August 2018
MOA PROJECT NO. 16-28
MUNICIPALITY OF ANCHORAGE
Project Management & Engineering Department

Draft Design Study Report

Midtown Corridor Improvements

Denali Street Area- Benson Blvd to Tudor Rd

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EXECUTIVE SUMMARY

The Municipality of Anchorage (MOA), Project Management and Engineering Department (PM&E), has retained R&M Consultants, Inc. (R&M) to study Denali Street (from Tudor Road to Benson Boulevard) and 36th Avenue (from A Street to Old Seward Highway) to develop recommendations to create safe corridors for non-motorized users, in order to expand transportation opportunities, promote livability and economic development, and enhance connectivity in midtown Anchorage.

The purpose of the Midtown Corridor Improvements project is to balance transportation improvements among bicyclists, pedestrians, and vehicles to determine feasible solutions for improving the area transportation network. This would expand transportation opportunities, promote livability and economic development, and enhance connectivity in Midtown Anchorage.

R&M implemented the MOA's Context Sensitive Solutions (CSS) process to proactively engage stakeholders in an effort to identify needs, analyze solutions, and present recommendations. The project team facilitated a total of ten separate meetings with stakeholders, including the public, businesses, community councils, MOA departments, utilities, and adjacent project teams. In addition, R&M conducted a limited Right-of-Way survey, utility conflict identification, and a traffic and safety analysis.

Throughout this process, the following major issues were identified:

- Both corridors lack dedicated bicycle facilities;
- Pedestrian facilities are narrow, not separated from the roadway, often obstructed by utilities, and not compliant with current accessibility guidelines;
- Pedestrians and bicyclists use the corridors for commuting to/from work, accessing civic destinations such as the ZJ Loussac Library or the Cuddy Family Midtown Park, and access to businesses;
- Future high density mixed use development along portions of Denali Street will create demand for non-motorized facilities;
- Three intersections and two segments exceed the respective critical crash rates;
- Speeding is evident along one segment of Denali Street;
- Both corridors lack sufficient temporary snow storage; and
- The traffic signal and illumination hardware is outdated.

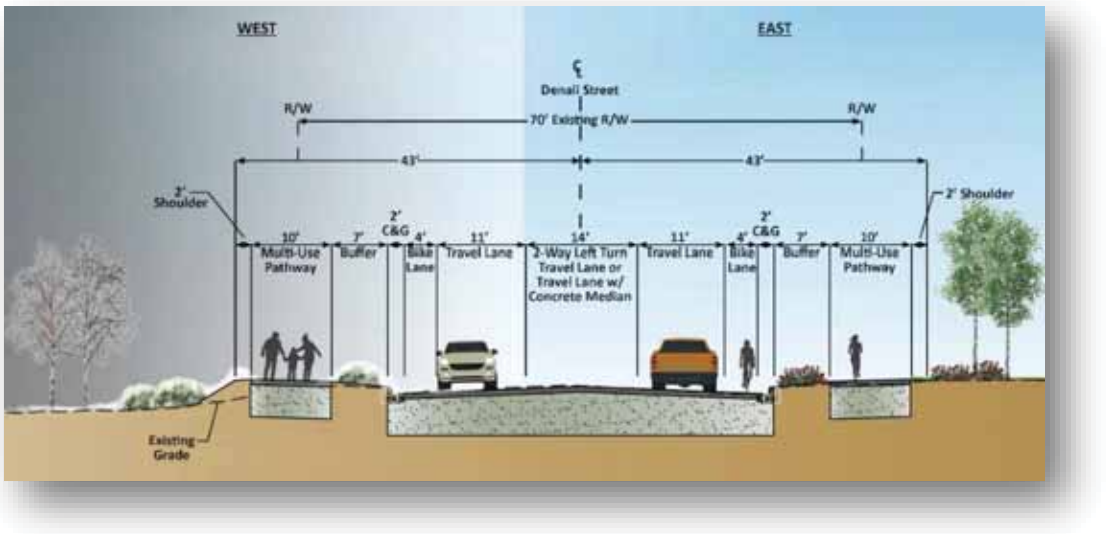
In addition to the issues identified above, the project team extended the study limits along Denali Street to Fireweed Avenue and along 36th Avenue to C Street in response to early agency and public stakeholder feedback regarding connectivity to area trails.

Following issues identification, alternatives were developed to address the purpose and need of the project. The corridors have distinct context and were divided into five segments, each of which was analyzed using two to three alternatives. Up to three alternatives were developed for each of the three main intersections. The following map shows the project limits, potential extensions, and segments/intersections that were

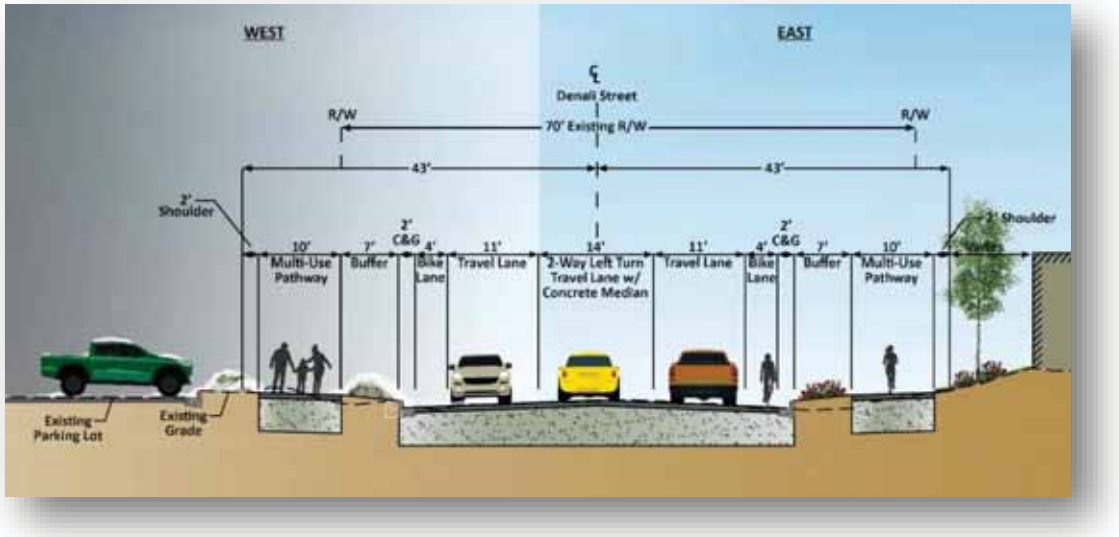
analyzed in greater detail. A separate but related PM&E project, *West 32nd Avenue and East 33rd Avenue Upgrades* (PM&E Project No. 16-29), is also shown on this project map for reference.

Project Area Map

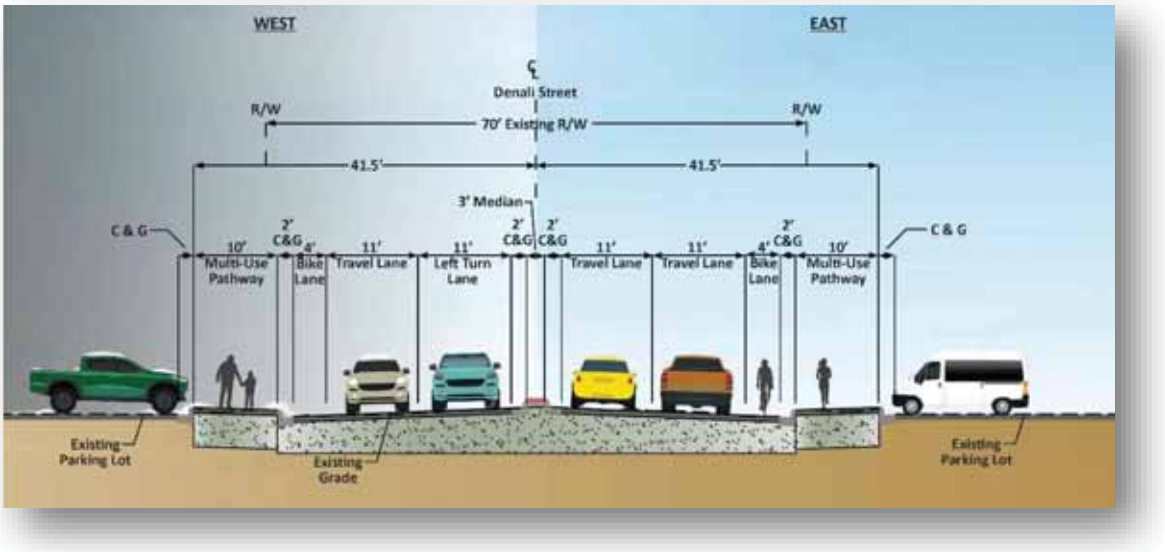
Three comprehensive alternatives were developed for Denali Street and two for 36th Avenue. These alternatives were presented to the public at the second open house held on April 12, 2018. Following the open house, the alternatives were evaluated using a set of benefit and impact criteria developed by the project team consistent with the purpose and need of the project, adopted plans and policies, as well as taking into consideration the stakeholder feedback received during the design study process. The recommended alternatives resulting from this process are shown below.



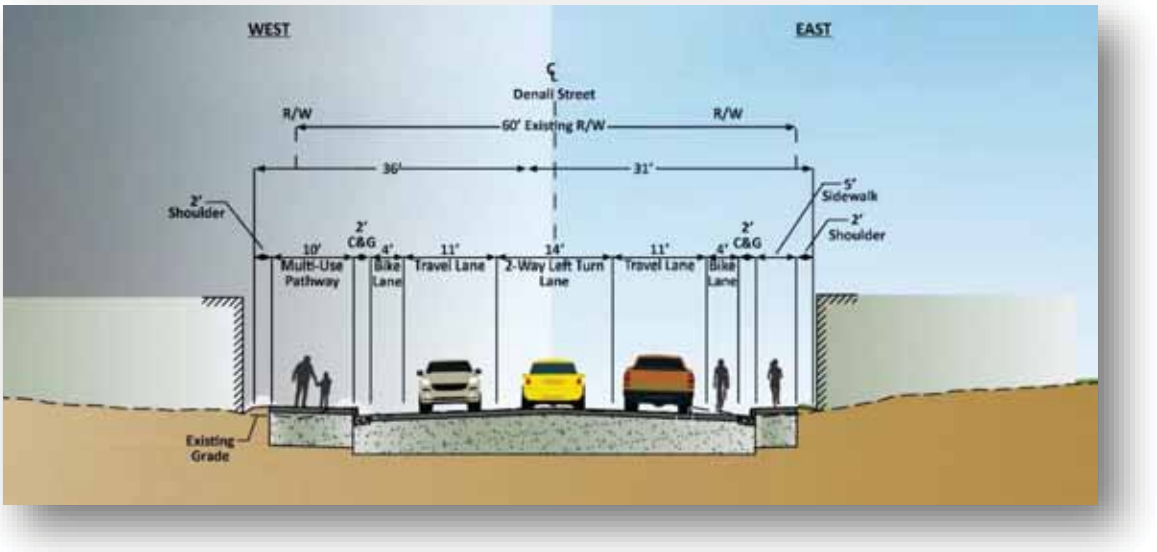
Denali Street: Tudor Road to 36th Avenue (Segment 1) - Recommended alternative



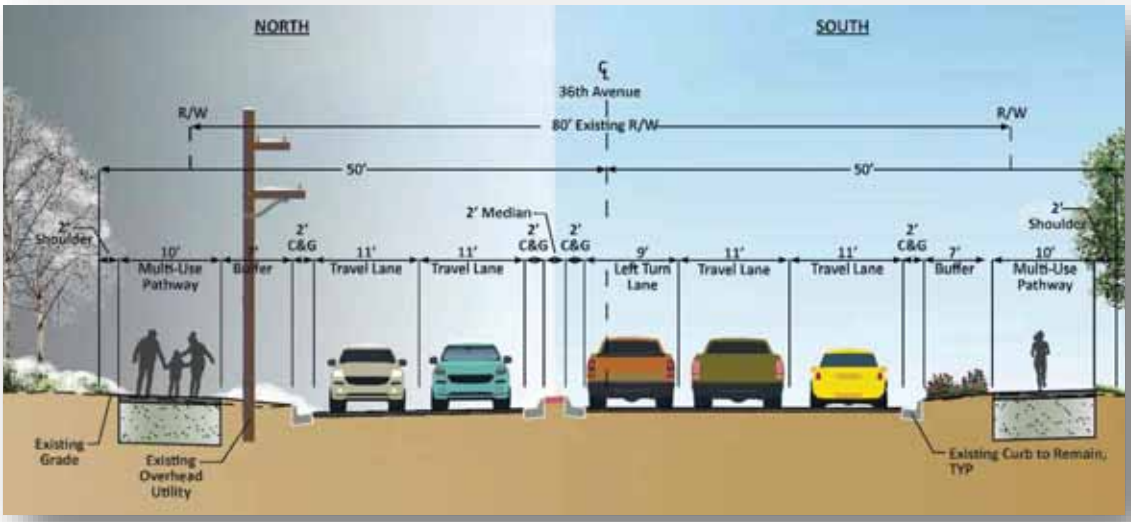
Denali Street: 36th Avenue to Benson Boulevard (Segment 2) – Recommended alternative



Denali Street: Benson Boulevard to Northern Lights Boulevard (Segment 3)
Recommended alternative



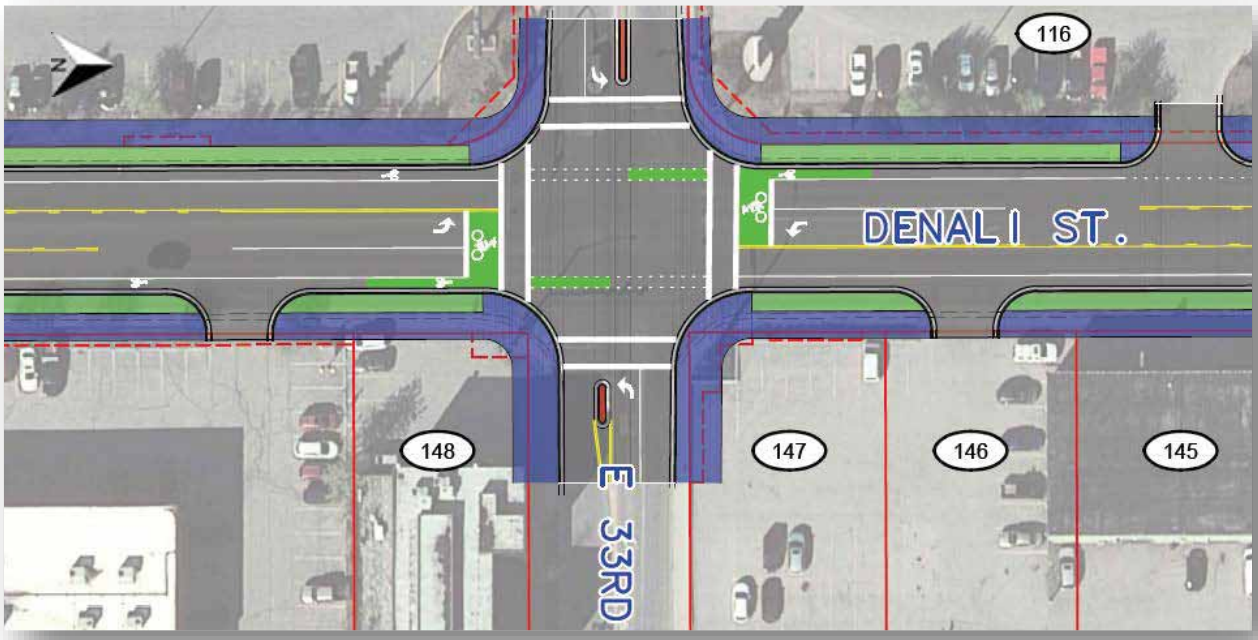
Denali Street: Northern Lights Boulevard to Fireweed Lane (Segment 4)
Recommended alternative



36th Avenue: C Street to Old Seward Highway (Segment 5) - Recommended alternative

Denali Street and 40th Avenue – Recommended intersection alternative

Denali Street and 36th Avenue – Recommended intersection alternative



Denali Street and 33th Avenue – Recommended intersection alternative

The recommended alternative cost estimate is summarized below. Included in the cost estimate are: construction, utility relocation, right-of-way acquisition, engineering, and contingencies.

CORRIDOR	ESTIMATED PROJECT COST
Denali Street Tudor Road to Fireweed Lane	$ 29,200,000
36th Avenue C Street to Old Seward Highway	$ 16,200,000
Total Estimated Project Cost	**$ 45,400,000**

Phasing the Denali Street improvements is recommended to prioritize segments with the greatest need/potential benefits, remain consistent with adopted plans and policies, and stay within the realm of available funding. An evaluation was conducted to determine the phasing sequence.

The Denali Street segments are recommended to be prioritized in the following order (from first priority to last priority, with respective estimated project costs):

PHASING PRIORITY	DENALI STREET SEGMENT	ESTIMATED SEGMENT COST
1	1 Tudor Road to 36th Avenue	$ 12,600,000
2	2 36th Avenue to Benson Boulevard	$ 9,300,000
3	4 Northern Lights Boulevard to Fireweed Lane	$ 4,500,000
4	3 Benson Boulevard to Northern Lights Boulevard	$ 2,800,000
Total		**$ 29,200,000**

The 36th Avenue improvements span a relatively short distance and is not recommended to be phased.

Current project funding is limited to the Draft DSR phase. Once additional funding becomes available, the pre-Final DSR will be presented to the Planning and Zoning Commission. Upon their approval (and depending on funding), the project will move into the detailed design phase. A timeline for this is yet to be determined.

NOTICE TO USERS

This report is intended to document the methodologies, findings, and conclusions of the pre-Draft Design Study Report for the Midtown Corridor Improvements, Denali Street Area – Benson Boulevard to Tudor Rd. project completed for the Municipality of Anchorage. Changes frequently occur during the evolution of the design process. Persons who may rely on information contained in this document should contact R&M Consultants, Inc. for the most current design decisions. Please contact Marc Frutiger at 907-646-9661 for this information or consult the project website at www.MidtownImprovementsDenali.com.

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LIST OF ACRONYMS

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway & Transportation Officials
ACS	Alaska Communications System
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Accessibility Guidelines
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AMATS	Anchorage Metropolitan Area Transportation Solutions
AMC	Anchorage Municipal Code
APDES	Alaska Pollutant Discharge Elimination System
ARDSA	Anchorage Road and Drainage Service Area
ASD	Anchorage School District
AWWU	Anchorage Water and Wastewater Utility
BMP	Best Management Practices
CAR	Crash Rate
CFR	Code of Federal Regulations
CGP	Construction General Permit
COE	Corps of Engineers
CSS	Context Sensitive Solutions
DCM	Design Criteria Manual
DIP	Ductile Iron Pipe
DOT&PF	Alaska Department of Transportation and Public Facilities
DSR	Design Study Report
ENSTAR	Enstar Natural Gas Company
F	Fahrenheit
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
ft	Feet
GCI	General Communication, Inc.
GSD	Greenway Support Development
HPS	High-Pressure Sodium
KE	Kinney Engineering, LLC

LED	Light Emitting Diode
LOA	Letter of Approval
LUPM	Anchorage 2040 Land Use Plan Map
LT	Left
kV	Kilovolt
LOS	Level of Service
M&O	Maintenance and Operations
MEV	Million Entering Vehicles
ML&P	Municipal Light and Power
mph	Miles Per Hour
MOA	Municipality of Anchorage
MUTCD	Manual of Uniform Traffic Control Devices
NACTO	National Association of City Transportation Officials
NEC	National Electric Code
OS&HP	Official Streets and Highway Plan
P&ZC	Planning and Zoning Commission
PCC	Portland Cement Concrete
PDO	Property Damage Only
PLI	Public Lands and Institutions
PM	Pacific Mountain
PM&E	Project Management & Engineering
PROWAG	Public Right of Way Accessibility Guidelines
PS&E	Plans, Specifications, and Estimate
R&M	R&M Consultants, Inc.
ROW, R/W	Right-of-Way
RT	Right
SCP	Safety Conscious Planning
Sec	Seconds
SF	Square Feet
Sta	Station (100 ft.)
SWPPP	Storm Water Pollution Protection Plan
TMV	Turning Movement Volumes
TORA	Transfer of Responsibility Agreement
TWLTL	Two-way left turn lane
UDC	Urban Design Commission
USACE	United States Army Corps of Engineers
USC	United States Code
USGS	United States Geological Survey
V	Volt
VZ	Vision Zero
W	Watt
WB	Wheel base
WMP	Wetland Management Plan

1.0 INTRODUCTION

1.1 General

The scope of this project is to design upgrades to Denali Street, from Benson Boulevard to Tudor Road and 36th Avenue, from A Street to the Old Seward Highway, to accommodate all users and transportation modes including but not limited to: pedestrians, bicyclists, transit riders, and motor vehicles.

1.2 Purpose

The Municipality of Anchorage (MOA) Project Management & Engineering Department (PM&E) is evaluating existing corridor conditions to identify obstacles to non-motorized and motorized travel. This project's goals are in compliance with and helps to implement the goals and policies of the adopted Anchorage Bowl Land Use Plan Map Update (LUPM Update), which encourages maximizing all modes of travel while enhancing connections between neighborhoods, employment, and commercial centers, to supporting successful growth. The Midtown Corridor Improvements project balances transportation improvements among bicyclist, pedestrian, and vehicles to determine feasible solutions for improving the area transportation network, which would expand transportation opportunities, promote livability, and enhance connectivity in Midtown Anchorage and beyond.

1.3 Project Needs

The scoping, concept, and design study phases identified specific needs to be addressed by this project. The project is evaluating the existing corridor conditions, defining problems that are obstacles to non-motorized and motorized travel and determining feasible solutions to improve the network.

OBJECTIVES

Denali Street	36th Avenue
Reallocate public ROW space for bicycles and pedestrians	Reduce intersection delay
Enhance the streetscape to promote walking and improve the pedestrian environment	Resurface the roadway and upgrade ADA facilities
Calm traffic to improve safety for all modes	Remove obstructions from the existing sidewalk
Maintain business accessibility, visibility and parking	Widen existing sidewalks for better connectivity to area pathways and trails
Provide adequate snow storage to facilitate seasonal maintenance	

1.4 Context Sensitive Solutions Summary/Project Goals

The design study phase, documented in this Design Study Report, evaluates the improvements to the roadway within the MOA's Context Sensitive Solutions (CSS) policy

framework, the Design Criteria Manual (DCM), the Official Streets and Highways Plan (OS&HP), Title 21 Land Use and Development Regulations and other adopted plans and policies to achieve these goals. The design study also considered the No Action Alternative. The CSS project development process will continue through the design phase and will include opportunities for stakeholders to participate, evaluate and provide input through open houses, the project website, emails, phone calls, user group and community council presentations.

The Midtown Corridor Improvements project is a context appropriate transportation project that aims to improve the facility while preserving and enhancing community and environmental quality and resources.

It will integrate a complete street typology to improve mobility and safety for all modes while reducing conflicts between motorized and non-motorized traffic. Expanding transportation options, promoting livability, improving maintainability, and complementing mixed-use development of the Denali Street corridor are established goals that will be addressed through the CSS process for this project. In addition, maintaining mobility, enhancing connectivity, improving maintainability, and extending the service life of 36th Avenue are objectives that may be added to the Midtown Corridor Improvements Project.

Figure 1: Project Area Map.

2.0 PROJECT HISTORY

The expansion of Anchorage from Downtown to Midtown occurred mainly during the 1970's and 1980's as major shopping destinations and financial institutions settled in Midtown. Located in the heart of Midtown Anchorage, Denali Street and 36th Avenue are the primary connections to two civic destinations, the Loussac Library and Cuddy Family Midtown Park. Denali Street begins at Tudor Road to the south and terminates at Fireweed Lane within this Midtown section. Denali Street, from 36th Avenue to 40th Avenue, was originally constructed in 1983 and was extended south to Tudor Road from 40th Avenue in 1998. In 2003, Denali Street was rehabilitated between 40th Avenue and Fireweed Lane. The segment of 36th Avenue from C Street to Old Seward Highway was last reconstructed in the mid 2000's and is the primary connection from the Loussac Library to the Seward Highway, the main North-South highway in Anchorage.

$750,000 in funding from Anchorage Roads and Drainage Service Area (ARDSA) bond funds was allocated in 2017 for this project to initiate community engagement, planning and preliminary design. Additional funding will be necessary to complete the design study, and detailed engineering. Construction funding is anticipated to be included as part of future ARDSA bonds.

There is an adjacent Alaska Department of Transportation and Public Facilities (DOT&PF) project, Midtown Congestion Relief, which is evaluating alternatives for the New Seward Highway and 36th Avenue intersection. It is unknown at this time how this DOT&PF project will affect Denali Street or 36th Avenue. Coordination with DOT&PF commenced with the agency scoping meeting in 2017 and will continue as both projects progress.

2.1 Potential Project Extensions

The project's current scope is limited to Denali Road from Tudor Road to Benson Boulevard and 36th Avenue from A Street to Old Seward Highway. Early feedback from stakeholders encouraged the consideration of project extensions, as shown on Figure 1. These extensions would provide for connectivity to surrounding pathways and trails, a topic discussed in greater detail later in this report. It is unknown at this time whether these extensions will be amended to the scope of this project, however this report considers their inclusion.

2.2 W 32nd and E 33rd Avenue Upgrades Project Coordination

Coordination with the adjacent W 32nd and E 33rd Avenue Upgrades project is ongoing. This project overlaps the W 32nd and E 33rd Avenue Upgrades project at the Denali Street and Calais Drive/E 33rd Avenue intersection. This intersection will be included as part of the Midtown Corridor Improvements project. More information can be found at http://www.32nd33rdupgrades.com/.

3.0 EXISTING CONDITIONS

3.1 Facility Description, Context, and Setting

The Midtown Corridor Improvements project includes Denali Street, a north-south roadway from Benson Boulevard to Tudor Road, and 36th Avenue, an east-west roadway from A Street to Old Seward Hwy. The project corridor is primarily adjacent to B-3 General Business District zoned land, with Public Lands and Institutions (PLI) and R-3 Mixed Residential zoned land south of 36th Avenue (see Figure 5 Project Area and Land Use Context). Access to this dense urban commercial corridor has been designed primarily for motorized vehicles. Non-motorized users traverse the corridor using narrow sidewalks that are often obstructed by utility facilities or snow storage in the winter months.

