

# PRELIMINARY ENGINEERING MEMORANDUM

## Sterling Highway, MP 45-60 Project No. F-021-2(15)/53014

Cooper Creek Alternative  
G South Alternative  
Juneau Creek Alternative

*Prepared for:*

HDR Alaska, Inc.  
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and

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March 2006

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The logo for R&M Consultants, Inc. features the letters 'R&M' in a bold, stylized, outlined font. The letters are contained within a rectangular frame that is part of a larger horizontal line spanning the width of the page.

**R&M CONSULTANTS, INC.**

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## ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ADT	Average Daily Traffic
BOP	Beginning of Project
cy	Cubic Yards
DHV	Design Hourly Volume
DOT&PF	Alaska Department of Transportation & Public Facilities
EOP	End of Project
ft.	Feet
K	Thousand
Lt.	Left
M	Million
Max.	Maximum
Min.	Minimum
MP	Mile Post
M.S.	Material Site
NHPA	National Historic Preservation Act
PCM	Alaska Preconstruction Manual
PEM	Preliminary Engineering Memorandum
Pg	Page
QCR	Quartz Creek Road
ROW	Right-of-Way
Rt.	Right
Sec.	Section
SLR	Skilak Lake Road
w/o	Without

# Preliminary Engineering Memorandum

Cooper Creek Alternative  
G South Alternative  
Juneau Creek Alternative

## **STERLING HIGHWAY, MP 45 TO 60 PROJECT NO. F-021-2(15)/53014**

The Sterling Highway, MP 45 to 60 Project begins just east of the Quartz Creek Road Intersection (MP 45) and ends just west of the Skilak Lake Road Intersection (MP 60). This memorandum (supplemented by the plans attached in Appendix A) summarizes the preliminary design for the following three build alternatives: Cooper Creek, G South, and the Juneau Creek Alternatives, shown in Figure A. The Preliminary Engineering Memorandum (PEM) and associated drawings have been developed following the standard engineering procedures of stationing the project west to east (from Skilak Lake Road to Quartz Creek Road).

### **ALIGNMENT INFORMATION**

Design of the three build alternatives was based on the Sterling Highway MP 37-60, 1994 Draft Environmental Impact Statement and Section 4(f) Evaluation, and preliminary and conceptual engineering documents created in 1989 and 1991.

- The Cooper Creek and G South Alternatives, up to the location where they depart from the existing highway, were based upon the 1989 conceptual drawings for the Kenai River Alternative.
- The Juneau Creek Alternative, except where it deviates and crosses the Juneau Creek Canyon, was based on the 1991 conceptual and preliminary engineering for the Juneau Creek Alternative, Wilderness Variant.

Modifications during preliminary engineering included revising alignments to be in conformance with current design criteria, and incorporating turning lanes, passing lanes, climbing lanes, and preliminary geotechnical recommendations into the design. Horizontal and vertical alignments were also adjusted to minimize wetland impacts, and to reduce cut and fill quantities, retaining wall heights, and impacts to the Kenai River.

Geotechnical information utilized in the preliminary engineering included:

- Sterling Highway MP 37 to MP 60, Preliminary Location Study, 1989;
- Reconnaissance Engineering Geology Report, Sterling Highway MP 37-60, August 1989;
- Reconnaissance Geotechnical Report, Sterling Highway MP 37-60 (Alternative 5), October 1991;
- Preliminary Geotechnical Memo, Cooper Creek Alternative, Sterling Highway MP 45-60, January 2001;

STERLING HIGHWAY, MP 45-60  
Project No. F-021-2(15)/53014  
ALTERNATIVES

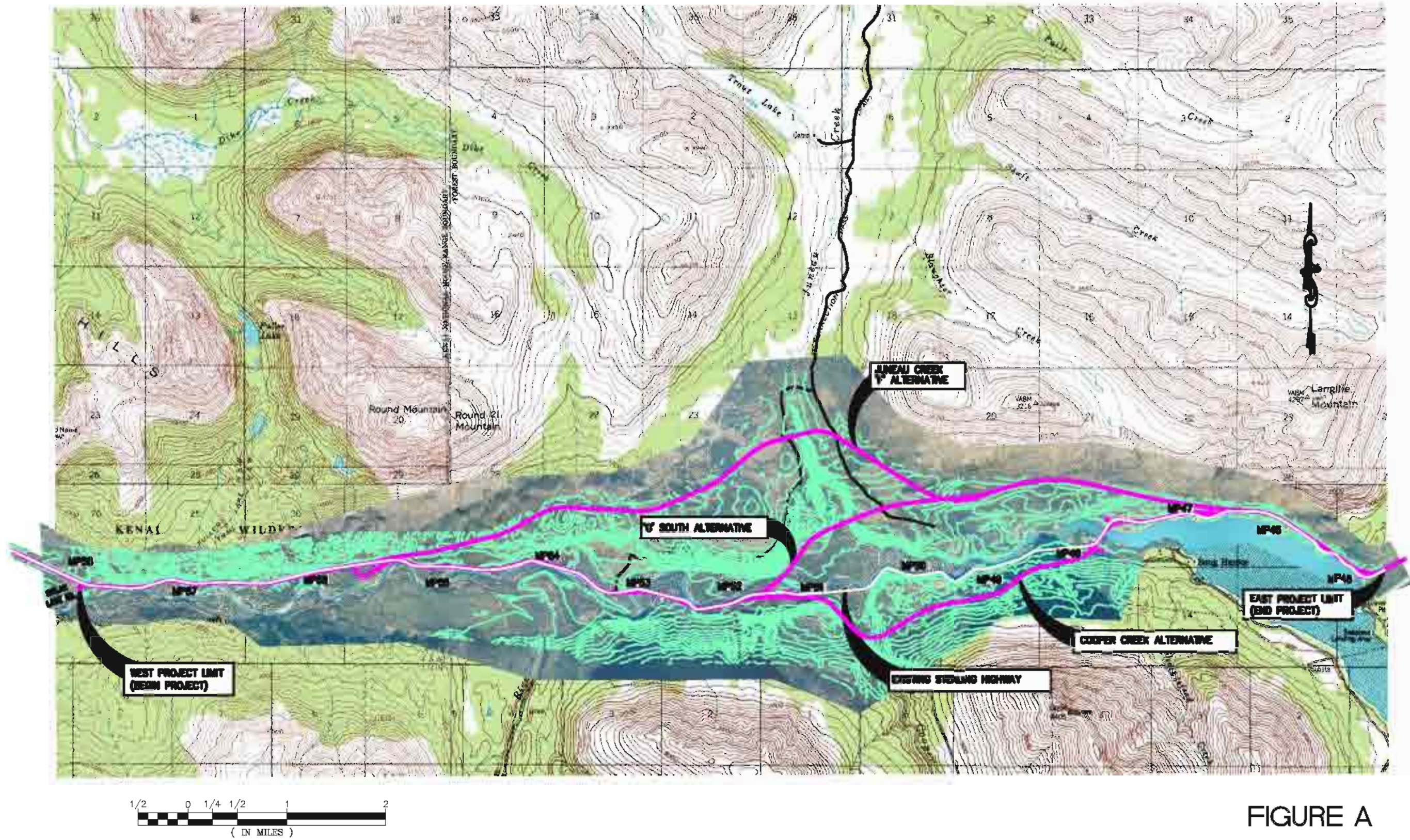


FIGURE A

Project:04\041800\Civil\Pros-Photo-05-03-05, 11:00 03/17/06 of 1144 by cdb

- General field observations, summer of 2004, and
- Preliminary Rock Stability Investigation, Sterling Highway MP 45-60, Juneau Creek Crossing F Alternative, May 2005.

