Sterling Highway MP 45–60
Final EIS and Final Section 4(f) Evaluation

Chapter 2
Project Alternatives

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Note to Reader:

Changes in this document since the Draft SEIS was published in March 2015 have been highlighted in grey for easy identification by the reader. Deletions and spelling corrections are not shown for clarity purposes.

Table of Contents

List of Maps

List of Figures

List of Tables

2 Alternatives

This chapter describes the evolution of the project alternatives and the alternative screening process. It describes how and why alternatives were identified for further evaluation in this Final Environmental Impact Statement (Final EIS), those alternatives that the screening process identified as reasonable for study in greater detail, and those alternatives that were eliminated from further consideration. It explains how the Juneau Creek Alternative became identified as the preferred alternative. Section 2.1 defines terms used throughout the Environmental Impact Statement (EIS). Section 2.2 describes the alternatives evaluation process. Section 2.3 provides background on alternatives from previous EIS efforts and then presents a summary overview of alternatives considered in the Draft SEIS effort (Section 2.4). Details follow about those alternatives that were not carried forward and why (Section 2.5). The final part of the chapter details the No Build Alternative and the four "build" alternatives evaluated throughout the rest of the EIS (Section 2.6) and presents detail on identification of the preferred alternative (Section 2.7).

2.1 Terminology Applicable to the Alternatives

All of the build alternatives would include a new highway. However, portions of each would follow the existing Sterling Highway, and portions would depart from the existing highway. This document uses the following terminology.

Existing highway (or existing road) refers to the Sterling Highway as it exists today.

Alternative refers to one of the five alternatives: the No Build, Cooper Creek, G South, Juneau Creek, and Juneau Creek Variant alternatives.

Build alternative refers to one of the four alternatives that would result in major construction. Each build alternative includes two segments of the existing Sterling Highway that would be completely rebuilt to remove sharp curves and add shoulders and passing lanes. Each of these alternatives also includes one segment that would cross land that is currently undeveloped, and in these areas a new highway would be built from scratch. These "segments" are not to be confused with segments 1–6 identified for traffic and safety purposes and discussed in Chapter 1.

Segment built on a new alignment refers to the segment of the alternative built all-new, off the existing alignment in a new location.

Segment built on the existing alignment refers to the two segments of each build alternative in which the existing highway would be rebuilt in the existing corridor. "Existing alignment" used in this document does *not* refer to a precise following of the existing highway centerline with the new highway centerline.

"Old" highway or "Old Sterling Highway" are used in quotation marks in certain circumstances to call out the segments of the existing highway that are not proposed to be altered as part of the alternatives for this project. Note, however, that changes could occur along the "old" highway to mitigate for impacts. This terminology also is used to distinguish between the "segment built on a new alignment" and the "existing highway" at the intersection of the two where a short segment of the "existing highway" would be rebuilt to include a T intersection with the segment built on a new alignment.

MP refers to "milepost" or "mile point" and may refer to a specific milepost posted in the field (MP 55) or to a mile point between two mileposts (MP 55.5).

2.2 Alternatives Development Process

To identify reasonable alternatives for this EIS, a screening process was established to evaluate the ability of potential project alternatives to meet the Purpose and Need (see Chapter 1) and other evaluation criteria. The evaluation criteria were developed by the Alaska Department of Transportation and Public Facilities (DOT&PF) and the Federal Highway Administration (FHWA) with input from agencies, community stakeholders, and interest-group stakeholders. This input was supplemented by communication with the broader community through specific outreach activities including an Internet-based survey. The evaluation criteria were made final after review and discussion by the Agency Consultation Committee and the Stakeholder Sounding Board. The DOT&PF formed these committees, respectively composed of regulatory agency personnel and project stakeholders from the public, to help review the project during development of alternatives (see Chapter 5, Comments and Coordination, for a description of the committees and their activities). The evaluation criteria consisted of the following:

- Consistency with the project's purpose and need;
- Potential physical environment effects, including impacts on natural resources (Kenai River, wetlands, fish, wildlife, vegetation, storm water runoff), aesthetics, and noise during project construction and operation;
- Potential social environment effects, including impacts to cultural and historical properties, trails, recreational properties, private property, economics, and subsistence, and consistency with local, regional, statewide, and Federal plans;
- Potential transportation-related effects, including impacts on vehicle traffic during construction and operation, freight movement, and the transportation system;
- Cost factors, including total project costs, annual operation and maintenance (O&M) costs, and 20-year life-cycle[1] costs; and
- Engineering feasibility.

The results of the screening process are fully documented in a technical report prepared for the project, titled *Evaluation Criteria and Alternatives Analysis* (HDR 2003a).

2.3 1982 and 1994 Draft EIS Efforts

Improving the Sterling Highway in the Cooper Landing area has been the subject of several efforts starting in the 1970s. These interrelated but discontinuous efforts resulted in a complicated set of previously considered potential alignments. A Draft EIS for a Milepost (MP) 37–60 project was approved in 1982 but was not approved as a Final EIS. A second Draft EIS for the same MP 37–60 project was approved in 1994 but was not approved as a Final EIS.

[1] Life-cycle costs are defined as the overall estimated cost of a single alternative over the life of the project or a defined period. All of the expenses associated with the project that occur during its life are used to calculate the life-cycle cost. Life-cycle costs take into consideration capital development costs as well as annual O&M costs, cost of major rehabilitation required during the life of the project, and the value of money over time. The period used for the screening process was 20 years.

DOT&PF and FHWA subsequently split the project and examined the MP 37–45 portion under a separate National Environmental Policy Act (NEPA) document. This EIS is the continuation of the evaluation of the MP 45–60 segment.

2.3.1 1982 Draft EIS

The 1982 Draft EIS addressed MP 37–60 of the Sterling Highway. The initial effort to develop alternatives resulted in several ways of negotiating or avoiding the most settled portion of the Cooper Landing community. All were variations on improving the existing alignment, and none strayed far from the existing alignment or from the Kenai River. By the time the 1982 Draft EIS was published, "Alternative B" was considered the "basic reconstruction proposal," addressing improvements throughout the length of the corridor. The other alternatives were minor variations, different from Alternative B for only short distances (see accompanying box "The Alphabet Soup of Alternative Names"). Other alternatives were developed and evaluated for the MP 37–45 segment (including the Quartz Creek area). Further information about the early effort is available in the 1982 Draft EIS (DOT&PF 1982), available on the project web site (sterlinghighway.net) and through DOT&PF.

The Alphabet Soup of Alternative Names

In 1982, the project began with alternatives called Alternative A, Alternative B, and so on through "E." When the 1982 Draft EIS was published, most of these alternatives were referred to in this alphanumeric way, but Alternative B was the primary alignment, Alternative C had been given the name "Bean Creek Alternative," and a "Juneau Creek Alternative" had been added without an alphanumeric designation (it crossed Juneau Creek near the confluence of Juneau Creek and the Kenai River, nearly 2.5 miles south of Juneau Creek Falls).

The 1994 Draft EIS carried forward the alphanumeric naming convention even though it considered all the A-E routes to be variations on a single "Kenai River Alternative." The 1994 effort added a "Juneau Creek F Alternative" (it crossed Juneau Creek 0.5 mile south of the falls) and a separate variation just called "Juneau Creek Alternative" (it crossed 1,000 feet north of the falls).

The current EIS effort began in 2000 and carried the alphanumeric system forward once again. Although A-E were dropped in favor of the name "Kenai River Alternative," the "F" alignment that crossed Juneau Creek 0.5 mile south of the falls was retained, and two variations of a "G" alternative were added.

After analysis to determine which alternatives were reasonable and would be carried forward for full study in this EIS, the only alphanumeric name remaining as a reasonable alternative was the G South Alternative. The other reasonable alternatives have place-based names: Cooper Creek Alternative, Juneau Creek Alternative, and Juneau Creek Variant Alternative. The No Action Alternative also is carried forward.

2.3.2 1994 Draft EIS

The 1994 Draft EIS considered the same alternatives as the 1982 Draft EIS and developed several new alternatives. Again, alternatives were developed and evaluated for the entire MP 37–60 segment. These alternatives included two Juneau Creek alternatives through the MP 45–60 segment. Each alternative included a new alignment that would be separated from the existing highway for about 9 miles:

- The "Juneau Creek Alternative" crossed Juneau Creek 1,000 feet north of Juneau Creek Falls and 500 feet north of the intersection of the Resurrection Pass and Bean Creek trails (fully evaluated in the 1994 EIS). This alternative was the same as the Juneau Creek Wilderness Alternative shown on Map 2.3-1 at the end of this chapter.
- The "Juneau Creek Variant (F)" crossed the creek's canyon 0.5 mile south of the falls (considered not reasonable and not carried forward for full evaluation in the 1994 EIS). This alternative was the same as the Juneau Creek "F" Wilderness Alternative shown on Map 2.3-1 at the end of this chapter.

In addition, the 1994 EIS carried forward a Resurfacing, Restoration, and Rehabilitation (3R) Alternative as a reasonable alternate. The Summary in the 1994 EIS stated: "to meet the requirements of Section 4(f), the 3R Alternative was developed as an avoidance alternative for the Kenai National Wildlife Refuge (KNWR) and the Resurrection Pass Trail." Section 2.5.1 further describes the 3R Alternative.

Further information on the 1994 Draft EIS is available in the document itself (DOT&PF 1994) and is available on the project web site (sterlinghighway.net) and through DOT&PF.

2.3.3 After the 1994 Draft EIS

In July 1995, DOT&PF published a Project Update. The Project Update explained that FHWA had approved splitting the Sterling Highway MP 37–60 Project into two separate, independent projects. The Project Update further explained that the improvement of the Sterling Highway from MP 37 to MP 45 was being expedited for construction, and it identified the Juneau Creek Alternative as the State's preferred alternative (at that time) for the MP 45–60 segment. The MP 37–45 segment was constructed and substantially complete in 2000. A final environmental document and a final decision for the MP 45–60 segment were not completed. The passage of time and changes in land ownership, land and river management, wildlife concerns, and transportation law required another draft EIS to supplement the previous work. A Notice of Intent (NOI) by FHWA to update the 1994 Draft EIS with a new draft SEIS was published in the *Federal Register* on May 19, 2003. The purpose of the NOI was to notify the public, Native groups, agencies, and local governments of the plan to prepare a Draft SEIS due to the passage of time[2] since the 1994 Draft EIS for the Sterling Highway MP 37 to 60 Project. Public and agency outreach and formal scoping meetings were held between July 2000 and July 2003. Scoping activities are summarized in the Scoping Summary Report (October 2006). The Draft SEIS and Draft Section 4(f) Evaluation were distributed for public review in March 2015. Public and agency review and input on the Draft SEIS were solicited during a 60-day comment period (March 27–May 26, 2015) and through hearings held in Anchorage, Cooper Landing, Soldotna, and Washington, DC. The Final EIS (this document) is the result.

2.4 Alternatives Considered for the Current EIS: Summary

With the background presented in Section 2.3, above, the current alternative development effort began in 2000. Although the Draft SEIS built upon previous work and knowledge of the area, the development and evaluation of alternatives started anew. DOT&PF and FHWA discarded old route preferences, reexamined the purpose and need for the project, and undertook substantial public and agency involvement to examine current issues and determine the scope of the Draft SEIS, including development of alternatives. While this Final EIS started with the previous work as a base, it evaluates and presents a fresh and current examination of area conditions, alternatives, and potential impacts.

Due to engineering advancements, changing community needs and perceptions, and updated projections of traffic, alternatives rejected during the 1982 or 1994 analyses were reconsidered (the Kenai River Alternative and Juneau Creek F Alternative). The 3R Alternative previously

[2] The original NOI for the Sterling Highway MP 37-60 EIS was published on June 12, 1980; another NOI was published on June 20, 1991 supporting the 1994 EIS.

carried to the Draft EIS phase was also reexamined. These evaluations are described in the following summary (Section 2.4.1) and in Section 2.5.

A key outcome of reassessing the purpose and need (Chapter 1) and alternatives was recognition of the importance of the Sterling Highway meeting current rural principal arterial standards over the full length of the alternative. Relatively minor adjustments to the highway that would result in improvements but still not meet these standards were not considered reasonable because they would not satisfy the project purpose and need—to reduce congestion, meet current standards, and improve highway safety.

2.4.1 Summary of Alternatives Screening Process

The project team (DOT&PF and FHWA) considered multiple alternatives in an effort to satisfy the project purpose and need. These alternatives were derived from previous Draft EIS efforts in 1982 and 1994, suggestions made during the SEIS public and agency scoping process, and engineering efforts developed specifically for the SEIS. After much consideration of possible variations, the team finalized a full range of alternatives for consideration, which were published in an *Evaluation Criteria and Alternatives Analysis* (HDR 2003a). Following a public and agency review period and consideration of more than 100 comments received, a 2003 publication[3] documented decisions for alternatives to carry forward as reasonable alternatives for evaluation in this EIS. Table 2.4-1 lists the alternatives discussed and evaluated in that analysis and identifies those that were carried forward as reasonable alternatives to be evaluated in the SEIS. Map 2.3-1 shows the 2003 alternatives considered but rejected, and Map 2.4-1 shows the alternatives that were advanced for a full evaluation in the SEIS, including the No Build Alternative. Sections 2.5 and 2.6 describe each alternative in further detail and describe the reasons for deciding not to carry several of them forward.

Table 2.4-1. 2003 results from evaluation criteria and alternatives analysis

Alternative	Carried Forward for Evaluation in the SEIS?
No Build Alternative	**Yes**
Resurfacing, Rehabilitation, Restoration Alternative (3R)	No
Kenai River Alternative	No
Kenai River Walls Alternative	No
Cooper Creek Alternative	**Yes**
Russian River Alternative	No
G North Alternative	No
G South Alternative	**Yes**
Juneau Creek "F" Wilderness Alternative	**Yes**
Juneau Creek "F" Forest Alternative	No
Juneau Creek Wilderness Alternative	No
Juneau Creek Forest Alternative	No

Source: (HDR 2003a, HDR 2003d)

[3] "Recommendations from the *Evaluation Criteria and Alternatives Analysis* for the Sterling Highway Supplemental Draft Environmental Impact Statement Process" (HDR 2003d).

2.4.2 Summary of Post-2003 Alternatives Refinement

2.4.2.1 General Summary

Post-2003, the project team conducted further engineering refinement of those alternatives carried forward. This included further work for all alternatives to balance cut and fill of earth material for a more efficient construction process, examination of bridge types, additional cost estimating, impact assessment, agency consultation, engineering, development of impact mitigation measures and enhancements, and other efforts.

Of note, further consideration of the Juneau Creek "F" Wilderness Alternative resulted in a geotechnical report (R&M Consultants 2005) that recommended moving the location of the bridge over Juneau Creek Canyon several hundred feet north to a location with a more stable rock foundation for the bridge. Because other Juneau Creek alternatives had not been carried forward, and for simplicity, the "F" was dropped from the name, and this alignment with the altered bridge location is now called the Juneau Creek Alternative.

The Forest Service, U.S. Department of Agriculture (Forest Service), as a cooperating agency, suggested that a full range of alternatives should include examination of the new proposed alignments with the additional removal of either the Schooner Bend Bridge or the Cooper Landing Bridge on the existing alignment, resulting in the existing alignment becoming a dead-end road. The *USFS-Suggested Alternatives Analysis* (HDR 2006b) determined that no combination of the EIS alternatives (Cooper Creek Alternative, G South Alternative, or Juneau Creek Alternative; described in Section 2.6) that included removal of either the Schooner Bend Bridge or the Cooper Landing Bridge would meet the project purpose for serving local traffic. Local traffic intending to get to recreational facilities along the existing highway (after removal of one of the two bridges) would have to travel in a loop a minimum of about 16 miles one way to reach popular destinations that are within 1–2 miles on the existing highway, such as the Resurrection Pass Trail and popular fishing holes such as Sportsman's Landing (HDR 2006b). For these reasons, the conceptual alternative was determined not reasonable, and this alternative is not discussed further in this Final EIS.

The involvement of Federal Wilderness within the KNWR on the Juneau Creek Alternative prompted reexamination of the "Forest" alternatives. After careful engineering, the project team determined that design modifications for grade (so that the slope of the road would meet the standard) and for the intersection of the existing Sterling Highway and proposed new highway near Sportsman's Landing could be made to include a variant of the Juneau Creek Alternative that avoided the Wilderness and would be feasible from an engineering standpoint. Three different alignments were evaluated through the same screening criteria used in 2003 (HDR 2010a). As a result, a single alignment called the Juneau Creek Variant Alternative was added as a reasonable alternative. This ultimately affected the approach of DOT&PF and FHWA to the treatment of the Juneau Creek and Juneau Creek Variant alternatives; see Section 2.4.2.2 below for further explanation.

Refinements of alternatives resulted in the following list of alternatives fully considered in this Final EIS:

- No Build Alternative
- Cooper Creek Alternative

- G South Alternative
- Juneau Creek Alternative
- Juneau Creek Variant Alternative

Map 2.4-1 shows all of these alternatives together on one map. Each of these alternatives is described in detail individually in Section 2.6.

2.4.2.2 Consideration of Juneau Creek Alternative

In January 2013, after analysis of the four build alternatives and after consultation with the agencies, DOT&PF sent a letter to the U.S. Fish and Wildlife Service (USFWS; KNWR) indicating that the project sponsors (DOT&PF and FHWA) did not intend to select the Juneau Creek Alternative as the preferred alternative. This was because the Juneau Creek Alternative was the only alternative that would cross KNWR lands outside the existing right-of-way and the only alternative that would cross Federally designated Wilderness (in particular since they had identified an alternative that avoided those impacts – i.e., the Juneau Creek Variant Alternative). The letter was prompted by a requirement for a specific process spelled out under Title XI of the Alaska National Interest Lands Conservation Act (ANILCA). DOT&PF had decided not to begin the ANILCA Title XI process because they did not intend on selecting an alternative that would cross KNWR [lands protected under Section 4(f) of the Department of Transportation (DOT) Act—the subject of Chapter 4] and Wilderness.

At that time, cooperating agencies USFWS, the Forest Service, and DNR objected to making what appeared to them to be a decision about the alternative before publishing the Draft SEIS. DOT&PF and FHWA considered the comments, and explained that it is common practice to examine avoidance alternatives and to drop alternatives or modify the alignment based on that analysis. They reconfirmed that the Juneau Creek Alternative was not likely to be selected. The combination of circumstances regarding KNWR and Wilderness impacts was seen as constituting an unusual risk for this alternative and contributed to the decision by DOT&PF and FHWA to announce that they were unlikely to pursue selection of the Juneau Creek Alternative as preferred as long as the land status remains Federally designated Wilderness and as long as there were other alternatives that would meet the transportation purpose and need for the project. Still, because of requests from agencies and tribal entities, and public expectation, the Juneau Creek Alternative was fully evaluated in the Draft SEIS.

DOT&PF and FHWA fully analyzed the alternative in part because it was possible that CIRI and DOI would execute a land exchange that would remove the Wilderness and KNWR designation in this area before project construction. Such an exchange was authorized by Congress in the Russian River Land Act (see Section 3.1.1.5), and CIRI stated in 2010 and 2013 project meetings that it intended to pursue the land exchange process.

