APPENDIX 3:

EVALUATED ALTERNATIVES

1.0 RE-ESTABLISH ACCESS ACROSS NBI#339 AND WASHOUT

Bridge NBI# 339 was closed in 2011 at MP 36 for safety reasons because the deep scour occurring in this river channel has undermined the bridge support piers. Subsequent erosion from this river channel has completely washed away the land and segment of the highway that previously connected NBI# 339 with NBI# 340 (Figure 1). Currently, the width of the active channel at ordinary high water (OHW) is about 1,110 feet.

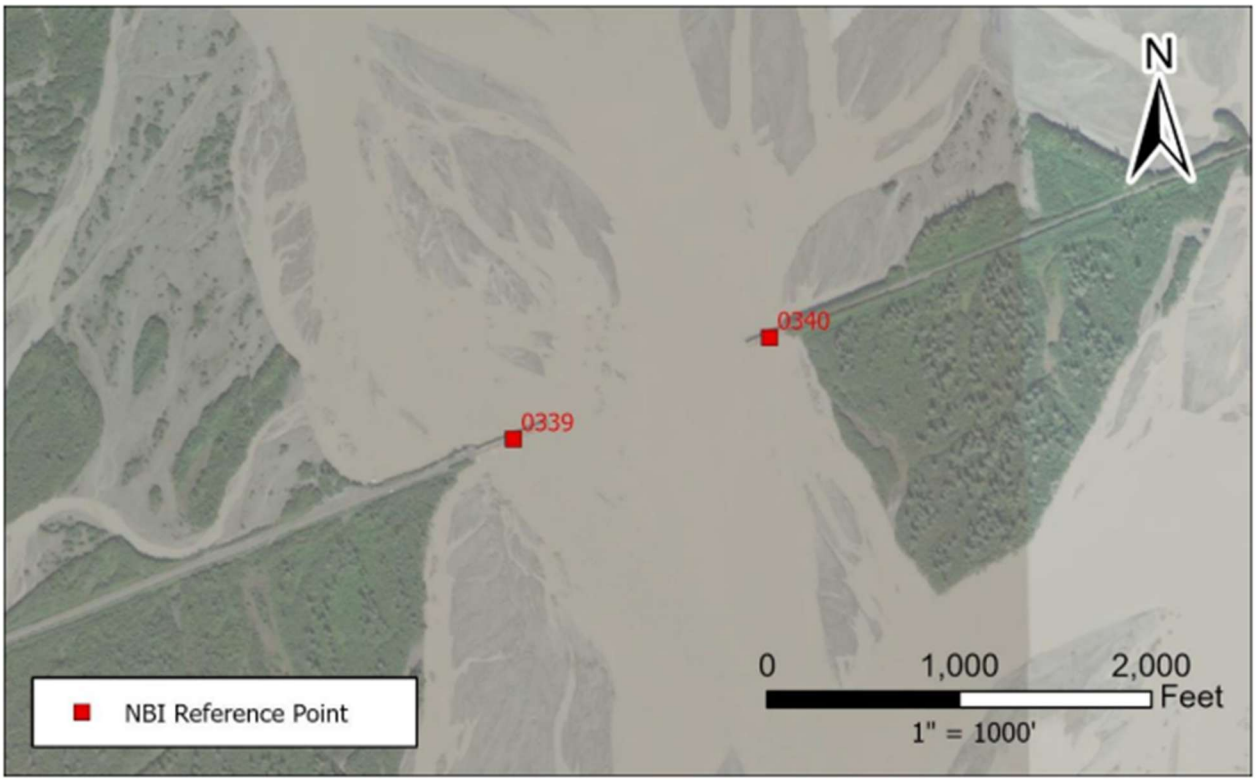


Figure 1: NBI# 339 and Associated Wash-Out

Six alternatives plus a no build were considered (Table 1):

Table 1: Project Alternatives to Re-Establish Access Across NBI#339 and Washout

Re-Establish Access Across NBI#339 and Washout	
Project Alternatives	**Recommendation**
Alternative 1: New 1,540 Bridge	Not Recommended
Alternative 2: New 1,400 Bridge	Recommended Alternative
Alternative 3: Repairing and Extending NBI #339	Not Recommended
Alternative 4: Suspension Bridge	Not Recommended
Alternative 5: Stay Cable Bridge	Not Recommended
Alternative 6: Aerial Ropeway/Tram System	Not Recommended
No Build	

These alternatives are summarized below.

1.1 Alternative 1: New 1,540 Feet Bridge (Not Recommended)

Overview

This design proposes a new bridge that is 1,540 feet long and 31 feet wide. The design consists of 11 spans of 140 feet and each span is founded on a pier that is a single 8 feet diameter drilled shaft measuring 170 feet in length and with a hammer head substructure. The superstructure consists of 66 precast concrete "bulb-tee" girders, weighing 80 tons each. After the new bridge is completed, NBI #339 and NBI #340 would be demolished because they would no longer be used and are within a navigable waterway, as defined by the U.S. Coast Guard (USCG).

Construction

To build Alternative 1, a temporary construction access trestle measuring approximately 1,400 long will need to be constructed downstream of the proposed bridge. A large crane, similar in size to a Manitowoc model 2250, will be required to place each of the 66 precast concrete "bulb-tee" girders across the 140 feet long spans. A hydraulic casing oscillator would be used to install the drilled shaft piers. An oscillator platform would be constructed at each pier and adjacent to the access trestle for this purpose. Additionally, a service platform would be constructed between each pier for a second smaller crane, similar in size to a 70-ton Grove RT770E Rough Terrain Crane, to support the hydraulic casing oscillator. The oscillator and crane service platforms would be needed to construct the main

access trestle concurrently with the drilled shaft piers to account for the short construction season.

Potential Impacts

The cumulative widths of the existing bridge (29 feet), the new replacement bridge (31 feet), and the main work trestle (approximately 37 feet), plus the oscillator and smaller crane's work platforms (approximately 50 feet), and the separation distances between the structures means that Alternative 1 would exceed DOT&PF's ROW and encroach into the Copper River Delta Critical Habitat Area, a protected resource under Section 4(f) of the U.S. Department of Transportation Act of 1966, as amended. The DOT&PF's ROW at this location is 200 feet (100 feet on each side of centerline).

A variation to Alternative 1 could be to construct the new bridge and its associated work trestle and platforms upstream from NBI #339 to avoid "use" of the Section 4(f) property. The project actions would still extend beyond DOT&PF's ROW, but the temporary encroachment would be outside the northern boundary of the Copper River Delta Critical Habitat Area and onto federal land, managed by the United States Forest Service.

Cost Estimate

In 2014, the estimated cost of Alternative 1 was $49,000,000, excluding bridge abutment slope protection, soil investigation, design and construction inspections, and the demolition of NBI #339 and NBI #340.

Three options were proposed for the protection of the bridge abutment slopes:
1. Install sheet pile walls; 2014 cost estimate was $8,065,770.
2. Install riprap; 2014 cost estimate was $2,433,390.
3. Install concrete blocks (dolos); 2014 cost estimate was $4,800,000.

The DOT&PF estimates the cost of the bridge demolitions, given their relatively remote locations, would be approximately $1,000,000 per 100 linear feet. NBI #339 is 401 feet long and NBI #340 is 241 feet long, resulting in an estimated demolition cost of $6,420,000.

1.2 Alternative 2: New 1,400 Feet Bridge (Recommended)

Overview

This alternative proposes a new bridge that is 1,750 feet long and 35 feet wide. NBI# 339 and NBI# 340 would be removed completely as part of this alternative. Additional work would be needed to reconstruct approach roadway sections, rehabilitate guide bank requirements, install riprap, and mitigate the impacts of ongoing erosion and river migration.

Construction

Early analyses provided high level detail on the proposed construction methodology. Two construction access trestles would be constructed along the same alignment as the proposed replacement bridge, one trestle on each side of bridge. The trestles would include rails for the primary hoisting equipment to travel

on, which would be a 225-ton straddle carrier gantry crane. As segments of the permanent bridge superstructure are completed those segments will provide the access road required for all material handling. Using this method of construction would allow the new bridge and its associated trestles to remain inside DOT&PF's ROW. As the construction season is short and the site is remote, all equipment would need to be flown or barged into the site and construction would depend on river flows, which tend to be substantial. Traffic control is not likely to be required as the road is not currently connected and is in use.