## DESIGN CRITERIA

The design criteria for this project conforms to the Alaska Department of Transportation and Public Facilities' (DOT&PF) June 16, 2003 "Alaska Preconstruction Manual" (PCM) and American Association of State Highway and Transportation Officials (AASHTO) guidelines.

**TABLE 1**  
**Project Design Criteria**

**Sterling Highway MP 45 – 60**  
**New Construction/Reconstruction**

ELEMENT	VALUE	SOURCE
Functional Classification	Rural Principal Arterial	AASHTO 2001, pg. 8
Design Year	2025	
Present Year ADT	9,000 (seasonal peak)	Sterling Hwy MP. 45-60 Traffic Data Collection Rpt.
Design Year ADT	18,300 (seasonal peak)	Sterling Hwy MP. 45-60 Traffic Data Collection Rpt.
Mid-Period ADT	13,050 (seasonal peak)	
Design Hourly Volume (DHV)	1200	Sterling Hwy MP. 45-60 Traffic Data Collection Rpt.
Directional Split (%D)	35/65	Sterling Hwy MP. 45-60 Traffic Data Collection Rpt.
Trucks (%T)	18%	Sterling Hwy MP. 45-60 Traffic Data Collection Rpt.
Pavement Design Year	2015	PCM (Sec. 1180.32) 11/4/2002
Design Vehicle	AASHTO WB-67	Memo 6/1/00, Duane Doerflinger, DOT&PF
Design Speed / Terrain	60 mph / Mountainous	AASHTO 2001, pg. 67 / 235
Stopping Sight Distance	570 ft (minimum)	AASHTO 2001, pg. 449, Exhibit 7-1
Passing Sight Distance	2135 ft (minimum)	
Allowable Grade Max / Min	6% Maximum / N/A (0%)	AASHTO 2001, pg. 450, Exhibit 7-2 / pg. 242
Min. Radius of Curvature	1340 ft. (minimum) (6% Superelevation)	AASHTO 2001, pg. 159, Exhibit 3-22
Minimum K-Value for Vertical Curves	Crest: 151 (Minimum) Sag: 136 (Minimum)	AASHTO 2001, pg. 274, Exhibit 3-76 AASHTO 2001, pg. 280, Exhibit 3-79
Number of Roadways	One	
Width of Traveled Way	24 ft. (2-12 ft Lanes)	AASHTO 2001, pg. 452, Exhibit 7-3
Width of Shoulders	8 ft.	AASHTO 2001, pg. 452, Exhibit 7-3
Surface Treatment	Asphalt Concrete (AC)	
Side Slopes Ratios	Foreslopes 4:1 (Max. w/o Guardrail) Backslopes 2:1 (Outside Clear Zone)	PCM (Sec. 1130)
Degree of Access Control	Access management / Partial control in acquisition areas.	
Illumination	Major intersections	1984 AASHTO Informational Guide For Roadway Lighting, Memo DOT&PF 1/21/99
Curb Usage and Type	None	
Bicycle Provisions	Shoulders	PCM (Sec. 1210)
Pedestrian Provisions	Shoulders	
Passing Lane Width	12 ft	
Vertical Clearance	16.5 ft.	PCM pg. 1130-5, Table 1130-1
Clear Zone	30 ft	PCM (Sec.1130) Table 1130-8

## TYPICAL SECTION

The proposed build alternatives consist of a two-lane highway with paved shoulders, passing lanes, climbing lanes, and turning lanes.

- Travel lanes are 12 feet wide.
- Paved shoulders are 8 feet wide.
- Climbing and passing lanes are 12 feet wide.
- Typical fill sections; 6:1 foreslopes for 22 feet, then “barn roof” to 2:1 slopes.
- Typical cut sections; 6:1 foreslopes for 22 feet then 2:1 backslopes.
- Ditch depths are 3.7 feet deep.
- Typical guardrail sections have 2:1 fill slopes or 1.5:1 riprap slopes.
- Maximum retaining wall height in fill sections is approximately 36 feet.
- Maximum retaining wall height in cut sections is approximately 32 feet.
- Typical rock excavation sections have 4:1 foreslopes for 14 feet then a 10-foot flat bottom ditch and 0.25:1 rock cut slopes.

Rock typical sections were developed following the guidance of previous reports and memos. Retaining walls are conceptually designed with a 10:1 batter.

Typical sections for each alternative are shown in Appendix A.

### Lane Widths

Lane widths influence safety, comfort and level of service. Following the guidance of AASHTO, travel lanes will be 12 feet wide, which will maintain roadway continuity, provide desirable clearances for vehicles traveling in opposite directions, and will optimize the level of service benefit. Auxiliary passing and climbing lanes also follow the guidance of AASHTO and are designed to the same width as the through traffic lanes.

### Shoulders

The shoulder is adjacent to the traveled way and accommodates stopped vehicles, emergency use, and lateral support of the subbase, base, and surface courses. For this project it is also designed to accommodate bicycles. Shoulders 10 feet wide are recommended for heavily traveled, high-speed highways and highways carrying large numbers of trucks. However, in difficult terrain (such as this project), shoulders of this width may not be practical. Shoulders eight feet wide are less than the desirable 10 feet, but provide adequate separation and sufficient width, clear of rumble strips, for safe bicycle use.

### Sideslopes

Sideslopes are designed to provide roadway stability and reasonable opportunity for recovery for an out-of-control vehicle. Where roadsides are reasonably flat, smooth, and clear of fixed objects, many potential crashes can be averted. A rate of slope of 6:1 or flatter on embankments can be negotiated by a vehicle with a good chance of recovery and should be provided where practical. On intermediate height fills, the cost of a continuous flat slope is prohibitive. As designed, the shoulder and 6:1 foreslope provides a reasonable recovery area prior to the cost-

effective 2:1 backslope and fill slopes. On large fills, 2:1 fill slopes are used to reduce earthwork with guardrail to redirect out-of-control vehicles away from the non-traversable slopes.

## **INTERSECTIONS**

All major intersections, most of which are Tee intersections, are designed with right and left turn lanes. Following the guidance of AASHTO, auxiliary lanes at intersections are designed to the same width as the through lanes (12 feet), and the left turn lanes are designed at 16 feet wide providing desirable width and separation from the through traffic. The major intersections include:

- Skilak Lake Road (Tee, all Alternatives, Station 1235+00);
- Sportsman's Point (Tee, Cooper Creek and G South Alternatives, Station 1433+20);
- Russian River Campground (4-way, Cooper Creek and G South Alternatives, Station 1556+40);
- Snug Harbor Road/Old Sterling Highway (4-way, Cooper Creek Alternative, Station 1803+00);
- Bean Creek Road (Tee, Cooper Creek Alternative, Station 1819+50);
- Quartz Creek Road (Tee, all Alternatives, Station, varies 1957+00 and 1965+00), and
- all intersections linking the Old Sterling Highway to the build alternatives (Tee intersections).

## **TRAFFIC ANALYSIS**

Traffic analysis was performed by HDR Alaska, Inc., see Sterling Highway MP 45 to 60 Traffic Analysis Memorandum, 2003, and Updated Traffic Analysis, August 2005.