Since publication of the Draft SEIS in March 2015, the DOI indicated in writing in August 2017 its commitment to undertaking the land exchange, should the Juneau Creek Alternative be selected. As a result, DOT&PF and FHWA have determined that, for the Juneau Creek Alternative, this constitutes a reasonably foreseeable future action, and its effect has been evaluated as a cumulative impact (see Section 3.27). This change has also been reflected in the Least Overall Harm Analysis under Section 4(f). See also Sections 2.7 and 4.8 regarding subsequent identification of the Juneau Creek Alternative as the preferred alternative because it would have the Least Overall Harm.

No decision will be final until FHWA signs the Record of Decision (ROD).

***Of Note: In the impact discussions in Sections 3.1 through 3.26, it is assumed that the KNWR and Wilderness status remain as they are today. However, in Section 3.27, Cumulative Impacts, there is analysis of the reasonably foreseeable future change in land status, should the Juneau Creek Alternative ultimately be selected in the ROD. The Least Overall Harm Analysis in Sections 4.8 and 4.9, reflects the overall impact, including the cumulative impacts.

2.5 Alternatives Considered and Not Advanced for Full Analysis

The following subsections describe reasons that some alternatives considered were eliminated from detailed study in this Final EIS. Map 2.3-1 displays these alternatives. Sections 2.1 and 2.4 above summarize the evaluation process.

2.5.1 Resurfacing, Restoration, and Rehabilitation Alternative (3R)

A 3R Alternative was considered to be a reasonable alternative when the 1994 Draft EIS was prepared.

In transportation engineering, 3R projects are based on a safety analysis and generally consist of minor fixes to curves or intersections. 3R projects can include other relatively minor upgrades, such as paving or re-paving. Typically, little or no new right-of-way is required. In contrast, "4R" projects include "reconstruction" and involve complete reconstruction of an existing road (see accompanying box).

The 1994 3R Alternative was carried forward at that time primarily to provide an alternative that avoided Section 4(f) properties; subsequently, it has been determined that it would not be possible to avoid Section 4(f) properties even if the project remained within the right-of-way (see Chapter 4 for current information on Section 4(f)). The project purpose and need at that time was general—"provide a safe modern highway"—and identified problems including lack of shoulders and congestion but did not require meeting standards. For purposes of the Final EIS, the 3R Alternative is no longer considered a reasonable alternative because it would not meet the current project purpose and need of reducing congestion, improving highway geometrics to current standards, and adequately improving safety of the National Highway System (NHS) in the Cooper Landing area. (Rural principal arterial standards are summarized in Section 2.6.2.)

The 1994 Draft EIS indicated that the Juneau Creek Alternative and the 3R Alternative each "would provide a modern highway meeting (then-) current design standards." However, the standards for the two types of improvement were not equal; the standards for a 3R project were (and still are) different than those for full reconstruction or construction on a new alignment. The 3R Alternative was noted in the 1994 EIS as "essentially the minimum development alternative" and would have had two 12-foot lanes and two 6-foot shoulders. Safety analysis indicated that one low-speed curve, at MP 47.5 (just north of the Cooper Landing Bridge), would have been improved. The 1994 Draft EIS stated: "Accident rates at the remaining low speed curves were not high and consequently no alignment improvements are required." The Sterling Highway under a 3R alternative would have remained a winding road with caution and advisory speed limit signs in the 30-45 mph range on several curves and for several miles. The alternative would have had narrower shoulders than the 1994 Juneau Creek Alternative.

In 1994, DOT&PF would have accepted the 3R Alternative as a stop-gap measure. The 1994 Draft EIS acknowledged that "3R projects generally are constructed to preserve and extend the

service life of roadways, while enhancing safety conditions" without necessarily bringing the highway fully up to then-current rural principal arterial standards. The 1994 Draft EIS acknowledged that the 3R Alternative was not equal to full reconstruction alternatives and would not have had the same design life: "(It) is likely that some additional improvements may be required within 10 to 15 years after construction of this alternative. Additional improvements could range from another 3R project to full reconstruction."

In contrast, the 1994 Juneau Creek Alternative would have had two 12-foot lanes and two 8-foot shoulders, and side slopes and clear zones that met standards for safety. All curves would have met standards for safe use at 60 mph, and the alternative was designed to last a minimum of 20 years without need for modification, except for repaving.

While a 3R alternative may have been acceptable in 1994, the passage of time and increases in traffic have led DOT&PF to determine that fully meeting rural principal arterial standards for roadway geometry is important. The project purpose and need has been made more explicit and detailed to indicate that meeting geometric standards for a rural principal arterial, and thereby increasing safety

3R, 4R, and "Existing Alignment"

Continued use of the existing alignment, with improvements, has been a goal expressed by some members of the public and some agency representatives, particularly since the issuance of the 1994 Draft EIS. That Draft EIS introduced concepts of all-new alignments separated from the existing highway for 8-9 miles (the Juneau Creek alternatives) and contrasted them with a "3R" Alternative on the existing alignment. It appears there has been confusion ever since, not only by commenters but within project documents, equating "3R" with "existing alignment."

The 2003 *Evaluation Criteria and Alternatives Analysis* (HDR 2003a) furthered the confusion by explicitly labeling the 3R Alternative a "reconstruction" alternative. However, a 3R project by definition is a "resurfacing, rehabilitation, and restoration" project and not a full reconstruction type of project. "4R" is the term used when adding "reconstruction."

Projects designated as 3R and 4R are constructed under different standards. 3R projects are focused on structural improvements within the context of the existing road design. Typically, changes to road geometry are based on spot safety issues that have been identified in specific locations. DOT&PF's *Alaska Preconstruction Manual* defines a 4R project as "a major highway improvement that completely rebuilds an existing roadway, or constructs a roadway on a new alignment, to the contemporary design standard...," that is, it rebuilds it to the standards for the given road classification. For the Sterling Highway, the functional classification is rural principal arterial.

The geometric standards for a rural principal arterial are discussed in Section 2.6.2 of this EIS. The standards are based on decades of transportation design experience and testing across the U.S. and internationally, and are meant primarily to achieve the safest and most efficient driving experience possible. DOT&PF and FHWA have determined that achieving these standards is important for this project, for safety and to relieve congestion. By State and Federal policy, once the type of project is determined for a road of any functional classification, formal design exceptions are required if there is a need to depart from the standards. For this project, DOT&PF and FHWA have determined that a 3R project or departure from the "4R" standards is not warranted or appropriate.

For this EIS, the project team reconsidered the 3R Alternative presented in 1994 and determined it to be not reasonable because it would continue to be too winding, inefficient, and unsafe for the amount of traffic it needs to accommodate—a slow, congested road for through traffic and one difficult and unsafe for the community, as well as recreation users, both drivers and pedestrians, as described in the main text. In short, it would not achieve the stated project purpose and need.

To satisfy the public interest in an alternative that stayed on the existing alignment, the project team also developed a reconstruction (4R) alternative that would meet all current standards for lane, shoulder, and clear-zone widths and for grades (road steepness), curves, and design speed while staying as close as possible to the existing alignment. That effort resulted in the Kenai River Walls Alternative, discussed below in the main text. It was found not reasonable based on engineering and construction problems and impacts to the Kenai River.

and reducing congestion, is a requirement of the project.

In an effort to further address public interest in an alternative that remained on the existing alignment throughout its length, DOT&PF compiled previous data related to alternatives following the existing alignment between MP 48 and MP 51 into one document—the *Existing Alignment Issues* report (HDR 2013c). It discusses the particular physical issues that render it not feasible from an engineering standpoint to widen lanes, add shoulders, soften curves, provide clear zones, and increase sight distances to meet standards in the MP 49–50.5 portion of the existing highway. Specifically, the 3R Alternative from 1994, like the Kenai River Walls Alternative (Section 2.5.3, below), would require extraordinary cuts into known unstable soils that comprise a high bluff that rises in some places directly from the Kenai River. There is not enough physical space for a widened highway. The condition of the bluff does not allow for cuts in the soil materials, and sensitivity of the Kenai River does not allow for fill in the river. Also, there are many additional safety and mobility problems, including a very narrow right-of-way and dozens of intersecting driveways, associated with placing a National Highway System route through Cooper Landing in the MP 48–49 area.

Therefore, because (1) it is not feasible using sound engineering judgment to create a route that would meet current standards for safety and highway efficiency, and (2) the 3R Alternative would not satisfy the current statement of purpose and need, a 3R solution is no longer reasonable.

A *Traffic Analysis Assessment* (HDR 2001a) for the EIS and the *Evaluation Criteria and Alternatives Analysis* (HDR 2003a) addressed the 3R Alternative but did not pass it through the alternatives screening process because, by definition, it did not meet the purpose and need. The *Alternatives Analysis* document stated:

> (The 3R Alternative) is no longer a viable alternative because it would not improve highway geometrics to current standards or adequately improve traffic flow through the Cooper Landing Area. The original traffic analysis conducted on the 3R Alternative for the 1994 DEIS only examined average annual traffic without consideration for peak season traffic volumes. After reanalyzing the 3R Alternative (in the *Traffic Analysis Assessment*) with peak season (summer) traffic data, it was determined that the 3R Alternative would not alleviate peak season traffic conditions. (HDR 2003a)

As an alternative that would have realigned only one particularly unsafe curve without meeting full geometric standards, the 1994 3R Alternative would not satisfy today's identified need to bring the highway to current rural principal arterial standards for highway geometry. It also would not adequately improve safety because it would retain tight curves and variable speed postings.

Based on further comments received on the Draft SEIS about use of the existing alignment, DOT&PF conducted additional engineering effort for this alternative. In an effort to optimize the 3R Alternative rather than taking it as it was in 1994, transportation engineers looked again at the problematic stretch of highway in the MP 48–51 area. It was assumed that the remaining 11 miles would meet current standards, as is shown in the Cooper Creek Alternative. The engineers' charge was to see how much they could do to improve the highway without substantially cutting into the unstable high bluffs on the uphill side of the highway, and without substantially filling in the Kenai River, all while remaining sensitive to impacts in the Cooper Landing community. The findings were that one curve—a curve at MP 49.5 bracketed by the river and the bluff—could

not be improved beyond the 35 mph design speed without substantially filling in the Kenai River. This curve set the standard for this 3-mile stretch of highway, because transportation engineers aim to establish as much consistency in the driving experience as possible and not promote sudden changes from slow speeds to faster speeds and back again.

Because the right-of-way is very narrow in Cooper Landing, and because of a need to retain or replace a community pathway, the engineers examined a curb-and gutter cross-section, which requires a buried stormwater drainage system in place of broad ditches and would allow the road to function with 12-foot lanes and 4-foot shoulders. In the area of approximately MP 50.5, another area where the highway is located immediately between the bluff and the river, the engineers examined use of a low cut in the bluff as an alternative to fill in the river or cantilevering the highway over the river flood zone.

Professional transportation engineers, including consultants making recommendations and decision-makers at DOT&PF, examined this variation of the 3R Alternative and determined that the same basic issues still applied: The highway design speed in this area would remain as it is today, 35 mph, and while a few driveways could be consolidated, dozens of driveway connections would remain. These features, and the curb and gutter cross-section itself, were indicative of an urban arterial or collector local street rather than a rural principal arterial necessary to support the National Highway System. DOT&PF and FHWA felt strongly that the project purpose and need was appropriate in calling for meeting rural principal arterial standards for safety and efficiency, and that the variation on the 3R Alternative would not satisfy the stated purpose and need. Furthermore, it still would require cutting into unstable bluffs—with engineering concerns remaining about bluff stability and long-term maintenance. Finally, it still would cause substantial impacts within Cooper Landing, continuing highway conflicts with side streets. All current and forecast future traffic would traverse the length of the community and, as is currently observable under similar speed and driveway conditions, traffic would continue to be backed up, with drivers impatient to continue their highway journey and prone to taking risks to pass other cars.

Under either the 1994 3R Alternative or the 2015 variation of the 3R Alternative, this alternative would retain conditions associated with multiple driveways that would contribute to congestion and safety conflict points on this NHS route. For these reasons, and based on the purpose and need expressed in Chapter 1 and the issues raised in the 2001 *Traffic Analysis* Assessment, the 2003 *Alternatives Analysis*, the 2013 *Existing Alignment Issues* report, and the 2015 variation effort, the 3R Alternative is not further addressed in this Final EIS.

2.5.2 Kenai River Alternative

The Kenai River Alternative would have been located mostly on the existing alignment along the Kenai River but included four new bridges crossing the Kenai River, one new bridge over Juneau Creek near its mouth, and replacement of the Schooner Bend and Cooper Landing bridges. The *Evaluation Criteria and Alternatives Analysis* and subsequent analysis (HDR 2003a, 2003d) found the Kenai River Alternative to be unreasonable. It was eliminated from further consideration because of its impacts to the Kenai River and Juneau Creek associated with the new bridges, cultural and private properties, and the lower Juneau Creek delta, an area that is

important for bears. Additionally, this alternative had a relatively poor level of service (LOS) for traffic in the design year.[4] This, in combination with the other factors, made it not reasonable.

2.5.3 Kenai River Walls Alternative

The Kenai River Walls Alternative was an attempt to design an alternative that would be a full reconstruction of the highway using its existing alignment. Similar to the Kenai River Alternative, the Kenai River Walls Alternative would have closely followed the Kenai River through the central section of the project area. This alternative provided an alternative alignment to the 2-mile section where the Kenai River Alternative (see Section 2.5.2 above) crossed the Kenai River four times in close succession, resulting in unreasonable impacts to the river (a State park). The Walls alternative would have remained on the south side of the Kenai River and generally followed the existing roadway. This alternative was designed as a complete reconstruction alternative (4R project) that would meet the purpose and need of this project (see sidebar explanation of 3R, 4R, and the existing alignment in Section 2.5.1, above).

The goal was to maintain a 60-mph design speed and include no new Kenai River crossings. To achieve this goal, retaining walls would have been required on both sides of the roadway between MP 49 and MP 50.5. The walls on the north (Kenai River) side of the highway would generally be 15 feet high by 800 feet long. The walls on the south side would be 50 feet high on average but would reach a maximum of 165 feet high and 1.1 miles long.[5] The *Evaluation Criteria and Alternatives Analysis* and subsequent analysis (HDR 2003a, 2003d) found the Kenai River Walls Alternative to be unreasonable, and it was eliminated from further consideration because of unusual engineering challenges (particularly unstable soils requiring unusually high walls with risk of failure onto the highway and into the Kenai River), impacts to existing highway traffic during construction, high life-cycle costs, potential impacts to the Kenai River and associated natural resources and recreational uses, and impacts to cultural resources and private properties. Additionally this alternative had a relatively poor LOS for traffic in the design year (see discussion about forecasted LOS in the design year in Section 1.2.2.1 and Table 1.2-3). This in combination with the other factors made it not reasonable.[6]

2.5.4 Russian River Alternative

The Russian River Alternative would have similarities to the Cooper Creek Alternative that is carried forward for full evaluation in this EIS (see Section 2.6.3). The goal was to find a road corridor that remained on the south side of the Kenai River between Kenai Lake and Sportsman's Landing, skirting south of the community and recreational driveways. From east to west, the Russian River Alternative would have departed the existing highway at the Cooper

[4] At that time, the design year was 2025. It has since been extended to 2043 to provide a 25-year projection from the expected EIS decision.

[5] Engineering challenges associated specifically with the soils and required walls are detailed in two reports on file with DOT&PF, dated June 3, 2003 and September 18, 2003. These reports were prepared by a team of roadway and structural engineers who interviewed wall engineering specialists across the United States and internationally. They are summarized in the *Existing Alignment Issues* report (HDR 2013c).

[6] The Cooper Creek Alternative is similar to the Kenai River Walls Alternative in that it presents a full reconstruction alternative that, for more than 70 percent of its length, uses the existing alignment. It deviates from the existing alignment to the south of Cooper Landing, routing around the "walls" area, where the ability to construct high walls is not recommended. Section 2.6.3 describes the Cooper Creek Alternative.

Landing Bridge and climbed the slope south of the Cooper Landing community (similar to the Cooper Creek Alternative, see Section 2.6.3). It would have crossed Cooper Creek on a high bridge and traversed the hillside, descending to cross the Russian River on a new bridge. It then would have paralleled a major power transmission line across KNWR lands to the Kenai River and crossed the river on a new bridge downstream of Sportsman's Landing and the Russian River Ferry, tying into the existing alignment near MP 55.5. The Russian River Alternative would have constructed 8 miles of new highway and three new major bridges. The *Evaluation Criteria and Alternatives Analysis* and subsequent analysis (HDR 2003a, 2003d) found the Russian River Alternative to be unreasonable. It was eliminated from further consideration because of high life-cycle costs; potential impacts to the Kenai and Russian rivers and Cooper Creek, their associated natural resources, and their recreational uses (e.g., camping and fishing in the Russian River Campground and Sportsman's Landing area); substantial impacts to cultural resources, particularly the Sqilantnu Archaeological District; and lack of public and agency support.

2.5.5 G North Alternative

The G North Alternative would have avoided community impacts by skirting north of developed areas of Cooper Landing. The G North Alternative would have followed and improved the existing alignment to MP 46.3 and then continued across the hillside north of Cooper Landing before descending to crossings of Bean Creek, Bean Creek Trail, lower Juneau Creek (a long bridge), and the Kenai River (a new bridge). The G North Alternative would have rejoined the existing alignment near MP 51.5, just east of Gwin's Lodge, and would have improved the existing alignment to the MP 58 area near Skilak Lake Road. The G North Alternative would have been similar to the G South Alternative (see Section 2.6.4) but located slightly farther north and higher on the slope above Cooper Landing. The new crossings of the Kenai River and Juneau Creek were at the same locations as in the G South Alternative, but the new Bean Creek crossing was farther to the north.

The *Evaluation Criteria and Alternatives Analysis* and subsequent analysis (HDR 2003a, 2003d) found that, while the G North Alternative and G South Alternative had relatively high life-cycle costs and involved new crossings of Bean and Juneau creeks and the Kenai River, they avoided the Resurrection Pass National Recreation Trail and KNWR Wilderness, which were compelling reasons to further study these alternatives. The G South Alternative was recommended for further study in the Draft SEIS because it had a better LOS for traffic in the design year than the G North Alternative; however, there was little to distinguish the two alternatives or justify carrying both forward. The G North Alternative was not carried forward, and is not discussed further in this EIS.

2.5.6 Juneau Creek "F" Forest Alternative

The Juneau Creek "F" Forest Alternative would have been similar to the Juneau Creek "F" Wilderness Alternative. The "F" Wilderness Alternative is carried forward in this EIS with slight modifications and renamed as Juneau Creek Alternative (see Section 2.6.5). The only difference between "F" Forest Alternative and "F" Wilderness Alternative was that, on average, the "F" Forest Alternative would have had slightly steeper grades (road slopes or hills) west of Juneau Creek to avoid KNWR designated Wilderness land. It would have tied into the existing alignment on Chugach National Forest land rather than within the KNWR. The Juneau Creek "F" Forest Alternative would have departed the existing alignment near MP 46.3 (similar to G

North; see Section 2.5.5) and would have traversed the hillside north of Cooper Landing, climbing to a crossing of Juneau Creek Canyon on a long bridge located about 0.5 mile south of Juneau Creek Falls and outside the southern boundary of the Forest Service Juneau Falls Recreation Area that surrounds Juneau Creek Falls. West of Juneau Creek, the alternative would have descended to the Sportsman's Landing area at grades of 6–7 percent, meaning the slope of the road would have been too steep to meet current standards. The alignment would have rejoined the existing alignment at MP 55 (at Sportsman's Landing).