Potential Impacts

As the alternative can remain within DOT&PF's ROW, potential impacts associated with the construction of this alternative are considered minimal. The construction approach would be dependent on water flows, as the river has a substantial flow in this location which is impacted by flood events and general weather conditions. This is also likely to impact the duration of the construction season and construction planning should assume a short construction window.

Cost Estimate

The 2025 planning level cost estimate for this alternative amounts to $180 Million (Refer to Appendix 4 for detailed cost estimate details). This amount includes the bridge and all associated work (road embankment, riprap armoring, etc.), and has a contingency amount of 10 percent.

1.3 Alternative 3: Repairing and Extending NBI #339 (Not Recommended)

Overview

This alternative repairs and extends the existing NBI #339. Repairs include new large diameter piles that would be driven deep into the alluvium on the outboard side of the existing piers. A new pile cap beam would be built between the new piles and around the existing cap beam. The existing piles would then be cut free and removed. This process would be repeated for each pier until the end of the bridge is reached. The existing NBI #339 is 401 feet long and the channel at this location has expanded to approximately 1,110 feet wide, which means the bridge would also need to be extended at least another 710 feet.

A variation to this alternative would be to construct a temporary work structure downstream from NBI #339 so that a large crane could be used to install 100 feet spans and a larger superstructure.

Construction

No detailed analysis has been completed on how this alternative would be constructed.

Potential Impacts

NBI #339 is 29 feet wide from its outside edge to outside edge. If the existing bridge is to be used as the work platform material handling and construction equipment, then only a small crane would fit such as a Tadano model GR-350XL Rough Terrain Crane. This would limit the ability to set bridge girders and result in small spans with closely spaced piers. This would essentially act as a large strainer,

creating barriers to vegetative debris and ice flows, particularly during spring break-up. The navigation opening at the bridge crossing would also be significantly reduced.

Cost Estimate No cost estimate is provided for this alternative.

1.4 Alternative 4: Suspension Bridge (Not Recommended)

Overview This alternative would create a suspension bridge, suspending the roadway from huge main cables, which extend from one end of the bridge to the other. These cables rest on top of high towers and the must to be securely anchored into the bank at either end of the bridge. The towers enable the main cables to be draped over long distances. Most of the weight or load of the bridge is transferred by the cables to the anchorage systems. These are embedded in either solid rock or huge concrete blocks. Inside the anchorages, the cables are spread over a large area to evenly distribute the load and to prevent the cables from breaking free.

Construction No detailed analysis has been completed on how this alternative would be constructed.

Potential Impacts Suspension bridges are more expensive to build than girder bridges.

Based on geotechnical investigations completed at the site, DOT&PF determined the unconsolidated sandy soils coupled with the shallow groundwater table would be problematic for constructing a concrete anchorage system and that anchoring the cables directly into bedrock is not feasible because of its depth.

It is likely the design height of the suspension bridge towers would exceed 200 feet above the ground level. So as not to impair aviation safety to the numerous aircraft that fly through this area, DOT&PF anticipates the Federal Aviation Administration (FAA) will require the towers to be lit to alert approaching aircraft of its presence, which would require an energy source for the tower lights. It is also anticipated that the bridge cables will need high-visibility sleeves and/or high-visibility aviation orange marker balls installed on them.

Cost Estimate No cost estimate is provided for this alternative.

1.5 Alternative 5: Stay Cable Bridge (Not Recommended)

Overview This alternative provides for the construction of a stay cable bridge. The design of a stay cable bridge is similar to that of a suspension bridge, as they both have towers to support the structure and the bridge deck that is held in place by huge main

cables. The cables hold the bridge deck by connecting it directly to the support pillars instead of using suspension bridge type anchorage systems.

Construction No detailed analysis has been completed on how this alternative would be constructed.

Potential Impacts Although the initial construction cost of a stay cable bridge is cheaper than a suspension bridge, the maintenance costs for this type of bridge are extensive and ongoing and would eventually outweigh the initial savings.

Cable bridges tend to sway during high-speed crosswinds, which can frequently occur on the Copper River Delta. This creates hazardous driving conditions, and over time it loosens the bridge support cables, making it possible for the structure to eventually fail. This increases the need for regular inspections and maintenance for this type of bridge.

Cost Estimate No cost estimate is provided for this alternative.

1.6 Alternative 6: Aerial Ropeway/Tramway System (Not Recommended)

Overview Aerial ropeways, also referred to as aerial tramways or cable propelled transit systems designed for freight can carry individual loads up to 40 tonnes (88,185 pounds) on specially designed carriers, and span distances of almost one mile (1,500 m). Two systems are generally used. A monocable ropeway is one where the carrier is attached directly to a single rope (steel cable) by either a fixed gripping mechanism or a detachable gripping mechanism. This single rope provides both the carrying and propulsion functions. A variation to this design is the double monocable ropeway, where the carrier is attached directly to two parallel carrying-haul ropes. Bicable or tri-cable systems have one or two stationary track ropes that the carriers bogey wheels runs along, much like the wheels of a train would run along its rails. The carriers propulsion is supplied by a hauling rope that the carrier is attached to by either a fixed or detachable gripping mechanism.

Construction No construction detail is provided.

Potential Impacts An aerial ropeway would provide public access, including compliance with Americans with Disabilities Act, across the washout out NBI #339 as well as the ability to transport small cargo items. Additionally, if specialized freight carriers were incorporated into the system then it would enable up to 88,185 pounds of freight per load to be transported across the washout, including a small dozers, tractor-trailer, duty light duty vehicles, four wheelers, side-by-side ATVs, and utility trailers. An aerial ropeway could be constructed along the north-east to south-west alignment of the Copper River Highway, from the washout at NBI #339 past NBI #345, approximately two miles. This would eliminate the need for maintenance,

repairs, and/or replacement to bridges #339, #342, #344, and #345. These bridges could then be demolished.

Heavy equipment required for other maintenance and repairs would not be able to be transported across the washout by the aerial ropeway. Aerial ropeways also require electrical power to operate and safety standards for this technology requires a duplicate power source in case one of its electrical generators fail. The ropeway towers will also need to be lit in order to alert approaching aircraft of their presence and the system's cables will need to be highly visible for the same reason.

If the system fails and the carrier is suspended over the Copper River there will be challenges in carrying out rescue operations, which would need to be fully explored if an aerial ropeway becomes a more fully developed alternative.

Cost Estimate The costs to construct an aerial ropeway are approximately two-thirds of the cost to construct a bridge. Although aerial ropeways are a reliable proven technology, they are costly to maintain because of the moving parts in the system's components and the impact on the cable systems. The systems are generally supported by a full-time staffed maintenance station.

1.6.1 No Build

Overview The No-Build Alternative would retain the *status quo*, as no attempts to re-establish access across NBI #339 and its associated washout would occur.

Construction No construction impacts will occur.

Potential Impacts The combined aspects of the washout and leaving the bridge in its current condition means that routine maintenance and necessary repairs to the infrastructure beyond this point could not occur.

Cost Estimate No costs are associated with the no build alternative.

2.0 REPLACE OR REMOVE CULVERTS

There are approximately 25 stream culverts with the study area. Most of these stream culverts are within anadromous waters that provide aquatic connectivity to important habitat. On September 13, 2022, DOT&PF inspected all the stream culverts east of the NBI# 339 washout and determined that none of the culverts were functioning, due to a variety of factors including being clogged with sediment and woody debris, age associated deterioration and settlement issues, and vortex forces created during high water events that have damaged the culvert structures.

The non-functioning stream culverts mean that fish passage through the study area is blocked. The impedance of fish passage limits access to critical habitat by both season and life stage, which can limit the number of fish a watershed can support. Furthermore, undersized, or failed stream culverts also interrupt ecological processes and reshape stream system form and function. The community of Cordova has ranked replacing failing stream culverts and culverts that inhibit fish passage as one of their top five priorities in the Copper River Highway Transportation Master Plan.

