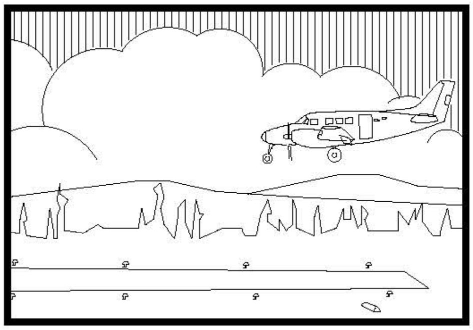
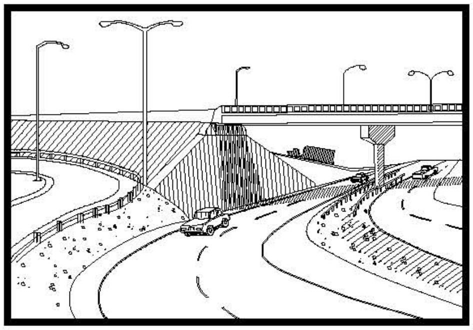
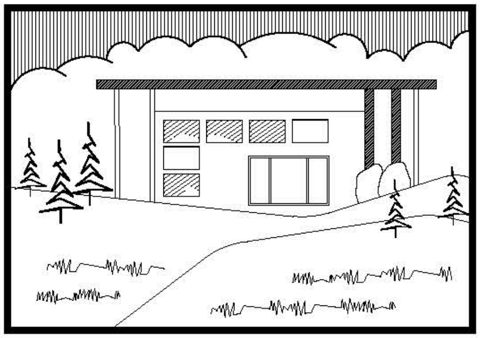
DESIGN STUDY REPORT

Airport Way/Cushman Street Intersection Reconstruction

0002312/Z640780000







STATE OF ALASKA

Department of Transportation
and Public Facilities

NORTHERN REGION

May 2020

DESIGN APPROVAL

AIRPORT WAY/CUSHMAN STREET INTERSECTION RECONSTRUCTION

PROJECT NO. 0002312/Z640780000

Requested by:

Carl Heim, P.E. Date
Engineering Manager
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Design Approval
Granted:

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Preconstruction Engineer
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Distribution:

DESIGN STUDY REPORT
FOR

AIRPORT WAY/CUSHMAN STREET INTERSECTION RECONSTRUCTION

PROJECT NO. 0002312/Z640780000

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ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION DESIGN AND ENGINEERING SERVICES
MAY 2020

AIRPORT WAY/CUSHMAN STREET INTERSECTION RECONSTRUCTION
PROJECT NO, 0002312/Z640780000

Table of Contents

Table of Figures

Table of Tables

INTRODUCTION/HISTORY

The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the Federal Highway Administration (FHWA), proposes to improve the intersection of Airport Way and Cushman Street[1] in Fairbanks, Alaska. The project is located in Section 10, Township 1S, Range 1W, Fairbanks Meridian. See Figure 1 for location and vicinity map.

Airport Way and Cushman Street are principal roads within the Fairbanks road network. Airport Way is part of the National Highway System, and serves as a key freight route, providing access to the Fairbanks International Airport and Fort Wainwright. It was last resurfaced in 2014. Cushman Street was one of the first roads in Fairbanks and was last resurfaced in 2014. It has been designated as the “signature street” for downtown Fairbanks; connecting civic uses to retail shops and the Chena River.

The DOT&PF identified the need for safety and capacity improvements at the Airport Way/Cushman Street intersection to address vehicular crashes, pedestrian and bicycle crashes, and congestion.

The Airport Way/Cushman Street intersection is listed on state and local transportation plans. The 2016-2019 Statewide Transportation Improvement Program (STIP) lists the intersection as Need 3843. The 2040 FMATS[2]/FAST Metropolitan Transportation Plan lists this intersection as a “Medium Range” project with the “need” described as capacity, traffic operations, and safety improvements.

Several studies and reports for this project have preceded this design study report (DSR) and are described below:

- *Traffic and Safety Analysis Report* (TSAR); Kinney Engineering, LLC (KE); November 2016 – The TSAR presents analyses findings of the existing condition and future design year condition of the traffic and safety operations at the Airport Way/Cushman Street intersection. This report also summarizes various planning documents for the area. The findings are summarized in the Traffic Analysis section of this DSR and the full TSAR can be found in APPENDIX C.
- *Preliminary Engineering Report* (PER); KE; December 2016 – The PER analyzes the purpose and need of the project, the existing conditions, design alternatives, and environmental considerations. This DSR builds from the results of the PER.
- *Parking Utilization Study*; KE; February 2018 – The Parking Utilization Study presents the findings of existing business parking supply and demand and how improvements to the Airport Way/Cushman Street intersection impact the parking needs. A summary of the report can be found in the Traffic Analysis section of this DSR and the full report is located in APPENDIX D.

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[1] Throughout this design study report, Cushman Street may refer to South Cushman Street or Cushman Street. South Cushman Street is defined as the route south of the Airport Way/Cushman Street Intersection. Cushman Street is defined as the route north of the intersection.

[2] “Fairbanks Area Surface Transportation (FAST) planning” was formerly “Fairbanks Metropolitan Area Transportation Systems (FMATS)”.

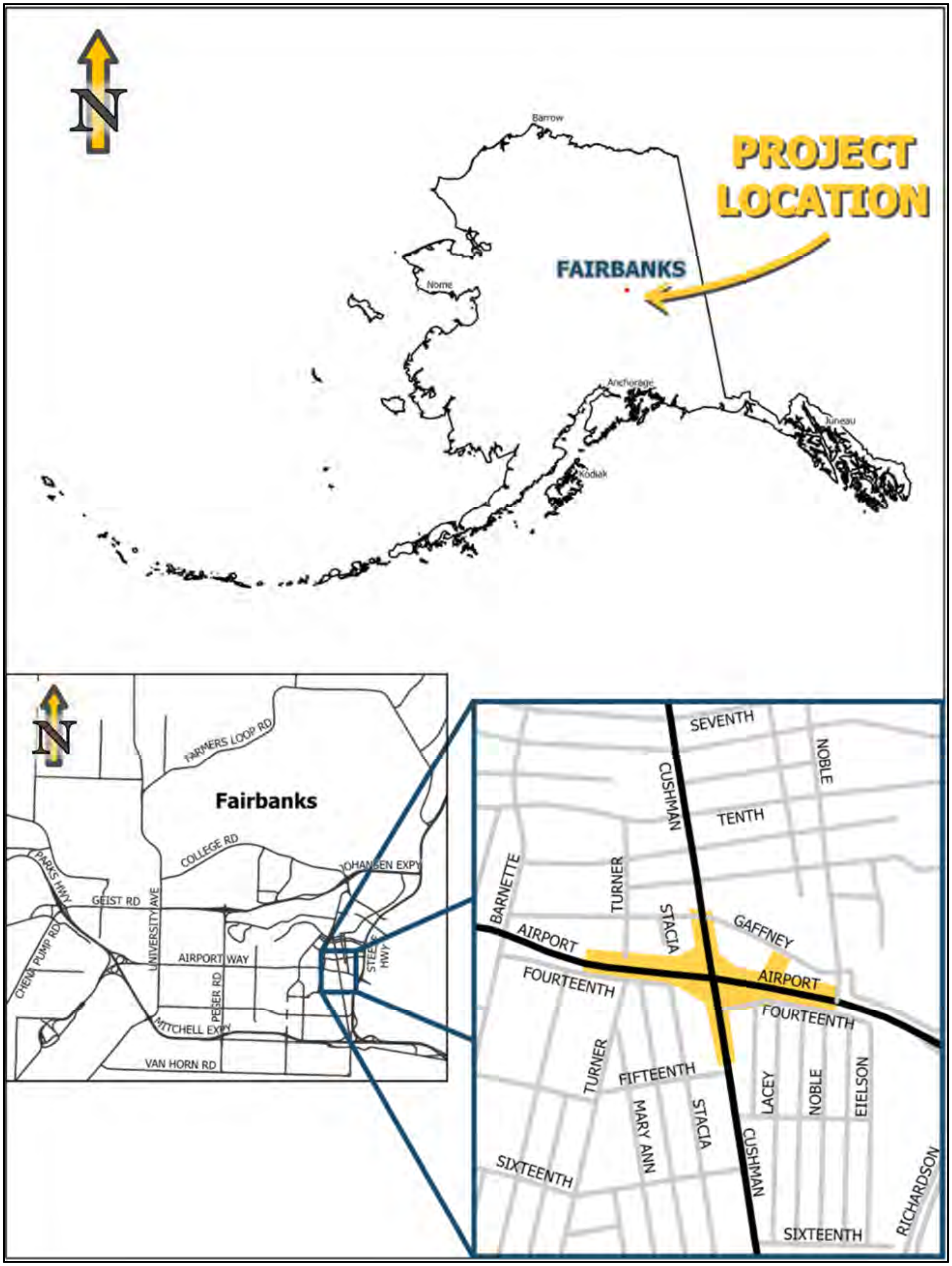

Figure 1: Location and Vicinity Map

PROJECT DESCRIPTION

Location & Existing Conditions

The project extends along Airport Way from just west of Turner Street to Noble Street, and along Cushman Street from just north of 15th Avenue to Gaffney Road. See Figure 2 for project limits.

Airport Way (CDS 175700) is classified by DOT&PF as a principal arterial owned and maintained by DOT&PF. Airport Way is a limited access expressway that extends east/west across Fairbanks between Fairbanks International Airport and Fort Wainwright. At the Cushman Street intersection, Airport Way consists of two through lanes, a dedicated left-turn lane, and a dedicated right-turn lane in both the westbound and eastbound approaches. Pedestrians are accommodated by a sidewalk separated from the road by a chain-link fence on both sides of the road. Light Emitting Diode (LED) lighting line both sides of the street near the intersection.

Cushman Street (CDS 176300) is classified as a minor arterial by DOT&PF and is maintained by the City of Fairbanks (COF). Cushman Street runs north/south between the Tanana River on the south side of Fairbanks and Illinois Street on the north side of Chena River. Airport Way divides Cushman Street into Cushman Street, north of the intersection, and South Cushman Street, south of the intersection. At the southbound approach of the intersection, Cushman Street contains one dedicated left-turn lane and a shared through and right-turn lane. The South Cushman northbound approach contains one shared though and right-turn lane and one shared through and left-turn lane. Sidewalks line both sides of the road for pedestrian use. High Pressure Sodium (HPS) lighting mounted on utility poles at variable spacing illuminate Cushman and South Cushman streets near the intersection.

The Airport Way/Cushman Street intersection is a fully actuated signalized intersection with signalized pedestrian crosswalks across each leg. The Cushman Street/Gaffney Street intersection to the north is signalized, as is the Airport Way/Noble Street intersection to the east. The Cushman Street/14th Avenue intersection is within the functional area of the project intersection and is stop controlled on 14th Avenue.

Adjacent land is primarily general commercial use. Land and businesses potentially affected by this project are discussed in the Right-of-Way (ROW) Requirements section of this report.

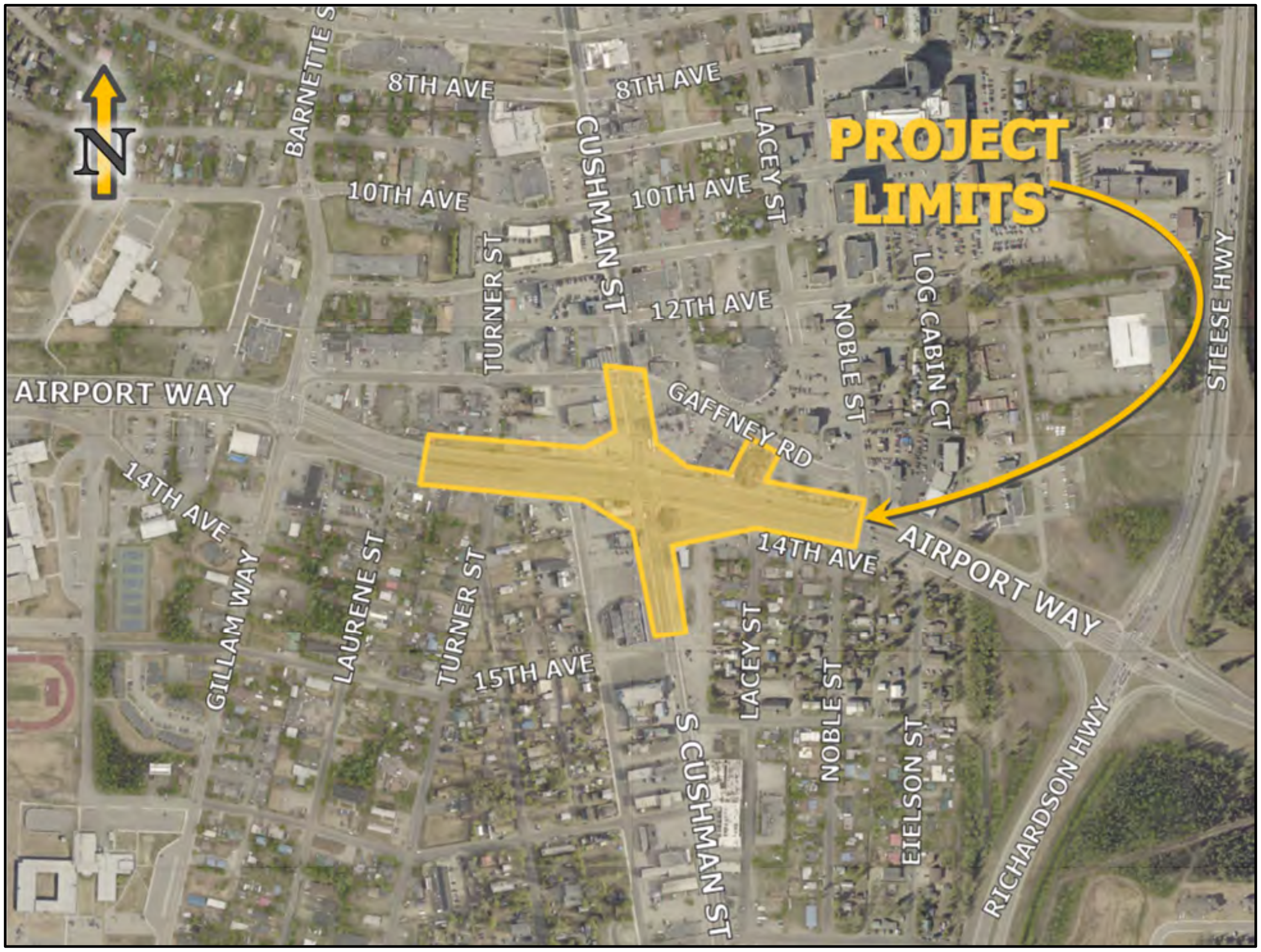

Figure 2: Project Limits

Purpose & Need

Safety and operational issues have been identified at the Airport Way/Cushman Street intersection. The density of vehicular and pedestrian traffic at the Airport Way/Cushman Street intersection has been identified as one of the top five highest-volume intersections within Fairbanks. This intersection experiences significant delays, especially for the southbound and northbound movements. In addition, the crash rate at this intersection is higher than the statewide average for similar intersection configuration, with the number of non-motorized crashes being the highest for any intersection within the FAST Planning[3] area.

The purpose of this project is to improve traffic operations, motorist and pedestrian safety, and air quality, and decrease delays at the Airport Way/Cushman Street intersection. This project will reconstruct Airport Way from just west of Turner Street to Noble Street, and along Cushman Street between just north of 15th Avenue and Gaffney Road. Reconstruction of the Airport Way/Noble Street and Cushman Street/Gaffney Road intersections will also be included in this project.

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[3] "Fairbanks Area Surface Transportation (FAST) planning" was formerly "Fairbanks Metropolitan Area Transportation Systems (FMATS)".

Proposed improvements include the following:

- Reconstruct intersection approaches and add auxiliary lanes to increase vehicular capacity and reduce delay
- Add positive offset left-turn lanes on Airport Way to improve sight distance and safety
- Resurface and stripe the roadway
- Install new signage
- Upgrade traffic signal controls
- Add raised corner/channelizing islands with curb ramps for improved pedestrian and bicyclist safety and ADA accessibility
- Replace and/or relocate lighting as needed for the improvements
- Relocate utilities as needed for the improvements
- Provide landscaping enhancements consistent with the COF Cushman Street Complete Streets Corridor

See APPENDIX F for preliminary plan and profile sheets.

DESIGN STANDARDS

Design standards and guidelines applicable to this project are contained in the following publications:

Standards

- A Policy on Geometric Design of Highways and Streets (GB), 6th Edition, American Association of State Highway and Transportation Officials (AASHTO), 2011.
- Roadside Design Guide (RDG), 4th Edition, AASHTO, 2011.
- Alaska Flexible Pavement Design Manual (AKFPDM), DOT&PF, 2004
- Alaska Highway Preconstruction Manual (HPCM), State of Alaska, DOT&PF, as amended.
- Alaska Highway Drainage Manual (AHDM), State of Alaska, DOT&PF, 2006.
- The Alaska Traffic Manual (ATM), consisting of the Manual on Uniform Traffic Control Devices (MUTCD), 2009 as amended, U.S. DOT, Federal Highway Administration (FHWA) and the Alaska Traffic Manual Supplement (ATMS), State of Alaska, DOT&PF, 2016.
- Guide for the Development of Bicycle Facilities (GDBF), 4th Edition, AASHTO, 2012.
- Americans with Disabilities Act (ADA) Standards for Transportation Facilities, U.S. DOT, 2006.
- ADA Standards for Accessible Design, United States Department of Justice, 2010.
- Highway Capacity Manual (HCM), 5th Edition, Transportation Research Board, 2010.
- National Electrical Safety Code (NESC), IEEE Standards Association, 2017
- Recommended Practice for Roadway Lighting (RP-8-14), American National Standards Institute / Illuminating Engineering Society, 2014.

