New Seward and 36th Avenue Intersection Conceptual Design

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CE A404
Highway Design

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Introduction:

In the State of Alaska, the Municipality of Anchorage is the most populated first class borough in the state. The State of Alaska Department of Transportation or the Municipality of Anchorage owns the highways, streets, and roads. The Municipality of Anchorage maintains all of the traffic signals.

Transportation within the city limits is an important part of the resident’s daily life and is vital to the Anchorage economy. Local residents, as well as commuters from the Mat-Su Valley, trucks carrying freight, and visitors, travel the network of roads within the Anchorage Bowl, to commute to work, recreation, shopping, school and personal business destinations. As shown in figure A below.

Figure A: Anchorage Residential Land Use, 1998 (Anchorage Bowl 2025 Long – Range Transportation Plan with 2027 Revisions)
The city is set up on a grid system with the New Seward Highway and Glenn Highway being the major freeway corridors north and south of the Anchorage Bowl. Passenger vehicles are the preferred method of transportation and comprise nearly 95 percent of the daily traffic including residents and commuters.

The intersection of New Seward Highway and 36th Avenue is located in midtown Anchorage and is a current source of congestion. The surrounding area consists of residential and business districts, two major universities, and two regional hospitals. One of the universities has a split campus with buildings on both sides the intersection. Business near the intersection consists of a hotel, an engineering company, a car dealer ship, some restaurants, and a bank. The residential area is located on the east side of the New Seward Highway. The Right-of-Way in this area is limited because of existing development. Although the universities and hospitals are not located directly on the intersection they constitute a significant portion of the attracted traffic uses at this intersection. With the variety of traffic generators and attractors this area is an essential part of Anchorage community.

North bound traffic on the New Seward Highway approaching the intersection drops in speed from 65 miles per hour to 55 miles per hour; south bound traffic on the New Seward Highway approaching the intersection at 45 miles per hour. 36th Avenue has a speed limit of 40 miles per hour. The New Seward Highway/36th Avenue intersection is the first signalized intersection going northbound on the highway. The intersection is at grade. The alignment is at an angle of 70 to 75 degrees instead of the preferred 90 degrees.

One block west of the New Seward Highway/36th Avenue intersection is a second signalized intersection at the Old Seward Highway and 36th Avenue that is located less than the recommended quarter-mile distance between signals. There is a public bus stop near the intersection of the New Seward Highway on 36th Avenue. Congestion from this intersection during evening peak hour traffic creates stop-and-go traffic, signal delays, and causes traffic headed east on 36th Avenue to back up. Drivers turning left from 36th Avenue, to head south on the New Seward Highway, spill over into the through lanes. This causes drivers to perform improper lane changes. Drivers that are distracted or traveling at unsafe speeds can cause accidents. With an increase in traffic accidents there is an increase in delay. This intersection in the year 2003 had the third largest number of accidents in the Anchorage area. Delay costs money in gas and employee time for freight and businesses, causes longer public transportation times, and contributes to air pollution.

This project examines the current traffic conditions of this intersection and proposes a conceptual design of this intersection by analyzing short-term and long-term alternatives. The purpose of this analysis is to raise the level of service, design a safer intersection, and one that is more pedestrian and bike friendly.
1.1 Introduction

The conceptual design is focused on the New Seward Highway and 36th Avenue intersection. In traveling this intersection during the evening peak hour there is noticeable delay of the left turn lanes on 36th Avenue going onto the southbound New Seward Highway. The spillover from the vehicles turning left from 36th Avenue goes into the through lanes creating stop and go traffic. Significant congestion exists on eastbound through lanes that cause traffic to back into the intersection of Old Seward Highway and 36th Avenue. The alignment of the intersection is not at a 90-degree angle; the intersection on Old Seward Highway is close, and three different speed limits are coming into the intersection. Please see overview map of Anchorage figure 1-1.

Figure 1-1: Overview Map of Anchorage (Google Earth Map)
TRAFFIC SYSTEMS MANAGEMENT ANALYSIS

2.1 Introduction

The traffic systems management analysis will look at short-term alternatives, with a design life of five years with an annual growth rate of traffic of 2%. This analysis will include changing of the geometry and traffic signal system. The alternatives will consist of changing the single phasing, the addition of lanes, and lifting one left turn from each side of the intersection and utilizing the other left turn lane as an additional through lane. Some of these alternatives could be implemented until a long-term solution can is completed. The anticipated outcome of this analysis is for a higher level of service for this intersection for a design life of five years.

