?	?	10	1						0
17	Unnamed Trib		1	Bridge	?	?	80				1			0
18	Unnamed Trib		1	Culvert	?	?	20		1					1
19	Unnamed Trib			Culvert	?	?	10	1						0
20	Unnamed Trib			Culvert	?	?	10	1						0
21	Unnamed Trib			Culvert	?	?	10	1						0
22	Unnamed Trib			Culvert	?	?	10	1						0
23	Unnamed Trib			Culvert	?	?	10	1						0
24	Unnamed Trib			Culvert	?	?	20		1					0
25	Unnamed Trib			Culvert	?	?	10	1						0
26	Unnamed Trib			Culvert	?	?	10	1						0
27	Unnamed Trib			Culvert	?	?	10	1						0
28	Unnamed Trib			Culvert	?	?	20		1					0
29	Unnamed Trib			Culvert	?	?	10	1						0
30	Unnamed Trib			Culvert	?	?	10	1						0
31	Unnamed Trib			Culvert	?	?	10	1						0
32	Unnamed Trib			Culvert	?	?	10	1						0
33	Unnamed Trib			Culvert	?	?	10	1						0
34	Unnamed Trib			Culvert	?	?	10	1						0
35	Unnamed Trib			Culvert	?	?	10	1						0
36	Unnamed Trib		1	Bridge	120	120	140				1			0
37	Unnamed Trib			Culvert	8	8	10	1						0
38	Unnamed Trib			Culvert	?	?	10	1						0
39	Koyukuk Trib			Bridge	?	?	40			1				0
40	Koyukuk Trib			Bridge	?	?	80				1			0
41	Koyukuk River	1		Bridge	450	580	600					1	600	0
42	Unnamed Trib			Culvert	?	?	10	1						0
43	Unnamed Trib			Culvert	?	?	10	1						0
44	Death Valley			Bridge	8	10	20		1					0
45	Timber Creek			Bridge	80	100	140				1			0
46	John River	1		Bridge	250	520	560					1	560	0
47	Unnamed Trib		1	Bridge	?	?	140				1			0
48	Unnamed Trib			Bridge	?	?	80				1			0
49	Unnamed Trib			Culvert	?	?	10	1						0
50	Unnamed Trib			Culvert	?	?	10	1						0
51	Malamute Fork John River			Bridge	150	300	400					1	400	0

1-Brooks East Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
52	Unnamed Trib			Bridge	?	?	40			1				0
53	Unnamed Trib			Culvert	10	10	10	1						0
54	Unnamed Trib			Culvert	10	10	10	1						0
55	Unnamed Trib			Culvert	10	10	10	1						0
56	Unnamed Trib			Culvert	10	10	10	1						0
57	East Fork Henshaw Creek		1	Culvert	16	18	20		1					1
58	East Fork Henshaw Trib			Culvert	10	10	10	1						0
59	East Fork Henshaw Trib			Culvert	12	14	20		1					0
60	East Fork Henshaw Trib			Culvert	10	10	10	1						0
61	East Fork Henshaw Trib			Culvert	10	10	10	1						0
62	East Fork Henshaw Trib			Culvert	10	10	10	1						0
63	East Fork Henshaw Creek			Culvert	12	14	20		1					0
64	East Fork Henshaw Trib			Culvert	10	10	10	1						0
65	East Fork Henshaw Trib			Culvert	10	10	10	1						0
66	East Fork Henshaw Trib			Culvert	10	10	10	1						0
67	Bedrock Creek			Culvert	10	10	10	1						0
68	Bedrock Creek Trib			Culvert	10	10	10	1						0
69	Bedrock Creek Trib			Culvert	10	10	10	1						0
70	Bedrock Creek Trib			Culvert	10	10	10	1						0
71	Bedrock Creek Trib			Culvert	10	10	10	1						0
72	Bedrock Creek Trib			Culvert	10	10	10	1						0
73	Bedrock Creek Trib			Culvert	10	10	10	1						0
74	Bedrock Creek Trib			Culvert	10	10	10	1						0
75	Bedrock Creek Trib			Culvert	10	10	10	1						0
76	Bedrock Creek Trib			Culvert	10	10	10	1						0
77	(South Fork Bedrock Creek)			Bridge	120	180	240					1	240	0
78	Unnamed Trib			Culvert	10	10	10	1						0
79	Unnamed Trib			Culvert	?	?	20		1					0
80	Unnamed Trib			Culvert	10	10	10	1						0
81	Unnamed Trib			Culvert	10	10	10	1						0
82	Unnamed Trib			Culvert	10	10	10	1						0
83	Unnamed Trib			Culvert	10	10	10	1						0
84	Unnamed Trib			Bridge	30	30	40			1				0
85	Unnamed Trib			Culvert	10	10	10	1						0
86	Unnamed Trib		1	Culvert	10	10	10	1						1
87	Unnamed Trib			Culvert	10	10	10	1						0
88	Unnamed Trib			Culvert	10	10	10	1						0
89	Unnamed Trib			Culvert	10	10	10	1						0
90	Unnamed Trib			Culvert	10	10	10	1						0
91	Unnamed Trib		1	Culvert	10	10	10	1						1
92	Unnamed Trib			Culvert	10	10	10	1						0
93	Alatna River	1		Bridge	370	450	500					1	500	0
94	Unnamed Trib			Culvert	10	10	10	1						0
95	Unnamed Trib			Culvert	10	10	10	1						0
96	Unnamed Trib			Culvert	10	10	10	1						0
97	Unnamed Trib			Culvert	10	10	10	1						0
98	Unnamed Trib			Culvert	10	10	10	1						0
99	Helpmejack Creek		1	Bridge	100	140	140				1			0
100	Unnamed Trib			Culvert	?	?	10	1						0
101	Unnamed Trib			Culvert	?	?	10	1						0
102	Unnamed Trib			Culvert	?	?	10	1						0

1-Brooks East Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
103	Unnamed Trib			Culvert	?	?	10	1						0
104	Helpmejack Creek			Bridge	?	?	40			1				0
105	Unnamed Trib			Culvert	?	?	10	1						0
106	Unnamed Trib			Culvert	?	?	10	1						0
107	Unnamed Trib			Culvert	14	16	20		1					0
108	Unnamed Trib			Bridge	?	?	80				1			0
109	Kobuk River		1	Bridge	160	380	440					1	440	0
110	Unnamed Trib		1	Bridge	?	?	80				1			0
111	Unnamed Trib			Bridge	?	?	80				1			0
112	Unnamed Trib			Culvert	10	10	10	1						0
113	Reed River		1	Bridge	140	270	320					1	320	0
114	Unnamed Trib			Culvert	?	?	10	1						0
115	Unnamed Trib			Culvert	?	?	10	1						0
116	Unnamed Trib			Culvert	?	?	10	1						0
117	Beaver Creek		1	Bridge	140	160	180					1	180	0
118	Unnamed Trib			Culvert	?	?	10	1						0
119	Unnamed Trib			Culvert	?	?	10	1						0
120	Beaver Creek			Culvert	?	?	20		1					0
121	Narvak Lake Tributary			Bridge	20	30	40			1				0
122	Unnamed Trib			Culvert	?	?	10	1						0
123	Unnamed Trib			Culvert	?	?	20		1					0
124	Avaraat Lake Tributary			Culvert	?	?	10	1						0
125	Avaraat Lake Tributary			Culvert	6	8	10	1						0
126	Unnamed Trib			Culvert	?	?	10	1						0
127	Killak River			Bridge	50	60	80				1			0
128	Unnamed Trib			Culvert	?	?	10	1						0
129	Unnamed Trib			Culvert	?	?	10	1						0
130	Mauneluk River		1	Bridge	200	300	320					1	320	0
131	Unnamed Trib		1	Culvert	?	?	10	1						1
132	Unnamed Trib			Culvert	?	?	10	1						0
133	Unnamed Trib			Culvert	?	?	10	1						0
134	Unnamed Trib			Culvert	?	?	10	1						0
135	Unnamed Trib			Culvert	?	?	10	1						0
136	Unnamed Trib		1	Bridge	60	70	80				1			0
137	Unnamed Trib		1	Bridge	60	70	80				1			0
138	Unnamed Trib			Culvert	?	?	10	1						0
139	Unnamed Trib			Culvert	?	?	10	1						0
140	Unnamed Trib			Culvert	?	?	10	1						0
141	Unnamed Trib			Culvert	?	?	10	1						0
142	Unnamed Trib			Culvert	?	?	10	1						0
143	Unnamed Trib			Culvert	?	?	10	1						0
144	Unnamed Trib			Culvert	?	?	10	1						0
145	Canyon Creek			Culvert	?	?	20		1					0
146	Kogoluktuk River		1	Bridge	340	460	480					1	480	0
147	Unnamed Trib			Culvert	?	?	10	1						0
148	Unnamed Trib			Culvert	?	?	10	1						0
149	Unnamed Trib			Culvert	?	?	10	1						0
150	Unnamed Trib			Culvert	?	?	10	1						0
151	Riley Creek			Culvert	?	?	20		1					0
152	Unnamed Trib			Culvert	?	?	10	1						0
153	Unnamed Trib			Culvert	?	?	10	1						0
154	Unnamed Trib			Culvert	?	?	10	1						0

1-Brooks East Corridor								Structure Classification						
Crossing	**Stream Name**	**Cataloged Anadomous**	**Assumed (GIS mapping) Anadomous**	**Structure**	**River Width**	**Flood Plain Width**	**Structure Width**	**Culvert Small (<10')**	**Culvert Large (10' to 20')**	**Bridge Small (<50')**	**Bridge Medium (50' to 140')**	**Bridge Large (>140')**	**Bridge Large Total Span**	**Fish Pass Culvert Req'd**
155	Unnamed Trib			Culvert	?	?	10	1						0
156	Unnamed Trib			Culvert	?	?	10	1						0
157	Unnamed Trib			Culvert	?	?	10	1						0
158	Unnamed Trib			Culvert	?	?	10	1						0
159	Unnamed Trib			Culvert	?	?	10	1						0
160	Unnamed Trib			Culvert	?	?	10	1						0
161	Shungnak River		1	Bridge	120	240	280					1	280	0
	Cataloged Anadromous:	5						114	16	5	13	13	5000	8
	Estimated Anadromous:		21					ea	ea	ea	ea	ea	LF	ea
	Total Anadromous:		**26**											
	Fish Passage Culverts:		**8**								Average Large Bridge Span		385	
											Min Large Bridge Span		180	
											Max Large Bridge Span		600	

2-Kanuti Flats Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
1	Jim River	1		Bridge	130	220	240					1	240	0
2	Unnamed Trib			Culvert	?	?	10	1						0
3	Unnamed Trib			Culvert	?	?	20		1					0
4	Unnamed Trib			Culvert	?	?	10	1						0
5	Unnamed Trib		1	Culvert	?	?	10	1						1
6	Unnamed Trib			Culvert	?	?	10	1						0
7	Unnamed Trib			Culvert	?	?	20		1					0
8	Unnamed Trib			Culvert	?	?	20		1					0
9	Unnamed Trib		1	Culvert	?	?	10	1						1
10	Unnamed Trib		1	Culvert	?	?	10	1						1
11	South Fork Koyukuk River	1		Bridge	170	410	440					1	440	0
12	Unnamed Trib			Culvert	?	?	10	1						0
13	Unnamed Trib			Culvert	?	?	10	1						0
14	Unnamed Trib			Culvert	?	?	10	1						0
15	Unnamed Trib			Culvert	?	?	10	1						0
16	Unnamed Trib			Culvert	?	?	10	1						0
17	Unnamed Trib		1	Bridge	?	?	80				1			0
18	Unnamed Trib		1	Culvert	?	?	20		1					1
19	Unnamed Trib			Culvert	?	?	10	1						0
20	Unnamed Trib			Culvert	?	?	10	1						0
21	Unnamed Trib			Culvert	?	?	10	1						0
22	Unnamed Trib			Culvert	?	?	10	1						0
23	Unnamed Trib			Culvert	?	?	10	1						0
24	Unnamed Trib			Culvert	?	?	20		1					0
25	Unnamed Trib			Culvert	?	?	10	1						0
26	Unnamed Trib			Culvert	?	?	10	1						0
27	Unnamed Trib			Culvert	?	?	10	1						0
28	Unnamed Trib			Culvert	?	?	20		1					0
29	Unnamed Trib			Culvert	?	?	10	1						0
30	Unnamed Trib			Culvert	?	?	10	1						0
31	Unnamed Trib			Culvert	?	?	10	1						0
32	Unnamed Trib			Culvert	?	?	10	1						0
33	Unnamed Trib			Culvert	?	?	10	1						0
34	Unnamed Trib			Culvert	?	?	10	1						0
35	Unnamed Trib			Culvert	?	?	10	1						0
36	Unnamed Trib		1	Bridge	120	120	140				1			0
37	Unnamed Trib			Culvert	8	8	10	1						0
38	Koyukuk Side Channel	1		Bridge	130	270	280					1	280	0
39	Koyukuk River	1		Bridge	690	820	840					1	840	0
40	Koyukuk Side Channel	1		Bridge	30	180	200					1	200	0
41	Unnamed Trib			Culvert	?	?	10	1						0
42	Unnamed Trib			Culvert	?	?	10	1						0
43	Unnamed Trib			Culvert	12	14	20		1					0
44	Jane Creek Trib			Culvert	12	14	20		1					0
45	Jane Creek		1	Bridge	26	30	40			1				0
46	Unnamed Trib			Culvert	?	?	10	1						0
47	Unnamed Trib			Culvert	?	?	10	1						0
48	Unnamed Trib		1	Bridge	?	?	80				1			0
49	Unnamed Trib		1	Bridge	?	?	80				1			0
50	Unnamed Trib			Bridge	?	?	40			1				0

2-Kanuti Flats Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
51	Unnamed Trib			Culvert	?	?	10	1						0
52	Henshaw Creek East Fork Trib		1	Bridge	?	?	80				1			0
53	Henshaw Creek East Fork Trib			Culvert	?	?	10	1						0
54	Henshaw Creek East Fork Trib		1	Culvert	?	?	10	1						1
55	Henshaw Creek East Fork Trib		1	Bridge	?	?	80				1			0
56	Henshaw Creek East Fork Trib			Culvert	?	?	10	1						0
57	Henshaw Creek East Fork Trib			Culvert	?	?	10	1						0
58	Henshaw Creek East Fork		1	Bridge	120	160	200					1	200	0
59	Henshaw Creek East Fork Trib			Culvert	?	?	10	1						0
60	Henshaw Creek West Fork Trib			Bridge	?	?	40			1				0
61	Henshaw Creek West Fork	1		Bridge	90	120	140				1			0
62	Henshaw Creek West Fork Trib			Culvert	?	?	10	1						0
63	Henshaw Creek West Fork Trib	1		Culvert	?	?	10	1						0
64	Henshaw Creek West Fork Trib	1		Culvert	?	?	10	1						0
65	Unnamed Trib			Culvert	?	?	10	1						0
66	Unnamed Trib		1	Culvert	?	?	10	1						1
67	Unnamed Trib		1	Culvert	?	?	10	1						1
68	Unnamed Trib			Culvert	?	?	10	1						0
69	Unnamed Trib			Culvert	?	?	10	1						0
70	Unnamed Trib			Culvert	?	?	10	1						0
71	Alatna River	1		Bridge	530	670	680					1	680	0
72	Alatna River Trib			Culvert	?	?	10	1						0
73	Alatna River Trib		1	Culvert	?	?	10	1						1
74	Alatna River Trib			Culvert	?	?	10	1						0
75	Alatna River Trib			Culvert	?	?	10	1						0
76	Alatna River Trib			Culvert	?	?	10	1						0
77	Alatna River Trib			Culvert	?	?	10	1						0
78	Alatna River Trib			Culvert	?	?	10	1						0
79	Alatna River Trib			Culvert	?	?	10	1						0
80	Alatna River Trib			Culvert	?	?	20		1					0
81	Alatna River Trib			Culvert	?	?	20		1					0
82	Siruk Creek		1	Bridge	50	70	80				1			0
83	Siruk Creek Trib			Culvert	?	?	10	1						0
84	Siruk Creek Trib			Culvert	?	?	10	1						0
85	Siruk Creek Trib			Culvert	?	?	10	1						0
86	Siruk Creek Trib			Culvert	?	?	10	1						0
87	Siruk Creek Trib			Culvert	?	?	10	1						0
88	Siruk Creek Trib		1	Culvert	?	?	10	1						1
89	Siruk Creek Trib		1	Culvert	?	?	20		1					1
90	Siruk Creek		1	Bridge	30	60	80				1			0
91	Unnamed Trib			Culvert	?	?	10	1						0
92	Unnamed Trib			Culvert	?	?	10	1						0
93	Unnamed Trib			Culvert	?	?	10	1						0
94	Unnamed Trib			Culvert	?	?	10	1						0
95	Hogatza River	1		Bridge	150	280	320					1	320	0
96	Unnamed Trib			Culvert	?	?	10	1						0
97	Unnamed Trib			Culvert	?	?	10	1						0
98	Unnamed Trib			Culvert	?	?	10	1						0
99	Unnamed Trib			Culvert	?	?	10	1						0
100	Unnamed Trib			Culvert	?	?	10	1						0
101	Unnamed Trib			Culvert	?	?	10	1						0

2-Kanuti Flats Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
102	Unnamed Trib			Culvert	?	?	10	1						0
103	Unnamed Trib			Culvert	?	?	10	1						0
104	Unnamed Trib		1	Bridge	?	?	40			1				0
105	Unnamed Trib			Culvert	?	?	10	1						0
106	Unnamed Trib			Culvert	?	?	10	1						0
107	Unnamed Trib			Culvert	?	?	10	1						0
108	Unnamed Trib		1	Bridge	?	?	80				1			0
109	Unnamed Trib			Culvert	?	?	10	1						0
110	Klikhtentotzna Creek	1		Bridge	?	?	80				1			0
111	Unnamed Trib			Culvert	?	?	10	1						0
112	Unnamed Trib			Culvert	?	?	10	1						0
113	Unnamed Trib			Culvert	?	?	10	1						0
114	Unnamed Trib			Culvert	?	?	10	1						0
115	Unnamed Trib			Culvert	?	?	10	1						0
116	Unnamed Trib			Culvert	?	?	10	1						0
117	Unnamed Trib			Culvert	?	?	10	1						0
118	Unnamed Trib			Culvert	?	?	10	1						0
119	Unnamed Trib		1	Bridge	?	?	120				1			0
120	Unnamed Trib			Culvert	?	?	10	1						0
121	Unnamed Trib			Culvert	?	?	10	1						0
122	Unnamed Trib			Culvert	?	?	10	1						0
123	Pah River Trib		1	Bridge	?	?	40			1				0
124	Pah River Trib			Culvert	?	?	10	1						0
125	Pah River Trib		1	Bridge	?	?	40			1				0
126	Pah River Trib			Culvert	?	?	10	1						0
127	Pah River Trib			Bridge	?	?	120				1			0
128	Unnamed Trib			Culvert	?	?	10	1						0
129	Unnamed Trib			Culvert	?	?	10	1						0
130	Unnamed Trib			Culvert	?	?	10	1						0
131	Asiksat Creek		1	Bridge	?	?	40			1				0
132	Unnamed Trib			Culvert	?	?	10	1						0
133	Unnamed Trib			Culvert	?	?	10	1						0
134	Unnamed Trib		1	Bridge	?	?	40			1				0
135	Unnamed Trib			Culvert	?	?	10	1						0
136	Unnamed Trib		1	Culvert	?	?	10	1						1
137	Unnamed Trib		1	Culvert	?	?	10	1						1
138	Unnamed Trib		1	Bridge	?	?	160					1	160	0
139	Unnamed Trib		1	Culvert	?	?	10	1						1
140	Unnamed Trib		1	Culvert	?	?	10	1						1
141	Unnamed Trib			Culvert	?	?	10	1						0
142	Unnamed Trib			Culvert	?	?	10	1						0
143	Unnamed Trib			Culvert	?	?	10	1						0
144	Unnamed Trib			Culvert	?	?	10	1						0
145	Unnamed Trib			Culvert	?	?	10	1						0
146	Unnamed Trib			Culvert	?	?	10	1						0
147	Unnamed Trib			Culvert	?	?	10	1						0
148	Unnamed Trib			Culvert	?	?	10	1						0
149	Unnamed Trib			Culvert	?	?	10	1						0
150	Unnamed Trib			Culvert	?	?	10	1						0
151	Pah River Confluence	1		Bridge	160	330	360					1	360	0

