



# ***South Mack Drive Extension***

City of Wasilla Project 54987

## **PRELIMINARY ENGINEERING REPORT**

CITY OF WASILLA  
DEPARTMENT OF PUBLIC WORKS

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**FINAL**  
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- *Alaska Highway Preconstruction Manual (PCM)*, 2005, State of Alaska Department of Transportation & Public Facilities
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- *South Mack Drive Extension Wetlands Delineation and Functional Assessment, Wasilla, Alaska*, May 2010, Hattenburg Dilley & Linnell, LLC

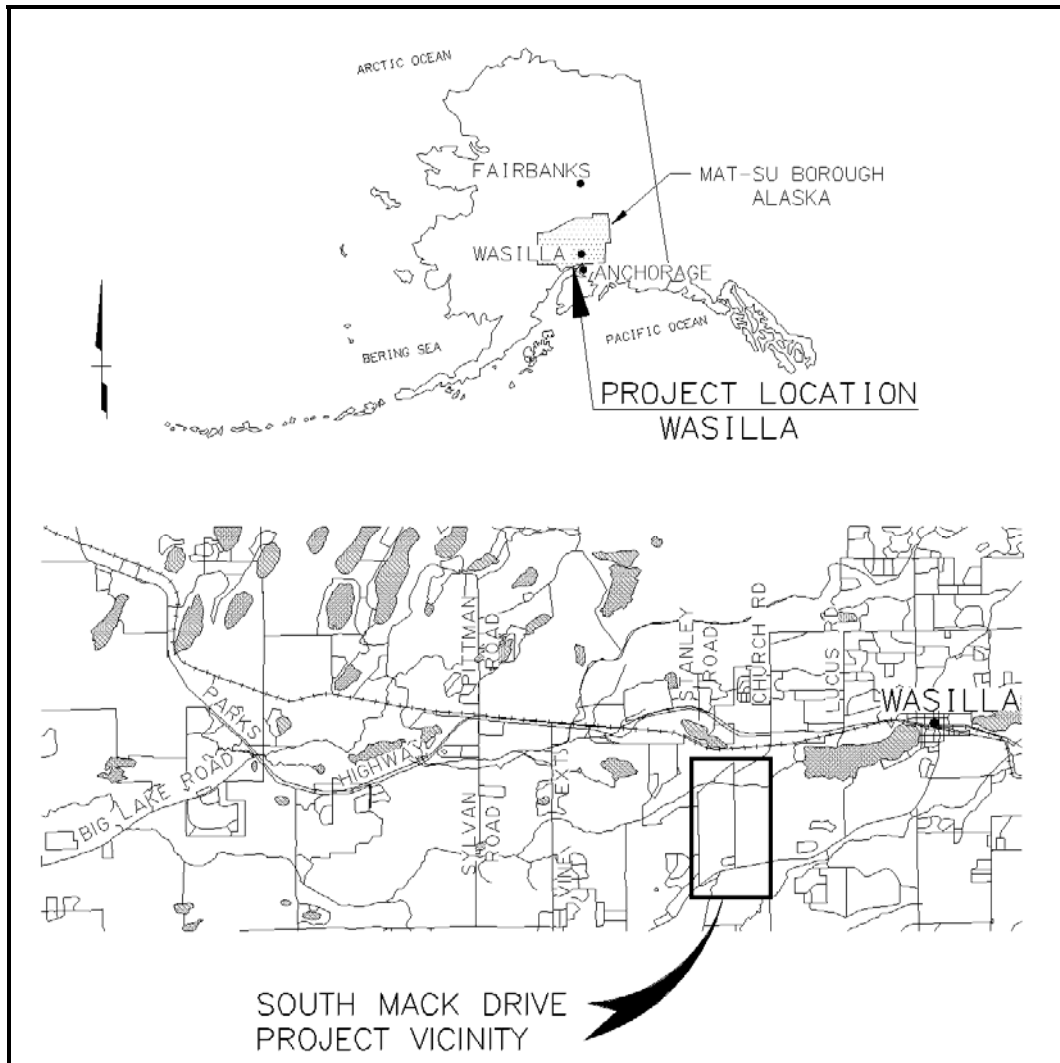


# 1.0 INTRODUCTION

This Preliminary Engineering Report (PER) documents and summarizes the purpose and need, development of alternatives, engineering analysis performed and recommendations for the South Mack Drive (Mack Drive) Extension project. The project includes an extension of Mack Drive from the Curtis D. Menard Memorial Sports Center (Sports Center) to Knik-Goose Bay (KGB) Road and the facilitation of the realignment of Fairview Loop Road near KGB Road.

## 1.1 General and Project Location

The project is located near the western border of the City of Wasilla (Wasilla). There are two existing segments of Mack Drive. The northern segment extends south from the Parks Highway to the Sports Center and is within the city limits; the southern segment extends north from KGB Road to a dead end south of Lucille Creek and is on the city boundary. **Figure 1** presents the Project Location and Vicinity Map. **Figure 2** presents the Project Area Map.