Two alternatives plus a no build were considered (Table 2):

Table 2: Project Alternatives to Replace or Remove Culverts

Replace or Remove Culverts	
Project Alternatives	**Recommendation**
Alternative 1: Replace Culverts	Recommended Alternative
Alternative 2: Remove and/or Block Culverts	Not Recommended
No Build	

These alternatives are summarized below.

2.1 Alternative 1: Replace Culverts – Recommended Alternative

Overview

The DOT&PF proposes to replace the culverts within the Copper River Highway area. The new replacement culverts will meet current design standards for conveyance of water during a 50-year flood event (two percent probability of occurring in any given year).

Culverts that require fish passage will be designed in coordination with the ADF&G and in accordance with the *MOA between Alaska Department of Fish and Game and Alaska Department of Transportation and Public Facilities for the Design, Permitting, and Construction of Culverts for Fish Passage*, August 3, 2001.

The identified culverts within the study area have a diameter between three feet and 12 feet, and variable lengths.

Construction Replacing the culverts will require heavy equipment, logistical support, construction materials, and personnel to be able to access the site. Currently, overland transport access is not possible past MP 36 (NBI# 339 and its associated washout).

Potential Impacts No impact analysis was provided for this alternative.

Cost Estimate Hydraulic modeling of the Copper River stream channels or tributaries where culverts are located has not been completed, meaning detailed culvert engineering designs and their cost estimates are not able to be developed. The 2025 planning level cost estimate assumes that all culverts would be capable of providing fish passage and costs vary depending on the diameter. Refer to Appendix 4 for further details. The total project cost is estimated to be $20 Million to replace all the culverts if all the work was accomplished as a single project.

Diameter	Cost per linear foot
4-foot	$700.00
5-foot	$965.00
12-foot	$4,000.00

2.2 Alternative 2: Remove and/or Block Culverts – Not Recommended

Overview Under this alternative DOT&PF proposed to remove all culverts and/or block them. Removing all the culverts that have connectivity to Clear Creek would effectively abandon the Copper River Highway past the first culvert.

Alternatively, blocking the existing culverts would result in water overtopping the existing Copper River Highway and further damaging the infrastructure.

Construction No construction details were provided for this alternative.

Potential Impacts This alternative does not meet the purpose and need of this study as it will not reconstruct, repair, or replace damaged transportation infrastructure.

Cost Estimate This alternative does not meet the Purpose and Need, is unlikely to last 20 years or more under normal routine maintenance and is not the most feasible alternative after taking into consideration cost and that it would have more impacts to the sensitive environment. Additionally, although the DOT&PF has not advanced the required hydraulic modeling needed to design a way to redirect water within the drainage channels away from the highway, it's anticipated that the cost of channel modifications, such as filling in upstream portion of the channel and constructing spur dikes would exceed the cost of replacing the culvert.

2.3 No Build

Overview	No attempts will be made to repair or replace the existing culverts. The existing undersized and damaged culverts could result in water overtopping and washing out segments of roadway during high water events. The culverts that are inadequate for fish passage will continue to prevent anadromous species from migrating upstream to essential fish habitat (EFH). This may result in a breach in the MOA between DOT&PF and ADF&G.
Construction	No construction will occur with this alternative.
Potential Impacts	The No Build alternative would have a continued adverse impact to anadromous and resident fish species and their access to EFH.
Cost Estimate	No costs are associated with the no build alternative.

3.0 RECONSTRUCT OR RE-ALIGN THE COPPER RIVER HIGHWAY AT THE MP 43.5 WASH-OUT

One of the main channels of the Copper River has been migrating eastward over the last 40 years, which has impacted the Copper River Highway. As of October 19, 2023, the fluvial process from the eastward migration has completely eroded away about 5,400 linear feet of the highway between approximately MP 43.5 and MP 45 and its limits have advanced at least 180 feet beyond DOT&PF's northeastern ROW boundary into property owned by TEC. Erosion impacts are ongoing and will likely increase over time. The DOT&PF's Right-of-Way at this location is 300 feet (150 feet from each side of the road's centerline). In 2019, TEC posted "No Trespassing" signs along with area of ongoing erosion, largely due to public safety concerns and liability issues associated with the dangers of accessing this area.

In addition to the erosion issues, high water events often overtop the highway at various locations between MP 38 through MP 43.5, which was anticipated and evaluated through a hydraulics study by DOT&PF and USGS. This study concluded that raising the road's elevation by five (5) feet between MP 38 through MP 43.5 would address the potential of the road being overtopped.

Four alternatives plus a no build were considered (Table 3):

Table 3: Project Alternatives to Re-Align the Copper River Higway at the MP 43.5 Wash-Out

Reconstruct or Re-Align the Copper River Highway at the MP 43.5 Wash-Out	
Project Alternatives	**Recommendation**
Alternative 1: Reconstruct Road on Original Alignment	Not Recommended
Alternative 2: Construct New Road East of Washout (Shorter Section)	Not Recommended
Alternative 3: Construct New Road East of Washout (Longer Section)	Not Recommended
Alternative 4: Reconstruct Road on Original Alignment with Higher Elevation	Recommended Alternative
No Build	

These alternatives are summarized below.

3.1 Alternative 1: Reconstruct Road on Original Alignment (Not Recommended)

Overview This alternative would reconstruct the road back into its original alignment, which would require recreating at least 2,875 linear feet of road that has been lost to erosion. As of September 2019, the river's cut bank had advanced 30 feet beyond DOT&PF's eastern ROW boundary, which is 150 feet from each side of the road's centerline (300 feet). The face of the cut bank was estimated to be 20 feet high and the depth of the river at this location was estimated to be three to four feet.

Construction At least 843,333 cubic yards (cy) of Class IV riprap would be required to construct the road back into its original alignment (2,875 linear feet by 330 feet width by 24 feet height). The riprap being installed along the western boundary of the ROW, adjacent to the river, will need to be keyed-in to the river's bed to inhibit scour. Incorporating spur dikes into the design should also be considered to divert the channel's thalweg further westward from the road.

Potential Impacts Potential impacts were not discussed.

Cost Estimate The DOT&PF completed a rough calculation using the dimensions of 5,400 linear feet by 360 feet wide by 24 feet height, which equates to 1,728,000 cubic yards. The estimated price of Class IV riprap is $85 per cubic yard, resulting in an estimated cost of $146,880,000 for the riprap. This cost is not considered reasonable or feasible and therefore this alternative is not recommended.

3.2 Alternative 2: Construct New Road East of Washout (Shorter Section) (Not Recommended)

Overview	A new segment of road would be constructed around the washout area located between MP 44 and MP 45. The proposed alignment would divert east from the Copper River Highway just before MP 44 and tie back into the highway near MP 45, an approximate length of 1.25 miles. This alignment would require the acquisition of ROW on land owned by TEC to construct the road.
Construction	Potential construction methodologies were not discussed.
Potential Impacts	Alternative 2 is a shorter alignment than Alternative 3 discussed below, and therefore less ROW acquisition would be needed to construct the new segment of roadway, and the cost of construction would be lower. However, the alternative does not address the potential of a washout occurring between MP 43.5 and MP 44, and it is not likely to last 20 years or more given the accelerated rate of erosion that is occurring along the channel's eastern bank.
Cost Estimate	In September 2019, Red Plains Professional, Inc. estimated the construction cost of Alternative 2 would be $2,547,000.

3.3 Alternative 3: Construct New Road East of Washout (Longer Section) (Not Recommended)

Overview	This alternative proposes a new segment of roadway be constructed around the washout between MP 44 and MP 45 and the area that is being threatened by erosion between MP 43.5 and MP 44. This proposed alignment would divert east from Copper River Highway near MP 43 and tie back into the highway past MP 45, an approximate length of 2.5 miles. This alignment would require the acquisition of ROW on land owned by TEC to construct the road.
Construction	Potential construction methodologies were not discussed.
Potential Impacts	The separation distance proposed around the MP 44 washout area may not be sufficient given observed erosion rates. Additionally, this alternative does not accommodate the risk of a washout occurring between MP 38 through MP 4 and is not likely to last at least 20 years with normal routine maintenance.
Cost Estimate	In September 2019, Red Plains estimated the construction cost of Alternative 3 would be $2,789,847.