- 2018 International Fire Code (IFC), International Code Council, 2018.
- LRFD Bridge Design Specification (ALBDS), 17th Edition, AASHTO, 2002.

Guidelines

- Guide for the Planning, Design, and Operation of Pedestrian Facilities, 1st Edition, AASHTO, 2004.
- Proposed Accessibility Standards for Pedestrian Facilities in the Public Right-of-Way (PROWAG), United States Access Board, 2011.

The Design Criteria for this project are included in APPENDIX A.

In addition, the development of this project includes consideration of the design criteria and/or recommendations of other project studies and reports, including the following:

- Airport Way Improvements Reconnaissance Study, Kittleson & Associates, Inc. et al, 2007
- Vision Fairbanks Downtown Plan, Crandall Arambula PC et al, 2008
- Cushman-Barnette Complete Streets Project, COF, 2012
- FMATS Non-Motorized Transportation Plan, Kittleson & Associates, Inc. et al, 2012
- FMATS 2040 Metropolitan Transportation Plan (MTP), Kittleson & Associates, Inc. et al, 2015
- FMATS Freight Mobility Plan (FMP), HDR, 2018
- Airport Way Functional Features Analysis, PDC Engineers, 2018
- Airport Way/Steese Expressway Interchange Project, DOT&PF
- Green Infrastructure Project Guide for Fairbanks, Alaska, 3rd Ed, Fairbanks Green Infrastructure Group, 2015
- Fairbanks Area Signal Upgrades, Stage 2, DOT&PF (under construction 2019-2020)
- Airport Way and Johansen Expressway LED Lighting Replacement, DOT&PF (under construction 2019-2020)

DESIGN EXCEPTIONS AND DESIGN WAIVERS

There are no design exceptions for this project.

A design waiver may be required for sight distance. For the northbound right-turning (NBRT) and southbound right-turning (SBRT) traffic, sight distance is limited due to the proposed fence and landscaping placement. Figure 3 illustrates the sight distance triangles for the NBRT and SBRT lanes per the GB. If the fence cannot be adjusted, a design waiver will be required.

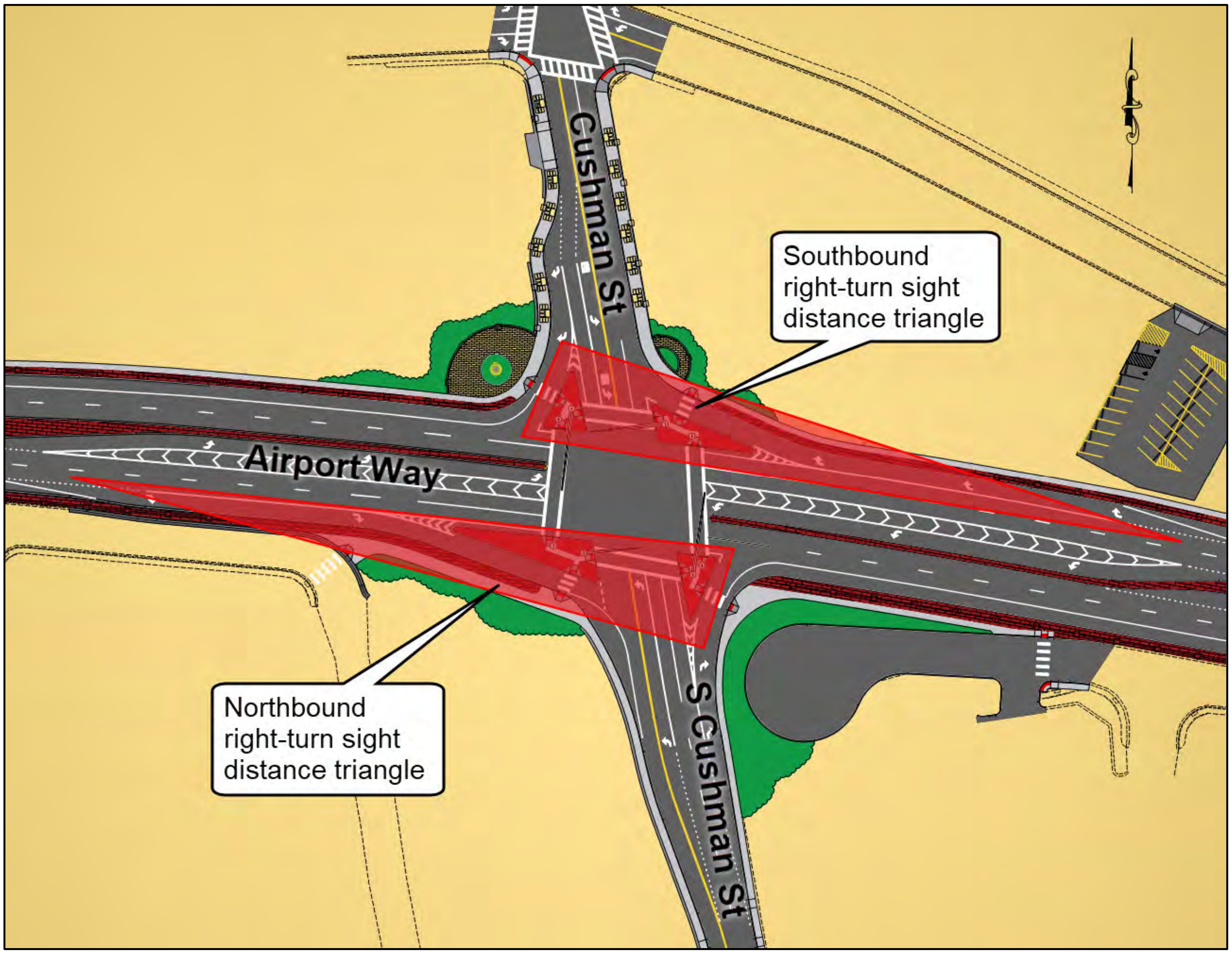

Figure 3: Design Waiver - Intersection Sight Distance Triangles

In addition, some storm drain structures and pipe will need separation waivers from the Alaska Department of Environmental Conservation (DEC). See the Drainage section for further details.

DESIGN ALTERNATIVES

The PER presents multiple design alternatives and a final recommended alternative, Signal Control Option 3 West. The preliminary design presented in this DSR incorporates and further refines the main components of the Signal Control Option 3 West alternative:

- Channelized right-turn lanes and designated left-turn lanes on all approach legs,
- Positive left-turn offsets on the Airport Way approach legs,
- Upgraded sidewalks to accommodate pedestrians, and
- Gateway landscaping features at the intersection.

Design Vehicle

Section 2.1.1 of the GB states "…the designer should consider the largest design vehicle that is likely to use that facility with considerable frequency or a design vehicle with special characteristics appropriate to a particular location in determining the design of such critical features as radii at intersections and radii of turning roadways." The GB also lists a general guide for choosing a design vehicle given certain road characteristics. Table 1 presents the design vehicles for each route based on the guidance of the GB.

Table 1: Design Vehicle per GB

STREET	ROADWAY CLASSIFICATION	DESIGN VEHICLE
Airport Way	Principal Arterial (Freight Route)	WB-67
Cushman Street	Minor Arterial (low speed, tight corners Central Business District)	BUS-45
S. Cushman Street	Minor Arterial (General Commercial and Light Industrial)	WB-67
Gaffney Road	Minor Collector	BUS-45 & SU
14TH Avenue	Local	SU

According to the FMATS FMP, Airport Way is one of the main east/west routes across Fairbanks and is part of the Primary Highway Freight System (PHFS). As a PHFS route, Airport Way connects freight zones within Fairbanks; and therefore, all turning movements within the Airport Way/Cushman Street intersection should accommodate WB-67 vehicles.

The Cushman Complete Streets Project (CCSP) Traffic Analysis Report looked at vehicle types likely to use the roads in the area. Vehicle usage varies along the Cushman corridor, and as such, the suggested design vehicle also varied. The suggested design vehicles for Cushman Street, per the CCSP, are as shown in Table 2.

Table 2: Design Vehicle per Cushman Complete Streets Project

MAIN STREET	CONNECTING STREET	DESIGN VEHICLE
Cushman Street	Airport Way	BUS-45
	Gaffney Road	SU
	Side Streets	BUS-45/SU/PASSENGER

As shown in the tables above, Gaffney Road should accommodate a single-unit truck (SU). Review of the Fairbanks area bus transit system revealed the Cushman Street/Gaffney Road intersection is part of the bus route system where buses make left turns; therefore, modifications to this intersection must also meet the turning radii of a BUS-45 design vehicle.

Given the fire station’s proximity to the project area, the proposed improvements must also consider the turning movements of the COF Fire Station’s fire ladder truck. Figure 4 and Figure 5 show the Fire Ladder Truck dimensions and design turning radii. A prominent characteristic of the ladder truck is the overhanging ladder. The sweep of the overhanging ladder influences the location of traffic signal poles at the intersection and the configuration of the 14th Avenue termination.

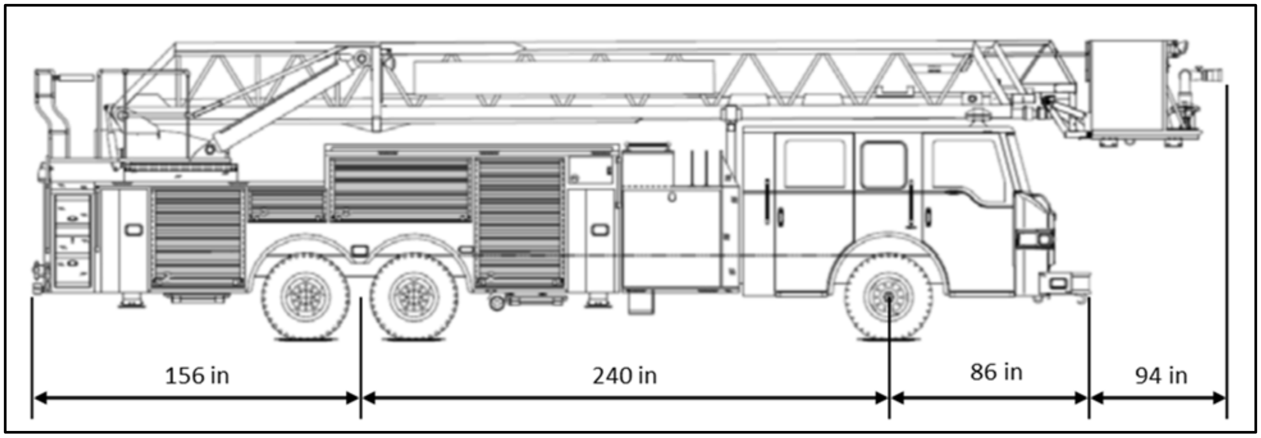

Figure 4: COF Fire Ladder Truck Dimensions

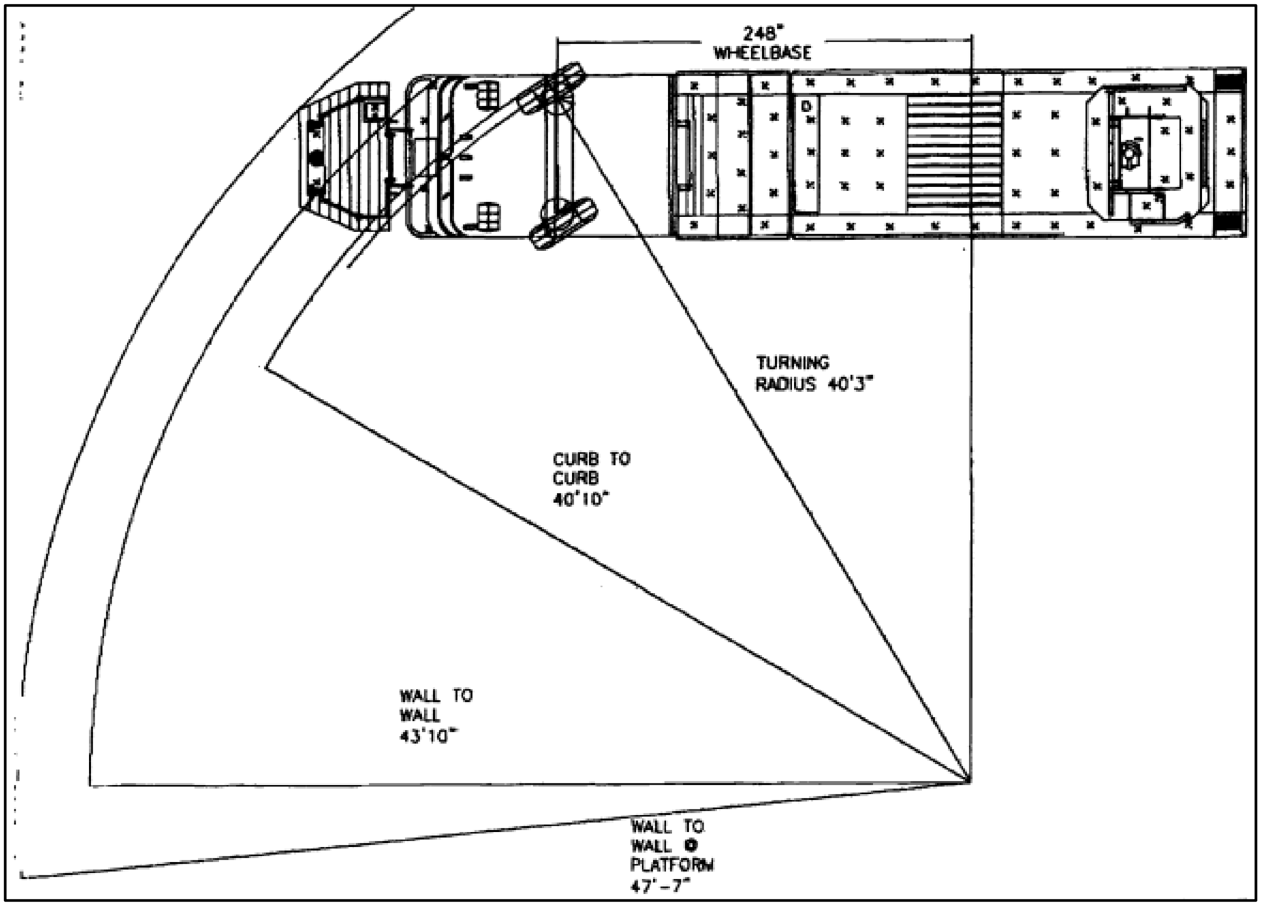

Figure 5: COF Fire Ladder Truck Turning Radius

Landscaping Features

Several planning and design documents, including Vision Fairbanks, the Complete Streets program, and the Airport Way Functional Features, identify the Airport Way/Cushman Street intersection as an important gateway to the Cushman "signature" Street and the Fairbanks Central Business District. This Airport Way/Cushman Street project will enhance the intersection by providing landscaping features with low or minimal maintenance requirements while striving to incorporate the ideas common to the aforementioned planning documents and as described below.

Gateway Structure & Wayfinding Signs

The gateway feature is recommended as a focal landscape element matching the character of the wayfinding signs and LED lighting of the downtown area. Reflective, low maintenance surfaces offer additional light and color. The gateway feature proposes a planting bed at the base of the structure to provide protection from snow removal operations in the winter and to create a place for annual flowers for summertime beautification.

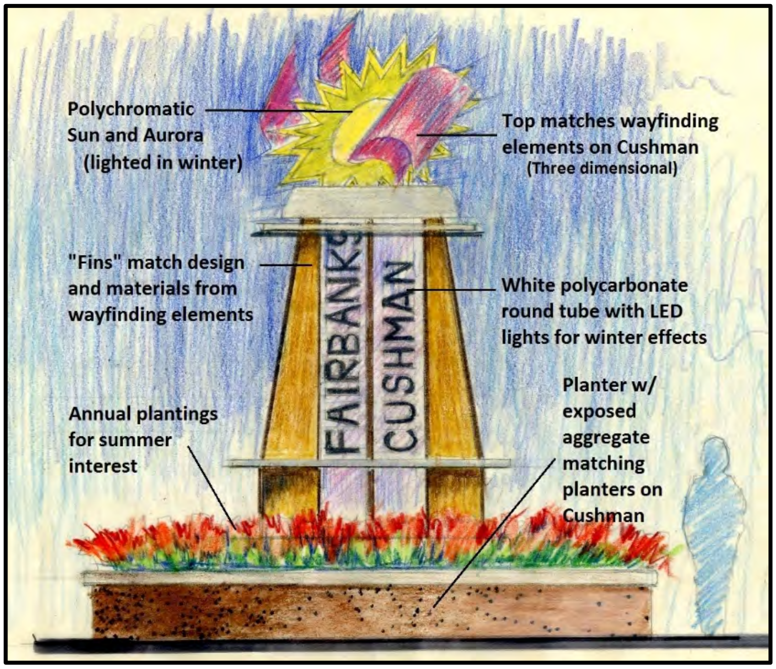

Figure 7: Artist Rendering of Gateway Element

Figure 6: Wayfinding Sign

Plaza

A small pedestrian plaza with benches is recommended on the northeast side of the Airport Way/Cushman Street intersection. The plaza serves as an entry to the downtown district at this intersection and its features complement those of the gateway element.

