

South Mack Drive Extension Project

**Knik Goose Bay Road to Curtis D. Menard
Memorial Sports Center**

Traffic Analysis Report

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Acronyms and Abbreviations

The following table presents acronyms and abbreviations that may be commonly used throughout this document.

ADT, AADT	Average Daily Traffic, Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADOT/ (&)PF, or DOT/(&)PF	Alaska Department of Transportation and Public Facilities
AWSC	All-way-stop-control (4 stop signs on all approaches)
CTWLTL or TWLTL	Continuous (or center)-two-way left turn lane
DD, DDHV	Direction al Distribution, DD Hourly Volume
DSR	Design Study Report
EB, EBL,EBLT	Eastbound, eastbound left turn
HSIP	Highway Safety Improvement Program (ADOT&PF)
Hwy	Highway
ISD	Intersection Sight Distance
ITE	Institute of Transportation Engineers
K	% of AADT or ADT during peak hour
LOS	Level of Service (performance grade)
L RTP	Long Range Transportation Plan
LT, L	Left turn(s)
MOA	Municipality of Anchorage
Mph, MPH	Miles Per Hour
MUTCD	Manual of Uniform Traffic Control Devices
MSB	Matanuska-Susitna Borough
NB, NBL, NBLT	Northbound, northbound left turn
OSHP	Official Streets and Highways Plan
PHF	Peak Hour Factor
Ped	Pedestrian
Pkwy	Parkway
PSD	Pedestrian Sight Distance
PTR	Permanent Traffic Recorder
RIO	Right-in turns only
RIRO	Right-in, Right-out driveway
Rd, RD	Road
RT, R	Right turn(s)
SB, SBL, SBLT	Southbound, southbound left turn
S, Sec	Second
Sf, SF	Square feet
SSD	Stopping Sight Distance
St, ST	Street
T, Th, Thru	Through
TWSC	Two-way-stop-control (2 stopped approaches)
Veh	Vehicle(s)
Vol	Volume
WB, WBL, WBLT	Westbound, westbound left turn