2-Kanuti Flats Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
152	Kobuk River	1		Bridge	380	620	640					1	640	0
153	Unnamed Trib			Culvert	?	?	10	1						0
154	Unnamed Trib		1	Culvert	?	?	10	1						1
155	Unnamed Trib			Culvert	?	?	10	1						0
156	Killak River	1		Bridge	?	?	120				1			0
157	Unnamed Trib		1	Culvert	?	?	10	1						1
158	Unnamed Trib		1	Culvert	?	?	10	1						1
159	Unnamed Trib			Culvert	?	?	10	1						0
160	Unnamed Trib			Culvert	?	?	10	1						0
161	Unnamed Trib			Culvert	?	?	10	1						0
162	Unnamed Trib			Culvert	?	?	10	1						0
163	Unnamed Trib			Culvert	?	?	10	1						0
164	Unnamed Trib			Culvert	?	?	10	1						0
165	Unnamed Trib			Culvert	?	?	10	1						0
166	Unnamed Trib			Culvert	?	?	10	1						0
167	Unnamed Trib			Culvert	?	?	10	1						0
168	Unnamed Trib			Culvert	?	?	10	1						0
169	Mauneluk Trib			Bridge	?	?	120				1			0
170	Unnamed Trib			Culvert	?	?	10	1						0
171	Unnamed Trib			Culvert	?	?	10	1						0
172	Unnamed Trib			Culvert	?	?	10	1						0
173	Unnamed Trib			Culvert	?	?	10	1						0
174	Unnamed Trib			Culvert	?	?	10	1						0
175	Unnamed Trib			Culvert	?	?	10	1						0
176	Unnamed Trib			Culvert	?	?	10	1						0
177	Unnamed Trib			Bridge	?	?	120				1			0
178	Unnamed Trib			Bridge	?	?	40			1				0
179	Unnamed Trib			Bridge	?	?	40			1				0
180	Unnamed Trib			Culvert	?	?	10	1						0
181	Mauneluk River		1	Bridge	200	300	320					1	320	0
182	Unnamed Trib		1	Culvert	?	?	10	1						1
183	Unnamed Trib			Culvert	?	?	10	1						0
184	Unnamed Trib			Culvert	?	?	10	1						0
185	Unnamed Trib			Culvert	?	?	10	1						0
186	Unnamed Trib			Culvert	?	?	10	1						0
187	Unnamed Trib		1	Bridge	60	70	80				1			0
188	Unnamed Trib		1	Bridge	60	70	80				1			0
189	Unnamed Trib			Culvert	?	?	10	1						0
190	Unnamed Trib			Culvert	?	?	10	1						0
191	Unnamed Trib			Culvert	?	?	10	1						0
192	Unnamed Trib			Culvert	?	?	10	1						0
193	Unnamed Trib			Culvert	?	?	10	1						0
194	Unnamed Trib			Culvert	?	?	10	1						0
195	Unnamed Trib			Culvert	?	?	10	1						0
196	Canyon Creek			Culvert	?	?	20		1					0
197	Kogoluktuk River		1	Bridge	340	460	480					1	480	0
198	Unnamed Trib			Culvert	?	?	10	1						0
199	Unnamed Trib			Culvert	?	?	10	1						0
200	Unnamed Trib			Culvert	?	?	10	1						0
201	Unnamed Trib			Culvert	?	?	10	1						0
202	Riley Creek			Culvert	?	?	20		1					0
203	Unnamed Trib			Culvert	?	?	10	1						0

2-Kanuti Flats Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
204	Unnamed Trib			Culvert	?	?	10	1						0
205	Unnamed Trib			Culvert	?	?	10	1						0
206	Unnamed Trib			Culvert	?	?	10	1						0
207	Unnamed Trib			Culvert	?	?	10	1						0
208	Unnamed Trib			Culvert	?	?	10	1						0
209	Unnamed Trib			Culvert	?	?	10	1						0
210	Unnamed Trib			Culvert	?	?	10	1						0
211	Unnamed Trib			Culvert	?	?	10	1						0
212	Shungnak River		1	Bridge	120	240	280					1	280	0
	Cataloged Anadromous:	14						157	13	10	18	14	5440	18
	Estimated Anadromous:		41					ea	ea	ea	ea	ea	LF	ea
	Total Anadromous:		**55**											
	Fish Passage Culverts:		**18**								Average Large Bridge Span		389	
											Min Large Bridge Span		160	
											Max Large Bridge Span		840	

3-Elliott Hwy Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
1	Ditch			Culvert	?	?	10	1						0
2	Glena Creek			Culvert	?	?	20		1					0
3	Rhode Island Creek		1	Culvert	?	?	20		1					1
4	Omega Creek		1	Culvert	?	?	20		1					1
5	Thanksgiving Creek		1	Culvert	?	?	20		1					1
6	New York Creek		1	Culvert	?	?	20		1					1
7	Baker Creek Trib		1	Culvert	?	?	10	1						1
8	Baker Creek Trib		1	Culvert	?	?	10	1						1
9	North Fork Baker Creek Trib			Culvert	?	?	10	1						0
10	North Fork Baker Creek Trib			Culvert	?	?	10	1						0
11	Orum Creek			Bridge	?	?	40			1				0
12	Stevens Creek		1	Bridge	?	?	80				1			0
13	Unnamed Trib			Culvert	?	?	10	1						0
14	Texas Creek			Bridge	?	?	40			1				0
15	Jordan Creek			Bridge	?	?	40			1				0
16	Cheyenne Creek			Culvert	?	?	20		1					0
17	Cheyenne Creek			Culvert	?	?	20		1					0
18	Yukon River Trib			Culvert	?	?	10	1						0
19	Yukon River	1		Bridge	2550	2700	2720					1	2720	0
20	Yukon River Trib		1	Culvert	?	?	20		1					1
21	Schieffelin Creek		1	Bridge	?	?	40			1				0
22	Unnamed Trib			Culvert	?	?	10	1						0
23	Unnamed Trib			Culvert	?	?	10	1						0
24	Sixteenmile Lake Trib			Culvert	?	?	10	1						0
25	Yukon River Trib			Culvert	?	?	10	1						0
26	Yukon River Trib			Culvert	?	?	10	1						0
27	Spieer Creek		1	Bridge	21	30	40			1				0
28	Coal Creek			Bridge	22	30	40			1				0
29	Jackson Creek			Bridge	45	55	80				1			0
30	Yukon River Trib			Culvert	?	?	20		1					0
31	Yukon River Trib			Culvert	?	?	20		1					0
32	Mission Creek			Culvert	11	16	20		1					0
33	Ptarmigan Creek			Bridge	30	40	80				1			0
34	Ptarmigan Trib			Culvert	?	?	10	1						0
35	Ptarmigan Trib			Culvert	?	?	10	1						0
36	Ptarmigan Creek			Bridge	30	40	80				1			0
37	Ptarmigan Trib			Culvert	?	?	10	1						0
38	Ptarmigan Trib			Culvert	?	?	10	1						0
39	Ptarmigan Trib			Culvert	?	?	10	1						0
40	Ptarmigan Trib			Culvert	?	?	10	1						0
41	Ptarmigan Trib			Culvert	?	?	10	1						0
42	Ptarmigan Trib			Culvert	?	?	10	1						0
43	Ptarmigan Trib			Culvert	?	?	10	1						0
44	Reindeer Creek Trib			Culvert	?	?	10	1						0
45	Reindeer Creek Trib			Culvert	?	?	10	1						0
46	Tozitna River Trib			Culvert	?	?	10	1						0
47	Tozitna River	1		Bridge	330	390	400					1	400	0

3-Elliott Hwy Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
48	Tozitna River Trib			Bridge	?	?	40			1				0
49	Tozitna River Trib		1	Bridge	?	?	80				1			0
50	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
51	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
52	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
53	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
54	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
55	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
56	Wrongtrail Creek		1	Bridge	80	90	120				1			0
57	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
58	Dagislakhna Creek			Bridge	60	60	80				1			0
59	Dagislakhna Creek			Bridge	60	70	80				1			0
60	Haha Creek			Bridge	?	?	40			1				0
61	Haha Trib			Culvert	?	?	10	1						0
62	Haha Trib			Culvert	?	?	10	1						0
63	Haha Trib		1	Bridge	?	?	80				1			0
64	Melozitna River			Bridge	130	140	180					1	180	0
65	Tokatjikh Creek Trib			Culvert	?	?	10	1						0
66	Tokatjikh Creek			Bridge	80	90	120				1			0
67	Tokatjikh Creek Trib			Culvert	?	?	10	1						0
68	Unnamed Trib			Culvert	?	?	10	1						0
69	Unnamed Trib			Culvert	?	?	10	1						0
70	Unnamed Trib			Culvert	?	?	10	1						0
71	Unnamed Trib			Culvert	?	?	10	1						0
72	Unnamed Trib			Culvert	?	?	10	1						0
73	Tobatokh Creek		1	Bridge	?	?	120				1			0
74	Unnamed Trib			Culvert	?	?	10	1						0
75	Unnamed Trib			Culvert	?	?	10	1						0
76	Unnamed Trib			Culvert	?	?	10	1						0
77	Sithdondit Creek		1	Bridge	?	?	40			1				0
78	Unnamed Trib			Culvert	?	?	10	1						0
79	Unnamed Trib			Culvert	?	?	10	1						0
80	Unnamed Trib			Culvert	?	?	10	1						0
81	Unnamed Trib		1	Culvert	?	?	20		1					1
82	Unnamed Trib		1	Culvert	?	?	10	1						1
83	Unnamed Trib		1	Culvert	?	?	10	1						1
84	Unnamed Trib		1	Culvert	?	?	10	1						1
85	Unnamed Trib			Culvert	?	?	10	1						0
86	Unnamed Trib			Culvert	?	?	10	1						0
87	Unnamed Trib			Culvert	?	?	10	1						0
88	Unnamed Trib			Culvert	?	?	10	1						0
89	Lake Todatonten Trib		1	Bridge	?	?	80				1			0
90	Lake Todatonten Trib			Culvert	?	?	10	1						0
91	Lake Todatonten Trib		1	Bridge	?	?	40			1				0
92	Unnamed Trib			Culvert	?	?	10	1						0
93	Unnamed Trib			Culvert	?	?	10	1						0

3-Elliott Hwy Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
94	Mentanontli River		1	Bridge	110	170	180					1	180	0
95	Unnamed Trib			Culvert	?	?	10	1						0
96	Unnamed Trib			Culvert	?	?	10	1						0
97	Unnamed Trib			Culvert	?	?	10	1						0
98	Unnamed Trib			Culvert	?	?	10	1						0
99	Unnamed Trib			Culvert	?	?	10	1						0
100	Unnamed Trib			Culvert	?	?	10	1						0
101	Unnamed Trib			Culvert	?	?	10	1						0
102	Unnamed Trib			Culvert	?	?	10	1						0
103	Unnamed Trib			Culvert	?	?	10	1						0
104	Unnamed Trib			Culvert	?	?	10	1						0
105	Unnamed Trib			Bridge	?	?	40			1				0
106	Unnamed Trib			Culvert	?	?	20		1					0
107	Unnamed Trib			Culvert	?	?	10	1						0
108	Koyukuk River	1		Bridge	1050	1280	1320					1	1320	0
109	Unnamed Trib			Culvert	?	?	10	1						0
110	Unnamed Trib			Culvert	?	?	10	1						0
111	Unnamed Trib			Culvert	?	?	10	1						0
112	Unnamed Trib			Culvert	?	?	10	1						0
113	Henry Creek		1	Bridge	40	60	80				1			0
114	Unnamed Trib			Culvert	?	?	10	1						0
115	Unnamed Trib		1	Culvert	?	?	20		1					1
116	Unnamed Trib			Culvert	?	?	10	1						0
117	Unnamed Trib			Culvert	?	?	10	1						0
118	Unnamed Trib			Culvert	?	?	10	1						0
119	Unnamed Trib			Culvert	?	?	10	1						0
120	Lake Mingoket Outlet		1	Bridge	?	?	40			1				0
121	Unnamed Trib			Culvert	?	?	10	1						0
122	Unnamed Trib			Culvert	?	?	10	1						0
123	Siruk Creek		1	Bridge	70	90	120				1			0
124	Unnamed Trib			Culvert	?	?	10	1						0
125	Unnamed Trib			Culvert	?	?	10	1						0
126	Unnamed Trib			Culvert	?	?	10	1						0
127	Unnamed Trib			Culvert	?	?	10	1						0
128	Unnamed Trib			Culvert	?	?	10	1						0
129	Siruk Creek		1	Bridge	30	60	80				1			0
130	Unnamed Trib			Culvert	?	?	10	1						0
131	Unnamed Trib			Culvert	?	?	10	1						0
132	Unnamed Trib			Culvert	?	?	10	1						0
133	Unnamed Trib			Culvert	?	?	10	1						0
134	Hogatza River	1		Bridge	150	280	320					1	320	0
135	Unnamed Trib			Culvert	?	?	10	1						0
136	Unnamed Trib			Culvert	?	?	10	1						0
137	Unnamed Trib			Culvert	?	?	10	1						0
138	Unnamed Trib			Culvert	?	?	10	1						0
139	Unnamed Trib			Culvert	?	?	10	1						0
140	Unnamed Trib			Culvert	?	?	10	1						0
141	Unnamed Trib			Culvert	?	?	10	1						0

3-Elliott Hwy Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
142	Unnamed Trib			Culvert	?	?	10	1						0
143	Unnamed Trib		1	Bridge	?	?	40			1				0
144	Unnamed Trib			Culvert	?	?	10	1						0
145	Unnamed Trib			Culvert	?	?	10	1						0
146	Unnamed Trib			Culvert	?	?	10	1						0
147	Unnamed Trib		1	Bridge	?	?	80				1			0
148	Unnamed Trib			Culvert	?	?	10	1						0
149	Klikhtentotzna Creek	1		Bridge	?	?	80				1			0
150	Unnamed Trib			Culvert	?	?	10	1						0
151	Unnamed Trib			Culvert	?	?	10	1						0
152	Unnamed Trib			Culvert	?	?	10	1						0
153	Unnamed Trib			Culvert	?	?	10	1						0
154	Unnamed Trib			Culvert	?	?	10	1						0
155	Unnamed Trib			Culvert	?	?	10	1						0
156	Unnamed Trib			Culvert	?	?	10	1						0
157	Unnamed Trib			Culvert	?	?	10	1						0
158	Unnamed Trib		1	Bridge	?	?	120				1			0
159	Unnamed Trib			Culvert	?	?	10	1						0
160	Unnamed Trib			Culvert	?	?	10	1						0
161	Unnamed Trib			Culvert	?	?	10	1						0
162	Pah River Trib		1	Bridge	?	?	40			1				0
163	Pah River Trib			Culvert	?	?	10	1						0
164	Pah River Trib		1	Bridge	?	?	40			1				0
165	Pah River Trib			Culvert	?	?	10	1						0
166	Pah River Trib			Bridge	?	?	120				1			0
167	Unnamed Trib			Culvert	?	?	10	1						0
168	Unnamed Trib			Culvert	?	?	10	1						0
169	Unnamed Trib			Culvert	?	?	10	1						0
170	Asiksat Creek		1	Bridge	?	?	40			1				0
171	Unnamed Trib			Culvert	?	?	10	1						0
172	Unnamed Trib			Culvert	?	?	10	1						0
173	Unnamed Trib		1	Bridge	?	?	40			1				0
174	Unnamed Trib			Culvert	?	?	10	1						0
175	Unnamed Trib		1	Culvert	?	?	10	1						1
176	Unnamed Trib		1	Culvert	?	?	10	1						1
177	Unnamed Trib		1	Bridge	?	?	160					1	160	0
178	Unnamed Trib		1	Culvert	?	?	10	1						1
179	Unnamed Trib		1	Culvert	?	?	10	1						1
180	Unnamed Trib			Culvert	?	?	10	1						0
181	Unnamed Trib			Culvert	?	?	10	1						0
182	Unnamed Trib			Culvert	?	?	10	1						0
183	Unnamed Trib			Culvert	?	?	10	1						0
184	Unnamed Trib			Culvert	?	?	10	1						0
185	Unnamed Trib			Culvert	?	?	10	1						0
186	Unnamed Trib			Culvert	?	?	10	1						0
187	Unnamed Trib			Culvert	?	?	10	1						0

3-Elliott Hwy Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
188	Unnamed Trib			Culvert	?	?	10	1						0
189	Unnamed Trib			Culvert	?	?	10	1						0
190	Pah River Confluence	1		Bridge	160	330	360					1	360	0
191	Kobuk River	1		Bridge	380	620	640					1	640	0
192	Unnamed Trib			Culvert	?	?	10	1						0
193	Unnamed Trib		1	Culvert	?	?	10	1						1
194	Unnamed Trib			Culvert	?	?	10	1						0
195	Killak River	1		Bridge	?	?	120				1			0
196	Unnamed Trib		1	Culvert	?	?	10	1						1
197	Unnamed Trib		1	Culvert	?	?	10	1						1
198	Unnamed Trib			Culvert	?	?	10	1						0
199	Unnamed Trib			Culvert	?	?	10	1						0
200	Unnamed Trib			Culvert	?	?	10	1						0
201	Unnamed Trib			Culvert	?	?	10	1						0
202	Unnamed Trib			Culvert	?	?	10	1						0
203	Unnamed Trib			Culvert	?	?	10	1						0
204	Unnamed Trib			Culvert	?	?	10	1						0
205	Unnamed Trib			Culvert	?	?	10	1						0
206	Unnamed Trib			Culvert	?	?	10	1						0
207	Unnamed Trib			Culvert	?	?	10	1						0
208	Mauneluk Trib			Bridge	?	?	120				1			0
209	Unnamed Trib			Culvert	?	?	10	1						0
210	Unnamed Trib			Culvert	?	?	10	1						0
211	Unnamed Trib			Culvert	?	?	10	1						0
212	Unnamed Trib			Culvert	?	?	10	1						0
213	Unnamed Trib			Culvert	?	?	10	1						0
214	Unnamed Trib			Culvert	?	?	10	1						0
215	Unnamed Trib			Culvert	?	?	10	1						0
216	Unnamed Trib			Bridge	?	?	120				1			0
217	Unnamed Trib			Bridge	?	?	40			1				0
218	Unnamed Trib			Bridge	?	?	40			1				0
219	Unnamed Trib			Culvert	?	?	10	1						0
220	Mauneluk River		1	Bridge	200	300	320					1	320	0
221	Unnamed Trib		1	Culvert	?	?	10	1						1
222	Unnamed Trib			Culvert	?	?	10	1						0
223	Unnamed Trib			Culvert	?	?	10	1						0
224	Unnamed Trib			Culvert	?	?	10	1						0
225	Unnamed Trib			Culvert	?	?	10	1						0
226	Unnamed Trib		1	Bridge	60	70	80				1			0
227	Unnamed Trib		1	Bridge	60	70	80				1			0
228	Unnamed Trib			Culvert	?	?	10	1						0
229	Unnamed Trib			Culvert	?	?	10	1						0
230	Unnamed Trib			Culvert	?	?	10	1						0
231	Unnamed Trib			Culvert	?	?	10	1						0
232	Unnamed Trib			Culvert	?	?	10	1						0
233	Unnamed Trib			Culvert	?	?	10	1						0
234	Unnamed Trib			Culvert	?	?	10	1						0
235	Canyon Creek			Culvert	?	?	20		1					0

3-Elliott Hwy Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
236	Kogoluktuk River		1	Bridge	340	460	480					1	480	0
237	Unnamed Trib			Culvert	?	?	10	1						0
238	Unnamed Trib			Culvert	?	?	10	1						0
239	Unnamed Trib			Culvert	?	?	10	1						0
240	Unnamed Trib			Culvert	?	?	10	1						0
241	Riley Creek			Culvert	?	?	20		1					0
242	Unnamed Trib			Culvert	?	?	10	1						0
243	Unnamed Trib			Culvert	?	?	10	1						0
244	Unnamed Trib			Culvert	?	?	10	1						0
245	Unnamed Trib			Culvert	?	?	10	1						0
246	Unnamed Trib			Culvert	?	?	10	1						0
247	Unnamed Trib			Culvert	?	?	10	1						0
248	Unnamed Trib			Culvert	?	?	10	1						0
249	Unnamed Trib			Culvert	?	?	10	1						0
250	Unnamed Trib			Culvert	?	?	10	1						0
251	Shungnak River		1	Bridge	120	240	280					1	280	0
	Cataloged Anadromous:	8						176	20	19	24	12	7360	20
	Estimated Anadromous:		48					ea	ea	ea	ea	ea	LF	ea
	Total Anadromous:		**56**											
	Fish Passage Culverts:		**20**								Average Large Bridge Span		613	
											Min Large Bridge Span		160	
											Max Large Bridge Span		2720	

4-Parks Hwy RR Corridor C-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
1	Nenana	1		Bridge	450	450	480					1	480	0
2	Little Nenana			Bridge	65	65	80				1			0
3	East Middle River			Bridge	30	40	40			1				0
4	West Middle River			Bridge	40	40	40			1				0
5	Swamp			N/A			0							0
6	Kantishna River	1		Bridge	800	900	900					1	900	0
7	Unnamed Trib		1	Culvert	?	?	10	1						1
8	Unnamed Trib		1	Bridge	?	?	80				1			0
9	Unnamed Trib		1	Bridge	150	160	160					1	160	0
10	Unnamed Trib		1	Bridge	?	?	80				1			0
11	Unnamed Trib		1	Culvert	?	?	20		1					1
12	Tanana River	1		Bridge	1200	1400	1400					1	1400	0
13	Hutlinana River	1		Bridge	75		80							0
14	Eureka Creek		1	Culvert	20	20	20		1					1
15	Omega Creek Trib		1	Culvert	?	?	10							0
16	Rhode Island Creek		1	Culvert	20	20	20		1					1
17	McKinley Creek		1	Culvert	10	10	10	1						1
18	Omega Creek		1	Culvert	10	10	10	1						1
19	Thanksgiving Creek		1	Culvert	10	10	10	1						1
20	North Fork Baker Creek Trib		1	Culvert	?	?	10	1						1
21	New York Creek		1	Culvert	?	?	20		1					1
22	Baker Creek Trib		1	Culvert	?	?	10	1						1
23	Baker Creek Trib		1	Culvert	?	?	10	1						1
24	North Fork Baker Creek Trib			Culvert	?	?	10	1						0
25	North Fork Baker Creek Trib			Culvert	?	?	10	1						0
26	Orum Creek			Bridge	?	?	40			1				0
27	Stevens Creek		1	Bridge	?	?	80				1			0
28	Unnamed Trib			Culvert	?	?	10	1						0
29	Texas Creek			Bridge	?	?	40			1				0
30	Jordan Creek			Bridge	?	?	40			1				0
31	Cheyenne Creek			Culvert	?	?	20		1					0
32	Cheyenne Creek			Culvert	?	?	20		1					0
33	Yukon River Trib			Culvert	?	?	10	1						0
34	Yukon River	1		Bridge	2550	2700	2720					1	2720	0
35	Yukon River Trib		1	Culvert	?	?	20		1					1
36	Schieffelin Creek		1	Bridge	?	?	40			1				0
37	Unnamed Trib			Culvert	?	?	10	1						0
38	Unnamed Trib			Culvert	?	?	10	1						0
39	Sixteenmile Lake Trib			Culvert	?	?	10	1						0
40	Yukon River Trib			Culvert	?	?	10	1						0
41	Yukon River Trib			Culvert	?	?	10	1						0
42	Spieer Creek		1	Bridge	21	30	40			1				0
43	Coal Creek			Bridge	22	30	40			1				0
44	Jackson Creek			Bridge	45	55	80				1			0
45	Yukon River Trib			Culvert	?	?	20		1					0
46	Yukon River Trib			Culvert	?	?	20		1					0
47	Mission Creek			Culvert	11	16	20		1					0