The *Evaluation Criteria and Alternatives Analysis* and subsequent analysis (HDR 2003a, 2003d) found the Juneau Creek "F" Forest Alternative to be unreasonable, and it was eliminated from further consideration because of traffic impacts at the intersection near Sportsman's Landing, an inability to meet current design standards for grade, and a lack of agency and public support. Two intersections—one for the existing Sterling Highway and one for Sportsman's Landing—would have been located at the base of a long hill. Sportsman's Landing (also the access for the Russian River Ferry) is the focal point for much of the fishing activity at the confluence of the Russian and Kenai rivers, and traffic, cars parked on the shoulder, and random pedestrian traffic on the highway are known safety issues in this area in mid-summer. Placing standard T-intersections with high seasonal use in close proximity would not improve the current situation, especially when coupled with grades in excess of standard. These factors contributed to the finding that this alternative was not reasonable. The Juneau Creek Variant Alternative (see Section 2.6.6) serves similar purposes and is designed to resolve the problems identified with the "F" Forest Alternative.

2.5.7 Juneau Creek Wilderness Alternative

The Juneau Creek Wilderness Alternative would have been similar in overall concept to the Juneau Creek "F" alternatives, departing the existing alignment at approximately MP 46.3, but it would have climbed farther up the hillside to cross Juneau Creek on a short bridge located about 1,000 feet north of Juneau Creek Falls. To accomplish this would have required a large horseshoe curve extending north before the alignment began a descent to rejoin the existing alignment near MP 55.6. The Juneau Creek Wilderness Alternative would have avoided the grade and intersection issues of the Juneau Creek "F" Forest Alternative and Juneau Creek Forest alternative (see Sections 2.5.6 and 2.5.8) by running farther west into the KNWR before rejoining the existing alignment. The Juneau Creek Wilderness Alternative would have required right-of-way from the KNWR Mystery Creek Wilderness area. This alternative would have crossed the Forest Service Juneau Falls Recreation Area withdrawal that surrounds Juneau Creek Falls, crossed the intersection of the Resurrection Pass and Bean Creek trails, and located the new roadway high in the Juneau Creek Valley, an area that is relatively undisturbed by the settlement or logging that have occurred farther south. In addition, this alternative would have operated at a substantially lower LOS than the Juneau Creek "F" Wilderness Alternative that would have been located on the same alignment except for the location of the Juneau Creek crossing and the large horseshoe curve. The *Evaluation Criteria and Alternatives Analysis* and subsequent analysis (HDR 2003a, 2003d) did not recommend the Juneau Creek Wilderness Alternative for further study in the SEIS.

2.5.8 Juneau Creek Forest Alternative

The Juneau Creek Forest Alternative would have been similar to the Juneau Creek Wilderness Alternative (see Section 2.5.7) and would have departed the existing alignment at the same location (MP 46.3), included a horseshoe curve extending north up Juneau Creek, and crossed Juneau Creek in the same location about 1,000 feet north of Juneau Creek Falls. The descent would have diverged from the Juneau Creek Wilderness Alternative, with grades of 6–7 percent (too steep to meet current standards). The alignment would have rejoined the existing highway at MP 55 (Sportsman's Landing) to avoid KNWR designated Wilderness land. The *Evaluation Criteria and Alternatives Analysis* and subsequent analysis (HDR 2003a, 2003d) found the Juneau Creek Forest Alternative to be not reasonable, and it was eliminated from further consideration because of the impacts at the intersection near Sportsman's Landing, an inability to meet current design standards for grade, and lack of agency and public support (same reasons as Juneau Creek "F" Forest Alternative; see further discussion in Section 2.5.6 above). The Juneau Creek Variant Alternative (Section 2.6.6) was designed to serve similar purposes near the KNWR boundary and to resolve the problems identified with the "Forest" alternatives.

2.6 SEIS Alternatives Advanced for Full Analysis: Detailed Description

The five alternatives advanced for full evaluation in this EIS—No Build, Cooper Creek, G South, Juneau Creek, and Juneau Creek Variant—are shown together on Map 2.4-1 and individually on Maps 2.6-1 through 2.6-6. Each alternative includes temporary construction areas, for construction staging and disposal of unusable earth materials, as shown on Map 2.6-8. The following sections describe each alternative in detail. The results of environmental analysis for these five alternatives are explained throughout this EIS. Chapter 3 presents the impacts for each of the alternatives (in the Environmental Consequences section for each resource), and a comparative summary of impacts appears in the Executive Summary for this EIS.

The alternatives share common termini at MP 45 and 60 (the actual limits of construction would be approximately MP 44.5 at the eastern end and MP 58.2 at the western end). The selection of logical termini is discussed in Chapter 1.

For all the build alternatives, anywhere the alternative overlies or follows the existing alignment, the existing alignment would be reconstructed with a wider, straighter highway built to modern rural principal arterial standards, and existing access to adjacent lands would be retained. Anywhere the alternative departed substantially from the existing alignment, the existing highway would become the "Old Sterling Highway" and would remain in service as a local road, and maintenance would remain the responsibility of the DOT&PF. In these areas, this project would not alter the "old" highway. However, DOT&PF would undertake routine maintenance, repaving, safety upgrades, bridge replacements, and other work over time to maintain the old highway. The old highway segment left by each build alternative would have a much reduced traffic load (estimated at about 30 percent of current and projected traffic) and would function as a collector or minor arterial road serving as access to the community and recreation destinations.

For all build alternatives, preliminary design incorporated the use of excavated material within the project corridor to the extent feasible to minimize hauling and borrow material needs, which in turn reduces construction cost and minimizes potential impacts to areas outside the project area corridor. The contractor would be responsible for obtaining construction material from a permitted site.

2.6.1 No Build Alternative

NEPA requires an EIS to describe and analyze the impacts of no action, or no build, as a benchmark that allows for comparison of the degree of environmental effects of the various project alternatives (CEQ 1981).

Under the No Build Alternative (Map 2.6-1), the highway would remain much as it is today, but some major maintenance and already programmed work is assumed to occur:

- Pavement is assumed to be replaced twice.
- The three project-area bridges are assumed to be replaced because of age.
- A programmed project to improve a curve at MP 45 would occur.

The highway under a No Build scenario would remain a two-lane highway with 11-foot lanes. Shoulders would remain 0–2 feet wide. Clear zones and slopes alongside each shoulder would remain as they are and would not achieve current design standards. Normal highway maintenance would continue and some major maintenance is assumed to occur as part of DOT&PF's asset management programs.

The Sterling Highway in the MP 45–60 area received a thin Hot Mix Asphalt Overlay during the summers of 2013 and 2014; such an overlay has an expected life of 5–12 years. Under the No Build Alternative, reporting, monitoring, and maintenance of the highway surface condition would continue, and two asphalt overlays are assumed to occur by 2043 (the future year for which the project is being designed).

Because of the ages of the bridges on the Sterling Highway in the project area, these bridges are assumed to be replaced prior to 2043. The Cooper Creek Bridge was built in 1955. The Schooner Bend Bridge over the Kenai River was built in 1964. The Cooper Landing Bridge over the Kenai River was built in 1965 (DOT&PF 2009a). By 2043, all three of these bridges would be past the typical 50- to 75-year bridge design life. Although there currently is no schedule for replacement, for purposes of this EIS, it is assumed all would be replaced by 2043.

The eventual repaving and bridge replacements described above for the No Build Alternative also would occur on the remnant section of "old" highway, as needed, if one of the build alternatives were selected. These are basic tasks necessary to keep the "old" highway operational. However, because the "old" highway would carry less traffic, the timeframe for bridge replacement and repaving likely would be extended, and the frequency of repaving likely would be reduced. The costs and associated impacts of the No Build Alternative activities are not considered part of the proposed project (DOT&PF is not seeking environmental clearance for these activities through this Final EIS). Because these activities are reasonably foreseeable, the impacts and costs with them are presented principally in Section 3.27, Cumulative Impacts.

2.6.2 Design Criteria Applicable to the Build Alternatives

Each of the four build alternatives being evaluated for the project—the Cooper Creek, G South, Juneau Creek, and Juneau Creek Variant alternatives—has been engineered based on guidelines from the *Alaska Preconstruction Manual* (DOT&PF 2005) and *A Policy on Geometric Design of Highways and Streets* (AASHTO 2004, 2011). These documents lay out the basic standards for highway design of rural principal arterials such as the Sterling Highway in Alaska and nationally.

Specific project design criteria are provided in the *Preliminary Engineering Report* (HDR 2014a) and are summarized in Table 2.6-1.

Table 2.6-1. Project design criteria

Design Element	Value
Functional classification	Rural principal arterial
Design year	2043
Design speed/terrain	60 mph/varies
Maximum allowable grade	6 percent
Width of traveled way	24 feet (two 12-foot lanes)
Width of shoulders	8 feet
Degree of access control	Acquire access rights to control access along any segment built on new alignment
Illumination/street lighting	Intersections of new and old highways
Curb	None
Bicycle provisions	Shoulders
Pedestrian provisions	Shoulders, and pathway space planned and dedicated on bridges
Passing lane width	12 feet
Vertical clearance	16.5 feet
Clear zone	30 feet

Source: HDR (2014a).

The proposed build alternatives consist of a two-lane highway with paved shoulders, passing lanes, and turning lanes. Travel lanes would be 12 feet wide, paved shoulders would be 8 feet wide (adequate for safe bicycle and pedestrian use), passing lanes would be 12 feet wide, and all major intersections would have right- and left-turn lanes. None of the alternatives would involve construction of interchanges. The "old" highway would intersect new segments within each alternative via a T-intersection with stop signs on the "old" highway.

Figure 2.6-1, Figure 2.6-2, and Figure 2.6-3 illustrate the paved highway width in locations with different proposed cross-sections:

- Two lanes with shoulders - 40 feet (applicable where no passing lanes are proposed)
- Three lanes with shoulders - 52 feet (applicable where there are passing lanes in one direction)
- Four lanes with shoulders - 64 feet (applicable where there are passing lanes in both directions)

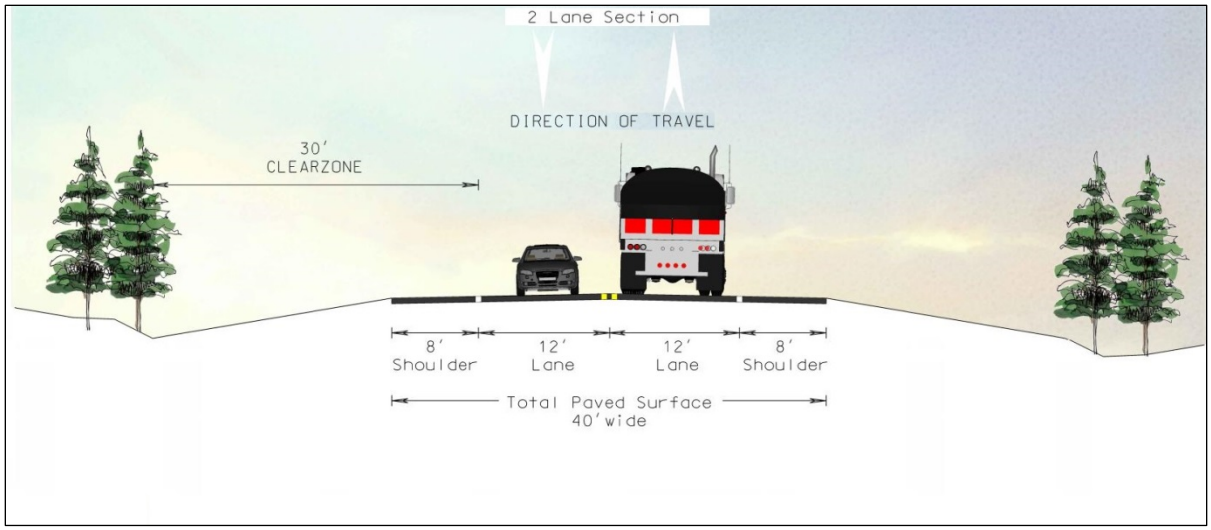

Figure 2.6-1. Typical two-lane cross section of a build alternative

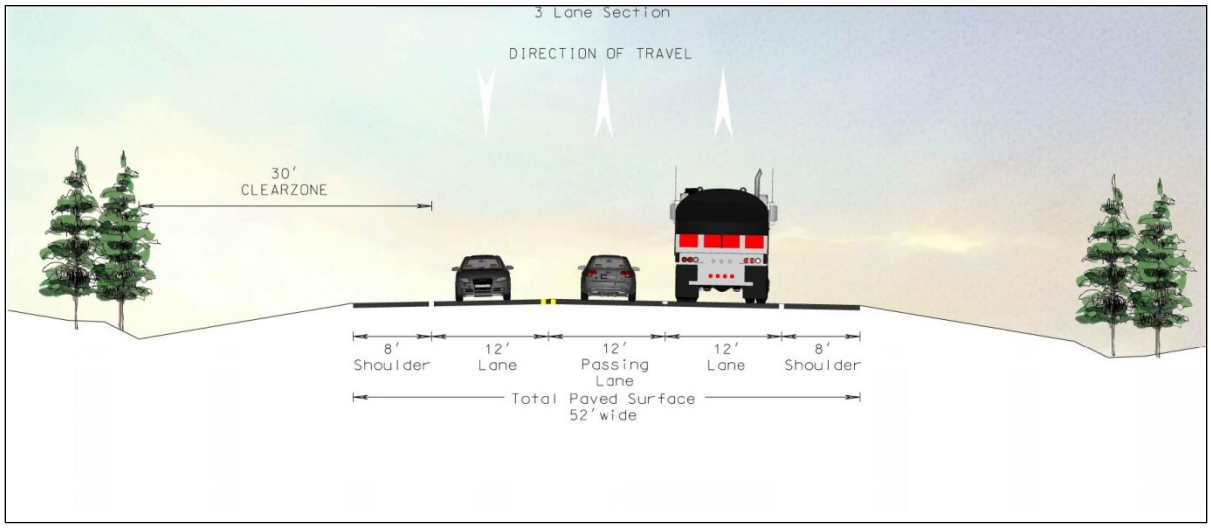

Figure 2.6-2. Three-lane cross section

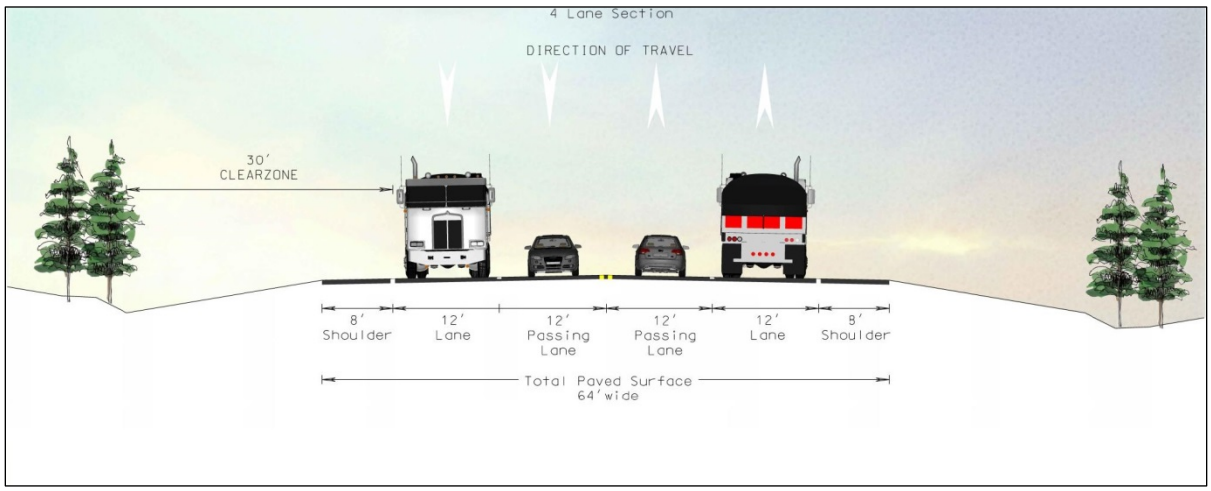

Figure 2.6-3. Four-lane cross section

The standard right-of-way for all alternatives would be 300 feet wide with slightly wider variations at large cut and/or fill areas. In general, clearing widths would correspond to the clear zones (30 feet from the edges of the outside lanes) or to the construction footprint in areas where the cut or fill extended beyond the clear zone. Clear zones would be maintained to be free of obstacles such as trees and boulders, and typically would be planted with a native seed mix and occasionally mowed. Gravel or cobbles could be used in some circumstances to discourage wildlife use of these near-road areas.

Design speed (listed in Table 2.6-1 as 60 mph for this project) is a selected speed used by highway engineers to determine the various geometric features of the roadway, and is not the same as the posted speed limit. All build alternatives are anticipated to be posted at 55 mph.

The DOT&PF will reserve roadway access rights, with all ingress/egress regulated, in areas where any build alternative is completely separate from the existing Sterling Highway (segment built on a new alignment). Controlling access means that access to the National Highway System will only be allowed at selected public roads or by interchanges as shown on right-of-way plans. DOT&PF will acquire land access rights where needed and plat and record the restrictions on access. No public roads or private driveways other than those planned or built as part of this project would be connected directly to the build alternatives in these segments. Any existing roads would be grade separated (i.e., routed under or over the highway) where they crossed a segment built on a new alignment but would not be connected to the new highway via on- and off-ramps as part of this project.

The reservation by DOT&PF of roadway access rights is necessary to preserve the function of the new highway and to avoid adjacent development that could create similar conflict points on the realigned highway as are currently experienced on the existing highway through Cooper Landing. This level of access management prevents induced growth from compromising the functionality of the highway and more appropriately directs local access needs to the local road system. This approach is consistent with the approved DOT&PF *Strategic Highway Safety Plan* (DOT&PF 2012), Strategy HG.1: Preserving Alaska's Main Road Corridors. It is also consistent with the *Cooper Landing Land Use Classification Plan* (1996), which states "There is to be NO access to or from the new alignment other than the departure from the existing road at either end of the bypass. The NO ACCESS issue is not a matter taken lightly by the community" (emphasis in the original). The Kenai Peninsula Borough adopted the *Cooper Landing Land Use Classification Plan* in 2005.

Potential future access points are acknowledged in this EIS and their impact is evaluated in Section 3.27. The specifics of access control for each alternative, including the future access points acknowledged, are addressed in Sections 2.6.3 through 2.6.6.

The build alternatives are identical from MP 45 to MP 46.3, at the eastern end of the project, and from MP 55.8 to MP 60, at the western end of the project.

In those segments built on the existing alignment, existing informal pullouts would be eliminated by road widening. Select pullouts would be formalized—paved and included in the project. See also Section 3.6 under "Pullouts" subheadings. Existing driveways and side roads would be retained and connected; final design could result in consolidation of some of these where reasonable access could be maintained.