**Figure 1: Location and Vicinity Map**

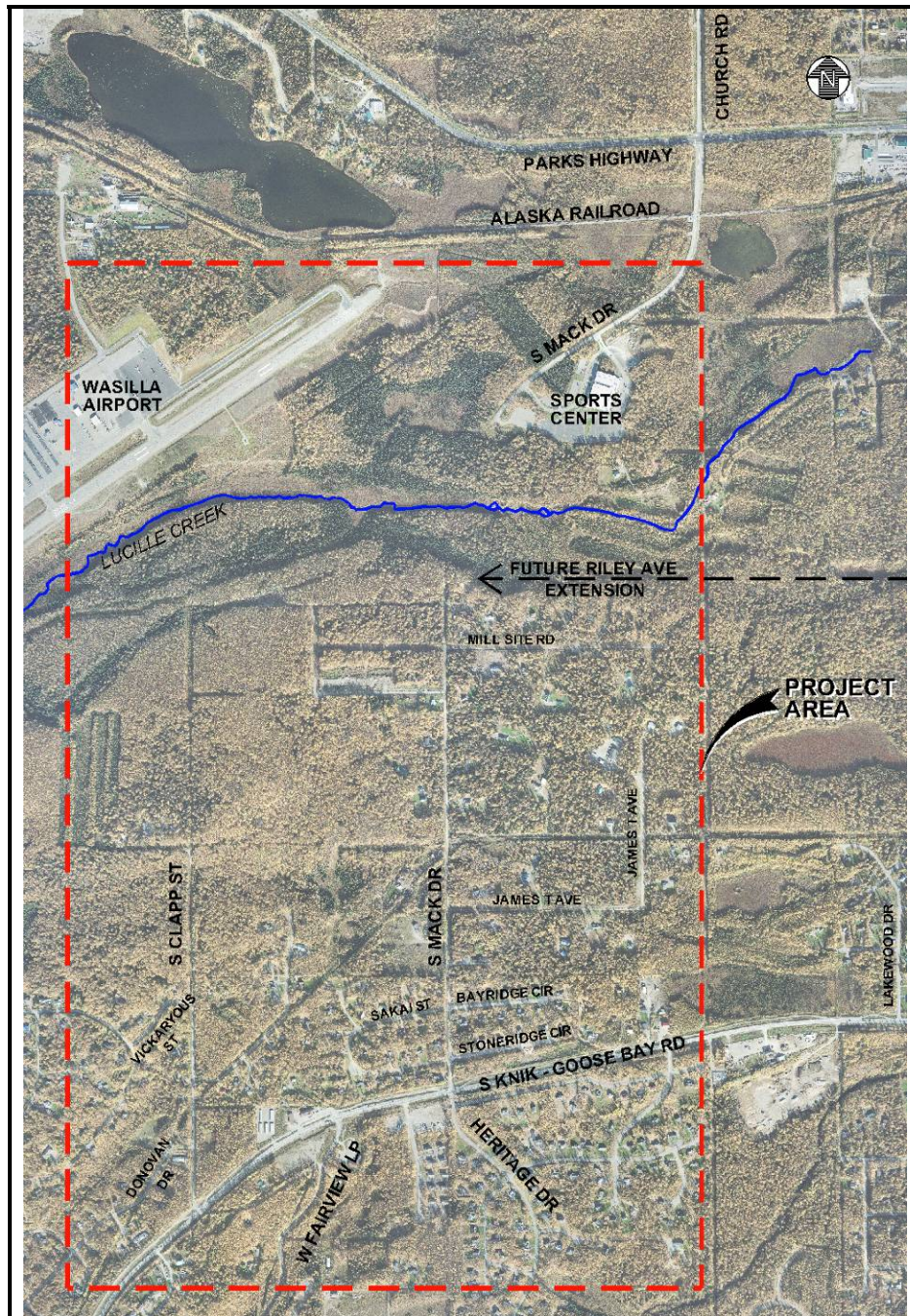


Figure 2: Project Area Map

## 1.2 Purpose and Need

Wasilla has poor circulation due in part to limited north-south connections between arterials resulting in traffic congestion at major arterial intersections, increased vehicle miles traveled, and safety concerns. The City of Wasilla and the KGB area to the south has grown rapidly over the past decade. Although growth has slowed, development is expected to continue as large tracts of land are converted into residential and commercial subdivisions. Currently, KGB Road and South Vine Road provide the most direct routes for residents traveling between the Knik-Fairview area and Wasilla and

points to the north. However, the intersections of these routes with the Parks Highway are more than five miles apart.

The City of Wasilla Transportation Plan, City of Wasilla Official Streets & Highways Plan FY 2005-2025 (OSHP), and the Matanuska-Susitna Borough's 2007 Long-Range Transportation Plan (MSB LRTP) recommend extending Mack Drive as a major collector road from the Sports Center to KGB Road.

Extending Mack Drive and facilitating a realignment of the Fairview Loop-KGB Road intersection will:

- Provide movement between residential areas (including the Knik-Fairview area), Wasilla, and points north and south on the Parks Highway
- Expand mobility while providing access between the Parks Highway and KGB Road
- Reduce congestion on the Parks Highway (a national highway system route) and KGB Road (a significant arterial)
- Provide crash-reduction benefit due to reduced volumes on two area highway safety corridors: Parks Highway and KGB Road
- Increase route options and reduce vehicle travel time
- Provide multiple points of access for emergency services and school bus routes to adjacent residential and commercial properties and improve emergency response times
- Improve trip distribution by providing a new link in the transportation network

## **2.0 HISTORY**

Development in the project area was relatively slow until the past decade, during which rapid growth occurred. Recently, development has slowed, however development is expected to continue as large tracts of land are converted into residential use.

The northern segment of Mack Drive was developed in 2002 by Wasilla as a pioneer road. With the construction of the Sports Center in 2004, it was upgraded to its current condition and the intersection with the Parks Highway was signalized. There is no additional development along the segment.

The southern segment of Mack Drive was constructed prior to 1951 and provided access to homesteads in the area. Little new development occurred until the 1980's, during which low-density, single-family homes were built on multi-acre lots. These developments were located along Mack Drive and along new side roads to the east from Mack Drive.

South Clapp Street (Clapp Street) was not constructed until the 1960's and is the result of section line clearing performed during land surveying. Until the 1980's, the sole development along Clapp Street was a homestead. Since then, low-density, single-family homes have been built on one acre or larger lots along Clapp Street and new side roads.

## **3.0 EXISTING CONDITIONS**

The existing Mack Drive segment from Parks Highway to its terminus at the Sports Center and the corridors considered for improvement, as well as the section of Fairview Loop considered for realignment, are described in the following subsections.

### **3.1 Facility Description**

Mack Drive is currently a discontinuous road that runs north-south between Parks Highway and KGB Road. From Parks Highway to its terminus at the Sports Center, Mack Drive is a 0.7-mile-long, paved, two-way, two-lane roadway with twelve-foot lanes, and four-foot shoulders. It has a separated multi-use pathway along the east side of the roadway and illumination on the northbound approach to Parks Highway. There is an at-grade, controlled crossing of the Alaska Railroad approximately 0.15 miles south of the Parks Highway and a traffic signal at the Parks Highway intersection.

Mack Drive, from KGB Road to its terminus near Mill Site Road, is a one-mile-long, two-way, two-lane, gravel roadway that varies in width between 24 feet at its southern end to approximately 16 feet at its northern end. A nine-foot wide trail extends for another 700 feet north of Mill Site Road. The roadway is in rolling terrain and has a posted speed limit of 25 miles per hour (mph).

Clapp Street is a local roadway that consists of three segments. The first segment between KGB Road and Vickaryous Street is a two-way, two-lane, paved roadway that is approximately 21 feet wide. North of Vickaryous Street, Clapp Street narrows to a 12-foot-wide gravel roadway and continues for another 1,500 feet to two residential properties. From this point, an even narrower trail continues for another one-half mile with no additional development. The roadway has a rolling grade and has a posted speed limit of 25 mph.

Fairview Loop is a two-way, two-lane, paved minor collector over rolling terrain, connecting neighborhoods in the Knik-Fairview area to KGB Road. The paved width is approximately 22 feet. The posted speed limit is 50 mph.

### **3.2 Traffic Conditions**

Traffic data was collected from information available from the Alaska Department of Transportation & Public Facilities (ADOT&PF) and from field studies performed by Kinney Engineering during preparation of the *Traffic Analysis Report* for this project. The 1997-2007 Average Annual Daily Traffic (AADT) along the southern portion of Mack Drive is 527 vehicles per day; the 85<sup>th</sup> percentile speed is 25 mph for northbound traffic and 27 mph for southbound traffic. These speeds correspond well with the posted speed limit of 25 mph. The AADT along Clapp Street is 926 vehicles per day; the 85<sup>th</sup> percentile speed is 30 mph for the northbound traffic and 35 mph for the southbound traffic. These speeds greatly exceed the 25 mph posted speed limit. The Fairview Loop AADT is 1,297 vehicles per day, although more recent data indicates the current AADT may be two times the 10-year average. The posted speed limit for Fairview Loop is 50 mph with a measured 85<sup>th</sup> percentile speed of 39 mph in the northbound direction and 38 mph in the southbound direction. The slower-than-posted measured speeds are likely due to horizontal curves near the KGB Road intersection.

Level-of-Service (LOS) is the primary performance measure for operational quality, with levels A (best, free flow) to F (failed, long delays). The LOS of the unsignalized intersections of Mack Drive and Clapp Street with KGB Road are shown in **Table 1** and **Table 2**. Also shown is the LOS of the intersection of Fairview Loop with KGB Road, which is located in between the Mack Drive and Clapp Street intersections. A traffic signal installed at the KGB Road and Fairview Loop intersection following the collection of the data presented here has likely changed the delay and LOS.

No approach LOS is given in the tables for the eastbound and westbound directions on KGB Road as this is the primary roadway with no stop control at the time of the study at any of the intersections noted.

**Table 1: Evening Peak Hour Existing LOS**

Intersection	Performance Measure	EB	WB	NB	SB
KGB Road & Mack Drive/Heritage Drive	Lane LOS	A	A	D	E
	Approach Delay (s)	1	0.5	28	41.3
	Approach LOS	-	-	D	E
KGB Road & Clapp Street	Lane LOS	A		-	E
	Approach Delay (s)	0.5	0	-	36.5
	Approach LOS	-	-	-	E
KGB Road & Fairview Loop	Lane LOS	A	A	F	F
	Approach Delay (s)	0.3	1.5	93.2	326.8
	Approach LOS	-	-	F	F

**Table 2: Morning Peak Hour Existing LOS**

Intersection	Performance Measure	EB	WB	NB	SB
KGB Road & Mack Drive/Heritage Drive	Lane LOS	A	A	B	C
	Approach Delay (s)	0.6	0.4	13.1	16.2
	Approach LOS	-	-	B	C
KGB Road & Clapp Street	Lane LOS	A		-	C
	Approach Delay (s)	0.1	0	-	18.5
	Approach LOS	-	-	-	C
KGB Road & Fairview Loop	Lane LOS	A	A	C	D
	Approach Delay (s)	0.1	2.1	19	28.1
	Approach LOS	-	-	C	D

A crash analysis of the intersections of Mack Drive, Clapp Street, and Fairview Loop with KGB Road indicates that the number of crashes at the Fairview Loop intersection is higher than at intersections with similar characteristics; left turn, right angle, and right turn angle crashes have rates higher than statewide rates for the same crash types at an unsignalized intersection. These crash types can typically be reduced by installing a traffic signal, which ADOT&PF completed in 2009.