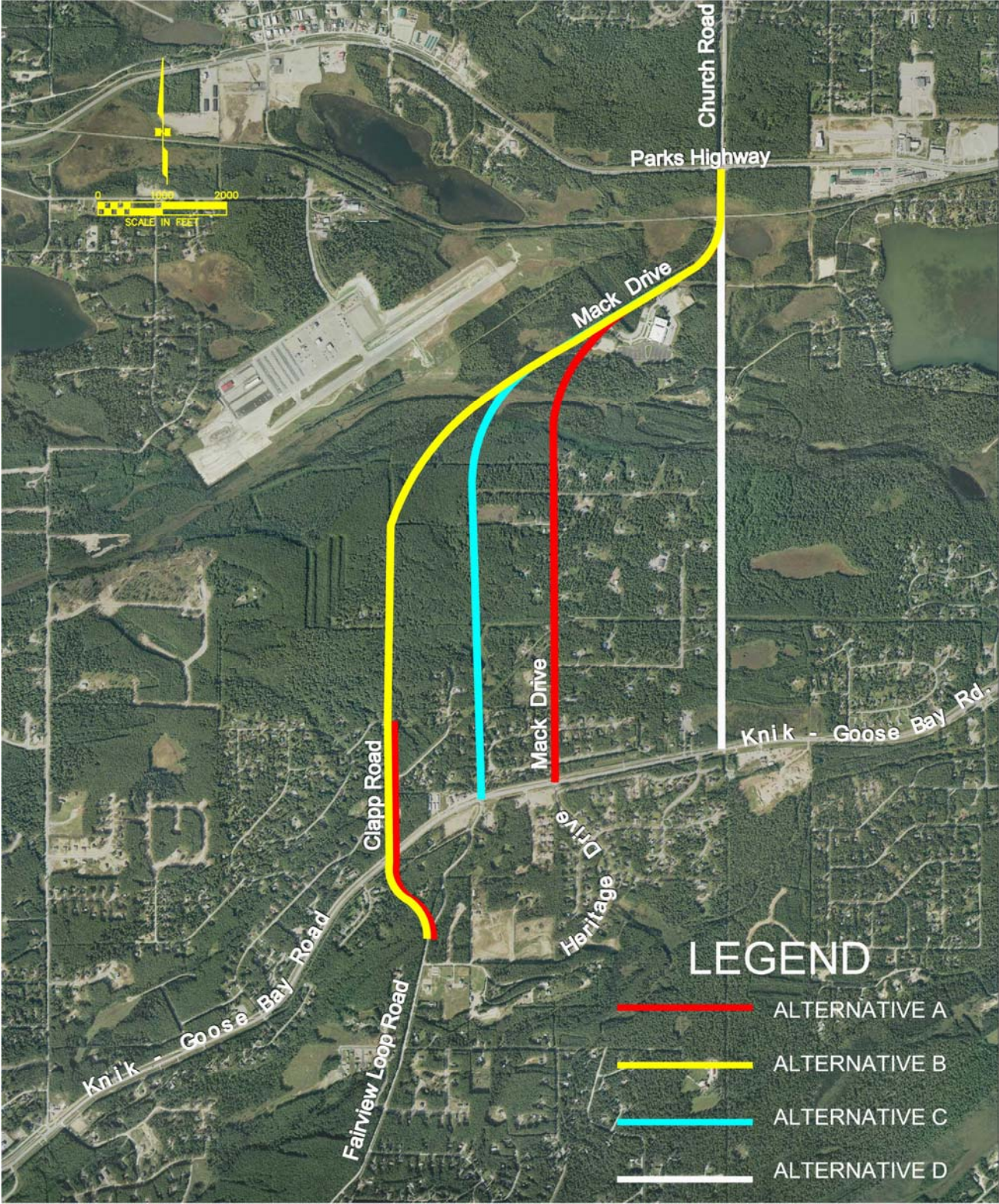
Summary

This traffic analysis report addresses traffic engineering and transportation planning elements required for design of South Mack Drive Extension between Knik Goose Bay Road and the Curtis D. Menard Memorial Sports Center that now must use the arterial system. Reassignment of intra-neighborhood trips from the arterials to Mack will reduce congestion at major arterial intersections, and reduce overall system vehicle miles travel.

South Mack Drive is functionally classified as a major collector in the City of Wasilla Official Streets and Highways Plan. Its proposed position in the street system network fits well with the collector classification in that it provides a link between the local neighborhoods and the Curtis D. Menard Memorial Sports Center, and the Parks Highway and Knik Goose Bay Road/Fairview Loop arterials. It will provide improved intra-neighborhood connectivity, especially for those residential areas that abut or connect to the Mack-Church corridor; which reduces the number of trips on the Parks and Knik Goose Bay Road. Reducing volume on these arterials would have crash-reduction benefit as well, in that both the Parks Highway and Knik Goose Bay (KGB) Road are designated safety corridors with high crash rates.

There are 4 corridor alternatives that are being evaluated in this study. Alternative A is aligned with the existing Mack Drive / Heritage Drive alignment. It is desirable to realign Fairview Loop to the west across from Clapp Road which would provide just over ½ mile spacing between future signals at Mack Drive, and a relocated Fairview signal. Alternative B would align with the Clapp Road Corridor. It is desirable to realign Fairview Loop to the west across from Clapp Road and relocate the Fairview signal to this location. Alternative C would align with an extension of the existing Fairview Road corridor at the KGB signal. Alternative D would align along the same corridor as Church Road (section line), and was suggested by several people at the July 23, 2009 public meeting in Wasilla.

The following figure presents the Alternatives under evaluation.



Executive Summary Figure A- Mack Drive Corridor Alternatives

The following summarizes key analysis sections of this report.

Design Objectives

The City of Wasilla's OSHP publishes design criteria for streets and roads. The following table presents design criteria values for Wasilla that apply to this project.

Characteristics/Design Criteria Elements	Collector (Mack Corridor)	Principal Arterial (KGB Road)	Local/ Residential (Cross Streets with Mack alignments)
Street spacing	¼ to ½ mile	1 to 5 miles	> 300'
Length	½ mile	Continuous	500' or 1000' for a cul de sac
Lanes	2 - 4	2 - 6	2
Min. pavement width	24'	40'	20'
R-O-W width (level ground)	60' - 100'	200'	60'
Cross Street spacing	330'	2640'-1 mile	660'
Volume Max./vehicle/day	12,000	N/A	200 - 500
Striping	Center line at ≥ 4,000 feet	Center line & lanes	None
Median	No	Yes	No
Turn lane	No	Yes	No
Traffic signal	No	Yes	No
Residential access	Indirect Desired	Limited or Prohibited	Direct
Maximum grade	8%	5%	10%
Minimum radius curve	185' - 510'	1,065-1660'	115' - 500'
Pedestrian crossings	Intersections, Signals	Limited or Prohibited	Unrestricted
Typical Speed Limit	25 - 40 mph	55-65 mph	25 mph
Commercial Access	MSB/City	Limited or Prohibited	Limited only by zoning
Two Points of Access	Yes	Yes	No
LOS Goal	D	C**	D
ADOT&PF Comparable Functional Classification	Rural Major or Minor Collector, Urban Collector	Rural or Urban Interstate, Rural or Urban Principal Arterial	Rural or Urban Local Roads
*See ADOT&PF Highway Preconstruction Manual Spacing Tables 1190-9 & 10. ** Exceptions in urban downtown districts.			