## **BRIDGE STRUCTURES**

A preliminary bridge structures technical memorandum was prepared by HDR Alaska, Inc., see Sterling Highway MP 45-60, Preliminary Bridge Structure Memorandum, August 2005.

Bridge sites are conceptual. Geotechnical investigations were limited to a preliminary rock stability investigation where the Juneau Creek Alternative crosses the Juneau Creek Canyon.

## **EARTH RETAINING STRUCTURES**

Locations requiring retaining wall structures are identified, but structure types have not been selected or designed. During final design geotechnical investigations will be conducted to support the selection and design of retaining structures.

## **BUILD ALTERNATIVES**

Stationing begins just west of the Skilak Lake Road Intersection (Station 1225+00) and ends just east of the Quartz Creek Road Intersection (end stationing varies with respect to the individual alignment lengths.) All three build alternatives follow identical alignments from Skilak Lake

Road Intersection to 1365+00 (1.2 miles west of Sportsman’s Point). At Station 1365+00 the Juneau Creek Alternative diverges north and climbs out of the river valley. Between Stations 1365+00 and 1595+00 the Cooper Creek and G South Alternatives are identical and continue along the existing highway corridor until Station 1595+00. At Station 1595+00, the G South Alternative diverges north, crosses the Kenai River and climbs out of the valley. Just past Station 1595+00, the Cooper Creek Alternative diverges south, climbs out of the valley and crosses Cooper Creek. The Cooper Creek Alternative rejoins the exiting highway corridor at the Kenai River Bridge in Cooper Landing and from that location it generally follows along the existing highway corridor to the end of the project. Juneau Creek and G South Alternatives rejoin and follow identical alignments from approximately Station 1822+00 to the end of the project.

**All Build Alternatives (Cooper Creek, G South, and Juneau Creek)**

Sta. 1225+00 to Sta. 1365+00 (Skilak Lake Road to 1.2 miles west of Sportsman’s Point)

All three build alternatives share identical alignments between Stations 1225+00 and 1365+00. This segment of roadway is bound by the Kenai River on the right and steep mountain slopes on the left. Retaining walls are used to minimize sliver cuts and to maintain slope limits within the existing right-of-way (ROW). Where the roadway is adjacent to sloughs, small streams, and the Kenai River, guardrail and riprap is used.

To minimize sliver cuts, avoid fill in the Kenai River and maintain slopes within the existing ROW, retaining walls are used in the following locations :

Station from	Station to	Max. Height (ft.)	Ave. Height (ft.)	Length (ft.)	Remarks
1258+00, Lt.	1259+25, Lt.	34	22	125	Upslope
1261+50, Lt.	1262+50, Lt.	35	20	100	Upslope
1265+00, Lt.	1272+50, Lt.	26	16	750	Upslope
1288+50, Lt.	1289+00, Lt.	4	4	50	Upslope
1348+50, Lt.	1351+00, Lt.	5	4	250	Upslope

To minimize river and wetland impacts, guardrail with 2:1 fill slopes are used in the following locations. At some locations riprap revetment structures are used to protect the roadway from river and stream erosion.

Station from	Station to	Guardrail	Riprap Revetment
1252+00, Rt.	1255+00, Rt.	Yes	No
1255+00, Rt.	1268+00, Rt.	Yes	Yes
1268+00, Rt.	1275+50, Rt.	Yes	No
1275+50, Rt.	1281+50, Rt.	Yes	Yes
1281+50, Rt.	1285+50, Rt.	Yes	No
1285+50, Rt.	1291+00, Rt.	Yes	Yes
1291+00, Rt.	1294+00, Rt.	Yes	No
1304+50, Rt.	1307+50, Rt.	Yes	No
1307+50, Rt.	1313+00, Rt.	Yes	Yes
1313+00, Rt.	1316+00, Rt.	Yes	No

A stream crosses the roadway near Station 1290+40. Currently this stream crosses the existing highway and then flows along the toe of the existing embankment. Given the proposed wider embankment, it is necessary to move the existing streambed and re-establish it at the toe of the new embankment on the right (south) side of the alignment between Stations 1287+00 and 1290+00.

An eastbound passing lane 0.7 miles long is located between Stations 1298+76 and 1336+00.

A westbound passing lane 0.75 miles long is located between Stations 1321+76 and 1362+00.

At Station 1365+00, the Juneau Creek Alternative diverges north and begins to climb out of the river valley. Cooper Creek and the G South Alternative continue to share the same alignment and follow the existing highway corridor along the Kenai River.

### **Cooper Creek and G South Alternatives**

Sta. 1365+00 to Sta. 1595+00 (1.2 miles west of Sportsman's Point to 1.2 miles west of Cooper Creek)

Cooper Creek and the G South Alternative share identical alignments between Stations 1365+00 and 1595+00. Between Stations 1365+00 and 1464+00, the roadway corridor is bound by the Kenai River on the right and steep mountain slopes on the left. Retaining walls are used to minimize sliver cuts and, where possible, to maintain slope limits within the existing ROW. Where the roadway is adjacent to sloughs, small streams, and the Kenai River steepened slopes, guardrail and riprap is used. Between Stations 1464+00 and 1595+00, the steep mountain slopes are further away from the road corridor and do not present significant design constraints.

To minimize sliver cuts, avoid fill in the Kenai River and to maintain slopes within the existing ROW retaining walls are used in the following locations:

Station from	Station to	Max. Height (ft.)	Ave. Height (ft.)	Length (ft.)	Remarks
1370+00, Lt.	1377+50, Lt.	12	7	750	Upslope
1399+25, Lt.	1399+75, Lt.	5	5	50	Upslope
1404+50, Lt.	1408+00, Lt.	18	12	350	Upslope
1405+50, Rt.	1409+00, Rt.	10	8	350	Downslope
1409+75, Lt.	1410+75, Lt.	30	26	100	Upslope
1414+50, Lt.	1415+50, Lt.	25	15	100	Upslope

Placing a revetment structure in the river between Stations 1404+50 and 1410+75 could greatly reduce costs and slope stability risks with respect to the required upslope and down slope retaining systems. Geotechnical investigations and hydraulic and hydrologic analysis will be necessary to develop final design recommendations at this location.

To minimize river and wetland impacts, guardrail with 2:1 fill slopes are used in the following locations. At some locations riprap revetment structures are used to protect the roadway from river and stream erosion.

Station from	Station to	Guardrail	Riprap Revetment
1363+00, Rt.	1366+00, Rt.	Yes	No
1366+00, Rt.	1383+50, Rt.	Yes	Yes
1385+50, Rt.	1387+00, Rt.	Yes	No
1387+00, Rt.	1391+50, Rt.	Yes	Yes
1391+50, Rt.	1394+50, Rt.	Yes	No
1400+50, Rt.	1403+50, Rt.	Yes	No
1403+50, Rt.	1405+50, Rt.	Yes	Yes
1405+50, Rt.	1409+00, Rt.	Yes	No
1409+00, Rt.	1415+00, Rt.	Yes	Yes
1415+00, Rt.	1427+50, Rt.	Yes	No
1435+50, Rt.	1438+50, Rt.	Yes	No
1438+50, Rt.	1452+00, Rt.	Yes	Yes
1452+00, Rt.	1454+50, Rt.	Yes	No
1565+00, Lt	1568+00, Lt.	Yes	No
1568+00, Lt.	1571+50, Lt.	Yes	Yes
1571+50, Lt.	1575+00, Lt.	Yes	No

An eastbound passing lane 0.6 miles long is located between Stations 1459+56 and 1490+10.