3.4 Alternative 4: Reconstruct Road on Original Alignment With Higher Elevation (Recommended)

Overview

This alternative raises the elevation of the roadway grade by five (5) feet, starting at MP 38 and continuing to MP 43. At MP 43 a new road segment would be constructed east around the washout and tie back in near MP 45, for a total length of 2.5 miles.

Class III riprap would be installed along the west side of the road's new embankment from MP 38 through MP 43 to armor the road from the Copper River.

Construction

This alternative will require heavy equipment, logistical support, construction materials, and personnel to be able to access the site. Currently, overland transport access is not possible past MP 36 (NBI# 339 and its associated washout). DOT&PF's material specification for Class III riprap includes the requirements that over 50 percent of the rocks weigh more than 700 pounds and up to 10 percent of rocks need to weigh more than 1,400 pounds.

Potential Impacts

Through a cooperative water study agreement with the DOT&PF, the USGS completed an evaluation of effects that could result from raising the road grade five (5) feet higher along the area of MP 38 through MP 43.

As part of this study, the USGS used their Survey Flow and Sediment Transport with Morphologic Evolution of Channels model to simulate water-surface elevation through this area for three flow scenarios, 116,000 cubic feet per second (ft^3/s), 174,000 ft^3/s, and 400,000 ft^3/s. Based on this analysis the USGS concluded that the Copper River Highway would not be overtopped by the river if the road's elevation was raised five (5) feet along the area of MP 38 through MP 43.17.

This alternative would meet the criteria of lasting 20 or more years. Raising the road grade from MP 38 through MP 44 would be a safeguard against travelers being stranded if the river overtops the roadway during a high-water event. The analysis concluded this option would be the least environmentally damaging practicable alternative (LEDPA) when compared to having to reconstruct or reroute this segment of roadway should it be lost to the impending erosion that is occurring in this area as it would remain largely within the existing ROW.

Cost Estimate

The 2025 planning level cost estimate for this alternative is $35 Million.

3.5 No Build

Overview

The No-build alternative provides for no construction activities.

Construction

No construction will occur with this alternative.

Potential Impacts	No right of way currently exists owing to erosion and the associated washout. This creates an access risk for all visitors seeking to pass this part of the highway to visit more remote locations.
Cost Estimate	No costs are associated with the no build alternative.

4.0 MILLION DOLLAR BRIDGE

The Million Dollar Bridge is located at MP 48 of the Copper River Highway and is listed on the NRHP and is a multi-span Pennsylvania Truss Bridge originally constructed as a rail bridge and later converted to a road bridge. The bridge was constructed in the early 1900s and spans 1,500 feet of the Copper River. Construction commenced in April 1909, and the bridge was in full service by July 1909. Ice calving from the Miles Glacier meant the bridge needed to withstand icebergs up to 20 feet in height moving with the 7.2 miles per hour current. The river's range is 24 feet in height, and the bed of the river is loose sand and gravel to a depth of 20 feet[1].

The bridge is constructed with four spans, Span 1 at 400 feet, Span 2 at 300 feet, Span 3 at 450 and Span 4 at 400 feet, which are mounted on three piers. Piers 1 and 2 required detached icebreakers to protect the structure from icebergs.

The bridge sustained considerable damage in the 1964 Good Friday Earthquake, resulting in Span 4 slipping off its foundation. This was temporarily repaired until 2003 when permanent repairs commenced to replace Pier 3, which had been damaged beyond repair. After its completion, the DOT&PF raised the fallen span, Span 4, back onto the new Pier 3. The DOT&PF also replaced the damaged and missing bridge members with newly fabricated parts, which resembled, to extent practicable, the original bridge materials and installation methods to maintain historic integrity. The repairs were not completed however, which include additional repairs to the damaged bridge structure and seismic retrofits on Piers 1 and 2.

In August 2016, a large iceberg struck and damaged the icebreaker protecting Pier 1 of the bridge. A high-water event in July 2019 moved this icebreaker further downstream, which means it is not currently protecting Pier 1 and making it vulnerable to damage from iceberg strikes. In addition, there is concern that Pier 2 is vulnerable to similar damage and requires remedial work to maintain its position and the protection it offers long term.

Eight alternatives plus a no build were considered (Table 4):

[1] *Alfredo O. Quinn (1995). Iron Rails to Alaskan Copper. D'Aloguin Publishing Co. p. 91,117–130,183–189.*

Table 4: Project Alternatives for the Million Dollar Bridge

Million Dollar Bridge	
Project Alternatives	**Recommendation**
Alternative 1: Reconstruct Ice Breaker at Pier 1	Recommended Alternative
Alternative 2: Install Steel-Casted Drilled Shafts to Replace Ice Breaker at Pier 1	Not Recommended
Alternative 3: Riprap or Dolosse to Protect Piers 1 and 2	Not Recommended
Alternative 4: Pre-Cast Concrete Ice Breaker or Caisson	Not Recommended
Alternative 5: Closed Cell Sheet Pile Around Pier 1	Not Recommended
Alternative 6: Drill/Pin Icebreaker in Place	Not Recommended
Alternative 7: Steel Cage Addition to Steel Piles Around Pier 2	Not Recommended
Alternative 8: Complete Repairs to Million Dollar Bridge	Recommended Alternative
No Build	

Three alternatives were recommended from this project group, which are intended to work together to maximize the value of a single mobilization of construction equipment to this remote site. These alternatives are summarized below.

4.1 Alternative 1: Reconstruct Ice Breaker at Pier 1 (Recommended Alternative)

Overview This alternative proposes to reconstruct the ice breaker at Pier 1 using flat, precast concrete slabs that would be stacked or “pancaked” on top of each other.

Construction This alternative will require heavy equipment, logistical support, construction materials, and personnel to be able to access the site, which is challenging because overland transportation access is currently not possible past MP 36 (NBI# 339 and its associated washout).
Reconstructing the icebreaker using the precast concrete slab approach outlined above requires that each slab have guide holes to keep them aligned as they are lowered through steel piles that would be installed around the ice breaker’s original caisson. After all the stacking is complete, the guide holes in the slabs would be grouted with concrete. A temporary work trestle would be required to construct this structure.

Potential Impacts	It is not clear whether this alternative is covered by the FONSI to complete repairs to the Million Dollar Bridge. A re-evaluation will be needed to confirm the proposed actions against the original EA, which could, depending on the scope of this addition, address the reconstruction of the ice breaker.
Cost Estimate	A planning level cost estimate of $25 Million for each ice breaker is provided, which was affirmed in 2025.

4.2 Alternative 2: Install Steel-Casted Drilled Shafts to Replace Ice Breaker at Pier 1 (Not Recommended)

Overview	This alternative proposes installing three 12-feet diameter steel-cased drilled shafts in front of Pier 1 to serve as a replacement ice breaker.
Construction	Potential construction methodologies were not discussed. This alternative would require the construction of a temporary work trestle, use of a thick large diameter casing that is not readily available, and for the mobilization of large specialty equipment, such as a hydraulic casing oscillator.
Potential Impacts	Potential impacts were not discussed.
Cost Estimate	The DOT&PF estimates the cost of this alternative would be approximately $30,000,000 per ice breaker. This cost estimate is dated.

4.3 Alternative 3: Riprap or Dolosse to Protect Piers 1 and 2 (Not Recommended)

Overview	This alternative proposes to construct two “islands” consisting of large riprap or precast concrete equivalent (aka dolos), to protect Pier 1 and Pier 2 of the Million Dollar Bridge from iceberg damage. Given the force of the Copper River, each piece of riprap would need to weigh 6,000 to 7,000 pounds so as not to be moved by the river. The “islands” would be considered sacrificial as loss of the riprap would occur over time due to the natural chemical and physical weathering processes, including abrasion from the suspended sediments in the river and potential dislodgements by ice. This approach has been successfully used at other bridges to protect the structures from vessel collision damage, but those bridge locations were accessible by barge and do not have the access challenges of the Million Dollar Bridge.
Construction	The most effective method to construct the “islands” would be during the winter when the river is completely frozen over, which would have the least impact on the river’s biological environment. This approach can only be achieved if there is sufficient ice to support construction equipment concurrent with the ability to

	clear the area where the islands would be constructed. In recent years there has been open water during winter months however, which means this construction method cannot be used. A second method would require the transportation of river barges but this has significant logistical challenges owing to the need to transport the barges over land to the Million Dollar bridge before floating them to use for construction.
Potential Impacts	Because the artificial "islands" are considered sacrificial, this alternative is unlikely to last 20 years or more under normal routine maintenance. Additionally, replacing the existing concrete icebreakers with artificial "islands" would look considerably different to what exists now, which may have implications for the historic integrity of the structure.
Cost Estimate	DOT&PF 's preliminary cost estimate is about $10,000,000 per "island".