The preliminary designs for major project bridges included space for a pedestrian pathway on each bridge. There are no standards or criteria requiring such a pathway, but pathway space was included to account for potential need and worst-case cost estimates. Pathways on bridges currently are proposed only where they would tie into pedestrian trails. Otherwise, the wide highway shoulders would accommodate pedestrians and bicyclists. It is possible that, in final design, the extra space would be eliminated.

Any of the build alternatives would include a phased construction process, primarily to spread construction costs out over several funding years. Each of the alternatives includes two segments built on the existing alignment and one segment built on a new alignment. It is anticipated that construction sequencing would focus on these three segments, which would be constructed one at a time. It is anticipated that the segment built on a new alignment would be built last.

2.6.3 Cooper Creek Alternative

2.6.3.1 Overview

The Cooper Creek Alternative would be 14.0 miles long (compared to 13.9 miles for the existing alignment in the project area). Under the Cooper Creek Alternative (Map 2.6-2), approximately 10 miles of the existing highway would be rebuilt to meet current standards and incorporate passing and turning lanes. The Cooper Creek Alternative would include a segment built on a new alignment, approximately 4 miles long. This segment would skirt a portion of Cooper Landing to the south. This alternative would replace two existing bridges over the Kenai River and also would provide a new bridge over Cooper Creek (see "Bridge" headings in Section 2.6.3.2 for details). This alternative would provide an underpass for Cooper Lake Dam Road.

2.6.3.2 Mile-by-Mile Detail

Segment built on the existing alignment (MP 44.5-47.9): The existing Sterling Highway would be widened and straightened to meet current rural principal arterial standards and would have the following features:

- MP 44.5–MP 45: This portion of the existing highway would be rebuilt to meet current standards.
- MP 45: Turning lanes would be provided on the Cooper Creek Alternative at its intersection with Quartz Creek Road.
- MP 45-46.5: A westbound passing lane would transition to an eastbound passing lane. A four-lane width would be provided at MP 46 where westbound and eastbound passing lanes both would occur.
- MP 46.5–MP 47.7: This portion of the existing highway would be rebuilt to meet current standards.
- MP 47.7: Turning lanes would be provided on the Cooper Creek Alternative at its intersection with Bean Creek Road.
- MP 47.8: The Cooper Landing Bridge would be replaced.
- MP 47.9: Turning lanes would be provided on the Cooper Creek Alternative at its intersection with "old" highway/Snug Harbor Road.

Segment built on a new alignment: A segment of highway would be built on a new alignment for about 4 miles.

At Snug Harbor Road (MP 47.9), the route would climb the hillside south of the existing highway for approximately 0.8 mile, with grades between 3 and 6 percent. The alternative would reach a natural bench and traverse it for approximately 1.2 miles, reaching a maximum elevation of 716 feet, approximately 275 feet above the Kenai River. The alternative would include a westbound passing lane throughout the hill climb. The new road would be designed to pass over the existing Cooper Lake Dam Road in this area. The overpass would not include any off- or on-ramps or other connection between the two roads. Where the Cooper Creek Alternative crossed Cooper Lake Dam Road, the opening of the bridge or oversized culvert would be designed to accommodate dam construction and maintenance equipment. For about one-half mile in this area, the westbound passing lane and an eastbound passing lane both would occur, so the highway would have four lanes total (Map 2.6-2).

The alignment would descend at a 6 percent grade for 0.7 mile, crossing Cooper Creek on a curved bridge. This alternative would include an eastbound passing lane on this slope for 1.8 miles. The alternative then would traverse a short bench for one-third mile, and a pullout would be provided on the south side of the highway in this area, in part to serve as an informal new trailhead for the Stetson Creek Trail. The highway would descend the bluff at a 6 percent grade for one-third mile and level out, rejoining the existing alignment at MP 51.3. Turning lanes would be provided on the Cooper Creek Alternative at its intersection with the "old" highway.

Segment built on the existing alignment (MP 51.3–58.2): The existing Sterling Highway would be widened and straightened to meet current rural principal arterial standards.

- MP 51.3–MP 52.5: This portion of the existing highway would be rebuilt to meet current standards.
- MP 52.5: Turning lanes would be provided on the Cooper Creek Alternative at its intersection with the Russian River Campground access road/K'Beq Heritage Site access road.
- MP 52.5–MP 53: This portion of the existing highway would be rebuilt to meet current standards.
- MP 53: The Schooner Bend Bridge would be replaced.
- MP 53.1–MP 53.9: A pullout to serve, in part, as parking for access to the Resurrection Pass Trail would be provided just west of Schooner Bend Bridge. A westbound passing lane would be provided.
- MP 53.9–MP 54.3: An eastbound passing lane would be provided. Both westbound and eastbound passing lanes would occur near MP 53.9, resulting in a four-lane highway in this area (Map 2.6-2).
- MP 54.3–MP 54.9: This portion of the existing highway would be rebuilt to meet current standards.
- MP 54.9: Turning lanes would be provided on the Cooper Creek Alternative at its intersection with the Sportsman's Landing and Russian River Ferry access road.

- MP 54.9–MP 56.4: This portion of the existing highway would be rebuilt to meet current standards. A pullout to serve, in part, as parking for summer access to the Kenai River within KNWR would be provided at MP 55.6.
- MP 56.4–MP 57.7: A westbound passing lane would transition to an eastbound passing lane with a short break between the two. .
- MP 57.7–MP 58: This portion of the existing highway would be rebuilt to meet current standards.
- MP 58: Turning lanes would be provided on the Cooper Creek Alternative at its intersection with Skilak Lake Road.
- MP 58–MP 58.2: This portion of the existing highway would be rebuilt to meet current standards.

Access Control. Under the Cooper Creek Alternative, the only driveway or side road authorized on the segment constructed on a new alignment would be a pullout that would also function as a new trailhead for Stetson Creek Trail. The alternative would cross Cooper Lake Dam Road without connection via an overpass, and access to that road would remain from the "old" Sterling Highway.

The "Old" Highway (MP 47.8–51.3). The segment of existing Sterling Highway (a total of approximately 3.5 miles) that is not incorporated into the Cooper Creek Alternative would not be altered as part of this alternative. As indicated at the beginning of Section 2.6, DOT&PF would continue to maintain this segment of "old" highway for access to Cooper Landing and to the Cooper Creek Campground. Costs of maintaining both the new and old highways are addressed under Cumulative Impacts (Section 3.27), and presented in Table 3.27-4.

Construction Sites. The alternative would require several construction staging areas and sites for disposal of woody debris and soils that would not be useable in construction (see Map 2.6-8); a 44-acre disposal site east of Cooper Creek would be the largest. Staging areas and temporary access roads beneath the Cooper Creek Bridge also would be necessary, as would relatively small staging areas adjacent to each new or replacement bridge. Use of these sites would be temporary, during construction only, but in some cases permanent effects could occur, as explained in Chapter 3. A 5-acre disposal site shown on Map 2.6-8 is located at the point at which the Cooper Creek Alternative leaves/joins the existing alignment (at MP 51). At the request of the Forest Service based on their review of the Draft SEIS, it was relocated to be placed in a previously disturbed area that currently serves as one of two access points for the Stetson Creek Trail (see Map 2.6-8). The Cooper Creek Alternative would include a new pullout and trailhead, making the existing access area no longer necessary and the material disposal site a better location for Forest Service management.

Cooper Landing Bridge Replacement. The Cooper Landing Bridge would be replaced on an alignment slightly upstream (east) of the existing bridge to match a realigned curve to the north and to allow for use of the existing bridge (or of a temporary bridge) during construction. Any part of the existing bridge not used in the new bridge would be removed. A retaining wall, instead of fill placement, would likely be used on the north side of the Kenai River. The bridge length would be approximately 670 feet. The total bridge width would be 78 feet. The proposed bridge would include two 12-foot lanes; a 12-foot westbound right-turn lane; a 16-foot center

turn lane; 8-foot shoulders; and a 6-foot separated pathway on the north (downstream) side of the bridge (see Figure 2.6-4).

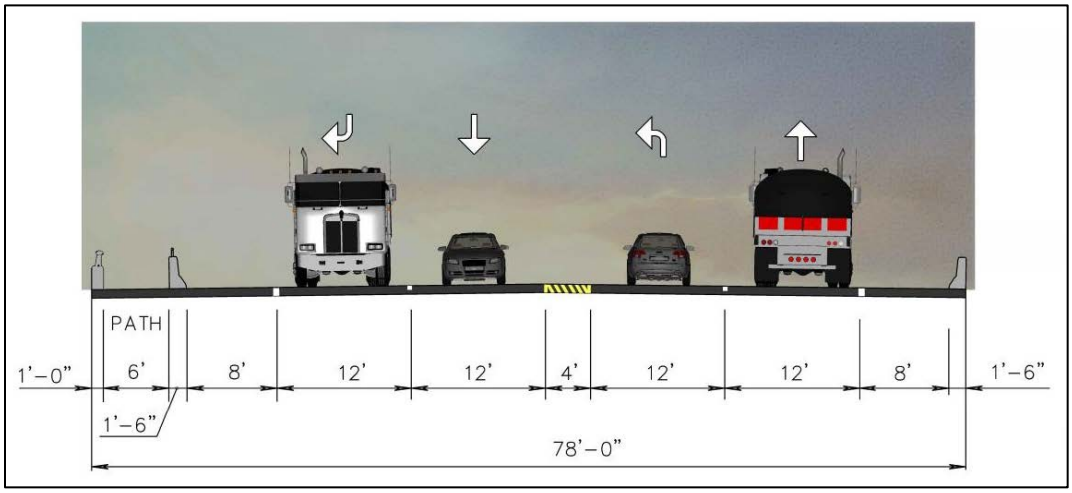

Figure 2.6-4. Cooper Landing Bridge cross section

Figure 2.6-5 is a rendering of a new Cooper Landing Bridge from the perspective of the ramp at the Cooper Landing Boat Launch. Preliminary bridge design indicates that three or four piers will be required for this bridge (depending on the bridge type).

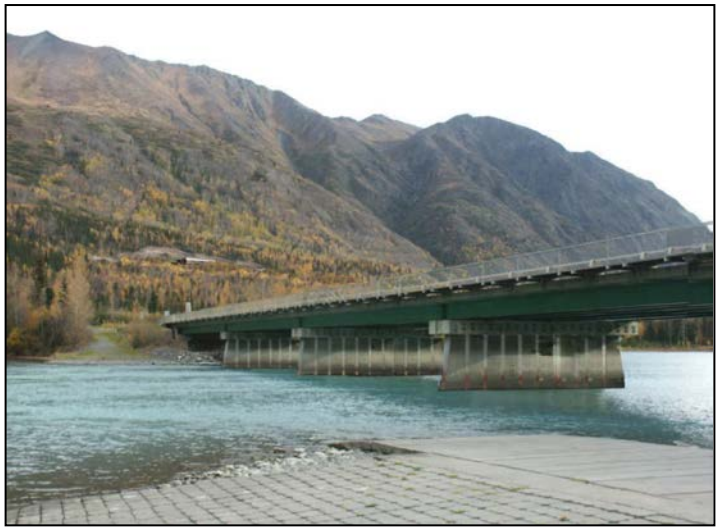

Figure 2.6-5. Visual simulation of Cooper Landing Bridge reconstruction

New Cooper Creek Bridge. The proposed Cooper Creek Bridge would be sited approximately one-half mile upstream of the existing Cooper Creek Bridge, and would cross over Cooper Creek in a curve at 6 percent grade. The total bridge length would be approximately 840 feet. The width of 62 feet would accommodate two 12-foot lanes, a 12-foot eastbound passing lane, 8-foot shoulders, and a future 6-foot pathway on one side (Figure 2.6-6). See the pathway discussion at

the end of Section 2.6.2. Preliminary bridge design indicates that four to six piers would be required for this bridge.

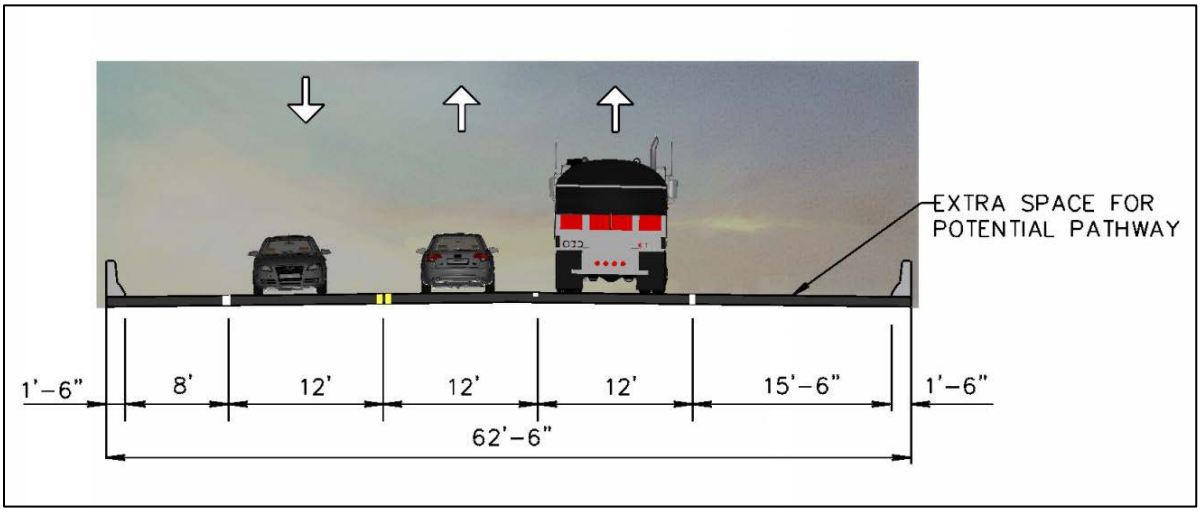

Figure 2.6-6. Cooper Creek Bridge cross section

Schooner Bend Bridge Replacement. The Schooner Bend Bridge would be replaced approximately 80 feet downstream from the existing bridge, which would allow for better road geometry, avoid an eroding bend in the Kenai River, and allow the old bridge to accommodate traffic during construction. The old bridge would be entirely removed once the new bridge was in operation. The proposed bridge would be approximately 325 feet long and 50 feet wide to include two 12-foot lanes, 8-foot shoulders, and space for a future 6-foot pathway on one side (see Figure 2.6-7). See the pathway discussion at the end of Section 2.6.2. Preliminary bridge design indicates that one to two piers would be required for this bridge.

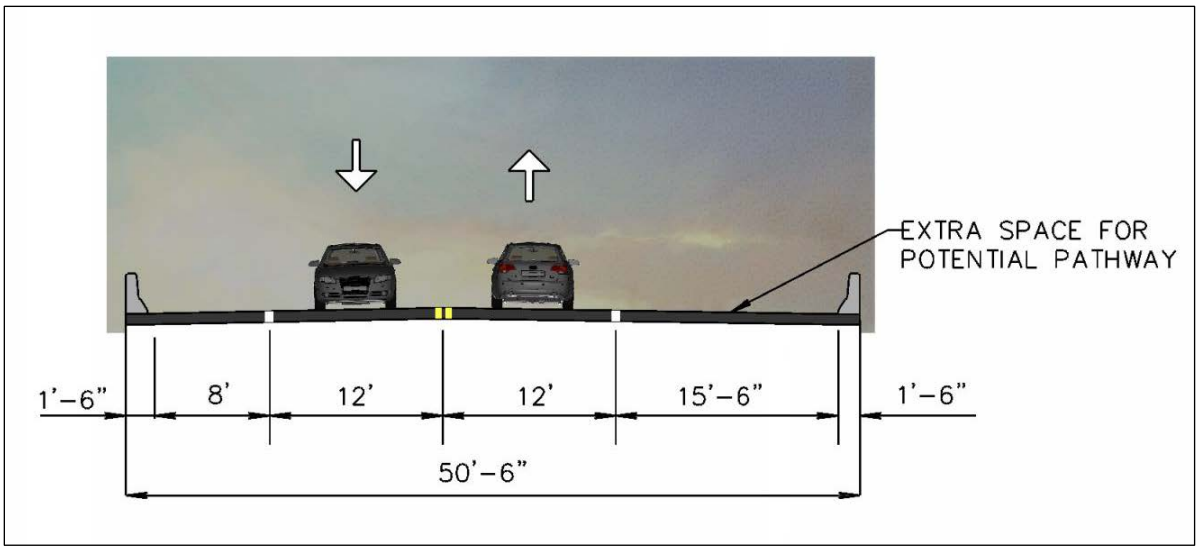

Figure 2.6-7. Schooner Bend Bridge cross section

2.6.4 G South Alternative

2.6.4.1 Overview

The G South Alternative would be 14.0 miles long (compared to 13.9 miles for the existing alignment in the project area). Under the G South Alternative (Map 2.6-3), approximately 8 miles of the existing Sterling Highway would be improved on the existing alignment to meet current standards and to incorporate passing and turning lanes. The G South Alternative would include a segment approximately 5.5 miles long built on a new alignment. This segment would skirt Cooper Landing to the north. One existing bridge over the Kenai River would be replaced, a separate new bridge over the Kenai River would be constructed, and a new bridge over Juneau Creek would be constructed (see "Bridge" headings in Section 2.6.4.2 for details). This alternative would include an underpass for the existing Slaughter Ridge Road (Forest Service logging road and route of the Bean Creek Trail) near a crossing of Bean Creek, without any connection between the two roads.

2.6.4.2 Mile-by-Mile Detail

Segment built on the existing alignment (MP 44.5–46.3)*:* The existing Sterling Highway would be widened and straightened to meet current rural principal arterial standards.

- MP 44.5–MP 45: This portion of the existing highway would be rebuilt to meet current standards.
- MP 45: Turning lanes would be provided on the G South Alternative at its intersection with Quartz Creek Road.
- MP 45–MP 46: A westbound passing lane would be provided.
- MP 46–MP 46.3: This portion of the existing highway would be rebuilt to meet current standards.
- MP 46.3: Turning lanes would be provided on the G South Alternative at its intersection with the "old" highway.

Segment built on a new alignment: A segment of highway would be built on a new alignment for about 5.5 miles.

The G South Alternative would depart from the existing highway alignment at MP 46.3 and climb the hillside well east of Bean Creek at 5.2 percent grade for 1.25 miles to a maximum elevation of 776 feet. A westbound passing lane would be provided as the alignment climbed the hill (see Map 2.6-3). The alternative would traverse a natural bench for approximately 2.4 miles.

The alternative would descend to cross the extension of Slaughter Ridge Road/Bean Creek Trail and Bean Creek. The trail/Forest Service road would be rerouted slightly and placed in an underpass under the new highway, with no direct connection between the highway and the old logging road. The underpass would provide for passage by logging trucks. A summer trailhead parking area off the highway and a pullout along the highway both would be constructed for access to Bean Creek Trail, both located west of Bean Creek and north of the new highway.

The alternative would descend at a 5.9 percent grade to cross Juneau Creek (lower canyon area) on a large new bridge. An eastbound passing lane 2.2 miles long would occur on this hill (Map 2.6-3). The alternative then would cross the Kenai River on a proposed new bridge and rejoin the

existing highway corridor at existing MP 51.9. Turning lanes would be provided on the G South Alternative at its intersection with the "old" highway. The intersection would occur near MP 51.4 of the existing highway.

Segment built on the existing alignment (MP 51.9–58.2): The existing Sterling Highway would be widened and straightened to meet current rural principal arterial standards. The G South Alternative in this segment would be identical to the Cooper Creek Alternative (see Section 2.6.3.2).