Vegetation
A civic forest along Airport Way is recommended as a buffer and demarcation of the downtown district. This includes a mixed forest, using native birch and spruce, for both sides of Airport Way to create a strong visual element and a buffer to adjacent land uses. Flowering trees are also suggested to bring scale and seasonal color to the intersection. Planting beds consisting of large masses of low maintenance trees and shrubs, and, once established, will have a natural forested appearance. Shrub plantings will direct pedestrian traffic to sidewalks and safe crossings.

Trees within a tree grate system are recommended along each side of Cushman Street following the sidewalk north of Airport Way to match landscape elements previously installed as part of the CCSP. This continues the character of Cushman Street as it enters downtown. The existing tree grate system and planters along Cushman Street are shown in Figure 8.

Landscaping Lighting
Pedestrian scale light columns matching those along Cushman Street, as shown in Figure 8, establishes a visual connection to downtown by continuing design elements up to the intersection.


Figure 8: Landscape Lighting & Tree Grate on Cushman

Fencing
Decorative fencing, as shown in Figure 9, is also recommended within the project area. A shorter version of this fence, at the corners of the intersection and along the east side of Cushman Street, tie in with the existing decorative fence along Cushman Street. A taller version continues east and west down Airport Way replacing the existing chain link fence for some distance providing a transition between the urban Cushman Street and the typical landscape found along Airport Way.


Figure 9: Typical Decorative Style Fencing

Traffic Island – Patterned and Colored Concrete

Patterned and colored concrete at traffic islands and pedestrian surfaces are recommended to provide safe pedestrian areas easily distinguished from adjacent roadway surfaces. To match elements from the CCSP plan, the islands will have integral color ("dredge bucket brown").

Traffic Islands – Permeable Pavers

At the Airport Way/Cushman Street intersection, permeable pavers, such as shown in Figure 10, are suggested as a "greener" alternative to Portland concrete cement in the raised channelizing right-turn islands. Permeable pavers are typically concrete or plastic with voids for vegetation growth. The permeable pavers act like rain gardens, reducing runoff pollutants and sediment by allowing runoff to infiltrate directly into the ground instead of through a curb and gutter system. These can improve aesthetics of an area by breaking up large areas of concrete and pavement.

Figure 10: Permeable Pavers

However, permeable pavers can pose a challenge for constructability and durability in freeze-thaw susceptible areas. They are prone to heaving, creating uneven surfaces, which in turn create catchpoints for snowplows. They require regular maintenance to clean out debris in order to maintain runoff filtration capabilities. Research by Minnesota State Department of Transportation[4] stated, "Permeable pavements require regular maintenance via pressure washing and/or vacuuming to prevent clogging that decreases infiltration capacity. Sand cannot be used for winter maintenance, and road salt application can be reduced."

Lighting

LED is the preferred lighting of NR DOT&PF per NR Design Directive 15-02. The lighting system along Airport Way was replaced with LED fixtures with the Airport Way and Johansen Expressway LED Lighting Replacement project in 2019. To accommodate the directive and be consistent with lighting along Airport Way, this project proposes to install light fixtures with LED luminaires on new galvanized steel streetlight pole/mast arms. "Nodes" could be installed on each new luminaire to upgrade the highway lighting system to a wireless control system allowing the option to limit the hours of lighting use or limit the output during periods of low nighttime traffic, thus offering additional energy savings.

14th Avenue Design

14th Avenue intersects Cushman Street within the functional area of the Airport Way/Cushman Street intersection. The TSAR recommends removing the intersection to mitigate vehicular conflicts. Due to the proximity of a fire hydrant at the southwest corner of 14th Avenue and Lacey Street to the proposed dead-ended street, the IFC was consulted for street termination options. Based on Table D103.4 of the IFC, two options for terminating 14th Avenue were analyzed; Hammerhead Turnaround and Cul-de-Sac.

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[4] "Guidance on Permeable Pavements in Cold Climates" (MN Department of Transportation, 2015)

<u>*Hammerhead Turnaround*</u>

A hammerhead turnaround termination converts a dead-end road to a short T-section for turnaround purposes. This type of termination allows a vehicle to turnaround using a 3-point turn maneuver. Construction of a hammerhead requires a relatively small amount of ROW, though are not as easy to facilitate a turn as other options. In addition, snow removal is challenging with this type of road termination. A typical hammerhead turnaround layout is presented in Figure 11.

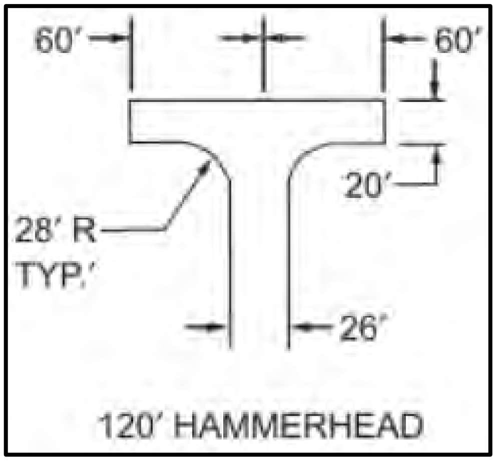

Figure 11: Hammerhead Turnaround

Source: 2018 International Fire Code

<u>*Cul-de-Sac*</u>

A cul-de-sac termination converts a dead-end road into a small turnaround circle. This type of termination allows a vehicle to turnaround in one maneuver. A cul-de-sac sized for a fire ladder truck requires a larger amount of ROW than other termination options; however, they are efficient to traverse and require less winter maintenance than other road terminations. A typical cul-de-sac layout is presented in Figure 12.

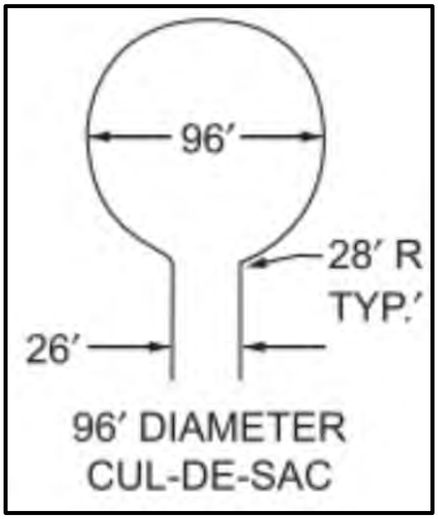

Figure 12: Cul-de-Sac Termination

Source: 2018 International Fire Code

PREFERRED DESIGN ALTERNATIVE

This project proposes to reconstruct the Airport Way/Cushman Street intersection following the recommended design alternative presented in the PER, Signal Option 3 West. This alternative will reconstruct intersection approaches, 14th Avenue, sidewalks, and traffic signal systems. Landscaping improvements will continue the thematic elements installed for the Cushman Complete Street. Design elements included with this project are further discussed in the following subsections. Figure 13 depicts the overall preferred design alternative. A close-up of the Airport Way/Cushman Street intersection is shown in Figure 14. Preliminary plan and profile sheets can be found in APPENDIX F.

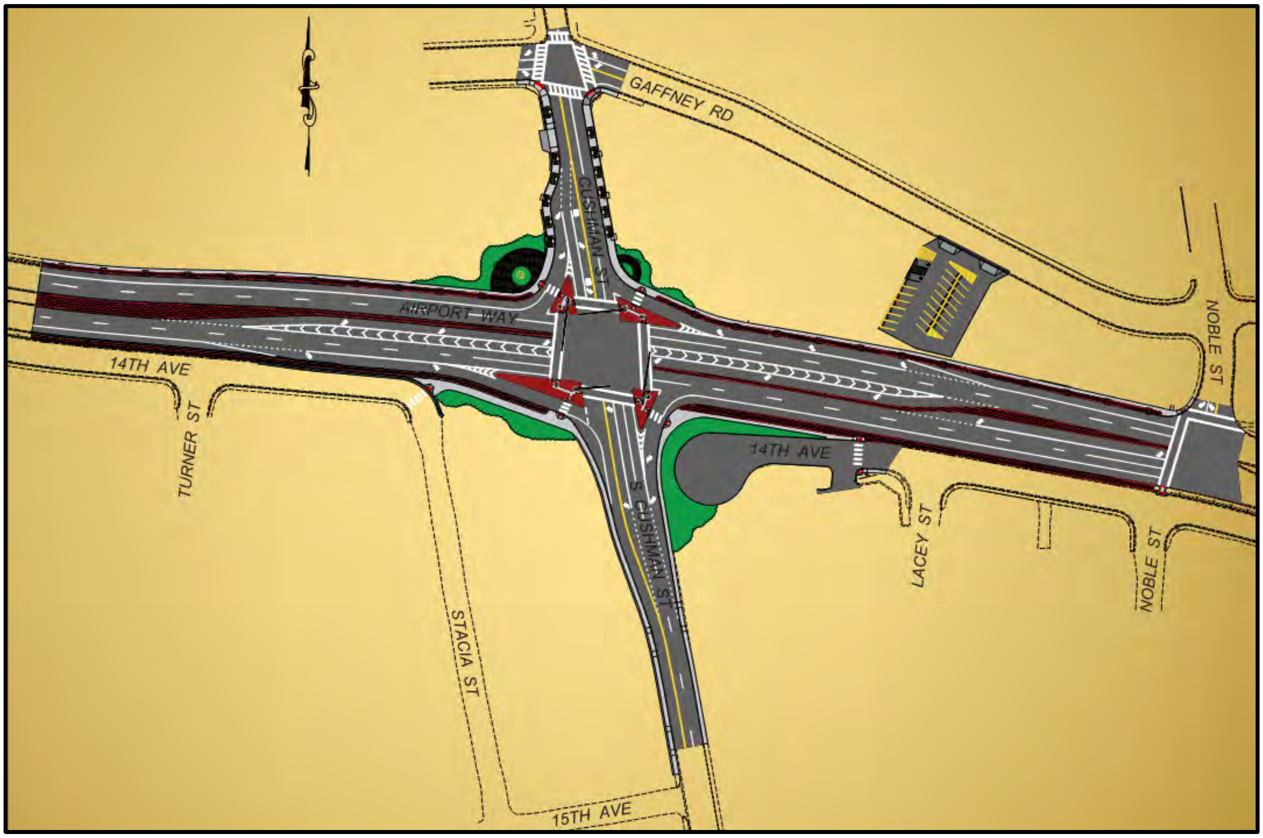

Figure 13: Preferred Design Alternative – Overall

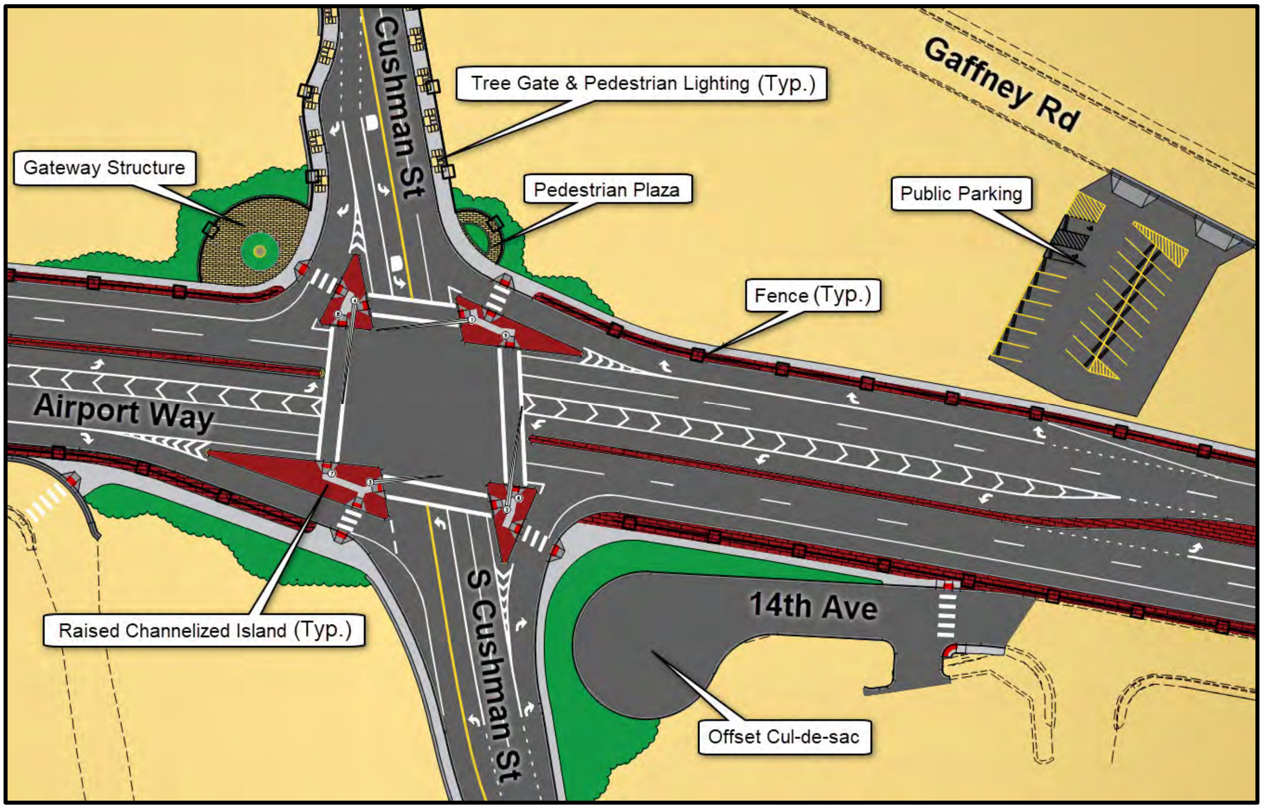

Figure 14: Preferred Design Alternative – Intersection Close-Up

Road and Intersection Improvements

Lane movement configuration for the Airport Way/Cushman Street intersection will be as shown in Figure 15. The right-turn lanes in all quadrants will be channelized using raised corner islands.

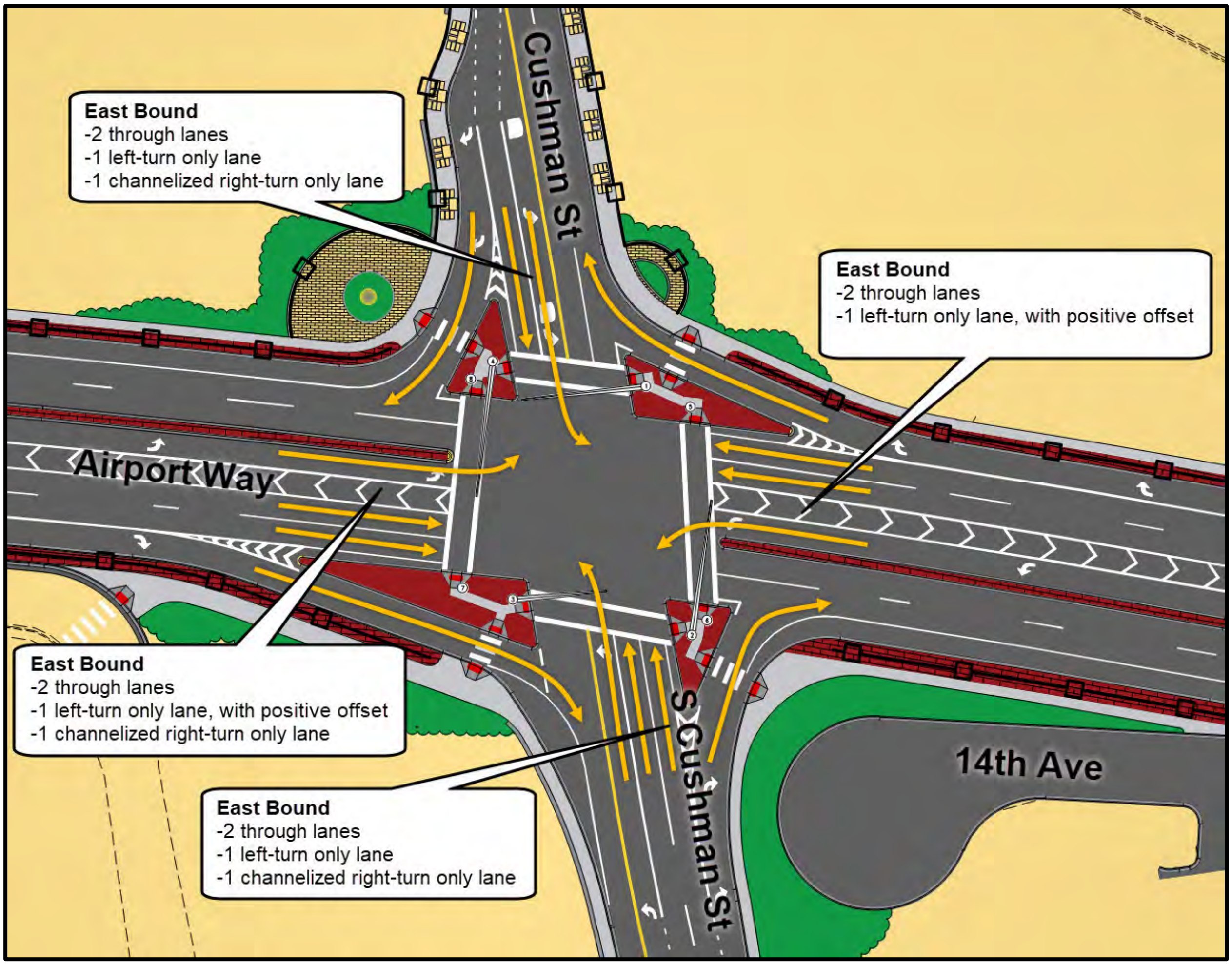

Figure 15: Airport Way/Cushman Street Intersection Lane Movements

Design Vehicle

Based on the information presented in the Design Alternative Section, the design vehicles chosen for this project are listed in Table 3. The Airport Way/Cushman Street intersection is within a PHFS route; therefore, all turning movements within the intersection will be designed for a WB-67. Other areas of Cushman Street, including the Cushman Street/Gaffney Road intersection will be designed to accommodate a city bus and single-unit truck. 14th Avenue, including the cul-de-sac turnaround will be designed for the COF Fire Ladder Truck movements.