4-Parks Hwy RR Corridor C-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
48	NC Creek		1	Bridge	30	30	40			1				0
49	Bear Creek		1	Bridge	50	70	80				1			0
50	Unnamed Creek			Bridge	20	30	40			1				0
51	Unnamed Creek			Bridge	30	30	40			1				0
52	Ten Mile Creek		1	Bridge	30	30	40			1				0
53	Unnamed Creek			Culvert	20	20	20		1					0
54	Unnamed Creek			Culvert	20	20	20		1					0
55	Unnamed Creek		1	Culvert	20	20	20		1					1
56	Unnamed Creek			Culvert	20	20	20		1					0
57	Unnamed Creek		1	Culvert	20	20	20		1					1
58	Unnamed Creek			Culvert	20	20	20		1					0
59	Unnamed Creek			Culvert	20	20	20		1					0
60	Unnamed Creek			Culvert	20	20	20		1					0
61	Tolzitna River	1		Bridge	230	250	250					1	250	0
62	Unnamed Creek			Bridge	30	30	40			1				0
63	Unnamed Creek			Bridge	30	30	40			1				0
64	Unnamed Creek			Bridge	30	30	40			1				0
65	Unnamed Creek			Bridge	30	30	40			1				0
66	Tenmile Creek			Bridge	?	?	120				1			0
67	Unnamed Trib			Culvert	?	?	10	1						0
68	Unnamed Trib			Culvert	?	?	10	1						0
69	Unnamed Trib			Culvert	?	?	10	1						0
70	Unnamed Trib			Culvert	?	?	10	1						0
71	Unnamed Trib			Bridge	?	?	40			1				0
72	Unnamed Trib			Bridge	?	?	40			1				0
73	Unnamed Trib			Culvert	?	?	10	1						0
74	Unnamed Trib			Culvert	?	?	10	1						0
75	Tozitna River	1		Bridge	140	460	520					1	520	0
76	Unnamed Trib			Culvert	?	?	10	1						0
77	Unnamed Trib			Culvert	?	?	10	1						0
78	Unnamed Trib			Bridge	?	?	40			1				0
79	Unnamed Trib			Bridge	?	?	40			1				0
80	Tozitna River Trib			Bridge	?	?	40			1				0
81	Tozitna River Trib		1	Bridge	?	?	80				1			0
82	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
83	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
84	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
85	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
86	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
87	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
88	Wrongtrail Creek		1	Bridge	80	90	120				1			0
89	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
90	Dagislakhna Creek			Bridge	60	60	80				1			0
91	Dagislakhna Creek			Bridge	60	70	80				1			0
92	Haha Creek			Bridge	?	?	40			1				0
93	Haha Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor C-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
94	Haha Trib			Culvert	?	?	10	1						0
95	Haha Trib		1	Bridge	?	?	80				1			0
96	Melozitna River			Bridge	130	140	180					1	180	0
97	Tokatjikh Creek Trib			Culvert	?	?	10	1						0
98	Tokatjikh Creek			Bridge	80	90	120				1			0
99	Tokatjikh Creek Trib			Culvert	?	?	10	1						0
100	Unnamed Trib			Culvert	?	?	10	1						0
101	Unnamed Trib			Culvert	?	?	10	1						0
102	Unnamed Trib			Culvert	?	?	10	1						0
103	Unnamed Trib			Culvert	?	?	10	1						0
104	Unnamed Trib			Culvert	?	?	10	1						0
105	Tobatokh Creek		1	Bridge	?	?	120				1			0
106	Unnamed Trib			Culvert	?	?	10	1						0
107	Unnamed Trib			Culvert	?	?	10	1						0
108	Unnamed Trib			Culvert	?	?	10	1						0
109	Sithdondit Creek		1	Bridge	?	?	40			1				0
110	Unnamed Trib			Culvert	?	?	10	1						0
111	Unnamed Trib			Culvert	?	?	10	1						0
112	Unnamed Trib			Culvert	?	?	10	1						0
113	Unnamed Trib		1	Culvert	?	?	20		1					1
114	Unnamed Trib		1	Culvert	?	?	10	1						1
115	Unnamed Trib		1	Culvert	?	?	10	1						1
116	Unnamed Trib		1	Culvert	?	?	10	1						1
117	Unnamed Trib			Culvert	?	?	10	1						0
118	Unnamed Trib			Culvert	?	?	10	1						0
119	Unnamed Trib			Culvert	?	?	10	1						0
120	Unnamed Trib			Culvert	?	?	10	1						0
121	Lake Todatonten Trib		1	Bridge	?	?	80				1			0
122	Lake Todatonten Trib			Culvert	?	?	10	1						0
123	Lake Todatonten Trib		1	Bridge	?	?	40			1				0
124	Unnamed Trib			Culvert	?	?	10	1						0
125	Unnamed Trib			Culvert	?	?	10	1						0
126	Mentanontli River		1	Bridge	110	170	180					1	180	0
127	Unnamed Trib			Culvert	?	?	10	1						0
128	Unnamed Trib			Culvert	?	?	10	1						0
129	Unnamed Trib			Culvert	?	?	10	1						0
130	Unnamed Trib			Culvert	?	?	10	1						0
131	Unnamed Trib			Culvert	?	?	10	1						0
132	Unnamed Trib			Culvert	?	?	10	1						0
133	Unnamed Trib			Culvert	?	?	10	1						0
134	Unnamed Trib			Culvert	?	?	10	1						0
135	Unnamed Trib			Culvert	?	?	10	1						0
136	Unnamed Trib			Culvert	?	?	10	1						0
137	Unnamed Trib			Bridge	?	?	40			1				0
138	Unnamed Trib			Culvert	?	?	20		1					0
139	Unnamed Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor C-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
140	Koyukuk River	1		Bridge	1050	1280	1320					1	1320	0
141	Unnamed Trib			Culvert	?	?	10	1						0
142	Unnamed Trib			Culvert	?	?	10	1						0
143	Unnamed Trib			Culvert	?	?	10	1						0
144	Unnamed Trib			Culvert	?	?	10	1						0
145	Henry Creek		1	Bridge	40	60	80				1			0
146	Unnamed Trib			Culvert	?	?	10	1						0
147	Unnamed Trib		1	Culvert	?	?	20		1					1
148	Unnamed Trib			Culvert	?	?	10	1						0
149	Unnamed Trib			Culvert	?	?	10	1						0
150	Unnamed Trib			Culvert	?	?	10	1						0
151	Unnamed Trib			Culvert	?	?	10	1						0
152	Lake Mingoket Outlet		1	Bridge	?	?	40			1				0
153	Unnamed Trib			Culvert	?	?	10	1						0
154	Unnamed Trib			Culvert	?	?	10	1						0
155	Siruk Creek		1	Bridge	70	90	120				1			0
156	Unnamed Trib			Culvert	?	?	10	1						0
157	Unnamed Trib			Culvert	?	?	10	1						0
158	Unnamed Trib			Culvert	?	?	10	1						0
159	Unnamed Trib			Culvert	?	?	10	1						0
160	Unnamed Trib			Culvert	?	?	10	1						0
161	Siruk Creek		1	Bridge	30	60	80				1			0
162	Unnamed Trib			Culvert	?	?	10	1						0
163	Unnamed Trib			Culvert	?	?	10	1						0
164	Unnamed Trib			Culvert	?	?	10	1						0
165	Unnamed Trib			Culvert	?	?	10	1						0
166	Hogatza River	1		Bridge	150	280	320					1	320	0
167	Unnamed Trib			Culvert	?	?	10	1						0
168	Unnamed Trib			Culvert	?	?	10	1						0
169	Unnamed Trib			Culvert	?	?	10	1						0
170	Unnamed Trib			Culvert	?	?	10	1						0
171	Unnamed Trib			Culvert	?	?	10	1						0
172	Unnamed Trib			Culvert	?	?	10	1						0
173	Unnamed Trib			Culvert	?	?	10	1						0
174	Unnamed Trib			Culvert	?	?	10	1						0
175	Unnamed Trib		1	Bridge	?	?	40			1				0
176	Unnamed Trib			Culvert	?	?	10	1						0
177	Unnamed Trib			Culvert	?	?	10	1						0
178	Unnamed Trib			Culvert	?	?	10	1						0
179	Unnamed Trib		1	Bridge	?	?	80				1			0
180	Unnamed Trib			Culvert	?	?	10	1						0
181	Klikhtentotzna Creek	1		Bridge	?	?	80				1			0
182	Unnamed Trib			Culvert	?	?	10	1						0
183	Unnamed Trib			Culvert	?	?	10	1						0
184	Unnamed Trib			Culvert	?	?	10	1						0
185	Unnamed Trib			Culvert	?	?	10	1						0
186	Unnamed Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor C-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
187	Unnamed Trib			Culvert	?	?	10	1						0
188	Unnamed Trib			Culvert	?	?	10	1						0
189	Unnamed Trib			Culvert	?	?	10	1						0
190	Unnamed Trib		1	Bridge	?	?	120				1			0
191	Unnamed Trib			Culvert	?	?	10	1						0
192	Unnamed Trib			Culvert	?	?	10	1						0
193	Unnamed Trib			Culvert	?	?	10	1						0
194	Pah River Trib		1	Bridge	?	?	40			1				0
195	Pah River Trib			Culvert	?	?	10	1						0
196	Pah River Trib		1	Bridge	?	?	40			1				0
197	Pah River Trib			Culvert	?	?	10	1						0
198	Pah River Trib			Bridge	?	?	120				1			0
199	Unnamed Trib			Culvert	?	?	10	1						0
200	Unnamed Trib			Culvert	?	?	10	1						0
201	Unnamed Trib			Culvert	?	?	10	1						0
202	Asiksat Creek		1	Bridge	?	?	40			1				0
203	Unnamed Trib			Culvert	?	?	10	1						0
204	Unnamed Trib			Culvert	?	?	10	1						0
205	Unnamed Trib		1	Bridge	?	?	40			1				0
206	Unnamed Trib			Culvert	?	?	10	1						0
207	Unnamed Trib		1	Culvert	?	?	10	1						1
208	Unnamed Trib		1	Culvert	?	?	10	1						1
209	Unnamed Trib		1	Bridge	?	?	160					1	160	0
210	Unnamed Trib		1	Culvert	?	?	10	1						1
211	Unnamed Trib		1	Culvert	?	?	10	1						1
212	Unnamed Trib			Culvert	?	?	10	1						0
213	Unnamed Trib			Culvert	?	?	10	1						0
214	Unnamed Trib			Culvert	?	?	10	1						0
215	Unnamed Trib			Culvert	?	?	10	1						0
216	Unnamed Trib			Culvert	?	?	10	1						0
217	Unnamed Trib			Culvert	?	?	10	1						0
218	Unnamed Trib			Culvert	?	?	10	1						0
219	Unnamed Trib			Culvert	?	?	10	1						0
220	Unnamed Trib			Culvert	?	?	10	1						0
221	Unnamed Trib			Culvert	?	?	10	1						0
222	Pah River Confluence	1		Bridge	160	330	360					1	360	0
223	Kobuk River	1		Bridge	380	620	640					1	640	0
224	Unnamed Trib			Culvert	?	?	10	1						0
225	Unnamed Trib		1	Culvert	?	?	10	1						1
226	Unnamed Trib			Culvert	?	?	10	1						0
227	Killak River	1		Bridge	?	?	120				1			0
228	Unnamed Trib		1	Culvert	?	?	10	1						1
229	Unnamed Trib		1	Culvert	?	?	10	1						1
230	Unnamed Trib			Culvert	?	?	10	1						0
231	Unnamed Trib			Culvert	?	?	10	1						0
232	Unnamed Trib			Culvert	?	?	10	1						0
233	Unnamed Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor C-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
234	Unnamed Trib			Culvert	?	?	10	1						0
235	Unnamed Trib			Culvert	?	?	10	1						0
236	Unnamed Trib			Culvert	?	?	10	1						0
237	Unnamed Trib			Culvert	?	?	10	1						0
238	Unnamed Trib			Culvert	?	?	10	1						0
239	Unnamed Trib			Culvert	?	?	10	1						0
240	Mauneluk Trib			Bridge	?	?	120				1			0
241	Unnamed Trib			Culvert	?	?	10	1						0
242	Unnamed Trib			Culvert	?	?	10	1						0
243	Unnamed Trib			Culvert	?	?	10	1						0
244	Unnamed Trib			Culvert	?	?	10	1						0
245	Unnamed Trib			Culvert	?	?	10	1						0
246	Unnamed Trib			Culvert	?	?	10	1						0
247	Unnamed Trib			Culvert	?	?	10	1						0
248	Unnamed Trib			Bridge	?	?	120				1			0
249	Unnamed Trib			Bridge	?	?	40			1				0
250	Unnamed Trib			Bridge	?	?	40			1				0
251	Unnamed Trib			Culvert	?	?	10	1						0
252	Mauneluk River		1	Bridge	200	300	320					1	320	0
253	Unnamed Trib		1	Culvert	?	?	10	1						1
254	Unnamed Trib			Culvert	?	?	10	1						0
255	Unnamed Trib			Culvert	?	?	10	1						0
256	Unnamed Trib			Culvert	?	?	10	1						0
257	Unnamed Trib			Culvert	?	?	10	1						0
258	Unnamed Trib		1	Bridge	60	70	80				1			0
259	Unnamed Trib		1	Bridge	60	70	80				1			0
260	Unnamed Trib			Culvert	?	?	10	1						0
261	Unnamed Trib			Culvert	?	?	10	1						0
262	Unnamed Trib			Culvert	?	?	10	1						0
263	Unnamed Trib			Culvert	?	?	10	1						0
264	Unnamed Trib			Culvert	?	?	10	1						0
265	Unnamed Trib			Culvert	?	?	10	1						0
266	Unnamed Trib			Culvert	?	?	10	1						0
267	Canyon Creek			Culvert	?	?	20		1					0
268	Kogoluktuk River		1	Bridge	340	460	480					1	480	0
269	Unnamed Trib			Culvert	?	?	10	1						0
270	Unnamed Trib			Culvert	?	?	10	1						0
271	Unnamed Trib			Culvert	?	?	10	1						0
272	Unnamed Trib			Culvert	?	?	10	1						0
273	Riley Creek			Culvert	?	?	20		1					0
274	Unnamed Trib			Culvert	?	?	10	1						0
275	Unnamed Trib			Culvert	?	?	10	1						0
276	Unnamed Trib			Culvert	?	?	10	1						0
277	Unnamed Trib			Culvert	?	?	10	1						0
278	Unnamed Trib			Culvert	?	?	10	1						0
279	Unnamed Trib			Culvert	?	?	10	1						0
280	Unnamed Trib			Culvert	?	?	10	1						0
281	Unnamed Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor C-A								Structure Classification						
Crossing	**Stream Name**	**Cataloged Anadomous**	**Assumed (GIS mapping) Anadomous**	**Structure**	**River Width**	**Flood Plain Width**	**Structure Width**	**Culvert Small (<10')**	**Culvert Large (10' to 20')**	**Bridge Small (<50')**	**Bridge Medium (50' to 140')**	**Bridge Large (>140')**	**Bridge Large Total Span**	**Fish Pass Culvert Req'd**
282	Unnamed Trib			Culvert	?	?	10	1						0
283	Shungnak River		1	Bridge	120	240	280					1	280	0
	Cataloged Anadromous:	13						176	27	33	27	17	10670	27
	Estimated Anadromous:		62					ea	ea	ea	ea	ea	LF	ea
	Total Anadromous:		**75**											
	Fish Passage Culverts:		**27**								Average Large Bridge Span		595	
											Min Large Bridge Span		160	
											Max Large Bridge Span		2720	

4-Parks Hwy RR Corridor C-B								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
1	Nenana	1		Bridge	450	450	480					1	480	0
2	Little Nenana			Bridge	65	65	80				1			0
3	East Middle River			Bridge	30	40	40			1				0
4	West Middle River			Bridge	40	40	40			1				0
5	Swamp			N/A			0							0
6	Kantishna River	1		Bridge	800	900	900					1	900	0
7	Unnamed Trib		1	Culvert	?	?	10	1						1
8	Unnamed Trib		1	Bridge	?	?	80				1			0
9	Unnamed Trib		1	Bridge	150	160	160					1	160	0
10	Unnamed Trib		1	Bridge	?	?	80				1			0
11	Unnamed Trib		1	Culvert	?	?	20		1					1
12	Tanana River	1		Bridge	1200	1400	1400					1	1400	0
13	Hutlinana River	1		Bridge	75		80							0
14	Eureka Creek		1	Culvert	20	20	20		1					1
15	Omega Creek Trib		1	Culvert	?	?	10							0
16	Rhode Island Creek		1	Culvert	20	20	20		1					1
17	McKinley Creek		1	Culvert	10	10	10	1						1
18	Omega Creek		1	Culvert	10	10	10	1						1
19	Thanksgiving Creek		1	Culvert	10	10	10	1						1
20	North Fork Baker Creek Trib		1	Culvert	?	?	10	1						1
21	New York Creek		1	Culvert	?	?	20		1					1
22	Baker Creek Trib		1	Culvert	?	?	10	1						1
23	Baker Creek Trib		1	Culvert	?	?	10	1						1
24	North Fork Baker Creek Trib			Culvert	?	?	10	1						0
25	North Fork Baker Creek Trib			Culvert	?	?	10	1						0
26	Orum Creek			Bridge	?	?	40			1				0
27	Stevens Creek		1	Bridge	?	?	80				1			0
28	Unnamed Trib			Culvert	?	?	10	1						0
29	Texas Creek			Bridge	?	?	40			1				0
30	Jordan Creek			Bridge	?	?	40			1				0
31	Cheyenne Creek			Culvert	?	?	20		1					0
32	Cheyenne Creek			Culvert	?	?	20		1					0
33	Yukon River Trib			Culvert	?	?	10	1						0
34	Yukon River	1		Bridge	2550	2700	2720					1	2720	0
35	Yukon River Trib		1	Culvert	?	?	20		1					1
36	Schieffelin Creek		1	Bridge	?	?	40			1				0
37	Unnamed Trib			Culvert	?	?	10	1						0
38	Unnamed Trib			Culvert	?	?	10	1						0
39	Sixteenmile Lake Trib			Culvert	?	?	10	1						0
40	Yukon River Trib			Culvert	?	?	10	1						0
41	Yukon River Trib			Culvert	?	?	10	1						0
42	Spieer Creek		1	Bridge	21	30	40			1				0
43	Coal Creek			Bridge	22	30	40			1				0
44	Jackson Creek			Bridge	45	55	80				1			0
45	Yukon River Trib			Culvert	?	?	20		1					0
46	Yukon River Trib			Culvert	?	?	20		1					0
47	Mission Creek			Culvert	11	16	20		1					0