A westbound passing lane 0.6 miles long is located between Stations 1488+00 and 1520+00.

The new bridge at Schooner Bend, between Stations 1531+00 and 1534+00, is skewed and located approximately 80 feet downstream from the existing bridge site. The skew and resiting enables desirable roadway geometrics. Siting the bridge downstream also places the bridge structure further away from an eroding bend in the river. The existing structure will be used during construction and then removed after completion of the new structure.

The Cooper Creek and G South Alternatives diverge at Station 1595+00.

### **Cooper Creek Alternative**

*Sta. 1595+00 to Sta. 1983+45 (1.2 miles west of Cooper Creek to Quartz Creek Road)*

Cooper Creek Alternative from Station 1595+00 to the end of the project (Quartz Creek Road Sta. 1983+45) is independent of the other two build alternatives. This segment of the Cooper Creek Alternative initially diverges south, climbs out of the valley and crosses Cooper Creek with a large bridge structure. Then it follows a natural bench south of Cooper Landing rejoining the existing highway at the Kenai Lake Bridge. From the bridge to the Quartz Creek Road it generally follows the existing roadway corridor.

To develop desirable intersection geometrics with the existing Sterling Highway and to minimize environmental impacts (NHPA Section 106), the Cooper Creek Alternative diverges south at Station 1595+00 and parallels the existing highway past the new intersection to Station 1630+00. Immediately east of the new intersection, an eastbound climbing lane begins. This climbing lane is 1.8 miles long, beginning at Station 1626+50 and ending at Station 1722+80. To minimize cut and fill impacts, the Cooper Creek Alternative turns south at Station 1633+10 and follows a natural bench to the proposed Cooper Creek Bridge. The bridge is sited approximately one-half

mile upstream of the existing bridge, near an old quarry site. Retaining walls are required both upslope and downslope.

Between Stations 1675+00 and 1700+00, the alignment cuts through the east bluff of the Cooper Creek Canyon. Cut slopes are designed at 2:1 and reach 180 feet in height. The longitudinal length of cut required to reach the upland area is approximately 2,500 feet. The material type within this cut is unknown. Preliminary design assumed that bedrock will not be encountered. During final design a detailed geotechnical investigation will be required to support the design of engineered slopes at this location.

Material slides and flowing soils were observed at Stations 1750+00 and 1765+00, 350 feet right. The materials in these slides exhibit thixotropic properties; therefore, with respect to slope stability, groundwater and surface water is a serious concern. During final design a detailed geotechnical investigation will be conducted to support the design of engineered slopes at these locations.

A westbound climbing lane 2.1 miles long is located between Stations 1690+00 and 1800+00 (1,500 feet east of the Cooper Creek Bridge to Snug Harbor Road).

The Kenai River Bridge at Cooper Landing is 68 feet wide accommodating two 12-foot through lanes, one 16-foot center turn lane, one 12-foot right turn lane, and two 8-foot shoulders. Pedestrian facilities will require additional width and will be separated from the vehicular traffic.

To minimize large cuts and fills, retaining walls are used at the following locations:

Station from	Station to	Max. Height (ft.)	Ave. Height (ft.)	Length (ft.)	Remarks
1641+00, Rt.	1642+50, Rt.	22	18	150	Upslope
1659+50, Rt.	1667+50, Rt.	33	20	800	Upslope
1662+50, Lt.	1667+50, Lt.	39	29	500	Downslope
1893+50, Lt.	1895+50, Lt.	19	17	200	Upslope
1916+00, Lt.	1918+50, Lt.	12	8	250	Upslope
1946+00, Rt.	1947+50, Rt.	10	9	150	Downslope

An eastbound climbing lane 0.7 miles long is located between Stations 1884+80 and 1919+80.

A westbound climbing lane 1.2 miles long is located between Stations 1901+80 and 1963+00.

The Cooper Creek Alternative ends just east of the Quartz Creek Road Intersection at Station 1983+45.

### **G South Alternative**

*Sta. 1595+00 to Sta. 1822+00 (1.2 miles west of Cooper Creek to 2.9 miles east of Juneau Creek)*

At Station 1595+00 the G South Alternative diverges north, crosses the Kenai River and then crosses Juneau Creek as it climbs out of the valley. The G South Alternative rejoins the Juneau

Creek Alternative at Station 1822+00. The G South and Juneau Creek Alternatives then follow identical alignments from Station 1822+00 to Quartz Creek Road.

On the west side of the Juneau Creek Bridge, Station 1654+00, left, the 2:1 cut slope is 220 feet high. On the east side of the Juneau Creek Bridge where the alignment cuts through the bluff, Stations 1670+00 to 1690+00, the 2:1 cut slopes reach 70 feet in height. The longitudinal length of cut required to reach the upland area is approximately 2,000 feet. The material type within the cut is unknown. Preliminary design assumed bedrock will not be encountered. During final design a detailed geotechnical investigation will be conducted to support the design of engineered slopes at these locations.

An eastbound climbing lane 2.2 miles long is located between Stations 1616+00 and 1730+00.

To minimize impacts to Bean Creek, the G South alignment is located on the north side of Bean Creek.

Between Stations 1751+00 and 1821+75, the G South and Juneau Creek Alternatives follow the same horizontal alignment, but to achieve balanced earthwork the vertical alignment of the G South Alternative is approximately 10 feet higher.

*Sta. 1822+00 to Sta. 1976+17 (2.9 miles east of Juneau Creek to Quartz Creek Road)*

From Station 1822+00 to the end of the project (Quartz Creek Road, Station 1976+17), the G South and Juneau Creek Alternatives are identical horizontally and vertically, but are addressed separately due to the different stationing associated with each alternative.

A westbound climbing lane 1.4 miles long is located between Stations 1783+75 and 1859+10.

To avoid large fill slopes and minimize differential settlement, the roadway is fully benched into the hillside between Stations 1822+00 and 1863+00.

The vertical alignment is set to minimize cuts in a large alluvial fan located between Stations 1856+00 and 1874+00.

Locating the intersection with the existing Sterling Highway at Station 1866+30 provides the opportunity to construct the new roadway on top of the existing highway from Station 1877+00 to the end of the project. It prevents major ROW impacts between Stations 1888+00 and 1895+00 left, eliminates the need to construct two roadways through an avalanche chute, and reduces earthwork and retaining structures.

To minimize large cuts and fills and to minimize impacts to private property, retaining walls are used at the following locations:

Station from	Station to	Max. Height (ft.)	Ave. Height (ft.)	Length (ft.)	Remarks
1820+00, Rt.	1820+50, Rt.	4	3	50	Downslope
1824+50, Rt.	1826+00, Rt.	25	18	150	Downslope
1829+50, Rt.	1833+50, Rt.	33	12	400	Downslope
1886+00, Lt.	1888+50, Lt.	10	8	250	Upslope
1872+50, Rt.	1876+50, Rt.	34	25	400	Downslope
1910+50, Lt.	1911+00, Lt.	6	5	50	Upslope
1939+00, Rt.	1940+50, Rt.	13	12	150	Downslope

A westbound climbing lane 1.1 miles long is located between Stations 1894+66 and 1952+06.