Table 3: Project Design Vehicles

STREET	ROADWAY CLASSIFICATION	DESIGN VEHICLE
Airport Way	Principal Arterial	WB-67
Cushman Street	Minor Arterial	BUS-45 & SU
S. Cushman Street	Minor Arterial	WB-67
Gaffney Road	Minor Collector	BUS-45 & SU
14TH Avenue	Local	COF Fire Ladder Truck

Pedestrian Facility Improvements

Pedestrian facilities will be provided with this project. ADA-compliant curb ramps will be installed where appropriate. On Airport Way, the existing pedestrian pathways will be replaced, as will the existing fence separating pedestrians from motor vehicles. The attached sidewalks along Cushman Street will be replaced and widened in areas. See the Typical Sections and Pedestrian/ Bicycle (ADA) Provisions sections of this report for pathway and sidewalk widths. Curb and gutter will be placed throughout the project along Airport Way and Cushman Street.

The project will also repave the intersections of Cushman Street/Gaffney Road and Airport Way/Noble Street. Per the HPCM, existing curb ramps are required to be reconstructed if the connecting road is being altered and the curb ramps do not meet current ADA Standards. The existing curb ramps on the Cushman Street/Gaffney Road intersection and at the northwest quadrant of Airport Way/Noble Street intersection appear to meet current ADA standards; and therefore, are not required to be reconstructed. However, in order to tie the proposed sidewalk into the existing sidewalk, these curb ramps will be reconstructed. In addition, the design proposes to reconstruct the curb ramp in the southwest quadrant of the Airport Way/Noble Street intersection to meet current ADA.

The project will remove the South Cushman Street/14th Avenue intersection and reconstruct the end of 14th Avenue as an offset cul-de-sac sized to accommodate the COF Fire Ladder Truck and minimize ROW impacts.

Landscape Improvements

Proposed landscaping features include the following:

- Gateway Structure on the northwest quadrant of the Airport Way/Cushman Street intersection
- Wayfinding signs installed in appropriate locations for directional awareness
- Pedestrian plaza on the northeast quadrant of the intersection
- Vegetation consisting of low maintenance trees and shrub plantings, and annual flowers around the gateway structure, plaza, and sidewalks and pathways on the southwest and southeast corners of the intersection
- Tree wells and planters along the sidewalk on both sides of Cushman Street
- Landscaping lights along Cushman Street north of Airport Way
- Decorative fencing along Cushman Street and a taller version along Airport Way replacing the existing chain link fencing
- Patterned and Colored Concrete Traffic Islands

Street Lighting Improvements

LED lighting, with "nodes", as described in the Design Alternative section, will be installed throughout the project. Light poles will be positioned in new locations, as needed to obtain minimum illuminance per RP-8-14. The light poles on Airport Way and South Cushman Street will be galvanized steel streetlight pole/mast arms and be installed on break away crashworthy bases. The light poles on Cushman Street, north of the Airport Way/Cushman Street intersection will match those installed for the CCSP. The lighting design analysis memorandum is provided in APPENDIX D.

Public Parking

The proposed improvements for the Airport Way/Cushman Street intersection will impact existing parking for a local business. To mitigate this impact, a new public parking area, containing 26 parking spaces will be constructed. See the Traffic Analysis and Right-of-Way Requirements sections for more information.

3R ANALYSIS

Not applicable. This is a reconstruction project.

TRAFFIC ANALYSIS

The Traffic and Safety Analysis Report (TSAR) (KE, November 2016) is included in APPENDIX C. Design designations for this project are included in APPENDIX A.

Traffic Volume

Average Annual Daily Traffic (AADT) volumes were collected from the DOT&PF Northern Region Annual Traffic Volume Report (ATVR). The existing year[5] volumes were taken as the average AADT for the past five years of volume reporting.

Traffic design volumes were forecasted based on a refined 2040 FMATS travel demand model; assuming the Steese Expressway Interchange at Airport Way will be constructed. The design volume AADTs for Airport Way and Cushman Street as determined by the TSAR are presented in Table 4.

Table 4: Design Volume AADTs per the TSAR

SEGMENT	YEAR			
	2015	2020	2030	2040
Airport Way: Barnette St/ Gillam Way to Noble St	18,650	19,760	22,200	24,940
Cushman St: Gaffney Rd to Airport Way	5,510	5,960	6,990	8,190
South Cushman St: Airport Way to 15th Ave	9,090	9,410	10,090	10,820

Since the TSAR was completed, DOT&PF recalculated design volume AADTs for the project. These volumes were used to design the pavement structural section (see the Pavement Design Section) and are presented in Table 5.

Table 5: Updated Design Volume AADTs per DOT&PF

SEGMENT	YEAR		
	2018	2030	2040
Airport Way: Barnette St/ Gillam Way to Noble St	17,000	18,900	20,700
Cushman St: Gaffney Rd to Airport Way	4,560	5,080	5,560
South Cushman St: Airport Way to 15th Ave	8,500	9,470	10,360

Based on historical data from the permanent traffic recorders (PTRs) located on Airport Way between Noble Street and the Steese Expressway and on the Cushman Street Bridge over the Chena River, the Heavy Vehicle percentage used for this analysis is four percent.

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[5] At the time of the Traffic Analysis Report, 2014 traffic volumes were the most recent available and 2015 traffic volumes were considered the existing AADT.

Operations

The TSAR analyzed existing and design year operations for the no-build and preferred design alternative for the Airport Way/Cushman Street intersection. The results for the PM peak hour are presented in Table 6.

Table 6: Airport Way/Cushman Street LOS, PM Peak Hour

Approach	**Movement**	**Existing**		**2040 No Build**		**2040 Preferred Alternative**	
		Control Delay (sec/veh)	**LOS**	**Control Delay (sec/veh)**	**LOS**	**Change in Delay (sec/veh)**	**LOS**
Northbound	Left	63	E	88	F	-47	D
	Through	63	E	88	F	-44	D
	Right					-65	C
Southbound	Left	34	C	57	E	-14	D
	Through	34	C	31	C	11	D
	Right					-14	C
Eastbound	Left	14	B	42	D	-17	C
	Through	17	B	29	C	-14	B
	Right	6	A	14	B	-1	B
Westbound	Left	24	C	72	E	-57	B
	Through	9	A	18	B	-9	A
	Right	1	A	14	B	-2	B
Intersection		**24**	**C**	**41**	**D**	**-22**	**B**

Crashes

The crash rate at this intersection is higher than the statewide average for similar intersections at a statistically significant level (with 95 percent confidence). The observed intersection crash rate for the study period is 1.980 crashes per million entering vehicles. The statewide average for similar facilities is 1.376 crashes per million entering vehicles. The crash patterns identified include:

- Rear-end and sideswipe crashes between vehicles on the northbound approach
- Left-turn crashes between eastbound and westbound vehicles
- Right-angle crashes involving eastbound vehicles

Parking Analysis

The proposed reconfiguration of the Airport Way/Cushman Street intersection will impact parking for some of the businesses in the project area. Using the recommended design alternative as depicted in the PER, a parking analysis was completed in February 2018. The analysis indicates parking mitigation is needed for a few surrounding businesses. See APPENDIX D for the Final Parking Utilization Study.

Since the Parking Analysis was finalized, geometric adjustments to the design have been completed. The adjustments impact parking for a business in the northeast quadrant of the Airport Way/Cushman Street intersection. Approximately 23 parking spaces will be impacted. As mitigation, the project proposes to use two lots east of this parcel for public parking, which will provide 26 spots, including 2 ADA stalls.

HORIZONTAL/VERTICAL ALIGNMENT

Horizontal Alignment

Airport Way

Along Airport Way, the horizontal alignment will closely match existing. There are three horizontal curves within the project limits. The HPCM and GB recommend, for urban arterials, the maximum superelevation rate to be less than or equal to six percent. To accommodate this reference, the radii of the existing curves will be altered to meet Table 3-9 of the GB.

Cushman Street

The proposed design of Cushman Street, within the project limits, shifts the existing alignment west to align with the northbound through lanes from South Cushman to Cushman Street north of Gaffney.

14th Avenue

As a safety and traffic operations improvement, the intersection of 14th Avenue on the east side of South Cushman Street will be terminated. The proposed horizontal alignment of 14th Avenue will be shifted north near the west end in order to minimize property impacts, and the end of the road will be constructed as an offset cul-de-sac. Adjustments to 14th Avenue horizontal alignment will require ROW acquisition; however, due to the reconfiguration of the Airport Way/Cushman Street intersection, acquisition of the lots between Airport Way and 14th Avenue have already been scheduled (see the Right-of-Way Requirements section).

Vertical Alignment

There is very little relief across the site within the project limits. The Airport Way/Cushman Street intersection is the high point of both roads in the project area. Grades on Airport Way are approximately one percent. Grades on Cushman Street are less than one percent. The Airport Way crown extends through the Cushman Street intersection. The proposed reconfiguration will generally maintain the vertical grades; however, the center point of the intersection will be raised by approximately one foot to meet the superelevation requirements.

This project will generally match the existing elevation of 14th Avenue.

See APPENDIX F for preliminary plan and profile sheets.

TYPICAL SECTIONS

The proposed typical section of Airport Way at the intersection is shown in Figure 16 and Figure 17, and includes the following:

- Two 12-foot through lanes in each direction
- 12-foot left-turn lane with 12-foot positive offset
- Channelized right-turn lane with raised island
- 9-foot shoulders
- 3-foot raised median, top back of curb to top back of curb
- 5- to 6-foot sidewalk/pathway on each side
- 5- to 9-foot buffer section between road and sidewalk/pathway with fence

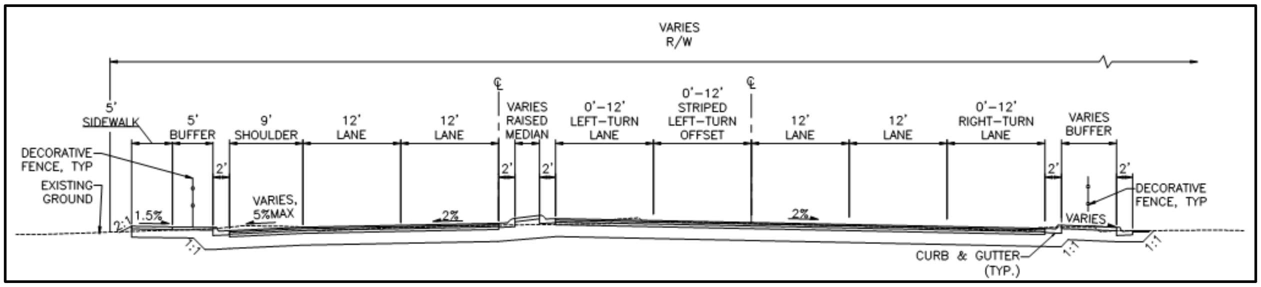

Figure 16: Airport Way Typical Section – West Approach

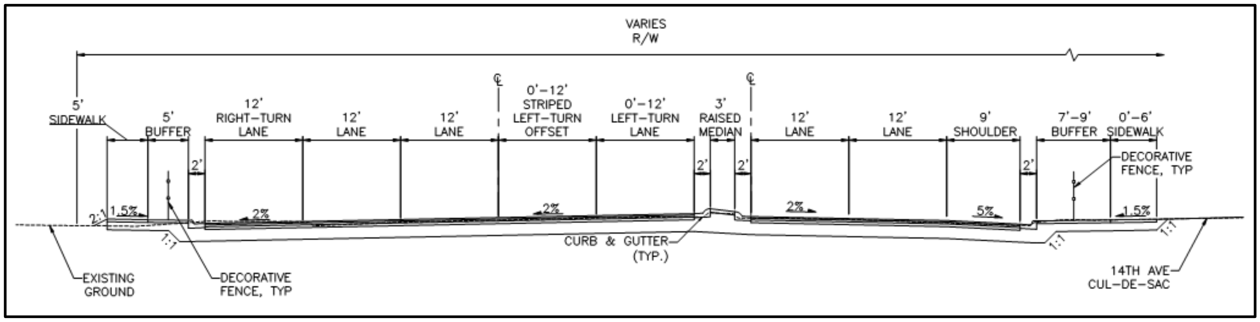

Figure 17: Airport Way Typical Section – East Leg

The proposed typical section of South Cushman Street at the intersection is shown in Figure 18 and includes the following:

- 12-foot through lanes
- 12-foot left-turn lane
- Channelized right-turn lane with raised island
- 5- to 8-foot wide sidewalk on each side

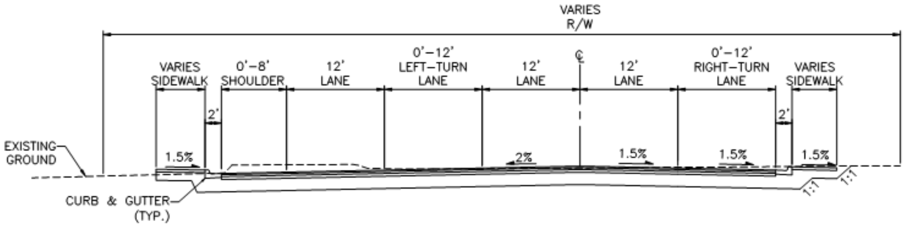

Figure 18: South Cushman Street Typical Section

The proposed typical section of Cushman Street at the intersection is shown in Figure 19 and includes the following:

- 12-foot through lanes
- 12-foot left-turn lane
- Channelized right-turn lane with raised island
- 7- to 10.5-foot wide sidewalk on each side

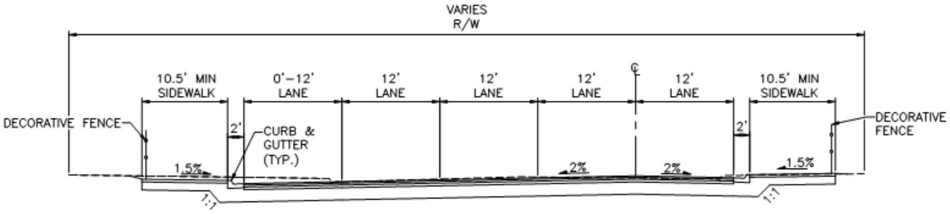

Figure 19: Cushman Street Typical Section

Figure 20 shows the typical section of 14th Avenue. The overall width of 14th Avenue is 34 feet and ends in a 45-foot radius curbed cul-de-sac.

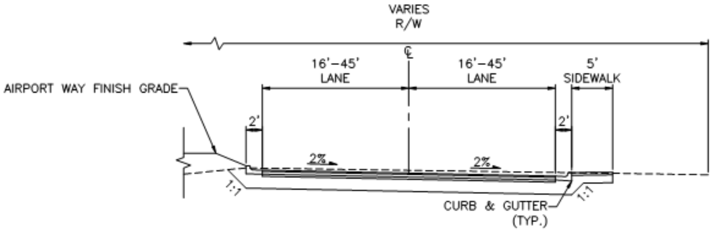

Figure 20: 14th Avenue Typical Section

PAVEMENT DESIGN

The proposed pavement design is determined using the mechanistic design procedures per the Alaska Flexible Pavement Design Manual (AKFPDM). The pavement design considered the findings and results of geotechnical investigations in the project area. These investigations are summarized in the Soil Conditions Section of this study.

The AKFPDM requires pavement structures carrying an AADT load of greater than 5,000 vehicles per day (vpd) with curb and gutter be designed under the requirements of General Policy #7 (GP-7). The pavement design must meet the following to comply with GP-7:

- Use Alaska Renewable Pavement (ARP) per Section 7.4.3 of the AKFPDM
- Use a 30-year design life for fatigue failure analysis
- Use a 15-year analysis period for functional failure analysis

The pavement design also needs to comply with the Stabilized Base Policy (SBP) of 12/19/2003, which includes use of a 20-year design life for fatigue failure analysis.

The structural section design assumes foundation soils are not frost susceptible or otherwise of poor quality to varying degrees. A pavement structure design that identifies and considers existing poor-quality foundation soils will require a geotechnical investigation.

Special provisions should consider testing of excavated materials to determine if they meet selected material requirements.

The AKFPDM software was used to ensure the selected pavement structure meets or exceeds the mechanistic design requirements for the design service life of the new pavement.

One pavement structure is recommended for Airport Way. Two pavement design analyses are presented in APPENDIX E:

1. A pavement structure analysis meeting mechanistic design and GP-7 (ARP) requirements per Section 7.4.3 of the AKFPDM. Note that by definition, this design will also comply with the SBP.
2. A pavement structure analysis meeting mechanistic design and SBP requirements per Section 7.4.1 of the AKFPDM.