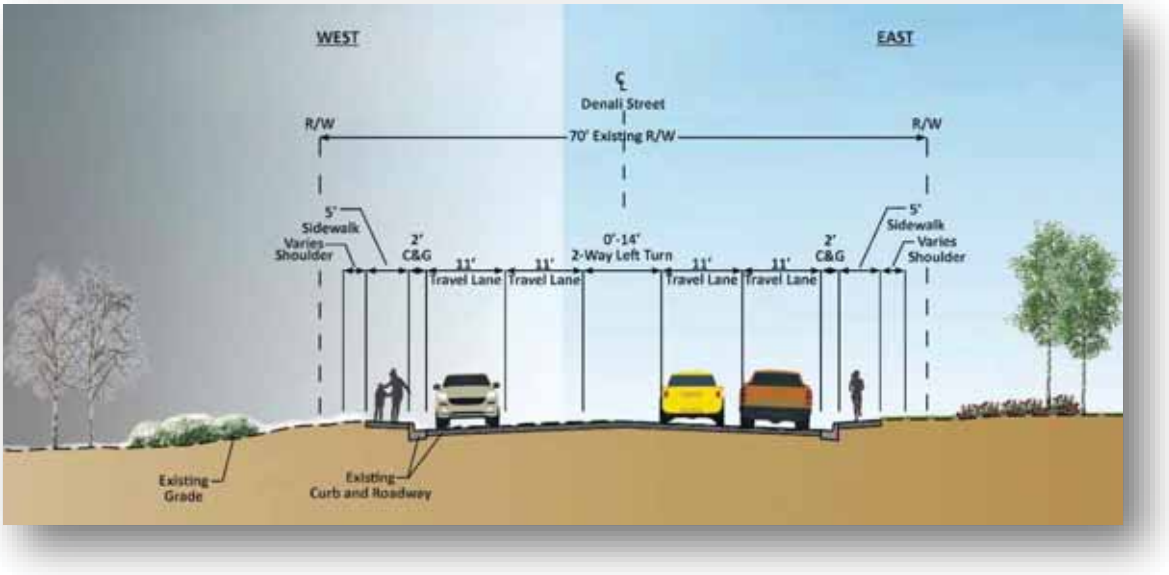


Figure 2: Denali Street Existing Conditions

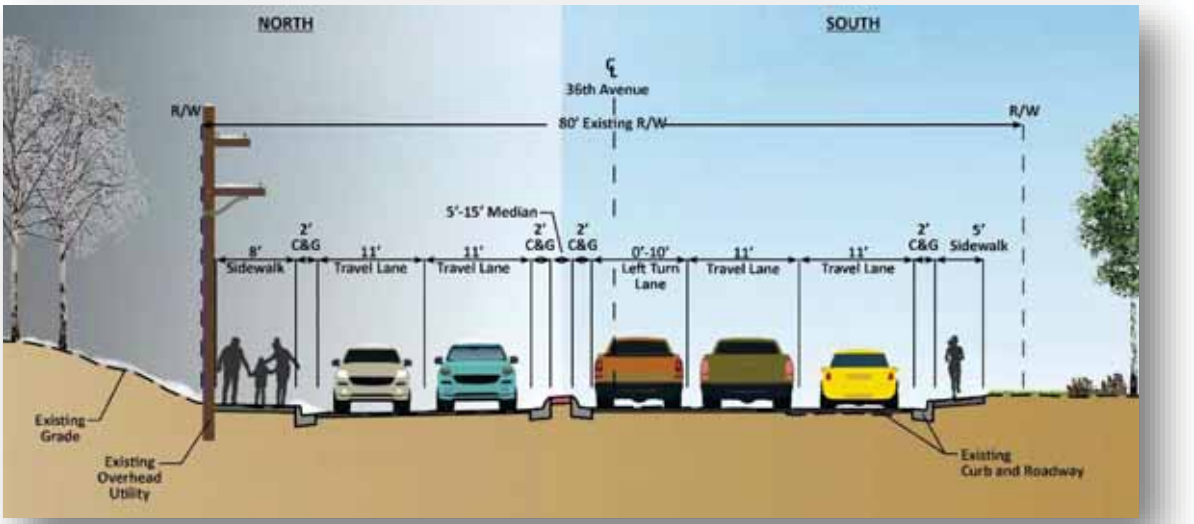


Figure 3: 36th Avenue Existing Conditions

3.2 Land Use and Area Context

Land use in the project area is predominately commercial, along with park and civic use. Outside of the project boundaries, residential areas are primarily south of Tudor Road and northwest of the project corridor and to the east, separated by the Seward Highway.

The 2040 Land Use Plan Map designates the project area to develop into a City Center to include a future mixed use high density residential development on Denali Street near 40th Avenue to balance the existing commercial environment. Revitalizing the public infrastructure for increased accessibility will encourage more public use of the corridor and its public spaces, as well as private investment in properties in the project area.

The Loussac Library and Cuddy Family Midtown Park are two civic destinations accessible from Denali Street and 36th Avenue. These destinations contribute to the character of the area and are major community assets. To further capitalize on these designations, area roadways need to complement and support the expected mix of users and move towards a complete streets typology.

Figure 4: Loussac Library as seen from Denali Street

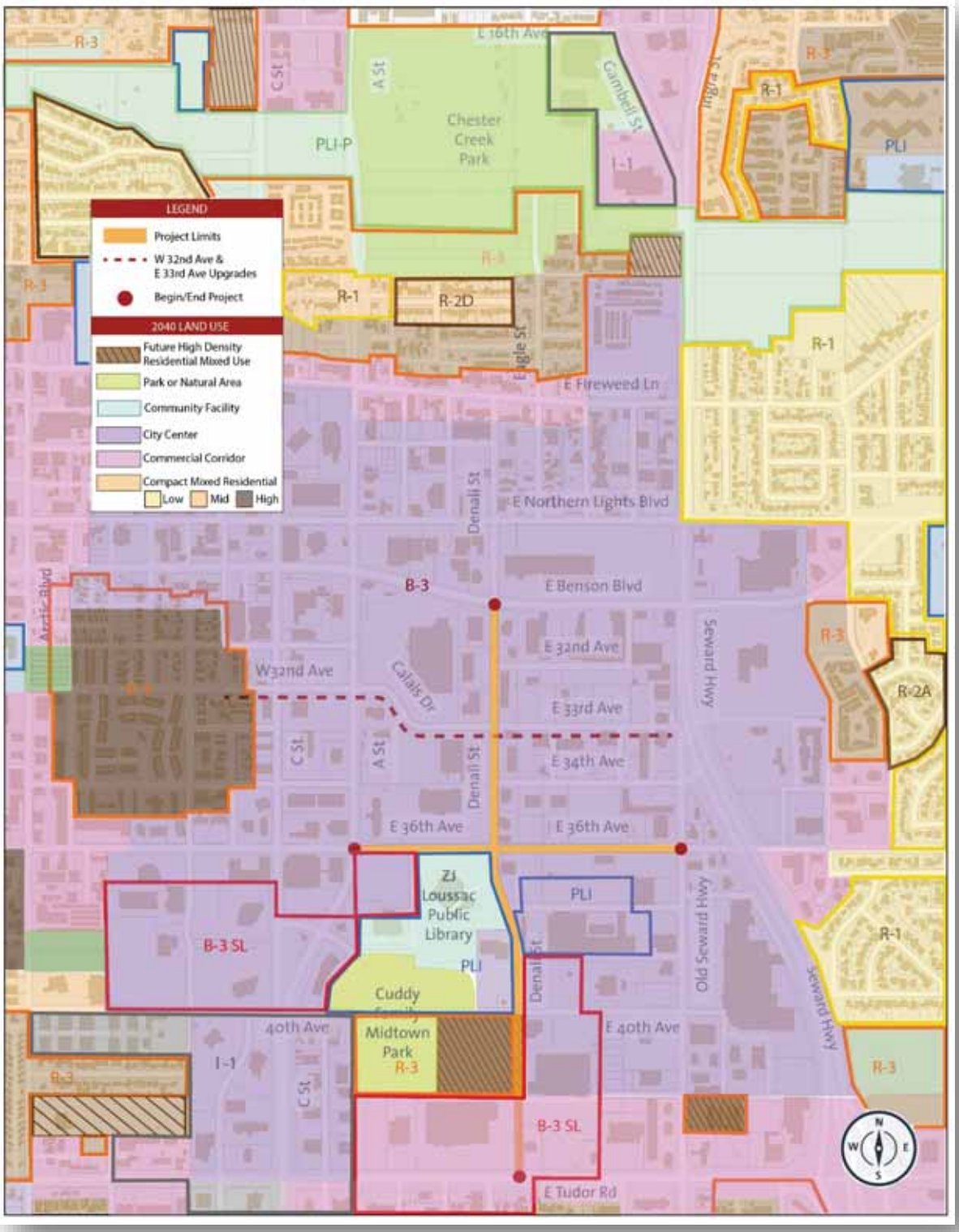


Figure 5: Project Area and Land Use Context

3.3 Traffic Conditions

Kinney Engineering, LLC (KE) completed a Complete Streets Analysis in February 2018. The analysis is summarized below and the full version is included in Appendix C.

3.3.1 Existing Traffic Volumes

Denali Street and 36th Avenue are both classified as Class II minor arterial roads by the MOA OS&HP. According to Chapter 1 of the MOA's Design Criteria Manual (DCM), a minor arterial moves traffic parallel to and connects traffic to major arterials, and connects major arterials to lower classification roadways. In general, minor arterial roadways carry between 10,000 and 20,000 vehicles a day. The only study area segments carrying volumes lower than this are Denali Street between Fireweed Lane and Northern Lights Boulevard and Denali Street between 40th Avenue and Tudor Road.

Overall, Average Annual Daily Traffic (AADT) on Denali Street has been decreasing over the last 10 years. Between 2005 and 2013, overall traffic numbers along 36th Avenue decreased before a slight increase in volume was observed in 2014. Traffic on Denali Street decreased by approximately 1.9% a year and traffic on 36th Avenue decreased by approximately 2.3% per year. Table 1 shows the existing year AADTs and the design 2045 AADTs which were back calculated using the design Turning Movement Volumes (TMVs).

Table 1: Denali Street and 36th Avenue AADT Volumes

SEGMENT	AADT (2013)	AADT (2045)
Denali Street: Tudor Road to 36th Avenue	8,260 to 9,639	13,895 to 15,087
Denali Street: 36th Avenue to Benson Boulevard	11,934 to 12,230	17,612 to 17,963
Denali Street: Benson Boulevard to Northern Lights Boulevard	10,351	14,051
Denali Street: Northern Lights Boulevard to Fireweed Lane	3,699	4,937
36th Avenue: C Street to Denali Street	15,	19,166 to 23,891
36th Avenue: Denali Street to Old Seward Highway	15,298	21,042

3.3.2 Speed Data

Speed studies were performed at five locations within the study area. At each location, speed data was collected separately for traffic traveling different directions. Two performance metrics were analyzed for each location: the pace and the 85th percentile speed. The pace is the 10-mph range in which the largest proportion of traffic travels. The 85th percentile speed is the speed 85 percent of drivers travel at or below, or, conversely, the speed 15 percent of drivers exceed.

The speed studies show that speeds on 36th Avenue are generally consistent with the 40-mph speed limit. However, on Denali Street the 85th percentile speeds often exceed the posted speed limit of 35 mph. The largest discrepancy (6 mph) between 85th percentile speed and speed limit was observed between 40th Avenue and Tudor Road in the northbound direction.

Table 2: Denali Street and 36th Avenue Speed Data Summary

SEGMENT	NORTHBOUND 10 MPH PACE	NORTH-BOUND 85TH % SPEED (MPH)	SOUTH-BOUND 10 MPH PACE	SOUTH-BOUND 85TH % SPEED (MPH)	POSTED SPEED (MPH)
Denali Street: 36th Avenue to Benson Boulevard.	32 to 41 mph	38	31 to 40 mph	39	35
Denali Street: At Communications Avenue	29 to 38 mph	36	31 to 40 mph	35	35
Denali Street: 40th Avenue to Tudor Road	32 to 41 mph	41	31 to 40 mph	39	35

Table 3: 36th Avenue Speed Data Summary

SEGMENT	EASTBOUND 10 MPH PACE	EAST-BOUND 85TH % SPEED (MPH)	WEST-BOUND 10 MPH PACE	WEST-BOUND 85TH % SPEED (MPH)	POSTED SPEED (MPH)
36th Avenue: At Loussac Library	32 to 41 mph	39	32 to 40 mph	38	40
36th Avenue: At McDonald's	34 to 43 mph	41	34 to 43 mph	42	40

In its *Guide for the Development of Bicycle Facilities*, AASHTO considers roadway design speed when selecting a bikeway type. In place of design speed, the greater of posted speed limit and observed 85th percentile speed can be considered when selecting a bicycle facility type. Based solely upon adjacent vehicle speed, either shared lanes with a wide outside lane or a bicycle lane would be an appropriate treatment for both Denali Street and 36th Avenue.

3.3.3 Crash Rates

Crash data for the area bounded by Northern Lights on the north, C Street on the west, Tudor Road on the south, and Old Seward Highway on the east were collected from the DOT&PF for the 4-year period from 2010 to 2014. Based on statewide averages, crashes involving bicycles, pedestrians, and parked cars, as well as rear ends, right angles, and

sideswipes are statistically significant in the study area. Overall, crashes within the study area were somewhat more severe than the average rates seen for crashes throughout the state with minor injury crashes within the study area being over-represented. Two fatal crashes occurred in the study area: one pedestrian crash on Denali Street between Northern Lights Boulevard and Benson Boulevard, and one right angle crash at the intersection of 40th Avenue and Denali Street.

Comparing the crash rate of the intersection or segment being studied to the DOT&PF average crash rate is one assessment of facility performance; however, facilities with higher than average rates are not necessarily significant problems. A calculated critical crash rate (CAR) is the threshold of concern. The CAR indicates the likelihood that the crash rate is above average due to characteristics of the location, and not purely by chance.

Sites identified as exceeding the CAR are most likely to realize a reduction in crash rates through the implementation of countermeasures. Improving safety is an objective of this project. Therefore, the sites identified below will be studied in greater detail to identify the crash characteristics and appropriate countermeasures.

Table 4 shows the results of the intersection crash rate analysis. At intersections, crash rates are calculated in terms of crashes per million entering vehicles. Three intersections have intersection crash rates that exceed the CAR: 36th Avenue at C Street, Denali Street at Benson Boulevard, and Denali Street at 40th Avenue.

Table 5 summarizes the results of the crash analysis for segments. Two segments with crash rates above the CAR were identified: Denali Street from Northern Lights Boulevard to Benson Boulevard and Denali Street from 40th Avenue to Tudor Road. A fatal accident and incapacitating injury accident occurred on these two segments, respectively.

Table 6 summarizes the crashes by type and severity. Two fatal crashes were recorded in the study area. A fatal crash involving a pedestrian occurred on Denali Street between Northern Lights Boulevard and Benson Boulevard in March 2012. A northbound vehicle driving at night failed to see a pedestrian in dark clothing who was in the roadway. The pedestrian was struck and killed. The second fatal crash occurred in October 2014 at the intersection of Denali Street and 40th Avenue. A westbound vehicle failed to stop at the stop sign, striking a northbound vehicle in the intersection. A passenger in the northbound vehicle perished.

Table 4: Intersection Crash Rates 2010 - 2014

INTERSECTION	NUMBER OF CRASHES	CRASH RATE (MEV)	STATE AVERAGE CRASH RATE (MEV)	ABOVE STATE AVERAGE?	ABOVE CAR?
Denali Street/Northern Lights Boulevard.	50	0.93	1.01	No	No
Denali Street/Benson Boulevard.	85	1.37	1.01	Yes	Yes
Denali Street/32nd Avenue	12	0.46	0.57	No	No
Denali Street/Calais Drive	26	1.03	1.47	No	No
Denali Street/34th Avenue	20	0.81	0.57	Yes	No
Denali Street/36th Avenue	74	1.42	1.47	No	No
Denali Street/Telephone Avenue	12	0.57	0.47	Yes	No
Denali Street/40th Avenue	30	1.74	0.57	Yes	Yes
Denali Street/Tudor Road	49	0.63	1.01	No	No
36th Avenue/C Street	76	1.28	1.01	Yes	Yes
36th Avenue/A Street	78	0.99	1.01	No	No
36th Avenue/Barrow Street	15	0.34	0.57	No	No
36th Avenue/Old Seward Highway	72	1.37	1.47	No	No

Xx Crash rate above State Average
Xx Crash rate above State Average and CAR

Table 5: Segment Crash Rates 2010-2014

SEGMENT	NUMBER OF CRASHES	CRASH RATE (MEV)	STATE AVERAGE CRASH RATE (MEV)	ABOVE STATE AVERAGE?	ABOVE CAR?
Denali Street: Northern Lights Boulevard to Benson Boulevard.	7	3.03	1.25	Yes	Yes
Denali Street: Benson Boulevard to Calais Drive	3	0.73	0.73	No	No
Denali Street: Calais Drive to 36th Avenue	4	0.95	0.95	No	No
Denali Street: 36th Avenue to Telephone Avenue	2	1.16	1.25	No	No
Denali Street: Telephone Avenue to 40th Avenue	1	0.42	1.25	No	No
Denali Street: 40th Avenue to Tudor Road	16	4.48	1.9	Yes	Yes
36th Avenue: C Street to A Street	2	0.61	1.25	No	No
36th Avenue: A Street to Denali Street	5	0.68	1.25	No	No
36th Avenue: Denali Street to Old Seward Highway	6	0.58	1.25	No	No

Xx Crash rate above State Average and CAR

Table 6: Summary of Crashes by Severity 2010-2014

ACCIDENT TYPE	PDO	MAJOR	MINOR	FATAL	TOTAL
Bicycle	2	2	11	0	15
Head On / Left Turn	56	1	31	0	88
Pedestrian	1	4	12	1	18
Rear End / Backing	151	3	57	0	211
Right Angle	109	6	92	1	208
Sideswipe	64	0	15	0	79
Struck Object	23	0	2	0	25
Unknown	1	0	0	0	1
Total	407	16	220	2	645

Figure 6 summarizes volume data and intersections/segments exhibiting above average/critical crash rates within the project area. See the Complete Streets Analysis in Appendix C for more detailed descriptions of the data depicted in Figure 6.

Figure 6: Traffic Data

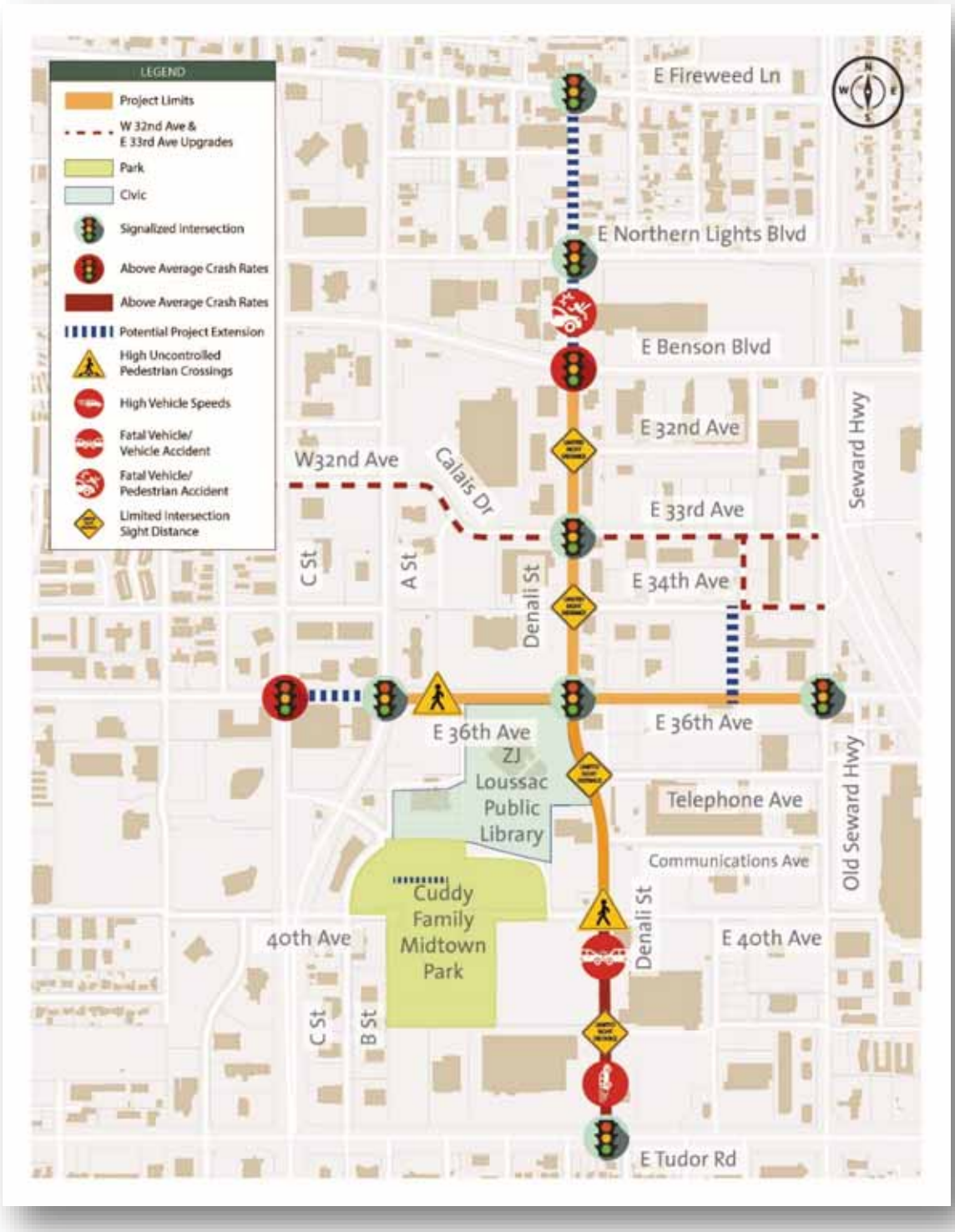


Figure 7: Traffic Safety

3.3.4 Intersection Turning Movements

Combined pedestrian and cyclist counts were collected as part of turning movement (TMVs) at intersections within the project area. Time periods for data collection include the weekday morning, midday, and evening peak periods. In addition, pedestrian and cyclist behavior was observed traveling along the corridor and crossing at both intersections and mid-block locations. These observations were performed on Wednesday, July 13, 2017 and Thursday, July 14, 2017 for about an hour between 11:45 AM and 6:00 PM at every segment. Movements were identified for pedestrians, bicycles, and motorized vehicles. Detailed information can be found in Appendix C.

The observations of behavior indicated that most non-motorized users are traveling along 36th Avenue and Denali Street and cross the street at signalized intersections. Some were observed crossing at unsignalized intersections or mid-block. The highest non-motorized user volumes were observed on the outer edges of the corridor (at the A / C and the Northern Lights / Benson couplets); nevertheless, a significant number of pedestrians were observed crossing at the intersection of Denali Street and 36th Avenue.

The highest number of observed pedestrian and cyclist crossings at unsignalized intersections occurred during the PM peak hour. At the intersection of 36th Avenue and Barrow Street, 25 non-motorized users crossed the major street (36th Avenue) in the PM peak hour. At the intersection of Denali Street and 40th Avenue, 20 non-motorized users crossed Denali Street. At all other unsignalized crossings, hourly pedestrian volumes are 20 pedestrians or less per hour.

Figure 8: Pedestrians crossing 36th Avenue at Barrow Street

3.3.5 Crossing Gaps

To more accurately characterize pedestrian activity in the study area, gap studies were conducted during the midday and PM peak hour at the two unsignalized locations where the highest number of crossing pedestrians were observed: the intersections of 36th Avenue and Barrow Street and Denali Street and 40th Avenue. The analysis found that if pedestrians walk at 6.0 ft/sec, Denali and 40th has an acceptable number of gaps per minute. However, if pedestrians walk at 3.5 ft/sec, the gap study confirms that the pedestrian level of service (LOS) falls to F. In other words, able bodied walkers are able to easily navigate the intersection, but other users would likely have a difficult time making a safe crossing. See Appendix C for more information regarding pedestrian crossing gaps.

3.4 Existing Right-Of-Way

The existing Right of Way (ROW) width varies considerably along Denali Street and 36th Avenue. On Denali Street between Tudor Road and Benson Boulevard, the ROW width varies between 70' and 82'. Between Benson Boulevard and Northern Lights Boulevard, the ROW width varies from 71' to 73'. Between Northern Lights Boulevard and Fireweed Lane, the ROW width varies from 60' to 71'. On 36th Avenue between A Street and Denali Street, the ROW width varies between 80' and 95'. Between Denali Street and Old Seward Highway, the ROW width varies from 71.5' to 90'. Various easements exist along both corridors, mainly for utilities with several public use easements at intersections.

3.5 Parking

On-street parking does not exist along Denali Street or 36th Avenue and is prohibited per the DCM (Chapter 1, Table 1-3). There is, however, ample off-street parking associated with the various commercial establishments. In some cases the off-street parking is immediately behind the existing sidewalk without a physical separation. Many of the commercial driveways are configured using curb cuts instead of curb returns, as is required by the current DCM (Chapter 1, Appendix D, 2.b).

Figure 9: Parallel parking behind sidewalk

3.6 Landscaping

Both Denali Street and 36th Avenue are characterized by existing commercial development on a mixture of lot sizes that are mostly developed. Zoning is B-3 with the exception of Midtown Park/Loussac Library and three parcels across Denali which are zoned PLI. One partially developed lot on the southwest corner of 40th and Denali is zoned R-3. B-3 zoning has created a landscape/urban pattern whereby landscaping typically includes narrow, linear plantings that are located between the sidewalk and parking lots. The Loussac Library site and Alaska Communications to the south are public or quasi-public facilities where landscaping and open space are more substantial. A site specific detailed analysis of landscaping and urban amenities was performed in January of 2018 and is summarized below.

3.6.1 Denali Street Urban Amenities

Between East Northern Lights Boulevard and Benson Boulevard landscaping consists of a short, decorative, precast sectional concrete wall that typically follows the back of sidewalk. Several sections of wall include mountain landscape images using relief in the concrete. These sections also include narrow downcast light fixtures mounted just below the top reveal intended to light the relief image. Lights are not currently functioning. Two transit stops, one on each side of the road provide a break in the linear character of the wall. The stops create an urban character with the placement of a shelter, benches, trash bin, and planter box. Plantings are limited in this block and include two planting areas, which contain a small evergreen and several deciduous trees and shrubs.

Figure 10: Decorative landscaping wall along Denali Street

From Benson Boulevard to 36th Avenue there are many newer commercial developments, which include landscaped areas between the sidewalk and adjacent parking lots. Landscaping includes trees and shrubs that help to screen parking lots and reduce the impact of vast areas of asphalt. In this section, a couple of older developments along the road lack landscaping likely due to the lack of a landscape ordinance at the time they were built. The short span of decorative concrete wall continues on the south side of Benson on the east side of Denali.