The northern segment of Mack Drive between Parks Highway and the Sports Center falls outside of the study area in the *Traffic Analysis Report* prepared for this project. However, the *Parks Highway MP 44 – 52.3 Lucus Road to Big Lake Cutoff Traffic Analysis and Alternative Development Report* shows that the 2005 AADT along this segment was 220 vehicles per day.

### **3.3 Land Use, Context and Setting**

In the Mack Drive and Clapp Street areas, the primary development is low-density, residential, single-family homes. Most of the residences have been constructed since 1990 when the MSB began experiencing significant growth. The more recently developed lots in the project area are typically one acre in size while many of the older homes and undeveloped properties are on larger lots ranging in size from two to 60 acres. The project area is not fully built-out. Additional development within the project area includes a church, storage facilities, and several small businesses including the Knik Kountry Store near the Fairview Loop intersection with KGB Road.

### **3.4 Land Ownership**

Land in the project area is a mix of large and small parcels, with small parcels primarily along the southern section of Mack Drive, Clapp Street, and near KGB Road. Ownership is primarily private, with the exception of land owned by the City of Wasilla at the Wasilla Municipal Airport and the Sports Center, native corporation-owned land along Clapp Street, and public rights-of-way. Land ownership is depicted in **Figure 3** on the following page.

### **3.5 Landscape**

There is no landscaping scheme within the project area. Some properties have lawns and landscaped yards while others retain the natural vegetation. Many properties that have been landscaped maintain the natural vegetation along property lines to provide privacy and shading. Natural vegetation in the area includes mature birch, aspen, spruce, and cottonwood trees. Near Lucille Creek, wetland vegetation dominates.

### **3.6 Drainage**

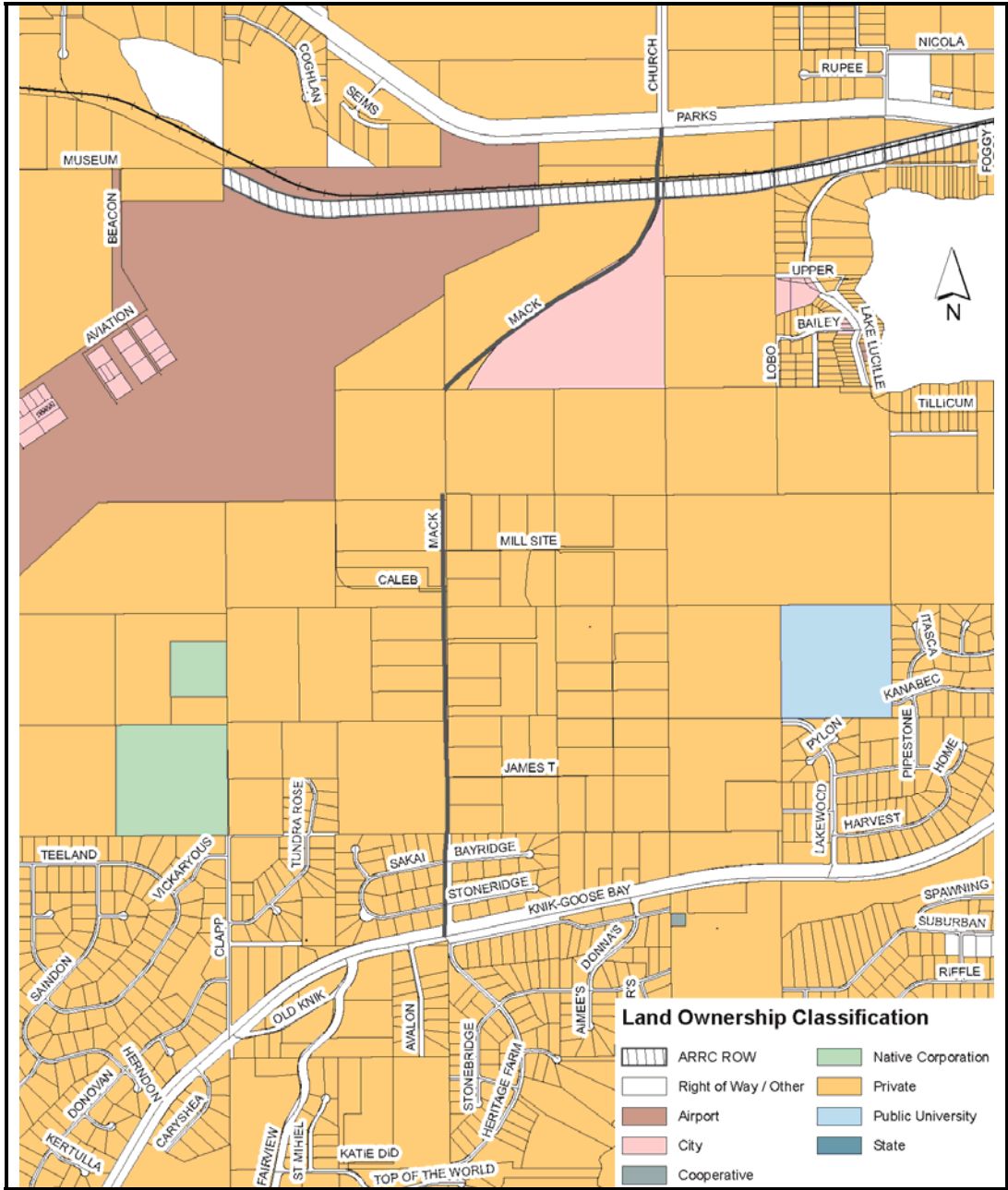
There are no existing piped storm drain systems within the project area. Roadside drainage is overland via ditches and swales. Storm water primarily ponds in low areas and infiltrates into the ground or flows to Lucille Creek, which crosses the project area between the ends of the existing Mack Drive segments. With the exception of Lucille Creek, there are no known streams in the project area.

### **3.7 Utilities**

Existing utilities within the project area include electric, telephone, cable television, and natural gas. See **Appendix A** for a general schematic of utilities within the project area. There is no public water, sanitary sewer, or storm drain utilities in the project area.

#### **3.7.1 Electric**

Matanuska Electric Association (MEA) owns and operates electric facilities within the project area including overhead and underground lines, poles, transformers, and pedestals. A power transmission line runs along the section line east of Mack Drive (the Church Road extension) and across the project area. From the section line, the transmission line runs west to Mack Drive, crossing about 2,500 feet north of KGB Road. The transmission line then extends to the southwest from Mack Drive and continues beyond Clapp Street, crossing about 1,100 feet north of KGB Road.



**Figure 3: Land Ownership Map**

Power is distributed along Mack Drive and adjacent roadways with overhead lines between KGB and approximately Bayridge Circle. North of Bayridge Circle, power is distributed with underground lines. In the Clapp Street area, power is distributed with overhead lines that follow the existing roadways.

**3.7.2 Telephone**

Matanuska Telephone Association (MTA) owns and operates telephone facilities within the project area including underground and overhead lines, pedestals, and poles. Both Mack Drive and Clapp Street areas are served by underground lines that are spliced from the main transmission line that parallels the south side of KGB Road.