The Design Designation was updated by DOT&PF in a memorandum signed October 15, 2019. The memorandum is included as Appendix A. The memorandum did not include lane direction percentages, as such that data was carried forward from the TSAR (KE, November 2016).

Both pavement designs are based on analysis of future traffic loading per the Design Designations, with consideration given to historic geotechnical investigations and historical performance of the as-built pavement structures in the immediate vicinity.

The minimum structural section for traffic loading is based on projected values of average AADT in vpd and Equivalent Single Axle Loads (ESALs). Values for Airport Way, the segment of the project used for pavement design, are shown in Table 7. Detailed ESAL calculation sheets are included in APPENDIX E

Table 7: Project ESALs

Airport Way	
Base Year AADT (2018)	17,000 vpd
% Growth	0.91%
% Trucks	4.8%
Percent Loadings	Lane 1 = 22%
	Lane 2 = 33%
	Lane 3 = 27%
	Lane 4 = 18%
Directional Split	60/40
ESALs-SBP (20 Y)	1,281,254
ESAL-GP-7 (30 Y)	2,014,371

Two structural pavement designs are presented below. The first design meets both requirements of the AKFPDM. The second design meets the stabilized base policy only and may provide an economical benefit.

The below pavement structure is recommended for the project. It meets the mechanistic design criteria and complies with GP-7 (ARP) and SBP:

- Two inches of surface wearing course of Hot Mix Asphalt (HMA), Type II; Class B; over
- Three inches of binder course of HMA; over
- Four inches of Aggregate Base Course (ABC), Grading D-1; over
- Eighteen inches of Subbase, Grading F.

The below pavement structure is an alternative design that meets the mechanistic design criteria and complies with the SBP; however, it does not comply with GP-7 (ARP):

- Two inches of HMA, Type II; Class B; over
- Three inches of Asphalt Treated Base (ATB); over
- Eighteen inches of Subbase, Grading F.

The Asphalt Treated Base may be a foamed or emulsion product if desired.

The layer of Subbase, Grading F is placed on the existing subgrade. The existing subgrade is scarified to a depth of eight inches and compacted to a proof roll specification.

The pavement design for Cushman Street will match the design of the CCSP, consisting of the following:

- Three inches of HMA, Type II; Class B; over
- Three inches of ATB; over
- Eighteen inches of Selected Material, Type A

The pavement design for South Cushman Street will match the design of the most recent reconstruction project in the area, consisting of the following:

- Three inches of HMA, Type II; Class B; over
- Three inches of ATB

The sidewalk surface will be constructed using a rigid pavement structure consisting of the following:

- Four inches of Portland Cement Concrete (PCC); over
- A minimum of twelve inches of Subbase, Grading F

The depth of concrete will thicken to six inches at driveways, effectively reducing the Subbase, Grading F material thickness to a minimum of ten inches.

Incorporating Recycled Asphalt Pavement (RAP) into the surface asphalt and into the base course layer is a viable option. Integrating RAP will be considered during any future constructability review. If utilized, final layer material properties and thicknesses may be modified.

PRELIMINARY BRIDGE LAYOUT

Not applicable. There are no bridges within the project limits.

RIGHT-OF-WAY REQUIREMENTS

Due to the widening and shifting of the intersection, parcels adjacent to the project corridor will be impacted. These parcels consist primarily of commercial properties:

Closest to the intersection, the proposed design requires multiple full and partial ROW acquisitions and the demolition of four buildings: Thrifty Liquor, Drop Inn Lounge, Bojangles Nightclub, and Coin King.

Coin King was identified as potentially having subsurface contamination. An environmental analysis was completed to determine the feasibility of acquiring the Coin King property (See APPENDIX D). This parcel will be acquired and reconstructed to a public parking area to mitigate business parking impacts. See the Traffic Analysis section for more information.

In addition, partial and full ROW acquisitions will be required on parcels along the north side of Airport Way, between 14th Avenue and Airport Way, along the west side of Cushman Street, and along the west side of South Cushman.

Temporary construction easements (TCEs) will be required to provide a working area for the construction contractor to construct the roadway and to provide utility companies working room to relocate their utilities. Temporary construction permits (TCPs) will also be required to accommodate driveway reconstruction.

In some areas, existing sidewalk or curb ramps extend slightly beyond the ROW and will need to be replaced in order to match the new road profile. TCEs will be required for this work.

Preliminary limits of TCEs and TCPs, along with the proposed ROW acquisitions are shown on the Preliminary Right-of-Way Concept Plans provided in APPENDIX G. These limits are subject to change as the design progresses.

MAINTENANCE CONSIDERATIONS

Airport Way is maintained by DOT&PF. Cushman Street is maintained by the COF.

The project will increase maintenance efforts by installing raised medians, which are an obstacle for snow plowing. The raised islands will be offset from the through lanes by up to six feet at the island noses, tapering to no less than two feet from the edge of the through lanes reduce the likelihood of a snowplow hitting the island.

Maintenance efforts will also be increased where widening occurs. Maintenance responsibilities for increased roadway widths mainly involve snow removal, pavement upkeep, street sweeping, and traffic marking restriping.

Lighting will be replaced throughout the project area; therefore, reducing efforts in maintaining the lighting for the near future. The replacement LED luminaires will be specified to have a 10-year replacement warranty and should last between 10 to 20 years before replacement is needed. The integrated wireless lighting control system can be used to quickly aid Maintenance response to malfunctioning luminaires and further reduce energy consumption and associated operating costs.

This project will remove unused conduit and j-boxes within the project limits, mitigating issues with pooling water and freezing.

In addition, the existing conduit and j-boxes associated with signal equipment will be removed, as the vehicle detection method will be radar instead of traffic loops. This will mitigate future issues with unused devices.

Landscaping elements will be low maintenance to reduce COF’s maintenance efforts.

MATERIAL SOURCES

All material sources will be Contractor-furnished, except the storm drain castings and pedestrian lighting, as discussed below.

There are numerous local commercial materials sources capable of providing quality materials meeting project specifications. Finished concrete and asphalt of specified quality is readily available from local commercial facilities.

Landscaping elements will be required to match those existing on Cushman Street. This may require coordination with the COF.

A public interest finding (PIF) is in place for the COF's proprietary storm drain castings, which will be required for the storm drain inlets, frames, and lids on Cushman and South Cushman Streets.

Pedestrian lighting will match the existing on Cushman Street. These may require a PIF to be incorporated into the project.

UTILITY RELOCATION & COORDINATION

There are numerous utilities within the corridor limits, both crossing and paralleling the streets. These utilities include:

- Alaska Communications (ACS): Telephone and fiber optics
- General Communications Inc. (GCI): Fiber optics and cable TV
- Golden Valley Electric Association (GVEA): Electric power
- Golden Heart Utilities (GHU): Water and sewer
- Fairbanks Natural Gas, LLC (FNG): Natural Gas

The existing utility information shown in the preliminary design is based on field-surveyed locates, as-builts, utility system maps, and information provided by utility companies. The actual configuration, existence, and location of utilities may vary from what is shown in the preliminary design.

The design seeks to minimize impacts to existing utilities; however, reconstruction of the Airport Way/Cushman Street intersection has varying levels of impact to most of the utilities within the project corridor. A utility conflict matrix has been prepared for this project and can be found in APPENDIX I. The following sections summarize the existing utilities and the impacts anticipated for each utility type. The contractor will be required to request utility locates prior to construction.

Communications

<u>*Existing Facilities*</u>

ACS has two Fiber Optic underground duct banks running along the east side of South Cushman Street and Cushman Street: a 6-way duct bank runs from south of the Begin of Project (BOP) to just south of Airport Way, and a 2-way duct bank runs from south of the BOP to north of Gaffney Road, beyond the End of Project (EOP). The 6-way duct bank is embedded in the 10-inch thick sidewalk and the 2-way duct bank is in the roadway adjacent to the curb and encased with approximately 13 inches of concrete. Within the project area, the duct banks intercept with telephone manholes located at 14th Avenue. The 2-way duct bank also intercepts a telephone vault just north of Airport Way. The ducts are 4-inch diameter HDPE. Manholes and vault are typically seven feet deep. Cables in the duct banks include a 48-strand fiber cable and three twisted pair cables (1500x24, 2400x26, and 1200x24). ACS also has above ground copper cables along Cushman Street and intermittently along Airport Way on GVEA's poles.

ACS also has overhead communication cables on the north side of Airport Way west of Cushman Street. These lines share utility poles owned by GVEA.

GCI has overhead communications cables crossing Airport Way east of Cushman Street. The lines consist of messenger-supported coaxial cable and self-supporting fiber optic cable which are attached to shared GVEA power poles.

Utility Conflicts

Sections of the existing underground telephone duct banks along South Cushman Street and Cushman Street will require relocation due to widening and relocating the sidewalk, reconstructing the Airport Way and Cushman Street intersection, installing the southeast and northeast signal poles, and installing landscape features. The rest of the underground duct banks will be protected in place.

A fiber optic vault for the 2-way telephone duct north of the Airport Way and Cushman Street intersection will require relocation.

Telephone manholes will require adjustment to the new finish grade elevation and/or relocation due to the widened sidewalk.

The GCI overhead line over the east leg of the intersection will need to be raised, as it has inadequate vertical clearance.

Most of the GVEA utility poles and their associated pole guy anchors, where applicable, will require relocation. Some of these poles are collocated with the GCI and/or ACS communication lines; therefore, the communication lines will also require relocation.

Electric/Power

Existing Facilities

All of the power lines in the project area, except for DOT&PF signal and lighting power, are overhead and belong to GVEA. Most of the poles are located adjacent to the back of sidewalk.

There is an aerial 12.47 kV three-phase distribution power line paralleling the east side of Cushman Street (within the corridor ROW) from 12th Avenue to 23rd Avenue.

GVEA also has aerial facilities parallel to, and on the north side of, Airport Way. West of Cushman Street, GVEA has overhead primary and secondary single-phase power lines. East of Cushman Street, GVEA has a three-phase distribution line extending approximately 600 feet.

Within the project area, aerial lines cross Cushman Street mid-block between Gaffney Road and Airport Way (three-phase); and cross Airport Way at Turner Street (single-phase) and just east of Cushman Street (three-phase).

Utility Conflicts

Many electrical poles and their pole guy anchors, as applicable, will require relocation. Most of these poles are on the north side of Airport Way. One of the poles contains a luminaire and another holds a meter.

The overhead line spanning the east leg of the intersection will need to be raised, as it has inadequate vertical clearance from the road.

An electrical junction box and a manhole in the northwest quadrant of the Airport Way/Noble Street intersection will require adjustment to the final grade.

Water

Existing Facilities

GHU water mains are typically buried 4.5 feet deep, but burial depths may vary. Water services are typically 3/4-inch to 2-inch diameter and are generally buried a minimum of four feet deep. In the project area, there are two fire hydrants, both located behind the back of existing sidewalk. One on the southwest corner of the Cushman Street/Gaffney Road intersection and one on the west side of Cushman Street mid-block between 14th Avenue and 15th Avenue.

GHU has a 6-inch diameter water main paralleling the west side of Cushman Street from south of the BOP to south of Gaffney Road. The water main is ductile iron pipe (DIP) south of 14th Avenue and wood stave pipe (WSP) north of 14th Avenue. There are numerous water services crossing Cushman Street connecting the buildings in the area to the 6-inch diameter main.

Within the project area, there are four water mains crossing Airport Way. There is a looped water main, comprised of a 16-inch diameter pipe and 6-inch diameter pipe, crossing Airport Way on the east side of Turner Street; the 6-inch diameter main crossing at Cushman Street; and an 8-inch diameter water main crossing Airport Way on the east side of Noble Street.

Within the Cushman Street/Gaffney Road intersection, a water main is present paralleling Gaffney to the south. This main extends west past Turner Street and east of Noble Street. The water main is a 10-inch diameter pipe east of Cushman Street and 12-inch diameter pipe west of Cushman Street. The 6-inch diameter main along the west side of Cushman Street terminates as a tee connection with the 10-inch and 12-inch diameter pipes at the southwest corner of the intersection.

A 6-inch diameter water main located in 14th Avenue, west of Cushman Street and runs between Gillam Way and Stacia Street. The main continues along the west side of Stacia Street extending south of 15th Avenue.

Utility Conflicts

Water valves in conflict with the proposed design will require adjustment to meet the final grade of the road. Existing waterlines will be protected in place and are not expected to be impacted.

The hydrant on South Cushman Street will require relocation due to widening of the road. The hydrant at the southwest corner of Gaffney Road and Cushman Street will be protected in place.

Sewer

Existing Facilities

GHU has three sewer mains crossing Airport Way within the project area: a 10-inch diameter sewer main crossing at Turner Street, approximately ten feet deep; a 10-inch diameter sewer main along the east side of and crossing at Stacia Street, approximately seven to ten feet deep; and a 10-inch diameter sewer main crossing mid-block between Cushman and Lacey Streets, approximately nine feet deep. The main at Stacia attaches to a manhole on the south side of Airport Way. The main between Cushman and Lacey Streets attach to manholes on the north and south sides of Airport Way. The manhole associated with the main at Turner Street is outside the project area.

An 8-inch diameter WSP sewer main crosses 14th Avenue west of Lacey Street and then heads west along the south side of Airport Way, crossing South Cushman Street, until Stacia Street. At

Stacia Street the sewer main continues west along 14th Avenue until Gillam Way. It is buried approximately 11 feet deep and connects to multiple manholes along its run.

An 8-inch diameter WSP sewer main is also located on the north side of Gaffney Road, from Barnette Street and Turner Street to west of Noble Street. The 8-inch diameter sewer main becomes a DIP west of Noble Street and continues east. The sewer main is buried approximately ten feet deep and connect to manholes and sewer cleanouts.

Utility Conflicts

Sewer manholes and cleanouts along Airport Way, South Cushman Street, 14th Avenue, and Gaffney Road in conflict with the project reconfiguration will require adjustment to the final grade or relocation. Others will require the lids be rotated and adjusted to meet a level surface. If the conflicting lids cannot be rotated and adjusted to meet a level surface, they will require relocation. Relocating these manholes requires the associated piping to also be relocated.

Natural Gas

Existing Facilities

FNG has some facilities within the project area. An 8-inch diameter gas line runs along Gaffney Road from east of Noble street to the northwest corner of the Cushman Street/Gaffney Road intersection. At this point, the gas line turns north and continues on the west side of Cushman Street. An 8-inch diameter gas line crosses Airport Way just east of Noble Street. A 2-inch diameter gas line runs along the south side of 14th Avenue. There is also a gas line along the east side of Stacia Street between 14th Avenue and 15th Avenue, which is just outside the project area but should be noted, due to the proximity to the project's proposed improvements.

Gas lines are typically buried a minimum of 36 inches deep outside of roadway areas and a minimum of 48 inches below roadways; however, depths vary and may be considerably deeper when directionally bored.

Utility Conflicts

The gas lines within the project area will be protected in place. The remaining gas lines outside the proposed improvements should not be affected but precautions should still be taken to avoid impacts with them.

ACCESS CONTROL FEATURES

Airport Way is a limited access roadway. Separated by jersey barriers and chain-link fencing, access is restricted to public road intersections. This project will not alter the restricted access characteristic on Airport Way. However, the existing controlled access line, which follows the existing fence line along Airport Way, should be adjusted to match the widening of the Airport Way/Cushman Street intersection.

Access along Cushman and South Cushman Streets is by permit from the COF. Properties and public roads have direct access onto Cushman. Within the project limits along Cushman Street, four curb cut driveways will be removed and one will be reduced in width to accommodate the southbound right-turn lane. The reduced driveway width meets HPCM standards. The project will remove two curb cut driveways along South Cushman Street and replace three curb cut driveways.

For safety and operational function, AASHTO recommends limiting access within the intersection functional area. There are several driveways on Cushman within this area as well as the 14th Avenue intersection. The driveways will be removed or reduced in width, as described above. The intersection of Cushman Street and 14th Avenue will be eliminated with this project to allow for safer and more efficient traffic flow in the area.

PEDESTRIAN/BICYCLE (ADA) PROVISIONS

Pedestrian access will be provided throughout the project area. The project will replace existing sidewalks along both sides of Airport Way, Cushman Street, and South Cushman Street, and replace the existing fence along both sides of Airport Way with a decorative fence. The new facilities will tie into the existing sidewalks and fencing.

Raised corner/channelizing islands will be constructed in all four quadrants of the intersection. The raised islands will assist pedestrians in navigating across the intersection by allowing them to cross the vehicle right turn movements separately from the through movements. The raised islands will also improve pedestrian visibility to motorists, as described in the Safety Improvements Section, and will reduce the pedestrian crossing distances.

Pedestrian facilities will meet ADA standards, as presented in the Design Standards section of this DSR. New ADA-compliant curb ramps will be constructed throughout the project area, including on 14th Avenue. Pedestrian push button assemblies will also be replaced with ADA-compliant assemblies.

The intersection will not be designed with bike lanes; thus, cyclists will use the sidewalks along the corridors for commuting as they do currently. AASHTO recommends a shared use facility be 10 feet wide where practicable. Reduced widths are allowed where project constraints are present. The proposed sidewalk width along Airport Way is based on physical and ROW constraints. AASHTO also recommends providing a physical separator where shared use paths are adjacent to roadways. This project will replace the fence along Airport Way, thus providing that physical separation. The majority of Cushman Street, within the project limits, will provide adequate sidewalk width for a shared-use facility.