Denali from 36th Avenue to Tudor Road continues the similar landscape character of planting beds separating parking lots from sidewalks and the road. In addition, the Loussac Library and PLI-zoned lands on the east side of Denali between Telephone Avenue and East 40th have broader landscape areas including significant open spaces with manicured lawns and gentle topography in a park-like setting. The low decorative concrete wall is located on both sides of Denali in several segments up to Telephone Avenue.

3.6.2 36th Avenue

From A Street to Denali Street, 36th Avenue has a similar landscape character, that of long linear landscape beds that separate business parking lots from sidewalks and the road. Several older developments lack landscaping including businesses close to the Denali intersection and at least four businesses between the Old Seward and New Seward Highway.

Within the project area, trees and shrubs are generally young and include a mix of evergreen and deciduous trees. Green and Blue spruce are the predominant evergreen trees with some pine trees. Deciduous trees include Canada Red, birch, mountain ash, columnar aspen and cottonwood. Shrubs include cotoneaster, frequently used as a hedge, Siberian peashrub, rose, mugo pine, and amur maple among others. More mature vegetation, planted over 20 years ago includes plantings at the library and roadside areas between Telephone Avenue and East 40th. There are no naturally forested areas within the study area; however several parcels of vacant land include volunteer cottonwood, grasses and small herbaceous plants.

3.7 Drainage

The project is primarily located in a dense urban setting, with few undeveloped lots. The terrain in the immediate project area has very little relief. Tudor Road represents the high point along the Denali Street alignment and the majority of surface drainage is intercepted by catch basins along 40th Avenue, 36th Avenue, 34th Avenue, Calais Drive, Benson Boulevard, Northern Lights Boulevard, and Fireweed Lane. Along 36th Avenue, the low spot of the roadway is at the A Street intersection. The associated storm drain systems north of Northern Lights Boulevard route the runoff and outfall to Chester Creek. The storm drain systems south of Northern Lights Boulevard drain to the west and outfall to Fish Creek.

Fish Creek, the major drainageway in the project area, crosses Denali Street at 40th Avenue in a 48-inch to 60-inch diameter storm drain. Fish Creek was one of the first Anchorage creeks to be undergrounded to make way for the development of Midtown. Fish Creek is listed by State of Alaska Department of Environmental Conservation as an “impaired water” due to urban runoff. Figure 11 shows the alignment of the creek pre- and post-undergrounding, as well as the drainage subbasins and flow directions.

The recently adopted 2040 Land Use Plan identifies the Fish Creek corridor as having a potential for Greenway-supported development (GSD). Greenway-Supported Development (GSD) identifies where new development will incorporate natural open spaces, creek corridors, and pedestrian routes. GSD features are proposed in the Fish Creek drainage across Midtown, potentially from west of Minnesota Drive to east of Seward Highway, bringing Fish Creek to the surface with a parallel trail system. While the restoration of Fish Creek is beyond the scope of this study, it is worth noting that the MOA’s current land policy is responding to the urban trend of providing greenbelts along previously channelized or undergrounded creeks.

MOA Street Maintenance has indicated surface drainage issues on the east side of Denali between Northern Lights Boulevard and Fireweed Lane, as well as along Denali Street for one half block north of 36th Avenue. A utility as-built survey and conditional assessment of the existing storm drain facilities will be completed during a later phase. Therefore little is known about the condition of the existing storm drain system. For cost estimating purposes it is assumed that the entire system will be replaced.

Figure 11: Existing drainage patterns

3.8 Utilities

Multiple above ground and buried utilities are located within the project corridor. Even though the current scope of the project did not include a utility survey, utility company-supplied grid maps were used to compile schematic-type utility drawings. Subsequent phases of the project will include a comprehensive utility survey to more accurately identify existing utilities. Below is a description of each utility. See Appendix D for more details and utility drawings.

3.8.1 Water

AWWU owns and operates potable water mains along Denali Street from Tudor Road to Telephone Avenue and from 36th Avenue to Fireweed Lane. Along 36th Avenue, AWWU owns and operates potable water mains between A Street and Old Seward Highway. The Denali Street water main consists of 8 to 12 inches diameter Cast Iron and Ductile Iron Pipe (DIP). The 36th Avenue water main consists of 16" diameter Ductile Iron pipe installed in the 1970's. A total of 11 hydrants are located along Denali Street and 7 located along 36th Avenue within the project limits.

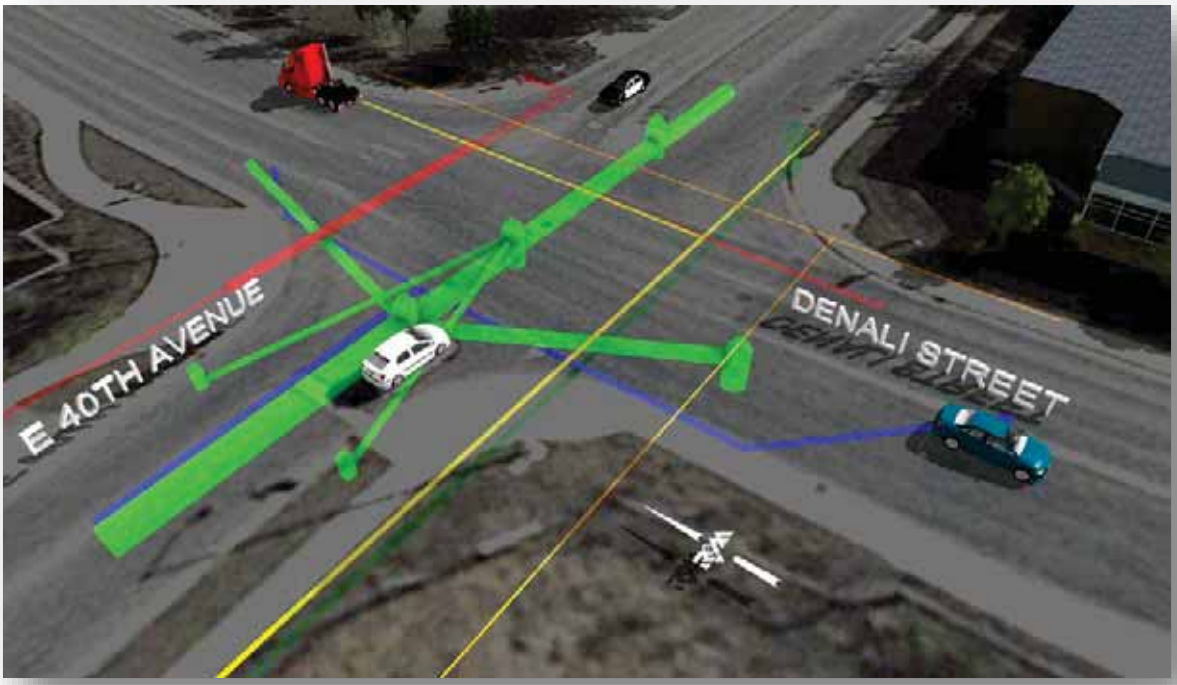


Figure 12: Existing underground utilities at Denali Street and East 40th Avenue

3.8.2 Sanitary Sewer

AWWU also owns and operates sanitary sewer mains along Denali Street from just north of Benson Boulevard to just south of 36th Avenue. There are other sanitary sewer lines along Denali Street north of Northern Lights Boulevard that are located in alleys or

easements along the back lot lines. The sanitary sewer crosses paths with the project at the Denali Street intersections at 34th Avenue, as well as at 40th Avenue. Between Benson Boulevard and 36th Avenue, the sanitary sewer varies from 8 to 14 inches AC pipe constructed in the late 1960's and early 1970's. At 34th Avenue, the 16-inch Asbestos Cement pipe was also installed in the 1960's and 1970's. Along 40th Avenue, a 16-inch DIP pipe was installed in the 1980's.

3.8.3 Natural Gas

Enstar Natural Gas Company (ENSTAR) owns and operates natural gas distribution lines throughout the project. From 40th Avenue, a 2-inch plastic pipe runs along the east side of Denali Street till leaving the road ROW at Telephone Avenue. A 2-inch steel pipe on Denali Street runs from just north of Benson Boulevard to 32nd Avenue before transitioning to 2-inch plastic pipe to 36th Avenue. A 1 ¼-inch steel pipe is present along Denali Street between Northern Lights and Fireweed Lane. Lastly, a 4-inch plastic pipe runs east-west along 36th Avenue within the project limits. A 6-inch steel pipe runs north-south along the west side of Old Seward Highway, which is likely a major gas main.

3.8.4 Electricity

Municipal Light & Power (ML&P) owns and operates underground and overhead conductors throughout the Denali Street and 36th Avenue project corridor. On Denali Street between Tudor Road and Communications Avenue, two parallel 12.47 Kilovolt (kV) lines are buried along the east side of the ROW. From Communications Avenue to Telephone Avenue, is one buried 12.47 kV line. From Telephone Avenue to the north side of 36th Avenue, three buried 12.47 kV lines, one 115 kV and one 12.47 kV overhead lines leave the Denali Street ROW and run within an electrical easement between the Denali FCU and Stewart Title buildings. Continuing north on Denali Street, one 12.47 kV line is buried on the west side of the ROW from 36th Avenue to north of Northern Lights Boulevard. Furthermore, the grid maps supplied by ML&P show spare conduits at many intersections as well as between Tudor Road to 40th Avenue.

Figure 13: ML&P overhead utility

On 36th Avenue between A Street and Denali Street, one 12.47 Kilovolt (kV) line is buried along the south side of the ROW. One overhead 12.5 kV and one overhead 115 kV line runs along the north side of 36th Avenue between A Street and Denali Street. Continuing east, one overhead 12.47 kV line extends from Denali Street to an undeveloped lot just west of the McDonalds. The 12.47kV line transitions from overhead to buried and extends east past the Old Seward Highway. A 115 kV overhead line running on the west side of the Old Seward highway crosses 36th Avenue. Grid maps supplied by ML&P show spare conduits

at the C Street, Denali Street and Old Seward Highway intersections as well as between the undeveloped lot west of McDonalds to the Old Seward Highway.

3.8.5 Communication

Both Alaska Communication Systems (ACS) and General Communication Inc. (GCI) own and operate above ground and overhead communication lines along the project corridor.

GCI facilities include a buried cable between Communications Avenue and 36th Avenue along the west side of Denali Street; buried cable crossings of Denali Street at Communications Avenue, 36th Avenue, and Benson Boulevard; and a buried cable along the south side of 36th Avenue.

The ACS main office is located at Communications Avenue and has major copper and fiber optic lines along Denali and 36th Avenue including crossings at the major street intersections. Lines are located both buried and overhead on power poles throughout the project limits.

3.9 Illumination

Along Denali Street, from Tudor Road to Northern Lights Boulevard, there are thirty street light poles on the west side of the road and one pole on the southeast corner of Denali Street and 32nd Avenue. All are operated and maintained by the MOA. The poles on the west side of Denali Street are spaced around 150 feet apart and almost all are approximately one foot behind the sidewalk.

Between A Street and Old Seward Highway there are fifteen street light poles along the south side of 36th Avenue, all the property of the MOA. From A Street to Denali Street, the light poles are located several feet behind the sidewalk in the vegetated area. The light poles between Denali Street and Old Seward Highway are positioned in the sidewalk near the back edge. Some of the poles and their foundations are significantly narrowing the usable travel way of the sidewalk. One such pole appears directly in the center of the sidewalk. The street light poles are spaced approximately 150 feet apart along the corridor.

Figure 14: Street Light poles along 36th Avenue

Bus shelters with interior lighting and bus stop light poles are present along both Denali Street and 36th Avenue. Additionally, a sidewalk retaining wall with accent lighting is present along Denali Street. These facilities are operated and maintained by the MOA.

Only one light within the project area belongs to the ML&P which is located at the northeast corner of the Old Seward Highway and 36th Avenue intersection.

Existing roadway lighting levels meet and exceed the minimum average illuminance levels required, except for the Denali Street, Tudor Road to 40th Avenue section. Uniformity and Veiling Luminance are acceptable, with a couple areas being slightly outside of the recommended values. The sidewalk lighting levels are adequate to good in all locations. Uniformity ratios are also very good. Most lighting installations are old and beyond their design life; and design guidance may have been different at the time of design and installation.

Refer to Appendix E for more detailed information about existing illumination.

3.10 Traffic Signals

Seven signalized intersections within the project area were studied. They are Denali Street/Tudor Road, Denali Street/36th Avenue, Denali Street/33rd Avenue, Denali Street/Benson Boulevard, Denali Street/Northern Lights Boulevard, 36th Avenue/A Street, and 36th Avenue/Old Seward Highway.

The maintenance for the Denali and Tudor Road, Benson Boulevard and Northern Lights intersections as well as the 36th Avenue and A Street, C Street and Old Seward Highway intersections falls under the Transfer of Responsibility Agreement (TORA), which means that they are owned by the Department of Transportation (DOT) and maintained by the Municipality of Anchorage (MOA). Maintenance and operation responsibilities for the Denali and 36th Avenue, Denali and Fireweed Lane, and 36th Avenue and Old Seward Highway intersections belong to the MOA. Loop detectors are present at all intersection approaches. Interconnect cables are present at all intersections.

It was noted that the signal at 36th Avenue and Old Seward Highway is over thirty years old and exhibiting structural failures. Load centers associated with most signals are in poor condition and are non-compliant with several National Electric Code (NEC) requirements.

For more information about existing traffic signals, see Appendix E.

3.11 Geotechnical Investigations Summary

A review of geologic maps, and geotechnical data from the project area was performed by R&M for the design study phase of this project. As-built drawings of the existing roadways were also reviewed. No field work was performed.

3.11.1 General Geology

Surficial geologic maps have been published by USGS (Schmoll & Dobrovolny, 1972[1]) and the MOA (1980). The area is mapped as organic deposits overlying glacial-fluvial, and fine-grained marine deposits. The organic deposits typically consist of peat ranging from 5 to 10 feet thick. Fine-grained pond deposits may occur at the base of the peat. The underlying glacial-fluvial deposits range from silty sand, sand, to sandy gravel. These sandy deposits are in turn underlain by the marine Bootlegger Cove Formation. Depth to groundwater in the project area is mapped as less than 10 feet (Freethey et al., 1974[2]).

3.11.2 Existing Borehole and As-built Data

Boreholes drilled along Denali Street, and 36th Avenue generally agreed with the mapped geology. Where the borings were drilled prior to roadway construction, peat deposits ranging from 2 to 10 feet thick were reported. The subgrade underlying the peat ranged from silt to sand and gravel. Groundwater was observed on most holes at depths less than 10 feet. Boreholes drilled through the pavement structural section for various improvements projects indicate that the organic material were completely removed and replaced with classified material.

3.12 Environmental

The Midtown Corridor Improvements corridor is a mostly developed urban area with vegetation comprised of landscaping and natural vegetation in undisturbed areas. According to the MOA's Wetland Management Plan (WMP), a stream and wetlands are

[1] Schmoll, H.R., Dobrovolny, E., 1972. Generalized geologic map of Anchorage and vicinity, Alaska. U.S. Geological Survey Miscellaneous Geologic Investigations Map I-787-A, scale 1 : 24,000.

[2] Dearborn, L. L. and Freethey, G. W., 1974. Water-table contour map, Anchorage area, Alaska. USGS Open-file report 1974, 1 sheet, scale 1:24,000.

present in the project boundary between Tudor Road and 36th Avenue. Fish Creek runs through a closed storm water pipe network that extends east of the New Seward Highway to west of Minnesota Drive, crossing below the project corridor at Denali Street along E 40th Avenue (see Figure 11). The storm water drain pipes bypass headwater flow along 36th Avenue to re-enter the Fish Creek main stem at Willow Street. Fish Creek is not cataloged as anadromous within the project corridor.

Wetlands are present at the southwest corner of the Denali Street and E 40th Avenue intersection, between Denali Street and Cuddy Family Midtown Park. The designated freshwater Class A wetland is within the Fish Creek Watershed.

The project area is not within a Federal Emergency Management Agency (FEMA) designated floodplain.

Six contaminated sites are identified on properties adjacent to the project area, according to Alaska Department of Environmental Conservation (ADEC) Contaminated Sites mapping. Five of the identified sites have a status of *Cleanup Complete* and one site, Hazard ID 2998 ACS Warehouse, is considered *Cleanup Complete with Institutional Controls.* Proposed project improvements should not impact contaminated sites.

4.0 DESIGN STANDARDS AND CRITERIA

Denali Street and 36th Avenue are classified as minor arterials by the OS&HP. The formal CSS process requires that modification of arterials proposed warrants following the CSS process.

4.1 Design Standards

The design guidelines and references that will be consulted for this project are:

Table 7: References

SOURCE	NAME	YEAR
AASHTO	Guide for Development of Bicycle Facilities	2012
AASHTO	A Policy on Geometric Design of Highways and Streets	2011
AASHTO	Roadside Design Guide	2011
AASHTO	Guide for the Planning, Design, and Operation of Pedestrian Facilities	2004
AMC	Title 21 Land use Planning ("New Code")	2017
FHWA	Manual on Uniform Traffic Devices (MUTCD)	2009
DOT&PF	Alaska Traffic Manual (ATM)	2016
MOA	MOA Standard Specifications (MASS)	2015
MOA	Design Criteria Manual (DCM)	2017[3]
MOA	Anchorage Stormwater Manual	2018
MOA - AMATS	2035 Metropolitan Transportation Plan	2012
MOA - AMATS	Anchorage Bicycle Plan	2010
MOA - AMATS	Anchorage Pedestrian Plan	2007
MOA - AMATS	Official Streets and Highways Plan	2014
MOA - AMATS	Areawide Trails Plan (ATP)	1997
NACTO	Urban Bikeway Design Guide	2014
US Access Board	Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG)	2011[3]

4.2 Design Criteria

All geometric features of the roadway, including horizontal and vertical geometry, typical section configuration, non-motorized amenities, etc. are all controlled by the selected design criteria. The design criteria was developed based on the functional classification of the roadway, current and projected traffic characteristics (volume and speed), and public input. Table 8 provides a listing of the critical design criteria. Complete design criteria are presented in Appendix A. Identified Design Criteria Waivers are provided in Section 20.0 – Design Variances.

[3] These references have not been adopted as of the submission of this report. However, their pending adoption prompted their use on this project.

Table 8: Abbreviated Design Criteria

CRITERIA	DENALI STREET	36th Avenue
AADT (2045)	4,937-17,963	19,166-23,891
Design Vehicle	WB-50	WB-50
Design Speed	45 mph	45 mph
Posted Speed	35 mph	35 mph (Currently 40 mph)
Lane Width	11 ft.	11 ft.
Median Width	14 ft. TWLTL	14 ft. TWLTL
Sidewalk Width	Min. 5 ft. Separated	Min. 5 ft. Separated
Multi-Use Pathway Width	Min. 10 ft. Separated	Min. 10 ft. Separated

4.3 Accessibility Guidelines

Pedestrian facilities will be designed and constructed to comply with the American with Disabilities Act (ADA) 42 U.S.C. The current adopted, enforceable accessibility standards are published as ADA Standards for Accessible Design (2010), which includes both the Title II regulations at 28 CFR 35.151; and the 2004 Americans with Disabilities Act Accessibility Guidelines (ADAAG).

However, ADAAG was developed primarily for building and on-site facilities. To provide guidance for facilities within the public ROW, PROWAG was created. Originally intended to supplement the ADAAG, the most current version was formatted as a stand-alone document. As of the writing of this report, PROWAG was still undergoing the rulemaking process. Once these guidelines are adopted by the Department of Justice, they will become enforceable standards under Title II of the ADA.

According to DCM Section 1.11, a project should incorporate the most current guidelines, whether part of a final rule or not. Therefore, PROWAG will be the accessibility guideline used to design the pedestrian facilities along Denali Street and 36th Avenue in an effort to avoid costly retrofits.

5.0 GUIDING PRINCIPLES

Adherence to design criteria and standards is an important part of roadway development. Equally important is the consideration of community agreed upon common themes, also referred to as guiding principles. These are community visions that share similarities with adopted plans and policies but sometimes in a less project specific fashion, and provide a foundation for and informs decision making. Below are four guiding principles applied to this project based on stakeholder feedback and overall community direction.

5.1 Vision Zero

Vision Zero (VZ) is a community commitment to reduce the loss of life and major injuries on roadways to Zero. VZ puts the safety of human life above all else. In 2016, the MOA joined VZ and is currently in the process of developing a formal VZ plan. Although safety is already at the forefront of traffic practitioners, Vision Zero embraces multidisciplinary collaboration to ensure all stakeholders take accountability when it comes to addressing this complex problem. Revisions to the CSS policy currently underway will implement Safety Conscious Planning (SCP). VZ is an initiative that meets the definition of SCP.

5.2 Complete Streets

Many Anchorage roadways, including Denali Street and 36th Avenue, were planned and constructed in an era when motorized mobility was the top priority. As a result, pedestrians are relegated to narrow sidewalks (sometimes obstructed by utilities), cyclists are forced to share the street with cars, and crossing facilities are not very comfortable. During winter months, roadway snow removal takes precedence and a lack of dedicated snow storage results in sidewalks being converted to de-facto snow storage.

The Complete Streets philosophy is aimed at improving this. Complete Streets are inclusive of all users including motorists, pedestrians, cyclists, and transit rider of all ages and abilities. Complete Streets improve equity, safety, and public health while reducing transportation costs and traffic woes.

Recent roadway reconstruction projects in Anchorage have implemented the Complete Streets philosophy, whether intentionally or not. AMATS is currently working on a Complete Streets policy as well as updating the OS&HP with street typology maps.

Figure 15: Example of Complete Street (West Dimond Boulevard)

Figure 16: Complete Street concept applied to Denali Street

5.3 Road Diet

A Road Diet is generally described as “removing travel lanes from a roadway and utilizing the space for other users and travel modes.” In essence, it is a useful tool while

implementing Complete Streets. Four-lane, undivided roadways (such as Denali Street south of 36th Avenue) are prone to experience the following crash types:

- Rear-end and sideswipe crashes caused by speed differential between vehicles;
- Sideswipe crashes caused by frequent and sudden lane changing between two through lanes;
- Rear-end crashes caused by left-turning vehicles stopped in the inside travel lane;
- Left-turn crashes caused by mainline left-turning motorists feeling pressure to depart the shared through/left lane by following motorists and making a poor gap judgment;
- Angle crashes caused by side street traffic crossing four lanes to make a through movement across an intersection, or turning left across two lanes;
- Bicycle crashes due to a lack of available space for bicyclists to ride comfortably; and
- Pedestrian crashes due to the high number of lanes for pedestrians to cross with no refuge.

Road Diets are considered a “Proven Safety Countermeasure” by the Federal Highway Administration (FHWA) with the potential to reduce total crashes between 19% and 47%. Other benefits of Road Diet installations include:

- Reduction of rear-end and left-turn crashes due to the dedicated left-turn lane.
- Reduced right-angle crashes as side street motorists cross three versus four travel lanes.
- Fewer lanes for pedestrians to cross.
- Opportunity to install pedestrian refuge islands, bicycle lanes, on-street parking, or transit stops.
- Traffic calming and more consistent speeds.
- A more community-focused, "Complete Streets" environment that better accommodates the needs of all road users.

Many four lane, undivided arterials in Anchorage have undergone a Road Diet. Recent examples include Spenard Road and Arctic Boulevard. For local businesses, a Road Diet can improve economic vitality by changing the corridor from a place that people “drive-through” to one that they “drive-to.” Replacing vehicle travel lanes with walking areas and bicycle lanes can make the street a more attractive “park once” area. With these improved facilities, a motorist is more likely to park, walk around, visit

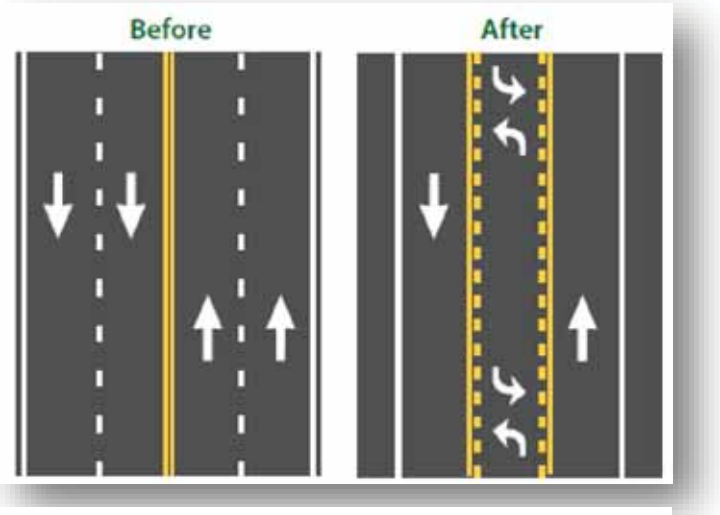


Figure 17: Road Diet

restaurants or shops, and enjoy the setting, benefiting the economy and public safety of the neighborhood. Bicycle and pedestrian transportation groups often organize social events that benefit nearby businesses. Recent studies have shown that roadway modifications, which increase pedestrian volumes, can result in a decline in a neighborhood's crime rate.

Figure 18: Arctic Boulevard (dieted in 2016/2017)

5.4 Connectivity

Logical connectivity to existing non-motorized facilities is particularly important to cyclists who tend to make longer trips than other non-motorized users. Stopping improvements short of these connectivity points neglects the needs to bike commuters who utilize area trails but desire bike lanes or sidepaths as part of their journey. Both the Anchorage Bicycle Plan as well as NACTO's Urban Bikeways Design Guide stress the importance of connectivity. Feedback received from stakeholders echoes this desire.