4.4 Alternative 4: Pre-Cast Concrete Ice Breaker or Caisson (Not Recommended)

Overview	This alternative proposes to float a precast concrete ice breaker or caisson out to the former location of the ice breaker at Pier 1 then fill it with cast-in-place (CIP) concrete, rocks, or other material to sink it in the desired location. This is an unusual approach, and the DOT&PF does not have any historical data in which to replicate a design from.
Construction	Potential construction methodologies were not discussed.
Potential Impacts	The ability to float the structure to the site has not been proved. This alternative would require leveling and preparation of the riverbed and would likely need anchoring piles and at work trestle around its perimeter.
Cost Estimate	This alternative is estimated to cost around $20,000,000 per float, but a contingency is recommended as the approach is not proven.

4.5 Alternative 5: Closed Cell Sheet Pile Around Pier 1 (Not Recommended)

Overview	This alternative proposes the construction of a closed cell sheet pile wall around Pier 1.
Construction	This approach is a more conventional approach to protecting piers. It would require an in-water work trestle, a pile driving template to accommodate the high flow velocity, and a relatively large diameter cell of about 60 feet to resist the anticipated loads. Driving piles for the work trestle, template, and cellular cofferdam is likely to be difficult in the high velocity water, and ice loads potentially create additional challenges to accommodate during construction.

Potential Impacts The DOT&PF is not sure if the relatively flexible sheet piles can be driven into the streambed, as they may be too long and susceptible to buckling during driving.

Cost Estimate The estimated cost of this alternative is approximately $15,000,000 per cell. No information is available regarding the number of cells likely to be needed for this alternative.

4.6 Alternative 6: Drill/Pin Pier 2 Icebreaker in Place (Not Recommended)

Overview This alternative provides for pinning the icebreaker at Pier 2 in place to mitigate for its age and reduce the possibility of it being displaced by an iceberg and leaving the bridge pier vulnerable to damage. This alternative is recommended to proceed together with other alternatives at the Million Dollar bridge to maximize the value of equipment mobilization needed to complete the work.

Construction Constructing this alternative will require heavy equipment, logistical support, construction materials, and personnel to be able to access the site, which may be challenging because overland transportation access is not possible past MP 36 (NBI #339 and its associated washout).

Pinning the icebreaker in place requires drilling three diamond core borings through the ice breaker using PQ drill pipe, which has an outside pipe diameter of 4.8 inches. The drill pattern would place two borings on each end of the downstream side of the ice breaker, drilled at a 45 degree angle towards the upstream direction. A third boring would be placed on the upstream end of the ice breaker at a 45 degree angle towards the downstream direction. All three borings will be advanced to depths of 150 to 200 feet. After each boring is completed the drill pipes will be filled with cement grout and then entire drill string will be unscrewed from the drill head and left in their respective boring. This alternative would in effect nail or pin the ice breaker in place.

A temporary work trestle, positioned over the ice breaker, would need to be constructed to support the drill rig, its tooling, and other necessary equipment. Each boring could be completed within two to three 12-hour shifts, provided that no steel rails are encountered when coring through the ice breaker or its caisson. If steel rails are encountered the drilling rate would be slower, and more than one drill bit is likely to be required to drill to the required depth.

Potential Impacts It is not clear whether this alternative is covered by the FONSI to complete repairs to the Million Dollar Bridge. A re-evaluation will be needed to confirm the proposed actions against the original EA, which could, depending on the scope of this addition, include pinning this ice breaker.

Cost Estimate This alternative has not been developed sufficiently for a planning level cost estimate. However, the second draft of the study notes that if most of the support equipment and temporary work trestle structure is already on site from the actions required to replace the icebreaker at Pier 1, then the cost to repair the icebreaker at Pier 2 would be about $6,000,000. It is not clear where this value is drawn from or the year that it was developed.

4.7 Alternative 7: Steel Cage Addition to Steel Piles around Pier 2 (Not Recommended)

Overview The DOT&PF proposes to construct a steel cage framed around steel piles that have been installed around the perimeter of the ice breaker at Pier 2.

Construction No construction detail has been provided.

Potential Impacts This alternative is likely to look considerably different to the existing structure, which is likely to create issues regarding Section 106 of the National Historic Preservation Act owing to the historic nature of the bridge.

Cost Estimate This alternative has not been developed in sufficient detail to provide a cost estimate. However, since a temporary work trestle would be required to construct this alternative, the cost estimate is likely to be in the general range of what it would cost to implement Alternative 4 at about $20,000,000.

4.8 Alternative 8: Complete Repairs to Million Dollar Bridge (Recommended Alternative)

Overview

This alternative will complete repairs to the damaged bridge structure following the 1964 earthquake. It will also install seismic retrofits on Pier 1 and Pier 2 and rehabilitate deteriorated bridge components that have occurred because the bridge is an old structure and has not been maintained since 2005.

Construction

Heavy equipment, logistical support, construction materials, and personnel need to access the site. Overland transport is not currently possible past MP 36 (NBI# 339 and its associated washout).

Work includes drilling vertical holes down through the entire length of Pier 1 and Pier 2 and through their respective caissons. The borings would be drilled from the bridge deck using diamond core or air rotary drilling techniques. High-strength post-tensioning anchor rods, having dimensions of 110 feet long by 1-3/8" diameter, would then be installed inside these borings. The anchor rods would increase the piers' external overturning resistance as well as their internal flexural-

and shear- strength. After the rods are installed, pressurized grouting techniques would be used to inject cement grout, through tremie pipe, to fill any voids within the caissons' cofferdam cribs and any voids within the gravel of the caissons' working chambers, as well as filling the annulus of the borings within the piers.

Additional work includes installing frictional pendulum bearings on Pier 1 and Pier 2 for seismic isolation of the bridge's superstructure, like the bearing already installed on Pier 3, which provides for seismic resiliency. In order to install these bearings, the bridge spans will need to be lifted, and the existing bearings removed and replaced using a bracket system. The seismic retrofitting and realignment of the bridge's superstructure will also require the back wall of the south abutment (Abutment 1) to be adjusted to allow room for the superstructure to move during an earthquake. At that time, repairs of cracks and spalls on this abutment would be completed.
Other work to restore the bridge's structural integrity include, where needed, repairs or replacements of the bridge's bottom chords, bottom laterals, missing bolts, tie-rods, and concrete corbels. The bridge would also be painted to protect its steel from rusting.

Potential Impacts

In February 2002, a Finding of No Significant Impact (FONSI) for Copper River Highway Million Dollar Bridge (Project No. BH-0851(62)/60803) was made for this alternative. A re-evaluation will be needed to confirm the proposed actions against the original Environmental Assessment (EA). Work proposed that was not part of the original EA includes seismic retrofitting of the bridge and repainting the bridge. Testing indicates that the current paint is lead-based, so mitigation will be required to manage the environmental impacts associated with the lead paint removal.

Cost Estimate

This alternative has a 2025 planning level cost estimate of $70 Million.

4.9 No Build

Overview

The No-build alternative would make no attempts to repair or rehabilitate the Million Dollar Bridge. The bridge would continue to deteriorate, and no work would be performed to the icebreaker structures that protect the bridge.

Construction

No construction would occur.

Potential Impacts

The no build alternative would not mitigate the bridges current vulnerability to structural failure.