Signage on Airport Way will be replaced, indicating where pedestrian and bicycle movements are prohibited.

Wayfinding signs are proposed to help guide pedestrians and bicyclists to near-by destinations.

SAFETY IMPROVEMENTS

Several driveways or local streets access Cushman Street within the functional area of the Airport Way and Cushman Street intersection. To improve safety and operations, access from14th Avenue onto Cushman will be removed, and driveways will be limited to the extent practical to reduce conflicts between traffic queues and traffic entering and leaving the driveways. Limiting access to Cushman Street in the functional area of the intersection will also reduce vehicle-pedestrian conflict points.

The addition of the dedicated left-turn and right-turn lanes on the northbound approach will separate the northbound through traffic from the decelerating northbound turning traffic. Separating this traffic will lessen the potential for rear-end and side-swipe crash patterns identified on the northbound approach.

Offsetting opposing left-turn lanes on Airport Way will improve sight distance for left-turning vehicles, which will allow motorists to better judge gaps in oncoming traffic and alleviate left-turn crashes between eastbound and westbound vehicles.

The channelizing right-turn islands are proposed to mitigate right-angle crashes and pedestrian/bicycle crashes with right-turning vehicles. Raised channelizing islands physically separate right-turning traffic from through traffic. They also provide pedestrian refuge and effectively decrease the width of road a pedestrian must cross. In addition, raised islands improve pedestrian visibility to motorists by placing the crossing paths perpendicular to each other. This also separates the pedestrian-vehicle interactions from the vehicle-vehicle interactions, by allowing turning vehicles to first encounter and focus on the crosswalk activities before proceeding to focus on roadway operations.

This project will improve roadway lighting levels, uniformity, and glare on Cushman Street by upgrading non-compliant roadway segments to meet current standards presented RP-8-14.

INTELLIGENT TRANSPORTATION SYSTEM FEATURES

Existing Intelligent Transportation System (ITS) features in the area of Airport Way and Cushman Street include roadway lighting controls, luminaire nodes, traffic signals at each adjacent intersection, the existing traffic signal being replaced as part of this project, and fiber optic and copper interconnect systems connecting to each of the adjacent traffic signals.

A public interest finding has been completed for the wireless lighting control module (gateway) and luminaire nodes and recommends exclusive use of GE LightGrid lighting control system.

A Systems Engineering Analysis (SEA) checklist was not completed for this project as it falls under Non-Systems Engineering (NSE) project exceptions which includes fiber, conduit, and signal system upgrades. No new technologies are being added as part of the signal system, lighting upgrades, or signal interconnect.

DRAINAGE

Existing Drainage

The project area is within the Chena River Subwatershed, which is bounded by Airport Way on the south, Fairbanks International Airport on the west, Fort Wainwright and North Pole on the east, and Skyline Ridge on the north. The project's stormwater drainage system collects runoff from an area of approximately 17 acres via curb and gutter, which is connected to piped storm drain systems. There are no wetlands, streams, lakes, or stream crossings within the project area. The Tanana River is approximately three miles south of the project area and the Chena River is approximately one-half mile to the northeast. The project area is protected from upstream 100-year flood events by the Moose Creek Dam.

The storm drain systems along Cushman Street, Gaffney Road, and 14th Avenue are maintained by the COF. Within the project limits, these systems feed into the Airport Way storm drain system maintained by DOT&PF. The Airport Way system was installed in the late 1950s to early 1960s.

The Airport Way/Cushman Street intersection is the hydraulic high point in the project area. At the beginning of project (BOP), runoff from the first approximate 350 linear feet of the westbound lanes is collected by a curb inlet and distributed into a west-draining, 18-inch wood stave pipe (WSP) via an 8-inch WSP lateral. Runoff within the project area is otherwise collected by a network of curb inlets and 8-inch to 12-inch WSP laterals and distributed into the east-draining Airport Way storm drain. The east-draining system is comprised of an 18-inch WSP near the BOP and transitions to a 24-inch WSP at the east end near the end of project (EOP). The east-draining system continues northeast beyond the EOP through the Steese Highway/Airport Way intersection and ultimately outfalls to the Chena River via ditch. The storm drain along Airport Way is generally located in the south shoulder. There are six storm drain manholes within the project limits.

At the north leg of the project, runoff from the Cushman Street/Gaffney Road intersection drains into the Gaffney Road storm drain system. The Gaffney Road system is comprised of a 15-inch diameter corrugated polyethylene pipe (CPP) draining east along Gaffney Road, then bends south tying into the Airport Way system west of Noble Street via a 12-inch CPP. Across the west and south legs of the intersections, the storm drain system includes cast iron pipes (CIP). The drainage analysis determined these pipes are under capacity for a 10-year flood event.

The storm drain system along South Cushman Street is comprised of 12-inch CPP and drains north into the Airport Way system. This section of storm drain was recently constructed in 2015 with the COF's South Cushman Sidewalk and Drainage Improvements project (DOT&PF Project No. 62532).

Runoff from 14th Avenue is piped to the Airport Way system via 8-inch WSP and 12-inch corrugated metal pipe (CMP).

The existing storm drain system within the project area appears to be functioning adequately; however, localized ponding appears to be an issue where inadequate surface grading is present. One area with apparent grading issues is the southeast corner of South Cushman Street and 14th Avenue, where runoff ponding occurs.

Proposed Drainage

The project will not alter the overall drainage patterns within the area. Within the project limits, the land is fully developed, and the impervious area is not expected to increase as a result of the proposed work. The proposed storm drain system will be designed per the AHDM for a 10-year storm event.

The design will upgrade and/or replace under-capacity and/or failing components. In general, existing 8-inch and 12-inch storm drain laterals, both WSP and CMP, will be replaced with new 12-inch CPP. New curb and gutter will be installed along Airport Way, South Cushman Street, and Cushman Street, and at the Cushman Street/Gaffney Road and Airport Way/Noble Street intersections. Curb inlets are proposed for locations with standard curb and gutter, and field inlets are proposed in non-pavement areas (e.g., landscaped or grass areas at back of sidewalk). Inlet locations will be relocated to correspond with the curb and gutter of the new roadway configuration and to provide effective drainage. Inlets are located at sag points in the gutter; in the gutter at locations where superelevation slopes transition to level; upstream of crosswalks and intersections; and behind sidewalks to drain low areas. Manhole spacing will not exceed 400 feet.

The Airport Way trunk line was evaluated per the AHDM to confirm its capacity and size. The analysis determined the existing pipe size and alignment are adequate to convey post-construction runoff. The existing 18-inch diameter WSP main will be replaced with new 18-inch diameter CPP. The project will also replace the dated storm drain piping and structures along Airport Way between west of Turner Street and Noble Street with new materials.

Portions of the South Cushman storm drain system will be replaced to correspond with the roadway widening.

Storm drain piping and structures replaced or added at the Cushman Street/Gaffney Road, intersection will meet COF standards. The project will replace the CIPs at the Cushman Street/Gaffney Road intersection with CPP, matching the other pipes in the vicinity.

The 14th Avenue cul-de-sac will regrade low spots to provide drainage flow to a field inlet installed in a grass swale.

Some of the existing structures scheduled to be replaced do not meet the Alaska Department of Environmental Conservation’s (DEC) required horizontal and/or vertical separation distance from a water line. In addition, at a few locations, the proposed storm drain system will cross above the existing water lines. In order to tie into the existing storm drain system, these structures and pipes cannot be relocated; and therefore, will require separation waivers from DEC.

The proposed horizontal layout of the storm drain is provided in APPENDIX F.

SOIL CONDITIONS

Geotechnical investigations were not included in the project scope. This section summarizes available studies and documents related to subsurface conditions in the project area.

Fairbanks lies in the floodplains between the Tanana and Chena Rivers. Surface and subsurface investigations in the vicinity of this project revealed alluvial soils ranging from frost susceptible silts up to sandy gravel deposits. Organic materials are often found on the upper strata of the silts. Old river channels and sloughs can result in pockets of organic and peat materials. Groundwater depths vary from eight feet to below 15 feet depending on the season, and is a source for frost heave mechanics if frost susceptible soils lie above the water table. Surface features and soil conditions along the project have been modified by development since before the 1950's.

Airport Way: Gillam to Noble

The geotechnical investigation for Project Number F-062-3(15) (1968) advanced several bore holes in the vicinity of the Airport Way/Cushman Street intersection. A summary of the investigations indicated boreholes within the roadway encountered a pavement structure comprised of a thin asphalt layer overlying sandy gravel fill of highly variable depth, ranging from less than a foot up to 3-foot thickness. Boreholes outside the traveled way typically indicated a silt layer varying from 2- to 4-feet thick; overlying a sandy silt/silty sand. At variable depths of eight to 12 feet the strata graded to silty sandy gravels. The bore log descriptions of the upper portion of the silts often referred to an organic silt. The report recommended a minimum excavation of 39 inches and backfilling with base, subbase, and selected material.

In the project area the as-builts from 1973 indicate an excavation/backfill of 36 inches and replacement with borrow. No specification for the borrow was mentioned. Six inches of Subbase was placed over the Borrow, and another six inches of Base Course (Grading D-1) completed the underlying pavement structure. Two 1.5-inch thick lifts of Hot Mix Asphalt were placed on the Base Course.

South Cushman: 15th Street to Gaffney:

To date, neither a geotechnical investigation specific to the original pavement structure nor as-built construction plans (other than the portion crossing Airport Way, see above) are available for this section of South Cushman. Roads along South Cushman were built without benefit of archived geotechnical investigations. Following is a general compilation of soil conditions information from geotechnical investigations and as-built drawings for historic projects in the project area. Design decisions for this project were based on available historic information.

South Cushman Street Improvements Project

The Engineering Geology & Soils Report for South Cushman Street Improvements, State Project 63216 (1994), explored subsurface soil conditions from Van Horn Road to Gaffney Road. A total of nine borings were advanced between 15th Avenue and Gaffney Road. This investigation anticipated a widening of Cushman Street to five lanes; therefore, the borings were located outside the traveled way in areas of the anticipated lane widening. Thus, no information about the existing pavement structure was presented. The report recommended excavating existing soils to a depth of 46 inches below final grade and building the pavement structure with select materials over the full new roadway width.

Cushman Complete Streets Project

The typical section for the Cushman Complete Streets project (2015) required excavating 24 inches below grade, then placing 18 inches of Selected Material, Type A overlain with two 3-

inch lifts of Hot Mix Asphalt. The Cushman Complete Streets project began on the north side of Gaffney Road, which is the end of this project.

Noble Street

Noble Street is the north-south street immediately east of Cushman. A Centerline Soil Profile (geotechnical) memorandum (1962) recommended excavating to two feet below grade and replacement with selected materials. The as-builts (1963) indicated the recommendation was followed and the select materials were overlain with two inches of asphalt.

Plans for an upgrade to Noble Street were advertised in 2016. The typical section for the upgrade (following recommendations in a 2012 Geotechnical Study for the project) specified excavation to a depth of 18 inches below grade. A pavement structure consisting of eight inches of Subbase overlain with six inches of Base Course Grading D-1, was placed. Four inches of Hot Mix Asphalt was placed on the Base Course.

Observations of these existing pavement structures by DOT&PF and the COF indicate adequate performance (limited rutting, heaving, or surface cracking due to weak pavement structure). Pavement damage has been limited in extent and localized in area. These pavement structures are used as design guidelines for the pavement design(s) presented in the Pavement Design section and detailed in APPENDIX E of this report..

EROSION AND SEDIMENT CONTROL

The project includes temporary and permanent measures to control or prevent erosion and sedimentation during and post project construction. The contractor will prepare a Storm Water Pollution Prevention Plan (SWPPP) prior to construction conforming to the current Alaska Construction General Permit (ACGP), the current Alaska Pollutant Discharge Elimination System (APDES) Permit for the City of Fairbanks, DOT&PF Best Management Practices (BMPs) for Erosion and Sediment Control, in accordance with the DOT&PF contract specifications, and following the guidelines of the Erosion and Sediment Control Plan (ESCP) provided to the contractor. The contractor will submit the SWPPP for approval by the Construction Project Engineer. The contractor will conduct construction activities in accordance with the approved SWPPP.

The area of ground disturbance for the project is approximately seven acres, not including material sites or staging areas. The project is in an urban area, with ground predominantly asphalt pavement or concrete and very little previously undisturbed ground. There are no wetlands, fish-bearing streams, lakes, or stream crossings within the project area.

Appropriate erosion and siltation controls will be used and maintained in optimal condition during construction and all other exposed soils/fills will be permanently stabilized. Temporary erosion control measures may include but are not limited to preservation of existing vegetation; erosion control mats; silt fence or fiber rolls; water for dust control; perimeter controls; stormwater drain guards; and good housekeeping practices. Temporary BMP’s will remain in place until permanent erosion and sediment control measures are in place and soil is permanently stabilized.

All disturbed ground will be seeded or covered with low erodible material for permanent stabilization at the end of construction activity. The site will be monitored at the frequency indicated in the ACGP until final stabilization has been achieved.

ENVIRONMENTAL COMMITMENTS

The approved Categorical Exclusion is included in APPENDIX B. The following are the commitments from this Categorical Exclusion:

1. The area is highly developed urban area. Vegetation clearing is not planned. If active bird or Bald Eagle nests are found during construction within 660 feet of the project limits (which includes primary and secondary projection zones), construction activities will cease except as permitted by Federal, State, and local laws, and approved by the Project Engineer.
2. Imported landscaping materials will comply with the project specification that prohibits noxious weeds on the Alaska Department of Natural Resources Division of Agriculture's Prohibited and Restricted Noxious Weeds list located at http://plants.alaska.gov/invasive/noxious-weeds.htm Seed containing more than the maximum allowable tolerance of restricted noxious weeds shall be rejected.
3. An Environmental Sampling Work Plan and Environmental Quality Assurance and Protection Plan to screen and sample contaminated soils and potentially contaminated groundwater will be prepared and submitted to ADEC for review and concurrence. Because dry cleaning solvents are considered Resource Conservation and Recovery Act (RCA) hazardous materials, coordination with the U.S. EPA RCRA Program will also be necessary for contaminated soil handling and disposal options.
4. Coin King will require assessment and removal of contaminated soil adjacent to and underneath the structure once it is demolished. An environmental alternatives analysis was completed for this project for the contaminated soils associated with the laundromat building. The report can be found in APPENDIX D.
5. Drainage system modifications will be designed in accordance with the Fairbanks Alaska Pollutant Discharge Elimination System (APDES) Individual MS 4 Permit, of which DOT&PF is a Co-Permittee.
6. No additional effects to Chena River water quality or groundwater quality are foreseen. Discharge to the storm drain system and the Chena River will be minimized during construction by compliance with the Construction General Permit, which requires implementation of Best Management Practices.
7. A Storm Water Pollution Prevention Plan (SWPPP) and best management practices (BMPSs) will be implemented to help alleviate temporary water and air quality impacts.

8. A Traffic Control Plan will be implemented, and the public notified prior to construction. Access to businesses will be maintained throughout construction.
9. TCEs will be needed for access to the project area. Staging areas will be needed. Although the contractor selects their staging areas, the vacant, paved lot in the northeast corner is a likely location. TCPs may be needed. Utility relocates are planned. The extent of TCEs, TCPs, and utility relocates will be known at final design. Staging areas selected by the contractor will be in accordance with DOT&PF policies. DOT&PF will continue to consult with ADEC to plan for hazardous material avoidance and clean-up for the contaminated sites and groundwater contamination plumes.
10. A City of Fairbanks Noise Ordinance Variance Permit is needed for noise if construction activity is planned between 11:00pm and 7:00am
11. Work will be done in compliance with APDES MS4 permit.
12. The disturbed area will be over an acre, a NOI will be filed with ADEC and a SWPPP will be submitted to ADEC for approval and implemented during construction.

WORK ZONE TRAFFIC CONTROL

The HPCM, Section 1400.2 sets forth the criteria for determining if a project is ‘significant’ for purposes of determining the level of effort required in developing a Traffic Management Plan (TMP). Significant projects require a full TMP, including Transportation Operations (TOP), Public Information (PIP), and Traffic Control (TCP) Plans. Exempt Significant or Non-Significant projects require a TCP as a minimum and may also include a PIP. Significant projects fall into either a Category 1 or Category 2 classification, as described below:

Category 1:
Project occupies a location for more than three days with either intermittent or continuous lane closures on Interstate Highways within a Transportation Management Area (TMA) – Neither Airport Way nor Cushman Street is considered an interstate highway. Furthermore, Fairbanks is not within a TMA; therefore, this criterion is not met.

Category 2:
Project occupies a location for more than three days with either intermittent or continuous lane closures on arterials, expressway, or freeways with an AADT of 30,000 or more – Airport Way and Cushman Street are classified as arterials; however, the entering AADT of the intersection is expected to be less than 30,000 vpd in the construction year; therefore, this criterion is not met.

Project fully closes an arterial for more than one hour at a time with no practical alternate route – Full closure of the intersection during construction is possible; however, other practical detour routes are available, such as Mitchel Expressway, Steese Highway, Gilliam Way, Gaffney Road, and 17th Avenue; therefore, this criterion is not met.

Any project that, alone or in combination with other concurrent projects nearby, is anticipated to require greater than normal attention to traffic control to eliminate sustained work zone impacts *greater than what would be considered acceptable* – Based on previous projects within the project area, lane restrictions, if necessary, may be limited to non-peak periods such as nights and weekends. In addition, practical alternate routes are available. Limiting work to non-peak periods and providing practical alternative routes eases the work zone impacts and typical traffic control is expected; therefore, this criterion is not met.