4-Parks Hwy RR Corridor C-B								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
48	NC Creek		1	Bridge	30	30	40			1				0
49	Bear Creek		1	Bridge	50	70	80				1			0
50	Unnamed Creek			Bridge	20	30	40			1				0
51	Unnamed Creek			Bridge	30	30	40			1				0
52	Ten Mile Creek		1	Bridge	30	30	40			1				0
53	Unnamed Creek			Culvert	20	20	20		1					0
54	Unnamed Creek			Culvert	20	20	20		1					0
55	Unnamed Creek		1	Culvert	20	20	20		1					1
56	Unnamed Creek			Culvert	20	20	20		1					0
57	Unnamed Creek		1	Culvert	20	20	20		1					1
58	Unnamed Creek			Culvert	20	20	20		1					0
59	Unnamed Creek			Culvert	20	20	20		1					0
60	Unnamed Creek			Culvert	20	20	20		1					0
61	Tolzitna River	1		Bridge	230	250	250					1	250	0
62	Unnamed Creek			Bridge	30	30	40			1				0
63	Unnamed Creek			Bridge	30	30	40			1				0
64	Unnamed Creek			Bridge	30	30	40			1				0
65	Unnamed Creek			Bridge	30	30	40			1				0
66	Tenmile Creek			Bridge	?	?	120				1			0
67	Unnamed Trib			Culvert	?	?	10	1						0
68	Unnamed Trib			Culvert	?	?	10	1						0
69	Unnamed Trib			Culvert	?	?	10	1						0
70	Unnamed Trib			Culvert	?	?	10	1						0
71	Unnamed Trib			Bridge	?	?	40			1				0
72	Unnamed Trib			Bridge	?	?	40			1				0
73	Unnamed Trib			Culvert	?	?	10	1						0
74	Unnamed Trib			Culvert	?	?	10	1						0
75	Tozitna River	1		Bridge	140	460	520					1	520	0
76	Unnamed Trib			Culvert	?	?	10	1						0
77	Unnamed Trib			Culvert	?	?	10	1						0
78	Unnamed Trib			Bridge	?	?	40			1				0
79	Unnamed Trib			Bridge	?	?	40			1				0
80	Tozitna River Trib			Bridge	?	?	40			1				0
81	Tozitna River Trib		1	Bridge	?	?	80				1			0
82	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
83	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
84	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
85	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
86	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
87	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
88	Wrongtrail Creek		1	Bridge	80	90	120				1			0
89	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
90	Dagislakhna Creek			Bridge	60	60	80				1			0
91	Dagislakhna Creek			Bridge	60	70	80				1			0
92	Haha Creek			Bridge	?	?	40			1				0
93	Haha Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor C-B								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
94	Haha Trib			Culvert	?	?	10	1						0
95	Haha Trib		1	Bridge	?	?	80				1			0
96	Melozitna River			Bridge	130	140	180					1	180	0
97	Tokatjikh Creek Trib			Culvert	?	?	10	1						0
98	Tokatjikh Creek			Bridge	80	90	120				1			0
99	Tokatjikh Creek Trib			Culvert	?	?	10	1						0
100	Unnamed Trib			Culvert	?	?	10	1						0
101	Unnamed Trib			Culvert	?	?	10	1						0
102	Unnamed Trib			Culvert	?	?	10	1						0
103	Unnamed Trib			Culvert	?	?	10	1						0
104	Unnamed Trib			Culvert	?	?	10	1						0
105	Tobatokh Creek		1	Bridge	?	?	120				1			0
106	Unnamed Trib			Culvert	?	?	10	1						0
107	Unnamed Trib			Culvert	?	?	10	1						0
108	Unnamed Trib			Culvert	?	?	10	1						0
109	Sithdondit Creek		1	Bridge	?	?	40			1				0
110	Unnamed Trib			Culvert	?	?	10	1						0
111	Unnamed Trib			Culvert	?	?	10	1						0
112	Unnamed Trib			Culvert	?	?	10	1						0
113	Unnamed Trib		1	Culvert	?	?	20		1					1
114	Unnamed Trib		1	Culvert	?	?	10	1						1
115	Unnamed Trib		1	Culvert	?	?	10	1						1
116	Unnamed Trib		1	Culvert	?	?	10	1						1
117	Unnamed Trib			Culvert	?	?	10	1						0
118	Unnamed Trib			Culvert	?	?	10	1						0
119	Unnamed Trib			Culvert	?	?	10	1						0
120	Unnamed Trib			Culvert	?	?	10	1						0
121	Lake Todatonten Trib		1	Bridge	?	?	80				1			0
122	Lake Todatonten Trib			Culvert	?	?	10	1						0
123	Lake Todatonten Trib		1	Bridge	?	?	40			1				0
124	Unnamed Trib			Culvert	?	?	10	1						0
125	Unnamed Trib			Culvert	?	?	10	1						0
126	Mentanontli River		1	Bridge	110	170	180					1	180	0
127	Unnamed Trib			Culvert	?	?	10	1						0
128	Unnamed Trib			Culvert	?	?	10	1						0
129	Unnamed Trib			Culvert	?	?	10	1						0
130	Unnamed Trib			Culvert	?	?	10	1						0
131	Unnamed Trib			Culvert	?	?	10	1						0
132	Unnamed Trib			Culvert	?	?	10	1						0
133	Unnamed Trib			Culvert	?	?	10	1						0
134	Unnamed Trib			Culvert	?	?	10	1						0
135	Unnamed Trib			Culvert	?	?	10	1						0
136	Unnamed Trib			Culvert	?	?	10	1						0
137	Unnamed Trib			Bridge	?	?	40			1				0
138	Unnamed Trib			Culvert	?	?	20		1					0
139	Unnamed Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor C-B								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
140	Koyukuk River	1		Bridge	1050	1280	1320					1	1320	0
141	Unnamed Trib			Culvert	?	?	10	1						0
142	Unnamed Trib			Culvert	?	?	10	1						0
143	Unnamed Trib			Culvert	?	?	10	1						0
144	Unnamed Trib			Culvert	?	?	10	1						0
145	Henry Creek		1	Bridge	40	60	80				1			0
146	Unnamed Trib			Culvert	?	?	10	1						0
147	Unnamed Trib		1	Culvert	?	?	20		1					1
148	Unnamed Trib			Culvert	?	?	10	1						0
149	Unnamed Trib			Culvert	?	?	10	1						0
150	Unnamed Trib			Culvert	?	?	10	1						0
151	Unnamed Trib			Culvert	?	?	10	1						0
152	Lake Mingoket Outlet		1	Bridge	?	?	40			1				0
153	Unnamed Trib			Culvert	?	?	10	1						0
154	Unnamed Trib			Culvert	?	?	10	1						0
155	Siruk Creek		1	Bridge	70	90	120				1			0
156	Unnamed Trib			Culvert	?	?	10	1						0
157	Unnamed Trib			Culvert	?	?	10	1						0
158	Unnamed Trib			Culvert	?	?	10	1						0
159	Unnamed Trib			Culvert	?	?	10	1						0
160	Unnamed Trib			Culvert	?	?	10	1						0
161	Siruk Creek		1	Bridge	30	60	80				1			0
162	Unnamed Trib			Culvert	?	?	10	1						0
163	Unnamed Trib			Culvert	?	?	10	1						0
164	Unnamed Trib			Culvert	?	?	10	1						0
165	Unnamed Trib			Culvert	?	?	10	1						0
166	Hogatza River	1		Bridge	150	280	320					1	320	0
167	Unnamed Trib		1	Culvert	?	?	20		1					1
168	Unnamed Trib		1	Bridge	?	?	40			1				0
169	Kobuk Trib		1	Culvert	?	?	20		1					1
170	Unnamed Trib			Culvert	?	?	10	1						0
171	Unnamed Trib			Culvert	?	?	10	1						0
172	Unnamed Trib			Culvert	?	?	10	1						0
173	Unnamed Trib			Culvert	?	?	10	1						0
174	Unnamed Trib			Culvert	?	?	10	1						0
175	Kobuk River		1	Bridge	270	360	400					1	400	0
176	Kobuk Trib			Culvert	?	?	10	1						0
177	Kobuk Trib			Culvert	?	?	10	1						0
178	Nutuvukiti Lake Trib			Culvert	?	?	10	1						0
179	Nutuvukiti Lake Trib			Culvert	?	?	10	1						0
180	Nutuvukiti Lake Trib			Culvert	?	?	10	1						0
181	Nutuvukiti Lake Trib			Culvert	?	?	10	1						0
182	Nutuvukiti Lake Trib			Culvert	?	?	10	1						0
183	Reed River		1	Bridge	140	270	320					1	320	0
184	Unnamed Trib			Culvert	?	?	10	1						0
185	Unnamed Trib			Culvert	?	?	10	1						0
186	Unnamed Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor C-B								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
187	Beaver Creek		1	Bridge	140	160	180					1	180	0
188	Unnamed Trib			Culvert	?	?	10	1						0
189	Unnamed Trib			Culvert	?	?	10	1						0
190	Beaver Creek			Culvert	?	?	20		1					0
191	Narvak Lake Tributary			Bridge	20	30	40			1				0
192	Unnamed Trib			Culvert	?	?	10	1						0
193	Unnamed Trib			Culvert	?	?	20		1					0
194	Avaraat Lake Tributary			Culvert	?	?	10	1						0
195	Avaraat Lake Tributary			Culvert	6	8	10	1						0
196	Unnamed Trib			Culvert	?	?	10	1						0
197	Killak River			Bridge	50	60	80				1			0
198	Unnamed Trib			Culvert	?	?	10	1						0
199	Unnamed Trib			Culvert	?	?	10	1						0
200	Mauneluk River		1	Bridge	200	300	320					1	320	0
201	Unnamed Trib		1	Culvert	?	?	10	1						1
202	Unnamed Trib			Culvert	?	?	10	1						0
203	Unnamed Trib			Culvert	?	?	10	1						0
204	Unnamed Trib			Culvert	?	?	10	1						0
205	Unnamed Trib			Culvert	?	?	10	1						0
206	Unnamed Trib		1	Bridge	60	70	80				1			0
207	Unnamed Trib		1	Bridge	60	70	80				1			0
208	Unnamed Trib			Culvert	?	?	10	1						0
209	Unnamed Trib			Culvert	?	?	10	1						0
210	Unnamed Trib			Culvert	?	?	10	1						0
211	Unnamed Trib			Culvert	?	?	10	1						0
212	Unnamed Trib			Culvert	?	?	10	1						0
213	Unnamed Trib			Culvert	?	?	10	1						0
214	Unnamed Trib			Culvert	?	?	10	1						0
215	Canyon Creek			Culvert	?	?	20		1					0
216	Kogoluktuk River		1	Bridge	340	460	480					1	480	0
217	Unnamed Trib			Culvert	?	?	10	1						0
218	Unnamed Trib			Culvert	?	?	10	1						0
219	Unnamed Trib			Culvert	?	?	10	1						0
220	Unnamed Trib			Culvert	?	?	10	1						0
221	Riley Creek			Culvert	?	?	20		1					0
222	Unnamed Trib			Culvert	?	?	10	1						0
223	Unnamed Trib			Culvert	?	?	10	1						0
224	Unnamed Trib			Culvert	?	?	10	1						0
225	Unnamed Trib			Culvert	?	?	10	1						0
226	Unnamed Trib			Culvert	?	?	10	1						0
227	Unnamed Trib			Culvert	?	?	10	1						0
228	Unnamed Trib			Culvert	?	?	10	1						0
229	Unnamed Trib			Culvert	?	?	10	1						0
230	Unnamed Trib			Culvert	?	?	10	1						0
231	Shungnak River		1	Bridge	120	240	280					1	280	0

4-Parks Hwy RR Corridor C-B								Structure Classification						
Crossing	**Stream Name**	**Cataloged Anadomous**	**Assumed (GIS mapping) Anadomous**	**Structure**	**River Width**	**Flood Plain Width**	**Structure Width**	**Culvert Small (<10')**	**Culvert Large (10' to 20')**	**Bridge Small (<50')**	**Bridge Medium (50' to 140')**	**Bridge Large (>140')**	**Bridge Large Total Span**	**Fish Pass Culvert Req'd**
	Cataloged Anadromous:	9						131	31	28	21	17	10410	22
	Estimated Anadromous:		53					ea	ea	ea	ea	ea	LF	ea
	Total Anadromous:		**62**											
	Fish Passage Culverts:		**22**								Average Large Bridge Span		612	
											Min Large Bridge Span		160	
											Max Large Bridge Span		2720	

4-Parks Hwy RR Corridor D-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
1	Goldstream Creek		1	Bridge	120	140	140				1			0
2	Unnamed Creek			Culvert	20	20	20		1					0
3	Unnamed Creek			Culvert	20	20	20		1					0
4	Unnamed Creek			Culvert	20	20	20		1					0
5	Unnamed Creek			Bridge	30	30	40			1				0
6	Unnamed Creek			Culvert	20	20	20		1					0
7	Unnamed Creek			Culvert	20	20	20		1					0
8	Unnamed Creek			Culvert	20	20	20		1					0
9	Unnamed Creek			Bridge	30	30	40			1				0
10	Unnamed Creek			Bridge	30	30	40			1				0
11	Unnamed Creek			Bridge	30	30	40			1				0
12	Unnamed Creek			Bridge	30	30	40			1				0
13	Unnamed Creek			Culvert	20	20	20		1					0
14	Unnamed Creek			Culvert	20	20	20		1					0
15	Unnamed Creek			Culvert	20	20	20		1					0
16	Unnamed Creek			Culvert	20	20	20		1					0
17	Chatanika River	1		Bridge	140	140	140				1			0
18	Unnamed Creek		1	Bridge	40	40	40			1				0
19	Unnamed Creek		1	Bridge	40	40	40			1				0
20	Washington Creek		1	Bridge	60	60	80				1			0
21	Unnamed Creek		1	Culvert	20	20	20		1					1
22	Tatalina River		1	Bridge	100	100	100				1			0
23	Unnamed Creek			Culvert	20	20	20		1					0
24	Tolovana River	1		Bridge	100	100	100				1			0
25	Unnamed Creek		1	Culvert	20	20	20		1					1
26	Unnamed Creek		1	Culvert	20	20	20		1					1
27	Unnamed Creek		1	Bridge	30	30	40			1				0
28	Unnamed Creek		1	Bridge	30	30	40			1				0
29	Unnamed Creek		1	Bridge	30	30	40			1				0
30	Unnamed Creek		1	Bridge	30	30	40			1				0
31	Unnamed Creek		1	Bridge	30	30	40			1				0
32	Unnamed Creek		1	Bridge	30	30	40			1				0
33	Unnamed Creek			Culvert	20	20	20		1					0
34	Unnamed Creek			Culvert	20	20	20		1					0
35	Unnamed Creek			Culvert	20	20	20		1					0
36	Negrohead Creek		1	Culvert	20	20	20		1					1
37	Unnamed Creek		1	Culvert	20	20	20		1					1
38	Hutlitnakwa Creek		1	Bridge	40	40	40			1				0
39	Unnamed Creek			Culvert	20	20	20		1					0
40	Hutlinana Creek	1		Bridge	50	50	60			1				0
41	Eureka Creek		1	Bridge	?	?	40			1				0
42	Glena Creek		1	Culvert	?	?	20		1					1
43	Omega Creek Trib		1	Culvert	?	?	10	1						1
44	Rhode Island Creek		1	Culvert	?	?	20		1					1
45	Omega Creek		1	Culvert	?	?	20		1					1
46	Thanksgiving Creek			Culvert	?	?	20		1					0
47	New York Creek		1	Culvert	?	?	20		1					1
48	Baker Creek Trib		1	Culvert	?	?	10	1						1

4-Parks Hwy RR Corridor D-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
49	Baker Creek Trib		1	Culvert	?	?	10	1						1
50	North Fork Baker Creek Trib			Culvert	?	?	10	1						0
51	North Fork Baker Creek Trib			Culvert	?	?	10	1						0
52	Orum Creek			Bridge	?	?	40			1				0
53	Stevens Creek		1	Bridge	?	?	80				1			0
54	Unnamed Trib			Culvert	?	?	10	1						0
55	Texas Creek			Bridge	?	?	40			1				0
56	Jordan Creek			Bridge	?	?	40			1				0
57	Cheyenne Creek			Culvert	?	?	20		1					0
58	Cheyenne Creek			Culvert	?	?	20		1					0
59	Yukon River Trib			Culvert	?	?	10	1						0
60	Yukon River	1		Bridge	2550	2700	2720					1	2720	0
61	Yukon River Trib		1	Culvert	?	?	20		1					1
62	Schieffelin Creek		1	Bridge	?	?	40			1				0
63	Unnamed Trib			Culvert	?	?	10	1						0
64	Unnamed Trib			Culvert	?	?	10	1						0
65	Sixteenmile Lake Trib			Culvert	?	?	10	1						0
66	Yukon River Trib			Culvert	?	?	10	1						0
67	Yukon River Trib			Culvert	?	?	10	1						0
68	Spieer Creek		1	Bridge	21	30	40			1				0
69	Coal Creek			Bridge	22	30	40			1				0
70	Jackson Creek			Bridge	45	55	80				1			0
71	Yukon River Trib			Culvert	?	?	20		1					0
72	Yukon River Trib			Culvert	?	?	20		1					0
73	Mission Creek			Culvert	11	16	20		1					0
74	NC Creek		1	Bridge	30	30	40			1				0
75	Bear Creek		1	Bridge	50	70	80				1			0
76	Unnamed Creek			Bridge	20	30	40			1				0
77	Unnamed Creek			Bridge	30	30	40			1				0
78	Ten Mile Creek		1	Bridge	30	30	40			1				0
79	Unnamed Creek			Culvert	20	20	20		1					0
80	Unnamed Creek			Culvert	20	20	20		1					0
81	Unnamed Creek		1	Culvert	20	20	20		1					1
82	Unnamed Creek			Culvert	20	20	20		1					0
83	Unnamed Creek		1	Culvert	20	20	20		1					1
84	Unnamed Creek			Culvert	20	20	20		1					0
85	Unnamed Creek			Culvert	20	20	20		1					0
86	Unnamed Creek			Culvert	20	20	20		1					0
87	Tolzitna River	1		Bridge	230	250	250					1	250	0
88	Unnamed Creek			Bridge	30	30	40			1				0
89	Unnamed Creek			Bridge	30	30	40			1				0
90	Unnamed Creek			Bridge	30	30	40			1				0
91	Unnamed Creek			Bridge	30	30	40			1				0
92	Tenmile Creek			Bridge	?	?	120				1			0
93	Unnamed Trib			Culvert	?	?	10	1						0
94	Unnamed Trib			Culvert	?	?	10	1						0
95	Unnamed Trib			Culvert	?	?	10	1						0
96	Unnamed Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor D-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
97	Unnamed Trib			Bridge	?	?	40			1				0
98	Unnamed Trib			Bridge	?	?	40			1				0
99	Unnamed Trib			Culvert	?	?	10	1						0
100	Unnamed Trib			Culvert	?	?	10	1						0
101	Tozitna River	1		Bridge	140	460	520					1	520	0
102	Unnamed Trib			Culvert	?	?	10	1						0
103	Unnamed Trib			Culvert	?	?	10	1						0
104	Unnamed Trib			Bridge	?	?	40			1				0
105	Unnamed Trib			Bridge	?	?	40			1				0
106	Tozitna River Trib			Bridge	?	?	40			1				0
107	Tozitna River Trib		1	Bridge	?	?	80				1			0
108	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
109	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
110	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
111	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
112	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
113	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
114	Wrongtrail Creek		1	Bridge	80	90	120				1			0
115	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
116	Dagislakhna Creek			Bridge	60	60	80				1			0
117	Dagislakhna Creek			Bridge	60	70	80				1			0
118	Haha Creek			Bridge	?	?	40			1				0
119	Haha Trib			Culvert	?	?	10	1						0
120	Haha Trib			Culvert	?	?	10	1						0
121	Haha Trib		1	Bridge	?	?	80				1			0
122	Melozitna River			Bridge	130	140	180					1	180	0
123	Tokatjikh Creek Trib			Culvert	?	?	10	1						0
124	Tokatjikh Creek			Bridge	80	90	120				1			0
125	Tokatjikh Creek Trib			Culvert	?	?	10	1						0
126	Unnamed Trib			Culvert	?	?	10	1						0
127	Unnamed Trib			Culvert	?	?	10	1						0
128	Unnamed Trib			Culvert	?	?	10	1						0
129	Unnamed Trib			Culvert	?	?	10	1						0
130	Unnamed Trib			Culvert	?	?	10	1						0
131	Tobatokh Creek		1	Bridge	?	?	120				1			0
132	Unnamed Trib			Culvert	?	?	10	1						0
133	Unnamed Trib			Culvert	?	?	10	1						0
134	Unnamed Trib			Culvert	?	?	10	1						0
135	Sithdondit Creek		1	Bridge	?	?	40			1				0
136	Unnamed Trib			Culvert	?	?	10	1						0
137	Unnamed Trib			Culvert	?	?	10	1						0
138	Unnamed Trib			Culvert	?	?	10	1						0
139	Unnamed Trib		1	Culvert	?	?	20		1					1
140	Unnamed Trib		1	Culvert	?	?	10	1						1