If a bridge pier(s) were to fail or if a bridge span(s) fell into the river there is potential for serious impacts to the navigation of the river and the environment. Due to statutory obligations with federal and state agencies, as well as liability issues, DOT&PF would have to retrieve the downed span(s). The cost of this endeavor would be extremely expensive and may cost more than the proposed actions to repair and rehabilitate the bridge. The implications of the historic status

of the structure should also be considered in any decisions regarding the future of the Million Dollar Bridge.

Cost Estimate There are no costs associated with the No Build alternative, but they may be costs associated with retrieving damaged sections in the event of structural failure.

4.10 Expand or Develop New Materials Sites

Many of the projects recommended in this study require additional earthen material for construction. These materials are limited in the general vicinity of the study area, and materials need to meet DOT&PF's standard material specifications for their intended purpose. It is also advantageous for material sites to be located as close to the project site as possible to reduce the cost of hauling materials and associated environmental impacts.

Two alternatives plus a no build were considered (Table 5):

Table 5: Project Alternatives to Expand or Develop New Materials Sites

Expand or Develop New Materials Sites	
Project Alternatives	**Recommendation**
Alternative 1: Develop Two Material Sources	Recommended Alternative
Alternative 2: Use/Expand Existing Materials Sites	Not Recommended
No Build	

4.10.1 Alternative 1: Develop Two New Material Sources (Recommended)

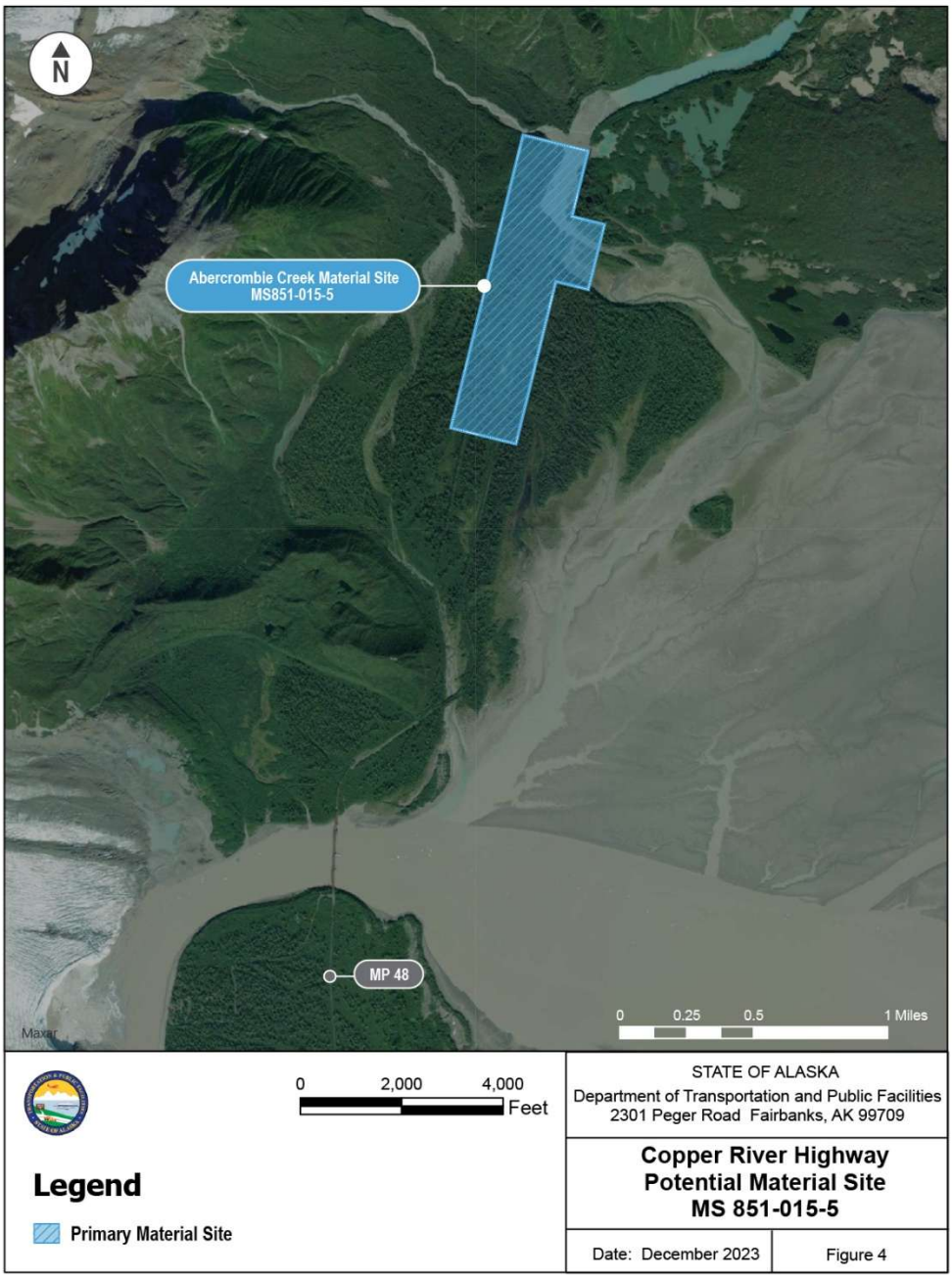
Overview Two material sources have been identified within the study area.

Existing Material Site 851-015-5
Material Site (MS) 851-015-5 is located north of the Million Dollar Bridge, between approximate MP 50 to MP 51 of the Copper River Highway (Figure 2).

The material at MS 851-015-5 is unconsolidated colluvium and reworked glacier till that was deposited in the outwash plain of the nearby Grinnell Glacier. The material within this site meets standard material specifications and there are sufficient quantities, with the exception of riprap, that could be used to provide the earthen material necessary to construct many of the recommended projects.

Because MS 851-015-5 is located north of the Million Dollar Bridge, haul trucks will need cross the bridge to access the site. Since the driving surface of the bridge deck is only 20 feet wide and its vertical clearance is about 16 feet, this limits the size of material trucks that can access the site. It would also limit the size of heavy equipment needed to obtain material at the site.