As this project does not meet the definition of a "Significant Project", a full TMP is not required.

Traffic Control Plan (TCP)

The project construction plans and special provisions will include a general TCP and any limitations regarding allowed traffic restrictions. The contractor may use the plans and special provisions as a guide to develop their TCP to be used during construction. The contractor's TCP will safely guide and protect the traveling public in work zones, in accordance with the ATM and the project specifications. The plan will be assessed and approved by the Construction Project Engineer and the Traffic Control Engineer.

Public Information Plan (PIP)

A formal PIP is not anticipated. Both the Department's Alaska Navigator system and 511 system will be used to inform stakeholders of construction activities. Through these methods, stakeholders will be informed of project scope, expected work zone impacts, closure details, and recommended action to avoid impacts and changing conditions during construction.

VALUE ENGINEERING

A Value Engineering (VE) study is required for projects on the NHS routes receiving federal assistance with an estimate total cost of $50 million or more. DOT&PF requires a VE study be considered for all projects with an estimated total value of $40 Million or greater. The total project cost is not expected to reach the minimum threshold; therefore, a VE study is not required for this project.

COST ESTIMATE

The estimated costs for this project are as follows:

Design	$	2,815,000
Utilities	$	1,500,000
Right-of-Way[6]	$	2,230,000
Acquisition/TCE/TCP	*$*	*930,000*
Building Demolition[7]	*$*	*1,300,000*
Construction (Includes 15% Engineering, 5.64% ICAP)	$	9,930,000
Total Cost of Project	$	16,475,000

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[6] ROW costs do not include relocation.
ROW costs shown include costs related to appraisals and acquisitions. ROW costs based on tax records total $1,840,000

[7] Building demolition costs do not include remediation for Coin King, estimated at $8,000,000 (See the environmental analysis in APPENDIX D).

APPENDIX A

DESIGN CRITERIA
AND
DESIGN DESIGNATION

DESIGN CRITERIA CHECKLIST

Project Name Airport Way / Cushman Street Intersection Reconstruction (AIRPORT WAY)
State Project No. Z640780000 Fed. Project No. 0002312
Functional Classification: Urban Arterial Terrain: Level
Present Year (&ADT): 2018 & 17000 Design Year (&ADT): 2040 & 20700
DHV (%): 2130 Directional Split (%): 40/60 Percent Trucks: 4.8
Pavement Design Year: 2040 Pavement Design ESAL: 1,050,000
Design Turning Vehicle: WB-67 Design Accommodated Vehicle: WB-67
Project Type: Reconstruction NHS: ☑ Non-NHS: ☐

FEDERAL 10 CONTROLLING DESIGN CRITERIA		**SOURCE**	**STANDARD**	**AS DESIGNED**	**EXCEPTION[1]**
1. Design Speed[1]		GB Sec 2.3.6, 7.3.2	30-60 mph	45 mph	No
2a. Travel Lane Width		GB Sec 7.3.3	10-12 ft	12 ft	No
2b. Auxiliary Lane Width		GB Sec 7.3.3, 9.7.1	10-12 ft	12 ft	
3a. Outside Shoulder Width		GB Sec 7.3.3	2-8 ft	9-9.5 ft	No
3b. Inside Shoulder Width		GB Sec 7.3.3	2-4 ft	0 ft	
3c. Auxiliary Lane Shoulder Width		GB Sec 7.3.3, 9.7.1	0-8 ft	0 ft	
4. Horizontal Curvature Radius(min-NC)		GB Sec 3.3.5	643 ft	1273 ft	No
5. Superelevation Rate, e(max)		GB Sec 3.3.3, HPCM Sec 1160.5.6	6 %	6 %	No
6. Stopping Sight Distance (SSD)		GB Sec 7.3.2	360 ft	>360 ft	No
7. Grade	Min.	GB 7.3.2	0.3 %	0.3 %	No
	Max.	GB Sec 7.3.2	6 %	1.0 %	No
8. Cross Slope		GB Sec 7.3.2	1.5-3.0 %	max. 2 %	No
9. Vertical Clearance		GB Sec 7.3.5	16 ft	18.5 ft	No
10. Design Loading Structural Capacity[1]		GB Sec 7.3.5	HL93	N/A	No

OTHER DESIGN CRITERIA		SOURCE	STANDARD	AS DESIGNED	WAIVER
Superelevation Transition, Δ		GB Sec3.3.8 (2-12' lanes	0.72 %	0.72 %	No
Bridge Clear-Roadway Width		N/A	N/A ft	N/A ft	N/A
Vertical Curvature, Min.	K(crest)	GB Sec 3.4.6	61	100	No
	K(sag)	GB Sec 3.4.6	79	153	No
Lateral Offset to Obstruction		GB Sec 7.3.4, RDG Sec	1.5 FOC, 3 at Int ft	ft	
Surfacing Material		HPCM Sect. 1180	HMA	HMA	No
Clear Zone Slope		N/A	N/A	N/A	N/A
Clear Zone Width			N/A ft	N/A ft	N/A
Bicycle Lane Width		N/A	N/A ft	N/A ft	N/A
Sidewalk Width		GB Sec 4.17.1	4-8 ft	min. 5 ft	No
Intersection Sight Distance, Left Turn		GB Sec 9.5.3, Case F	400* ft	>400 ft	No
Right Turn		GB Sec 9.5.3, Case C2	530 ft	352 ft	Yes
Crossing		GB Sec 9.5.3, Case D	N/A ft	N/A ft	No
Passing Sight Distance		N/A	N/A ft	N/A ft	N/A
Degree of Access Control		HPCM Sec. 1190.3, GB	No Driveways	No Driveways	No
Median Treatment		HPCM Sec 1150	raised curb	raised curb	No
Median Width			min. 4 ft	min. 4 ft	
Illumination		RPRL	Continuous	Continuous	No
Curb Type		ASD I-20.20	curb & gutter	curb & gutter	No

Proposed by: ______________________________ Date: ____________________

Designer Signature (Consultant or Staff)

Recommended by: ______________________________ Date: ____________________

Engineering Manager Signature

Accepted by: ______________________________ Date: ____________________

Regional Preconstruction Engineer Signature

DESIGN CRITERIA CHECKLIST

Project Name Airport Way / Cushman Street Intersection Reconstruction (SOUTH CUSHMAN ST)
State Project No. Z640780000 Fed. Project No. 0002312
Functional Classification: Urban Arterial Terrain: Level
Present Year (&ADT): 2018 & 8500 Design Year (&ADT): 2040 & 10360
DHV (%): 1070 Directional Split (%): 40/60 Percent Trucks: 3.60
Pavement Design Year: 2040 Pavement Design ESAL: 825,000
Design Turning Vehicle: WB-67 Design Accommodated Vehicle: WB-67
Project Type: Reconstruction NHS: ☐ Non-NHS: ☑

FEDERAL 10 CONTROLLING DESIGN CRITERIA		SOURCE	STANDARD	AS DESIGNED	EXCEPTION[1]
1. Design Speed[1]		GB Sec 2.3.6, 7.3.2	30-60 mph	30 mph	No
2a. Travel Lane Width		GB Sec 7.3.3	10-12 ft	12 ft	No
2b. Auxiliary Lane Width		GB Sec 7.3.3, 9.7.1	10-12 ft	12 ft	
3a. Outside Shoulder Width		GB Sec 7.3.3	2-8 ft	0 ft	No
3b. Inside Shoulder Width		GB Sec 7.3.3	2-4 ft	0 ft	
3c. Auxiliary Lane Shoulder Width		GB Sec 7.3.3, 9.7.1	0-8 ft	0 ft	
4. Horizontal Curvature Radius(min-NC)		HPCM Sec 1120	275 ft	333 ft	No
5. Superelevation Rate, e(max)		HPCM Sec 1130	6 %	6 %	No
6. Stopping Sight Distance (SSD)		HPCM Sec 1120	200 ft	>200 ft	No
7. Grade	Min.	HPCM Sec 1120	0.3 %	%	No
	Max.	HPCM Sec 1120	7 %	0.70 %	No
8. Cross Slope		HPCM Sec 1130	min1.5 %	max. 3 %	No
9. Vertical Clearance		HPCM Sec 1130	17.5 ft	18.5 ft	No
10. Design Loading Structural Capacity[1]		ALBDS	N/A	N/A	No

OTHER DESIGN CRITERIA		SOURCE	STANDARD	AS DESIGNED	WAIVER
Superelevation Transition, Δ		GB Sec 3.3.8	0.66 %	0.66 %	No
Bridge Clear-Roadway Width		N/A	N/A ft	N/A ft	N/A
Vertical Curvature, Min.	K(crest)	GB Sec 3.4.6	19	N/A	No
	K(sag)	GB Sec 3.4.6	37	49	No
Lateral Offset to Obstruction		GB Sec 7.3.4, RDG Sec	1.5 FOC, 3 at Int ft	1.5 FOC, min. 3.6 at Int ft	No
Surfacing Material		HPCM Sect. 1180	HMA	HMA	No
Clear Zone Slope		N/A	N/A	N/A	N/A
Clear Zone Width			N/A ft	N/A ft	N/A
Bicycle Lane Width		N/A	N/A ft	N/A ft	N/A
Sidewalk Width		GB Sec 4.17.1	4-8 ft	min. 5 ft	No
Intersection Sight Distance, Left Turn		GB Sec 9.5.3, Case F	245 ft	>245 ft	No
Right Turn		GB Sec 9.5.3, Case C2	355 ft	>355 ft	No
Crossing		GB Sec 9.5.3, Case D	N/A ft	N/A ft	No
Passing Sight Distance		N/A	N/A ft	N/A ft	N/A
Degree of Access Control		HPCM Sec. 1190.3, GB	Driveways permitted	driveways	No
Median Treatment		HPCM Sec 1150	flush, Left Turning	flush, Left Turning	No
Median Width			min. 12 ft	min. 12 ft	
Illumination		RPRL	Continuous	Continuous	No
Curb Type		ASD I-20.20	curb & gutter	curb & gutter	No

Proposed by: ______________________________ Date: ____________________

Designer Signature (Consultant or Staff)

Recommended by: ______________________________ Date: ____________________

Engineering Manager Signature

Accepted by: ______________________________ Date: ____________________

Regional Preconstruction Engineer Signature

DESIGN CRITERIA CHECKLIST

Project Name Airport Way / Cushman Street Intersection Reconstruction (CUSHMAN ST)
State Project No. Z640780000 Fed. Project No. 0002312
Functional Classification: Urban Arterial Terrain: Level
Present Year (&ADT): 2018 & 8500 Design Year (&ADT): 2040 & 10360
DHV (%): 1070 Directional Split (%): 40/60 Percent Trucks: 3.60
Pavement Design Year: 2040 Pavement Design ESAL: 825,000
Design Turning Vehicle: Bus Design Accommodated Vehicle: Bus
Project Type: Reconstruction NHS: ☐ Non-NHS: ☑

FEDERAL 10 CONTROLLING DESIGN CRITERIA		**SOURCE**	**STANDARD**	**AS DESIGNED**	**EXCEPTION[1]**
1. Design Speed[1]		GB Sec 2.3.6, 7.3.2	30-60 mph	25 mph	No
2a. Travel Lane Width		GB Sec 7.3.3	10-12 ft	12 ft	No
2b. Auxiliary Lane Width		GB Sec 7.3.3, 9.7.1	10-12 ft	12 ft	
3a. Outside Shoulder Width		GB Sec 7.3.3	2-8 ft	0 ft	No
3b. Inside Shoulder Width		GB Sec 7.3.3	2-4 ft	0 ft	
3c. Auxiliary Lane Shoulder Width		GB Sec 7.3.3, 9.7.1	0-8 ft	0 ft	
4. Horizontal Curvature Radius(min-NC)		HPCM Sec 1120	185 ft	N/A ft	No
5. Superelevation Rate, e(max)		HPCM Sec 1130	6 %	N/A %	No
6. Stopping Sight Distance (SSD)		HPCM Sec 1120	155 ft	>155 ft	No
7. Grade	Min.	HPCM Sec 1120	0.3 %	0.3 %	No
	Max. *(30mph)*	HPCM Sec 1120	7 %	0.45 %	No
8. Cross Slope		HPCM Sec 1130	min1.5 %	max. 2 %	No
9. Vertical Clearance		HPCM Sec 1130	17.5 ft	18.5 ft	No
10. Design Loading Structural Capacity[1]		ALBDS	N/A	N/A	No

OTHER DESIGN CRITERIA		SOURCE	STANDARD	AS DESIGNED	WAIVER
Superelevation Transition, Δ		GB Sec 3.3.8	0.70 %	N/A %	N/A
Bridge Clear-Roadway Width		N/A	N/A ft	N/A ft	N/A
Vertical Curvature, Min.	K(crest)	GB Sec 3.4.6	12	N/A	No
	K(sag)	GB Sec 3.4.6	26	49.8	No
Lateral Offset to Obstruction		GB Sec 7.3.4, RDG Sec	1.5 FOC, 3 at Int ft	1.5 FOC, min. 5 at Int ft	No
Surfacing Material		HPCM Sect. 1180	HMA	HMA	No
Clear Zone Slope Clear Zone Width		N/A	N/A N/A ft	N/A N/A ft	N/A N/A
Bicycle Lane Width		N/A	N/A ft	N/A ft	N/A
Sidewalk Width		GB Sec 4.17.1	4-8 ft	min. 6 ft	No
Intersection Sight Distance, Left Turn		GB Sec 9.5.3, Case F	220 ft	>220 ft	No
Right Turn		GB Sec 9.5.3, Case C2	295 ft	>295 ft	No
Crossing		GB Sec 9.5.3, Case D	N/A ft	N/A ft	No
Passing Sight Distance		N/A	N/A ft	N/A ft	N/A
Degree of Access Control		HPCM Sec. 1190.3, GB	Driveways permitted	1 Driveway	No
Median Treatment Median Width		HPCM Sec 1150	flush, Left Turning min. 12 ft	flush, Left Turning min. 12 ft	No
Illumination		RPRL	Continuous	Continuous	No
Curb Type		ASD I-20.20	curb & gutter	curb & gutter	No

Proposed by: ______________________________ Date: ____________________
Designer Signature (Consultant or Staff)

Recommended by: ______________________________ Date: ____________________
Engineering Manager Signature

Accepted by: ______________________________ Date: ____________________
Regional Preconstruction Engineer Signature

MEMORANDUM

State of Alaska
Department of Transportation & Public Facilities

TO: Sarah E. Schacher, P.E.,
Preconstruction Engineer
Northern Region

DATE: October 15, 2019

FILE NO: I:\Traffic Data\Design\2019\Airport_Z640780000

TELEPHONE NO: 451-5150

FROM: Scott Vockeroth
Traffic Data Manager
Fairbanks Field Office

SUBJECT: Airport Way/Cushman St Intersection
Recontruction
Design Designation Request

Please approve the attached design designation by signing the endorsement below which enables your staff to proceed.

Contact our office if you have any questions.