4-Parks Hwy RR Corridor D-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
141	Unnamed Trib		1	Culvert	?	?	10	1						1
142	Unnamed Trib		1	Culvert	?	?	10	1						1
143	Unnamed Trib			Culvert	?	?	10	1						0
144	Unnamed Trib			Culvert	?	?	10	1						0
145	Unnamed Trib			Culvert	?	?	10	1						0
146	Unnamed Trib			Culvert	?	?	10	1						0
147	Lake Todatonten Trib		1	Bridge	?	?	80				1			0
148	Lake Todatonten Trib			Culvert	?	?	10	1						0
149	Lake Todatonten Trib		1	Bridge	?	?	40			1				0
150	Unnamed Trib			Culvert	?	?	10	1						0
151	Unnamed Trib			Culvert	?	?	10	1						0
152	Mentanontli River		1	Bridge	110	170	180					1	180	0
153	Unnamed Trib			Culvert	?	?	10	1						0
154	Unnamed Trib			Culvert	?	?	10	1						0
155	Unnamed Trib			Culvert	?	?	10	1						0
156	Unnamed Trib			Culvert	?	?	10	1						0
157	Unnamed Trib			Culvert	?	?	10	1						0
158	Unnamed Trib			Culvert	?	?	10	1						0
159	Unnamed Trib			Culvert	?	?	10	1						0
160	Unnamed Trib			Culvert	?	?	10	1						0
161	Unnamed Trib			Culvert	?	?	10	1						0
162	Unnamed Trib			Culvert	?	?	10	1						0
163	Unnamed Trib			Bridge	?	?	40			1				0
164	Unnamed Trib			Culvert	?	?	20		1					0
165	Unnamed Trib			Culvert	?	?	10	1						0
166	Koyukuk River	1		Bridge	1050	1280	1320					1	1320	0
167	Unnamed Trib			Culvert	?	?	10	1						0
168	Unnamed Trib			Culvert	?	?	10	1						0
169	Unnamed Trib			Culvert	?	?	10	1						0
170	Unnamed Trib			Culvert	?	?	10	1						0
171	Henry Creek		1	Bridge	40	60	80				1			0
172	Unnamed Trib			Culvert	?	?	10	1						0
173	Unnamed Trib		1	Culvert	?	?	20		1					1
174	Unnamed Trib			Culvert	?	?	10	1						0
175	Unnamed Trib			Culvert	?	?	10	1						0
176	Unnamed Trib			Culvert	?	?	10	1						0
177	Unnamed Trib			Culvert	?	?	10	1						0
178	Lake Mingoket Outlet		1	Bridge	?	?	40			1				0
179	Unnamed Trib			Culvert	?	?	10	1						0
180	Unnamed Trib			Culvert	?	?	10	1						0
181	Siruk Creek		1	Bridge	70	90	120				1			0
182	Unnamed Trib			Culvert	?	?	10	1						0
183	Unnamed Trib			Culvert	?	?	10	1						0
184	Unnamed Trib			Culvert	?	?	10	1						0
185	Unnamed Trib			Culvert	?	?	10	1						0
186	Unnamed Trib			Culvert	?	?	10	1						0
187	Siruk Creek		1	Bridge	30	60	80				1			0
188	Unnamed Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor D-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
189	Unnamed Trib			Culvert	?	?	10	1						0
190	Unnamed Trib			Culvert	?	?	10	1						0
191	Unnamed Trib			Culvert	?	?	10	1						0
192	Hogatza River	1		Bridge	150	280	320					1	320	0
193	Unnamed Trib			Culvert	?	?	10	1						0
194	Unnamed Trib			Culvert	?	?	10	1						0
195	Unnamed Trib			Culvert	?	?	10	1						0
196	Unnamed Trib			Culvert	?	?	10	1						0
197	Unnamed Trib			Culvert	?	?	10	1						0
198	Unnamed Trib			Culvert	?	?	10	1						0
199	Unnamed Trib			Culvert	?	?	10	1						0
200	Unnamed Trib			Culvert	?	?	10	1						0
201	Unnamed Trib		1	Bridge	?	?	40			1				0
202	Unnamed Trib			Culvert	?	?	10	1						0
203	Unnamed Trib			Culvert	?	?	10	1						0
204	Unnamed Trib			Culvert	?	?	10	1						0
205	Unnamed Trib		1	Bridge	?	?	80				1			0
206	Unnamed Trib			Culvert	?	?	10	1						0
207	Klikhtentotzna Creek	1		Bridge	?	?	80				1			0
208	Unnamed Trib			Culvert	?	?	10	1						0
209	Unnamed Trib			Culvert	?	?	10	1						0
210	Unnamed Trib			Culvert	?	?	10	1						0
211	Unnamed Trib			Culvert	?	?	10	1						0
212	Unnamed Trib			Culvert	?	?	10	1						0
213	Unnamed Trib			Culvert	?	?	10	1						0
214	Unnamed Trib			Culvert	?	?	10	1						0
215	Unnamed Trib			Culvert	?	?	10	1						0
216	Unnamed Trib		1	Bridge	?	?	120				1			0
217	Unnamed Trib			Culvert	?	?	10	1						0
218	Unnamed Trib			Culvert	?	?	10	1						0
219	Unnamed Trib			Culvert	?	?	10	1						0
220	Pah River Trib		1	Bridge	?	?	40			1				0
221	Pah River Trib			Culvert	?	?	10	1						0
222	Pah River Trib		1	Bridge	?	?	40			1				0
223	Pah River Trib			Culvert	?	?	10	1						0
224	Pah River Trib			Bridge	?	?	120				1			0
225	Unnamed Trib			Culvert	?	?	10	1						0
226	Unnamed Trib			Culvert	?	?	10	1						0
227	Unnamed Trib			Culvert	?	?	10	1						0
228	Asiksat Creek		1	Bridge	?	?	40			1				0
229	Unnamed Trib			Culvert	?	?	10	1						0
230	Unnamed Trib			Culvert	?	?	10	1						0
231	Unnamed Trib		1	Bridge	?	?	40			1				0
232	Unnamed Trib			Culvert	?	?	10	1						0
233	Unnamed Trib		1	Culvert	?	?	10	1						1
234	Unnamed Trib		1	Culvert	?	?	10	1						1
235	Unnamed Trib		1	Bridge	?	?	160					1	160	0

4-Parks Hwy RR Corridor D-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
236	Unnamed Trib		1	Culvert	?	?	10	1						1
237	Unnamed Trib		1	Culvert	?	?	10	1						1
238	Unnamed Trib			Culvert	?	?	10	1						0
239	Unnamed Trib			Culvert	?	?	10	1						0
240	Unnamed Trib			Culvert	?	?	10	1						0
241	Unnamed Trib			Culvert	?	?	10	1						0
242	Unnamed Trib			Culvert	?	?	10	1						0
243	Unnamed Trib			Culvert	?	?	10	1						0
244	Unnamed Trib			Culvert	?	?	10	1						0
245	Unnamed Trib			Culvert	?	?	10	1						0
246	Unnamed Trib			Culvert	?	?	10	1						0
247	Unnamed Trib			Culvert	?	?	10	1						0
248	Pah River Confluence	1		Bridge	160	330	360					1	360	0
249	Kobuk River	1		Bridge	380	620	640					1	640	0
250	Unnamed Trib			Culvert	?	?	10	1						0
251	Unnamed Trib		1	Culvert	?	?	10	1						1
252	Unnamed Trib			Culvert	?	?	10	1						0
253	Killak River	1		Bridge	?	?	120				1			0
254	Unnamed Trib		1	Culvert	?	?	10	1						1
255	Unnamed Trib		1	Culvert	?	?	10	1						1
256	Unnamed Trib			Culvert	?	?	10	1						0
257	Unnamed Trib			Culvert	?	?	10	1						0
258	Unnamed Trib			Culvert	?	?	10	1						0
259	Unnamed Trib			Culvert	?	?	10	1						0
260	Unnamed Trib			Culvert	?	?	10	1						0
261	Unnamed Trib			Culvert	?	?	10	1						0
262	Unnamed Trib			Culvert	?	?	10	1						0
263	Unnamed Trib			Culvert	?	?	10	1						0
264	Unnamed Trib			Culvert	?	?	10	1						0
265	Unnamed Trib			Culvert	?	?	10	1						0
266	Mauneluk Trib			Bridge	?	?	120				1			0
267	Unnamed Trib			Culvert	?	?	10	1						0
268	Unnamed Trib			Culvert	?	?	10	1						0
269	Unnamed Trib			Culvert	?	?	10	1						0
270	Unnamed Trib			Culvert	?	?	10	1						0
271	Unnamed Trib			Culvert	?	?	10	1						0
272	Unnamed Trib			Culvert	?	?	10	1						0
273	Unnamed Trib			Culvert	?	?	10	1						0
274	Unnamed Trib			Bridge	?	?	120				1			0
275	Unnamed Trib			Bridge	?	?	40			1				0
276	Unnamed Trib			Bridge	?	?	40			1				0
277	Unnamed Trib			Culvert	?	?	10	1						0
278	Mauneluk River		1	Bridge	200	300	320					1	320	0
279	Unnamed Trib		1	Culvert	?	?	10	1						1
280	Unnamed Trib			Culvert	?	?	10	1						0
281	Unnamed Trib			Culvert	?	?	10	1						0
282	Unnamed Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor D-A								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
283	Unnamed Trib			Culvert	?	?	10	1						0
284	Unnamed Trib		1	Bridge	60	70	80				1			0
285	Unnamed Trib		1	Bridge	60	70	80				1			0
286	Unnamed Trib			Culvert	?	?	10	1						0
287	Unnamed Trib			Culvert	?	?	10	1						0
288	Unnamed Trib			Culvert	?	?	10	1						0
289	Unnamed Trib			Culvert	?	?	10	1						0
290	Unnamed Trib			Culvert	?	?	10	1						0
291	Unnamed Trib			Culvert	?	?	10	1						0
292	Unnamed Trib			Culvert	?	?	10	1						0
293	Canyon Creek			Culvert	?	?	20		1					0
294	Kogoluktuk River		1	Bridge	340	460	480					1	480	0
295	Unnamed Trib			Culvert	?	?	10	1						0
296	Unnamed Trib			Culvert	?	?	10	1						0
297	Unnamed Trib			Culvert	?	?	10	1						0
298	Unnamed Trib			Culvert	?	?	10	1						0
299	Riley Creek			Culvert	?	?	20		1					0
300	Unnamed Trib			Culvert	?	?	10	1						0
301	Unnamed Trib			Culvert	?	?	10	1						0
302	Unnamed Trib			Culvert	?	?	10	1						0
303	Unnamed Trib			Culvert	?	?	10	1						0
304	Unnamed Trib			Culvert	?	?	10	1						0
305	Unnamed Trib			Culvert	?	?	10	1						0
306	Unnamed Trib			Culvert	?	?	10	1						0
307	Unnamed Trib			Culvert	?	?	10	1						0
308	Unnamed Trib			Culvert	?	?	10	1						0
309	Shungnak River		1	Bridge	120	240	280					1	280	0
	Cataloged Anadromous:	12						172	48	47	29	13	7730	28
	Estimated Anadromous:		72					ea	ea	ea	ea	ea	LF	ea
	Total Anadromous:		**84**											
	Fish Passage Culverts:		**28**								Average Large Bridge Span		595	
											Min Large Bridge Span		160	
											Max Large Bridge Span		2720	

4-Parks Hwy RR Corridor D-B								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
1	Goldstream Creek		1	Bridge	120	140	140				1			0
2	Unnamed Creek			Culvert	20	20	20		1					0
3	Unnamed Creek			Culvert	20	20	20		1					0
4	Unnamed Creek			Culvert	20	20	20		1					0
5	Unnamed Creek			Bridge	30	30	40			1				0
6	Unnamed Creek			Culvert	20	20	20		1					0
7	Unnamed Creek			Culvert	20	20	20		1					0
8	Unnamed Creek			Culvert	20	20	20		1					0
9	Unnamed Creek			Bridge	30	30	40			1				0
10	Unnamed Creek			Bridge	30	30	40			1				0
11	Unnamed Creek			Bridge	30	30	40			1				0
12	Unnamed Creek			Bridge	30	30	40			1				0
13	Unnamed Creek			Culvert	20	20	20		1					0
14	Unnamed Creek			Culvert	20	20	20		1					0
15	Unnamed Creek			Culvert	20	20	20		1					0
16	Unnamed Creek			Culvert	20	20	20		1					0
17	Chatanika River	1		Bridge	140	140	140				1			0
18	Unnamed Creek		1	Bridge	40	40	40			1				0
19	Unnamed Creek		1	Bridge	40	40	40			1				0
20	Washington Creek		1	Bridge	60	60	80				1			0
21	Unnamed Creek		1	Culvert	20	20	20		1					1
22	Tatalina River		1	Bridge	100	100	100				1			0
23	Unnamed Creek			Culvert	20	20	20		1					0
24	Tolovana River	1		Bridge	100	100	100				1			0
25	Unnamed Creek		1	Culvert	20	20	20		1					1
26	Unnamed Creek		1	Culvert	20	20	20		1					1
27	Unnamed Creek		1	Bridge	30	30	40			1				0
28	Unnamed Creek		1	Bridge	30	30	40			1				0
29	Unnamed Creek		1	Bridge	30	30	40			1				0
30	Unnamed Creek		1	Bridge	30	30	40			1				0
31	Unnamed Creek		1	Bridge	30	30	40			1				0
32	Unnamed Creek		1	Bridge	30	30	40			1				0
33	Unnamed Creek			Culvert	20	20	20		1					0
34	Unnamed Creek			Culvert	20	20	20		1					0
35	Unnamed Creek			Culvert	20	20	20		1					0
36	Negrohead Creek		1	Culvert	20	20	20		1					1
37	Unnamed Creek		1	Culvert	20	20	20		1					1
38	Hutlitnakwa Creek		1	Bridge	40	40	40			1				0
39	Unnamed Creek			Culvert	20	20	20		1					0
40	Hutlinana Creek	1		Bridge	50	50	60			1				0
41	Eureka Creek		1	Bridge	?	?	40			1				0
42	Glena Creek		1	Culvert	?	?	20		1					1
43	Omega Creek Trib		1	Culvert	?	?	10	1						1
44	Rhode Island Creek		1	Culvert	?	?	20		1					1
45	Omega Creek		1	Culvert	?	?	20		1					1
46	Thanksgiving Creek			Culvert	?	?	20		1					0
47	New York Creek		1	Culvert	?	?	20		1					1
48	Baker Creek Trib		1	Culvert	?	?	10	1						1

4-Parks Hwy RR Corridor D-B								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
49	Baker Creek Trib		1	Culvert	?	?	10	1						1
50	North Fork Baker Creek Trib			Culvert	?	?	10	1						0
51	North Fork Baker Creek Trib			Culvert	?	?	10	1						0
52	Orum Creek			Bridge	?	?	40			1				0
53	Stevens Creek		1	Bridge	?	?	80				1			0
54	Unnamed Trib			Culvert	?	?	10	1						0
55	Texas Creek			Bridge	?	?	40			1				0
56	Jordan Creek			Bridge	?	?	40			1				0
57	Cheyenne Creek			Culvert	?	?	20		1					0
58	Cheyenne Creek			Culvert	?	?	20		1					0
59	Yukon River Trib			Culvert	?	?	10	1						0
60	Yukon River	1		Bridge	2550	2700	2720					1	2720	0
61	Yukon River Trib		1	Culvert	?	?	20		1					1
62	Schieffelin Creek		1	Bridge	?	?	40			1				0
63	Unnamed Trib			Culvert	?	?	10	1						0
64	Unnamed Trib			Culvert	?	?	10	1						0
65	Sixteenmile Lake Trib			Culvert	?	?	10	1						0
66	Yukon River Trib			Culvert	?	?	10	1						0
67	Yukon River Trib			Culvert	?	?	10	1						0
68	Spieer Creek		1	Bridge	21	30	40			1				0
69	Coal Creek			Bridge	22	30	40			1				0
70	Jackson Creek			Bridge	45	55	80				1			0
71	Yukon River Trib			Culvert	?	?	20		1					0
72	Yukon River Trib			Culvert	?	?	20		1					0
73	Mission Creek			Culvert	11	16	20		1					0
74	NC Creek		1	Bridge	30	30	40			1				0
75	Bear Creek		1	Bridge	50	70	80				1			0
76	Unnamed Creek			Bridge	20	30	40			1				0
77	Unnamed Creek			Bridge	30	30	40			1				0
78	Ten Mile Creek		1	Bridge	30	30	40			1				0
79	Unnamed Creek			Culvert	20	20	20		1					0
80	Unnamed Creek			Culvert	20	20	20		1					0
81	Unnamed Creek		1	Culvert	20	20	20		1					1
82	Unnamed Creek			Culvert	20	20	20		1					0
83	Unnamed Creek		1	Culvert	20	20	20		1					1
84	Unnamed Creek			Culvert	20	20	20		1					0
85	Unnamed Creek			Culvert	20	20	20		1					0
86	Unnamed Creek			Culvert	20	20	20		1					0
87	Tolzitna River	1		Bridge	230	250	250					1	250	0
88	Unnamed Creek			Bridge	30	30	40			1				0
89	Unnamed Creek			Bridge	30	30	40			1				0
90	Unnamed Creek			Bridge	30	30	40			1				0
91	Unnamed Creek			Bridge	30	30	40			1				0
92	Tenmile Creek			Bridge	?	?	120				1			0
93	Unnamed Trib			Culvert	?	?	10	1						0
94	Unnamed Trib			Culvert	?	?	10	1						0
95	Unnamed Trib			Culvert	?	?	10	1						0
96	Unnamed Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor D-B								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
97	Unnamed Trib			Bridge	?	?	40			1				0
98	Unnamed Trib			Bridge	?	?	40			1				0
99	Unnamed Trib			Culvert	?	?	10	1						0
100	Unnamed Trib			Culvert	?	?	10	1						0
101	Tozitna River	1		Bridge	140	460	520					1	520	0
102	Unnamed Trib			Culvert	?	?	10	1						0
103	Unnamed Trib			Culvert	?	?	10	1						0
104	Unnamed Trib			Bridge	?	?	40			1				0
105	Unnamed Trib			Bridge	?	?	40			1				0
106	Tozitna River Trib			Bridge	?	?	40			1				0
107	Tozitna River Trib		1	Bridge	?	?	80				1			0
108	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
109	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
110	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
111	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
112	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
113	Wrongtrail Creek Trib			Culvert	?	?	20		1					0
114	Wrongtrail Creek		1	Bridge	80	90	120				1			0
115	Wrongtrail Creek Trib			Culvert	?	?	10	1						0
116	Dagislakhna Creek			Bridge	60	60	80				1			0
117	Dagislakhna Creek			Bridge	60	70	80				1			0
118	Haha Creek			Bridge	?	?	40			1				0
119	Haha Trib			Culvert	?	?	10	1						0
120	Haha Trib			Culvert	?	?	10	1						0
121	Haha Trib		1	Bridge	?	?	80				1			0
122	Melozitna River			Bridge	130	140	180					1	180	0
123	Tokatjikh Creek Trib			Culvert	?	?	10	1						0
124	Tokatjikh Creek			Bridge	80	90	120				1			0
125	Tokatjikh Creek Trib			Culvert	?	?	10	1						0
126	Unnamed Trib			Culvert	?	?	10	1						0
127	Unnamed Trib			Culvert	?	?	10	1						0
128	Unnamed Trib			Culvert	?	?	10	1						0
129	Unnamed Trib			Culvert	?	?	10	1						0
130	Unnamed Trib			Culvert	?	?	10	1						0
131	Tobatokh Creek		1	Bridge	?	?	120				1			0
132	Unnamed Trib			Culvert	?	?	10	1						0
133	Unnamed Trib			Culvert	?	?	10	1						0
134	Unnamed Trib			Culvert	?	?	10	1						0
135	Sithdondit Creek		1	Bridge	?	?	40			1				0
136	Unnamed Trib			Culvert	?	?	10	1						0
137	Unnamed Trib			Culvert	?	?	10	1						0
138	Unnamed Trib			Culvert	?	?	10	1						0
139	Unnamed Trib		1	Culvert	?	?	20		1					1
140	Unnamed Trib		1	Culvert	?	?	10	1						1

4-Parks Hwy RR Corridor D-B								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
141	Unnamed Trib		1	Culvert	?	?	10	1						1
142	Unnamed Trib		1	Culvert	?	?	10	1						1
143	Unnamed Trib			Culvert	?	?	10	1						0
144	Unnamed Trib			Culvert	?	?	10	1						0
145	Unnamed Trib			Culvert	?	?	10	1						0
146	Unnamed Trib			Culvert	?	?	10	1						0
147	Lake Todatonten Trib		1	Bridge	?	?	80				1			0
148	Lake Todatonten Trib			Culvert	?	?	10	1						0
149	Lake Todatonten Trib		1	Bridge	?	?	40			1				0
150	Unnamed Trib			Culvert	?	?	10	1						0
151	Unnamed Trib			Culvert	?	?	10	1						0
152	Mentanontli River		1	Bridge	110	170	180					1	180	0
153	Unnamed Trib			Culvert	?	?	10	1						0
154	Unnamed Trib			Culvert	?	?	10	1						0
155	Unnamed Trib			Culvert	?	?	10	1						0
156	Unnamed Trib			Culvert	?	?	10	1						0
157	Unnamed Trib			Culvert	?	?	10	1						0
158	Unnamed Trib			Culvert	?	?	10	1						0
159	Unnamed Trib			Culvert	?	?	10	1						0
160	Unnamed Trib			Culvert	?	?	10	1						0
161	Unnamed Trib			Culvert	?	?	10	1						0
162	Unnamed Trib			Culvert	?	?	10	1						0
163	Unnamed Trib			Bridge	?	?	40			1				0
164	Unnamed Trib			Culvert	?	?	20		1					0
165	Unnamed Trib			Culvert	?	?	10	1						0
166	Koyukuk River	1		Bridge	1050	1280	1320					1	1320	0
167	Unnamed Trib			Culvert	?	?	10	1						0
168	Unnamed Trib			Culvert	?	?	10	1						0
169	Unnamed Trib			Culvert	?	?	10	1						0
170	Unnamed Trib			Culvert	?	?	10	1						0
171	Henry Creek		1	Bridge	40	60	80				1			0
172	Unnamed Trib			Culvert	?	?	10	1						0
173	Unnamed Trib		1	Culvert	?	?	20		1					1
174	Unnamed Trib			Culvert	?	?	10	1						0
175	Unnamed Trib			Culvert	?	?	10	1						0
176	Unnamed Trib			Culvert	?	?	10	1						0
177	Unnamed Trib			Culvert	?	?	10	1						0
178	Lake Mingoket Outlet		1	Bridge	?	?	40			1				0
179	Unnamed Trib			Culvert	?	?	10	1						0
180	Unnamed Trib			Culvert	?	?	10	1						0
181	Siruk Creek		1	Bridge	70	90	120				1			0
182	Unnamed Trib			Culvert	?	?	10	1						0
183	Unnamed Trib			Culvert	?	?	10	1						0
184	Unnamed Trib			Culvert	?	?	10	1						0
185	Unnamed Trib			Culvert	?	?	10	1						0
186	Unnamed Trib			Culvert	?	?	10	1						0
187	Siruk Creek		1	Bridge	30	60	80				1			0
188	Unnamed Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor D-B								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
189	Unnamed Trib			Culvert	?	?	10	1						0
190	Unnamed Trib			Culvert	?	?	10	1						0
191	Unnamed Trib			Culvert	?	?	10	1						0
192	Hogatza River	1		Bridge	150	280	320					1	320	0
193	Unnamed Trib		1	Culvert	?	?	20		1					1
194	Unnamed Trib		1	Bridge	?	?	40			1				0
195	Kobuk Trib		1	Culvert	?	?	20		1					1
196	Unnamed Trib			Culvert	?	?	10	1						0
197	Unnamed Trib			Culvert	?	?	10	1						0
198	Unnamed Trib			Culvert	?	?	10	1						0
199	Unnamed Trib			Culvert	?	?	10	1						0
200	Unnamed Trib			Culvert	?	?	10	1						0
201	Kobuk River		1	Bridge	270	360	400					1	400	0
202	Kobuk Trib			Culvert	?	?	10	1						0
203	Kobuk Trib			Culvert	?	?	10	1						0
204	Nutuvukiti Lake Trib			Culvert	?	?	10	1						0
205	Nutuvukiti Lake Trib			Culvert	?	?	10	1						0
206	Nutuvukiti Lake Trib			Culvert	?	?	10	1						0
207	Nutuvukiti Lake Trib			Culvert	?	?	10	1						0
208	Nutuvukiti Lake Trib			Culvert	?	?	10	1						0
209	Reed River		1	Bridge	140	270	320					1	320	0
210	Unnamed Trib			Culvert	?	?	10	1						0
211	Unnamed Trib			Culvert	?	?	10	1						0
212	Unnamed Trib			Culvert	?	?	10	1						0
213	Beaver Creek		1	Bridge	140	160	180					1	180	0
214	Unnamed Trib			Culvert	?	?	10	1						0
215	Unnamed Trib			Culvert	?	?	10	1						0
216	Beaver Creek			Culvert	?	?	20		1					0
217	Narvak Lake Tributary			Bridge	20	30	40			1				0
218	Unnamed Trib			Culvert	?	?	10	1						0
219	Unnamed Trib			Culvert	?	?	20		1					0
220	Avaraat Lake Tributary			Culvert	?	?	10	1						0
221	Avaraat Lake Tributary			Culvert	6	8	10	1						0
222	Unnamed Trib			Culvert	?	?	10	1						0
223	Killak River			Bridge	50	60	80				1			0
224	Unnamed Trib			Culvert	?	?	10	1						0
225	Unnamed Trib			Culvert	?	?	10	1						0
226	Mauneluk River		1	Bridge	200	300	320					1	320	0
227	Unnamed Trib		1	Culvert	?	?	10	1						1
228	Unnamed Trib			Culvert	?	?	10	1						0
229	Unnamed Trib			Culvert	?	?	10	1						0
230	Unnamed Trib			Culvert	?	?	10	1						0
231	Unnamed Trib			Culvert	?	?	10	1						0
232	Unnamed Trib		1	Bridge	60	70	80				1			0
233	Unnamed Trib		1	Bridge	60	70	80				1			0
234	Unnamed Trib			Culvert	?	?	10	1						0
235	Unnamed Trib			Culvert	?	?	10	1						0