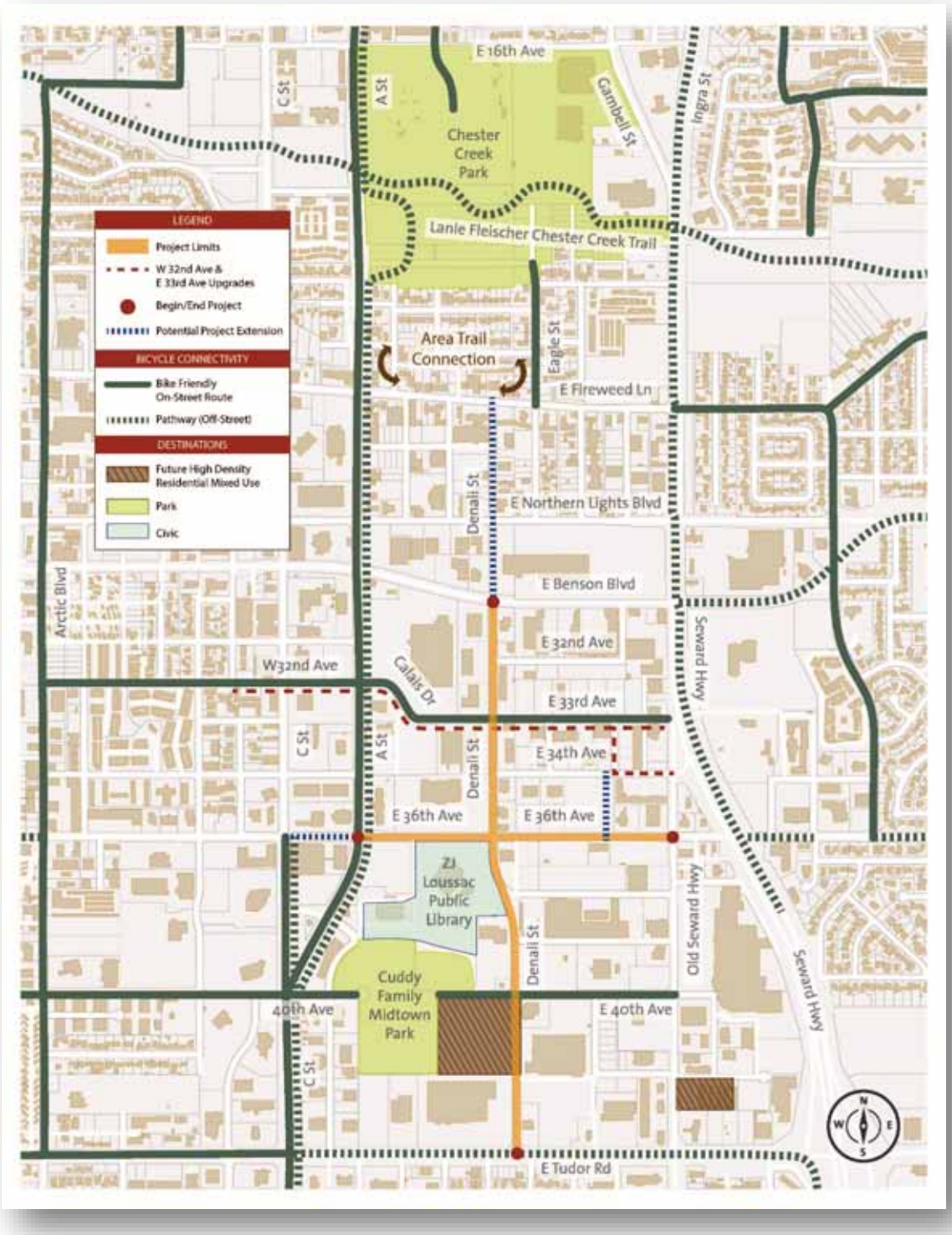


Figure 19: Connectivity to non-motorized network

It is for this reason the project is considering the following potential. On Denali Street, the improvements would extend from Benson Boulevard to East Fireweed Lane, providing for a near-direct connection to the Chester Creek Trail. On 36th Avenue, the project may be extended from A Street to C Street to provide access to the on-street route on C Street. Lastly, a pathway connection between 36th Avenue and 34th Avenue is being considered to create an off-street pathway link at Fairbanks Street. Figure 19 illustrates existing facilities and proposed project extensions.

6.0 ALTERNATIVES

6.1 General

Twelve total alternatives (three per segment) for Denali Street and 36th Avenue were developed taking into consideration stakeholder input received during the concept phase. Each segment alternative is described in greater detail below.

6.2 No-Action Alternatives

This alternative was not considered viable for this corridor because it would not solve the problems identified by stakeholders. Conflicts between motorized and non-motorized users would potentially increase, leading to more crashes and further deterioration of the level of service along Denali Street and 36th Avenue.

6.3 Denali Street

Denali Street, classified as an urban minor arterial in the OSHP, was divided into four segments: Tudor Road to 36th Avenue, 36th Avenue to Benson Boulevard, Benson Boulevard to Northern Lights Boulevard, and Northern Lights Boulevard to Fireweed Lane. Lane reductions were found to be feasible between Tudor Road and Northern Lights Boulevard, in conjunction with appropriate turning lanes at signalized intersections. More detail can be found in Appendix C. Alternatives for each segment are discussed further in the following subsections.

6.3.1 Segment 1: Tudor Road to 36th Avenue

This segment provides access to civic and park destinations such as Loussac Library, and Cuddy Family Park, as well as businesses such as Home Depot, Lowe's Home Improvement, Alaska Communications, KTUU-TV and Denali Federal Credit Union. The AADT's here are some of the lowest along Denali Street, ranging from 8,260 to 9,639 for the southern and northern half of this segment, respectively. Even though the ROW is 70 feet wide, the existing improvements occupy only 60 feet. To accomplish the objectives of the project, the footprint of the proposed alternatives will occupy the majority of the ROW, as shown on Figure 21. The acquisition of additional ROW is anticipated. Though there are many businesses along this section of Denali Street, this segment has the most room along the ROW for expansion of motorized and non-motorized use. All segment 1 alternatives feature two 11-foot travel lanes (one in each direction), one 14-foot Two Way Left Turn Lane (TWLTL) and 4-foot bike lanes.

Figure 20: Denali Street Segment 1

6.3.1.1 Alternative 1

This alternative proposes separated 10-foot multi-use pathways along each side of Denali Street to serve both pedestrians and two-way bicycle traffic. 7-foot wide vegetated buffers between the roadway and pathways will incorporate clusters of landscape plantings and allow for temporary snow storage. This alternative exceeds DCM requirements but provides pedestrian and bicycle facilities to both sides of the roadway. This alternative will require the most ROW acquisition (approx. 8-foot each side) for this segment.

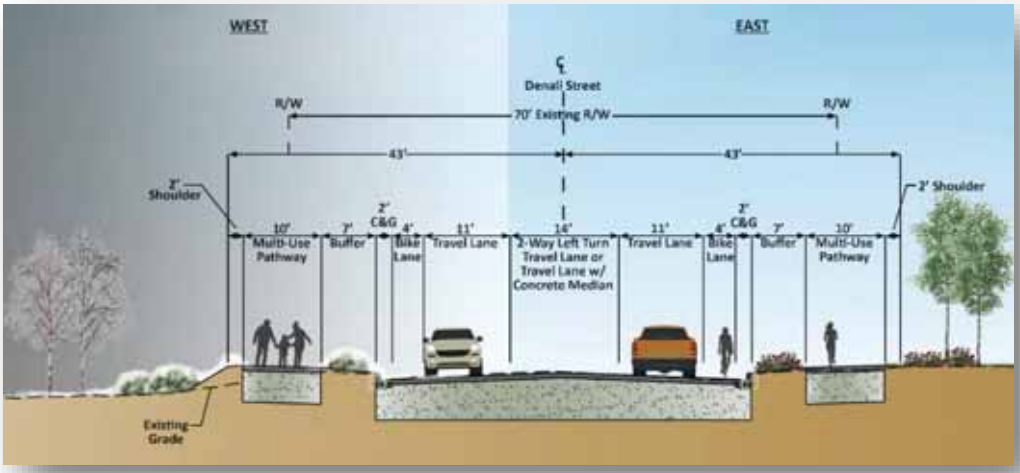


Figure 21: Denali Street (Tudor Road to 36th Avenue) – Alternative 1

6.3.1.2 Alternative 2

This alternative meets the DCM requirements for a minor urban arterial with one 10-foot multi-use pathway along the west side of the roadway and a 5-foot sidewalk along the east. Landscaped buffers of 7 feet in width separate the pedestrian facilities from the roadway. Landscaping would be similar to alternative 1.1 while ROW acquisition would be less (approx. 8-foot on the west side and approx. 3-foot on the east side).

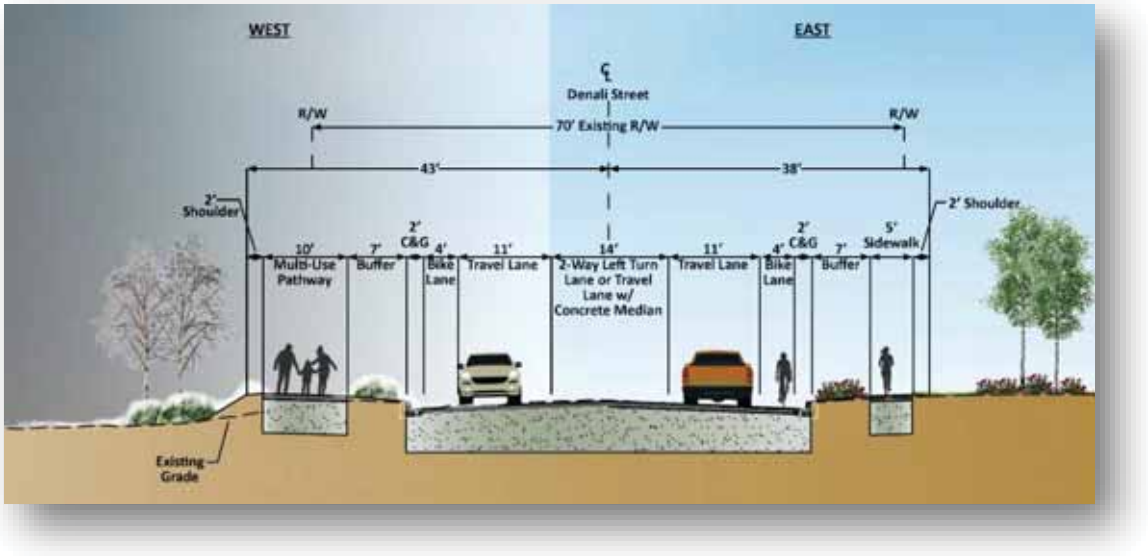


Figure 22: Denali Street (Tudor Road to 36th Avenue) – Alternative 2

6.3.1.3 Alternative 3

Alternative 3 is similar to Alternative 2 however the landscaped buffers have been reduced from 7 feet to 4 feet. ROW needs are the smallest of the three alternatives (approx. 8-foot on the west side) while the reduced buffer width would be seeded only as the width would not be sufficient for plantings.

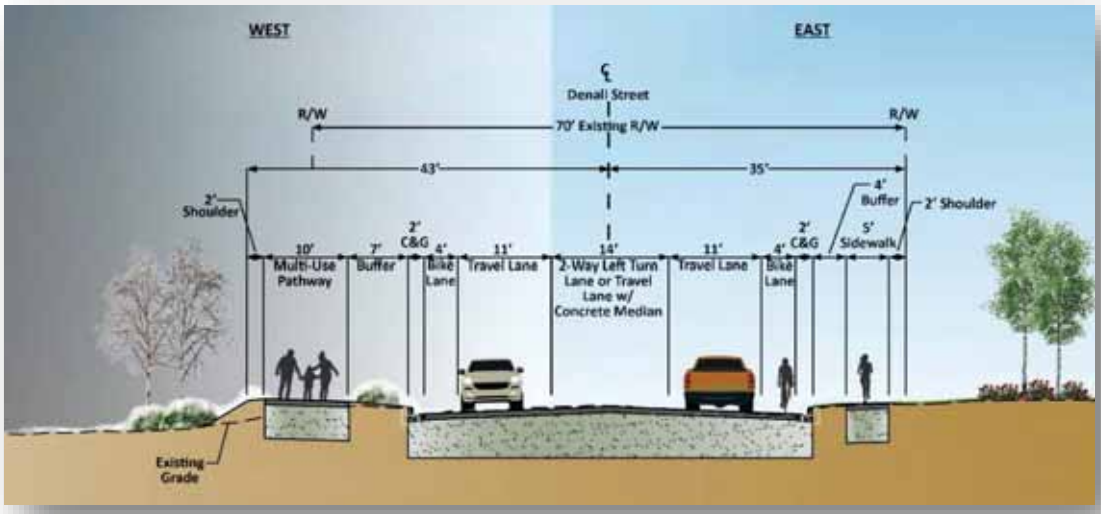


Figure 23: Denali Street (Tudor Road to 36th Avenue) – Alternative 3

6.3.2 Segment 2: 36th Avenue to Benson Boulevard

This segment consists of commercial land use with adjacent businesses such as Century 16 Cinemas, and nearby businesses such as Walmart and Moose's Tooth Pizza. The AADT's in this segment are the highest along Denali Street, ranging from 11,934 to 12,230. The ROW is typically 70 feet wide, and increases to 82 feet near the intersections with 36th Avenue and also Benson Boulevard. A large number of existing buildings along the east side of the segment are located along the edge of ROW and will increase project costs in order to construct the proposed facilities. This segment currently consists of four lanes (2 in each direction) with a TWLTL. However, each of the following alternatives proposes to reduce the through lanes from four to two while maintaining a TWLTL. In addition, each alterative would have a 4-foot bike lane in each direction. Reducing the amount of

Figure 24: Denali Street Segment 2

through lanes does not reduce the LOS below present levels, but does reduce the amount of ROW acquisition required. Each of the segment 2 alternatives feature the same roadway section as Segment 1.

6.3.2.1 Alternative 1

This alternative is similar to Segment 1, Alternative 1 in that it proposes separated 10-foot multi-use pathways with 7-foot wide vegetated buffers along each side of Denali Street. ROW acquisition for this alternative will be the most costly of the three alternatives (approx. 8-foot each side).

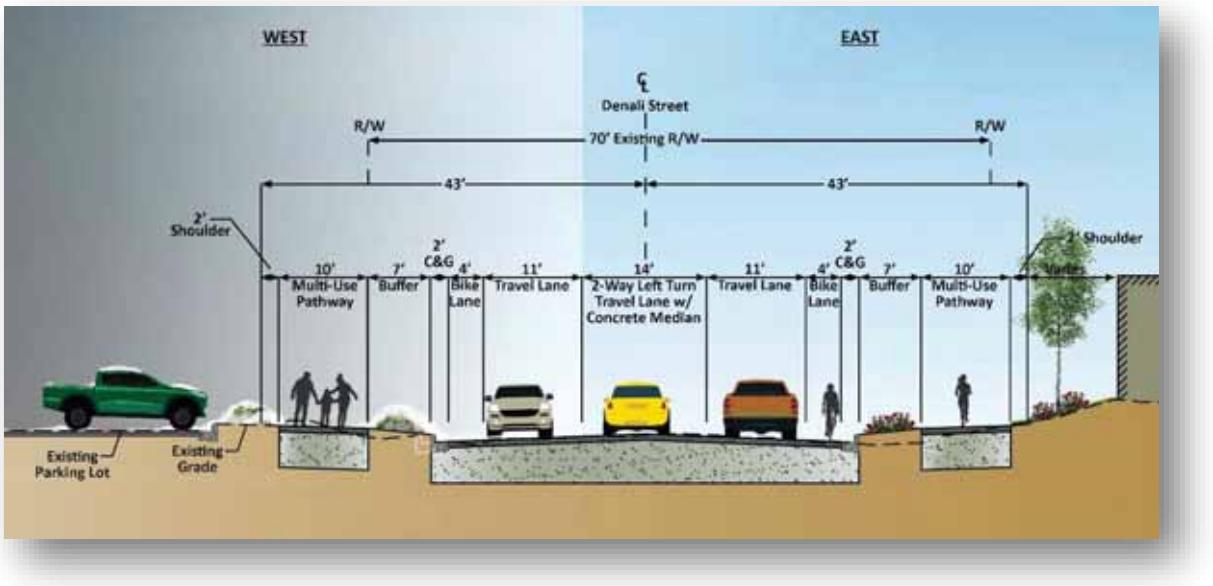


Figure 25: Denali Street (36th Avenue to Benson Boulevard) – Alternative 1

6.3.2.2 Alternative 2

Similar to the previous alternative, Alternative 2 proposes a 10-foot separated multi-use pathway on the west side of the roadway and one 5-foot sidewalk along the east, which meets the requirements set forth in the DCM for a minor urban arterial. With the reduction in travel lanes from four to two, ROW acquisition is less along the road (approx. 8-foot on the west side). A 7-foot vegetative buffer along the west side of Denali allows for plantings as well as snow storage. Along the east side, the vegetative buffer is reduced to 4-foot to reduce ROW impacts.

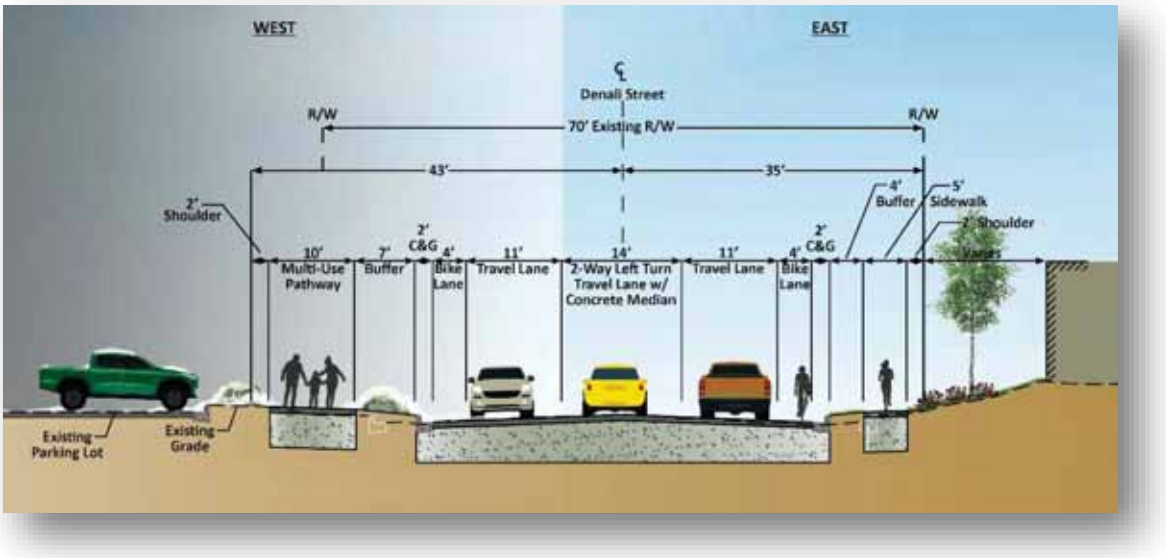


Figure 26: Denali Street (36th Avenue to Benson Boulevard) – Alternative 2

6.3.2.3 Alternative 3

This alternative modifies Alternative 2 by reducing the vegetative buffer along the west side of the segment from 7-foot to 4-foot, further reducing the impacts to ROW (approx. 5-foot on the west side). All other features remain the same as Segment 2, Alternative 2.

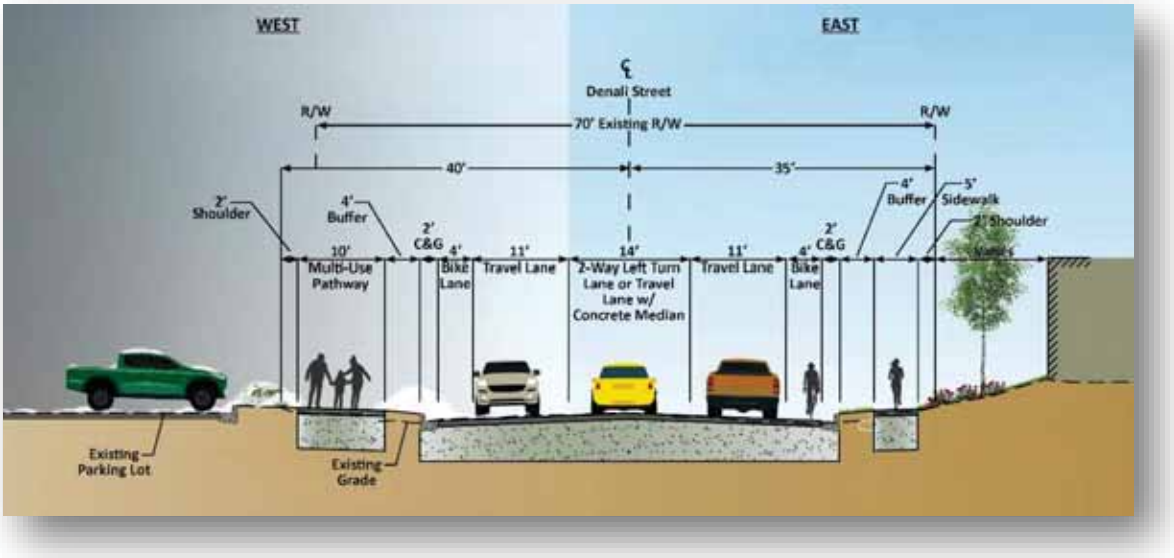


Figure 27: Denali Street (36th Avenue to Benson Boulevard) – Alternative 3

6.3.3 Segment 3: Benson Boulevard to Northern Lights Boulevard

With a length of 600 feet, this short segment provides access for both eastbound Benson Boulevard and westbound Northern Lights Boulevard, as well as to financial and commercial destinations such as Alaska USA Federal Credit Union, Denny's and the Mall at Sears. As such, the AADT's are fairly high at 10,351 for this segment. The ROW

varies between 71 feet and 73 feet in width with the existing improvements occupying almost all of this space. The existing section within this segment consists of five 11-foot wide lanes with the inside lanes as alternating turn lanes and 5-foot wide sidewalks on each side. Additionally, 1-foot wide concrete landscape walls exist on the outside of each sidewalk.

Figure 28: Denali Street Segment 3 (source: Google)

To accomplish the project objectives, the footprint of the proposed alternatives will occupy the majority of the ROW. The acquisition of additional ROW is anticipated. One lane will be reduced in the southbound direction. All segment 3 alternatives feature a total of four travel lanes with two in the northbound direction, one lane southbound, and left turn lanes (see Figure 29). Minimal landscaping is proposed for this segment with limited temporary snow storage within the ROW.

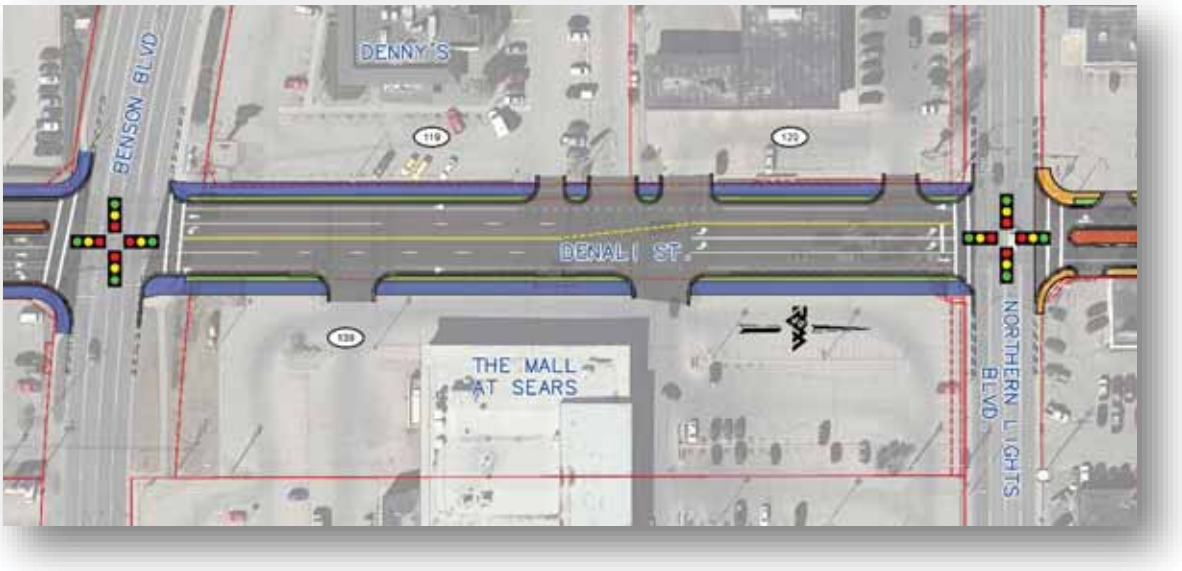


Figure 29: Segment 3 Lane Configuration

6.3.3.1 Alternative 1

This alternative proposes to add 4-foot bike lanes to each side of the traveled way. In addition, this alternative proposes 10-foot multi-use pathways along each side of the roadway separated by 4-foot landscape buffers for temporary snow storage within the limited ROW (approx. 9-foot of additional ROW is required on both sides).

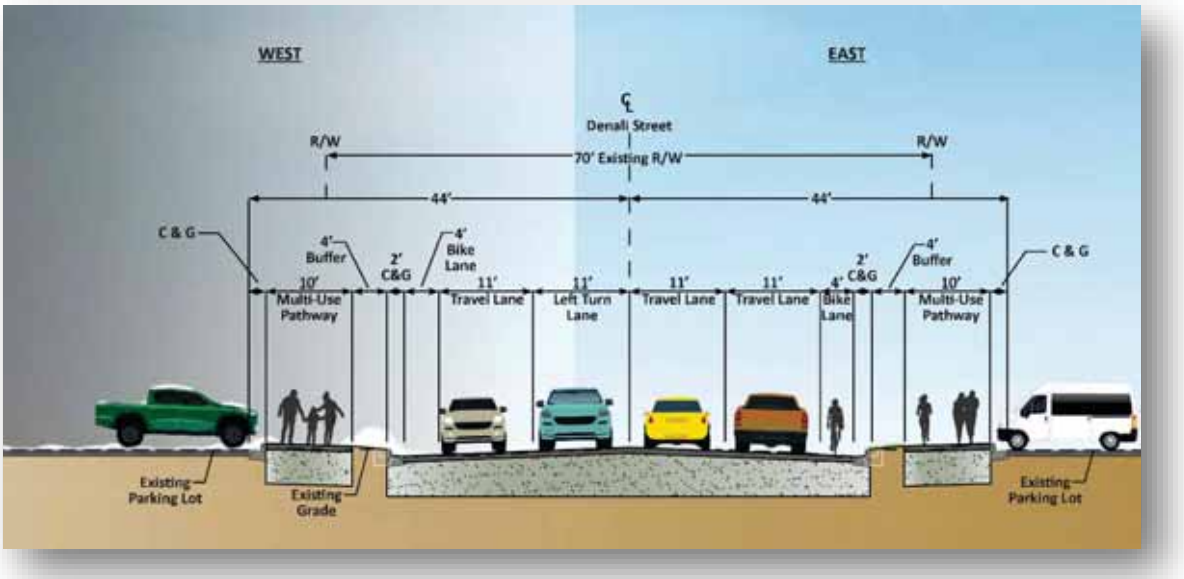


Figure 30: Denali Street (Benson Boulevard to Northern Lights Boulevard) – Alternative 1

6.3.3.2 Alternative 2

Alternative 2 proposes 11-foot pathways comprised of 6-foot wide paved “cycle tracks” adjacent to 5-foot wide concrete sidewalks. Additional ROW will be required to construct this alternative (approx. 2-foot on each side). Landscaping buffers are not provided as part of this alternative thereby effectively limiting temporary snow storage. The southernmost driveway to The Mall at Sears and the northernmost driveway to the Alaska USA Federal Credit Union are proposed to be eliminated. Both businesses will retain one driveway onto Denali Street in addition to driveways on Northern Lights Boulevard and Benson Boulevard.