- MP 51.9–MP 52.5: This portion of the existing highway would be rebuilt to meet current standards.
- MP 52.5: Turning lanes would be provided on the G South Alternative at its intersection with the Russian River Campground access road/K'Beq Heritage Site access road.
- MP 52.5–MP 53: This portion of the existing highway would be rebuilt to meet current standards.
- MP 53: The Schooner Bend Bridge would be replaced.
- MP 53.1–53.9: A pullout to serve in part as parking for winter access to the Resurrection Pass Trail would be provided just west of Schooner Bend Bridge. A westbound passing lane would be provided.
- MP 53.9–54.3: An eastbound passing lane would be provided. Both westbound and eastbound passing lanes would occur near MP 53.9, resulting in a four-lane highway in this area (Map 2.6-3).
- MP 54.3–MP 54.9: This portion of the existing highway would be rebuilt to meet current standards.
- MP 54.9: Turning lanes would be provided on the G South Alternative at its intersection with the Sportsman's Landing and Russian River Ferry access road.
- MP 54.9–MP 56.4: This portion of the existing highway would be rebuilt to meet current standards. A pullout to serve, in part, as parking for summer access to the Kenai River within KNWR would be provided at MP 55.6.
- MP 56.4–MP 57.7: A westbound passing lane would transition to an eastbound passing lane, with a short break between the two.
- MP 57.7–MP 58: This portion of the existing highway would be rebuilt to meet current standards.
- MP 58: Turning lanes would be provided on the G South Alternative at its intersection with Skilak Lake Road.
- MP 58–MP 58.2: This portion of the existing highway would be rebuilt to meet current standards.

Access Control. Under the G South Alternative, the only driveways or side roads authorized on the segment constructed on a new alignment would be:

- A driveway to a new trailhead for Bean Creek Trail.
- A pullout that would also function as a winter trailhead for Bean Creek Trail.

The alternative would cross the Slaughter Ridge Road extension/trail without connection via an overpass, and access to that road would remain from the "old" Sterling Highway and Bean Creek Road.

The "Old" Highway (MP 46.3–51.9). The segment of existing highway, approximately 5.6 miles long, not incorporated into the G South Alternative would not be altered as part of this project. As indicated at the beginning of Section 2.6, DOT&PF would continue to maintain this segment of "old" highway for access to Cooper Landing and Cooper Creek Campground. Costs of maintaining both the new and old highways are addressed under Cumulative Impacts (Section 3.27), and presented in Table 3.27-4.

Construction Sites. The alternative would require several construction staging areas and sites for disposal of woody debris and soils that would not be useable in construction (see Map 2.6-8). A 35-acre area west of Juneau Creek would be the largest site needed for this alternative, combining a bridge construction staging and disposal area, and including an access road. A 27-acre disposal area is proposed east of Juneau Creek, as well as relatively small staging areas adjacent to each new or replacement bridge. Use of these sites would be temporary and occur during construction only, but in some cases permanent effects could occur, as explained in Chapter 3.

New G South Juneau Creek Bridge. The Juneau Creek Bridge would be about 1,300 feet long and 62 feet wide. The bridge would have two 12-foot lanes, a 12-foot eastbound passing lane, 8-foot shoulders, and enough width to accommodate a future 6-foot pathway on one side (identical to the Cooper Creek Bridge; see Figure 2.6-6, above). No pathway on the bridge is proposed at this time. This crossing would be constructed where the canyon begins to open into the Kenai River Valley. At its highest point, the bridge would be approximately 200 feet above the canyon floor. Preliminary bridge design indicates that three to eight piers would be required for this bridge.

New Kenai River Bridge. The proposed new Kenai River Bridge would be about 500 feet long and 78 feet wide. It would have two 12-foot lanes, a 12-foot eastbound passing lane, a 16-foot center turn lane, 8-foot shoulders, and enough width to accommodate a future 6-foot pathway on one side (see Figure 2.6-8). See the pathway discussion at the end of Section 2.6.2. Preliminary bridge design indicates that two to three piers would be required for this bridge (depending on the bridge type).

Schooner Bend Bridge Replacement. The Schooner Bend Bridge would be replaced approximately 80 feet downstream from the existing bridge. Building the bridge in a new location would allow for better road geometry, avoid an eroding bend in the Kenai River, and allow the old bridge to accommodate traffic during construction. The old bridge would be entirely removed once the new bridge was in operation. The proposed bridge would be approximately 325 feet long and 50 feet wide and would include two 12-foot lanes, 8-foot shoulders, and enough width to accommodate a future 6-foot pathway on one side (see Figure

2.6-7, above). No pathway on the bridge is proposed at this time. Preliminary bridge design indicates that one to two piers would be required for this bridge.

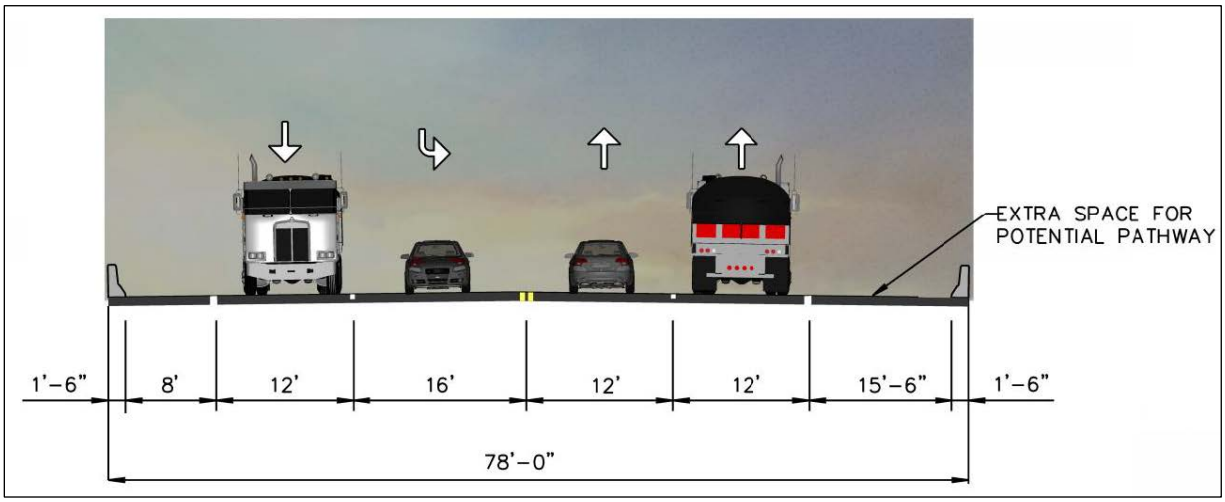

Figure 2.6-8. G South Alternative, new Kenai River Bridge cross section

2.6.5 Juneau Creek Alternative (Preferred Alternative)

2.6.5.1 Overview

The Juneau Creek Alternative and Juneau Creek Variant Alternative (see Section 2.6.6) are similar. Map 2.6-4 and Map 2.6-6 illustrate these alternatives. The major difference between the two alternatives is that the Juneau Creek Alternative was developed on the best alignment for engineering and traffic purposes, but crossed the Mystery Creek Wilderness in the KNWR. The Juneau Creek Variant Alternative was developed to avoid KNWR Wilderness.

The Juneau Creek Alternative would be 14.6 miles long (compared to 13.9 miles for the existing alignment in the project area). The Juneau Creek Alternative (Map 2.6-4) would include a segment built on a new alignment approximately 10 miles long. This segment would skirt Cooper Landing to the north. Under the Juneau Creek Alternative, approximately 4 miles of the existing highway would be improved on the existing alignment to meet current standards and incorporate passing and turning lanes. This alternative would not replace any existing bridges but would include one new bridge over Juneau Creek (see "Bridge" heading in Section 2.6.5.2 for details). This alternative would include underpasses or overpasses for Forest Service logging roads

Status of Juneau Creek Alternative in this Final EIS

The Juneau Creek Alternative would cross lands currently part of the KNWR and Federally designated as Wilderness. Based in part on the impacts to KNWR and designated Wilderness, DOT&PF and FHWA had announced after publication of the Draft SEIS that G South was identified as the preferred alternative. Since the Draft SEIS, the DOI committed in August 2017 to proceed with a land trade with CIRI that would remove KNWR and Wilderness lands in this area, should this alternative ultimately be selected. This required the analysis of the Juneau Creek Alternative to be updated and it was subsequently identified as the preferred alternative. However, no final decision will be made until the Record of Decision is signed. See more information in Section 2.4.2.2 (above), Section 3.27, and Section 4.8.

west of Juneau Creek, with no connection between the highway and the road at each crossing.

2.6.5.2 Mile-by-Mile Detail

Segment built on the existing alignment (MP 44.5–46.3): The existing Sterling Highway would be widened and straightened to meet current rural principal arterial standards.

- MP 44.5–MP 45: This portion of the existing highway would be rebuilt to meet current standards.
- MP 45: Turning lanes would be provided on the Juneau Creek Alternative at its intersection with Quartz Creek Road.
- MP 45–46.3: A westbound passing lane would be provided.
- MP 46.3: Turning lanes would be provided on the Juneau Creek Alternative at its intersection with the "old" highway.

Segment built on a new alignment: A new segment of highway would be built on a new alignment for about 10 miles. The Juneau Creek Alternative would diverge from the existing highway alignment at MP 46.3 and climb the hillside to the west for approximately 1.2 miles at a 5 percent grade. A westbound passing lane would be provided in this area. The alternative would level out for another 1.2 miles, then climb 2 miles at a 4.3 percent grade; a westbound passing lane would be provided. The grade would be reduced as the alternative crossed the Juneau Creek canyon with a long new bridge. Immediately east of the bridge, a pullout would be constructed north of the highway. Immediately west of the bridge, a large trailhead parking area would be constructed for the Resurrection Pass Trail. West of the canyon, the alternative would continue to climb to its maximum elevation of 1,150 feet, and the westbound passing lane would continue.

The alternative would then descend the hillside over 3.3 miles, enter a 0.8-mile-long segment with nearly 6 percent downgrade, and then flatten out and rejoin the existing highway corridor near MP 55.8. An eastbound passing lane would occur throughout this section and overlap with the westbound passing lane, creating a four-lane section west of Juneau Creek. An overpass or underpass would be provided for Chunkwood Road, a Forest Service road located approximately 1 mile west of Juneau Creek, and for West Juneau Road, another former Forest Service logging road located approximately 2.5 miles west of Juneau Creek. No connection between the highway and these roads would be provided, but access at these locations (via ramps only) is evaluated as a cumulative impact. The Kenai Peninsula Borough (KPB), as the land owner/developer, would need to follow the DOT&PF's access development process and develop the access in accord with DOT&PF design criteria. The underpass/overpass designs would accommodate logging trucks and future neighborhood traffic.

At MP 55.8, the "old" highway would be rerouted to loop south of its current location for a short distance to form a T-intersection with the new alignment. Turning lanes would be provided on the Juneau Creek Alternative at its intersection with the "old" highway. A pullout to serve, in part, as parking for summer access to the Kenai River within the KNWR would be provided at about MP 55.6 on the realigned "old" highway as part of the configuration of the intersection of the "old" and new highways.

Segment built on the existing alignment (MP 55.8–MP 58.2): The existing Sterling Highway would be widened and straightened to meet current rural principal arterial standards. All alternatives in this segment would be identical.

- MP 55.8–MP 56.4: This portion of the existing highway would be rebuilt to meet current standards.
- MP 56.4–MP 57.7: A westbound passing lane would transition to an eastbound passing lane, with a short break between the two.
- MP 57.7–MP 58: This portion of the existing highway would be rebuilt to meet current standards.
- MP 58: Turning lanes would be provided on the Juneau Creek Alternative at its intersection with Skilak Lake Road.
- MP 58–MP 58.2: This portion of the existing highway would be rebuilt to meet current standards.

Access Control. Under the Juneau Creek Alternative, the only driveways or side roads authorized on the segment constructed on a new alignment would be:

- A driveway to a new trailhead for Resurrection Pass Trail, located just west of Juneau Creek Bridge, to be built as part of this project.
- A pullout that would also function as a winter trailhead for Bean Creek Trail, located just east of Juneau Creek Bridge, to be built as part of this project.

In addition, DOT&PF and FHWA acknowledge the potential future access desires of the KPB on State Management Unit 395 and CIRI on its Tract A land. DOT&PF and FHWA would allow future access for these lands but cannot specify now precisely where this would occur, because development plans are not known. Two access points have been evaluated in Section 3.27 for potential future access to Unit 395 (via ramps as an interchange only), mostly likely at one or both locations where the highway would cross over (or under) existing Forest Service roads. The potential access ramps would not be developed by this project but potentially could be developed by the Kenai Peninsula Borough at a future date. The addition of the ramps to the bridges developed by this project would create an interchange at one or both locations.[7] The design and construction of these access points would need to follow the DOT&PF access development process for the National Highway System, and KPB would need to secure their own environmental permits.

For Tract A, a driveway for future access to CIRI Tract A is granted by the Russian River Land Act. DOT&PF and FHWA acknowledge this potential future access point, which for this alternative would occur off the south side of the highway. This access would not be built as part

[7] Development of a subdivision by the KPB in Unit 395 is reasonably foreseeable. However, the exact way Unit 395 would be accessed is unknown. Two access concepts have been evaluated in Section 3.27 as a cumulative impact: either upgrading an existing Forest Service logging road connecting off of the "old" Sterling Highway or providing access via ramps as described.

of this project, but could be built by others if needed.[8] The design and construction of this access would need to follow DOT&PF's access development process for the National Highway System, and CIRI would need to secure its own environmental permits.

The "Old" Highway (MP 46.3–MP 55.8). The segment of existing highway (approximately 9.5 miles) that is not incorporated into the Juneau Creek Alternative would not be altered as part of this project. As indicated at the beginning of Section 2.6, DOT&PF would continue to maintain this segment of "old" highway for access to Cooper Landing and to recreational amenities along the Kenai River. Costs of maintaining both the new and old highways are addressed under Cumulative Impacts (Section 3.27), and presented in Table 3.27-4.

Construction Sites. The alternative would require several construction staging areas and sites for disposal of woody debris and soils that would not be useable in construction (see Map 2.6-8). A 27-acre disposal area east of Juneau Creek with a 4-acre access road would be the largest construction site needed for this alternative. A 20-acre disposal area is proposed well west of Juneau Creek, as well as relatively small staging areas adjacent to the new Juneau Creek Bridge. Use of these sites would be temporary and during construction only, but in some cases permanent changes could occur, as explained in Chapter 3.

New Juneau Creek Bridge. The proposed new bridge would be 62 feet wide with two 12-foot traffic lanes, one 12-foot westbound passing lane, 8-foot shoulders, and a 6-foot pathway on the south side of the bridge (see Figure 2.6-9). The bridge length would be approximately 1,200 feet with a main span of 825 feet. [9]

Several options were considered for the longer 825-foot main span (space between bridge pier supports). If constructed, this would be the longest span in Alaska, though still within the realm of standard bridge design and construction. Figure 2.6-10 is a visual simulation of one type of bridge being considered for the crossing of Juneau Creek canyon, and Figure 2.6-11 shows the different bridge options that have been evaluated (HDR 2011c) for this Final EIS.

Preliminary bridge design indicates abutments and piers would not be required in the canyon. For purposes of this document, the top (rim) of the canyon is defined as elevation 1,060 feet. DOT&PF has made a commitment that no structure or work would occur in the Juneau Creek canyon below elevation 1,060 feet in this area.

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[8] An agreement between the Forest Service and CIRI (and others) ratified by the Russian River Land Act of 2002 (i.e., in federal law) provided a provision for access from any new alignment of the Sterling Highway in this area to CIRI Tract A. See Section 3.1.2.2 for further information.

[9] The conceptual alignment and profile for this crossing location identify the bridge as approximately 230 feet above the creek. The rim-to-rim width of the canyon at the crossing location is approximately 425 feet. Preliminary geotechnical investigation revealed large cracks running parallel to the canyon up to 100 feet from the rim on both sides. The instability caused by the cracks creates the potential for a large slide of the soil and rock from the cracks area to Juneau Creek; therefore, it was recommended that the ends of the bridges be located no closer to the canyon rim than 200 feet. This setback value of 200 feet from the canyon rim is preliminary, based on available geotechnical information. This setback would be validated during project design to ensure that bridge supports were located in solid founding materials. Piers could be located on the canyon rims if geotechnical investigation indicated adequate foundation material. In either case, the bridge main span or approach span would allow for users of the Resurrection Pass Trail, located on the west side of the Juneau Creek Canyon, to pass under the bridge without relocating the existing trail. Users of the relocated Bean Creek Trail, located on the east side of the Juneau Creek Canyon, would also be able to pass under the bridge on the east side of the bridge crossing. Further discussion appears in Chapter 4 under Measures to Minimize Harm.

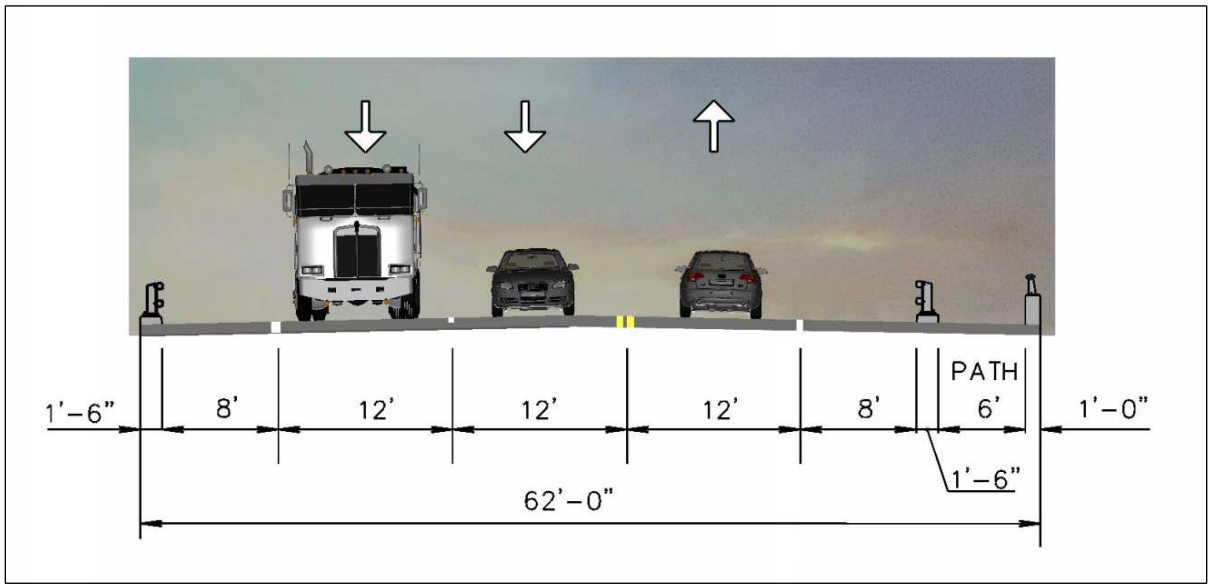

Figure 2.6-9. Juneau Creek Bridge cross section

Figure 2.6-10. Juneau Creek Bridge visual simulation

The most efficient bridge options would be a large arch tied by steel or cable to the road deck below (tied arch); and a road deck supported by cable stays hung from towers, one at each end of the bridge (cable stayed; see Figure 2.6-11). Two additional options were considered that would be designed for a shorter main span that might be founded near the rims of the canyon. These options would result in a 450-foot main span with approach spans that would tie into the bridge abutments. Bridge options under consideration for the shorter main 450-foot span include a box girder and a deck arch, also illustrated in Figure 2.6-11.