The G South Alternative ends just east of the Quartz Creek Road intersection at Station 1976+17.

### **Juneau Creek Alternative**

*Sta. 1365+00 to Sta. 1822+00 (1.2 miles west of Sportsman's Point to 2.9 miles east of Juneau Creek)*

From the beginning of the project to Station 1340+00, the Juneau Creek, G South and Cooper Creek Alternatives are identical. At Station 1340+00, the Juneau Creek Alternative begins to deviate vertically and then at Station 1390+00 it diverges horizontally and begins to climb out of the river valley. At Station 1822+00, the Juneau Creek and G South alignments rejoin and are identical to the end of the project.

The alignment of the Juneau Creek Alternative, except where it deviates and crosses the Juneau Creek Canyon downstream of the falls, is based on the 1991 Juneau Creek Alternative, Wilderness Variant.

The intersection with the existing Sterling Highway is located at Station 1381+00 on a fairly flat gradient, 0.52%.

An eastbound climbing lane 4.25 miles long is located between Stations 1386+00 and 1610+00.

To minimize sliver cuts and to prevent fill slopes from covering the existing highway retaining walls are used at the following locations:

Station from	Station to	Max. Height (ft.)	Ave. Height (ft.)	Length (ft.)	Remarks
1368+00, Lt.	1377+50, Lt.	18	11	950	Upslope
1399+50, Rt.	1405+50, Rt.	35	20	600	Downslope
1405+00, Lt.	1409+00, Lt.	19	13	400	Upslope

The bridge across Juneau Creek Canyon was originally sited to avoid a recreational withdrawal in the vicinity of the Juneau Creek Falls. But a field reconnaissance trip during the summer of 2004 revealed a very recent landslide at this bridge site. A preliminary rock stability investigation was then conducted to investigate the possibility for a better crossing location. Based on the results and recommendations from the Preliminary Rock Stability Investigation, the

alignment was relocated to cross the canyon at a right angle, approximately 600 feet north of the original crossing location. Crossing sites near the Juneau Creek Falls were not considered due to aesthetic impacts on the falls.

A westbound climbing lane three miles long is located between Stations 1583+00 and 1743+00.

An eastbound passing lane 0.6 miles long is located between Stations 1740+00 and 1770+00.

Between Stations 1751+00 and 1822+00, the Juneau Creek and G South Alternatives follow the same horizontal alignment, but to achieve balanced earthwork the Juneau Creek Alternative is approximately 10 feet lower.

Sta. 1822+00 to Sta. 1977+45 (2.9 miles east of Juneau Creek to Quartz Creek Road)

From Station 1822+00 to the end of the project (Quartz Creek Road, Station 1977+45), the Juneau Creek and G South Alternatives are identical horizontally and vertically, but are addressed separately due to the different stationing associated with each alternative.

A westbound climbing lane 1.4 miles long is located between Stations 1780+95 and 1856+30.

To avoid large fill slopes and minimize differential settlement, the roadway is fully benched into the hillside between Stations 1822+00 and 1856+00.

The vertical alignment is set to minimize cuts in a large alluvial fan located between Stations 1857+00 and 1882+00.

Locating the intersection with the existing Sterling Highway at Station 1867+50 provides the opportunity to construct the new roadway on top of the existing highway through the existing avalanche chute from Station 1878+00 to the end of the project. It prevents major ROW impacts between Stations 1889+00 and 1895+00 left through the existing avalanche chute, eliminates the need to construct two roadways, and reduces earthwork and retaining structures.

To minimize large cuts and fills and to minimize impacts to private property, retaining walls are used at the following locations:

Station from	Station to	Max. Height (ft.)	Ave. Height (ft.)	Length (ft.)	Remarks
1825+50, Rt.	1827+00, Rt.	21	17	150	Downslope
1830+50, Rt.	1833+50, Rt.	37	14	300	Downslope
1873+50, Rt.	1877+50, Rt.	37	25	400	Downslope
1887+00, Lt.	1889+00, Lt.	14	12	200	Downslope
1911+50, Lt.	1912+00, Lt.	6	6	50	Upslope
1939+50, Rt.	1941+50, Rt.	13	11	200	Downslope

A westbound climbing lane 1.1 miles long is located between Stations 1891+86 and 1949+26.

The Juneau Creek Alternative ends just east of the Quartz Creek Road intersection at Station 1977+45.

## **EARTHWORK**

Usability of insitu material was estimated through general field observations and preliminary geotechnical reports and memoranda. The preliminary engineering and earthwork balancing process resulted in alignments which minimized impacts and achieved an earthwork balance between the usable cut material and required fill quantities. Earthwork balance is based on the following assumptions:

- Most till cuts will produce 50% usable material (In a few isolated locations 75% of the material will be usable and in a few other isolated locations 0% of the till material will be usable.)
- Shrinkage factor for till material is 17%.
- Excavated Rock is not suitable for riprap, aggregate, or Selected Material, Type A.
- Excavated Rock is 93% usable as Selected Material, Types B and C and has a 7% swell factor.
- Selected Material, Type A, riprap and all aggregates will need to be imported from an off-site source or from a contractor-developed borrow source within the project limits.

The following geotechnical information was utilized for estimating the location and types of materials that might be encountered (rock or till):

- Sterling Highway, MP 37 to MP 60, Preliminary Location Study, 1989;
- Reconnaissance Engineering Geology Report, Sterling Highway MP 37-60, August 1989;
- Reconnaissance Geotechnical Report, Sterling Highway MP 37-60 (Alternative 5), October 1991;
- Field observations, summer of 2004.

Percentage of usable material is conceptual and is based on reasonable judgment and general field observations; no field sampling or additional geotechnical investigations were conducted.

Earthwork balancing on the Juneau Creek Alternative and the G South Alternative considers the inability to haul material across the Juneau Creek Canyon. Earthwork balancing on the Cooper Creek Alternative requires moving material across the Cooper Creek Canyon. This can be achieved with a contractor-constructed access roadway with an approximate grade of 10 to 12 percent. Estimated earthwork quantities are shown in the tables below.

**TABLE 2**  
**Earthwork**  
**Cooper Creek Alternative**

<b>Embankment</b>	<i>SLR to Cooper Creek</i>	<i>Cooper Creek to QCR</i>	<i>Total (BOP to EOP)</i>
Selected Material, Type A	175,000 cy	140,000 cy	315,000 cy
Selected Material, Type B	240,000 cy	170,000 cy	410,000 cy
Selected Material, Type C	835,000 cy	810,000 cy	1,645,000 cy
<b>Total Embankment</b>	<b>1,250,000 cy</b>	<b>1,120,000 cy</b>	<b>2,370,000 cy</b>
<b>Excavation</b>			
Rock Excavation	105,000 cy	810,000 cy	915,000 cy
Classified Excavation	465,000 cy	1,710,000 cy	2,175,000 cy
<b>Total Excavation</b>	<b>570,000 cy</b>	<b>2,520,000 cy</b>	<b>3,090,000 cy</b>
<b>Borrow</b>			
Aggregate for Base and AC	67,000 cy	50,000 cy	117,000 cy
Borrow A	175,000 cy	140,000 cy	315,000 cy
Borrow B	135,000 cy	0 cy	135,000 cy
Borrow Type C	600,000 cy*	0 cy	115,000 cy**
<b>Total Borrow</b>	<b>977,000 cy*</b>	<b>190,000 cy</b>	<b>682,000 cy</b>
Excess Material (Usable)	0	485,000 cy	0 cy**
Waste Material (Unusable)	185,000 cy	980,000 cy	1,165,000 cy

SLR = Skilak Lake Road, QCR = Quartz Creek Road

\* Material could be hauled from the large cut on the east side of the canyon reducing the borrow quantity by 485,000 cubic yards.