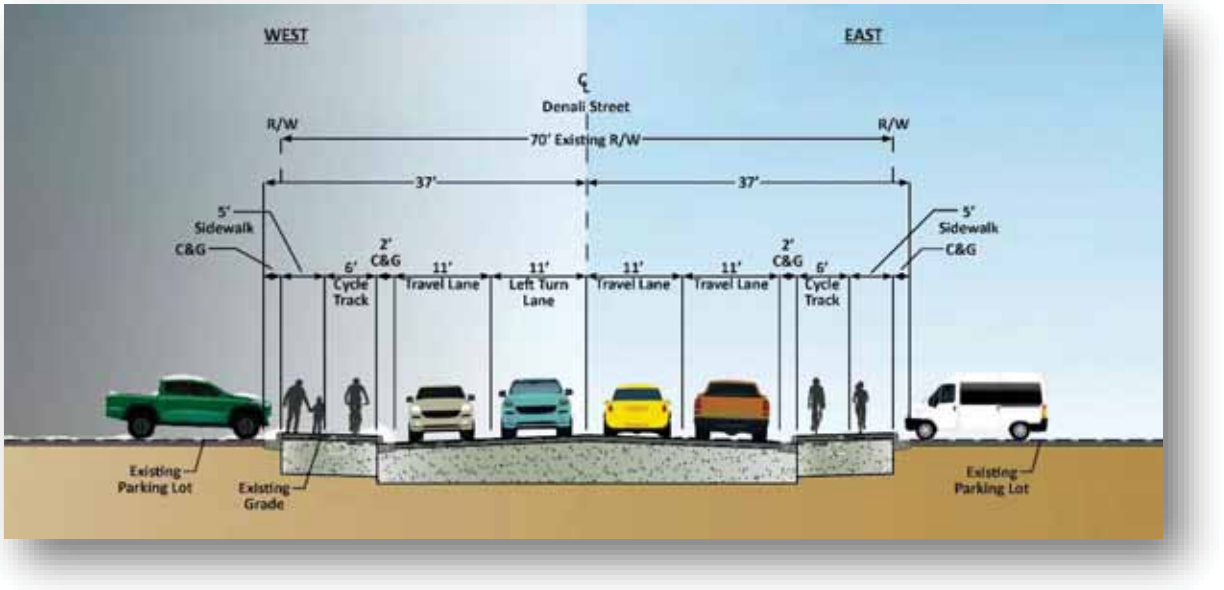


Figure 31: Denali Street (Benson Boulevard to Northern Lights Boulevard) – Alternative 2

6.3.3.3 Alternative 3

Similar to Segment 3 Alternative 1, this alternative proposes 10-foot multi-use pathways on each side of the roadway. However, this alternative does not include dedicated bike lanes. Landscape buffers are not proposed for this alternative though the existing landscape walls will remain. This alternative will require approximately 4-foot of additional ROW on each side.

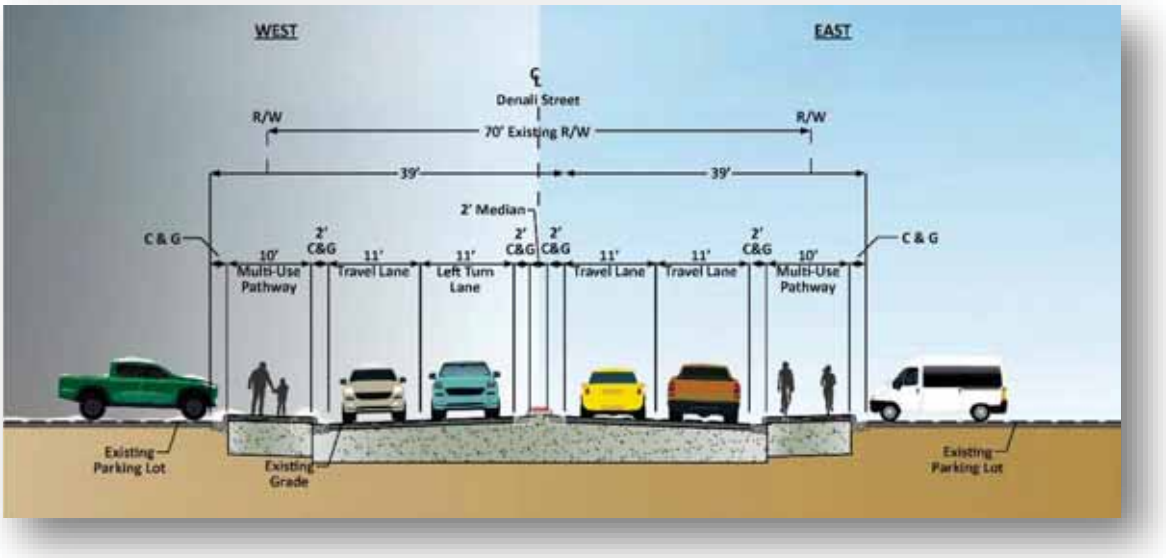


Figure 32: Denali Street (Benson Boulevard to Northern Lights Boulevard) – Alternative 3

6.3.4 Segment 4: Northern Lights Boulevard to Fireweed Lane

This segment provides access to commercial destinations including the two multi-story Denali Towers. The AADT's within this segment are 3,699, the lowest in the corridor. The ROW width varies between 60 feet and 71 feet.

Figure 33: Denali Street Segment 4 (source: Google)

The footprint of the proposed alternatives will occupy the majority of the ROW. The acquisition of additional ROW is anticipated for all three alternatives.

6.3.4.1 Alternative 1

This alternative maintains the existing three lane roadway with a TWLTL but adds 4-foot bike lanes along each side of Denali. This alternative proposes a 10-foot multi-use pathway along the west side of Denali Street with a 5-foot sidewalk on the east. ROW acquisition will be needed along the west side (approx. 7-foot) to accommodate the multi-use pathway. Landscaping buffers are not proposed due to the proximity of multi-story commercial buildings, making additional ROW acquisition cost-prohibitive.

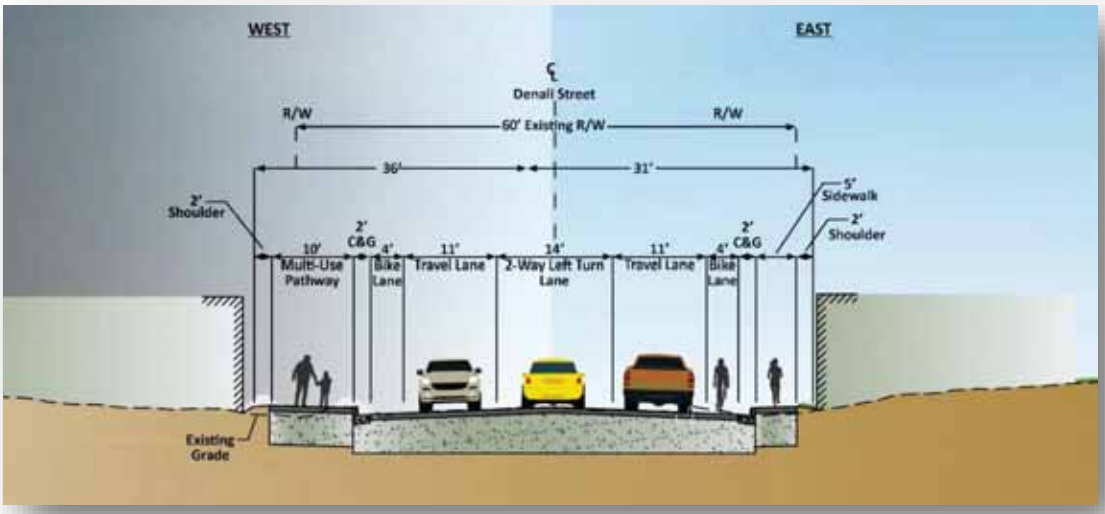


Figure 34: Denali Street (Northern Lights Boulevard to Fireweed Lane) – Alternative 1

6.3.4.2 Alternative 2

Alternative 2 modifies the existing three lane roadway section to two travel lanes with 4-foot bike lanes on each side of Denali Street. Similar to Segment 4 Alternative 1, this alternative proposes a 10-foot multi-use pathway along the west side of the roadway and a 5- foot sidewalk along the east. Four-foot landscape buffers are proposed between the roadway and pathway/sidewalk. Minimal ROW acquisition will be required on both sides of the roadway in order to accommodate the proposed improvements.

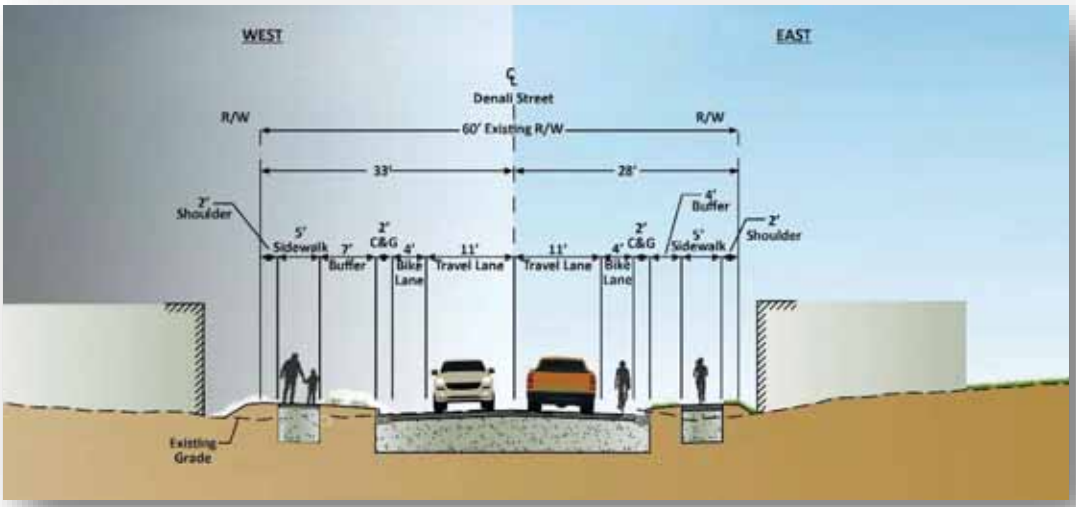


Figure 35: Denali Street (Northern Lights Boulevard to Fireweed Lane) – Alternative 2

6.3.4.3 Alternative 3

This alternative proposes modifying the existing three lane roadway to two 11-foot shared lanes with no adjacent bike lanes. Left turns will be made from the through lanes. Alternative 3 proposes 10-foot multi-use pathways along each side of the roadway. A 7-foot landscape buffer is proposed along the west side pathway only to reduce ROW acquisition needs. There is no landscape buffer proposed along the east side of the roadway.

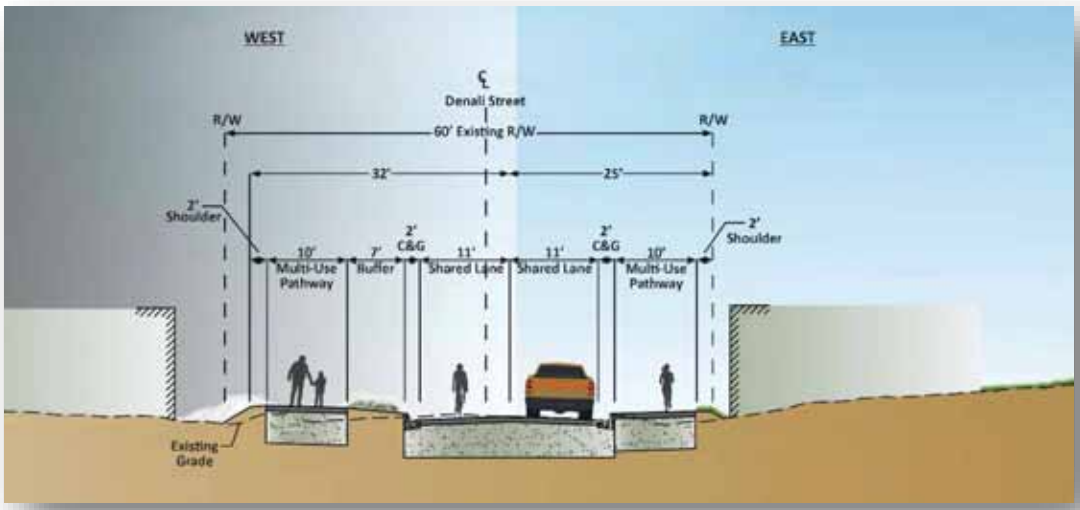


Figure 36: Denali Street (Northern Lights Boulevard to Fireweed Lane) – Alternative 3

6.4 36th Avenue

For the purposes of this project, 36th Avenue from C Street to Old Seward Highway was kept as a singular segment. Design year AADTs on 36th Avenue exceed most

jurisdictions' level of comfort for a road diet. FHWA guidance indicates roadways with AADTs in excess of 20,000 to be "possible candidates" for 3-lane conversions but cautions that it could result in an increased likelihood of congestion and diverting traffic. Therefore, it was decided to forgo lane reductions on 36th Avenue. Alternatives for 36th Avenue are discussed further in the following subsections.

6.4.1 Segment 5: C Street to Old Seward Highway

This stretch of 36th Avenue provides access to civic and park destinations such as Loussac Library, and Cuddy Family Park as well as businesses such as those in the Frontier Building, First National Bank Alaska, Century 16 Cinemas, Springhill Suites, Natural Pantry, Stewart Title Company, McDonalds, Denali Federal Credit Union, Tatitlik Corporation, Kuukpik Corporation, and many more. The AADT's along this segment are much higher than Denali Street, ranging from 15,151 to 18,270 for the western and eastern half of this segment, respectively. Between A Street and Denali Street, the ROW width varies between 80 feet and 95 feet. Between Denali Street and Old Seward Highway, the ROW width fluctuates between 71.5 feet to 90 feet.

Figure 37: 36th Avenue

To accomplish the objectives of the project, the footprint of the proposed alternatives will occupy the majority of the ROW, as shown below. The acquisition of additional ROW is anticipated along both the north and south sides of the segment. All of the segment 5 alternatives maintain the existing median-divided four travel lanes (two in each direction), with intermittent Left Turn Lanes.

6.4.1.1 Alternative 1

This alternative proposes 10-foot multi-use pathways on both sides of 36th Avenue to serve both pedestrians and two-way bicycle traffic. Landscape buffers are not proposed with this alternative. Significant ML&P utilities along the north side of 36th Avenue will be relocated as part of this alternative. To accommodate the proposed improvements, approx. 3-foot of ROW acquisition will be needed on both sides of 36th Avenue in addition to a utility easement for the relocated overhead utility. Impacts to landscaping and parking to businesses along the roadway are anticipated.

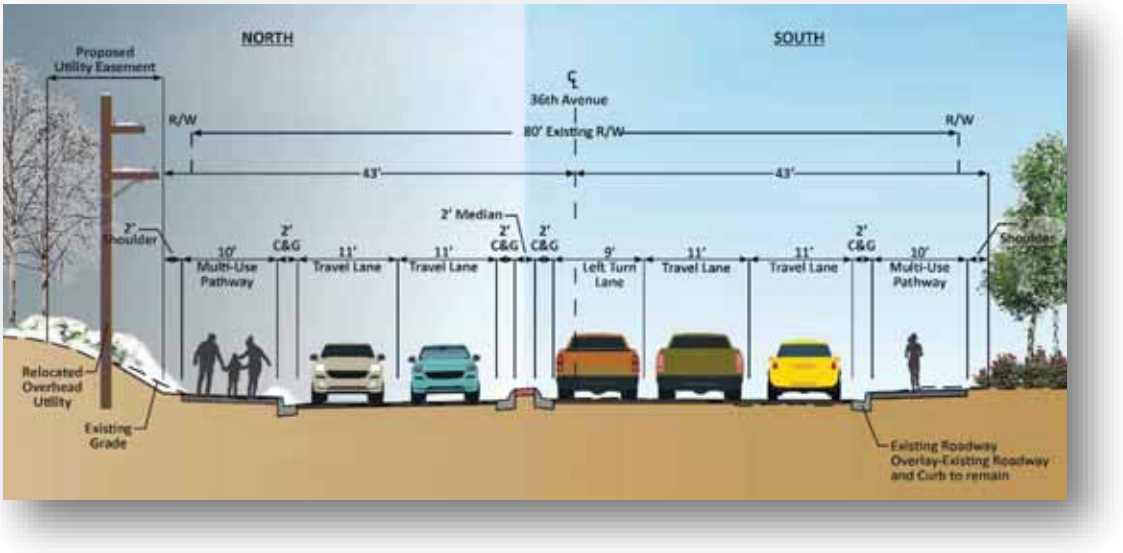


Figure 38: 36th Avenue (A Street to Old Seward Highway) – Alternative 1

6.4.1.2 Alternative 2

Alternative 2 proposes 7-foot landscaped buffers and 10-foot multi-use pathways on both the north and south side of 36th Avenue to serve both pedestrians and two-way bicycle traffic. Landscape buffers will allow the existing ML&P overhead utility to remain and provide space for plantings and temporary snow storage. ROW acquisition for this alternative is greater than those in Alternative 1 (approx. 10-foot on each side). However, ML&P utilities do not require relocation along the north side of 36th Avenue.

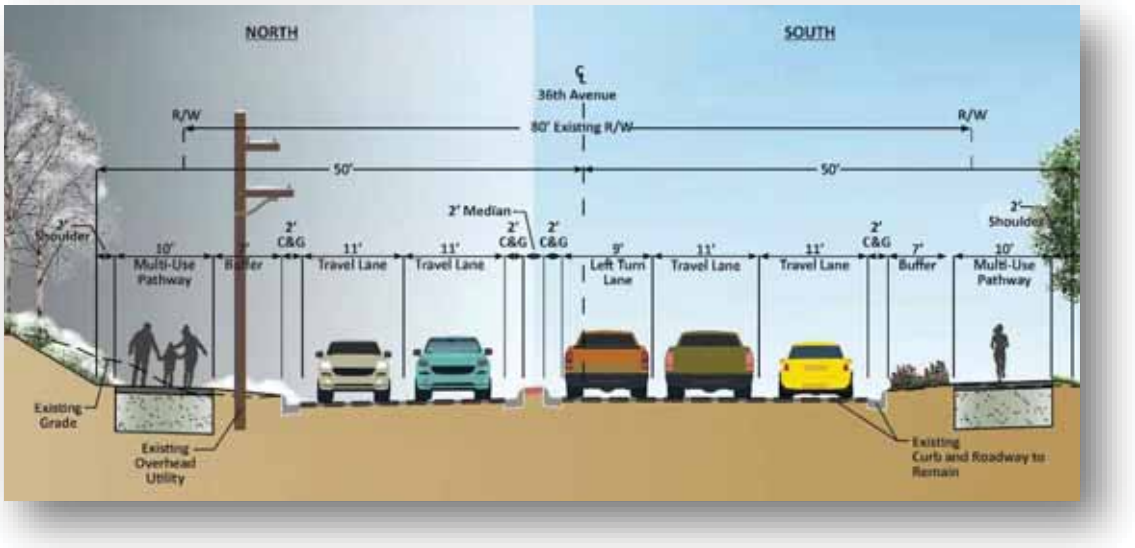


Figure 39: 36th Avenue (A Street to Old Seward Highway) – Alternative 2

6.4.1.3 Alternative 3

This alternative proposes a 10-foot multi-use pathway on both the north and west side of 36th Avenue to serve both pedestrians and two-way bicycle traffic. Four-foot landscape buffers proposed along each side of 36th Avenue provide for temporary snow storage. The center median will be widened from 2-foot to 6-foot between C Street and Denali Street to allow for a pedestrian refuge at the Barrow Street crossing.

This alternative was dismissed from further study due to conflicts between left turn vehicles and the proposed crosswalk, as well as the relatively high cost of shifting the existing curb approximately 2-foot.

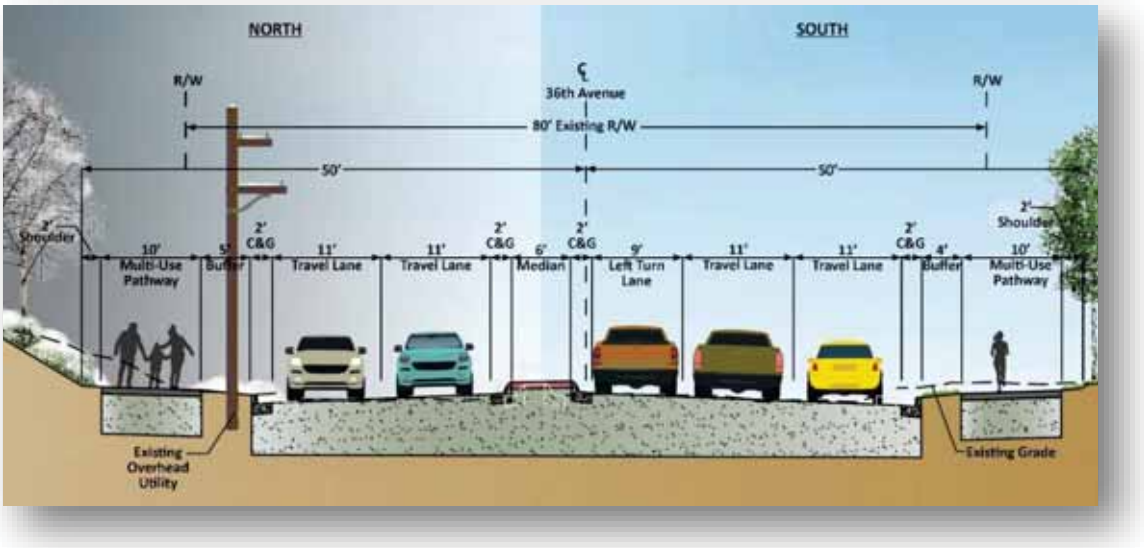


Figure 40: 36th Avenue (A Street to Old Seward Highway) – Alternative 3

6.5 Intersections

In order for Denali Street to become a preferred north-south non-motorized corridor within the Midtown area, the project intersections need to complement and support the segment alternatives by providing reduced delay and increased safety for pedestrians and bicycles. That in turn will add to the appeal of the corridor and provide users less busy, more comfortable routes.

Ten intersections along Denali Street and five along 36th Avenue are affected by this project. However, only five intersections on Denali Street (Tudor Road, 40th Avenue, 36th Avenue, Calais Drive, Benson Boulevard and Northern Lights Boulevard) and three intersections on 36th Avenue (A Street, Barrow Street and Old Seward Highway) are analyzed further in the following subsections. Intersection alternatives including signalization and pedestrian pushbutton recommendations are discussed in greater detail below. Please review the Traffic and Safety Analysis Report, located in Appendix C, for more information.

6.5.1 No-Action Alternatives

The No-Action alternative was not considered viable for this corridor because it would not solve the problems identified by stakeholders. Conflicts between motorized and non-motorized users would potentially increase, leading to more accidents and further deterioration of the level of service of Denali Street. Neglecting upgrades to intersections stifles the effectiveness of the segment improvements.

6.5.2 Denali Street and Tudor Road Intersection

This intersection did not warrant multiple alternatives. Rather, the proposed improvements focus on connectivity for non-motorized users. That includes widening of the existing sidewalks along each side of Denali Street into 10-foot multi-use pathways. 4-foot bike lanes will transition to the pathways prior to entering the intersection. Due to limited ROW, the pathway will be attached to the curb instead of separated, which will allow users of Denali Street to cross at the Tudor Road traffic signal for access to the Tudor pathways. Traffic signal improvements are recommended including lengthening mast arms, relocating signal heads, and replacing the northeast pushbutton pole. ADA improvements are also needed at the intersection including paving near existing pole-mounted push buttons, and relocating ramps closer to the pushbuttons. Also, to accommodate the proper use of the northbound bike lane, a pedestrian crossing is recommended along the east leg of Tudor Road.

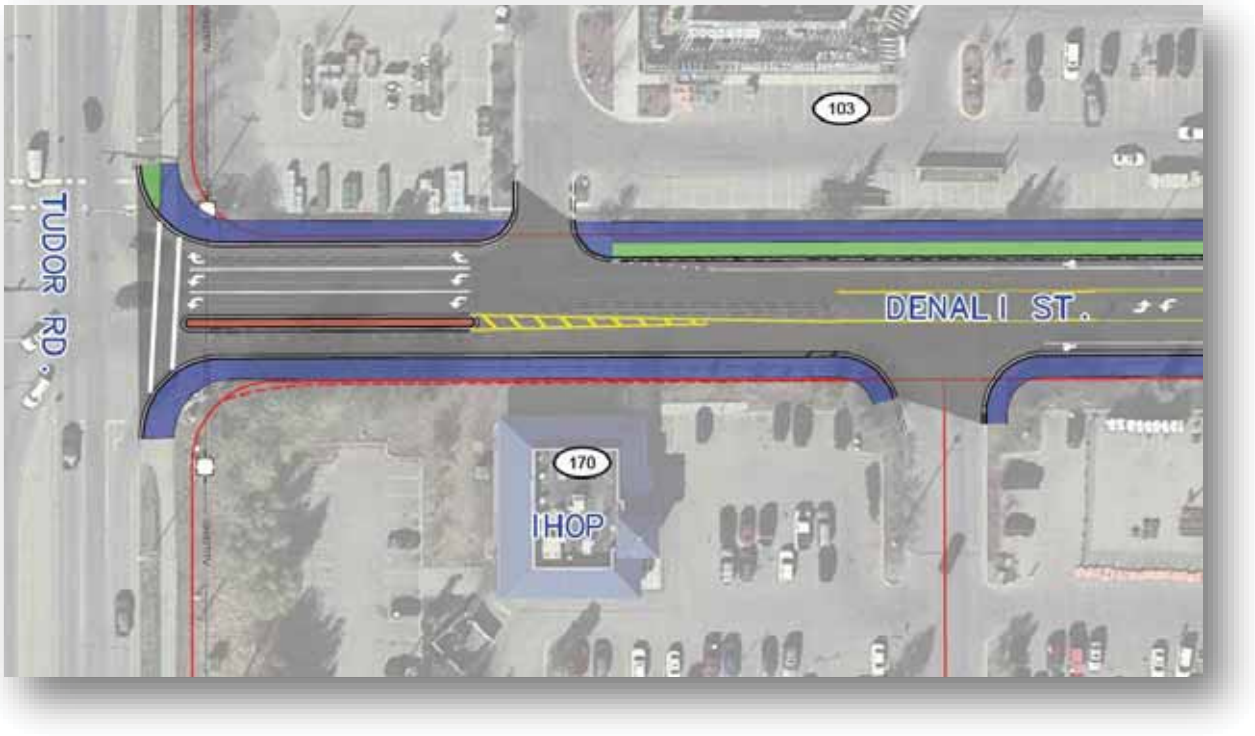


Figure 41: Denali Street and Tudor Road

6.5.3 Denali Street and 40th Avenue Intersection

The 40th Avenue intersection is the second of five major crossings along Denali Street. This intersection is currently two-way stop controlled along 40th Avenue with one ladder crosswalk striping across Denali Street. One of the two study area fatalities occurred at this intersection, as well as a high number of observed pedestrian crossings. Lastly, the highest speeds were recorded within the segment between Tudor Road and 40th Avenue. Therefore, proposed improvements focus on connectivity and safety for non-motorized users. Two alternatives to improve this intersection were developed and are discussed in greater detail below.