At Mack Drive, a distribution line crosses under KGB Road and parallels the west side of Mack Drive. North of Sakai Circle, the line crosses under Mack Drive and parallels the east side of Mack Drive to Mill Site Road. There are additional lines and crossings at intersections.

At the intersection of KGB Road with Clapp Street, a distribution line crosses under KGB Road and parallels the west side of Clapp Street until the road becomes a trail approximately 3,600 feet north of KGB Road. There are additional lines and crossings at intersections.

### **3.7.3 Cable Television**

Both MTA and General Communications, Inc. (GCI) own and provide cable television facilities within the project area including underground lines and pedestals. MTA's cable television lines parallel their telephone lines as described in Paragraph 3.7.2 above. GCI has fiber optic and trunk lines that parallel KGB Road. Both Mack Drive and Clapp Street areas are served by underground lines that are spliced from their trunk and fiber optic lines. The GCI distribution lines follow the MTA distribution system along both Mack Drive and Clapp Street as they share the same trenches.

### **3.7.4 Natural Gas**

ENSTAR Natural Gas Company provides natural gas within the project area. The gas main parallels the north side of KGB Road and has distribution lines that feed adjacent streets. A distribution line parallels Mack Drive from KGB Road to Mill Site Road where it continues to the east to feed properties adjacent to that roadway. There are also crossings for distribution lines at intersections.

A distribution line parallels Clapp Street from Donovan Drive to Vickaryous Street, approximately 1,500 feet. Approximately half-way between Donovan Drive and Vickaryous Street, a distribution line extends to the east to serve properties adjacent to Tundra Rose Drive.

## **4.0 DESIGN STANDARDS AND CRITERIA**

### **4.1 Design Standards**

The documents listed below provide the design standards for this project:

- *Alaska Highway Preconstruction Manual*, 2005, State of Alaska, Department of Transportation & Public Facilities
- *City of Wasilla Official Streets & Highways Plan FY 2005-2025*, 2005, City of Wasilla
- *A Policy on Geometric Design of Highways and Streets (PGDHS)*, 2004, American Association of State Highway and Transportation Officials
- *Roadside Design Guide (RDG)*, 2006, American Association of State Highway and Transportation Officials

## 4.2 Design Criteria

Project design criteria are a function of the roadway characteristics and the appropriate design standards. The owner of the roadway and the funding source often dictate the design standards to be used. The source of the funding for this project is anticipated to be the State of Alaska; the design criteria are based on the *City of Wasilla Official Streets and Highways Plan (OS&HP)* and supplemented by the *ADOT&PF Highway Preconstruction Manual* where necessary. The Design Criteria used to develop alternatives is provided in the Project Design Criteria form in **Appendix B**.

The Mack Drive design is based upon how the road will operate in the design year. The design year is typically defined as 20 years after the anticipated construction year. In the design year, the roadway should meet minimum performance standards based on forecasted traffic demand. For this project, the anticipated construction year is 2011 and the design year is 2031.

Functional classifications group roadways by the character of the service they provide within the roadway hierarchy. The functional classification determines the basic design criteria including the design speed, number of lanes, lane and shoulder width, and alignment. The *OS&HP* identifies the Mack Drive Extension as a major collector.

The *Traffic Analysis Report* indicates that in the design year the traffic along the Mack Drive extension will vary between 5,000 and 10,200 vehicles per day, depending on the segment of the roadway. According to the *OS&HP*, the maximum daily traffic acceptable on a collector road is 12,000 vehicles per day. The estimated traffic falls within the maximum allowable traffic and the intended function of the proposed extension matches the definition of collector roadway and, most importantly, the needs of Wasilla. For this reason the design criteria as presented in the *OS&HP* are compatible and consistent with the proposed Mack Drive extension and with area planning.

The lowest allowable LOS for design of a collector is D and the lowest allowable LOS for design of a major arterial is C. Therefore, the Mack Drive extension and Fairview Loop should have a LOS D or better, and KGB Road should have a LOS C or better, through the design year.

### 4.2.1 Design Speed

The design speed determines the amount of sight distance required along the horizontal alignment and vertical profile of the roadway. As design speeds increase, longer sight distances are required to provide sufficient perception-reaction time and braking distance when reacting to obstacles in the roadway. Higher design speeds also require more gradual changes in both horizontal and vertical alignment. The *OS&HP* lists acceptable speed limits for a collector roadway as being between 25 mph and 40 mph. Because the existing speeds along Clapp Street are higher than the posted limit and because the intended function of the roadway stresses mobility, the design speed for the proposed extension should be five mph higher than the posted speed limit to provide for additional an additional factor of safety and increased sight distance when the road surface is icy.

While moderate to high design speeds (35 mph to 50 mph) are desirable for mobility, other constraints (available right of way, terrain, adjacent development, pedestrian presence and other site controls) may dictate a lower value. Additionally, several

adjacent stakeholders have indicated a preference for lower design and posted speeds. The recommended design speed for evaluation of alternatives is 40 mph with a posted speed limit of 35 mph.

#### **4.2.2 Pedestrian & Bicycle Improvements**

Pedestrian facilities should be included in all alternatives to provide for walkers, rollerbladers, recreational cyclists, and commuter cyclists. A separated multi-use pathway will provide for recreational users. The AASHTO *Guide for the Development of Bicycle Facilities* indicates that the minimum width for a multi-use pathway is eight feet; the recommended width for evaluation of alternatives is 10 feet. Pedestrian facilities should meet all accessibility guidelines of the Americans with Disabilities Act (ADA), including maximum grade, cross slope, and width.

Commuter cyclists are typically more advanced riders and generally use the roadway shoulders; the fewer conflict points, such as driveway crossings, allow for a faster ride. The minimum width of shoulder allowable for use as a bike lane is four feet. However, the shoulder will also serve as a breakdown lane for disabled vehicles so that mobility is maintained and will provide space for snow storage during the winter. The recommended shoulder width for evaluation of alternatives is eight feet.

#### **4.2.3 Illumination**

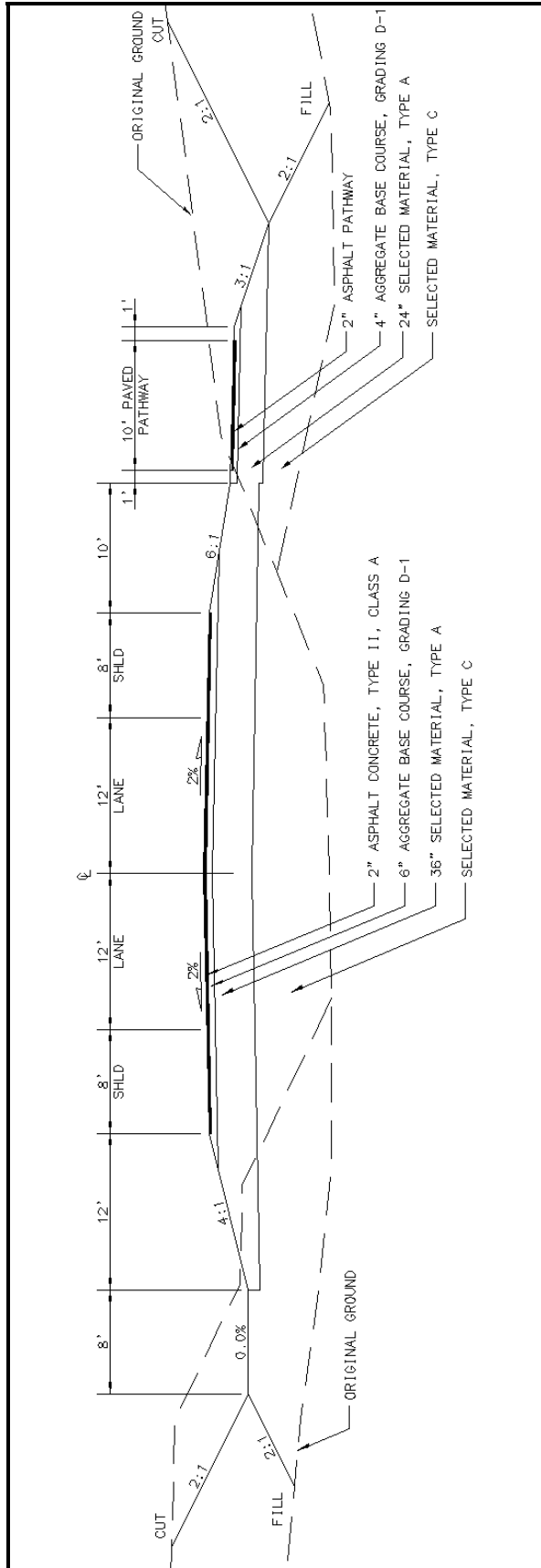
Illumination systems are intended to enhance traffic and pedestrian safety. Because of the rural project setting, continuous lighting is not warranted and would negatively contribute to light pollution. Lighting for evaluation of alternatives is recommended only at the intersection of the selected alignment with KGB Road. If desired by Wasilla, additional lighting could be installed at other intersections to enhance visibility of street signs for directional use and to improve visibility for pedestrian and moose avoidance.