\*\* Includes moving 485,000 cubic yards of Select Material Type C across the Cooper Creek Canyon.

**TABLE 3**  
**Earthwork**  
**G South Alternative**

<b>Embankment</b>	<i>SLR to Juneau Creek</i>	<i>Juneau Creek to QCR</i>	<i>Total (BOP to EOP)</i>
Selected Material, Type A	175,000 cy	130,000 cy	305,000 cy
Selected Material, Type B	235,000 cy	160,000 cy	395,000 cy
Selected Material, Type C	605,000 cy	1,340,000 cy	1,945,000 cy
<b>Total Embankment</b>	<b>1,015,000 cy</b>	<b>1,630,000 cy</b>	<b>2,645,000 cy</b>
<b>Excavation</b>			
Rock Excavation	105,000 cy	865,000 cy	970,000 cy
Classified Excavation	845,000 cy	1,565,000 cy	2,410,000 cy
<b>Total Excavation</b>	<b>950,000 cy</b>	<b>2,430,000 cy</b>	<b>3,380,000 cy</b>
<b>Borrow</b>			
Aggregate for Base and AC	65,000 cy	47,000 cy	112,000 cy
Borrow A	175,000 cy	130,000 cy	305,000 cy
Borrow B	125,000 cy	0 cy	125,000 cy
Borrow Type C	210,000 cy	0 cy	210,000 cy
<b>Total Borrow</b>	<b>575,000 cy</b>	<b>177,000 cy</b>	<b>752,000 cy</b>
Excess Material (Usable)	0 cy	0 cy	30,000 cy
Waste Material (Unusable)	375,000 cy	825,000 cy	1,200,000 cy

SLR = Skilak Lake Road, QCR = Quartz Creek Road

**TABLE 4**  
**Earthwork**  
**Juneau Creek Alternative**

<b>Embankment</b>	<i>SLR to Juneau Creek</i>	<i>Juneau Creek to QCR</i>	<i>Total (BOP to EOP)</i>
Selected Material, Type A	175,000 cy	140,000 cy	315,000 cy
Selected Material, Type B	230,000 cy	175,000 cy	405,000 cy
Selected Material, Type C	975,000 cy	1,305,000 cy	2,280,000 cy
<b>Total Embankment</b>	<b>1,380,000 cy</b>	<b>1,620,000 cy</b>	<b>3,000,000 cy</b>
<b>Excavation</b>			
Rock Excavation	530,000 cy	980,000 cy	1,510,000 cy
Classified Excavation	960,000 cy	1,245,000 cy	2,205,000 cy
<b>Total Excavation</b>	<b>1,490,000 cy</b>	<b>2,225,000 cy</b>	<b>3,715,000 cy</b>
<b>Borrow</b>			
Aggregate for Base and AC	66,000 cy	50,000 cy	116,000 cy
Borrow A	175,000 cy	140,000 cy	315,000 cy
Borrow B	0 cy	0 cy	0 cy
Borrow Type C	240,000 cy	0 cy	240,000 cy
<b>Total Borrow</b>	<b>481,000 cy</b>	<b>190,000 cy</b>	<b>671,000 cy</b>
Excess Material (Usable)	0 cy	35,000 cy	35,000 cy
Waste Material (Unusable)	470,000 cy	670,000 cy	1,140,000 cy

SLR = Skilak Lake Road, QCR = Quartz Creek Road

## POTENTIAL BORROW SITES

Potential borrow sites identified are conceptual and are based on surface observations only. Detailed subsurface geotechnical investigations are necessary to identify quantity and quality of material and limits of all potential borrow sites.

### All Alternatives

An old borrow site at the Fuller Lake Trailhead, Station 1301+00 left, could potentially yield 120,000 cubic yards of aggregate and Select Material Type A. If this site is developed, the existing trailhead at this location could be reconstructed to provide additional parking and possibly camping, and rest facilities. *(This site has been eliminated from consideration due to being located within the Intensive Management area of the Kenai National Wildlife Refuge.)*

An old borrow site at Station 1384+00 left (where the power transmission line crosses the existing highway), could potentially yield 450,000 cubic yards of aggregate and Select Material Type A. *(This site has been eliminated from consideration due to being located within the Intensive Management area of the Kenai National Wildlife Refuge.)*

An existing material site (M.S. 21-2-043-1) located on the north side of the road at MP 69 of the Sterling Highway could also be a viable material source. An investigation in July of 1978 estimated 350,000 cubic yards of material remained in the site. It is our understanding that a road project in the early 1980s used some material and an upcoming project, Sterling Highway MP 60 to 79, will also use this material site. Judging by the topography and borelogs, expanding the site north could potentially yield enough additional material to fulfill the requirements of the west

half of the Sterling Highway MP 45-60 Project. *(This site has been eliminated from consideration due to being located within the Intensive Management area of the Kenai National Wildlife Refuge.)*

In 1979, an area in the vicinity of the Resurrection Pass Trailhead was identified to have a sufficient amount of suitable material to be a major source for this project. It was also determined this area could be mined in a manner that would create an area suitable for a campground. Preliminary investigations determined this area could potentially produce 320,000 cubic yards of material. If the investigation was expanded it is possible this area could produce a much higher volume of quality material. This area could potentially yield sufficient material to fulfill the requirements for the west half of this project.

Field observations and the Mineral Materials Survey of the Seward and Glacier Range Districts Road Corridor, Chugach National Forest, Alaska, May 1997 indicate small material sites are very likely to be encountered within the roadway prism of the western segment of the Juneau Creek Alternative. These sites will be identified during design and staging and use of materials will be specified in the contract documents.

An existing material site (M.S. 21-2-051-1), located on the north side of the road near Milepost 40 on the Sterling Highway, is anticipated to supply the required Selected Material, Type A, and other aggregates to complete the east half of this project, and if necessary, the complete project.

## **POTENTIAL WASTE AREAS**

Areas identified as potential waste areas are conceptual and based on anticipated volume of waste for each alternative. The areas selected were also based on the earthwork balancing assumptions and utilize existing topography while minimizing impacts to wetlands and viewshed.

### **Cooper Creek Alternative**

East of the intersection with the existing Sterling Highway, Stations 1621+00 to 1642+00 left and right, a 20-acre area has been identified as a disposal area for approximately 325,000 cubic yards of material. *(The area on the left has been eliminated from consideration due to wetland and NHPA Section 106 impacts. The remaining area on the right is five acres and is available to dispose 150,000 cubic yards of waste material.)*

East of the Cooper Creek Bridge on top of the bluff, between Stations 1685+00 and 1702+00, left, a 46-acre area has been identified as a disposal area for approximately 1,200,000 cubic yards of material.

### **G South Alternative**

West of the Juneau Creek Bridge, between Stations 1641+00 and 1662+00, right, a 28-acre waste area has been identified as a disposal area for approximately 700,000 cubic yards of material.