6.5.3.1 Alternative A

This alternative proposes a single-lane roundabout to replace the existing stop controlled intersection. The roundabout alternative would improve safety for roadway users, pedestrians and bicyclists by reducing vehicular speeds and crossing distances. Bike lane exit ramps are proposed at all four entrance legs to move bicyclists off the roadway and onto the multi-use pathways. The proposed single lane roundabout will require new lighting to provide proper lighting levels for vehicles, bicycles, and pedestrians.

Figure 42: Denali Street and 40th Avenue

Figure 43: Denali Street and 40th Avenue

6.5.3.2 Alternative B

Alternative B proposes median left turn lanes at each leg of the intersection and ladder crosswalk striping across Denali Street along the north and south legs. As an additional pedestrian safety measure, this alternative proposes the installation of an electronic warning device (e.g., beacon). As stated earlier, improving the crossings at major intersections greatly increases the comfort level for users and support of Denali Street as a preferred non-motorized corridor.

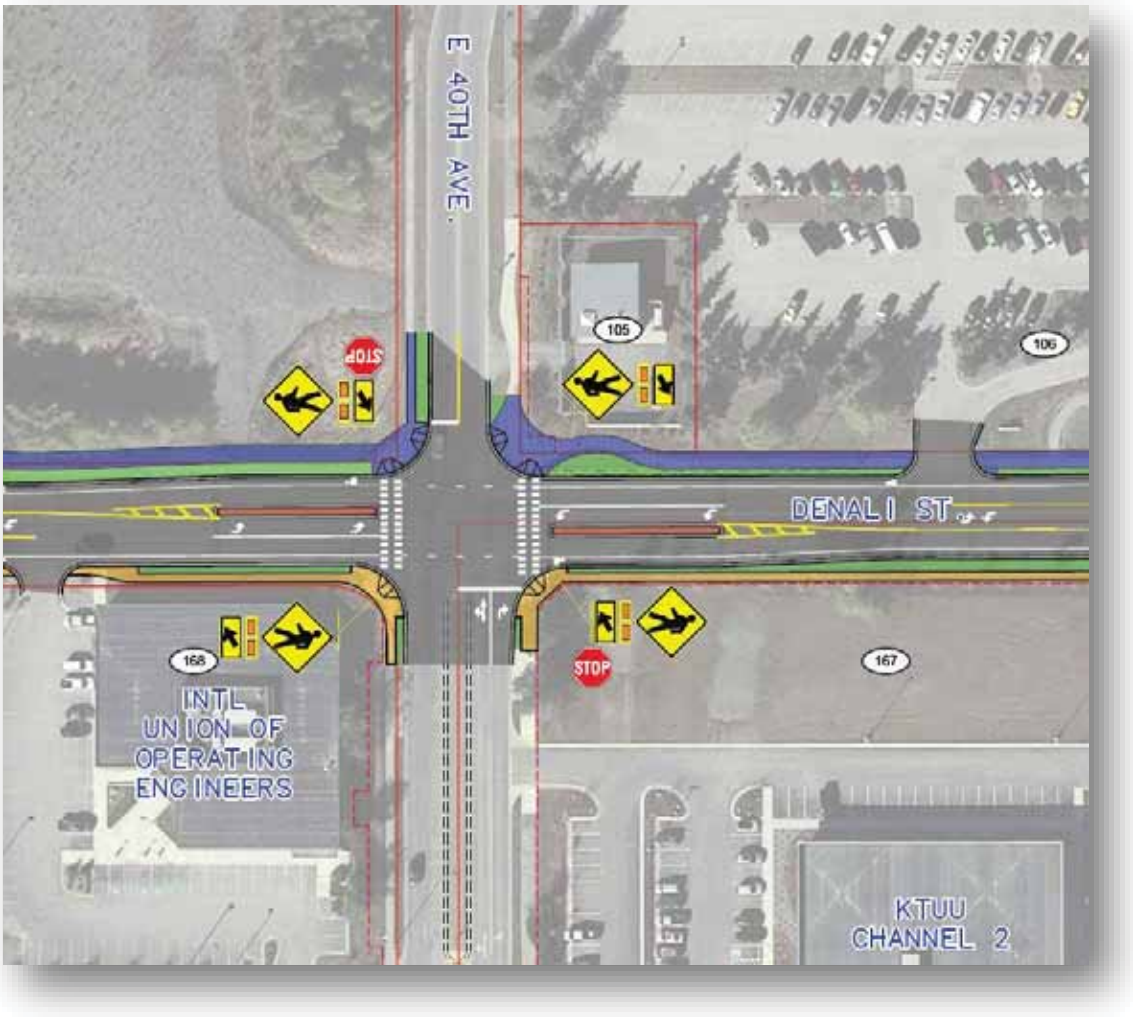


Figure 44: Denali Street and 40th Avenue – Alternative B

6.5.4 Denali Street and 36th Avenue Intersection

The 36th Avenue intersection is the third of five major crossings along Denali Street. This intersection is currently signalized. The lane configurations for each intersection leg will stay the same except for the southbound direction which will be reduced from two to one lane. The proposed improvements focus on connectivity and safety for non-motorized users while also improving level of service for vehicles. There are two alternatives proposed that are discussed in greater detail below. For both alternatives, we propose the traffic signals be upgraded to include flashing yellow arrow operation and signal heads for all four directions of travel. In addition, all four signal poles, mast arms, and foundations including the existing traffic controller cabinet are proposed to be replaced.

6.5.4.1 Alternative A

This alternative proposes channelized right turn lanes with pedestrian islands at both the southwest and northeast corner of the intersection. These right turn lanes allow for a better level of service on the 36th Avenue approaches. Pedestrian pushbuttons are required at the northwest and southeast corners of the intersection. Bike lanes will be

carried through the intersection on the north and south legs. Dedicated bicycle detection is recommended

Figure 45: Denali Street and 36th Avenue – Alternative A

6.5.4.2 Alternative B

Alternative B includes unchannelized right turns for east bound and west bound traffic turning onto Denali Street. This alternative was developed to reduce the ROW impacts, particularly in the southwest quadrant. The minimal setback of the business located at the northeast quadrant would necessitate a full parcel acquisition and demolition of the structure regardless of the selected intersection alternative. Queue lengths do not change appreciably between alternatives A and B. However, the pedestrian crossing distance is greater for alternative B than alternative A.

Figure 46: Denali Street and 36th Avenue – Alternative B

6.5.4.3 Alternative C

Alternative C does not include the right turn lanes at the southwest and northeast corners and the bike lanes on Denali Street are directed away from the street via exit ramps onto the multi-use pathways. This intersection struggles to accommodate the full build-out volumes as detailed in Appendix C. Eliminating the channelized right-turns proposed above would result in a reduction of LOS.

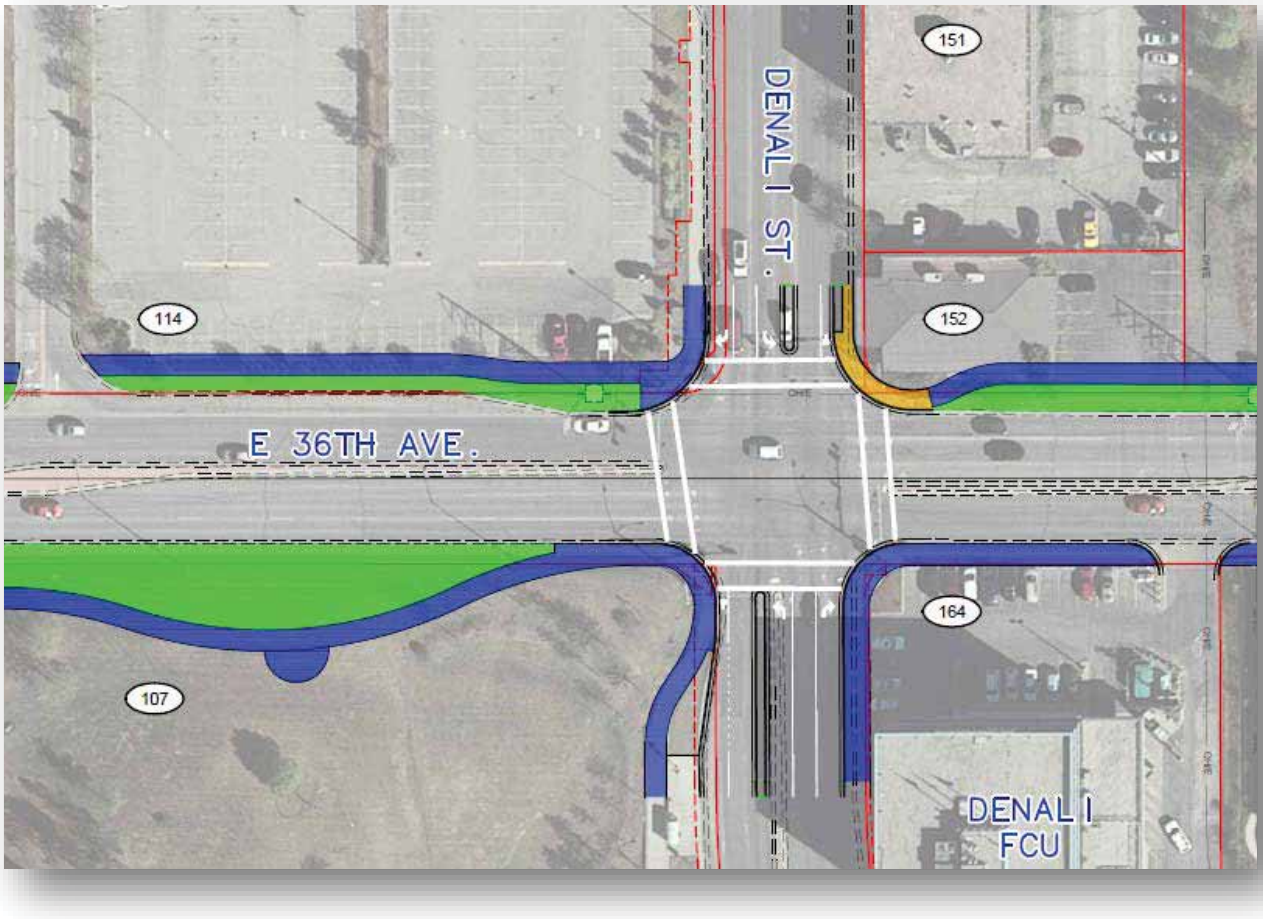


Figure 47: Denali Street and 36th Avenue – Alternative C

6.5.5 Denali Street and 33rd Avenue Intersection

The proposed improvements for this alternative focus on connectivity for non-motorized users. That includes a widening of the existing sidewalks to a 10-foot wide, multi-use pathway. Due to limited ROW and proximity to existing buildings, the pathway will be attached to the curb instead of separated. This intersection overlaps with the West 32nd and East 33rd Avenue Upgrades project currently in design. The roadway diet from 5 to 3 lanes will allow a shorter crossing distance for pedestrians but will require signal pole and pedestrian pushbuttons to be replaced. Combined with placing the pedestrian pushbuttons and signals on separate poles will shorten the minimum green time on the side streets. Several alternatives to improve this intersection were developed and are discussed in greater detail below.

6.5.5.1 Alternative A

Alternative A proposes green bike lanes and bike boxes across all northbound and southbound lanes. The intent of the colored boxes are to allow for bike users to que in front of vehicles, allowing turn movements within the travel lanes and bypassing the pedestrian crosswalk and pushbuttons at the signals. Placing bicyclists ahead of the queuing traffic provides the following benefits: increases visibility of bicyclists, reduces

signal delay for bicyclists, helps prevent “right-hook” conflicts, groups bicyclists together to quickly clear the intersection, and reduces vehicle encroachment into the crosswalk.

FHWA will grant separate interim approvals for green pavement markings and bike boxes. The MOA has already received interim approval for green pavement markings but has yet to apply for the bike boxes. It is assumed that interim approval amounts to a mere formality and would be granted. Colored concrete is proposed instead of inlaid markings to maintain skid resistance and reduce maintenance intervals.

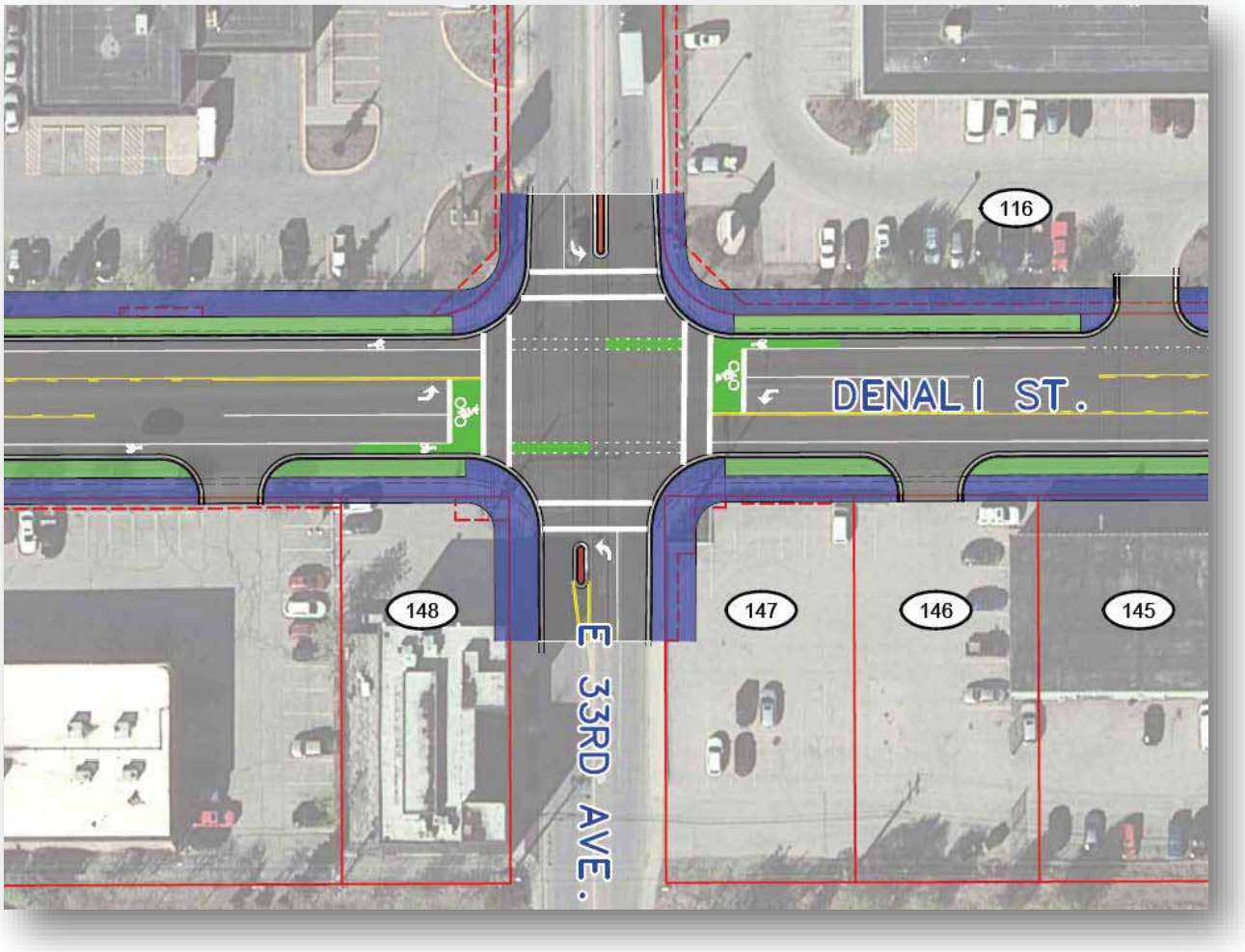


Figure 48: Denali Street and 33rd Avenue – Alternative A

6.5.5.2 Alternative B

This alternative is similar to Alternative 1 with the only difference being the absence of the green bike boxes across all north and south bound lanes. Only the bike lanes are proposed to be green.

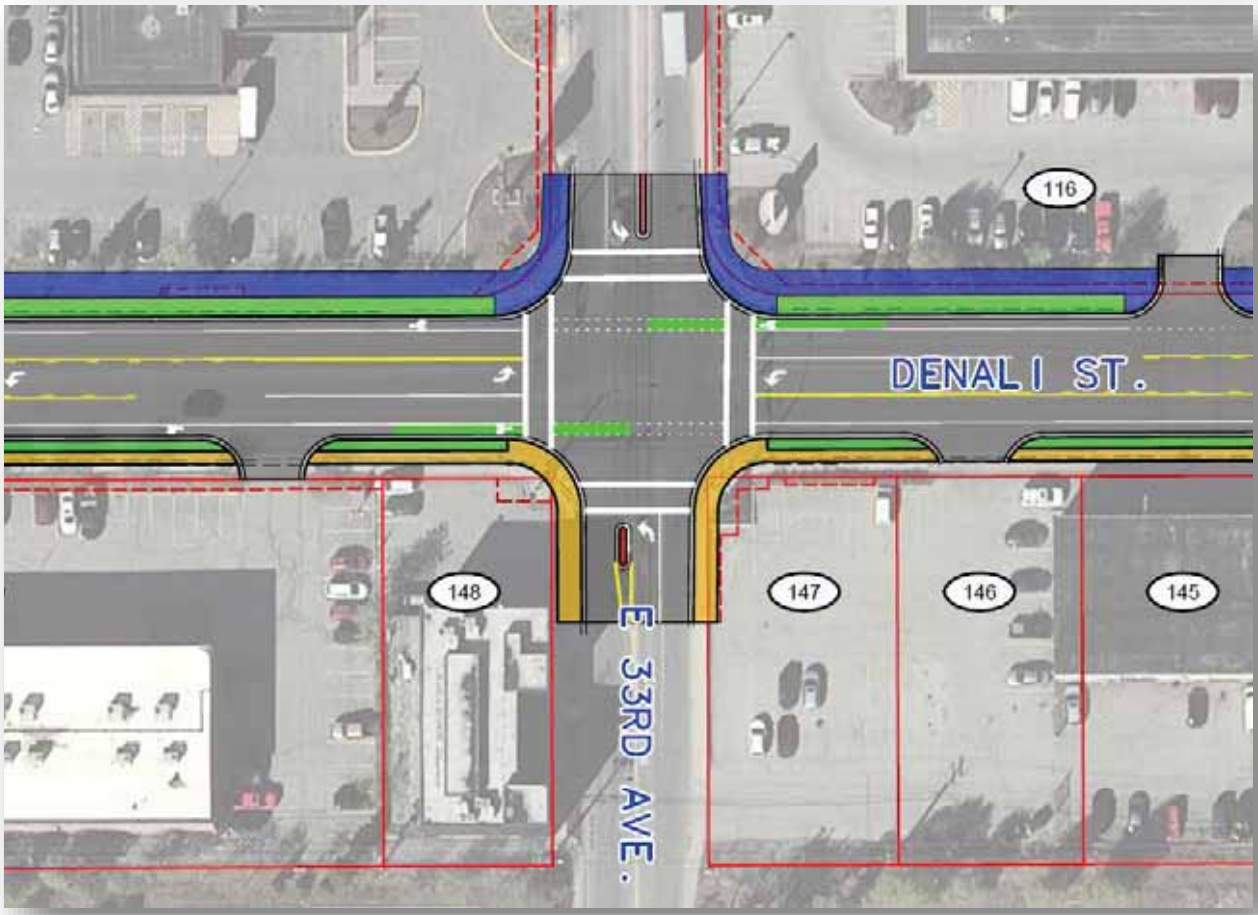


Figure 49: Denali Street and 33rd Avenue – Alternative B

6.5.5.3 Alternative C

This alternative proposes to end the bike lanes along Denali Street prior to the intersection, directing bicycle users onto the multi-use pathways via exit ramps.

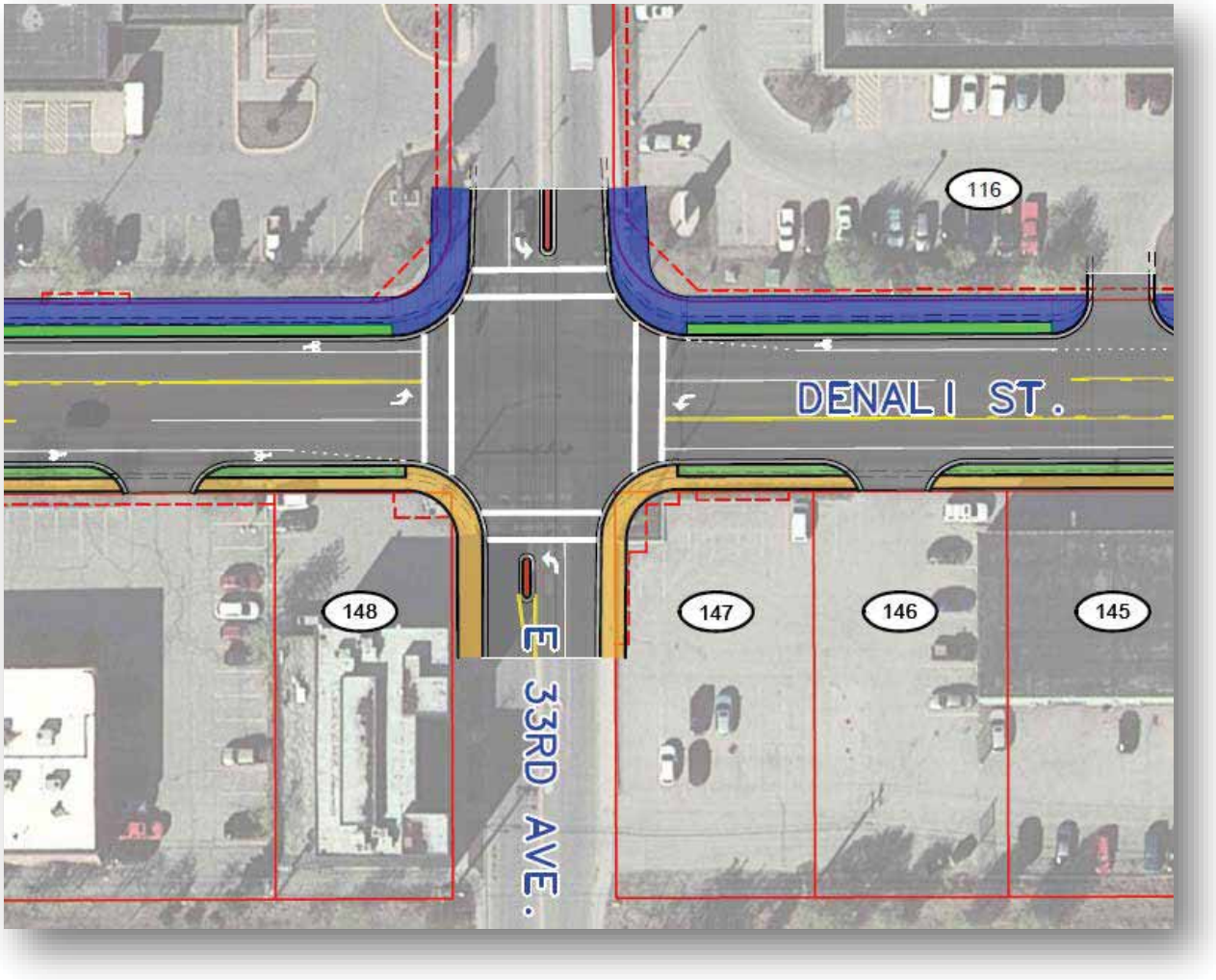


Figure 50: Denali Street and 33rd Avenue – Alternative C

6.5.6 Denali Street and Benson Boulevard Intersection

The alternatives for this intersection are dependent on the selected segment alternative. Similar for all intersection alternatives, bike lanes are present south of Benson Boulevard. However, bike lanes are either continued north toward Northern Lights Boulevard or bike users are moved to a separated bike lane or multi-use pathway. The removal of a southbound lane will allow for pedestrian and bicycle improvements without significantly affecting the layout of the remaining traffic lanes. Regardless of the Denali Street Segment 3 alternative chosen, the traffic signal located in the southwest corner of the intersection will need to be replaced and tied into the entire corridor. Additionally, the pedestrian pushbutton located in the northwest corner will need to be relocated closer to the new curb ramp.

Figure 51: Denali Street and Benson Boulevard Intersection

6.5.7 Denali Street and Northern Lights Boulevard Intersection

Similar to the Denali Street and Benson Boulevard intersection, the layout for this intersection is dependent on the adjoining segment alternatives chosen. The presence of bike lanes to the north and south of the intersection influence the pedestrian crossing distance and pushbutton locations. Nearby buildings are located along the ROW limiting improvements in the northeast corner. Impacts to parking lots exist at all four corners of the intersection. Regardless of segment alternative selected, the pedestrian signal heads on the northeast and southeast signal poles will need to be relocated onto new pedestrian pushbutton signal poles.