Source: *Wasilla Official Streets and Highways Plan*

Executive Summary Table A- Wasilla Street System Design Criteria

The project should be compatible and consistent with area planning. To that end, KGB Road is a major arterial that will ultimately be expanded to a four-lane facility. The Mack Drive extension will be an urban collector. The Wasilla Area Plan includes two non-

vehicular objectives which should be considered for this project, and are not in the criteria above:

- The project should “*Design for pedestrian access and multimodal transportation*”, meaning that pedestrian and biking facilities should be provided, and
- The design should “*Preserve rural character of the community and enhance aesthetics in transportation projects*”, suggesting a minimization of design features that are present in an urban environment, such as curb, gutters, storm drains and continuous illumination. It should be noted that rural character and the consequent rural design features are compatible with, and can be applied to those roadways that are functionally classified as an urban roadway.

With regards to vehicular and pedestrian operational quality, the primary performance measure is level of service, with levels A (best, free-flow) through F (failed, long delays). These are defined for facility elements under Attachment B. AASHTO’s *GDHS 2004*, Exhibit 2-32 provides guidelines for design levels of service of functionally classed facilities, as does Wasilla’s criteria. Both Wasilla and AASHTO indicate that urban collectors may have a LOS of D. Therefore, a Mack Drive or alternative corridors approach to the KGB Road intersection should have LOS D or better through the design year.

KGB Road as an urban arterial should have a LOS of C or better to comply with Wasilla and AASHTO’s guidelines. It should be noted that if intersections are modified with signals or roundabouts so that KGB Road is no longer an uninterrupted flow facility, the intersection LOS will control the quality of service for KGB Road, and intersecting roadway approaches.

Traffic Forecasts

Alternative traffic volume forecasts (daily traffic and peak hour) were developed for a design year of 2031 and a mid-life year of 2021. Each alternative has similar traffic

forecasts for the design year. The corridors are forecasted to have between 5,000 to 10,000 vehicles per day in 2031.

Collector Road Typical Section

Each alternative's typical section would include two through lanes and shoulders. The minimum lane width should be 11 feet (desirable 12 feet) and the minimum shoulder width should be 4 feet (desirable 8 feet).

Intersections

Alternative A would require the Mack/KGB intersection and the relocated Fairview/Clapp/KGB intersection to be signalized in 2011. Alternative B would require the Fairview/Clapp/KGB intersection to be signalized in 2011. Alternative C would require the Fairview/Mack/KGB intersection to be signalized in 2011 (the existing Fairview intersection is currently signalized). Alternative D would require the Mack Church Extension/KGB intersection to be signalized in 2011. All signalized intersections under each alternative will operate at a level of service of C or better through the design year (LOS C is minimum).

Collector Road Effectiveness

Alternative A provides the collector in a central location to adjoining residential areas and the Curtis D. Menard Memorial Sports Center and will promote hierarchical movement between neighborhoods and arterials. Moreover, this alternative enables Clapp Road to be signalized if a realignment of Fairview is implemented, and would in effect make Clapp Road a de facto collector. Alternative B also provides the collector in a central location to adjoining residential areas and the Curtis D. Menard Memorial Sports Center and will promote hierarchical movement between neighborhoods and arterials.

If Alternative C can be connected from the local streets currently served by the existing Mack Drive and Clapp Road, then this corridor would be in a good location as a collector. Otherwise, those neighborhoods would still use Mack and Clapp. The Mack and Clapp intersections with KGB Road would remain unsignalized and peak hour LOS for the stopped approaches would deteriorate further from the poor LOS (E and F) shown under

Table 14- 2009 Evening Peak Hour Unsignalized Intersection Capacity Analyses Performance Measures on page 38. However, one of the best attributes of Alternative C is that it produces a continuous north-south Fairview/Mack/Church corridor, with no out of direction travel.

Alternative D would not serve neighborhoods that are currently served by Clapp Road. In addition, in order to be an effective collector for those areas currently served by the existing Mack Drive, additional connections to local streets must be made.

Safety

Alternative A would correct the critical level of crashes experienced at the Fairview intersection. In addition, the alternative reduces conflicts and potential crashes for the other significant approaches in the study area.