#### **4.2.4 Design Variances**

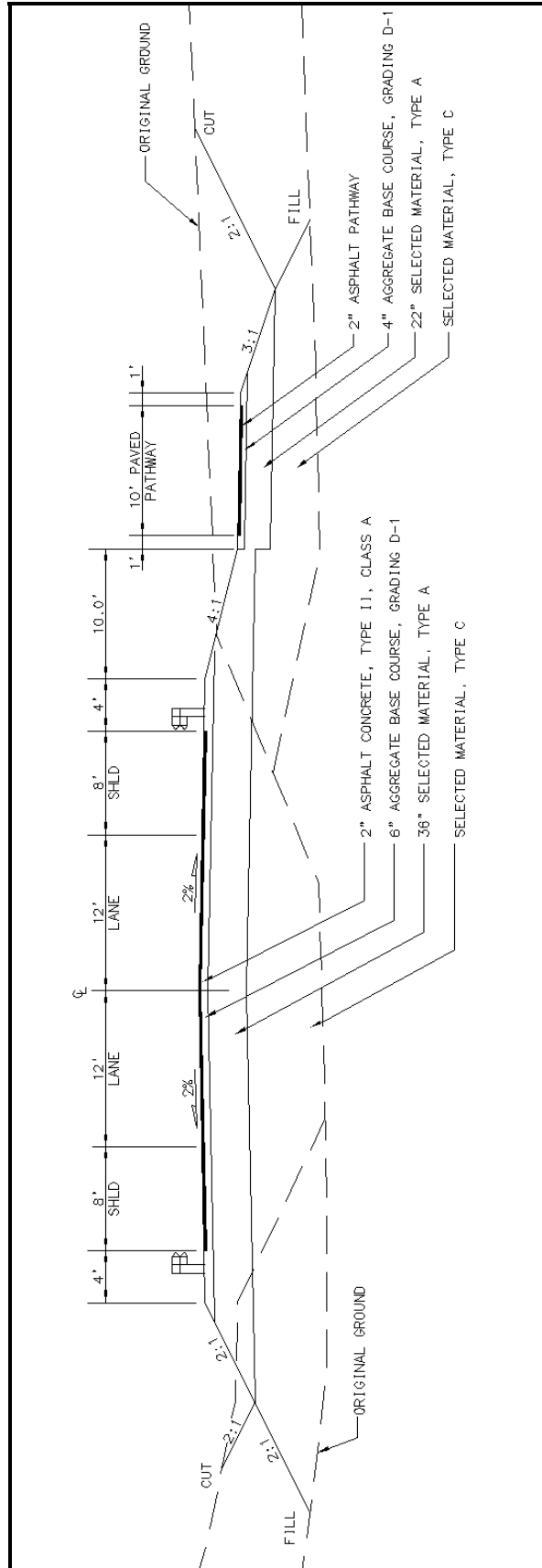
No design variances are anticipated with this project.

#### **4.2.5 Typical Section**

Based on the design criteria, the typical section shown in **Figure 4** on the following page will be used for alternative development. Some areas of the project will require guardrail where the height of the fill slope doesn't provide for an adequate clear zone, such as the culvert crossing over Lucille Creek, or where the fill slope height is greater than deemed safe in the AASHTO *Roadside Design Guide*. The guardrail section is shown in **Figure 5** (on page 12).



**Figure 4: Typical Road Section**



**Figure 5: Typical Guardrail Road Section**

## 5.0 ALTERNATIVE IDENTIFICATION AND EVALUATION

Five alignment alternatives have been identified for evaluation. **Figure 6** presents an overall view of the alternatives. Detailed plan and profile drawings of each of the alternatives are in **Appendix C**. For operation analysis purposes, all alternatives assume that Riley Avenue will be extended west to intersect the new Mack Drive extension by 2021 (mid-design year).