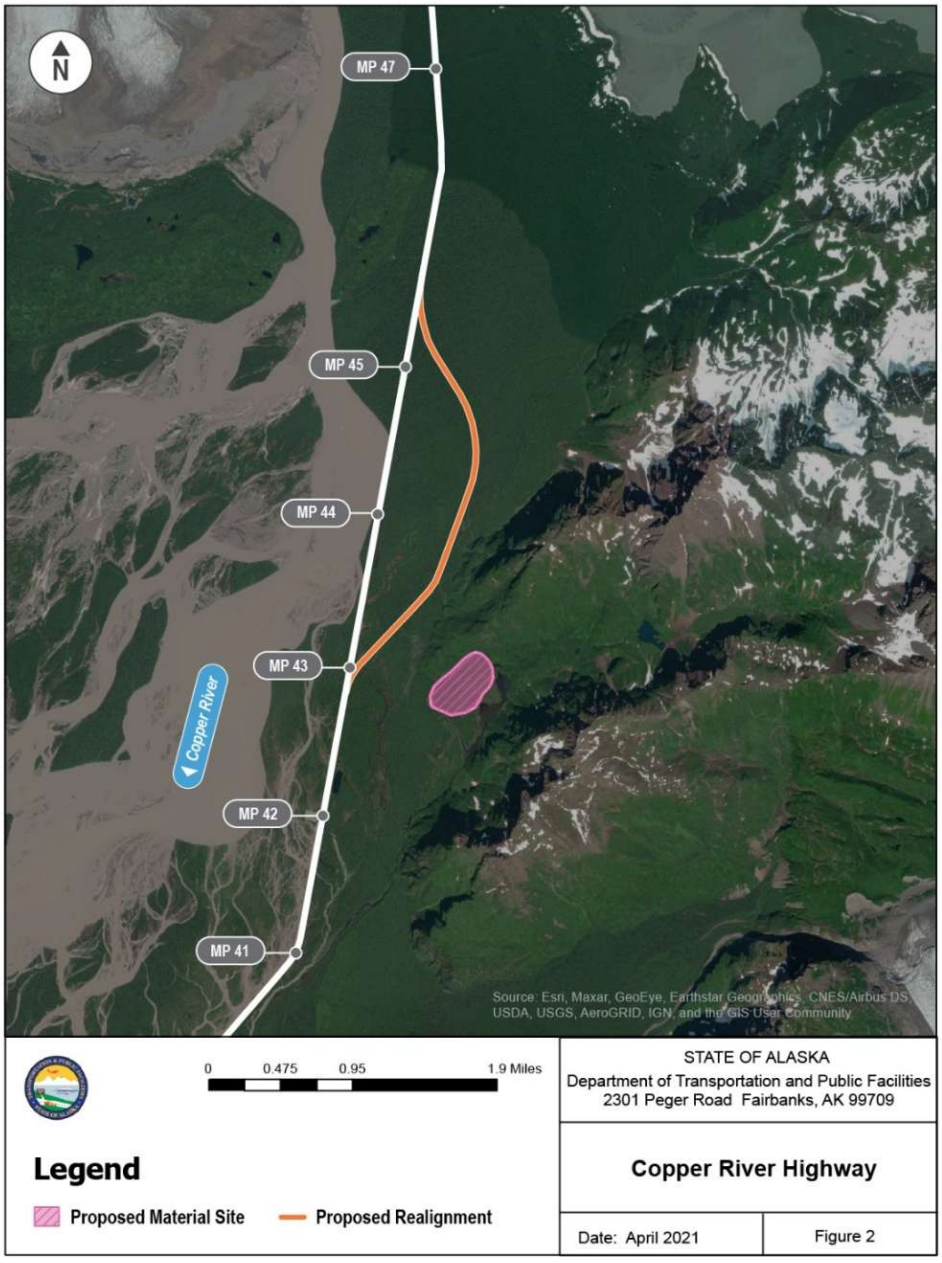
Figure 2: Material Site 851-015-5



Goat Mountain Glacial Valley Material Site

The second site is an undeveloped bedrock feature located at the mouth of the glacial valley that cuts through Goat Mountain near the proposed new highway alignment around the MP 43 washout (Figure 3). TEC owns the surface estate and Chugach Alaska Corporation owns the subsurface estate of this site. Preliminary material testing indicates materials that exceed the thresholds for both the Standard Highway Material Specifications and the Standard Airport Material Specifications. This site is also capable of producing all class size of riprap.

Figure 3: Goat Mountain Glacial Valley Material Site



Construction

MS 851-015-5 already exists so no additional construction impacts are anticipated other than using equipment to extract materials.

No detailed analysis has been completed on how the new material site at Goat Mountain Glacial Valley would be constructed.

Potential Impacts

Existing Material Site 851-015-5

A potential impact of MS 851-015-5 is created because the site's northern boundary encompasses a portion of Abercrombie Creek, an anadromous stream identified as rearing habitat for chinook, sockeye, and coho salmon. However, potential impacts to this stream could be mitigated by not mining any material from within the active floodplain of Abercrombie Creek and by maintaining a minimum buffer of at least 100 feet between the quarry and Abercrombie Creek. MS 851-015-5 also has a shallow groundwater table, which means that any excavation depths approaching 10 feet below the ground surface will likely encounter the groundwater table.

Goat Mountain Glacial Valley Material Site

Potential impacts of creating the Goat Mountain Glacial Valley material site include the need for blasting to mine materials from the site and the need to construct a haul road measuring approximately 0.6 miles in length across land owned by TEC to access the Copper River Highway near MP 43. The site is located at the mouth of a glacial valley that forms the headwaters of Clear Creek, which is an anadromous stream and the impacts on this waterway would need to be evaluated as part of creating this materials site.

Cost Estimate

No cost estimates are provided for these material sites.

4.10.2 Alternative 2: Use/Expand Existing Materials Sites

Overview

The DOT&PF evaluated the potential to use existing material sites (MS), including expansion of these sites if necessary. Most of the MS identified between MP 9 and MP 52 are no longer available, and highway access is not possible past MP 36 (NBI # 339 and its associated washout). The closest site has existing demands from DOT&PF's Maintenance and Operations Division, which means it cannot be used for projects considered in this study. Other potential sites are either farther away, have poor quality material, have been depleted, have been lost to erosion or also have existing demands on their material.

Construction

There are potential new sites that could be developed but are either far away and would require long haul routes to be build, or are near anadromous streams.

Potential Impacts

Potential impacts are not discussed beyond noting the closest existing site already has demands on the materials that mean they cannot be used for these potential projects.

Cost Estimate

No cost estimates are provided.

4.10.3 No Build

Overview	The No-build alternative would not result in new material sites being created. Earthen material required to construct any of the projects identified in this study would have to be mined and transported from existing permitted MS.
Construction	No construction is anticipated.
Potential Impacts	No impacts have been identified.
Cost Estimate	No cost estimates are provided.

4.11 Temporary Overland Route Within the Study Area

A temporary overland route was evaluated in the event another project receives funding prior to re-establishing access across NBI #339 and its associated washout, or an emergency event occurs that necessitates the creation of a temporary access. This alternative may also be appropriate if ADF&G issues an order to DOT&PF to remove all the culverts providing connectivity with the Copper River and Clear Creek before or if access is reestablished across NBI #339 and its associated washout.

Seven alternatives plus a no build were considered (Table 6):

Table 6: Project Alternatives to Expand or Develop New Materials Sites

Temporary Overland Route within Study Area	
Project Alternatives	**Recommendation**
Alternative 1: Temporary Work Trestle Spanning Washout at NBI #339	Recommended Alternative
Alternative 2: Construct Ice Road to Cross Channel at NBI #339	Not Recommended
Alternative 3: Ice Road on Broad, Shallow Delta Near NBI #339	Not Recommended
Alternative 4: Low Flow Period Temporary Work Trestle Spanning Washout at NBI #339	Not Recommended
Alternative 5: Overland Route on West Side of Copper River	Not Recommended
Alternative 6: New Road Above Copper River Active Flood Plain	Not Recommended
Alternative 7: Airstrip on Copper River Highway	Not Recommended
No Build	

4.11.1 Alternative 1: Temporary Work Trestle Spanning Washout at NBI #339 (Recommended)

Overview

This alternative provides for the construction of a temporary work trestle that spans the washout at NBI #339. If access is required to reach the Million Dollar Bridge, then a temporary access road will also need to be constructed around the washout at MP 43.5.

Construction

The design of the temporary trestle would need to accommodate large cranes and other heavy equipment, meaning spans of no greater than 40 feet are needed. The total length of the channel is 1,1110 feet, meaning 28 spans are needed. Each span takes approximately one week to construct, resulting in a construction period of more than six months to create the temporary trestle.

Potential Impacts

Potential impacts include the long construction duration, which would mean a full construction season is needed to construct the temporary trestle before any work could occur crossing the trestle.

The short spans needed to accommodate the weight of heavy vehicles have the potential to act as a large strainer, creating barriers to vegetative debris and ice flows. Ongoing monitoring and maintenance would be needed to avoid significant forces caused by debris and ice buildup that could potentially damage the temporary trestle. As such, there would need to be a dedicated effort to keep vegetative debris and ice from blocking the flow of water under this structure. If not, it would exert significant force on the piers of the temporary work trestle and potential jeopardizing its structural integrity. The short spans would also negatively impact the navigational opening under the temporary work trestle.

Given the uncertainty of work on the Copper River Highway or funding to move forward with projects, it is not clear how long this “temporary” trestle could be in place. It is possible it could be needed for several years.

Cost Estimate

The cost of this temporary work trestle is estimated to be approximately $7,000,000. It is not clear when this estimate was developed or what elements are included in this cost estimate.

4.11.2 Alternative 2: Construct Ice Road to Cross Channel at NBI #339 (Not Recommended)

Overview

This alternative proposes to use lower water flows during the winter months to enable the construction of an ice road to cross the channel at NBI#339.

Construction	Constructing this alternative is dependent on winter freeze conditions to reduce the flow of water through the Copper River Watershed. On freeze-up, an ice road would be created crossing the channel at NBI #339, which could then be used to transport equipment across the opening.
Potential Impacts	Freezing conditions to support the construction of an ice road are not consistent each year, which reduces the reliability of this option. The open water and strong current within the channel further mean that conditions can change quickly, creating a risk that personnel or equipment could be caught during a crossing or unable to cross back after successfully crossing the channel. Because of the risks associated with this alternative in the event freezing conditions do not occur, it is not considered reasonable or feasible.
Cost Estimate	No cost estimates are provided.