4-Parks Hwy RR Corridor D-B								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
236	Unnamed Trib			Culvert	?	?	10	1						0
237	Unnamed Trib			Culvert	?	?	10	1						0
238	Unnamed Trib			Culvert	?	?	10	1						0
239	Unnamed Trib			Culvert	?	?	10	1						0
240	Unnamed Trib			Culvert	?	?	10	1						0
241	Canyon Creek			Culvert	?	?	20		1					0
242	Kogoluktuk River		1	Bridge	340	460	480					1	480	0
243	Unnamed Trib			Culvert	?	?	10	1						0
244	Unnamed Trib			Culvert	?	?	10	1						0
245	Unnamed Trib			Culvert	?	?	10	1						0
246	Unnamed Trib			Culvert	?	?	10	1						0
247	Riley Creek			Culvert	?	?	20		1					0
248	Unnamed Trib			Culvert	?	?	10	1						0
249	Unnamed Trib			Culvert	?	?	10	1						0
250	Unnamed Trib			Culvert	?	?	10	1						0
251	Unnamed Trib			Culvert	?	?	10	1						0
252	Unnamed Trib			Culvert	?	?	10	1						0
253	Unnamed Trib			Culvert	?	?	10	1						0
254	Unnamed Trib			Culvert	?	?	10	1						0
255	Unnamed Trib			Culvert	?	?	10	1						0
256	Unnamed Trib			Culvert	?	?	10	1						0
257	Shungnak River		1	Bridge	120	240	280					1	280	0
	Cataloged Anadromous:	8						127	52	42	23	13	7470	23
	Estimated Anadromous:		63					ea	ea	ea	ea	ea	LF	ea
	Total Anadromous:		**71**											
	Fish Passage Culverts:		**23**								Average Large Bridge Span		575	
											Min Large Bridge Span		180	
											Max Large Bridge Span		2720	

5-DMTS Port Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
1	Unnamed Trib		1	Culvert	12	12	20		1					1
2	Umagatsiak Creek		1	Culvert	10	14	20		1					1
3	Agagrak Creek		1	Bridge	18	37	40			1				0
4	Imik Lagoon Trib		1	Culvert	8	8	10	1						1
5	Imik Lagoon Trib		1	Culvert	?	?	10	1						1
6	Rabbit Creek	1		Bridge	60	230	280					1	280	0
7	Unnamed Trib		1	Culvert	?	?	10	1						1
8	Jade Creek	1		Bridge	30	70	80				1			0
9	Kotlik Lagoon Trib		1	Culvert	6	6	10	1						1
10	Unnamed Trib		1	Culvert	12	12	20		1					1
11	Unnamed Trib			Culvert	6	6	10	1						0
12	Unnamed Trib			Culvert	8	8	10	1						0
13	Unnamed Trib			Culvert	9	9	10	1						0
14	Unnamed Trib			Culvert	9	9	10	1						0
15	Unnamed Trib			Culvert	8	8	10	1						0
16	Unnamed Trib			Culvert	6	6	10	1						0
17	Unnamed Trib			Culvert	8	8	10	1						0
18	Unnamed Trib			Culvert	?	?	10	1						0
19	Unnamed Trib			Culvert	8	8	10	1						0
20	Unnamed Trib			Culvert	?	?	10	1						0
21	Unnamed Trib			Culvert	?	?	10	1						0
22	Unnamed Trib			Culvert	5	5	10	1						0
23	Unnamed Trib			Culvert	5	5	10	1						0
24	Unnamed Trib			Culvert	?	?	10	1						0
25	Nauyoaruk Trib		1	Culvert	12	12	20		1					1
26	Noatak Trib		1	Culvert	?	?	10	1						1
27	Noatak Trib		1	Culvert	?	?	10	1						1
28	Noatak Trib			Culvert	?	?	10	1						0
29	Noatak Trib			Culvert	?	?	10	1						0
30	Noatak Trib			Culvert	?	?	10	1						0
31	Noatak Trib			Culvert	?	?	10	1						0
32	Noatak Trib			Culvert	?	?	10	1						0
33	Noatak Trib		1	Culvert	10	10	10	1						1
34	Noatak Trib			Culvert	13	13	20		1					0
35	Noatak Trib			Culvert	7	7	10	1						0
36	Noatak Trib		1	Culvert	6	6	10	1						1
37	Noatak Trib		1	Culvert	13	13	20		1					1
38	Noatak Trib		1	Culvert	6	6	10	1						1
39	Noatak Trib			Culvert	5	5	10	1						0
40	Noatak Trib			Culvert	13	13	20		1					0
41	Noatak Trib			Culvert	15	15	20		1					0
42	Noatak Trib		1	Culvert	12	12	20		1					1
43	Noatak Trib			Culvert	15	15	20		1					0
44	Noatak River	1		Bridge	1340	1520	1560					1	1560	0
45	Noatak Trib			Culvert	?	?	10	1						0
46	Agashashok Trib			Culvert	?	?	10	1						0
47	Agashashok Trib			Culvert	7	7	10	1						0
48	Agashashok Trib			Culvert	?	?	10	1						0
49	Agashashok Trib			Bridge	30	120	140				1			0
50	Agashashok Trib			Culvert	?	?	20		1					0
51	Agashashok Trib			Culvert	?	?	10	1						0

5-DMTS Port Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
52	Agashashok Trib			Culvert	?	?	10	1						0
53	Agashashok Trib			Culvert	?	?	10	1						0
54	Agashashok Trib			Culvert	?	?	20		1					0
55	Agashashok Trib			Culvert	?	?	20		1					0
56	Agashashok Trib		1	Bridge	120	300	320					1	320	0
57	Agashashok Trib			Culvert	?	?	20		1					0
58	Unnamed Trib			Culvert	?	?	20		1					0
59	Unnamed Trib			Culvert	?	?	20		1					0
60	Unnamed Trib			Culvert	?	?	20		1					0
61	Unnamed Trib			Culvert	?	?	20		1					0
62	Unnamed Trib		1	Bridge	60	140	140				1			0
63	Squirrel River Trib		1	Bridge	85	240	280					1	280	0
64	Squirrel River Trib			Culvert	?	?	20		1					0
65	Squirrel River Trib			Culvert	?	?	20		1					0
66	Squirrel River Trib			Culvert	?	?	20		1					0
67	Unnamed Trib			Culvert	?	?	20		1					0
68	Unnamed Trib			Culvert	?	?	20		1					0
69	Unnamed Trib			Bridge	100	120	140					1	800	0
70	Unnamed Trib			Culvert	?	?	20		1					0
71	Unnamed Trib		1	Culvert	?	?	20		1					1
72	Unnamed Trib		1	Culvert	?	?	20		1					1
73	Unnamed Trib		1	Culvert	?	?	10	1						1
74	Unnamed Trib		1	Culvert	?	?	10	1						1
75	Unnamed Trib		1	Culvert	?	?	10	1						1
76	Unnamed Trib		1	Culvert	?	?	10	1						1
77	Unnamed Trib		1	Culvert	?	?	20		1					1
78	Unnamed Trib		1	Culvert	?	?	10	1						1
79	Unnamed Trib		1	Culvert	?	?	10	1						1
80	Unnamed Trib		1	Culvert	?	?	10	1						1
81	Unnamed Trib		1	Culvert	?	?	10	1						1
82	Unnamed Trib		1	Culvert	?	?	10	1						1
83	Nookati Creek		1	Bridge	100	140	140				1			0
84	Nookati Creek Trib		1	Bridge	100	140	140				1			0
85	Unnamed Trib		1	Bridge	66	150	160					1	160	0
86	Squirrel River Trib		1	Culvert	?	?	20		1					1
87	Squirrel River Trib		1	Culvert	?	?	20		1					1
88	Squirrel River Trib		1	Culvert	?	?	20		1					1
89	Squirrel River Trib		1	Culvert	?	?	20		1					1
90	Squirrel River Trib			Culvert	?	?	20		1					0
91	Squirrel River Trib		1	Culvert	?	?	20		1					1
92	Squirrel River Trib		1	Culvert	?	?	20		1					1
93	Squirrel River Trib			Culvert	?	?	20		1					0
94	Squirrel River Trib			Culvert	?	?	20		1					0
95	Squirrel River Trib			Culvert	?	?	20		1					0
96	Squirrel River Trib			Culvert	?	?	10	1						0
97	Squirrel River Trib		1	Culvert	?	?	10	1						1
98	Squirrel River Trib		1	Culvert	?	?	10	1						1
99	Squirrel River Trib			Culvert	?	?	10	1						0
100	Squirrel River Trib			Culvert	?	?	10	1						0
101	Squirrel River Trib			Culvert	?	?	10	1						0
102	Squirrel River Trib			Culvert	?	?	10	1						0
103	Squirrel River Trib		1	Culvert	?	?	10	1						1
104	Squirrel River Trib		1	Culvert	?	?	10	1						1

5-DMTS Port Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
105	Squirrel River Trib		1	Culvert	?	?	10	1						1
106	Squirrel River Trib		1	Culvert	?	?	10	1						1
107	Squirrel River Trib			Culvert	?	?	10	1						0
108	Squirrel River Trib			Culvert	?	?	10	1						0
109	Squirrel River Trib			Culvert	6	6	10	1						0
110	Squirrel River Trib			Culvert	?	?	10	1						0
111	Squirrel River Trib			Culvert	8	8	10	1						0
112	Squirrel River Trib			Culvert	8	8	10	1						0
113	Squirrel River Trib			Culvert	5	5	10	1						0
114	Squirrel River Trib			Culvert	8	8	10	1						0
115	Squirrel River Trib			Culvert	8	8	10	1						0
116	Squirrel River Trib			Culvert	?	?	10	1						0
117	Squirrel River Trib			Culvert	?	?	10	1						0
118	Squirrel River Trib			Culvert	8	8	10	1						0
119	Squirrel River Trib			Culvert	?	?	10	1						0
120	Squirrel River Trib			Culvert	?	?	10	1						0
121	Squirrel River Trib			Culvert	9	9	10	1						0
122	Squirrel River Trib			Culvert	?	?	10	1						0
123	Squirrel River Trib			Culvert	?	?	10	1						0
124	Squirrel River Trib			Culvert	?	?	10	1						0
125	Squirrel River Trib			Culvert	?	?	10	1						0
126	Squirrel River Trib			Culvert	?	?	10	1						0
127	Squirrel River Trib			Culvert	?	?	10	1						0
128	Squirrel River Trib			Culvert	?	?	10	1						0
129	Squirrel River Trib			Culvert	?	?	10	1						0
130	Squirrel River Trib			Culvert	?	?	10	1						0
131	Squirrel River Trib			Culvert	?	?	10	1						0
132	Squirrel River Trib			Culvert	?	?	10	1						0
133	Squirrel River Trib			Culvert	?	?	10	1						0
134	Squirrel River Trib			Culvert	?	?	10	1						0
135	Squirrel River Trib		1	Culvert	12	12	20		1					1
136	Squirrel River	1		Bridge	340	600	640					1	640	0
137	Otter Creek		1	Culvert	12	12	20		1					1
138	Otter Creek			Culvert	?	?	20		1					0
139	Central Creek Trib			Culvert	15	15	20		1					0
140	Unnamed Trib			Culvert	6	6	10	1						0
141	Unnamed Trib			Culvert	12	12	20		1					0
142	Unnamed Trib			Culvert	6	6	10	1						0
143	Unnamed Trib			Culvert	?	?	10	1						0
144	Unnamed Trib			Culvert	8	8	10	1						0
145	Unnamed Trib			Culvert	15	15	20		1					0
146	Kallarichuk River	1		Bridge	102	320	360					1	360	0
147	Kallarichuk River	1		Bridge	?	600	600					1	600	0
148	Unnamed Trib			Culvert	?	?	10	1						0
149	Kitlik River Trib			Culvert	13	13	20		1					0
150	Kitlik River	1		Bridge	42	97	120							0
151	Kitlik River Trib			Culvert	20	20	20		1					0
152	Salmon River Trib			Culvert	?	?	20		1					0
153	Salmon River	1		Bridge	115	350	360					1	360	0
154	Tutuksuk River	1		Bridge	135	410	440					1	440	0
155	Tutuksuk River Trib			Culvert	?	?	20		1					0
156	Tutuksuk River Trib			Culvert	?	?	10	1						0
157	Tutuksuk River Trib	1		Bridge	64	250	280					1	280	0

5-DMTS Port Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
158	Unnamed Trib			Culvert	?	?	10	1						0
159	Kaligurichеark River Trib			Culvert	7	7	10	1						0
160	Kaligurichеark River	1		Bridge	50	150	160					1	160	0
161	Kaligurichеark River Trib		1	Bridge	90	90	120				1			0
162	Unnamed Trib		1	Culvert	15	15	20		1					1
163	Unnamed Trib			Culvert	11	11	20		1					0
164	Unnamed Trib			Culvert	?	?	10	1						0
165	Unnamed Trib			Bridge	50	70	80				1			0
166	Hunt River Trib			Culvert	20	20	20		1					0
167	Hunt River Trib			Culvert	12	12	20		1					0
168	Hunt River		1	Bridge	220	300	320					1	320	0
169	Nekakte Creek Trib		1	Culvert	18	18	20		1					1
170	Nekakte Creek		1	Bridge	56	220	240					1	240	0
171	Unnamed Trib			Culvert	?	?	10	1						0
172	Akillik River		1	Bridge	135	160	200					1	200	0
173	Unnamed Trib		1	Bridge	60	60	80				1			0
174	Unnamed Trib			Bridge	30	40	40			1				0
175	Unnamed Trib			Culvert	?	?	10	1						0
176	Unnamed Trib			Culvert	?	?	10	1						0
177	Unnamed Trib			Culvert	?	?	10	1						0
178	Jade Creek			Bridge	?	?	120				1			0
179	Jade Creek			Bridge	?	?	120				1			0
180	Unnamed Trib			Culvert	?	?	10	1						0
181	Unnamed Trib		1	Bridge	60	70	80				1			0
182	Unnamed Trib		1	Culvert	?	?	10	1						1
183	Unnamed Trib			Culvert	?	?	10	1						0
184	Redstone River Trib		1	Culvert	?	?	20		1					1
185	Redstone River Trib			Culvert	?	?	20		1					0
186	Redstone River Trib			Culvert	?	?	20		1					0
187	Redstone River	1		Bridge	140	280	280					1	280	0
188	Redstone River Trib		1	Culvert	?	?	20		1					1
189	Redstone River Trib		1	Culvert	?	?	20		1					1
190	Unnamed Trib		1	Culvert	?	?	10	1						1
191	Cross Creek		1	Bridge	?	?	200					1	200	0
192	Unnamed Trib		1	Bridge	?	?	40			1				0
193	Ambler River	1		Bridge	300	940	960					1	960	0
194	Ambler River Trib			Bridge	110	110	120				1			0
195	Ambler River Trib			Culvert	?	?	20		1					0
196	Ambler River Trib			Culvert	?	?	20		1					0
197	Ambler River Trib			Culvert	?	?	20		1					0
198	Lake Anirak Trib			Culvert	?	?	20		1					0
199	Lake Anirak Trib			Culvert	?	?	20		1					0
200	Lake Anirak Trib			Culvert	?	?	20		1					0
201	Unnamed Trib			Culvert	?	?	10	1						0
202	Unnamed Trib			Culvert	?	?	10	1						0
203	Unnamed Trib			Culvert	?	?	10	1						0
204	Unnamed Trib			Culvert	?	?	10	1						0
205	Unnamed Trib			Culvert	?	?	10	1						0
206	Unnamed Trib			Culvert	?	?	10	1						0
207	Unnamed Trib			Culvert	?	?	10	1						0
208	Unnamed Trib			Culvert	?	?	10	1						0
209	Unnamed Trib			Culvert	?	?	10	1						0
210	Unnamed Trib			Culvert	?	?	10	1						0

5-DMTS Port Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
211	Unnamed Trib			Culvert	?	?	10	1						0
212	Unnamed Trib			Culvert	?	?	10	1						0
213	Unnamed Trib			Culvert	?	?	10	1						0
214	Unnamed Trib			Culvert	?	?	10	1						0
	Cataloged Anadromous:	13						116	63	3	12	19	8440	48
	Estimated Anadromous:		63					ea	ea	ea	ea	ea	LF	ea
		Total Anadromous:	**76**											
		Fish Passage Culverts:	**48**									Average Large Bridge Span	444	
											Min Large Bridge Span		160	
											Max Large Bridge Span		1560	

6-Cape Blossom Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
1	Unnamed Trib		1	Bridge	570	570	600					1	600	0
2	Unnamed Trib			Culvert	?	?	20		1					0
3	Unnamed Trib			Culvert	?	?	20		1					0
4	Unnamed Trib		1	Bridge	250	450	480					1	480	0
5	Unnamed Trib		1	Bridge	200	700	750					1	750	0
6	Unnamed Trib		1	Bridge	1100	1100	1120					1	1120	0
7	Unnamed Trib		1	Bridge	230	230	240					1	240	0
8	Unnamed Trib		1	Bridge	128	128	160					1	160	0
9	Unnamed Trib			Culvert	?	?	10	1						0
10	Unnamed Trib			Culvert	?	?	10	1						0
11	Unnamed Trib			Culvert	?	?	10	1						0
12	Unnamed Trib			Culvert	?	?	10	1						0
13	Unnamed Trib			Culvert	?	?	10	1						0
14	Unnamed Trib			Culvert	?	?	10	1						0
15	Unnamed Trib			Culvert	13	13	20		1					0
16	Unnamed Trib			Culvert	?	?	10	1						0
17	Unnamed Trib			Culvert	?	?	10	1						0
18	Unnamed Trib			Culvert	?	?	10	1						0
19	Unnamed Trib			Culvert	?	?	20		1					0
20	Unnamed Trib			Culvert	?	?	20		1					0
21	Unnamed Trib			Culvert	?	?	10	1						0
22	Unnamed Trib			Culvert	?	?	10	1						0
23	Unnamed Trib			Culvert	?	?	10	1						0
24	Unnamed Trib			Culvert	?	?	10	1						0
25	Unnamed Trib			Culvert	?	?	10	1						0
26	Unnamed Trib			Culvert	?	?	10	1						0
27	Unnamed Trib			Culvert	?	?	10	1						0
28	Unnamed Trib			Culvert	?	?	10	1						0
29	Unnamed Trib			Culvert	?	?	10	1						0
30	Unnamed Trib			Culvert	?	?	10	1						0
31	Unnamed Trib			Culvert	12	12	20		1					0
32	Unnamed Trib			Culvert	5	5	10	1						0
33	Unnamed Trib			Culvert	?	?	10	1						0
34	Unnamed Trib			Culvert	7	7	10	1						0
35	Unnamed Trib			Culvert	?	?	10	1						0
36	Unnamed Trib			Culvert	?	?	10	1						0
37	Unnamed Trib			Culvert	7	7	10	1						0
38	Unnamed Trib			Culvert	?	?	10	1						0
39	Unnamed Trib			Culvert	?	?	20		1					0
40	Unnamed Trib			Culvert	7	7	10	1						0
41	Unnamed Trib			Culvert	11	11	20		1					0
42	Unnamed Trib			Culvert	?	?	10	1						0
43	Unnamed Trib			Culvert	7	7	10	1						0
44	Unnamed Trib			Culvert	5	5	10	1						0
45	Unnamed Trib			Culvert	5	5	10	1						0
46	Unnamed Trib			Culvert	5	5	10	1						0
47	Unnamed Trib			Culvert	10	10	10	1						0
48	Unnamed Trib			Culvert	5	5	10	1						0
49	Unnamed Trib			Culvert	7	7	10	1						0
50	Unnamed Trib			Culvert	8	8	10	1						0
51	Unnamed Trib			Culvert	6	6	10	1						0
52	Unnamed Trib			Culvert	?	?	10	1						0
53	Unnamed Trib			Culvert	?	?	10	1						0