Between Stations 1672+00 and 1695+00, right, a 27-acre waste area has been identified as a disposal area for approximately 1,000,000 cubic yards of material.

Between Stations 1804+00 and 1819+00, right, a 13-acre waste area has been identified as a disposal area for approximately 450,000 cubic yards of material. *(This area has been eliminated from consideration due to wetland and private property impacts.)*

A major disposal area near Station 1725+00, left, was considered but then eliminated from consideration due to unfavorable impacts. This area was identified to potentially dispose of 1,000,000 cubic yards of material, but is not recommended due to the wetland impacts and potential impacts to the headwaters of Bean Creek.

### **Juneau Creek Alternative**

Between Stations 1506+00 and 1525+00, left, a 20-acre waste area has been identified as a disposal area for approximately 650,000 cubic yards of material.

Near Station 1535+00, left and right, an area was identified but then eliminated from consideration due to unfavorable impacts. This area was identified to potentially dispose of 75,000 cubic yards of material, but is not recommended due to the wetland impacts and the relatively small disposal volume.

East of the bridge site, between Stations 1655+00 and 1671+00, left, a 20-acre waste area has been identified as a disposal area for approximately 700,000 cubic yards of material. *(This area has been eliminated from consideration due to wetland and stream impacts.)*

Between Stations 1692+00 and 1708+00, right, a 27-acre waste area has been identified as a disposal area for approximately 1,000,000 cubic yards of material, a 2,200-foot long access road along an existing logging road will be improved and used to access the waste site.

A major disposal area near Station 1725+00, left, was considered but then eliminated from consideration due to unfavorable impacts. This area was identified to potentially dispose of 1,000,000 cubic yards of material, but is not recommended due to the wetland impacts and potential impacts to the headwaters of Bean Creek.

A major disposal area near Station 1810+00, right, was identified but then eliminated from consideration due to unfavorable impacts. This area was identified to potentially dispose of 400,000 cubic yards of material, but is not recommended due to the wetland and property impacts.

### **STAGING AREAS**

Staging areas for the construction office and bridge construction are conceptually identified. For all alternatives, the construction office will be located near the Quartz Creek Road Intersection or, as an alternative, could be located in the material site at Sterling Highway MP 40, approximately four miles east of the Quartz Creek Road Intersection.

Selection of potential staging areas is based on anticipated area of need, traffic control concerns, wetland impacts, environmental impacts, and the natural topography.

### **Cooper Creek and G South Alternatives**

*Schooner Bend Bridge Potential Staging Area:* 1.6 acres on the west side of the river located within the ROW and 1.0 acre on the east side of the river located within the ROW.

### **Cooper Creek Alternative**

*Cooper Creek Bridge Potential Staging Area:* 3.9 acres between the west abutment and the toe of the east bluff and 1.0 acre on the east side of Cooper Creek on top of the bluff.

*Kenai River Bridge, Potential Staging Area:* all staging will be within the ROW.

### **G South Alternative**

*Kenai River Bridge Potential Staging Area:* 1.0 acre adjacent to the existing highway and 5.7 acres spanning across the Kenai River including a temporary bridge across the Kenai River.

*Juneau Creek Bridge, West Side, Potential Staging Area:* A 3,100-foot long access road and a 5.2-acre staging area including a temporary bridge over Juneau Creek.

*Juneau Creek Bridge, East Side, Potential Staging Area:* An 8-acre staging area located at the top of the east bluff.

### **Juneau Creek Alternative**

*Juneau Creek Bridge, West Side, Potential Staging Area:* a 6.3-acre staging area away from the bridge site and an 8.4-acre staging area within the ROW adjacent to the bridge site.

*Juneau Creek Bridge, East Side, Potential Staging Area:* An 11.4-acre staging area immediately adjacent to the bridge site then paralleling the roadway skirting the wetlands on the south side of the road.

## **RIGHT-OF-WAY AND ACCESS CONTROL**

Right-of-way impacts were minimized by adjusting the horizontal and vertical alignments, using guardrail and 2:1 fill slopes, and placing retaining walls in specific locations. For all alternatives, the cut and fill slopes are maintained within the existing ROW from the beginning of project (Station 1225+00) to Station 1400+00.

The greatest ROW impacts occur where the build alternatives leave the existing roadway corridor. For additional detail, see Sterling Highway MP 45 to 60, Conceptual Stage Relocation Study and Assessment of Right-of-Way Acquisition, prepared by HDR Alaska Inc., 2006.

Regulating access is called “access control” and is categorized as full control of access, partial control of access, access management, and driveway/entrance regulations. Access control is necessary to preserve the level of service and safety of the roadway. If access control is not established and managed, roadside businesses and driveways can become major factors in reducing capacity (level of service), increasing crash potential, and eroding the mobility function of the facility.

### **Cooper Creek Alternative**

The Cooper Creek Alternative requires a new ROW corridor to be acquired between Stations 1636+00 and 1801+00. For this segment of roadway, it is recommended access control be established and acquired at the time of ROW acquisition.

### **G South Alternative**

The G South Alternative requires a new ROW corridor to be acquired between Stations 1612+00 and 1865+00. For this segment of roadway, it is recommended access control be established and acquired at the time of ROW acquisition.

### **Juneau Creek Alternative**

The Juneau Creek Alternative requires a new ROW corridor to be acquired between Stations 1408+00 and 1857+00. For this segment of roadway, it is recommended access control be established and acquired at the time of ROW acquisition.

## **UTILITY IMPACTS**

Chugach Electric maintains the power distribution lines, Homer Electric maintains the power transmission line, and TeleAlaska maintains the telephone lines. Telephone lines are currently strung on the power distribution poles and both copper and fiber optic communication lines exist within the corridor. TeleAlaska recently replaced telephone lines (copper and fiber) between the Cooper Landing Kenai River Bridge and Sunrise (completed, summer of 2005). These new telephone lines are being placed underground in the same corridor as the power poles.

### **Cooper Creek Alternative**

The Cooper Creek Alternative impacts the power transmission line, power distribution lines and telephone lines. The identified conflicts are:

- Station 1498+00 left - Relocate distribution and telephone - one pole
- Stations 1624+00 to 1640+00 right, 1,750 feet - Relocate distribution and telephone - five poles
- Station 1803+00 - Raise distribution and telephone lines - two poles
- Station 1862+25 left - Relocate distribution and telephone - one pole
- Stations 1880+00 to 1907+00 - Relocate distribution and telephone - eight poles
- Stations 1805+00 to 1905+00 - Relocate (underground) copper and fiber optic communication lines.
- Stations 1717+00 to 1727+00 - Raise transmission line
- Stations 1740+00 to 1750+00 - Raise transmission line and relocate one tower

### **G South Alternative**

The G South Alternative impacts the power distribution lines and telephone lines. The identified conflicts are:

- Station 1498+00 left - Relocate distribution and telephone - one pole
- Stations 1850+00 to 1895+00 right - Relocate distribution - 12 poles

- Stations 1850+00 to 1900+00 - Relocate (underground) copper and fiber optic communication lines.

### **Juneau Creek Alternative**

The Juneau Creek Alternative impacts the power distribution lines. The identified conflicts are:

- Stations 1850+00 to 1895+00 right - Relocate distribution - 12 poles
- Stations 1850+00 to 1900+00 - Relocate (underground) copper and fiber optic communication lines.