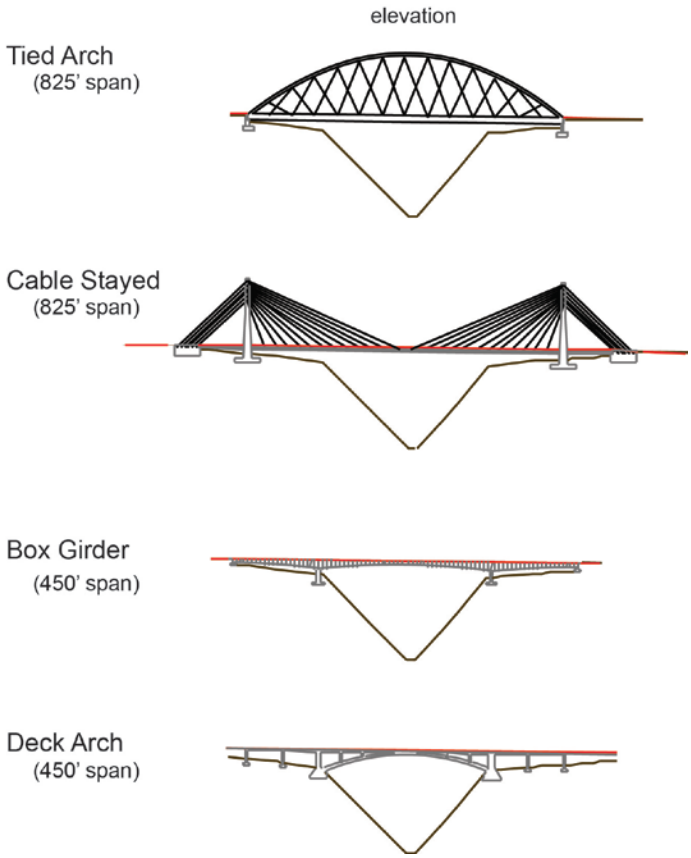

Figure 2.6-11. Juneau Creek Bridge types under consideration, with length of main span indicated.

Box girder and deck arch bridge types include an approach span at either end of the main span.

2.6.5.3 Construction Sequencing

A financial plan (Appendix H) was developed for the Juneau Creek Alternative as the preferred alternative. Creation of the financial plan necessitated the detailing of a construction sequencing plan.

Table 2.6-2 shows the anticipated sequencing for the Juneau Creek Alternative. The steps are illustrated in Map 2.6-5, and additional details are included in the financial plan.

Table 2.6-2. Anticipated construction sequencing [New]

Step	Construction Description	Construction Duration
1	Complete reconstruction of segments built on the existing alignment, through final paving, striping, and signs: • Approximately MP 44.5 and MP 46. • Approximately MP 55.5 and MP 58. Construct the segment built on a new alignment as a "pioneer road" sufficient to access the Juneau Creek Bridge site from each side and to mobilize bridge construction materials and equipment.	Two construction seasons, years 1–2
2	Construct Juneau Creek Bridge.	Four construction seasons, years 3–6[a]
3	Construct eastern portion of segment built on a new alignment to of final width and subgrade.	Two construction seasons, years 3–4[a]
4	Construct western portion of segment built on a new alignment to of final width and subgrade.	Two construction seasons, years 4–5[a]
5	Pave segment built on a new alignment, including final signing, striping, and site work to open this segment to highway traffic	Two construction seasons, years 5–6

[a] Bridge construction and road construction would overlap considerably. Once bridge construction was underway, construction of the road to final width could commence. The road would principally remain open to bridge construction traffic throughout years 3–5.

2.6.6 Juneau Creek Variant Alternative

2.6.6.1 Overview

The Juneau Creek Variant Alternative would be 14.2 miles long (compared to 13.9 miles for the existing alignment in the project area). The Juneau Creek Variant Alternative (Map 2.6-6) would include a segment approximately 9 miles long on a new alignment. This segment built on a new alignment would skirt Cooper Landing to the north. Approximately 5 miles of the existing road would be improved on the existing alignment to meet current standards and incorporate passing and turning lanes. This alternative would not replace any existing bridges and would include one new bridge over Juneau Creek. This alternative would include underpasses or overpasses for two crossings of Forest Service logging roads west of Juneau Creek. At the western end of the "old" highway near Sportsman's Landing, this alternative would bridge over the "old" highway in order to create an intersection on the north side of the new highway.

2.6.6.2 Mile-by-Mile Detail

Segment built on the existing alignment (MP 44.5–46.3): The existing Sterling Highway would be widened and straightened to meet current rural principal arterial standards. The Juneau Creek Variant Alternative would be identical to the Juneau Creek Alternative (see Section 2.6.5.2) in this area.

Segment built on a new alignment: A new segment of highway would be built on a new alignment for about 9 miles.

From east to west, the Juneau Creek Variant Alternative would climb to a crossing of Juneau Creek and to its high point and would be identical to the Juneau Creek Alternative (see Section 2.6.5.2) in this area. The difference between the alternatives would occur in a segment 3.2 miles

long in the area west of Juneau Creek and east of Sportsman's Landing. Beginning at a point approximately 1.5 miles west of the Juneau Creek Bridge, the Variant would diverge from the Juneau Creek Alternative and follow a slightly more sinuous and, on average, slightly steeper alignment to rejoin the existing alignment at MP 55 of the existing highway. The grades would reach 5.8 percent but would not exceed the 6 percent standard for a rural principal arterial. An eastbound passing lane would occur throughout this section. An overpass or underpass would be provided for Chunkwood Road, a Forest Service road located approximately 1 mile west of Juneau Creek, and for West Juneau Road, another former Forest Service logging road located approximately 2.5 miles west of Juneau Creek. No connections between the highway and these roads would be provided. The underpass/overpass designs would accommodate logging trucks.

The new highway would cross another overpass at the base of the descent, and the "old" highway near MP 54.9 would be rerouted under this bridge to form a T-intersection on the north side of the new highway, as illustrated on Map 2.6-7 and in a visual simulation in Figure 2.6-12. The highway at the base of this descent would be four lanes wide, with a combination of turning lanes, acceleration lanes, and an eastbound passing lane. Access to Sportsman's Landing would occur off the "old" highway and would be slightly reconfigured as part of the re-routing of the western end of the "old" highway. The Juneau Creek Variant Alternative would be within the existing highway right-of-way at the KNWR boundary, and this alternative would avoid the need for acquiring lands from the KNWR designated Wilderness. This is the key difference between this alternative and the Juneau Creek Alternative (see Section 2.6.5.2).

Segment built on the existing alignment (MP 55–58.2): The existing Sterling Highway would be widened and straightened to meet current rural principal arterial standards. The horizontal alignment of the Juneau Creek Variant Alternative throughout this segment would be identical to the Cooper Creek and G South alternatives (see Sections 2.6.3.2 and 2.6.4.2).

- MP 55–MP 56.4: This portion of the existing highway would be rebuilt to meet current standards. A pullout to serve in part as parking for summer access to the Kenai River within KNWR would be provided at MP 55.6.
- MP 56.4–MP 57.7: A westbound passing lane would transition to an eastbound passing lane, with a short break between the two.
- MP 57.7–MP 58: This portion of the existing highway would be rebuilt to current standards.
- MP 58: Turning lanes would be provided on the Juneau Creek Variant Alternative at its intersection with Skilak Lake Road.
- MP 58–MP 58.2: This portion of the existing highway would be rebuilt to meet current standards.

Figure 2.6-12. Sportsman's Landing underpass visual simulation

Car heading west from Sportsman's Landing, passing under the Juneau Creek Variant Alternative. The visualization provides an approximate depiction of the bridge/underpass scenario expected for the crossing. The nature of the final structure will be refined through the design process.

Access Control. Under the Juneau Creek Variant Alternative, the only driveways or side roads authorized on the segment constructed on a new alignment would be:

- A driveway to a new trailhead for Resurrection Pass Trail, located just west of Juneau Creek Bridge, would be built as part of this project.
- A pullout that would also function as a winter trailhead for Bean Creek Trail, located just east of Juneau Creek Bridge, would be built as part of this project.

In addition, access points have been evaluated for potential future access to State Management Unit 395 (via ramps as an interchange only) and for potential future access to CIRI Tract A. The access to Unit 395 would be the same as described above for the Juneau Creek Alternative. For CIRI Tract A, a driveway for future access is granted by the Russian River Land Act.[10] DOT&PF and FHWA acknowledge this potential future access, which for this alternative would occur off both sides of the highway to provide access to the northern and southern portions of

[10] An agreement between the Forest Service and CIRI (and others) ratified by the Russian River Land Act of 2002 (i.e., in federal law) provided a provision for access from any new alignment of the Sterling Highway in this area to CIRI Tract A. See Section 3.1.2.2 for further information.

Tract A. This access would not be built as part of this project, but could be built by others if needed. The design and construction of this access would need to follow DOT&PF's access development process for the National Highway System, and CIRI would need to secure its own environmental permits.

The "Old" Highway (MP 46.3–55.0): The remaining segment of the existing highway (approximately 8.7 miles) that is not incorporated into the Juneau Creek Variant Alternative would not be altered as part of this alternative, except at Sportsman's Landing on its very western end where it ties into the Juneau Creek Variant alternative. As indicated at the beginning of Section 2.5, DOT&PF would continue to maintain the "old" highway for access to Cooper Landing and to recreational amenities along the Kenai River. Costs of maintaining both the new and old highways are addressed under Cumulative Impacts (Section 3.27), and presented in Table 3.27-4.

Construction Sites. The alternative would require several construction staging areas and sites for disposal of woody debris and soils that would not be useable in construction. These would be the same as discussed above for the Juneau Creek Alternative (Section 2.6.5.2) and shown on Map 2.6-8.

Juneau Creek Bridge. The proposed new Juneau Creek Bridge would be the same as the bridge described under the Juneau Creek Alternative (see Section 2.6.5.2; Figure 2.6-9 and Figure 2.6-10, above).

Connection to "Old" Highway Near Sportsman's Landing. A half-loop arc of road would connect the "Old Sterling Highway" to the Juneau Creek Variant Alternative, and a 140-foot bridge would route the new highway over the rerouted end of the "old" highway (see Map 2.6-7 and photo simulation in Figure 2.6-12). On the bridge, the Juneau Creek Variant Alternative would be 64 feet wide, with two 12-foot lanes, a 12-foot eastbound passing lane, a 12-foot westbound turning lane, and 8-foot shoulders. The existing highway would be rerouted to pass under this bridge and would be 40 feet wide and consist of two lanes with 8-foot shoulders.

2.7 Comparison of Alternatives and Identification of the Preferred Alternative

A side-by-side comparison of quantifiable benefits and adverse impacts of the alternatives has been compiled in tabular format. That summary table appears in the Executive Summary. Comparative analysis also appears at the end of Chapter 4, the Section 4(f) Evaluation. Such comparisons are important in the selection of a preferred alternative; however, these summary tables are provided for convenience. The full text of the EIS is necessary to understand the project and its impacts.

DOT&PF and FHWA have identified the Juneau Creek Alternative as the preferred alternative. DOT&PF and FHWA identified the preferred alternative after fully considering and responding to comments on the Draft SEIS, comments made in public hearings, and other comments received since the Draft SEIS was published.

Identification of the preferred alternative is not a final decision. FHWA will make its final decision by selecting an alternative for design and construction in a ROD. FHWA and DOT&PF anticipate collecting public comment on the Final EIS and identified preferred alternative and

responding to those comments in the ROD. Publication of the ROD will occur no sooner than 30 days after the close of the comment period.

Identification of the Juneau Creek Alternative occurred in a complex regulatory environment. As primary examples for this project:

- Regulations related to Section 4(f) of the Federal DOT Act require that FHWA balance seven factors to determine the alternative that has the "least overall harm" and require FHWA to select that alternative. See Chapter 4, the Section 4(f) Evaluation, and specifically the last section of the chapter (Section 4.8), which presents the least overall harm analysis. Section 4.8.9 provides a synthesis of DOT&PF and FHWA's reasoning.
- The Roadless Area Conservation Rule requires that the Forest Service find that a proposed project that would use land from an Inventoried Roadless Area "is in the public interest or is consistent with the purposes for which the land was reserved and acquired and no other reasonable and prudent alternative exists" to the use of the Inventoried Roadless Area (IRA) land. The project team has consulted with the Forest Service as a cooperating agency for this project, and has prepared appropriate documentation for the Forest Service in this Final EIS. See Chapter 3.2, Land Use Plans and Polices, and particularly Section 3.2.4.6.
- Section 404 of the Clean Water Act requires the U.S. Army Corps of Engineers (USACE) to determine the "least environmentally damaging practicable alternative" (LEDPA) and limits that agency to issuing a permit for fill in waters of the United States (including wetlands) only for that alternative. The project team has consulted with the USACE as a cooperating agency for this project, and has drafted supporting documentation that the Juneau Creek Alternative is the LEDPA. See Chapter 3.20, Wetlands and Vegetation, and Appendix G (*Draft Clean Water Act Section 404(b)(1) Guidelines Analysis)*. The USACE is anticipated to make its determination on the LEDPA based on this Final EIS.
- Title XI of ANILCA would require that multiple Federal agencies approve or disapprove the project's use of land from the Resurrection Pass Trail and/or the Kenai National Wildlife Refuge (both are conservation system units under ANILCA)[11]. The EIS contains the information needed for Title XI findings but does not compile an ANILCA-specific analysis of the findings. That will occur in the ROD. The EIS identifies it is reasonably foreseeable under the Juneau Creek Alternative that a land trade will occur that will remove most KNWR and all designated Wilderness lands in the area needed for this alternative (see Section 2.4.2.2).

While these analyses, and associated findings required of the agencies, have different technical requirements, all allow for consideration of a range of impact and benefit issues in an effort to determine what is "reasonable" or "practicable" or has the "least overall harm" or is "least environmentally damaging."

[11] The Alaska Attorney General has issued an opinion indicating the State's belief that the Resurrection Pass Trail is not a CSU under ANILCA. The Forest Service indicates the trail is a CSU. For the purposes of this EIS, DOT&PF and FHWA have provided the information required by the Forest Service to make their decision regarding the trail.

2.8 Summary of Analyses that Identified the Preferred Alternative

Based on analysis and on comments received on (and since) the Draft SEIS, DOT&PF and FHWA have determined that the Juneau Creek Alternative would have the least overall harm under Section 4(f) of the DOT Act. DOT&PF and FHWA also believe that the Juneau Creek Alternative would be the LEDPA under Section 404 of the Clean Water Act and is both in the public interest and the most prudent and reasonable alternative under the Forest Service's Roadless Rule. The Juneau Creek Alternative was determined to be the best alternative overall for a combination of reasons outlined below. The last section of Chapter 4 presents the actual Section 4(f) finding, Appendix G presents DOT&PF and FHWA's draft Section 404 (b)(1) analysis, and Section 3.2.4.6 presents the IRA analysis.

DOT&PF and FHWA have identified their preferred alternative in the context of a project area where all alternatives would have important impacts to protected properties—recreational, park, historic and archaeological, and/or wildlife refuge lands—and to wetlands and waters of the United States, including the Kenai River and associated wetlands and tributary streams. All alternatives would impact inventoried roadless areas. In addition, wildlife and habitat impacts in general are important to all alternatives. There is no perfect or obvious solution. DOT&PF and FHWA have balanced all factors, taken into account public and agency comments, and undertaken all possible planning to minimize harm to arrive at a conclusion.

The Cooper Creek and G South alternatives share the feature of using a substantial portion of the existing alignment. Normally, this could be seen as an advantage, but the existing alignment closely follows the Kenai River. Comments received following initial announcement of a preferred alternative (the G South Alternative) in December 2015 caused DOT&PF and FHWA to reconsider their balancing of factors and to give more weight to protection of the Kenai River. Such protection has been part of the project's statement of purpose and need since it was crafted early in the project, but DOT&PF and FHWA have given greater weight to this element of the project purpose based on the input.

The *Kenai River Comprehensive Plan*, promulgated by the State of Alaska and formally endorsed by the project area's Federal land management agencies, states policy that new highway construction should take place away from the Kenai River and states that no new bridges should be built crossing the Kenai River. DOT&PF and FHWA have given more weight to these issues as a result of agency and public comments that highlighted protection of the river. The G South Alternative includes a new bridge across the Kenai River and across an important tributary (Juneau Creek) in an area of known importance for salmon spawning and brown bear feeding. Both G South and Cooper Creek alternatives are within 300 feet of Kenai River and Tier I tributaries substantially more than the two Juneau Creek alternatives. The Juneau Creek alternatives would remove 70 percent of the traffic from these segments of the "old" highway adjacent to the river, reducing the risk of spills into the river, and benefitting the river as a natural water course and as salmon and wildlife habitat. The G South and Cooper Creek alternatives would bury or excavate more historic and archaeological sites within the Sqilantnu Archaeological District than the other two alternatives, particularly more than the Juneau Creek Alternative.

In addition, the Cooper Creek Alternative has an important set of impacts not shared by any of the other alternatives. These are impacts to the community of Cooper Landing. Chapter 3 of this EIS spells out the effects of routing the highway through a portion of Cooper Landing versus routing the highway around the entire community. There are important impacts, including using private property, displacing households (with little to no replacement housing available), exacerbating highway noise, and affecting community character by keeping highway traffic in town. Moreover, in large part because of the continued conflicts and congestion of routing part of the alternative through Cooper Landing, the Cooper Creek Alternative does not solve the transportation problems as well as the other alternatives. Overall, DOT&PF and FHWA believe that the benefits of routing the highway around the community far outweigh the impacts. Routing traffic around the community will best serve local and through drivers, land owners, and recreationalists over time.

The suite of issues above taken together means that neither the Cooper Creek Alternative nor the G South Alternative is the least harmful or least damaging overall.

The Juneau Creek Variant Alternative would have impacts overall that are similar, in most respects, to the impacts of the Juneau Creek Alternative. However, the Juneau Creek Variant Alternative would have extraordinary impacts and land acquisition issues not present in the other three alternatives. These are impacts to the Sqilantnu Russian River Confluence Site. The issues, related to acquisition of land for a highway right-of-way through sacred lands selected by and transferred to a regional Alaska Native corporation via a special act of Congress to resolve Native land claims, would be unusually difficult to overcome. This is especially true given that there are three other reasonable alternatives that would not have these impacts. These issues were primary reasons DOT&PF and FHWA have found the Juneau Creek Variant Alternative to be more harmful and more damaging to the overall environment than the Juneau Creek Alternative.