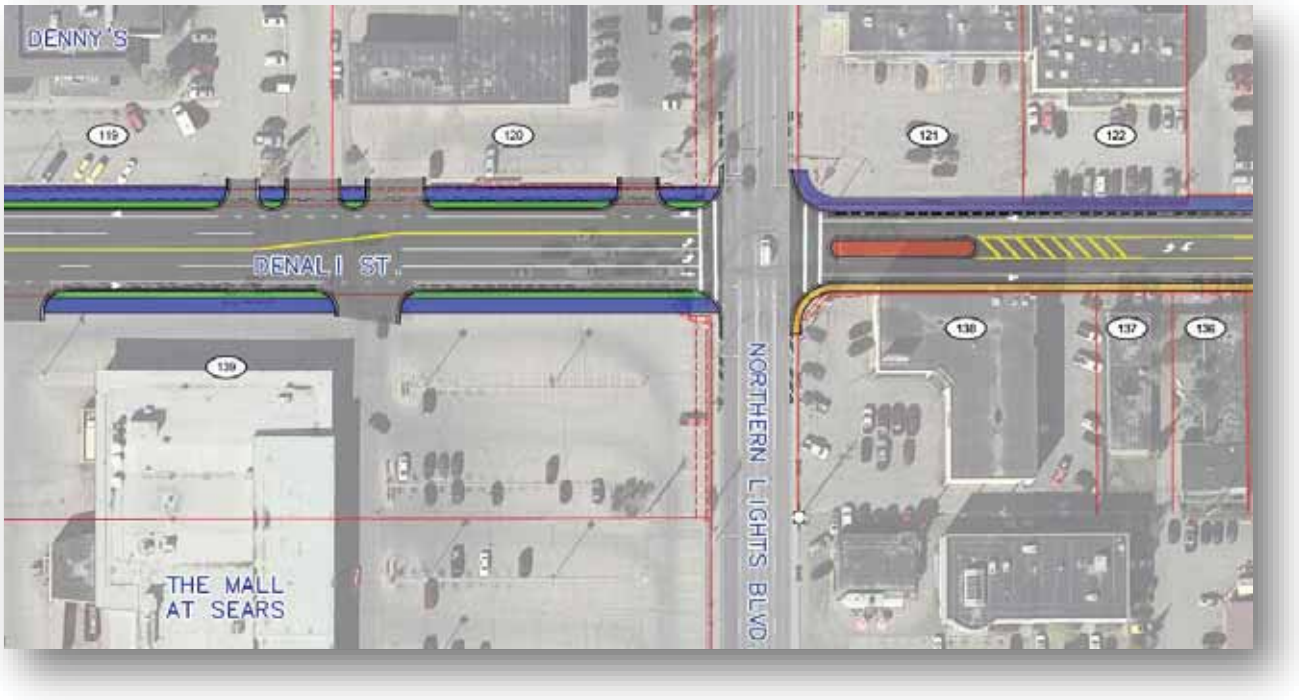


Figure 52: Denali Street and Northern Lights Boulevard Intersection

6.5.8 Denali Street and Fireweed Lane Intersection

All alternatives maintain the T-intersection and lane configuration at the northern terminus of the project: two lanes northbound (one dedicated left turn and one dedicated right turn) and one lane southbound. All movements will remain signal controlled. Sidewalks are available on both sides of Fireweed Lane for non-motorized users. Those wishing to continue towards the Chester Creek Trail can travel 350 feet east to Eagle Street and access the Trail past the north end of Eagle Street. Another option is to travel 1,100 feet west to A Street, turning north on the A Street pathway to the Chester Creek Trail or continuing along A Street to Downtown.

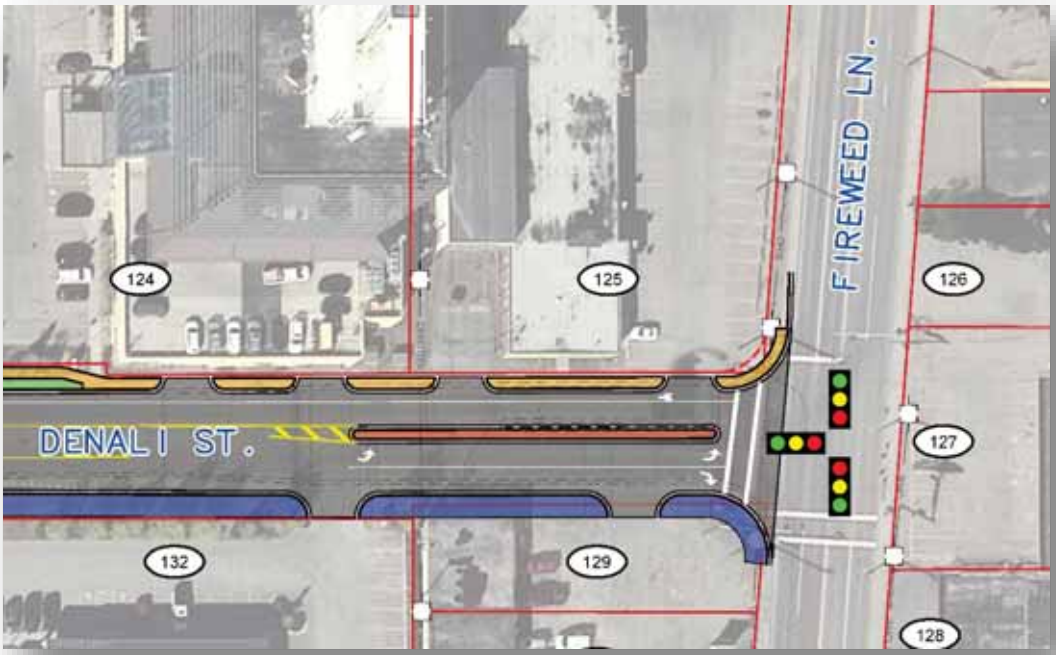


Figure 53: Denali Street and Fireweed Lane Intersection

6.5.9 36th Avenue and A Street Intersection

The recommendations for this intersection are limited to signalization upgrades. A new signal pole, mast arms, and foundation should be installed on the northwest corner due to damage to the existing pole as well as to accommodate additional signal heads. There currently is not a signal head over each lane of traffic at this intersection, leading to installing one additional signal head to each mast arm. The northeast corner has an older existing signal pole located about 15 feet north of where it ideally would be placed. A new signal pole and foundation will be installed closer to the intersection at the back of the sidewalk. All appurtenances on this signal pole would be replaced. On the southwest corner, the pedestrian push buttons are attached to a street light pole that is several feet behind the sidewalk. It is recommended that a new pedestrian push button pole be installed closer to the curb ramp with the existing pedestrian signal heads and push buttons relocated to this new pedestrian push button pole.

6.5.10 36th Avenue and Barrow Street Intersection

There is only one proposed alternative at the 36th Avenue and Barrow Street intersection. This alternative focuses on pedestrian crossing safety by widening the existing median from 2 feet to 6 feet. To accommodate the increased median width, the two westbound lanes are shifted to the north. In addition, Pedestrian Crossing Warning Signs with pedestrian push button activated LEDs embedded in the sign will be installed to call attention to the crossing.

This alternative was dismissed from further study due to conflicts between left turn vehicles and the proposed crosswalk, as well as the relatively high cost of shifting the existing curb approximately 2 feet.

Figure 54: 36th Avenue and Barrow Street Pedestrian Crossing Alternative

6.6 Interconnect

Minimal improvements are needed to the existing interconnect system throughout the project area. This project proposes to isolate the interconnect cables from the high voltage street lighting junction boxes, and any poor condition type II interconnect boxes should be replaced.

As an alternative, we would replace the existing copper interconnect with a new fiber optic interconnect along approximately 1.5 miles of roadway. This upgrade has a straight forward, one-time cost associated with switching to fiber optic but it also provides significantly greater signal control capabilities. New conduit, wiring, and underground vaults would be necessary to support the system upgrade, along with minor updates to the traffic signal controller hardware.

6.7 Corridor Alternatives

The segment and intersection alternatives described above were assembled to form corridor alternatives and presented at the second open house. Input obtained from stakeholders as well as a desire for consistent facilities along the alignment were the foremost criteria used during the assembly. Table 9 describes the corridor alternatives. Alterations to these corridor alternatives are expected as the project moves forward.

Table 9: Corridor Alternatives

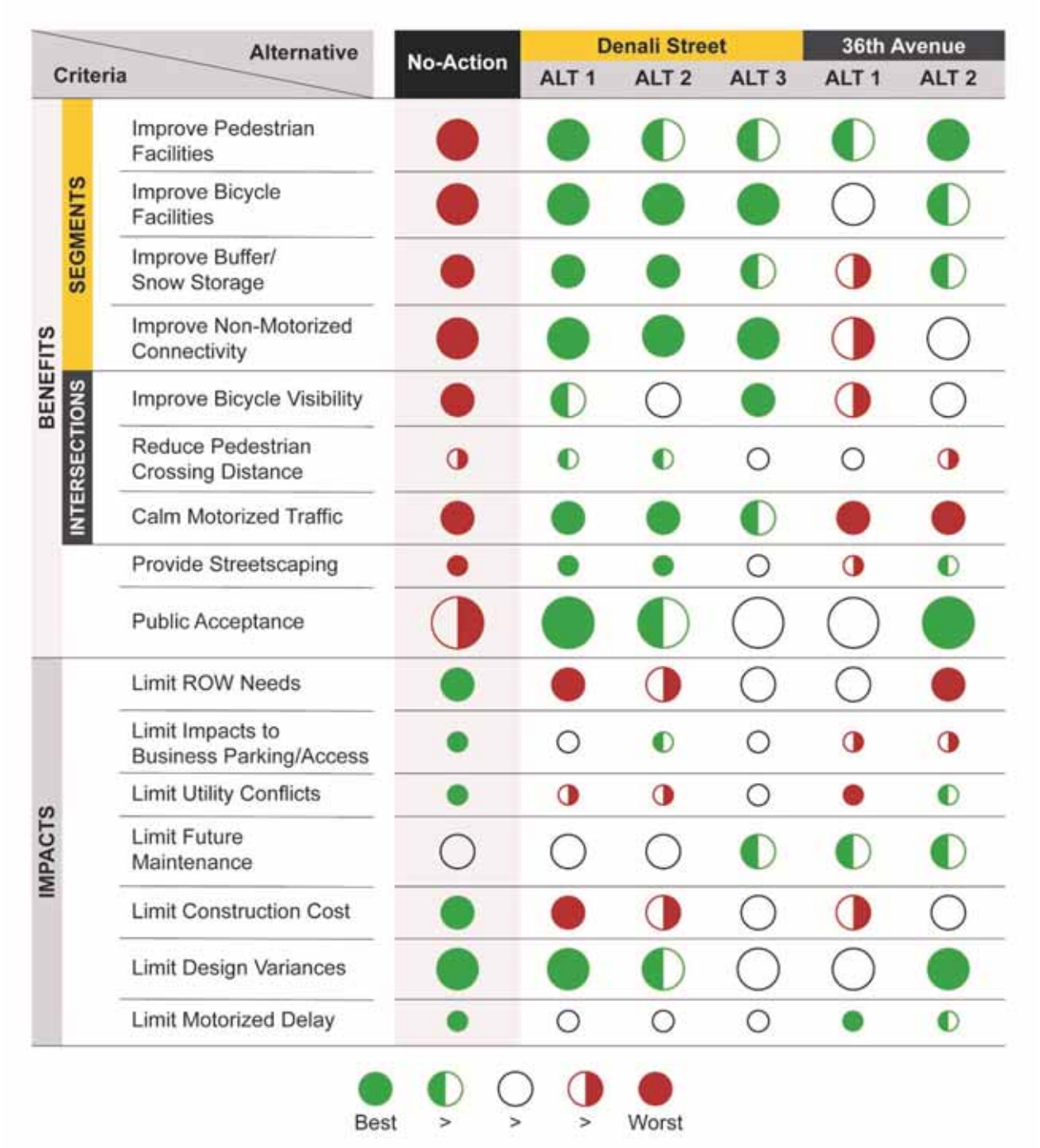
		DENALI STREET			36TH AVENUE	
SEGMENT *INTERSECTION*	a	ALT 1	ALT 2	ALT 3	ALT 1	ALT 2
1 - Tudor Rd to 36th Ave		1	2	3		
Denali St and 40th Ave		A	A	B		
Denali St and 36th Ave		A	B	C		
2 - 36th Ave to Benson Blvd		1	2	3		
Denali St and Calais Dr		A	B	C		
3 - Benson Blvd to Northern Lights Blvd		3	2	3		
4 - Northern Lights Blvd to Fireweed Ln		1	2	3		
5 - C St to Old Seward Hwy					1	2
36th Ave and Denali St					A	B

7.0 EVALUATION AND RECOMMENDATION

7.1 Alternatives Evaluation

The design study phase evaluated several alternatives that reasonably represent the range of options available for this project. The corridor alternatives described in Table 9 were evaluated using a set of benefit and impact criteria developed by the project team consistent with the purpose and need of the project, adopted plans and policies, as well as taking into consideration the stakeholder feedback received during the design study process. Weighting was applied to the various criteria, as indicated by the size of the symbols shown in the following two tables. For example, “Improve Pedestrian Facilities” was deemed more important than “Limit Motorized Delay” and was therefore assigned a greater weight in the overall analysis. Table 10 illustrates the results of the evaluation.

Table 10: Alternatives Evaluation Matrix



7.2 Phasing Evaluation

Phasing the Denali Street improvements is recommended to prioritize segments with the greatest need/potential benefits, remain consistent with adopted plans and policies, and stay within the realm of available funding. An evaluation was conducted to determine the phasing sequence similar to the alternatives evaluation. The 36th Avenue improvements span a relatively short distance and are not recommended to be phased. Table 11 illustrates the results of the phasing evaluation.

Table 11: Phasing Evaluation Matrix

Criteria \ Segment	Denali Street			
	Segment 1	Segment 2	Segment 3	Segment 4
	Tudor Rd to 36th Ave	36th Ave to Benson Blvd	Benson Blvd to Northern Lights Blvd	Northern Lights Blvd to Fireweed Ln
Lane Miles of Non-Motorized Improvements				
Connectivity to Area Trails				
Potential ROW Acquisition Conflicts/Project Delays				
Potential Utility Conflicts/Project Delays				
Pedestrians/Bicyclists Usage/Planning Priority				
Resolving Identified Pavement/Drainage Issues				
Identified Safety Deficiencies/Potential for Improvements				

7.3 Recommendation

The ranking was conducted based on how each alternative/segment addresses the sum of the weighted criteria. The following table summarizes the recommended alternative.

Table 12: Recommended Alternative

SEGMENT *INTERSECTION*	DENALI STREET	36TH AVENUE
1 - Tudor Rd to 36th Ave	• 3 lane section (center TWLTL) • Both sides: o bike lanes o multi-use pathways o buffers	N/A
Denali St and 40th Ave	• Single lane modern roundabout	N/A
Denali St and 36th Ave	• Signalized with bike detection • Channelized right-turn lanes on 36th Avenue • Pedestrian refuge islands	
2 - 36th Ave to Benson Blvd	• 3 lane section (center TWLTL) • Both sides: o bike lanes o multi-use pathways o buffers	N/A
Denali St and Calais Dr	o Signalized with bike detection o Green bike boxes with green ingress/egress lanes	N/A
3 - Benson Blvd to Northern Lights Blvd	• 4 lane section • Center raised median • Both sides: o bike lanes o multi-use pathways	N/A
4 - Northern Lights Blvd to Fireweed Ln	• 3 lane section (center TWLTL) • Bike lanes both sides • One multi-use pathway • One sidewalk	N/A
5 - C St to Old Seward Hwy	N/A	• Resurface roadway (lane config. to remain as-is) • Both sides: o multi-use pathways o buffers • ML&P transmission line to remain as-is • Multi-use pathway to 34th Ave
Segments	Replace street lighting and signal interconnect	
Signalized intersections	Replace complete signal system (7 intersections) Bicycle detection	

The Denali Street segments are recommended to be prioritized in the following order (from first priority to last priority):

1) Segment 1 (Tudor Road to 36th Avenue);
2) Segment 2 (36th Avenue to Benson Boulevard);
3) Segment 4 (Northern Lights Boulevard to Fireweed Lane); and
4) Segment 3 (Benson Boulevard to Northern Lights Boulevard).

8.0 SOILS AND PAVEMENT DESIGN

The project area is generally characterized by poor soil conditions, including organic and fine-grained materials, and shallow groundwater. The extent that these adverse conditions were mitigated during the original roadway construction or subsequent improvement projects is unknown. Additional subsurface investigation will be needed for design. The existing pavement surface conditions and drainage conditions should be investigated to determine locations where subsurface conditions may be effecting roadway performance.

The results of the pavement condition survey will help determine areas where the existing structural section may need to be replaced. However, assuming a generally good condition of the existing pavement, a full depth reconstruction of the structural section is not expected to be necessary in most areas. Commensurate with the preliminary nature of the project it is assumed that 25% of the roadway will require excavation and a 4-foot thick, insulated structural section. Where new improvements extend outside the existing roadway, excavation to remove organic material may be required. In these areas, a minimum 4-foot thick structural section should be anticipated, along with insulation.

9.0 DRAINAGE

In order to evaluate the existing storm drain system and prepare recommendations, a comprehensive topographic and planimetric survey shall be performed, along with a conditional assessment of existing pipes and structures. This will be necessary to positively identify and correct assumed drainage issues such as the one shown below. This work is outside the scope of the current contract and should be amended to future contracts.

Figure 55: Ponding on Denali Street south of 36th Avenue

10.0 UTILITY IMPACTS

Utility companies with facilities located within the project area have been contacted to identify utility ownership and open a dialog to identify any facility relocations that may be necessary as well as utility-initiated upgrades. Presented below are preliminary descriptions of issues related to existing and proposed utilities.

A more detailed analysis of the need for relocations or extension will be made during the design process. The locations of utilities within the project corridor are based solely on record drawings and/or grid maps provided by the utility. A comprehensive utility survey will need to be performed to accurately identify conflicts.

A complete utility conflict report as well as plans showing approximate existing utility locations are contained in Appendix D.

10.1 Water

No conflicts are anticipated with water distribution mains on either 36th Avenue or Denali Street. However, the preliminary estimate provides for the surface adjustment of approximately forty-six water valve boxes and lids to finished pavement grades, and the relocation/adjustment of eighteen fire hydrants. The adjustments and/or relocations apply to all design alternatives.

10.2 Sanitary Sewer

No conflicts are anticipated with sewer collection pipelines along 36th Avenue or Denali Street. However, the preliminary relocation estimate provides for the adjustment of twelve manhole frames and grates to finished pavement grades. The adjustments apply to all design alternatives.

10.3 Natural Gas

Encounters with the 4-inch plastic main along 36th Avenue are likely, given its location under the existing pathway. Depending on the design alternative chosen and factors such as the pathway structural section depth, landscape grading, etc., the encounters may become conflict and require relocation or adjustment.

It is assumed that the construction of the roundabout at 40th Avenue requires the relocation of the 2-inch plastic main between stations 24+00 and 31+30 under design alternatives 1 and 2. The preliminary relocation estimate provides for minor vertical or horizontal adjustments to the main under design alternative 3.

Encounters with the 2-inch main along Denali Street between 36th Avenue and Northern Lights Boulevard are likely, given its location under the existing sidewalk, curb and gutter, and the northbound travel lane. Full relocation of the main between stations 37+65 and 61+60, including crossings at 36th Avenue, station 54+25, and station 58+60, are assumed under design alternative 1. The preliminary relocation estimate provides for minor vertical or horizontal adjustments to the main under design alternatives 2 and 3.

10.4 Electricity

Design alternative 1 on 36th Avenue requires the relocation of the ML&P pole line north, into a new utility easement, to accommodate the 115kV circuit. The 12.5kV circuit and fiber optic cable underbuilt on the existing poles would be relocated to an underground configuration, presumably under the proposed 10-foot pathway. The ML&P preliminary estimate also provides for relocation of the 3-phase 12.5kV direct buried circuit along the south side of 36th Avenue between A Street and Denali Street.

Design alternative 2 does not require the relocation of the ML&P pole line along the north side of 36th Avenue. However, the ML&P preliminary estimate provides for undergrounding the aerial 3-phase 12.5kV circuit and fiber optic cable along the north side of 36th Avenue, as well as the 3-phase 12.5k V circuit along the south side of 36th Avenue between A Street and Denali Street.

ML&P has a project in design (Sub 16 West Feeders) that will underground the aerial 2-phase 12.5kV circuit between riser pole 51B, station 122+20, and riser pole 71B, station 128+40. However, the costs to underground the circuit and remove the poles are included in ML&P's preliminary relocation estimate for this project.

Figure 56: ML&P Pole along 36th Avenue

ML&P's preliminary estimate provides for the relocation of the underground 3-phase 12.5kV facilities along and crossing Denali Street between Tudor Road and Fireweed Lane in all design alternatives. The estimate provides for the relocation of conductors and associated vaults, pull boxes, switch cabinets and transformers for design options land 2. The estimate provides for relocating underground direct buried conductors into conduits in all design options.

10.5 Communication

This report and preliminary relocation estimate is predicated on the project design avoiding any conflict with the ACS and GCI underground duct and cables associated with both the Central Wire Center, and the ACS manhole/duct systems along 36th Avenue and Denali Street. Surface adjustments to GCI handholes and ACS manhole access lids are considered.

10.5.1 ACS

Potential conflict exists between proposed pathway construction and existing underground 1200x24 cables:

- Along the south side of 36th Avenue between stations 102+00 and 122+10, and
- Along the north side of 36th Avenue between stations 122+10 and 135+00.

The preliminary estimate provides for a replacement-in-kind relocation for all design alternatives.

The preliminary estimate also includes costs to adjust seventeen ACS manhole lids, frames and grates to final pavement grades.

Figure 57: ACS Vault on 36th Avenue

10.5.2 GCI

Potential conflict exists between pathway construction and underground fiber optic cable along the south side of 36th Avenue between stations 108+00 and 129+00. The preliminary estimate includes costs for a replacement in kind relocation.

The preliminary estimate also includes costs for the adjustment and/or relocation of four fiber handholes associated with the Central Wire Center on Denali Street. The estimate assumes sufficient fiber Slack loops in each of the handholes.

11.0 ACCESS AND RIGHT-OF-WAY CONSIDERATIONS

11.1 Access Control

Since both Denali Street and 36th Avenue are minor urban arterials, local civic, park, private property and business access will remain unrestricted, albeit better defined and coordinated with improvements to roadway, pedestrian and bicycle facilities including landscaping. Some opportunities for driveway consolidations have been identified along Denali Street, segment 3.

11.2 Right-of-Way

The minimum ROW width to accommodate the DCM typical section for a minor arterial is 69 feet, which does not account for bike lanes (+8 feet) or shoulders behind the sidewalks/pathways (+6 feet). The majority of the existing ROW is around 70 feet wide, which results in all alternatives require varying degrees of ROW acquisition to meet the purpose and need of the project.

Alternatives developed for this design study have taken into consideration available MOA owned ROW (e.g., Loussac Library), undeveloped parcels, and the anticipated challenges associated with acquiring ROW between alternating sides of the street. ROW needs for Public Use Easements for road improvements and utility easements for the relocation of ML&P's transmission line are summarized below and detailed in Appendix H.

Table 13: ROW Needs

ALTERNATIVE	PERMANENT ROW NEED (SF) APPROX.	PERMANENT ROW NEED PERMANENT (# PARCELS)	FULL PARCEL NEED (# PARCELS)
Denali Street			
Alternative 1	76,000	36	0
Alternative 2	61,000	30	0
Alternative 3	50,000	32	0
36th Avenue			
Alternative 1	63,000	>19	1
Alternative 2	94,000	17	1

In addition, temporary easements and permits to aid construction will be required along the corridor.

12.0 TRANSIT

MOA Transit routes changed significantly in October 2017. Prior to that, several routes served both Denali Street and 36th Avenue. Currently, all service on Denali Street and 36th Avenue within the study area has been suspended. Even though it is too early to tell, this may increase pedestrian and bicycle volumes as transit patrons are likely to traverse the study area to access bus stops or other destinations.

Even though bus service is currently suspended, MOA Transit has requested that the transit infrastructure along 36th Avenue and Denali Street south of 36th Avenue remain. This impacts seven stops along 36th Avenue and two along Denali Street. The remaining two stops along Denali Street north of 36th Avenue do not need to be restored.

Figure 58: Transit Stop on 36th Avenue

13.0 MAINTENANCE CONSIDERATIONS

The MOA's Street Maintenance Department (M&O) was included in the agency outreach and provided valuable input during the development of the concept and design study reports.

13.1 Snow

Currently, both Denali Street and 36th Avenue lack temporary snow storage which forces M&O to haul the plowed snow to an off-site snow disposal site. The closure of the Northwood snow disposal site has added an additional challenge for M&O crews as it requires a commercial day haul to the C Street snow disposal site.

Figure 59: Snow restricting access to pedestrian push button

The proposed addition of buffers between the curb and pathway would allow for M&O to temporarily store snow. Bike lanes become de-facto shoulders during the winter and will be utilized by M&O to temporarily store snow. M&O is in favor of a "Bicycle Priority Network" that would designate certain core bicycle routes for year-round maintenance whereas other, less used routes are maintained less frequently.

The placement of landscaping within the buffers has an effect on M&O activities. Pockets of landscaping are preferred over continuous plantings. Those pockets should be located midway between approaches/sidestreets to provide maximum snow storage downstream of approaches/sidestreets.

13.2 Pavement Markings

Elaborate pavement markings (e.g., Sharrows) are difficult and expensive to maintain. MOA Traffic requested a minimal number of these type of symbols and to place them outside the wheel path. To date, no bike lane symbols have been replaced within the MOA. Green markings for bike boxes are best implemented using colored concrete for longevity and skid resistance.

13.3 Maintenance Impacts

Overall, the project intends to lessen impacts to M&O activities as much as possible, as shown on Table 14. Discussions will resume once the project advances to the next stage.

Table 14: Impacts to M&O

PROPOSED IMPROVEMENT	IMPACTS ON MAINTENANCE ACTIVITIES (+/-)
Separated pathways/sidewalks	Provide temporary snow storage
Bike lanes	De-facto shoulders for temporary snow storage
Reconstruct roadway and sidewalks/pathways	Decrease need for crack sealing and pot hole repairs
Road Diet	Reduce overall lane miles
Provide continuous LED lighting system	Decrease operation costs and increase longevity
Upgrade signals	Add reliability, less call-outs
Relocate overhead utilities	Less obstacles in the ROW
Channelization	More difficult to plow, work around
Signing/striping	Recurring costs for replacement
Landscaping	Decreases available snow storage

14.0 STREET ILLUMINATION

Two alternatives were developed for the proposed improvements. The first alternative is the minimum improvements needed to bring the illumination into line with current MOA design practices and standards. Alternative 2 consists of the improvements necessary to accommodate the Complete Street Alternative. Illumination recommendations are discussed in further detail in Appendix E.

14.1 Street Lighting

The current design practice within the MOA is to transition outdoor roadway lighting to light emitting diode (LED) lighting fixtures, in compliance with the DCM. This would apply to all street light fixtures within the project area. LED luminaires tend to cost more than High Pressure Sodium (HPS) or metal halide fixtures, but they provide several benefits that make up for the price:

- LEDs usually meet standards while using 50-percent less electricity.
- LEDs are rated to last 2 to 4 times longer than HPS lamps.
- LEDs can be fitted with remote monitoring and dimming controls.