## **CONSTRUCTION SEQUENCING**

Construction sequencing and phasing for the Sterling Highway MP 45-60 considers overall project length, project costs, material availability, haul routes, bridge construction, and impassable topography (Juneau Creek Canyon). The existing highway and bridges will remain open to traffic during construction although night closures will be necessary for the construction of all build alternatives. The Cooper Creek Alternative will have the greatest impact to the traveling public and the Juneau Creek Alternative will have the least impacts. Haul routes will utilize the proposed roadway embankment as much as possible, but it will be necessary to use portions of the existing highway as a haul route for all the build alternatives. Cooper Creek will utilize the existing highway to the greatest extent and the Juneau Creek Alternative will utilize the existing highway the least.

### **Cooper Creek Alternative**

The Cooper Creek Alternative can be constructed in two separate phases. The first phase, from Skilak Lake Road to the east side of the Cooper Creek Canyon, Station 1695+00, provides the necessary balance of materials to construct the roadway embankment and includes construction of the new bridge near Schooner Bend and the new Cooper Creek Bridge. At the completion of this phase the existing bridge near Schooner Bend will be removed.

Two potential material sites have been identified that could supply the Selected Material, Type A, and the aggregates necessary for this phase of the project: a potential source near the Resurrection Trailhead, Station 1510+00, left; and an existing material site (M.S. 21-2-051-1) located near Milepost 40 of the Sterling Highway. In addition, the contractor might be able to locate and develop a material site within the same area designated as a potential waste area located on the east side of Cooper Creek.

Access to the east abutment of the Cooper Creek Bridge will be via a temporary bridge over Cooper Creek and an access road up the east side of the Canyon. Areas for the project office and materials will be located in the same area as the Cooper Creek bridge staging area, although the bridge staging area may need to be increased slightly to provide additional room for the project offices and material staging.

Traffic will be maintained on the existing highway during construction of this segment. Night closures will be necessary.

The second phase will begin at Station 1695+00 and continue to Quartz Creek Road. Material generated from the large rock cuts above Kenai Lake will be hauled and used for embankment construction between Station 1695+00 and the Kenai River Bridge at Cooper Landing. This phase also includes construction of the Kenai River Bridge at Cooper Landing. An existing material site (M.S. 21-2-051-1) located at Milepost 40 of the Sterling Highway will supply the Select Material Type A, and aggregates necessary for this phase of the project.

Traffic will be maintained on the existing highway during construction of this segment. Night closures will be necessary.

### **G South Alternative**

The G South Alternative can be constructed in two separate phases. The first phase, from Skilak Lake Road to the west abutment of the Juneau Creek Bridge, includes the construction of the new bridge near Schooner Bend and the new Kenai River Bridge. Suitable fill material excavated from the large cut between the Kenai River Bridge and the Juneau Creek Bridge will be hauled across a temporary bridge over the Kenai River and used to construct the new roadway embankment. Waste material will be back-hauled and placed in the waste area. At completion of this phase both the temporary bridge and the existing bridge near Schooner Bend will be removed.

Two borrow areas have been identified that could supply the Select Material Type A and aggregates for the road segment west of the Juneau Creek Canyon; a potential source near the Resurrection Trailhead, Station 1510+00, left; and an existing material site (M.S. 21-2-051-1) located near Milepost 40 of the Sterling Highway. In addition, the contractor might be able to locate and develop a material site in the same area designated as a potential waste area located on the west side of Juneau Creek.

Areas for the project office and materials will be located in the same area as the Kenai River bridge staging area, although the bridge staging area will need to be increased slightly to provide additional room for the project offices and material staging.

Traffic will be maintained on the existing highway during construction of this segment. Night closures will be necessary.

The second phase will be from the west abutment of the Juneau Creek Bridge to Quartz Creek Road and will include constructing the Juneau Creek Bridge. Material generated from the large rock cuts above Kenai Lake will be hauled and used for embankment construction throughout this segment. Construction of the Juneau Creek Bridge can begin no sooner than one season after the start of Phase 1 and will need to be closely coordinated with the Phase 1 construction sequencing. Access to the west abutment and the western segment of the bridge site will be via the new roadway embankment and either the new bridge or the temporary bridge. Detailed coordination between contractors will be required. An existing material site (M.S. 21-2-051-1) located at Milepost 40 of the Sterling Highway will supply the Select Material Type A, and aggregates necessary for this phase of the project.

Traffic will be maintained on the existing highway during construction of this segment. Night closures will be necessary.

### **Juneau Creek Alternative**

The Juneau Creek Alternative can be constructed in two separate phases. The first phase is from Skilak Lake Road to the west abutment of the Juneau Creek Bridge. If desired, the first phase could be broken into two segments: Skilak Lake Road to one mile west of Sportsman's Point (Station 1399+00), and Station 1399+00 to the Juneau Creek Canyon. Breaking the first phase into two segments requires importing an additional 100,000 cubic yards of borrow material to construct the Skilak Lake Road to Station 1399+00 embankment and wasting 100,000 cubic yards of excess material in the Station 1399+00 to the Juneau Creek Canyon segment.

Two borrow areas have been identified that could supply the Select Material Type A, and the aggregates necessary for the road segment west of the Juneau Creek Canyon; a potential source near the Resurrection Trailhead, Station 1510+00, left; and an existing material site (M.S. 21-2-051-1) located near Milepost 40 of Sterling Highway.

The project office and material staging areas will be located at the borrow site and in select areas along the new alignment, within the existing ROW.

Traffic will be maintained on the existing highway during construction of this segment. Night closures will be necessary.

The second phase will be from the west abutment of the Juneau Creek Bridge to Quartz Creek Road and will include constructing the Juneau Creek Bridge. Material generated from the large rock cuts above Kenai Lake will be hauled and used for embankment construction throughout this segment. Construction of the Juneau Creek Bridge can begin no sooner than one season after the start of the first phase and will need to be closely coordinated with the first phase construction sequencing. Access to the west abutment and the western segment of the bridge site will be via the new roadway embankment. Detailed coordination between contractors will be required. An existing material site (M.S. 21-2-051-1) located near Milepost 40 of the Sterling Highway will supply the Select Material Type A, and aggregates necessary for this phase of the project.

Traffic will be maintained on the existing highway during construction of this segment. Night closures will be necessary.

## CONSTRUCTION COSTS

Construction costs are based on 2004 unit prices.

	<u>Cooper Creek</u>	<u>G South</u>	<u>Juneau Creek</u>
Basic Bid	\$62.0 M	\$61.0 M	\$64.0 M
Bridge Structures	\$48.4 M	\$57.0 M	\$34.4 M*
Design Engineering @ 12%	\$13.2 M	\$14.2 M	\$11.8 M
Construction Engineering @ 15%	<u>\$16.6 M</u>	<u>\$17.7 M</u>	<u>\$14.8 M</u>
<b>Subtotal:</b>	\$140.2 M	\$149.9 M	\$125.0 M
Right-of-Way/Property Acquisition	\$4.7 M	\$1.9 M	\$1.1 M
Power Distribution Relocation	\$350 K	\$200 K	\$200 K
Telephone Relocation	\$900 K	\$300 K	\$300 K
Power Transmission Relocation	<u>\$300 K</u>	<u>0</u>	<u>0</u>
<b>TOTAL:</b>	<b>\$146.5 M</b>	<b>\$152.3 M</b>	<b>\$126.6 M</b>

(M = million, K= thousand)

\* Average of seven bridge options