The Juneau Creek Alternative would best satisfy the project purpose and need—both its transportation elements and the element of protecting the Kenai River. It would have the highest level of service of any of the alternatives and would be routed farthest overall from the Kenai River and other Tier I streams. It would cross the fewest anadromous fish (salmon) streams. A commitment by the DOI to undertake a land exchange that would remove KNWR land status and Federally designated Wilderness status in a portion of KNWR would reduce refuge and Wilderness impacts attributed to this alternative. Under such an exchange, the KNWR is anticipated to retain an equal or greater value of land overall (habitat and Wilderness value, as well as monetary value) by exchanging for lands near the Killey River/Kenai River confluence held by CIRI, the regional Alaska Native corporation for the Kenai Peninsula area. The trade would protect those lands from future development.

Both Juneau Creek alternatives share the distinction of using and fragmenting the greatest extent of wildlife habitat of the four alternatives. DOT&PF and FHWA balanced these impacts by undertaking all possible measures to minimize harm. DOT&PF and FHWA first studied wildlife movement and then developed substantial wildlife mitigation based on that study. The proposed measures include multiple wildlife crossing structures.

While the Juneau Creek Alternative impacts more vegetated wetlands, this project area encompasses the confluence of the Kenai and Russian rivers, which are also waters of the United States. These rivers are productive streams that provide a food source for wildlife (notably brown bears) and provide for recreation, tourism, and fishing that have local, regional, and statewide economic importance. The existing highway is close to the river throughout the entire project area and is the only highway that provides access between western Kenai Peninsula communities and the rest of the state and National Highway System. The protection of flowing waters of the Kenai River outweigh the protection of wetlands located at a distance from the river. The Juneau Creek Alternative provides an opportunity both to improve traffic conditions and to better protect the river environment, including improved water quality from runoff and potential spill risk. The recreation benefits include better safety and access, reduced noise levels on the river, and fewer visual impacts as seen from the river.

As described in more detail in Chapter 4, in Appendix G (*Draft Clean Water Act Section 404(b)(1) Guidelines Analysis*), and in Section 3.2.4.6, these are the reasons DOT&PF and FHWA have identified the Juneau Creek Alternative as the preferred alternative.

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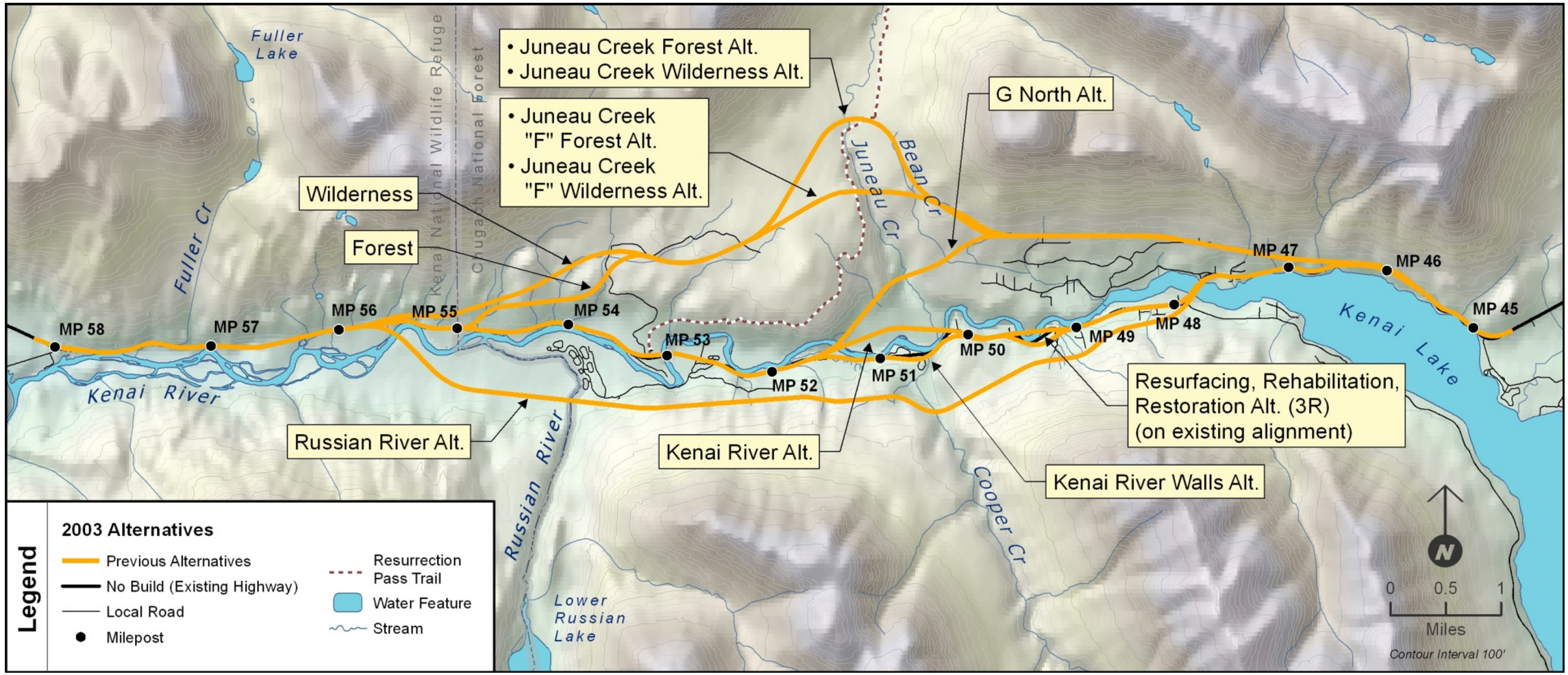

Map 2.3-1. 2003 alternatives considered but rejected

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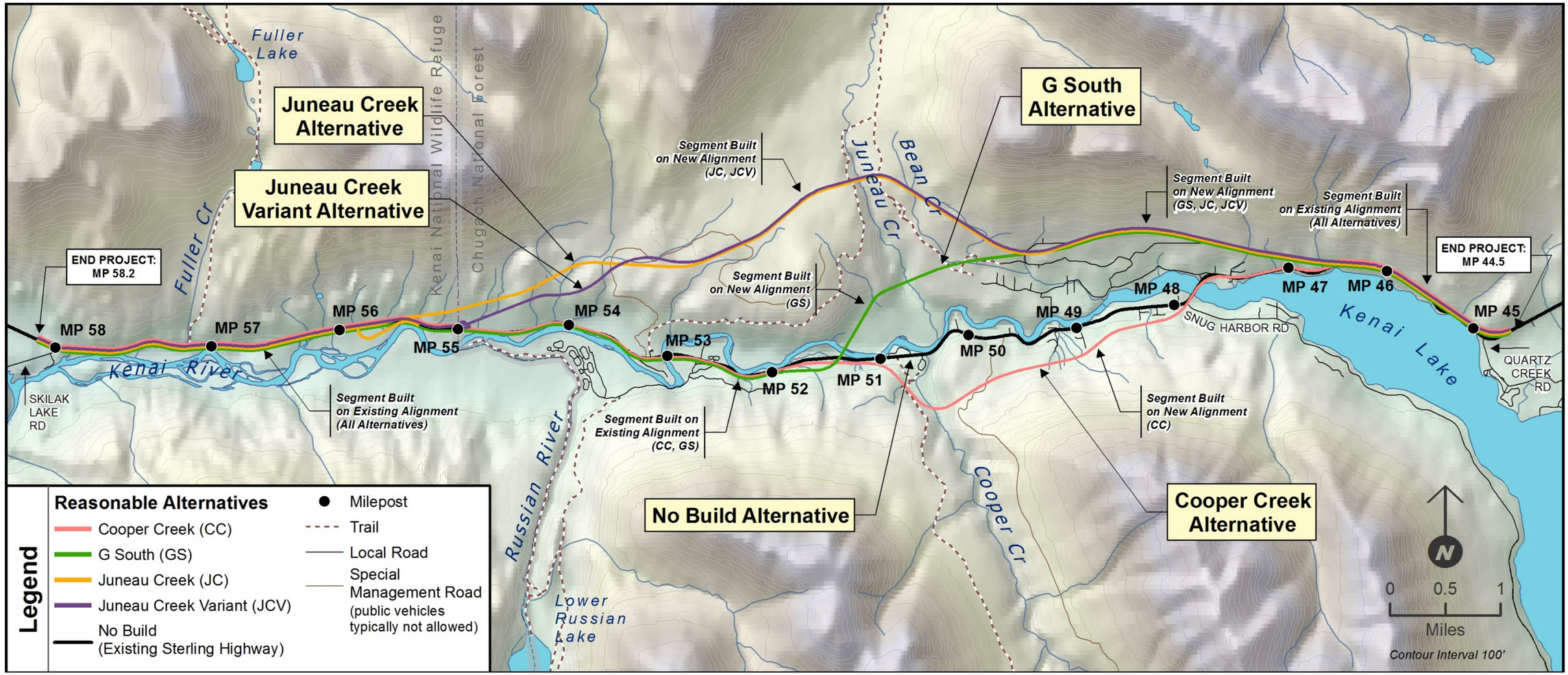

Map 2.4-1. Reasonable alternatives [Updated]

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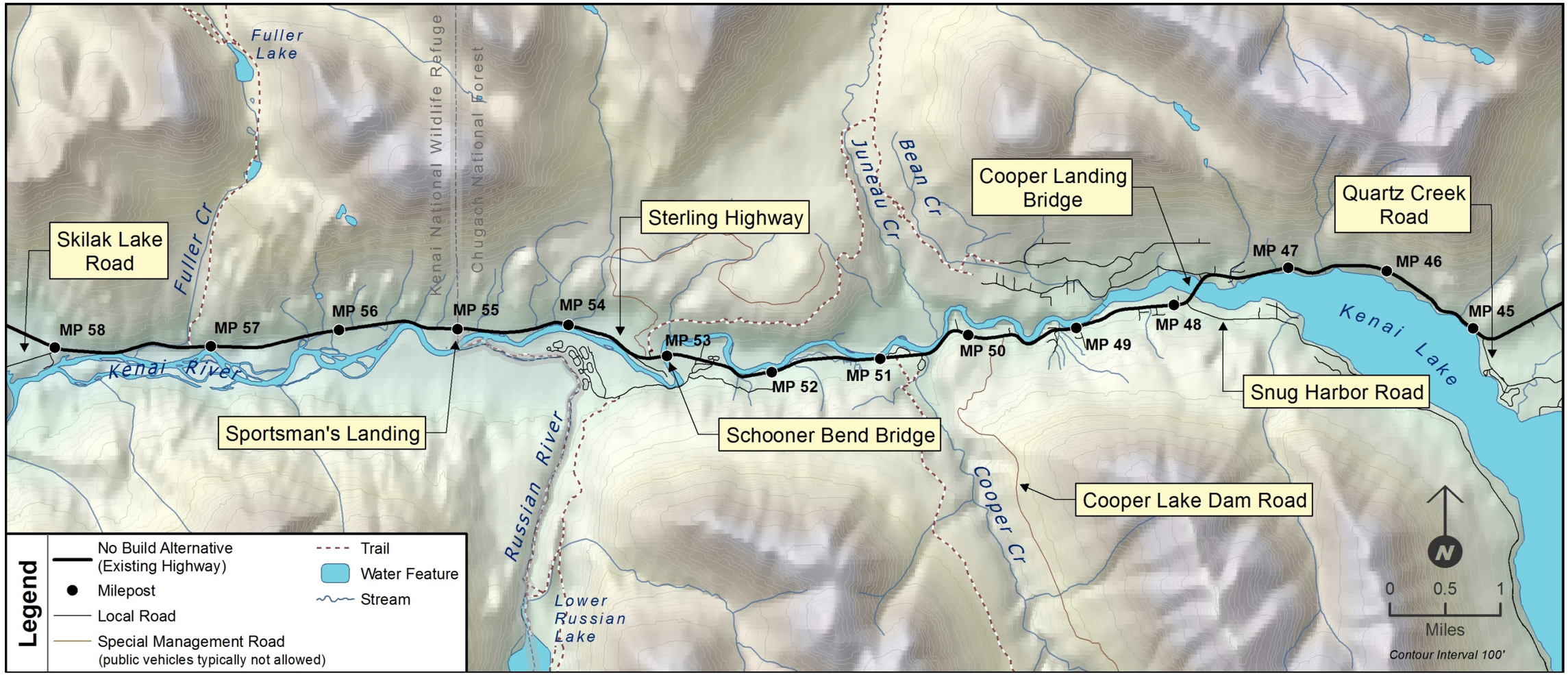

Map 2.6-1. No Build Alternative

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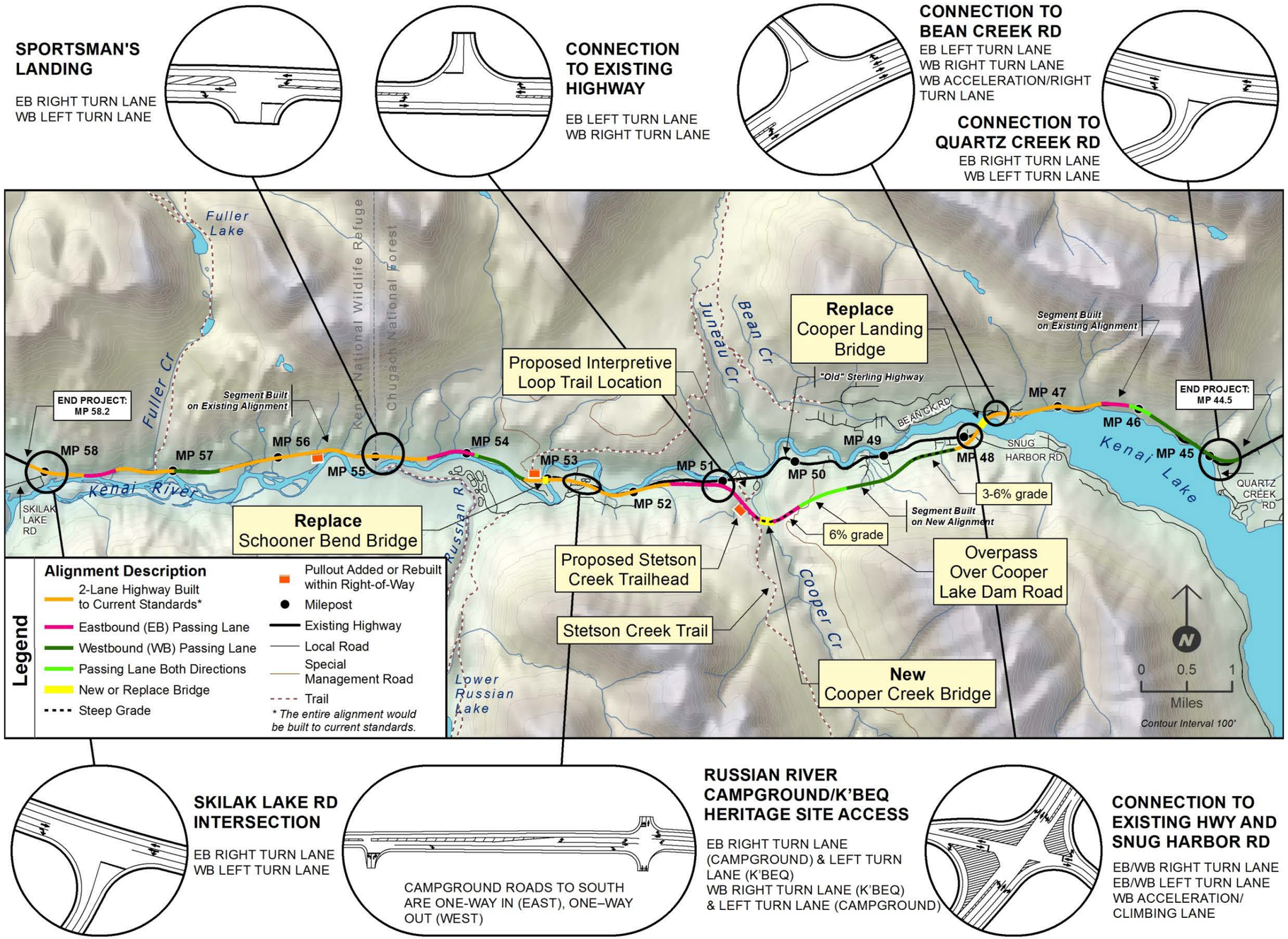

Map 2.6-2. Cooper Creek Alternative [Updated]

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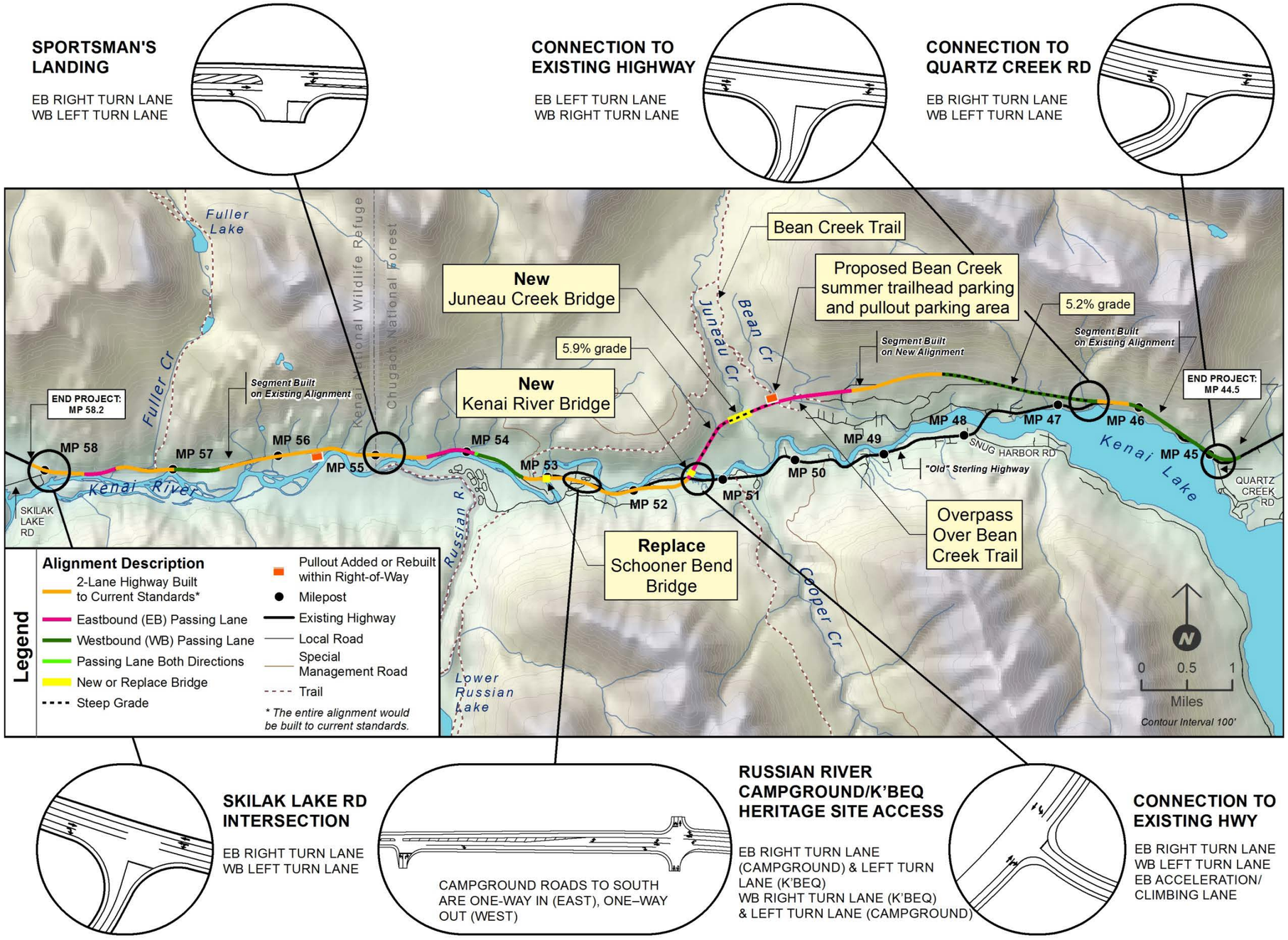