While LED light fixtures have a larger upfront expense, they have a lower operating and maintenance cost over the life of the system.

Alternative 1 would change all the street light fixtures to LED. In addition, it is recommended to add a remote monitoring and control system to all the illumination poles within the project area. Benefits of this system include automated maintenance logs, alerts when fixtures fail, and the ability to lower light levels (and power usage) during low traffic volume times. If some area light levels are well above MOA standard minimums, it would be feasible to dim the streetlights during off-hours and still meet requirements.

Alternative 2, the Complete Streets Alternative, would replace the existing street lights on Denali Street with new LED luminaires at 300-foot spacing on alternating sides of the street. There would also be pedestrian scale lights installed behind the pathway at 100-foot spacing on both sides of the street to enhance pedestrian comfort. The existing street lights on 36th Avenue would be replaced with new LED luminaires at 150-foot spacing on the south side of the street to avoid the overhead utilities on the north side of 36th Avenue. There will also be pedestrian scale lights installed behind the pathway on both sides of the street at 100-foot spacing to enhance pedestrian comfort. Lastly, the proposed single lane roundabout at Denali Street and 40th Avenue will require new lighting to provide proper lighting levels for vehicles, bicycles, and pedestrians.

The existing lighting on 36th Avenue, from Denali Street to Old Seward Highway, is recommended for complete removal of the eight illumination poles and replacing them with new foundations, poles, mast arms, and LED fixtures with remote monitoring modules. These poles are in the middle of the pedestrian traveled way. New junction boxes, conduit and wiring should also be installed at the back of the sidewalk. Currently these existing poles are spaced at about 150 feet apart but increasing that separation to around 200 feet could mean two less illumination poles needed for this section of road.

An added benefit to completely replacing this stretch of lighting would be the ability to split the lighting system into its own junction boxes, which are currently shared with the interconnect cabling.

14.2 Intersection Lighting

To avoid any visibility discomfort in switching between LED and HPS lighting systems, all traffic signal pole luminaires in the project area should be swapped to LED fixtures. In addition to the lighting upgrades, load centers will need to be replaced at the following intersections: Denali Street and Tudor Road, 36th Avenue and A Street, and 36th Avenue and Old Seward Highway. Each of these load centers has either passed its life expectancy or is nearing its recommended design life.

14.3 Pedestrian Lighting

Pedestrian scale LED light fixtures should be considered as an added security and safety benefit to bicyclists and pedestrians. Although the lighting level analysis showed that the existing street lights provide adequate illumination on the sidewalks, there could still be demand for higher light levels. Pedestrian luminaires could be installed at the back of the sidewalks and spaced uniformly between the street light poles.

15.0 LANDSCAPING

15.1 Local Requirements

Both Denali Street and 36th Avenue have existing public landscaping related to the road or other public and private facilities related to adjacent businesses. Public areas including roads, the library, and lands with PLI zoning are under the jurisdiction of the Planning and Zoning Commission (AMC 21.02.030 and 21.03.190), and the Urban Design Commission (MOA Section 21.03.090).

Anchorage 20/20 identifies the need for landscaping along Anchorage's roads:
Chapter 4 Land Use Concept Plan "Design and landscape roads to maintain and enhance the attractiveness of neighborhoods, open space, and commercial corridors and centers, and reduce adverse impacts on neighborhoods."

The Design Criteria Manual (1.5H) recognizes the importance of landscaping "…an important aspect of every project and is typically noticed more than any other aspect of design." It states the following criteria for landscaping:

- ideally install amenities behind pedestrian improvements to reduce damage during maintenance operations;
- landscaping between curb and pedestrian should use a minimum width of 3-feet for grass areas and 7-feet for plantings;
- design improvements to fit character of the area as well as stakeholder needs.

The Design Criteria Manual (DCM) design elements that have significance for this project include:

- saving existing vegetation where possible; providing adequate space for plants to grow and thrive;
- locating plants in masses for visibility and easier maintenance; setback woody plant materials 4-feet from back of curb; sizing trees to reduce moose damage;
- use of street trees (taller branched trees);
- use of tree grates; use raised planters where possible; irrigation system (in coordination with MOA Horticulture);
- selection of plants to fit site conditions (climate, aesthetics, function, maintenance);
- clear vison area requirements (provide sight triangles on drawings);
- 7-foot wide grass strip at back of curb for snow storage which includes 2-foot wide textured concrete apron;
- hardscape
- art and sculpture where planting space is limited; and
- acquisition of right-of-way.

Commercially zoned areas require landscaping along the road and adjacent to parking lots per MOA Tittle 21. Land within the corridor is primarily zoned B-3. Two types of landscaping are required within the B-3 zone, Site Perimeter Landscaping and Parking Lot Landscaping. Both are met with Visual Enhancement Landscaping or L1, according

to 21.07-2. L1 requires businesses to provide an 8-foot wide planting bed on average (with 5-foot min. allowed under certain conditions) with a minimum count of trees and shrubs. Optional design standards provide some flexibility for land owners and include raised planters, pedestrian amenities, and pedestrian lighting to reduce the required tree count. Shrubs and perennials may be used in the design to accommodate utilities and spatial or aesthetic concerns.

15.2 Climatic Requirements

The project area is generally a Zone 3/4 designation in terms of plant hardiness (Plant Hardiness Zones, Epps, Cooperative Extension Service, 1983). Temperature extremes are a high temperature in the 80-degree F (Fahrenheit) in July, typically the hottest month, to minus 30 degrees F in January and February, the coldest months. The prevailing wind direction is from the north with a mean wind speed of 6.9 mph, however winds as high as 90 mph have been recorded in the area. The Chugach Range affects the local climate by reducing daylight hours due to the height of the mountains and by altering wind patterns.

15.3 Landscaping Recommendations

The primary site specific elements for the proposed project are related to the Midtown urban character of the project including the B-3 zoning with its existing businesses and the public facilities within the area. Limited right-of-way to accommodate complete streets, green streets, landscaping and maintenance requirements and needs plays a major role in the development of landscape solutions related to roadway improvements.

Overall landscape solutions will include massing of vegetation to improve plant growth and survival and to allow reasonable snow removal and storage operations. The design will explore the idea of northern lights as a thematic element reflecting the existing and potential character of Midtown. The landscape design will enhance existing landscaped areas at public facilities including Loussac Library and PLI zoned uses.

Design concepts/strategies area summarized below.

Snow storage: provide temporary snow storage to aide with MOA Street Maintenance operations. Strategic plant massing will be part of the design solution. Placement of a concrete apron along the roadside and at roundabouts will be explored.

Loussac Library: Construct plaza or square in the northeast corner (SW corner of Denali and 36th) connect to transit facilities connect to sidewalks, constructed of 6 inches PCC concrete; Plaza may include benches, bike racks, kiosks, planters, signage, lighting, trashcans, art/sculpture; gateway, sign features; connect plaza and Cuddy Park to south; consult Loussac Library master plan October 1026 MOA Memo).

- Midtown does not have a cohesive design theme, however design elements are beginning to emerge as new projects are being developed and roads are being rebuilt. The design will explore the idea on northern lights as a thematic element in part due to some of the vertical elements along the commercial strip that celebrate northern lights and to the name of Northern Lights Boulevard itself.

Canada Red is a prominent planting within the project area, continued use of the plant which is adaptable as a street tree will be considered.

- Business owners have stated a desire to limit landscaping. This is related to business visibility and issues with transient populations who use landscape areas. Plant massing with specific consideration to allowing views into and through landscape areas as well as not creating attractive places to camp or gather.

- Pedestrian amenities including art, benches, raised planters and low concrete wall will be explored as design solutions particularly where the right-of-way is narrow. The existing low decorative concrete wall may or may not be an ideal design element; if practical it will be reused.

- Greens streets/infrastructure: Opportunities for using run-off and reducing water that enters the storm drain system will be explored. Where practical rain gardens with low maintenance requirements yet with an urban feeling will be used to allow water to percolate.

- Use roundabouts as strong landscape design elements that may create gateways or focal points using sculpture, plant materials or a combination that enhance the theme or character of the area.

- Recognize the value of existing landscaping including hedges that hide parking lots and trees that soften the appearance and improve the scale of the road and parking lots. As practical, existing high quality landscaping will be saved.

Figure 60: Northern Lights Gateway in 40th Avenue Roundabout central island

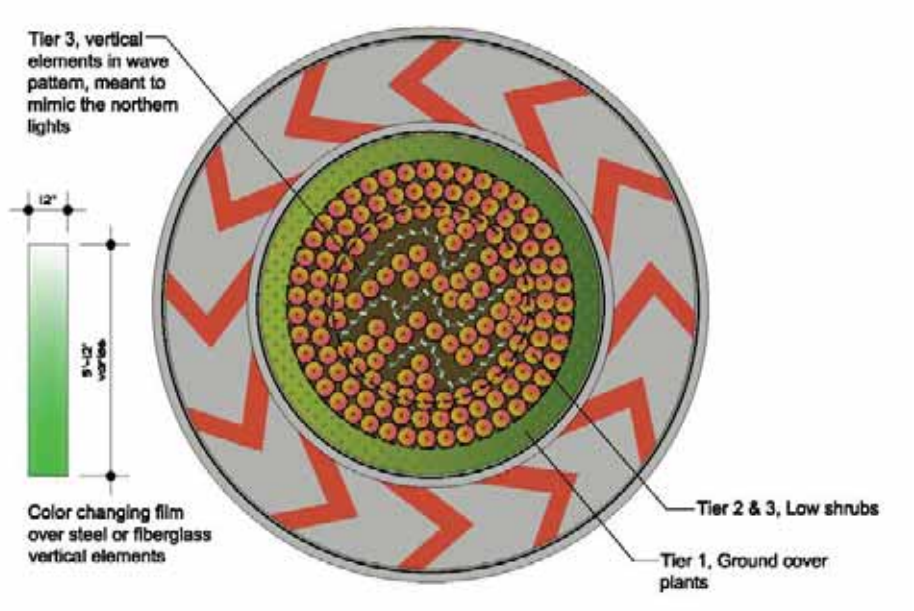


Figure 61: Northern Lights Gateway in 40th Avenue Roundabout central island

Figure 62: Alternative Gateway treatment

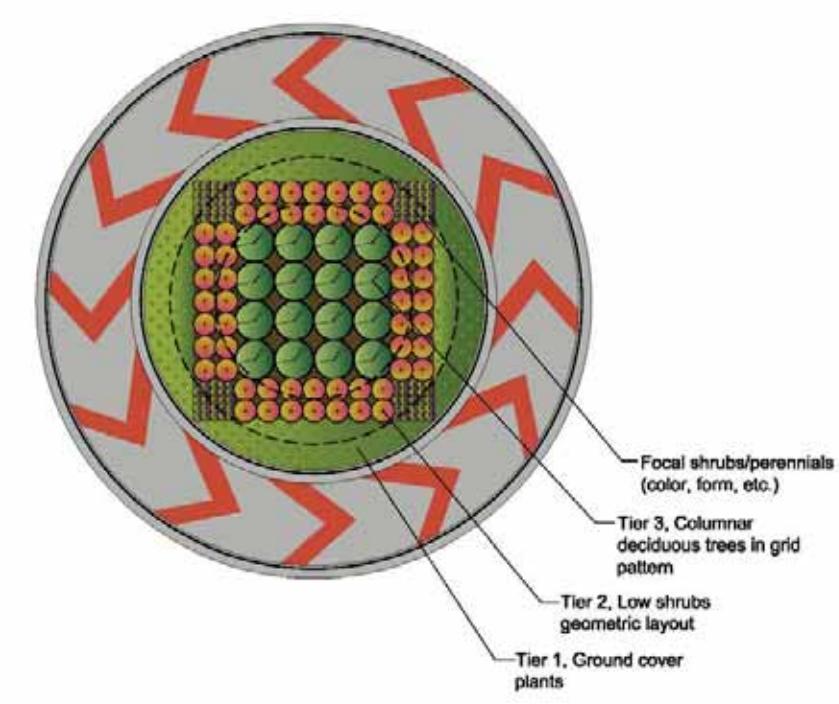


Figure 63: Alternative Gateway treatment

16.0 WORK ZONE TRAFFIC CONTROL

Construction should be phased to minimize impacts to local traffic and cut through traffic discouraged with proper signage. It is anticipated that construction will take place under traffic conditions whenever possible. In addition, access to businesses will be maintained during construction to reduce impacts to the extent practicable. Fortunately, several detour opportunities exist that could be used during construction for potential full width roadway closures. The key to a successful construction phase is early coordination with stakeholders. Refinement of the traffic control plan will continue through final design.

17.0 PERMITTING AND APPROVALS

This project follows the MOA's adopted CSS policy, which includes two appearances with the Planning and Zoning Commission (P&ZC) and one appearance with the urban Design Commission (UDC).

17.1 Planning and Zoning Commission

The Concept Report was reviewed by the P&ZC on December 4th, 2017. The commissioners expressed support for the project, particularly the combination of road diet and addition of bike lanes. The meeting minutes are included with the Concept Report (Appendix F).

17.2 Urban Design Commission

Public roadway project plans, including 65% complete landscaping plans, are reviewed by the UDC.

17.3 Design Reviews

In addition to the reviews stated above, the 95% Plans, Specifications, and Estimate (PS&E) will be reviewed by the appropriate municipal departments and state agencies. Furthermore, utility companies with facilities within the project corridor will be asked to review the PS&E and provide comments.

17.4 Environmental Permitting and Approvals

United States Army Corps of Engineers (USACE)

The USACE has jurisdiction over Waters of the U.S. including wetlands. A review of the MOA wetlands map indicates that Class A freshwater wetlands are intermittently present on one parcel adjacent to Denali Street and E 40th Avenue, in project segment on Denali Street between Tudor Road and 36th Avenue. Alternatives 1, 2, and 3 for Denali Street propose varying amounts of ROW be acquired for non-motorized facility improvements, which may or may not impact wetlands delineated on the parcel. Consultation and coordination with MOA Watershed Management and USACE will be required to determine if impacts are anticipated and whether a Municipal General or USACE Individual Permit is required.

According to the WMP the General Permit is applicable in this area with the following:

> *GP Site Restrictions and Design Criteria: construction timing window, identify surface water features, BMPs for local flooding and storm water controls required. Development shall direct stormwater through appropriate treatment prior to entrance into stormdrain as it leads directly into Fish Creek. Could serve as stormdrain treatment/collection site. Any development must not adversely affect AWWU well at 40th/Barrow. COE Jurisdictional Determination required.*
>
> *SW 40th and Denali Street site: remaining wetlands are preserved by permit, Fish Creek 04-C.*

Alaska Department of Environmental Conservation (ADEC)

Fish Creek is listed on ADEC's list of impaired waters (September 2010) for Fecal Coliform Bacteria. The source of the pollutant is identified as urban runoff, and as the storm sewer drainage system in the project corridor drains into the piped Fish Creek, a Stormwater Engineering Plan Review/Letter of Approval (LOA) may be required for some or all of the alternatives. An LOA would be required for any alternatives that include an oil/grit separator. A copy of the Permanent Storm Water Management Control Plan Review Checklist with all required documents would need to be submitted to ADEC to obtain a LOA. Consultation with ADEC is required to determine if any of the alternatives will require a LOA. For temporary stormwater discharges during construction, a SWPPP would need to be prepared by the contractor and a Notice of Intent filed with ADEC for authorization under the Alaska Pollutant Discharge Elimination System (APDES) Construction General Permit (CGP). This requirement applies to all alternatives.

Alaska Department of Fish & Game (ADF&G)

Coordination with ADF&G is recommended due to Denali Street crossing the sub-surface Fish Creek at E 40th Avenue and anticipated storm water improvements associated with the proposed alternatives. An ADF&G permit is not anticipated.

MOA Stormwater Compliance

MOA Handout AG.21 outlines procedures of stormwater treatment plan review for new and redevelopment projects. Much like the CGP, this review is required for stormwater management during construction. Three types of SWPPP checklists are required based on areas of disturbance. This requirement applies to all alternatives.

Other Permits/Regulatory Requirements

According to the U.S. Fish and Wildlife Service Recommended Bird Clearing Window Guidance for Southcentral Alaska, vegetation clearing may not occur between May 1st and July 15th.

PERMIT OR APPROVAL	DENALI ALT 1	DENALI ALT 2	DENALI ALT 3	36th ALT 1	36th ALT 2
USACE Section 404/10	Unknown	Unknown	Unknown	NO	NO
ADF&G Fish Habitat Permit	Not required for any alternative				
ADEC Stormwater Engineering Plan Review (LOA)	Additional information/consultation required to determine if a Plan review is required				
ADEC Construction General Permit (SWPPP)	Required for all alternatives				
MOA Flood Hazard Permit	Not required for any alternative				
MOA Stormwater Treatment Plan Review (SWPPP Checklists)	Required for all alternatives				

18.0 STAKEHOLDER & PUBLIC INVOLVEMENT

This section describes the public involvement initiated at the start of the project in August 2017 and will continue throughout the duration of the project. The public involvement efforts were planned and conducted using the MOA CSS Policy as a guideline and engaged informed, and educated affected public stakeholders, agencies and elected officials. Reference Appendix G Public Involvement Plan.

18.1 Public Involvement Completed

The public involvement and community discussion on multi-modal improvements for the Midtown Corridor, Denali Street Area project has been conducted from the project's initiation with the creation of a project specific website (www.MidtownImprovementsDenali.com), agency scoping meeting, Community Council presentation, and a public open house were primary methods used to solicit input and feedback, as summarized in the table below.

The Planning & Zoning Commission reviewed the Draft Concept Report as an informational item on December 4th, 2017 as part of the MOA CSS Transportation Project Review Process. Commissioners expressed support for the project, despite the lack of specified facilities in the Anchorage Bicycle Plan, and agreed that there is a logical need and opportunity for non-motorized improvements on Denali Street and 36th Avenue. Commissioners recognized and openly appreciated the project's multi-modal inclusive purpose and how it supports the longer-term vision of revitalizing the Midtown area. The Commissioner's opinions echo those of the public participating in the project to date.

On April 12, 2018, a second public open house was held to gather feedback on the presented draft alternatives for Denali Street, 36th Avenue and intersections throughout the corridor. Stakeholders in attendance were overwhelmingly supportive of the alternatives presented, stating that any treatment is an improvement from the existing conditions and would be welcomed. Comment forms available at the meeting prompted attendees to select their preferred alternatives; the submitted forms leaned in favor of Alternative 1 for Denali Street, and unanimously selected Alternative 2 for 36th Avenue. Support for specific alternative segments and concepts were identified through comment and conversation at the meeting and has been taken into consideration in the selection of the preferred alternative (see Appendix G. Public Involvement Summary, Open House 2 Summary).

For a summary of the public involvement materials, agency scoping meeting, public open house #1, minutes from the Planning & Zoning Commission appearance, and a summary of public open house #2 see Appendix G. Public Involvement Summary.

A Public Involvement Plan was developed and the public involvement activities included in the following table have been completed to date.

Table 15: Public Involvement Activities

DATE	INVOLVEMENT TOOL (OUTREACH / ACTIVITY)	PURPOSE
Start: 6/21/17	Project Website www.MidtownImprovementsDenali.com	Notifications, information storage, public review and comment
7/18/17	Joint 32nd/33rd & Midtown Denali St. Midtown Community Council Meeting	Announce projects, request early comment
8/09/17	Joint 32nd/33rd & Midtown Denali St. Agency Stakeholder Meeting & Presentation	Inform agencies, request early comment on potential issues
9/13/17	Midtown Community Council Presentation	Announce project, invite community to public meeting
9/18/17	Postcard Mailer & E-Newsletter Invite to Open House	Announce project; invite community to public meeting
9/18/17	Door to Door Outreach to Businesses, Property Owners, Employees	Announce project; collect contact information, invite to public meeting
9/27/17	Federation of Community Councils E-Notice Invite to Open House	Announce project; invite community to public meeting
10/05/17	Open House at Stewart Title Company on 36th Ave	Introduce project; educate public; provide input/comment opportunity; issues & opportunities identification
10/10/17	Open House Concepts and Materials Posting to Website and E-Notice	Inform public; encourage participation
12/04/17	Planning & Zoning Commission Appearance	MOA CSS Policy – Informational Item
2/01/18	E-Notice Invite to Anchorage Transportation Fair	Inform public; encourage participation & comment; collect contact information
2/08/18	Anchorage Transportation Fair Booth	Inform public; encourage participation & comment; collect contact information
3/28/2018	Facebook Event Published and promoted	Invite community and public to meeting, encourage participation
4/02/2018	E-Notice Invite to Open House #2	Invite community and public to meeting

DATE	INVOLVEMENT TOOL (OUTREACH / ACTIVITY)	PURPOSE
4/03/2018	Door to Door Outreach to Businesses, Property Owners, Employees	Invite to public meeting, collect contact information, provide project update.
4/09/2018	Federation of Community Councils E-Notice Invite to Open House	Invite community to public meeting
4/12/2018	Open House #2 at Stewart Title Company on 36th Ave	Present design alternative, encourage participation & comment to move to a preferred alternative
4/13/2018	Open House #2 Alternatives and Materials Posting to Website	Inform public, encourage participation & comment
4/18/2018	E-Notice Follow Up to Open House	Encourage participation & comment
Ongoing	Project Website Updates	Inform public
Ongoing	Individual Stakeholder Phone Calls and Emails	Inform & involve public

18.2 Public Agency Coordination

The project team held a joint meeting with the E 32nd and E 33rd Avenue Upgrades project team with staff from various MOA Departments, utility providers, and DOT&PF to introduce the project, discuss MOA and DOT&PF goals for the project, understand agency opportunities and issues, and determine what changes the public can affect while still meeting department standards or guidelines. The agency coordination meeting was also held to make contact with staff and encourage project coordination internally with other ongoing municipal, state or utility projects in the area which may impact the Midtown Corridor Improvements project.

18.3 Future Public Involvement

Additional public involvement will build on the completed outreach activities and will be planned and executed for the preliminary design phase (65%), final design phase and pre-construction. Activities will include a public meeting presenting the preliminary design and a public hearing before the Urban Design Commission. An updated public involvement plan which provides in detail the methods and timeline for engaging the community and agencies as the project moves forward will be produced as the project receives funding and continues to develop, following the MOA's CSS Policy.

19.0 COST ESTIMATE

The estimated costs are summarized below and detailed in appendices D, E, and H.

Table 16: Denali Street Cost Estimate

DESCRIPTION	ITEM	CALC	ESTIMATED COST (rounded)		
			Alternative 1	Alternative 2	Alternative 3
Construction					
Road and Drainage	A		$ 10,130,000	$ 9,850,000	$ 9,570,000
Illumination	B		$ 1,160,000	$ 1,160,000	$ 1,160,000
Signalization	C		$ 3,440,000	$ 3,440,000	$ 3,440,000
Landscaping	D	8% of A	$ 820,000	$ 790,000	$ 770,000
Subtotal Construction	E	A+B+C+D	$ 15,550,000	$ 15,240,000	$ 14,940,000
Contingency	F	25% of E	$ 3,890,000	$ 3,810,000	$ 3,740,000
Total Construction	G	E+F	$ 19,440,000	$ 19,050,000	$ 18,680,000
Utilities					
Utility Relocations[4]	H		$ 2,920,000	$ 2,550,000	$ 2,280,000
ROW					
Permanent ROW Acquisition	I		$ 1,310,000	$ 1,000,000	$ 830,000
Contingency	J	50% of I	$ 660,000	$ 500,000	$ 420,000
Total ROW	K	I+J	$ 1,970,000	$ 1,500,000	$ 1,250,000
Engineering/ Management					
Design	L	15% of G	$ 2,920,000	$ 2,860,000	$ 2,810,000
Construction	M	10% of G	$ 1,950,000	$ 1,910,000	$ 1,870,000
Total Engineering/ Management	N	L+M	$ 4,870,000	$ 4,770,000	$ 4,680,000
Total Estimated Project Cost	**O**	**G+H+K+N**	**$ 29,200,000**	**$ 27,900,000**	**$ 26,900,000**

[4] Includes: 10% contingency, utility company design engineering, and construction inspection

Table 17: 36th Avenue Cost Estimate

DESCRIPTION	ITEM	CALC	ESTIMATED COST (rounded) Alternative 1	ESTIMATED COST (rounded) Alternative 2
Construction				
Road and Drainage	A		$ 2,350,000	$ 1,840,000
Illumination	B		$ 850,000	$ 850,000
Signalization	C		$ 1,500,000	$ 1,500,000
Landscaping	D	8% of A	$ 190,000	$ 150,000
Subtotal Construction	E	A+B+C+D	$ 4,890,000	$ 4,340,000
Contingency	F	25% of E	$ 1,230,000	$ 1,090,000
Total Construction	G	E+F	$ 6,120,000	$ 5,430,000
Utilities				
Utility Relocations[5]	H		$ 6,670,000	$ 5,420,000
ROW				
Permanent ROW Acquisition	I		$ 2,390,000	$ 2,600,000
Contingency	J	50% of I	$ 1,200,000	$ 1,300,000
Total ROW	K	I+J	$ 3,590,000	$ 3,900,000
Engineering/ Management				
Design	L	15% of G	$ 920,000	$ 820,000
Construction	M	10% of G	$ 620,000	$ 550,000
Total Engineering/ Management	N	L+M	$ 1,540,000	$ 1,370,000
Total Estimated Project Cost	**O**	**G+H+K+N**	**$ 18,000,000**	**$ 16,200,000**

[5] Includes: 10% contingency, utility company design engineering, and construction inspection

20.0 DESIGN VARIANCES

A variance process was established in Title 21 to address situations where it is not practical or not possible to implement the design standards set forth in the DCM and other guidelines. DCM variances require approval by the Municipal Engineer and/or the Municipal Traffic Engineer. The following variances are anticipated:

Table 18: Anticipated Variances

ITEM	REFERENCED STANDARD	CRITERIA	ANTICIPATED VARIANCE	REASON
Buffer	DCM 1.5 F	7 foot	≥ 0 foot	Some existing improvements (e.g., Denali Federal Credit Union) abut the ROW and would be cost prohibitive to acquire.
Driveways	DCM Appendix 1D	Distance between driveways	< 430 feet	Driveways are typically reconstructed at their original location unless the property allows for a shift/consolidation.
Driveways	DCM Appendix 1D	Corner Clearance	< 310 feet	
Markings	MUTCD	Green Intersection Bicycle Boxes	File for interim approval	Improved positioning of turning bicycles at the intersection of Denali Street and Calais Drive/East 33rd Avenue will facilitate the use of both corridors.

MUNICIPALITY OF ANCHORAGE

August 2018

Draft Design Study Report

MOA PROJECT NO. 16-28