6-Cape Blossom Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
54	Kauk River Trib			Culvert	?	?	10	1						0
55	Kauk River Trib			Culvert	?	?	10	1						0
56	Kauk River Trib			Culvert	?	?	20		1					0
57	Unnamed Trib			Culvert	?	?	10	1						0
58	Unnamed Trib			Culvert	15	15	20		1					0
59	Unnamed Trib		1	Culvert	10	10	10	1						1
60	Unnamed Trib			Culvert	12	12	20		1					0
61	Unnamed Trib		1	Culvert	?	?	20		1					1
62	Unnamed Trib			Culvert	?	?	20		1					0
63	Kauk River Trib			Bridge	?	?	80				1			0
64	Kauk River Trib			Bridge	?	?	80				1			0
65	Kauk River Trib			Culvert	?	?	20		1					0
66	Kauk River Trib			Culvert	?	?	20		1					0
67	Kauk River Trib			Culvert	?	?	20		1					0
68	Kauk River Trib			Culvert	?	?	20		1					0
69	Kauk River Trib			Culvert	?	?	20		1					0
70	Kauk River Trib			Culvert	?	?	20		1					0
71	Kauk River Trib			Culvert	?	?	20		1					0
72	Kauk River Trib		1	Culvert	?	?	20		1					1
73	Kauk River Trib			Culvert	?	?	20		1					0
74	Kauk River Trib			Culvert	?	?	20		1					0
75	Kauk River Trib			Culvert	?	?	20		1					0
76	Kauk River Trib			Bridge	?	?	80				1			0
77	Kauk River Trib		1	Bridge	180	200	240					1	240	0
78	Kauk River Trib			Culvert	?	?	20		1					0
79	Kauk River Trib			Culvert	?	?	20		1					0
80	Kauk River Trib			Culvert	?	?	20		1					0
81	Kauk River Trib			Culvert	?	?	20		1					0
82	Kauk River Trib			Culvert	?	?	20		1					0
83	Lomen Creek Trib		1	Bridge	350	400	440					1	440	0
84	Lomen Creek		1	Bridge	130	360	400					1	400	0
85	Mangoak River Trib		1	Culvert	?	?	20		1					1
86	Mangoak River Trib		1	Bridge	80	80	120				1			0
87	Mangoak River Trib		1	Culvert	?	?	20		1					1
88	Mangoak River Trib		1	Bridge	180	200	240					1	240	0
89	Mangoak River Trib		1	Bridge	100	100	120				1			0
90	Mangoak River Trib		1	Bridge	130	160	200					1	200	0
91	Unnamed Trib			Culvert	?	?	20		1					0
92	Unnamed Trib			Culvert	?	?	20		1					0
93	Unnamed Trib		1	Culvert	?	?	20		1					1
94	Unnamed Trib		1	Bridge	90	90	120				1			0
95	Unnamed Trib		1	Culvert	?	?	20		1					1
96	Unnamed Trib		1	Culvert	?	?	20		1					1
97	Unnamed Trib		1	Culvert	?	?	20		1					1
98	Unnamed Trib		1	Culvert	?	?	20		1					1
99	Unnamed Trib		1	Bridge	140	140	140				1			0
100	Unnamed Trib		1	Bridge	110	120	120				1			0
101	Hunt Creek Trib		1	Culvert	?	?	10	1						1
102	Hunt Creek Trib		1	Culvert	?	?	10	1						1
103	Hunt Creek Trib			Culvert	?	?	10	1						0
104	Hunt Creek Trib			Culvert	?	?	10	1						0
105	Hunt Creek Trib			Culvert	?	?	10	1						0
106	Hunt Creek Trib			Culvert	?	?	10	1						0

6-Cape Blossom Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
107	Hunt Creek Trib		1	Culvert	?	?	20		1					1
108	Hunt Creek Trib			Culvert	?	?	20		1					0
109	Hunt Creek Trib			Culvert	?	?	20		1					0
110	Hunt Creek Trib			Culvert	?	?	20		1					0
111	Hunt Creek		1	Bridge	?	?	160					1	160	0
112	Unnamed Trib		1	Bridge	?	?	180					1	180	0
113	Unnamed Trib		1	Bridge	?	?	500					1	500	0
114	Unnamed Trib		1	Bridge	31	31	40			1				0
115	Unnamed Trib		1	Culvert	?	?	20		1					1
116	Unnamed Trib		1	Culvert	?	?	20		1					1
117	Unnamed Trib		1	Culvert	?	?	20		1					1
118	Unnamed Trib		1	Culvert	?	?	20		1					1
119	Unnamed Trib		1	Culvert	?	?	20		1					1
120	Unnamed Trib		1	Culvert	?	?	20		1					1
121	Unnamed Trib			Culvert	?	?	20		1					0
122	Unnamed Trib			Culvert	?	?	20		1					0
123	Unnamed Trib			Culvert	?	?	20		1					0
124	Unnamed Trib		1	Culvert	?	?	20		1					1
125	Unnamed Trib			Culvert	?	?	20		1					0
126	Unnamed Trib		1	Culvert	?	?	20		1					1
127	Unnamed Trib			Culvert	?	?	20		1					0
128	Unnamed Trib			Culvert	?	?	20		1					0
129	Unnamed Trib			Culvert	?	?	20		1					0
130	Unnamed Trib			Culvert	?	?	20		1					0
131	Unnamed Trib		1	Bridge	52	60	80				1			0
132	Unnamed Trib		1	Culvert	?	?	20		1					1
133	Unnamed Trib		1	Culvert	?	?	20		1					1
134	Unnamed Trib		1	Bridge	80	100	120				1			0
135	Unnamed Trib			Bridge	120	150	160					1	160	0
136	Unnamed Trib		1	Bridge	250	300	300					1	300	0
137	Unnamed Trib			Culvert	?	?	20		1					0
138	Tagagawik River		1	Bridge	230	400	440					1	440	0
139	Unnamed Trib			Culvert	?	?	20		1					0
140	Unnamed Trib			Culvert	?	?	20		1					0
141	Ekiek Creek		1	Culvert	?	?	10	1						1
142	Ekiek Creek		1	Culvert	?	?	10	1						1
143	Ekiek Creek		1	Culvert	?	?	10	1						1
144	Ekiek Creek		1	Culvert	?	?	10	1						1
145	Unnamed Trib			Culvert	?	?	10	1						0
146	Unnamed Trib			Culvert	?	?	10	1						0
147	Unnamed Trib			Culvert	?	?	10	1						0
148	Unnamed Trib			Culvert	?	?	10	1						0
149	Unnamed Trib			Bridge	120	380	400					1	400	0
150	Unnamed Trib			Culvert	?	?	10	1						0
151	Unnamed Trib			Culvert	?	?	10	1						0
152	Unnamed Trib			Culvert	?	?	10	1						0
153	Unnamed Trib			Culvert	?	?	10	1						0
154	Unnamed Trib			Culvert	?	?	10	1						0
155	Unnamed Trib			Culvert	?	?	10	1						0
156	Unnamed Trib			Culvert	?	?	10	1						0
157	Unnamed Trib			Culvert	?	?	10	1						0
158	Unnamed Trib			Culvert	?	?	10	1						0

6-Cape Blossom Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
159	Unnamed Trib			Culvert	?	?	10	1						0
160	Unnamed Trib		1	Bridge	110	150	160					1	160	0
161	Unnamed Trib			Culvert	?	?	20		1					0
162	Unnamed Trib		1	Culvert	?	?	10	1						1
163	Unnamed Trib		1	Culvert	?	?	10	1						1
164	Unnamed Trib		1	Culvert	?	?	10	1						1
165	Unnamed Trib		1	Culvert	?	?	10	1						1
166	Unnamed Trib		1	Culvert	?	?	20		1					1
167	Unnamed Trib		1	Culvert	?	?	20		1					1
168	Unnamed Trib		1	Culvert	?	?	20		1					1
169	Unnamed Trib		1	Culvert	?	?	20		1					1
170	Ingruksukruk Creek		1	Bridge	100	240	280					1	280	0
171	Ingruksukruk Creek Trib			Culvert	?	?	20		1					0
172	Shovel Creek		1	Bridge	?	?	80				1			0
173	Shovel Creek Trib		1	Culvert	?	?	10	1						1
174	Unnamed Trib			Culvert	?	?	10	1						0
175	Unnamed Trib			Culvert	?	?	10	1						0
176	Unnamed Trib			Culvert	?	?	10	1						0
177	Unnamed Trib			Culvert	?	?	10	1						0
178	Unnamed Trib		1	Culvert	?	?	10	1						1
179	Selawik River	1		Bridge	110	270	280					1	280	0
180	Unnamed Trib		1	Culvert	?	?	10	1						1
181	Unnamed Trib			Culvert	?	?	10	1						0
182	Unnamed Trib		1	Culvert	?	?	10	1						1
183	Rabbit River		1	Bridge	60	450	480					1	480	0
184	Unnamed Trib		1	Culvert	?	?	10	1						1
185	Unnamed Trib		1	Culvert	?	?	10	1						1
186	Unnamed Trib			Culvert	?	?	20		1					0
187	Unnamed Trib			Culvert	?	?	20		1					0
188	Unnamed Trib			Culvert	?	?	10	1						0
189	Unnamed Trib			Culvert	?	?	10	1						0
190	Unnamed Trib			Culvert	?	?	10	1						0
191	Unnamed Trib			Culvert	?	?	10	1						0
192	Unnamed Trib			Culvert	?	?	10	1						0
193	Unnamed Trib			Culvert	?	?	10	1						0
194	Unnamed Trib			Culvert	?	?	10	1						0
195	Unnamed Trib			Culvert	?	?	10	1						0
196	Unnamed Trib			Culvert	?	?	10	1						0
197	Unnamed Trib		1	Culvert	?	?	10	1						1
198	Unnamed Trib			Culvert	?	?	10	1						0
199	Unnamed Trib		1	Culvert	?	?	10	1						1
200	Black River Trib		1	Culvert	?	?	10	1						1
201	Black River Trib		1	Culvert	?	?	10	1						1
202	Unnamed Trib		1	Culvert	?	?	10	1						1
203	Unnamed Trib		1	Culvert	11	11	20		1					1
204	Unnamed Trib		1	Culvert	8	8	10	1						1
205	Unnamed Trib		1	Culvert	7	7	10	1						1
206	Tekeaksakrak Lake Trib		1	Culvert	5	5	10	1						1
207	Pick River		1	Bridge	80	80	120				1			0
208	Unnamed Trib		1	Culvert	14	14	20		1					1
209	Kuikcherk River		1	Bridge	30	50	80				1			0
210	Kobuk River Trib		1	Bridge	80	110	120				1			0
211	Kobuk River	1		Bridge	540	750	760					1	760	0

6-Cape Blossom Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
212	Dahl Creek			Bridge	?	?	40			1				0
213	Dahl Creek Trib			Culvert	?	?	10	1						0
214	Dahl Creek Trib			Culvert	?	?	10	1						0
215	Ruby Creek Trib			Culvert	?	?	10	1						0
216	Ruby Creek Trib			Culvert	?	?	10	1						0
217	Ruby Creek Trib			Culvert	?	?	10	1						0
218	Ruby Creek Trib			Culvert	?	?	10	1						0
219	Wesley Creek Trib			Culvert	?	?	10	1						0
220	Wesley Creek Trib			Culvert	?	?	10	1						0
221	Shungnak River		1	Bridge	120	240	280					1	280	0
	Cataloged Anadromous:	2												
	Estimated Anadromous:		83					108	73	2	14	24	9250	51
		Total Anadromous:	**85**					ea	ea	ea	ea	ea	LF	ea
		Fish Passage Culverts:	**51**											
											Average Large Bridge Span		385	
											Min Large Bridge Span		160	
											Max Large Bridge Span		1120	

7-Selawik Flats Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
1	Niukluk River	1		Bridge	300	300	300					1	300	0
2	Ophir Creek	1		Bridge	55	60	60				1			0
3	Sweetcake Creek	1		Culvert	8	8	10	1						0
4	Harrison Creek			Culvert	3	4	10	1						0
5	California Creek			Culvert	5	6	10	1						0
6	Gold Creek			Culvert	12	14	20		1					0
7	Crooked Creek	1		Culvert	12	14	20		1					0
8	Ophir Creek			Bridge	30	55	60				1			0
9	Flat Creek Trib			Culvert	6	7	10	1						0
10	Flat Creek Trib			Culvert	6	6	10	1						0
11	Unnamed Trib			Culvert	6	8	10	1						0
12	Unnamed Trib			Culvert	4	5	10	1						0
13	Pargon Creek Channel	1		Bridge	35	45	50			1				0
14	Pargon Creek Channel	1		Bridge	60	90	100				1			0
15	Pargon Creek Channel	1		Bridge	20	60	60				1			0
16	Pargon Creek Channel	1		Culvert	12	14	20		1					0
17	Pargon Creek Channel	1		Bridge	22	60	60				1			0
18	Oregon Creek		1	Bridge	300	320	320					1	320	0
19	Baker Creek	1		Bridge	440	570	580					1	580	0
20	Fish River	1		Bridge	280	380	380					1	380	0
21	Lava Creek	1		Bridge	180	240	240					1	240	0
22	Unnamed Trib			Culvert	?	?	10	1						0
23	Unnamed Trib			Culvert	?	?	10	1						0
24	Telephone Creek West	1		Bridge	70	80	80				1			0
25	Telephone Creek West		1	Bridge	120	120	140				1			0
26	Telephone Creek East		1	Bridge	220	240	240					1	240	0
27	Windy Creek Trib			Culvert	?	?	20		1					0
28	Windy Creek			Bridge	70	80	80				1			0
29	Granite Creek Trib			Culvert	?	?	20		1					0
30	Granite Creek Trib			Culvert	?	?	20		1					0
31	Granite Creek Trib			Bridge	?	?	40			1				0
32	Tubutulik River	1		Bridge	120	120	140				1			0
33	Tubutulik Trib		1	Culvert	?	?	10	1						1
34	Tubutulik Trib			Culvert	?	?	10	1						0
35	Tubutulik Trib			Culvert	?	?	10	1						0
36	Tubutulik Trib			Culvert	?	?	20		1					0
37	Koyuk River Trib	1		Bridge	?	?	80				1			0
38	Koyuk River	1		Bridge	180	240	280					1	280	0
39	First Chance Creek		1	Bridge	240	440	440					1	440	0
40	Unnamed Trib			Culvert	?	?	20		1					0
41	Unnamed Trib			Culvert	?	?	20		1					0
42	Unnamed Trib			Culvert	?	?	20		1					0
43	Unnamed Trib			Culvert	?	?	20		1					0
44	Kiwalik River	1		Bridge	400	400	400					1	400	0
45	Quartz Creek	1		Bridge	?	?	570					1	570	0
46	Coal Creek Trib			Culvert	?	?	20		1					0
47	Quartz Creek Trib			Bridge	?	?	80				1			0
48	Quartz Creek Trib			Bridge	?	?	80				1			0
49	Buck Creek Trib			Bridge	?	?	120				1			0
50	Buck Creek Trib			Bridge	?	?	120				1			0

7-Selawik Flats Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
51	Buck Creek Trib			Culvert	?	?	20		1					0
52	Unnamed Trib			Bridge	?	?	40			1				0
53	Unnamed Trib		1	Bridge	?	?	40			1				0
54	Unnamed Trib		1	Culvert	?	?	20		1					1
55	Unnamed Trib			Culvert	?	?	20		1					0
56	West Fork Buckland River	1		Bridge	85	200	240					1	240	0
57	Masukatalik Creek Trib		1	Culvert	?	?	20		1					1
58	Masukatalik Creek Trib		1	Culvert	?	?	20		1					1
59	Masukatalik Creek		1	Bridge	75	110	120				1			0
60	Masukatalik Creek Trib		1	Bridge	?	?	40			1				0
61	Masukatalik Creek Trib			Bridge	?	?	40			1				0
62	Brush Creek			Bridge	65	75	80				1			0
63	Buckland River	1		Bridge	130	280	320					1	320	0
64	Buckland River Trib			Culvert	?	?	20		1					0
65	Buckland River Trib			Culvert	?	?	10	1						0
66	Buckland River Trib			Culvert	?	?	10	1						0
67	Buckland River Trib			Culvert	?	?	10	1						0
68	Buckland River Trib			Culvert	?	?	20		1					0
69	Buckland River Trib			Culvert	?	?	20		1					0
70	Buckland River Trib			Culvert	?	?	10	1						0
71	Buckland River Trib			Culvert	?	?	10	1						0
72	Buckland River Trib			Culvert	?	?	10	1						0
73	Buckland River Trib			Culvert	?	?	10	1						0
74	North Fork Buckland River	1		Bridge	230	300	320					1	320	0
75	North Fork Buckland River Trib			Culvert	?	?	10	1						0
76	North Fork Buckland River Trib			Culvert	?	?	10	1						0
77	North Fork Buckland River Trib			Culvert	?	?	10	1						0
78	North Fork Buckland River Trib			Culvert	?	?	20		1					0
79	North Fork Buckland River Trib			Culvert	?	?	20		1					0
80	North Fork Buckland River Trib			Culvert	?	?	20		1					0
81	North Fork Buckland River Trib			Culvert	?	?	20		1					0
82	North Fork Buckland River Trib			Culvert	?	?	20		1					0
83	Unnamed Trib			Culvert	?	?	10	1						0
84	Unnamed Trib			Culvert	?	?	10	1						0
85	Unnamed Trib			Culvert	?	?	10	1						0
86	Unnamed Trib			Culvert	?	?	10	1						0
87	Unnamed Trib			Culvert	?	?	10	1						0
88	Unnamed Trib			Culvert	?	?	10	1						0
89	Unnamed Trib			Culvert	?	?	10	1						0
90	Unnamed Trib			Culvert	?	?	10	1						0
91	Unnamed Trib			Culvert	?	?	10	1						0
92	Unnamed Trib			Culvert	?	?	10	1						0
93	Tagagawik River Trib			Culvert	?	?	20		1					0
94	Tagagawik River		1	Bridge	?	?	200					1	200	0
95	Tagagawik River Trib			Culvert	?	?	20		1					0
96	Tagagawik River Trib			Culvert	?	?	20		1					0
97	Tagagawik River Trib			Culvert	?	?	20		1					0
98	Tagagawik River Trib			Culvert	?	?	10	1						0
99	Tagagawik River Trib			Culvert	?	?	10	1						0
100	Tagagawik River Trib			Culvert	?	?	10	1						0
101	Tagagawik River Trib			Bridge	?	?	80				1			0
102	Tagagawik River Trib			Culvert	?	?	20		1					0
103	Unnamed Trib			Culvert	?	?	20		1					0

7-Selawik Flats Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
104	Unnamed Trib			Culvert	?	?	20		1					0
105	Ekiek Creek		1	Culvert	?	?	10	1						1
106	Ekiek Creek		1	Culvert	?	?	10	1						1
107	Ekiek Creek		1	Culvert	?	?	10	1						1
108	Ekiek Creek		1	Culvert	?	?	10	1						1
109	Unnamed Trib			Culvert	?	?	10	1						0
110	Unnamed Trib			Culvert	?	?	10	1						0
111	Unnamed Trib			Culvert	?	?	10	1						0
112	Unnamed Trib			Culvert	?	?	10	1						0
113	Unnamed Trib			Bridge	120	380	400					1	400	0
114	Unnamed Trib			Culvert	?	?	10	1						0
115	Unnamed Trib			Culvert	?	?	10	1						0
116	Unnamed Trib			Culvert	?	?	10	1						0
117	Unnamed Trib			Culvert	?	?	10	1						0
118	Unnamed Trib			Culvert	?	?	10	1						0
119	Unnamed Trib			Culvert	?	?	10	1						0
120	Unnamed Trib			Culvert	?	?	10	1						0
121	Unnamed Trib			Culvert	?	?	10	1						0
122	Unnamed Trib			Culvert	?	?	10	1						0
123	Unnamed Trib			Culvert	?	?	10	1						0
124	Unnamed Trib		1	Bridge	110	150	160					1	160	0
125	Unnamed Trib			Culvert	?	?	20		1					0
126	Unnamed Trib		1	Culvert	?	?	10	1						1
127	Unnamed Trib		1	Culvert	?	?	10	1						1
128	Unnamed Trib		1	Culvert	?	?	10	1						1
129	Unnamed Trib		1	Culvert	?	?	10	1						1
130	Unnamed Trib		1	Culvert	?	?	20		1					1
131	Unnamed Trib		1	Culvert	?	?	20		1					1
132	Unnamed Trib		1	Culvert	?	?	20		1					1
133	Unnamed Trib		1	Culvert	?	?	20		1					1
134	Ingruksukruk Creek		1	Bridge	100	240	280					1	280	0
135	Ingruksukruk Creek Trib			Culvert	?	?	20		1					0
136	Shovel Creek		1	Bridge	?	?	80				1			0
137	Shovel Creek Trib		1	Culvert	?	?	10	1						1
138	Unnamed Trib			Culvert	?	?	10	1						0
139	Unnamed Trib			Culvert	?	?	10	1						0
140	Unnamed Trib			Culvert	?	?	10	1						0
141	Unnamed Trib			Culvert	?	?	10	1						0
142	Unnamed Trib		1	Culvert	?	?	10	1						1
143	Selawik River	1		Bridge	110	270	280					1	280	0
144	Unnamed Trib		1	Culvert	?	?	10	1						1
145	Unnamed Trib			Culvert	?	?	10	1						0
146	Unnamed Trib		1	Culvert	?	?	10	1						1
147	Rabbit River		1	Bridge	60	450	480					1	480	0
148	Unnamed Trib		1	Culvert	?	?	10	1						1
149	Unnamed Trib		1	Culvert	?	?	10	1						1
150	Unnamed Trib			Culvert	?	?	20		1					0
151	Unnamed Trib			Culvert	?	?	20		1					0
152	Unnamed Trib			Culvert	?	?	10	1						0
153	Unnamed Trib			Culvert	?	?	10	1						0