Alternative B, C, and D would also correct the critical level of crashes experienced at the Fairview intersection. However, under Alternative B, the existing Mack and Heritage approaches would not have signalization, and consequently would have no improvement in conflict control. Under Alternatives C and D, the Clapp, Mack, and Heritage approaches would not have signalization and consequently would have no improvement in conflict control.

All alternatives remove short trips from the Parks Highway and KGB Road, both designated as safety corridors. Removal of trips from these facilities with safety issues by providing alternative circulation should improve the overall safety of the area.

System Benefits

All alternatives would reduce volumes on many of the close-proximity segments of the Parks and KGB arterials by providing another north-south corridor that improves connection and continuity, and by reducing arterial use for short inter- and intra-neighborhood trips. Alternative A would reduce volumes by about 5% overall. Alternative B would reduce arterial volume about 9% overall. Alternative C reduces overall segment trips by about 7%. Overall reduction by Alternative D for the nearby arterial segments is about 5%.

Pedestrian and Bicycle Facilities

All alternatives would include a minimum 4-foot shoulder which provides a bicycle lane in each direction of travel, typically used by utilitarian and advanced cyclists. Pathways on both sides of the roadway are desirable for pedestrians and bicycles (recreational riders), and one should be provided at a minimum. AASHTO's *Guide for the Development of Bicycle Facilities* suggests that a multi-use, (shared-use) pathway minimum width is 8 feet, and desirable width is 10 feet. A graded 2-foot width shoulder should be provided beyond the edge of the path.

There are no designated pedestrian crossings along the corridor, and therefore crosswalks are not anticipated. However, at a minimum each local street intersection is a potential crossing point, especially if there is only one pathway on one side of the road. At these locations, stopping sight distance (SSD) must be provided. If possible, the sight distance should be increased to satisfy pedestrian sight distance (PSD). The following table presents PSD and SSD for the range of design speeds that might be applied to this project.

Design Speed	PSD	SSD
25 MPH	230 ft.	155 ft.
30 MPH	277 ft.	200 ft.
35 MPH	323 ft.	250 ft.
40 MPH	369 ft.	305 ft.
45 MPH	415 ft.	360 ft.

Executive Summary Table B- PSD and SSD For Intersections and Other Potential Pedestrian Crossings

If there is a potential crossing with identifiable pedestrian crossing demand, then crossing treatments may have to be considered for some higher volume segments. North of Riley Road, AADT approaches are in the 9,000 to 10,000 range in the design year and peak hour volumes will around 900 to 1,000 vehicles per hour. With this volume of street traffic, delays for a pedestrian to cross 22 foot to 24 foot road way will be 28 to 42 seconds, a LOS of D to E. Generally these LOS levels are not desirable for locations where there is a low to moderate crossing demand. In such locations, some treatments such as warning signs or mid-road refuges may be desirable.

1 Introduction

This traffic analysis report addresses traffic engineering and transportation planning elements required for design of South Mack Drive Extension between Knik Goose Bay Road and the Curtis D. Menard Memorial Sports Center. South Mack Drive is a discontinuous roadway. There is a segment in place between the Parks Highway and Curtis D. Menard Memorial Sports Center, with a length of about 0.7 miles. A second segment extends to the north from Knik-Goose Bay Road for about 1 mile. There is about 0.3 miles between the existing ends of South Mack Drive. Mack Drive between the Parks Highway and Knik Goose Bay Road will be about 2 miles once the extension is completed. Additionally, Mack Drive forms the south leg of the Parks Highway, Church Road (north leg), and Mack Drive signalized intersection. The South extension will also provide a continuous 6 mile north south Mack-Church corridor, and has the potential of tying into Fairview Loop, thus extending the corridor further.

South Mack Drive is functionally classified as a major collector in the City of Wasilla Official Streets and Highways Plan. Its proposed position in the street system network fits well with the collector classification in that it provides a link between the local neighborhoods and the Curtis D. Menard Memorial Sports Center, and the Parks Highway and Knik Goose Bay Road/Fairview Loop arterials. It will provide improved intra-neighborhood connectivity, especially for those residential areas that abut or connect to the Mack-Church corridor; which reduces the number of trips that now must use the arterial system. Reassignment of intra-neighborhood trips from the arterials to Mack will reduce congestion at major arterial intersections, and reduce overall system vehicle miles travel.

In particular, the development of Mack Drive, as well as other Matanuska-Susitna Borough connectors and collectors, will remove substantial “short trip” volumes from the Parks Highway in the future. These “short trips” typically use this major arterial as the route between adjacent origin and destinations that have no other connection options. The trips impact overall capacity and mobility of facility because they require an allocation of capacity to serve the short trips, often resulting in extended signal times for left-turn movement onto