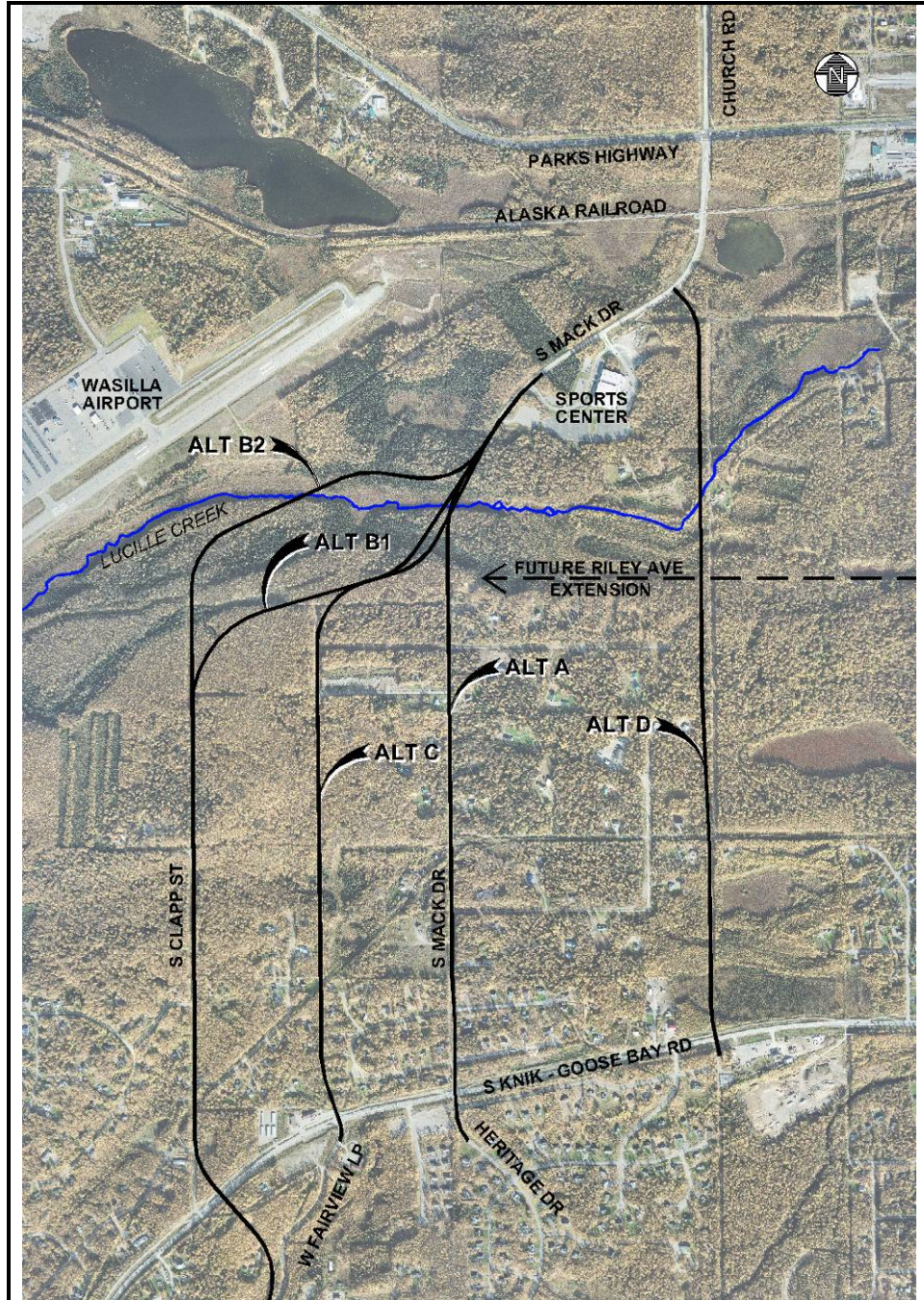


Figure 6: Project Alternatives Overview Map

## **5.1 Alternative A – Mack Drive Alignment**

Alternative A would connect the northern segment of Mack Drive at the Sports Center to the southern segment of Mack Drive just north of Mill Site Drive and would install a traffic signal at the Mack Drive-Heritage Drive-KGB Road intersection. This traffic signal would be too close to the recently constructed interim traffic signal at the KGB Road-Fairview Loop intersection to meet minimum ¼ mile signal spacing criteria. To provide adequate spacing, Alternative A would reconstruct a portion of Fairview Loop to relocate the traffic signal at a new Fairview Loop-Clapp Street-KGB Road intersection. The new intersection location would provide better sight distance for both north- and south-bound movements onto KGB Road and reduces the number of curves on Fairview Loop. Major components of the interim signal can be reinstalled at the new intersection. Under this alternative, both Mack Drive and Clapp Street intersections with KGB Road would be signalized to improve access, reduce delay and improve safety.

In the design year, Mack Drive would have LOS C south of Riley Ave and LOS D north of Riley Ave; the signalized intersections of both Mack Drive and Fairview Loop-Clapp Street with KGB Road would have LOS C. The LOS shows that this alternative is viable with respect to roadway operations.

Alternative A would reduce the crash rate at both the Mack Drive and Clapp Street intersections with KGB Road, and would maintain the benefit obtained by the signalization of the Fairview Loop intersection.

Alternative A would provide an alternate route for short trips on Parks Highway and KGB Road, reducing the traffic volume on these segments by about five percent overall, which would reduce congestion and improve overall safety. However, traffic traveling from the Knik-Fairview area on Fairview Loop to Parks Highway would have to use KGB Road to get to Mack Drive. This is less favorable than a direct crossing of KGB Road as it requires two additional turning movements.

A 12-foot diameter culvert would be installed at the Lucille Creek crossing, which would allow for minimal disturbance of the existing stream and provide for moose passage under the roadway. Wetland areas adjacent to the stream would be impacted and mitigation would be required.

A future extension of Riley Avenue would connect to Alternative A near the middle of a long, steep slope. An intersection at this location is not desirable due to difficulty meeting minimum design criteria for intersection grades and meeting accessibility requirements on the pathway.

Alternative A meets the purpose and need of the project.

## **5.2 Alternative B – Clapp Street Alignment**

Alternative B would connect the northern segment of Mack Drive at the Sports Center to the north end of Clapp Street, and similar to Alternative A, a portion of Fairview Loop would be reconstructed to create a new signalized Fairview Loop-Clapp Street-KGB Road intersection. The existing southern section of Mack Drive would continue to operate as a local roadway.

Relocating the Fairview Loop traffic signal location is essential because, without relocation, the spacing between the two signals would be only 1/3 mile. While this meets minimum criteria, it would adversely impact progression along KGB Road. Additionally, if this staggered connection remained; there would be pronounced out-of-direction travel for northbound trips.

In the design year, the new Alternative B roadway would have LOS C south of Riley Ave and LOS D north of Riley Ave; the new Clapp Street-Fairview Loop-KGB Road intersection would have LOS C. The LOS shows that this alternative is viable with respect to roadway operations.

Alternative B would reduce the crash rate at the Clapp Street-KGB Road intersection and would maintain the benefit obtained by the signalization of the Fairview Loop intersection. However, there would be no improvement in conflict control at the existing Mack Drive intersection.

Alternative B would promote hierarchal movement between neighborhoods and arterials and would remove short trips from the Parks Highway and KGB Road safety corridors, which would reduce congestion and improve overall safety. It is estimated that building this connection would reduce traffic in key segments along Parks Highway and KGB Road by nine percent.

This alternative is divided into two subalternatives. Alternatives B1 and B2 accomplish the same goals and make the same primary connections but differ in the route from the Sports Center to the northern end of Clapp Street.

### **5.2A Alternative B1**

As shown on **Figure 6** and on the plan and profile sheets in **Appendix C**, Alternative B1 crosses Lucille Creek near the Alternative A crossing, then turns to the southwest to connect to the north end of Clapp Street.

### **5.2B Alternative B2**

As shown on **Figure 6** and on the plan and profile sheets in **Appendix C**, Alternative B2 turns to the west before crossing Lucille Creek and then turns to the southwest to cross the creek and connect to the north end of Clapp Street. A portion of this alternative is on airport property and could restrict future airport expansion and development. Field reconnaissance identified a small cache pit near the proposed Alternative B2 alignment, which may require further consultation and study to determine its status as a National Register of Historic Places eligible resource.

For either Alternative B1 or B2, a 12-foot diameter culvert would be installed at the Lucille Creek crossing, which would allow for minimal disturbance of the existing stream and provide for moose passage under the roadway. Wetland areas adjacent to the stream would be impacted and mitigation would be required.

A future extension of Riley Avenue would connect to Alternative B2 between the bottom of a long, steep slope and a horizontal curve; the connection to Alternative B1 would be near the top of a shorter, more gentle slope, at the end of a horizontal curve. The connection to Alternative B1 is in a more desirable location based on roadway geometry.

Alternatives B1 and B2 meet the purpose and need of the project.

### **5.3 Alternative C – Fairview Loop Alignment**

Alternative C would connect the northern segment of Mack Drive at the Sports Center to Fairview Loop at the existing Fairview Loop-KGB Road intersection, following a route that is approximately mid-way between the existing Mack Drive and Clapp Street. This alternative would utilize the recently constructed traffic signal in its present location; however it would preclude future signalization at either Clapp Street or Mack Drive because of improper spacing. Under this alternative, both Clapp Street and Mack Drive would continue to function as local streets.

In the design year, the new roadway would have a LOS C south of Riley Avenue and LOS D north of Riley Avenue; the signalized intersection of the new roadway-Fairview Loop-KGB Road would have LOS B. However, the existing Mack Drive and Clapp Street intersections with KGB Road would deteriorate further from their current LOS E and LOS F.

Alternative C would not improve conflict control at the Mack Drive or Clapp Street intersections with KGB Road, but would maintain the benefit obtained by the signalization of the Fairview Loop intersection.

Alternative C would remove short trips from Parks Highway and KGB Road which should help to facilitate reduction in congestion and improved safety. Overall segment trips are estimated to reduce by seven percent.

A 12-foot diameter culvert would be installed at the Lucille Creek crossing, which would allow for minimal disturbance of the existing stream and provide for moose passage under the roadway. Wetland areas adjacent to the stream would be impacted and mitigation would be required.

The Alternative C alignment is a new alignment, entirely on private property. This would require extensive right-of-way (ROW) acquisition and would have significant negative impact to local residents. Several homes would need to be purchased, resulting in displaced families, and portions of many additional parcels would need to be acquired.

Although this alternative provides mobility, local access would not be improved without the construction of additional local roads to connect Mack Drive and Clapp Street to the new roadway. This would result in additional costs, ROW acquisition, and negative social impacts.

This alternative has significant negative impact to local residents and does not meet the purpose and need of the project. It will not be evaluated further.