7-Selawik Flats Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
154	Unnamed Trib			Culvert	?	?	10	1						0
155	Unnamed Trib			Culvert	?	?	10	1						0
156	Unnamed Trib			Culvert	?	?	10	1						0
157	Unnamed Trib			Culvert	?	?	10	1						0
158	Unnamed Trib			Culvert	?	?	10	1						0
159	Unnamed Trib			Culvert	?	?	10	1						0
160	Unnamed Trib			Culvert	?	?	10	1						0
161	Unnamed Trib		1	Culvert	?	?	10	1						1
162	Unnamed Trib			Culvert	?	?	10	1						0
163	Unnamed Trib		1	Culvert	?	?	10	1						1
164	Black River Trib		1	Culvert	?	?	10	1						1
165	Black River Trib		1	Culvert	?	?	10	1						1
166	Unnamed Trib		1	Culvert	?	?	10	1						1
167	Unnamed Trib		1	Culvert	11	11	20		1					1
168	Unnamed Trib		1	Culvert	8	8	10	1						1
169	Unnamed Trib		1	Culvert	7	7	10	1						1
170	Tekeaksakrak Lake Trib		1	Culvert	5	5	10	1						1
171	Pick River		1	Bridge	80	80	120				1			0
172	Unnamed Trib		1	Culvert	14	14	20		1					1
173	Kuikcherk River		1	Bridge	30	50	80				1			0
174	Kobuk River Trib		1	Bridge	80	110	120				1			0
175	Kobuk River	1		Bridge	540	750	760					1	760	0
176	Dahl Creek			Bridge	?	?	40			1				0
177	Dahl Creek Trib			Culvert	?	?	10	1						0
178	Dahl Creek Trib			Culvert	?	?	10	1						0
179	Ruby Creek Trib			Culvert	?	?	10	1						0
180	Ruby Creek Trib			Culvert	?	?	10	1						0
181	Ruby Creek Trib			Culvert	?	?	10	1						0
182	Ruby Creek Trib			Culvert	?	?	10	1						0
183	Wesley Creek Trib			Culvert	?	?	10	1						0
184	Wesley Creek Trib			Culvert	?	?	10	1						0
185	Shungnak River		1	Bridge	120	240	280					1	280	0
	Cataloged Anadromous:	23						94	42	7	21	21	7470	32
	Estimated Anadromous:		48					ea	ea	ea	ea	ea	LF	ea
	Total Anadromous:		**71**											
	Fish Passage Culverts:		**32**								Average Large Bridge Span		356	
											Min Large Bridge Span		160	
											Max Large Bridge Span		760	

8-Cape Darby Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
1	Norton Bay Trib			Culvert	?	?	20		1					0
2	Norton Bay Trib			Culvert	?	?	20		1					0
3	Norton Bay Trib			Culvert	?	?	20		1					0
4	Norton Bay Trib			Culvert	?	?	20		1					0
5	Norton Bay Trib			Bridge	?	?	80				1			0
6	Norton Bay Trib			Bridge	?	?	80				1			0
7	Portage Roadhouse Trib			Culvert	?	?	20		1					0
8	Carson Creek	1		Bridge	?	?	120				1			0
9	Carson Creek	1		Bridge	?	?	120				1			0
10	Kwiniuk River Trib	1		Bridge	?	?	200					1	200	0
11	Kwiniuk River Trib	1		Bridge	?	?	200					1	200	0
12	Kwiniuk River	1		Bridge	?	?	400					1	400	0
13	Kwiniuk River Trib	1		Bridge	?	?	160					1	160	0
14	Kwiniuk River Trib	1		Bridge	?	?	160					1	160	0
15	Kwiniuk River Trib	1		Bridge	?	?	160					1	160	0
16	Kwiniuk River Trib	1		Bridge	?	?	120				1			0
17	Kwiniuk River Trib		1	Bridge	?	?	80				1			0
18	Kwiniuk River Trib			Bridge	?	?	80				1			0
19	Kwiniuk River Trib		1	Culvert	?	?	20		1					1
20	Kwiniuk River Trib	1		Culvert	?	?	20		1					0
21	Kwiniuk River Trib	1		Bridge	23	55	80				1			0
22	Kwiniuk River Trib			Culvert	14	14	20		1					0
23	Kwiniuk River Trib	1		Culvert	15	15	20		1					0
24	Kwiniuk River Trib	1		Culvert	12	12	20		1					0
25	Kwiniuk River Trib	1		Culvert	7	7	10	1						0
26	Kwiniuk River Trib		1	Culvert	?	?	10	1						1
27	Tubutulik River Trib		1	Culvert	16	16	20		1					1
28	Tubutulik River	1		Bridge	200	400	440					1	440	0
29	Chukajak Creek	1		Bridge	?	?	200					1	200	0
30	Tubutulik River Trib			Culvert	?	?	20		1					0
31	Lost Creek Trib			Culvert	?	?	20		1					0
32	Lost Creek		1	Bridge	?	?	80				1			0
33	Salmon Creek Trib			Culvert	?	?	20		1					0
34	Salmon Creek			Bridge	?	?	120				1			0
35	Salmon Creek Trib			Culvert	?	?	20		1					0
36	Salmon Creek Trib			Culvert	?	?	20		1					0
37	Salmon Creek Trib			Bridge	?	?	40			1				0
38	Salmon Creek Trib			Bridge	?	?	40			1				0
39	Salmon Creek Trib			Bridge	?	?	40			1				0
40	Unnamed Trib			Culvert	?	?	20		1					0
41	Unnamed Trib			Culvert	?	?	20		1					0
42	June Creek	1		Bridge	140	280	320					1	320	0
43	Copper Creek Trib		1	Culvert	?	?	20		1					1
44	Copper Creek		1	Bridge	130	200	240					1	240	0
45	Koyuk River Trib	1		Bridge	?	?	80				1			0
46	Koyuk River	1		Bridge	180	240	280					1	280	0
47	First Chance Creek		1	Bridge	240	440	440					1	440	0
48	Unnamed Trib			Culvert	?	?	20		1					0

8-Cape Darby Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
49	Unnamed Trib			Culvert	?	?	20		1					0
50	Unnamed Trib			Culvert	?	?	20		1					0
51	Unnamed Trib			Culvert	?	?	20		1					0
52	Kiwalik River	1		Bridge	400	400	400					1	400	0
53	Quartz Creek	1		Bridge	?	?	570					1	570	0
54	Coal Creek Trib			Culvert	?	?	20		1					0
55	Quartz Creek Trib			Bridge	?	?	80				1			0
56	Quartz Creek Trib			Bridge	?	?	80				1			0
57	Buck Creek Trib			Bridge	?	?	120				1			0
58	Buck Creek Trib			Bridge	?	?	120				1			0
59	Buck Creek Trib			Culvert	?	?	20		1					0
60	Unnamed Trib			Bridge	?	?	40			1				0
61	Unnamed Trib		1	Bridge	?	?	40			1				0
62	Unnamed Trib		1	Culvert	?	?	20		1					1
63	Unnamed Trib			Culvert	?	?	20		1					0
64	West Fork Buckland River	1		Bridge	85	200	240					1	240	0
65	Masukatalik Creek Trib		1	Culvert	?	?	20		1					1
66	Masukatalik Creek Trib		1	Culvert	?	?	20		1					1
67	Masukatalik Creek		1	Bridge	75	110	120				1			0
68	Masukatalik Creek Trib		1	Bridge	?	?	40			1				0
69	Masukatalik Creek Trib			Bridge	?	?	40			1				0
70	Brush Creek			Bridge	65	75	80				1			0
71	Buckland River	1		Bridge	130	280	320					1	320	0
72	Buckland River Trib			Culvert	?	?	20		1					0
73	Buckland River Trib			Culvert	?	?	10	1						0
74	Buckland River Trib			Culvert	?	?	10	1						0
75	Buckland River Trib			Culvert	?	?	10	1						0
76	Buckland River Trib			Culvert	?	?	20		1					0
77	Buckland River Trib			Culvert	?	?	20		1					0
78	Buckland River Trib			Culvert	?	?	10	1						0
79	Buckland River Trib			Culvert	?	?	10	1						0
80	Buckland River Trib			Culvert	?	?	10	1						0
81	Buckland River Trib			Culvert	?	?	10	1						0
82	North Fork Buckland River	1		Bridge	230	300	320					1	320	0
83	North Fork Buckland River Trib			Culvert	?	?	10	1						0
84	North Fork Buckland River Trib			Culvert	?	?	10	1						0
85	North Fork Buckland River Trib			Culvert	?	?	10	1						0
86	North Fork Buckland River Trib			Culvert	?	?	20		1					0
87	North Fork Buckland River Trib			Culvert	?	?	20		1					0
88	North Fork Buckland River Trib			Culvert	?	?	20		1					0
89	North Fork Buckland River Trib			Culvert	?	?	20		1					0
90	North Fork Buckland River Trib			Culvert	?	?	20		1					0
91	Unnamed Trib			Culvert	?	?	10	1						0
92	Unnamed Trib			Culvert	?	?	10	1						0
93	Unnamed Trib			Culvert	?	?	10	1						0
94	Unnamed Trib			Culvert	?	?	10	1						0
95	Unnamed Trib			Culvert	?	?	10	1						0
96	Unnamed Trib			Culvert	?	?	10	1						0
97	Unnamed Trib			Culvert	?	?	10	1						0
98	Unnamed Trib			Culvert	?	?	10	1						0
99	Unnamed Trib			Culvert	?	?	10	1						0

8-Cape Darby Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
100	Unnamed Trib			Culvert	?	?	10	1						0
101	Tagagawik River Trib			Culvert	?	?	20		1					0
102	Tagagawik River		1	Bridge	?	?	200					1	200	0
103	Tagagawik River Trib			Culvert	?	?	20		1					0
104	Tagagawik River Trib			Culvert	?	?	20		1					0
105	Tagagawik River Trib			Culvert	?	?	20		1					0
106	Tagagawik River Trib			Culvert	?	?	10	1						0
107	Tagagawik River Trib			Culvert	?	?	10	1						0
108	Tagagawik River Trib			Culvert	?	?	10	1						0
109	Tagagawik River Trib			Bridge	?	?	80				1			0
110	Tagagawik River Trib			Culvert	?	?	20		1					0
111	Unnamed Trib			Culvert	?	?	20		1					0
112	Unnamed Trib			Culvert	?	?	20		1					0
113	Ekiek Creek		1	Culvert	?	?	10	1						1
114	Ekiek Creek		1	Culvert	?	?	10	1						1
115	Ekiek Creek		1	Culvert	?	?	10	1						1
116	Ekiek Creek		1	Culvert	?	?	10	1						1
117	Unnamed Trib			Culvert	?	?	10	1						0
118	Unnamed Trib			Culvert	?	?	10	1						0
119	Unnamed Trib			Culvert	?	?	10	1						0
120	Unnamed Trib			Culvert	?	?	10	1						0
121	Unnamed Trib			Bridge	120	380	400					1	400	0
122	Unnamed Trib			Culvert	?	?	10	1						0
123	Unnamed Trib			Culvert	?	?	10	1						0
124	Unnamed Trib			Culvert	?	?	10	1						0
125	Unnamed Trib			Culvert	?	?	10	1						0
126	Unnamed Trib			Culvert	?	?	10	1						0
127	Unnamed Trib			Culvert	?	?	10	1						0
128	Unnamed Trib			Culvert	?	?	10	1						0
129	Unnamed Trib			Culvert	?	?	10	1						0
130	Unnamed Trib			Culvert	?	?	10	1						0
131	Unnamed Trib			Culvert	?	?	10	1						0
132	Unnamed Trib		1	Bridge	110	150	160					1	160	0
133	Unnamed Trib			Culvert	?	?	20		1					0
134	Unnamed Trib		1	Culvert	?	?	10	1						1
135	Unnamed Trib		1	Culvert	?	?	10	1						1
136	Unnamed Trib		1	Culvert	?	?	10	1						1
137	Unnamed Trib		1	Culvert	?	?	10	1						1
138	Unnamed Trib		1	Culvert	?	?	20		1					1
139	Unnamed Trib		1	Culvert	?	?	20		1					1
140	Unnamed Trib		1	Culvert	?	?	20		1					1
141	Unnamed Trib		1	Culvert	?	?	20		1					1
142	Ingruksukruk Creek		1	Bridge	100	240	280					1	280	0
143	Ingruksukruk Creek Trib			Culvert	?	?	20		1					0
144	Shovel Creek		1	Bridge	?	?	80				1			0
145	Shovel Creek Trib		1	Culvert	?	?	10	1						1
146	Unnamed Trib			Culvert	?	?	10	1						0
147	Unnamed Trib			Culvert	?	?	10	1						0
148	Unnamed Trib			Culvert	?	?	10	1						0
149	Unnamed Trib			Culvert	?	?	10	1						0

8-Cape Darby Corridor								Structure Classification						
Crossing	Stream Name	Cataloged Anadomous	Assumed (GIS mapping) Anadomous	Structure	River Width	Flood Plain Width	Structure Width	Culvert Small (<10')	Culvert Large (10' to 20')	Bridge Small (<50')	Bridge Medium (50' to 140')	Bridge Large (>140')	Bridge Large Total Span	Fish Pass Culvert Req'd
150	Unnamed Trib		1	Culvert	?	?	10	1						1
151	Selawik River	1		Bridge	110	270	280					1	280	0
152	Unnamed Trib		1	Culvert	?	?	10	1						1
153	Unnamed Trib			Culvert	?	?	10	1						0
154	Unnamed Trib		1	Culvert	?	?	10	1						1
155	Rabbit River		1	Bridge	60	450	480					1	480	0
156	Unnamed Trib		1	Culvert	?	?	10	1						1
157	Unnamed Trib		1	Culvert	?	?	10	1						1
158	Unnamed Trib			Culvert	?	?	20		1					0
159	Unnamed Trib			Culvert	?	?	20		1					0
160	Unnamed Trib			Culvert	?	?	10	1						0
161	Unnamed Trib			Culvert	?	?	10	1						0
162	Unnamed Trib			Culvert	?	?	10	1						0
163	Unnamed Trib			Culvert	?	?	10	1						0
164	Unnamed Trib			Culvert	?	?	10	1						0
165	Unnamed Trib			Culvert	?	?	10	1						0
166	Unnamed Trib			Culvert	?	?	10	1						0
167	Unnamed Trib			Culvert	?	?	10	1						0
168	Unnamed Trib			Culvert	?	?	10	1						0
169	Unnamed Trib		1	Culvert	?	?	10	1						1
170	Unnamed Trib			Culvert	?	?	10	1						0
171	Unnamed Trib		1	Culvert	?	?	10	1						1
172	Black River Trib		1	Culvert	?	?	10	1						1
173	Black River Trib		1	Culvert	?	?	10	1						1
174	Unnamed Trib		1	Culvert	?	?	10	1						1
175	Unnamed Trib		1	Culvert	11	11	20		1					1
176	Unnamed Trib		1	Culvert	8	8	10	1						1
177	Unnamed Trib		1	Culvert	7	7	10	1						1
178	Tekeaksakrak Lake Trib		1	Culvert	5	5	10	1						1
179	Pick River		1	Bridge	80	80	120				1			0
180	Unnamed Trib		1	Culvert	14	14	20		1					1
181	Kuikcherk River		1	Bridge	30	50	80				1			0
182	Kobuk River Trib		1	Bridge	80	110	120				1			0
183	Kobuk River	1		Bridge	540	750	760					1	760	0
184	Dahl Creek			Bridge	?	?	40			1				0
185	Dahl Creek Trib			Culvert	?	?	10	1						0
186	Dahl Creek Trib			Culvert	?	?	10	1						0
187	Ruby Creek Trib			Culvert	?	?	10	1						0
188	Ruby Creek Trib			Culvert	?	?	10	1						0
189	Ruby Creek Trib			Culvert	?	?	10	1						0
190	Ruby Creek Trib			Culvert	?	?	10	1						0
191	Wesley Creek Trib			Culvert	?	?	10	1						0
192	Wesley Creek Trib			Culvert	?	?	10	1						0
193	Shungnak River		1	Bridge	120	240	280					1	280	0
	Cataloged Anadromous:	26												
	Estimated Anadromous:		51					84	54	8	22	25	7890	35
	Total Anadromous:		**77**					ea	ea	ea	ea	ea	LF	ea
	Fish Passage Culverts:		**35**											
											Average Large Bridge Span		316	
											Min Large Bridge Span		160	
											Max Large Bridge Span		760	

Summary Hydraulics Report

Dalton Highway MP 175 to 209 Rehabilitation
Coldfoot to Dietrich Camp Vicinity

Federal Project No. DP-065-4(8)
State Project No. 61214

Prepared by:
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State of Alaska
Department of Transportation and Public Facilities
Northern Region Preconstruction
2301 Peger Road
Fairbanks, Alaska

August 2005

Introduction

The Dalton Highway MP 175-209 Reconstruction project is situated in the southern foothills of the Brooks Range. The project begins at Mile 175 of the Dalton Highway at Coldfoot, Alaska and runs north through the relatively narrow Middle Fork Koyukuk River valley. The project ends at Mile 209 at the access road to the site of the decommissioned Dietrich pipeline construction camp, just north of the confluence of the Dietrich and Bettles Rivers, which come together to form the Middle Fork Koyukuk River. The project will widen the roadway from 28 to 32 feet and provide an asphalt concrete pavement surface treatment.

There are 10 bridges and over 210 new and existing culverts in this 34-mile stretch of the Dalton Highway. Marion Creek bridge was replaced in 2002 and there will be minor repairs and upgrades to the remaining 9 bridges as part of this project. The Bridge Design Section will be providing plans for those upgrades and repairs. There are over 50 major and minor culverted stream crossings that require hydrologic and hydraulic summaries and about 30 stream crossings will require fish passage designs.

The following report provides hydrologic and hydraulic summaries for drainages that require 48-inch diameter (or equivalent flow capacity in a bank of smaller culverts) and larger culverts, fish passage designs, revetment repairs, ditch drainage, locations for new culverts, recommend culvert extensions, and general drainage recommendations in accordance with the Alaska Preconstruction Manual.

Hydraulic History

Due to various changes in scope since project inception, neither the hydraulics section nor the location section were able to perform complete surveys of the stream crossings. Information used to develop the design details came from two brief field trips that collected some condition data and a few profiles at culverts that will be retrofitted and not replaced. A location survey crew was sent to collect minimal cross section data after the first change in scope, but they were never directed to collect stream data for fish passage designs. They did collect culvert invert elevation data, which was used to estimate stream gradients. The result is that some of the hydraulic history data required for a complete summary hydraulics report is missing. The design details presented do, though, meet the minimum requirements of providing hydrologic and hydraulic summaries for all culverts that require them.

The hydraulics section did not inspect all of the smaller culverts, many of which are over 25 years old. Most of the existing smaller culverts have unwelded lock-seams and narrow, 9-12 inch, dimple bands at the joints. On the recent Dalton Highway MP 144-175 reconstruction project, many of the existing culverts that appeared to be in good condition on the inside were found to be severely pitted and rusted on the outside. Current specifications call for welded lock-seam culverts and coupling bands that are at least 22 inches wide. All smaller culverts not covered in this report should be replaced if there is any question about the performance, functionality, or expected life of the culvert.

Topographic maps indicate that there are no glaciers in any of the drainage basins along this section of the Dalton Highway. There will be no glacier related design issues, such as lake dumps and subsequent debris flows. Flood borne debris problems will be reduced because of the larger culverts required to meet fish passage and current hydraulic requirements. There were no reported aufeis problems that could not be managed by standard thaw pipe installations. Stream stability issues, such as bed load and lateral stream movements, will be addressed as necessary in the site specific recommendations.

Corridor	Corridor Length (miles)	Minor Culverts* (EA)
1-Brooks East Corridor	216	864
2-Kanuti Flats Corridor	241	964
3-Elliott Hwy Corridor	365	1460
4-Parks Hwy RR Corridor	420-450	1680-1800
4-Parks Hwy RR Corridor A	430	1720
4-Parks Hwy RR Corridor B	450	1800
4-Parks Hwy RR Corridor C	420	1680
4-Parks Hwy RR Corridor D	440	1760
5-DMTS Port Corridor	257	1028
6-Cape Blossom Corridor	245	980
7-Selawik Flats Corridor	331	1324
8-Cape Darby Corridor	340	1360
**Assumes 4 minor culverts per mile*		

Dalton Highway MP 175 to 209 Rehabilitation

Number of Minor Culverts:	150
Miles:	34
Minor Culverts/Mile:	4.4

Ambler Mining District Access