Map 2.6-3. G South Alternative [Updated]

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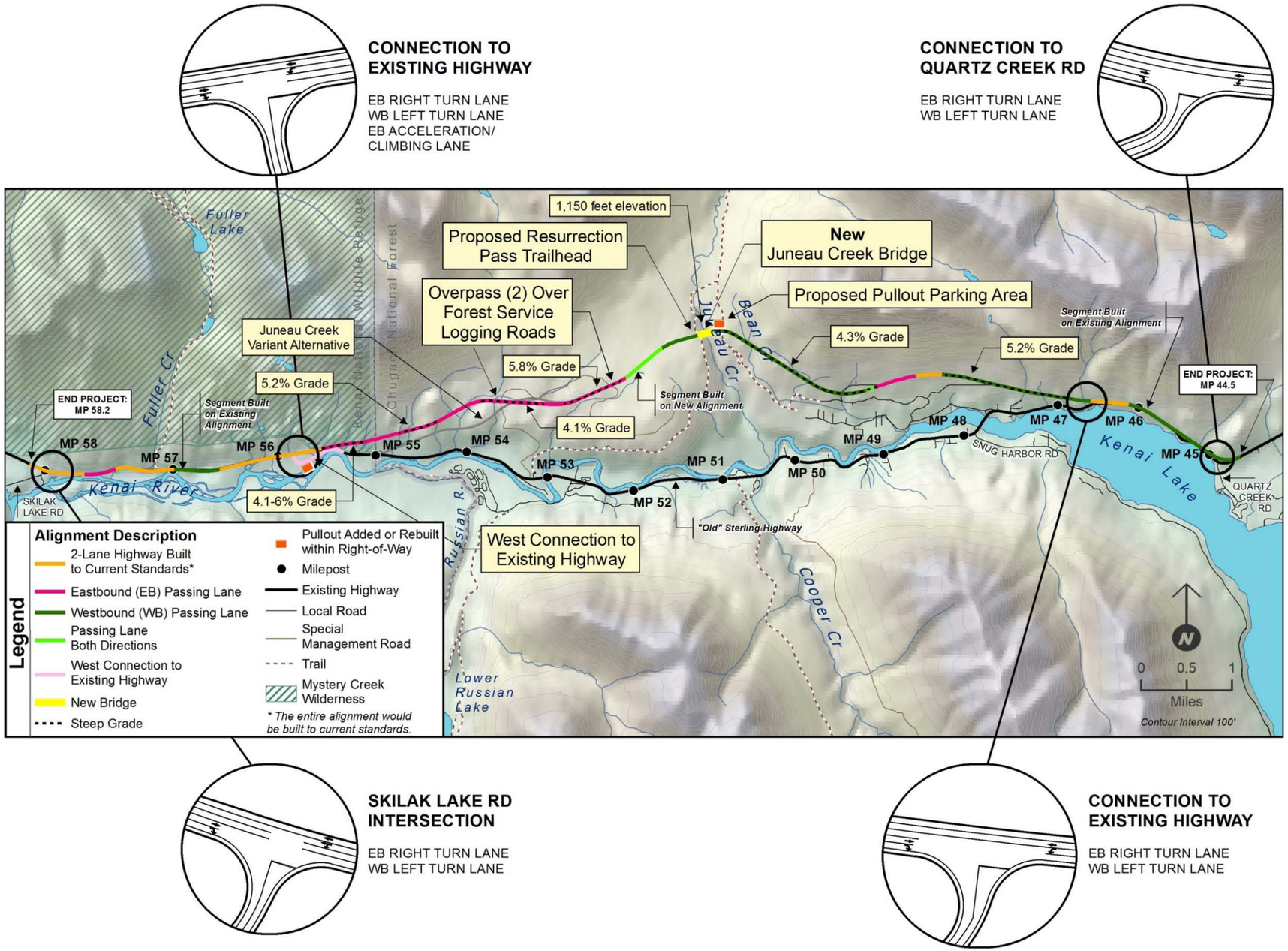

Map 2.6-4. Juneau Creek Alternative (Preferred) [Updated]

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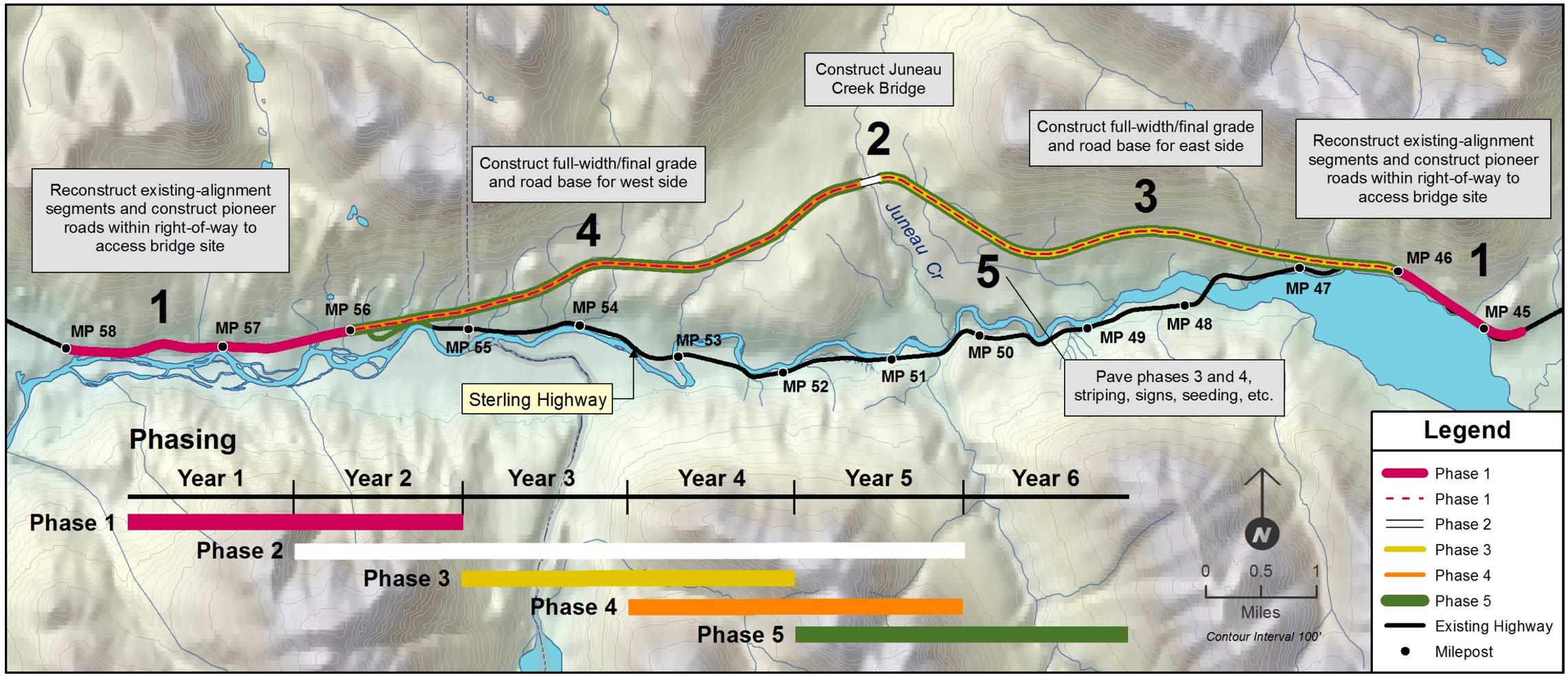

Map 2.6-5. Anticipated Construction Sequencing, Juneau Creek Alternative [New]

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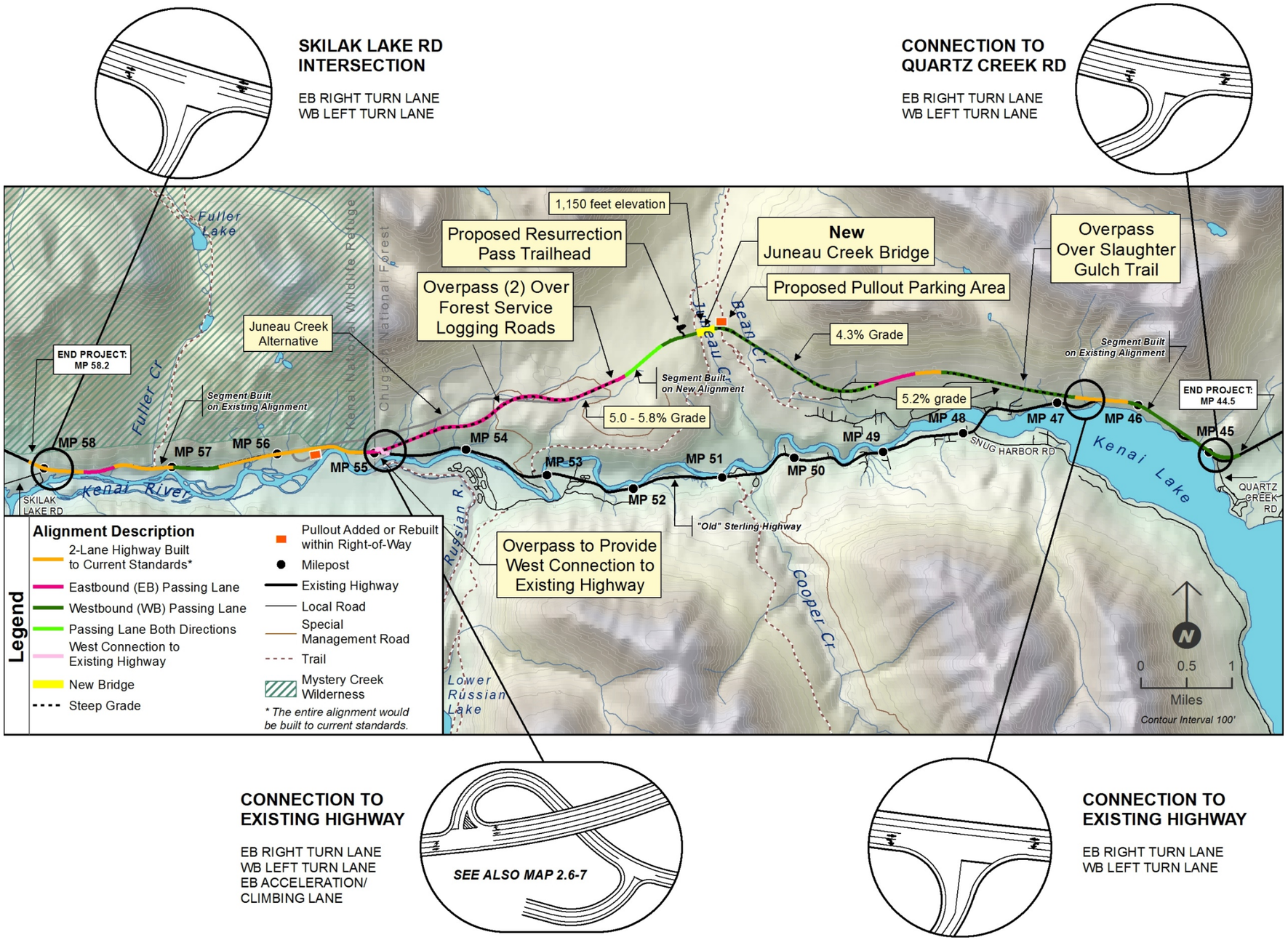

Map 2.6-6. Juneau Creek Variant Alternative [Updated]

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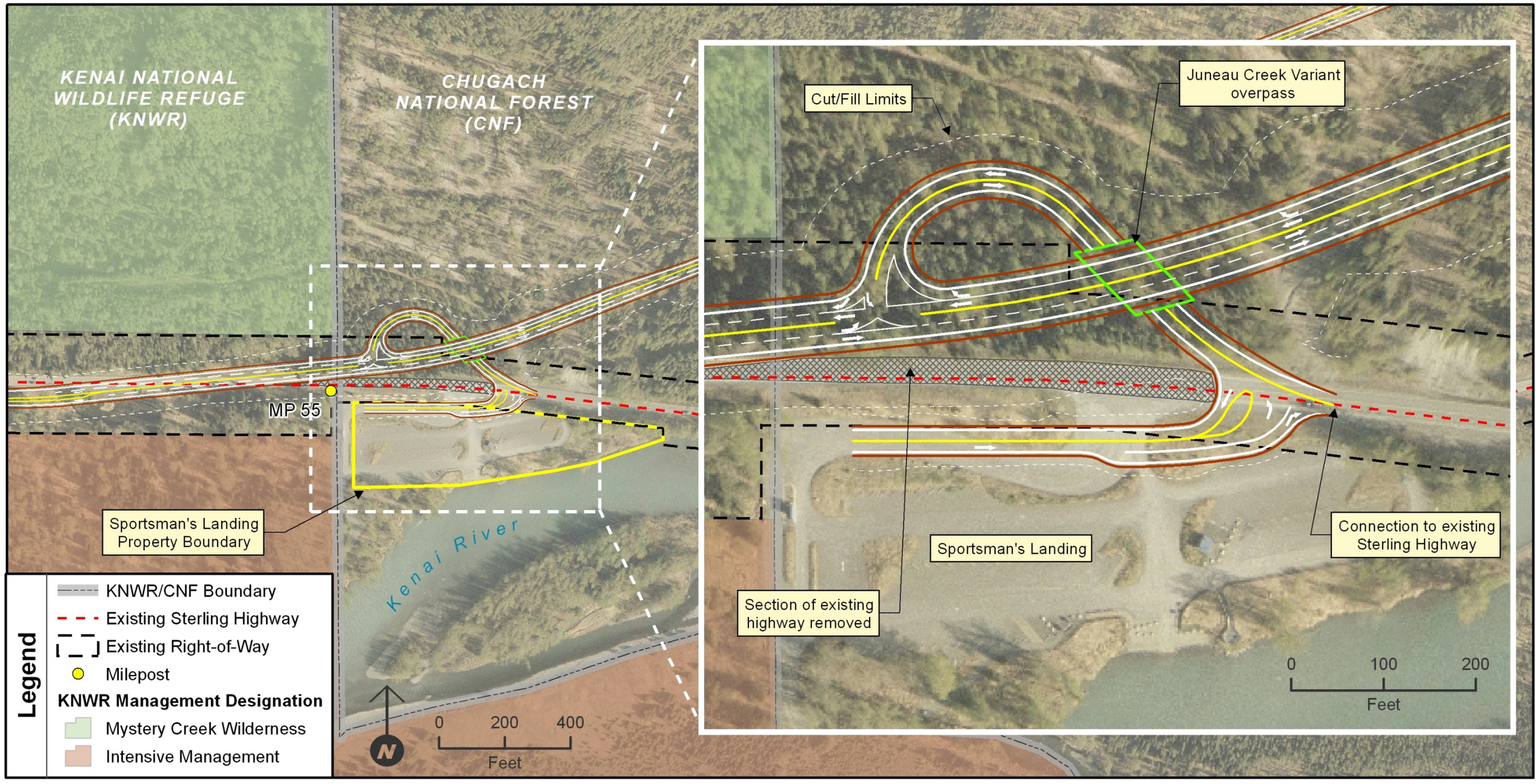

Map 2.6-7. Sportsman's Landing in Juneau Creek Variant Alternative

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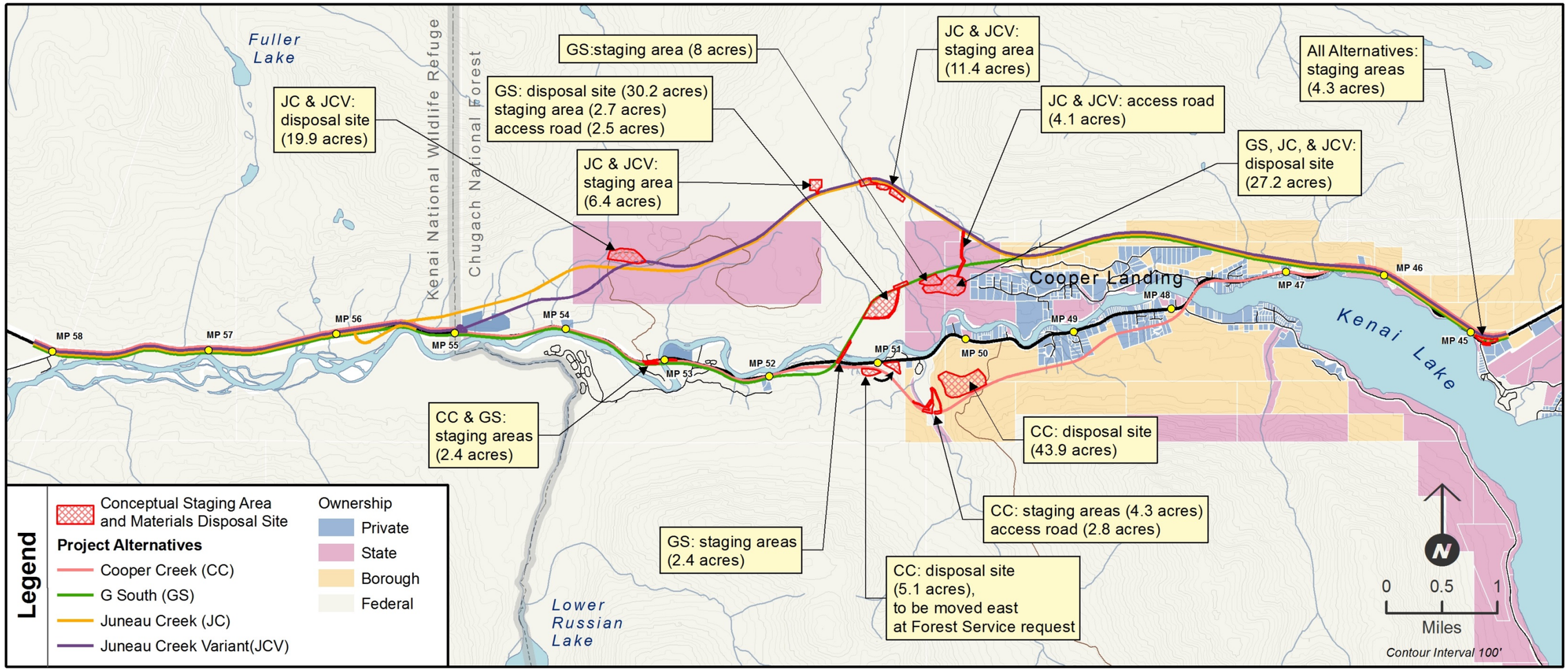

Map 2.6-8. Temporary construction areas [Updated]

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