### **5.4 Alternative D – Church Road Alignment**

Alternative D would construct a new roadway along the section line east of Mack Drive. This alignment would be a *de facto* extension of Church Road north of the Parks Highway. A new intersection would be constructed north of the Sports Center and a traffic signal would be constructed where the new roadway intersects with KGB Road. Under this alternative, both Clapp Street and Mack Drive would continue to function as local streets.

The recently constructed signal at Fairview Loop would remain; however the new signal would be only 0.36 miles from a planned signal at the Lakewood Drive intersection to the east. The minimum 0.25 mile signal spacing would be met, but the desired 0.5 mile spacing on a major arterial would not be satisfied. This could be resolved by relocating the traffic signal from Lakewood Drive to another intersection. Alternative D would also require a new signal at the new intersection north of the Sports Center, although it would not be needed until the mid-design year (2021).

In the design year, the new roadway would have a LOS C south of Riley Avenue and LOS D north of Riley Avenue; the signalized intersection of the new roadway at KGB Road would have LOS C. However, the existing Mack Drive and Clapp Street intersections with KGB Road would deteriorate further from their current LOS E and LOS F.

Alternative D would not improve conflict control at the Mack Drive or Clapp Street intersections with KGB Road.

Alternative D would remove short trips from Parks Highway and KGB Road which should help to facilitate reduction in congestion and improved safety. Overall segment trips would be reduced by five percent.

This alternative takes advantage of an existing section line easement. However, a portion of this easement is already occupied by a 115 KV overhead electric transmission line. At least 11 power poles would need to be relocated at an estimated cost of nearly \$1 million, and additional ROW would need to be acquired.

Although this alternative provides mobility, local access for the neighborhoods currently served by Mack Drive and Clapp Street would not be improved. To be an effective collector, additional local roads would need to be constructed. This would result in additional costs, ROW acquisition, and negative social impacts.

This alternative has significant utility relocation impacts that other alternatives do not have, requires a future traffic signal, and does not meet the purpose and need of the project. It will not be evaluated further.

### **5.5 Alternative E – No Action**

The no-action alternative leaves the existing roadways as they are and no extension is built to connect Mack Drive from its current terminus at the Sports Center to KGB Road. This alternative would have no cost and no ROW impacts. However, this alternative does not address the near-term transportation needs of the community as identified in the *OS&HP* and does not meet the purpose and need of the project. It will not be further evaluated.

### **5.6 Alternatives for Further Evaluation**

Alternatives C, D, and E do not meet the purpose and need of the project; Alternatives A, B1 and B2 will be evaluated further. The discussion of alternatives in the following sections refers to these alternatives only.

## 6.0 ENVIRONMENTAL CONSIDERATIONS

### 6.1 Wetlands

A wetlands delineation and functional assessment using plant species identification, soils testing, and hydrologic indicators was performed in July 2009. Areas within the proposed project alignments were identified as Palustrine Forested and Palustrine Emergent/Scrub-Shrub wetlands as shown in **Appendix D**. Both wetlands types were assigned an overall Category II ranking, which are habitats not considered critical and are prevalent throughout the Matanuska-Susitna Valley. Unavoidable wetland impacts will occur due to this project, which will require mitigation. Mitigation may include mitigation bank credits, in-lieu fee program credits, or permittee-responsible mitigation. **Table 3** presents the area of wetland impact by alternative.

**Table 3: Wetland Impacts**

Alternative	Area Impacted
Alternative A Mack Alignment	1.60 acres
Alternative B1 Clapp Alignment southern route	1.32 acres
Alternative B2 Clapp Alignment northern route	1.32 acres

### 6.2 Fish Habitat

The project alignments cross Lucille Creek, an anadromous stream. According to the Alaska Department of Fish and Game Anadromous Waters Catalogue, Lucille Creek supports coho and sockeye salmon. Adult sculpin and adult threespine stickleback were also identified in the creek in the *Fish and Aquatics Resources Assessment* prepared for this project.

Impacts to fish habitat are equivalent among the alternatives.

### 6.3 Habitat

The habitat along the project alignments consists mainly of dense black spruce mixed with birch with mosses/lichens and some grasses covering the ground. According to the *Evaluation of Potential Effects on Large Mammal* report prepared for this project, it is likely that both black and brown bears use the riparian areas along Lucille Creek as a travel corridor in the spring, summer, and fall, with the most intensive time for bear use occurring in mid- and late-summer when spawning salmon are present in the creek. The Wasilla area is well known to be used by a large number of animals and moose-vehicle collisions in this area are common, especially during the winter months (ADOT&PF, 1995).

Impacts to wildlife habitat are equivalent among the alternatives.

## **6.4 Hazardous Materials Assessment**

Based on the findings of the *South Mack Drive Extension All Appropriate Inquiry/Phase I Environmental Site Assessment* prepared for this project, no potentially hazardous sites are likely to impact development of the alternatives.

## **6.5 Cultural Resource Assessment**

Cultural resource background research and a comprehensive literature review of the project area were completed by Northern Land Use Research, Inc. (NLUR). Findings were compiled into an *Assessment of Potential Cultural Resources along a Proposed South Mack Road Extension Corridor* to guide fieldwork. Review of the Alaska Heritage Resource Survey (AHRS) files did not list any known cultural resources directly within the proposed corridors although one historic home (ANC-3086, Church Stone Cottage) on Old Knik Road near Fairview Loop was identified. A review of the area history and a preliminary landscape study suggested that more historic buildings or archaeological sites may occur in or adjacent to the alternative corridors. However, further investigation indicates that there are no historic buildings within the proposed right of ways of the roadway alternatives.

The cultural resource assessment for the South Mack Drive Extension study area resulted in the identification of two new archaeological sites (one archaeological cache pit, ANC-3294 and one 1960's hunting stand site-3295) on the north bank of Lucille Creek that have been preliminarily evaluated for National Register eligibility. In addition to the archaeological sites, two Late-Homestead period homes were identified in the study area (ANC-3068 and ANC-3296) but not described in detail or evaluated because they are considered outside the area of direct impact of the currently proposed project. As currently proposed, the project will not have an adverse effect on the Late-Homestead period properties.

NLUR also assessed the potential for previously unidentified historic districts that may include buildings and neighborhoods adjacent to or within the study area. All other buildings identified during the survey have construction dates after 1965 and have not achieved significance within the last 50 years. No historic districts were identified as a result of this survey. A summary of NLUR's findings were compiled into *Cultural Resource Survey along a Proposed South Mack Drive Extension Corridor, Wasilla, Alaska*. The analysis of potential for adverse effects on these properties has not been conducted as it is dependent on the final road design; however, the currently proposed South Mack Drive and South Clapp Street alternatives should have little or no affect on historic properties eligible for listing on the National Register of Historic Places.

## **6.6 Threatened and Endangered Species/Bald Eagles**

According to the U.S. Fish and Wildlife Service's map "ESA Listed Species Consultation Guide – Anchorage Fish and Wildlife Field Office" it appears that no threatened or endangered species or critical habitat areas are located in the project area. Additionally, a check of the Alaska Bald Eagle Nest Atlas showed no eagle nests in the project area. Therefore, it is not likely that the project will impact threatened or endangered species or bald eagles. A walk through the project area prior to construction should be conducted to ensure bald eagle nests have not been established.

## **6.7 Environmental Summary**

Environmental commitments could include the following and are equivalent for all alternatives:

1. Wetland mitigation and minimization measures.
2. Protect adjacent wetlands, streams, and lakes with Best Management Practices during construction.
3. If contaminated materials are discovered during construction, all work near the contaminated site will be stopped until the Alaska Department of Environmental Conservation (ADEC) is contacted and an action plan is approved.
4. The Contractor will stop work if archeological or cultural resources are encountered during exploration, excavation, or construction. Work at the specific site will not resume until the Project Engineer and the State Historic Preservation Office (SHPO) have been notified and a clearance from SHPO is issued to the Project Engineer.