The Grade Separated

3.1 Introduction

The last alternative in the conceptual design is a grade-separated intersection. The separation will utilize a depressed highway design for the New Seward Highway. This will improve the Anchorage traffic network by relived the congestion and remove the thought traffic from the New Seward off of 36th Avenue. The will increase the capacity of this intersection as well as the surrounding intersections. The midtown area has several business and two universities. The intersection is vital to the area; two hospitals with emergency rooms are located off of 36th Avenue and need to have the emergency vehicles able to reach them swiftly.

A depressed interaction was considered because of the Plan Recommendations for the Highway-to-Highway connection in the Anchorage Bowl 2025 Long-Range Transportation Plan with Revisions for 2027 (LTRP). The LTRP’s Highway-to-Highway is the connection of the New Seward Highway from the south and the Glenn Highway from the north. Currently a major arterial road connects the two highways. This connection will improve the capacity of the Anchorage network of transportation.
3.4 Conclusion

In the Analysis of this alternative there is a significant improvement on the LOST of the intersection. By removing the New Seward Highway’s through traffic the safety is greatly improved. The traffic systems management analysis produced short-term alternative, which after 5 years returned to the current conditions. The grade separated intersections the only alternative to improve this intersection.

With the alternatives produced the traffic systems management analysis the raised left turns will improve the LOS for a short period of time, however taking into consideration the cost of design and construction for the turns it is not a feasible alternative. Until the grade separated intersection can be installed emplaning the addition of lanes and traffic signal phasing changes could be used to relieve some of the delay.

3.5 Recommendations:

In consideration this design is conceptual design environmental, geotechnical, social and economical studies. Other studies of a design of roundabouts on the two intersection of the grade separated design and traffic flow studies would also be recommend. The design of guardrails and landscaping for the opened area between the 36th Avenue and the U-Turns on the grade separated alternative to keep drivers from aborting the U-Turns. The New Seward Highway should conform to the Standards of design and construction set forth by The State of Alaska’s Department of Transportation. The development of 36th Avenue should comply with the Municipality of Anchorage Specification of Standards and AASHTO.
Figure 1: Schematic Map for Lifting The Left Turn on 36th Ave. and Adding One Through Traffic Lane

Design Considerations

- Design Speed on Ramp: 25 mph
- Superelevation: 0.08
- Slope of the Ramp: 7%
- Coefficient of Friction: 0.16
- Overhead Clearance Height: 14'
- Beginning and Ending Ramp Lane Width: 17'
- Top of Ramp Lane Width: 15'
- Ramp Shoulder Width: 2'
- Critical Vehicle is a bus with length 35-40'
- Acceleration Runway for the Critical Design Vehicle: 1.0 in/ft

University of Alaska Anchorage
Conce('/ Conceptual Design For 36 Ave. & New Seward Highway

State: Alaska
Year: 2008
Scale: 1:50

Alternative #3
Lifting Left Turn Ramp And Adding One Through Traffic Lane

Distance Between Each Whistle Station: 25m

Note: DIMENSIONS ARE IN METRIC UNLESS OTHERWISE NOTED

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Figure 2: Lifting The Left Turn on 36th Ave. and Adding One Through Traffic Lane

University of Alaska Anchorage

Conceptual Design
For 36 Ave.
& New Seward Highway

State Alaska
Year 2008
Scale 1:50

Alternative #3
Lifting Left Turn Ramp And Adding One Through Traffic Lane

Note: DIMENSIONS ARE IN METRIC UNLESS OTHERWISE NOTED

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Figure 3: Schematic Map for The Grade Separated Intersection

Design Considerations

- Height of Overpass Clearance: 18'
- Slope of New Seward Highway South of Intersection: -2.0%
- Distance need to start slop from the Intersection: 270
- Slope of New Seward Highway North of Intersection: 0%

- Off ramps length: 235m
- On ramps length: 195m
Figure 4: The Grade Separated Intersection

Design Considerations

<table>
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<tr>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
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