4.11.3 Alternative 3: Ice Road on Broad, Shallow Delta Near NBI #339 (Not Recommended)

Overview	A variation of the ice-road alternative would be to construct it further down river than the NBI #339 crossing, where the river delta broadens, becomes shallower, and the flow rate is slightly slower.
Construction	Constructing this alternative is dependent on winter freeze conditions to reduce the flow of water through the Copper River Watershed. On freeze-up, an ice road would be created, which could then be used to transport equipment across the opening.
Potential Impacts	Freezing conditions to support the construction of an ice road are not consistent each year, which reduces the reliability of this option. Because of the risks associated with this alternative in the event freezing conditions do not occur, it is not considered reasonable or feasible. In addition, the Copper River Delta Critical Habitat Area, a potential Section 4(f) resource, is located immediately downstream and adjacent to DOT&PF's ROW. This would need to be considered when selecting the location for an ice road crossing. Because of the risks associated with this alternative in the event freezing conditions do not occur, it is not considered reasonable or feasible.
Cost Estimate	No cost estimates are provided.

4.11.4 Alternative 4: Low Flow Period Temporary Work Trestle Spanning Washout at NBI #339 (Not Recommended)

Overview

This alternative assumes the width of the channel at NBI #339 would be reduced during late fall and winter due to freezing conditions, meaning a much shorter temporary work trestle would be needed.

Construction

The assumed trestle length would be approximately 200 feet, take 6 weeks to construct, and cost approximately 800,000. If the trestle is completed by early December then it could be used for construction activities for approximately three to three-and-a-half months before river levels would start to rise and the trestle would need to be removed.

This is a favorable alternative, but any earthen material that would need to be compacted could not achieve standard American Association of State Highway and Transportation Officials (AASHTO) compaction specifications if the material is frozen. In addition, temperatures would be below the level that would enable concrete to cure without the application of an artificial heat source to keep the temperature above a minimum 40°F, with the optimum temperature range being between 50°F and 90°F.

Potential Impacts

Potential impacts are not discussed in detail.

Cost Estimate

The cost estimate for the temporary trestle is $800,000.

4.11.5 Alternative 5: Overland Route on West Side of Copper River (Not Recommended)

Overview

This alternative proposes to establish an overland route along the riverbank on the west side of the active floodplain of the Copper River while the river is at its low flow stage during the late fall and winter. A route along this same area has been used during the low flow period by Childs Glacier Lodge.

Construction

It is assumed this alternative could be constructed using a bulldozer and grader to create a suitable trail. The trail would be lost when water levels rise during the spring. The route would connect back into the Copper River Highway north of the Million Dollar Bridge.

Potential Impacts

As this alternative would connect with the Copper River Highway north of the Million Dollar Bridge, it will likely restrict equipment that can use the route to what can be accommodated on its 20-foot width and 16-foot height.

This alternative would also require passage directly below and adjacent to Childs Glacier, which is prone to calving year-round and creates an unpredictable safety

hazard. Because of the risk associated with the glacier calving, this alternative is not considered to be reasonable or feasible.

Cost Estimate No cost estimates are provided.

4.11.6 Alternative 6: New Road Above Copper River Active Flood Plain (Not Recommended)

Overview This alternative proposes to construct an entirely new road along the west side of the Copper River, above its active floodplain, instead of trying to reconstruct, repair, or replace the existing damaged transportation infrastructure.

This alternative would to divert off the existing Copper River Highway near Flag Point (MP 27) and construct a new road along the flanks of the Chugach Mountains to gain access to the Childs Glacier Campground and Recreational Area and the Million Dollar Bridge.

Construction This alternative would require construction of new road of approximately 20 miles in length through the mountainous terrain that has been carved by glaciers and by the Copper River.

Potential Impacts The DOT&PF does not currently own ROW along the proposed alternative alignment. Land ownership along the southern portion of the alignment is federal land managed by the USFS, and the northern portion is on land owned by TEC.

Cost Estimate The DOT&PF has not advanced this alternative sufficiently to create a planning level cost estimate. However, TEC is constructing a new Shepard Point Road, which is approximately one fifth of the length of this proposed alternative and has an estimated cost of $132 Million (September, 2023). A new bridge would be required to cross the Copper River near Childs Glacier, further increasing the cost of this alternative. Extrapolating the cost of the Shepard Point Road and likely cost of a new bridge means this alternative is likely to exceed $1 Billion. This cost is not reasonable or feasible and therefore this alternative is not recommended to be considered further.

4.11.7 Alternative 7: Airstrip on Copper River Highway (Not Recommended)

Overview In 2022, DOT&PF and federal partners cleared vegetation on an area of the Copper River Highway between the Million Dollar Bridge and MS 851-015-5 to enable the it to be used as an airstrip for small, fixed wing aircraft. Currently the airstrip measures 1,100 feet with run-outs at each end. This runway length accommodates small plans similar to a Cessna 150. The USFS and Recreational Aviation Foundation

	would like to expand the airstrip to accommodate larger planes such as the de Havilland DHC-2 Beaver.
Construction	The 1,100-foot airstrip is already in operation. To expand the runway, additional clearing will be needed including a riprap material stockpile.
Potential Impacts	Neither the DOT&PF nor TEC, which owns the adjacent land, have issued permits to the USFS or the Recreational Aviation Foundation for use of the Highway for the airstrip. Furthermore, If DOT&PF decides to decommission the Copper River Highway within the study area then it can only vacate the property to TEC, in compliance with ANCSA Interim Conveyance No. 943, September 28, 1984.
Cost Estimate	No cost estimates are provided.

4.11.8 No Build

Overview	The No Build Alternative does not provide for any actions to create an alternative route for the Copper River Highway.
Construction	No construction is required.
Potential Impacts	No potential impacts are identified.
Cost Estimate	No costs are provided.

4.12 Decommission the Copper River Highway

As federal funds have been used to construct facilities along the Copper River Highway, they cannot just be abandoned. In addition, community members have expressed concerns about potential environmental effects associated with structural failure of bridges and culverts along the highway. The costs of removing infrastructure along the highway, and whether federal funds can be used to remove them, have been considered at a high level but are difficult to quantify. It is likely that if the road is no longer maintained, infrastructure would need to be removed as it fails, or investment should be made in reconstructing, repairing, or replacing the damaged infrastructure.

One alternative plus a no build were considered (Table 7):

Table 7: Decommission the Copper River Highway Alternatives

Decommission the Copper River Highway	
Project Alternatives	**Recommendation**
Alternative 1: Reconstruct, Repair, or Replace the Damaged Infrastructure Along Copper River Highway	Recommended Alternative
No Build	

4.12.1 Alternative 1: Reconstruct, Repair, or Replace the Damaged Infrastructure Along Copper River Highway (Recommended)

Overview

This alternative provides for the reconstruction, replacement or repair of damaged infrastructure along the Copper Rived Highway. This alternative would be realized through the implementation of the projects:

- Re-establish access across NBI #339 and Washout
- Replacing damaged culverts
- Reconstructing or realigning the Copper River Highway at the MP 43.5 Washout
- Repairs to the Million Dollar Bridge

To enable the mobilization of equipment, the re-establishment of access along NBI #339 and washout would be the first project completed, and could then be followed by the reconstruction and realignment of the highway at the MP 43.5 washout. Replacing damaged culverts would need to occur as work proceeds along the highway. The Million Dollar Bridge is the furthest point and unless it increases in priority, it could be the last project completed.

Construction

Construction should proceed as detailed in the projects.

Potential Impacts

Likely impacts are as identified in the projects.

Cost Estimate

Cost estimates are as identified in the projects.

4.12.2 Alternative 2: No Build

Overview

The No Build alternative provides for no action. No repair or reconstruction work would occur under this alternative.

Construction	No construction is proposed.
Potential Impacts	Impacts have not been evaluated. As the road and infrastructure has been constructed using federal funds, DOT&PF would be obligated to remove infrastructure in the event of failure.
Cost Estimate	Costs have not been estimated.