## **7.0 SOIL CONDITIONS**

Soil conditions along the alternative alignments consist of sands and gravels, with varying amounts of fines. In general, the organic surface layer is less than two feet thick. Some thick peat areas may exist in the area of Lucille Creek. The soil conditions do not appear to vary significantly between alternatives.

## **8.0 PEDESTRIAN ACCESS**

The existing multi-use pathway along the northern segment of Mack Drive serves pedestrian and bicyclists. Similarly, a multi-use pathway parallels KGB Road. There are no existing pedestrian facilities within the limits of the proposed project. All alternatives propose 8-foot shoulders adjacent to the traveled way and a 10-foot wide multi-use pathway to connect the existing facilities at each end. The pedestrian facilities will meet all ADA accessibility guidelines, including maximum grade, cross slope, and width.

## **9.0 DRAINAGE**

The topography within the project area consists of rolling terrain and there is no established runoff collection system. Lucille Creek is the only significant drainage course. A large, 12-foot diameter culvert is proposed for the creek crossing in all alternatives. The alternatives will maintain existing drainage patterns and have equal impacts to project area drainage.

## **10.0 UTILITY IMPACTS**

All alternatives will require substantial relocation of underground and overhead utilities. Alternatives B1 and B2 will have the same impacts to utilities; no existing utilities lie within the area where the alternatives differ. Alternative A has significantly greater impacts to underground utilities; Alternatives B1 and B2 have greater overhead utility impacts. The preliminary estimate of utility relocation costs presented in **Appendix F** shows that Alternatives B1 and B2 have slightly greater overall utility relocation cost.

## 11.0 RIGHT-OF-WAY CONSIDERATIONS

All alternatives will require significant ROW acquisition to accommodate the proposed roadway. The existing Mack Drive ROW is 70 feet wide and extends approximately 1,100 feet north of KGB Road; the remainder of the existing roadway is not in a public ROW. The existing Clapp Street ROW is 60 feet wide from KGB Road north for approximately 2,300, beyond which there appears to be no public ROW.

For alternative comparison, the anticipated ROW width varies based on the entire proposed cut/fill slopes as shown in the typical sections in **Figure 4** and **Figure 5** and the plan and profile drawings in **Appendix C**.

Alternative A will likely require complete acquisition of 8 parcels and acquisition of a portion of 34 parcels. Alternative B1 will likely require complete acquisition of 6 parcels and acquisition of a portion of 32 parcels. Alternative B2 will likely require complete acquisition of 6 parcels and acquisition of a portion of 31 parcels. The property acquisition required for the Fairview Loop realignment of these alternatives is three full parcels and a portion of 10 parcels. ROW acquisition costs are presented in the cost estimate section below.

Alternative A has significantly greater ROW acquisition cost than Alternatives B1 and B2.

## 12.0 MAINTENANCE CONSIDERATIONS

All of the proposed design alternatives will require increased maintenance as a result of the new roadway, pathway, guardrail, and intersection signals and lighting. Snow storage/disposal is provided for within the shoulders and ditches along all proposed alternatives. Alternative A results in one additional traffic signal to maintain; Alternative B2 will require more guardrail than Alternatives A and B1.

## 13.0 ILLUMINATION

There is currently no street illumination within the project area except for the northbound approach to Parks Highway and at the new traffic signal at Fairview Drive. Continuous illumination is not required with this project and is not proposed with any alternative. Alternative A will install intersection lighting with the traffic signals at the Mack Drive and Clapp Street-Fairview Loop intersections with KGB Road. Alternatives B1 and B2 will install intersection lighting with the traffic signal at the Clapp Street-Fairview Loop-KGB Road intersection.

## 14.0 PUBLIC INVOLVEMENT SUMMARY

A Public Involvement Plan was approved by Wasilla and posted on the project website ([www.parkshighway44-52.info/southmack](http://www.parkshighway44-52.info/southmack)). A project newsletter was prepared and distributed in July 2009 to the project mailing list. A public meeting to introduce the project and solicit comments on potential corridors was held July 23, 2009 at the Sports Center. The project was represented at the Mat-Su Transportation Fair on October 8, 2009 and comments were collected. A final public meeting was held on February 25, 2010 at the Sports Center to present the draft of this *Preliminary Engineering Report* and the recommended alternative. A summary of public comments is provided in **Appendix E**.

## 15.0 COST ESTIMATE

**Table 4** presents a summary of the estimated costs for the proposed improvements of each alternative. Detailed cost estimates are presented in **Appendix F**. The Fairview Loop realignment is a distinct component, but is an integral part of all alternatives. Therefore, the Fairview Loop cost is tabulated separately in the detailed estimates, but is included in the summary costs presented here.

**Table 4: Estimated Alternative Costs**

Item	Alternative A Mack Alignment	Alternative B1 Clapp Alignment southern route	Alternative B2 Clapp Alignment northern route
Right-of-Way	\$3,036,662	\$1,682,916	\$1,570,929
Utilities	\$747,880	\$844,580	\$844,580
Design & Const. Engineering	\$2,942,495	\$3,255,690	\$3,190,630
Construction & Contingency	\$9,060,438	\$10,007,719	\$9,790,853
Wetland Mitigation	\$32,000	\$26,400	\$26,400
<b>TOTAL</b>	<b>\$15,819,475</b>	<b>\$15,817,305</b>	<b>\$15,423,392</b>

## 16.0 RECOMMENDED ALTERNATIVE

The recommended alternative is the one that can best meet the project purpose and need with the least negative impact to the surrounding community and environment.

**Table 5** on the following page presents a summary of the evaluation of each alternative.

**Table 5: Evaluation Matrix**

<b>Criteria</b>	<b>Alternative A Mack Alignment</b>	<b>Alternative B1 Clapp Alignment southern route</b>	<b>Alternative B2 Clapp Alignment northern route</b>
Mobility	Good, but requires short trip on KGB Road	Excellent	Excellent
Access	Good for properties along Mack	Good for properties along Clapp	Good for properties along Clapp
Minimize Access Control	12 driveway connections	5 driveway connections	5 driveway connections
Riley Avenue connection	Undesirable – in the middle of long, steep slope	Desirable – at the top of gentle slope	Undesirable – in the middle of long, steep slope
Congestion Relief on Parks & KGB	5% overall traffic volume reduction	9% overall traffic volume reduction	9% overall traffic volume reduction
Crash Reduction	Improved at Mack/KGB & Clapp/KGB	Improved at Clapp/KGB; no improvement at Mack/KGB.	Improved at Clapp/KGB; no improvement at Mack/KGB
Requires Acquisition of Airport Property	No	No	Yes
Wetlands Impacts	1.60 acres	1.32 acres	1.32 acres
Cultural Resources	No historic properties affected	No historic properties affected	Potential historic property affected
Utility Relocation	Impacts to buried utilities – \$747,880	Impacts to overhead utilities – \$844,580	Impacts to overhead utilities – \$844,580
Right of Way	8 full parcels, 34 partial parcels \$3,036,662	6 full parcels, 32 partial parcels \$1,682,916	6 full parcels, 31 partial parcels \$1,570,929
Maintenance	1 additional signal	- -	Additional guardrail
Cost	\$15,819,475	\$15,817,305	\$15,423,392

Based on a review of the matrix, Alternatives B1 and B2 are preferred over Alternative A because of the increased mobility, congestion relief, lesser wetland impact, better access control, and significantly less ROW acquisition cost. Although Alternative B1 and B2 are nearly equal in all other regards, Alternative B1 is preferred because it provides more desirable roadway geometry for the future Riley Avenue connection, avoids a potential cultural impact, and retains development potential at the Wasilla Airport.

## **17.0 CONCLUSION**

The draft *Preliminary Engineering Report* was presented to the Matanuska-Susitna Borough Transportation Advisory Board and the Wasilla Planning Commission. Both bodies adopted resolutions in support of the South Mack Drive Extension and the recommendation of Alternative B1. Copies of these resolutions are provided in **Appendix G**.