10/16/2019

Sarah E. Schacher, P.E., Preconstruction Engineer Date

cc: Carl Heim, P.E., Engineering Manager, Northern Region

Attachment

DESIGN DESIGNATION

Northern Region Planning

Traffic Data & Forecasting

ROUTE NAME: Cushman St
STATE ROUTE NO: 176300, 2581181X000
CDS MILEAGE: 2.628-2.810
FUNCTIONAL CLASS: Minor Arterial
URBAN/RURAL: Urban

	YEAR	AADT	%	
AADT	2018	8500		
	2030	9470		
	2040	10360		
DHV	2030		10.30	980
	2040			1070
D				40-60
T			**3.60**	**Total**
			0.20	Class 4
			2.90	Class 5
			0.20	Class 6
			0.20	Class 8
			0.10	Class 9
ESAL'S (Design Lane)	To Be Provided by Design			

DESIGN DESIGNATION
Northern Region Planning
Traffic Data & Forecasting

ROUTE NAME: Airport Way
STATE ROUTE NO: 175700, 2581179I000
CDS MILEAGE: 0.208-0.545
FUNCTIONAL CLASS: Principal Arterial- Other
URBAN/RURAL: Urban

	YEAR	AADT	%	
AADT	2018	17000		
	2030	18900		
	2040	20700		
DHV	2030		10.30	1950
	2040			2130
D				40-60
T			**4.80**	**Total**
			0.20	Class 4
			4.10	Class 5
			0.20	Class 6
			0.20	Class 8
			0.10	Class 9
ESAL'S (Design Lane)	To Be Provided by Design			

Submitted Data Request Type: Design Designations Request (Northern)

Latest Status Update:	**Data Request Record has been assigned to an email address.**
Assigned to the following e-mail address:	**jill.sullivan@alaska.gov; scott.vockeroth@alaska.gov**
Record Creation:	**August 19, 2019 02:38:56 PM**
Routed to assigned e-mail address:	**August 19, 2019 03:03:15 PM**
Request Resolution:	**Resolution Pending**

Requestor

First Name: *	Carl	Last Name: *	Heim
Email: *	carl.heim@alaska.gov		
Additional Email Contacts:			
Date Needed: (AKST)	mm / dd / yyyy		

Project Information

Project Name: *	Airport Way/Cushman Street Intersection Reconstruction
Project Engineer(s): *	Not Currently Assigned
State Project Number: *	Z640780000
Federal Project Number: *	0002312
Route ID: *	2581179I000, 2581181X000
Milepoint (To/From): *	0.208 to 0.545 and 2.628 to 2.810
Construction Year: *	2020

Please select the type of project. *

● Reconstruction

Rehabilitation

New Construction

Other (please describe) Reconstruction

Project Notes:

Please select the project's region to view the Data Fields that are available to request. *

Central

● Northern

Southcoast

Data Fields Requested: (please pick at least one) *

Present AADT

Design Year AADT (Please specify Year) 2040

Mid-Design Year AADT (Please specify Year) 2030

Design Hourly Volume (DHV)

Directional Split (D)

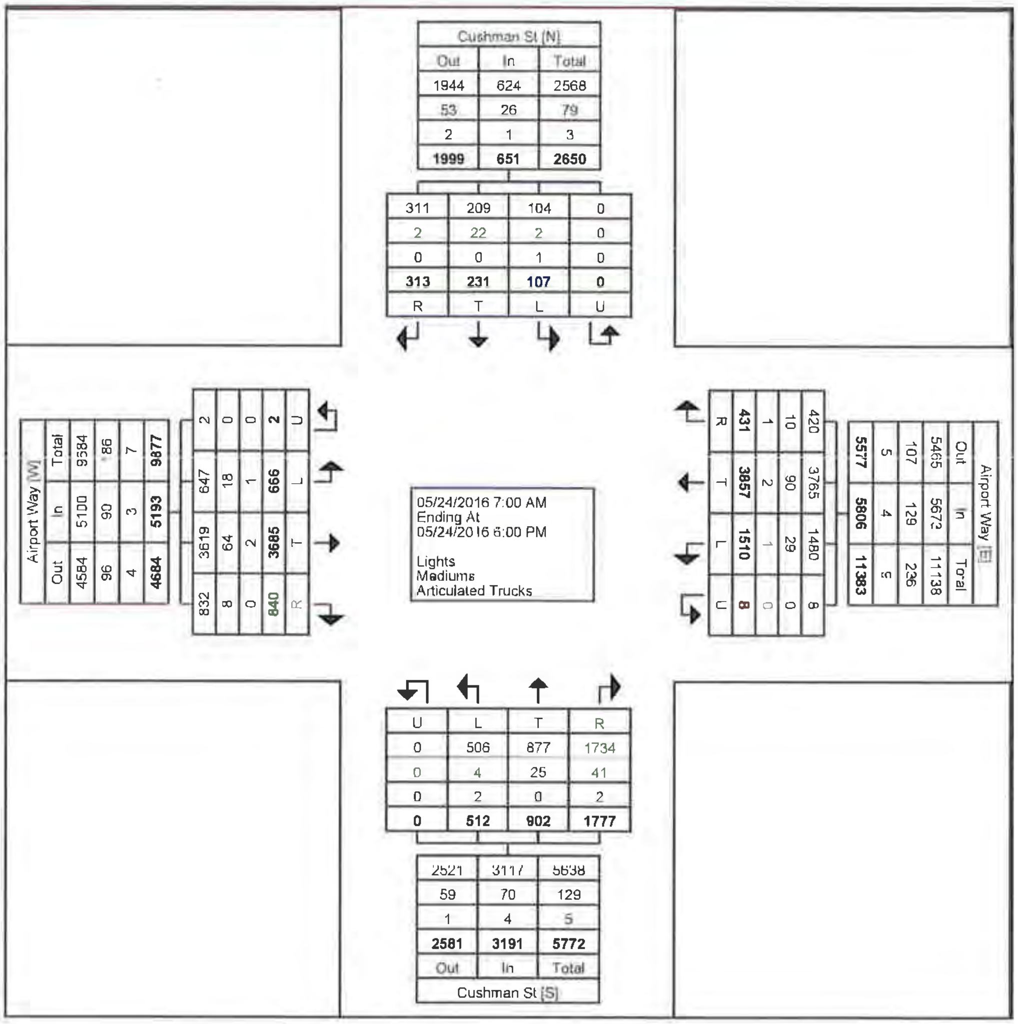
Percent Trucks

Road Functional Classification

Intersection Turning Movements (Please specify Locations)

Gaffney,Cushman

Please specify any other requested data fields not listed above:



Cushman St [N]

Out	In	Total
1944	624	2568
53	26	79
2	1	3
1999	**651**	**2650**

R	T	L	U
311	209	104	0
2	22	2	0
0	0	1	0
313	**231**	**107**	**0**

Airport Way [W]

Out	In	Total
4584	5100	9584
96	90	86
4	3	7
4684	**5193**	**9877**

U	L	T	R
2	647	3619	832
0	18	64	8
0	1	2	0
2	**666**	**3685**	**840**

Airport Way [E]

Out	In	Total
5465	5672	11138
107	129	236
5	4	9
5577	**5806**	**11383**

R	T	L	U
420	3765	1480	8
10	90	29	0
1	2	1	0
431	**3857**	**1510**	**8**

05/24/2016 7:00 AM
Ending At
05/24/2016 6:00 PM

Lights
Mediums
Articulated Trucks

U	L	T	R
0	506	877	1734
0	4	25	41
0	2	0	2
0	**512**	**902**	**1777**

2521	3117	5638
59	70	129
1	4	5
2581	**3191**	**5772**
Out	In	Total

Cushman St [S]

Turning Movement Data Plot

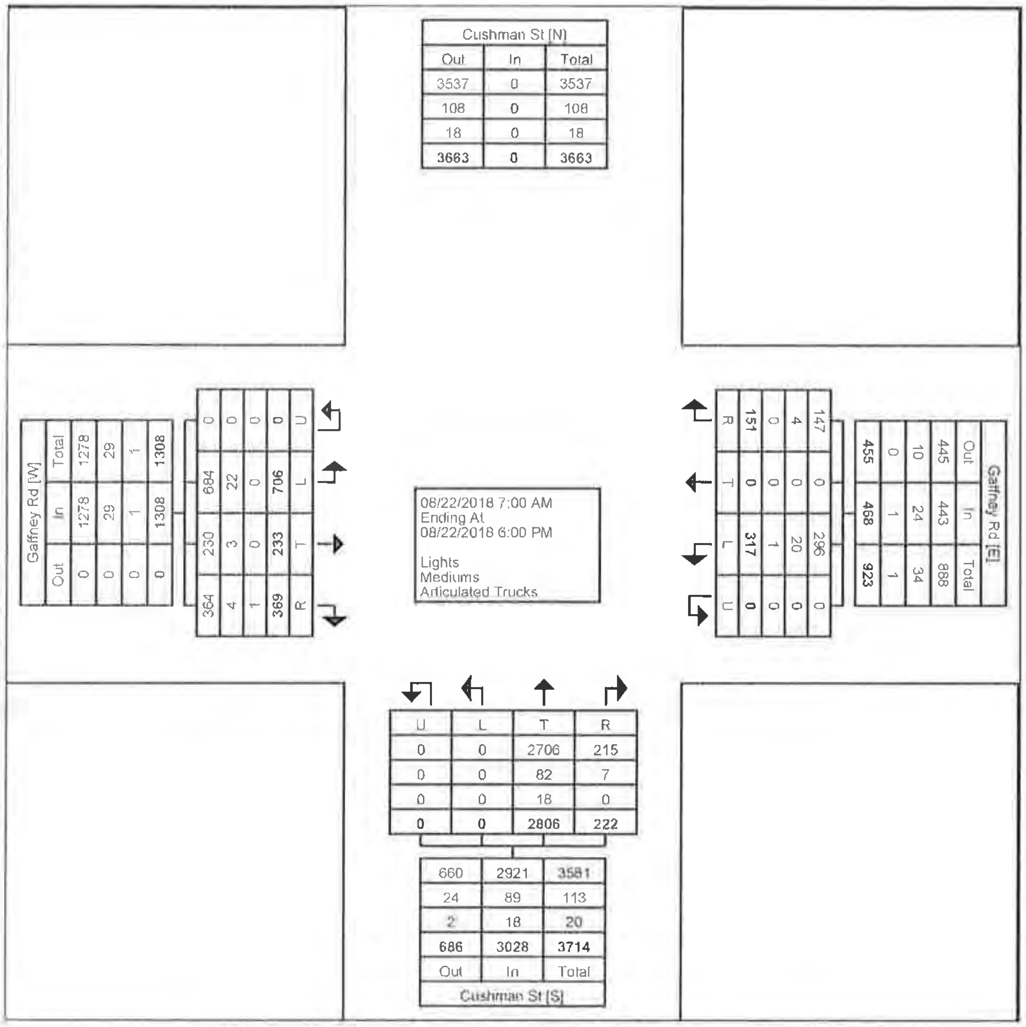
Map N

Alaska Department of Transportation & Public Facilities
Traffic Data & Forecasting
2301 Peger Road
Fairbanks, Alaska, United States 99709

Count Name: Airport Way & Cushman St
Site Code: 175700176300
Start Date: 05/24/2016
Page No: 1

Turning Movement Data

Start Time	Cushman St Southbound					Airport Way Westbound					Cushman St Northbound					Airport Way Eastbound					
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
7:00 AM	0	2	2	0	4	14	50	26	0	90	26	11	2	0	39	9	55	7	0	71	204
7:15 AM	4	5	4	0	13	19	67	23	0	109	24	20	7	0	51	20	68	13	0	101	274
7:30 AM	3	5	4	0	12	29	120	33	0	182	47	24	13	0	84	15	73	17	0	105	383
7:45 AM	5	7	2	0	14	35	131	48	0	214	51	32	12	0	95	19	98	12	0	129	452
Hourly Total	12	19	12	0	43	97	368	130	0	595	148	87	34	0	269	63	294	49	0	406	1313
8:00 AM	6	3	0	0	9	13	87	29	0	129	30	19	8	0	57	16	76	16	0	108	303
8:15 AM	4	5	4	0	13	17	98	21	0	136	29	16	5	0	50	13	83	13	1	110	309
8:30 AM	6	4	3	0	13	17	85	37	0	139	42	23	12	0	77	32	93	15	0	140	369
8:45 AM	7	6	4	0	17	21	108	22	0	151	61	21	14	0	96	19	111	16	0	146	410
Hourly Total	23	18	11	0	52	68	378	109	0	555	162	79	39	0	280	80	363	60	1	504	1391
9:00 AM	11	10	1	0	22	17	86	31	0	134	60	15	11	0	86	19	105	10	0	134	376
9:15 AM	7	10	3	0	20	6	85	25	0	116	45	13	13	0	71	21	100	27	0	148	355
9:30 AM	10	3	1	0	14	10	88	35	0	133	41	19	10	0	70	21	72	15	0	108	325
9:45 AM	5	6	1	0	12	10	103	24	0	137	40	24	12	0	76	25	76	30	0	131	356
Hourly Total	33	29	6	0	68	43	362	115	0	520	186	71	46	0	303	86	353	82	0	521	1412
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	7	4	1	0	12	13	103	32	0	148	45	33	11	0	89	18	96	28	0	142	391
11:15 AM	18	5	5	0	28	12	100	30	0	142	38	23	13	0	74	28	93	19	0	140	384
11:30 AM	13	4	2	0	19	17	112	58	0	187	58	34	21	0	113	28	103	28	0	159	478
11:45 AM	14	7	5	0	26	13	168	44	0	225	65	27	25	0	117	31	112	26	0	169	537
Hourly Total	52	20	13	0	85	55	483	164	0	702	206	117	70	0	393	105	404	101	0	610	1790
12:00 PM	14	12	3	0	29	15	110	76	0	201	63	37	12	0	112	37	139	36	0	212	554
12:15 PM	15	6	6	0	27	10	115	51	0	176	60	34	20	0	114	25	133	27	0	185	502
12:30 PM	15	10	5	0	30	11	111	50	0	172	71	35	23	0	129	34	147	20	0	201	532
12:45 PM	14	7	1	0	22	10	114	48	0	172	90	24	24	0	138	30	135	26	1	192	524
Hourly Total	58	35	15	0	108	46	450	225	0	721	284	130	79	0	493	126	554	109	1	790	2112
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	12	7	1	0	20	4	130	40	0	174	46	38	18	0	102	23	137	25	0	185	481
3:15 PM	12	9	5	0	26	15	126	49	0	190	56	39	21	0	116	25	119	31	0	175	507
3:30 PM	7	2	4	0	13	17	132	48	0	197	62	30	22	0	114	31	120	19	0	170	494
3:45 PM	8	11	4	0	23	10	126	59	0	195	62	34	18	0	114	32	106	26	0	164	496
Hourly Total	39	29	14	0	82	46	514	196	0	756	226	141	79	0	446	111	482	101	0	694	1978
4:00 PM	11	14	2	0	27	6	118	48	0	172	56	36	19	0	111	37	150	16	0	203	513
4:15 PM	13	10	4	0	27	14	167	58	1	240	61	29	22	0	112	34	137	14	0	185	564
4:30 PM	15	8	3	0	26	9	168	72	0	249	77	50	19	0	146	40	143	23	0	206	627
4:45 PM	9	11	2	0	22	7	164	93	5	269	77	36	22	0	135	31	148	28	0	207	633
Hourly Total	48	43	11	0	102	36	617	271	6	930	271	151	82	0	504	142	578	81	0	801	2337
5:00 PM	13	15	5	0	33	12	183	75	2	272	70	35	29	0	134	32	202	19	0	253	692
5:15 PM	13	11	9	0	33	7	142	73	0	222	78	32	22	0	132	32	157	19	0	208	595
5:30 PM	12	6	5	0	23	10	185	88	0	283	76	31	16	0	123	34	175	26	0	235	664
5:45 PM	10	6	6	0	22	11	175	64	0	250	70	28	16	0	114	29	123	19	0	171	557
Hourly Total	48	38	25	0	111	40	685	300	2	1027	294	126	83	0	503	127	657	83	0	867	2508
Grand Total	313	231	107	0	651	431	3857	1510	8	5806	1777	902	512	0	3191	840	3685	666	2	5193	14841
Approach %	48.1	35.5	16.4	0.0	-	7.4	66.4	26.0	0.1	-	55.7	28.3	16.0	0.0	-	16.2	71.0	12.8	0.0	-	-
Total %	2.1	1.6	0.7	0.0	4.4	2.9	26.0	10.2	0.1	39.1	12.0	6.1	3.4	0.0	21.5	5.7	24.8	4.5	0.0	35.0	-
Lights	311	209	104	0	624	420	3765	1480	8	5673	1734	877	506	0	3117	832	3619	647	2	5100	14514
% Lights	99.4	90.5	97.2	-	95.9	97.4	97.6	98.0	100.0	97.7	97.6	97.2	98.8	-	97.7	99.0	98.2	97.1	100.0	98.2	97.8
Mediums	2	22	2	0	26	10	90	29	0	129	41	25	4	0	70	8	64	18	0	90	315
% Mediums	0.6	9.5	1.9	-	4.0	2.3	2.3	1.9	0.0	2.2	2.3	2.8	0.8	-	2.2	1.0	1.7	2.7	0.0	1.7	2.1
Articulated Trucks	0	0	1	0	1	1	2	1	0	4	2	0	2	0	4	0	2	1	0	3	12
% Articulated Trucks	0.0	0.0	0.9	-	0.2	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.4	-	0.1	0.0	0.1	0.2	0.0	0.1	0.1



Cushman St [N]

Out	In	Total
3537	0	3537
108	0	108
18	0	18
3663	**0**	**3663**

Gaffney Rd [W]

Out	In	Total
0	1278	1278
0	29	29
0	1	1
0	**1308**	**1308**

U	L	T	R
0	684	230	364
0	22	3	4
0	0	0	1
0	**706**	**233**	**369**

08/22/2018 7:00 AM
Ending At
08/22/2018 6:00 PM

Lights
Mediums
Articulated Trucks

Gaffney Rd [E]

R	T	L	U
147	0	296	0
4	0	20	0
0	0	1	0
151	**0**	**317**	**0**

Out	In	Total
445	443	888
10	24	34
0	1	1
455	**468**	**923**

U	L	T	R
0	0	2706	215
0	0	82	7
0	0	18	0
0	**0**	**2806**	**222**

Out	In	Total
660	2921	3581
24	89	113
2	18	20
686	**3028**	**3714**

Cushman St [S]

Turning Movement Data Plot

Alaska Department of Transportation & Public Facilities
Traffic Data & Forecasting
2301 Peger Road
Fairbanks, Alaska, United States 99709
907-451-2251 ryan.pierce@alaska.gov

Count Name: Cushman St & Gaffney St
Site Code: 176300150007
Start Date: 08/22/2018
Page No: 1

Turning Movement Data

Start Time	Gaffney Rd Westbound					Cushman St Northbound					Gaffney Rd Eastbound					
	Right	Thru	Left	U-Turn	App Total	Right	Thru	Left	U-Turn	App Total	Right	Thru	Left	U-Turn	App Total	Int. Total
7:00 AM	1	0	1	0	2	5	42	0	0	47	3	1	6	0	10	59
7:15 AM	0	0	3	0	3	4	62	0	0	66	1	5	10	0	16	85
7:30 AM	6	0	3	0	9	8	90	0	0	98	5	5	23	0	33	140
7:45 AM	3	0	3	0	6	5	136	0	0	141	2	8	27	0	37	184
Hourly Total	10	0	10	0	20	22	330	0	0	352	11	19	66	0	96	468
8:00 AM	2	0	6	0	8	4	81	0	0	85	5	6	11	0	22	115
8:15 AM	4	0	5	0	9	4	68	0	0	72	10	7	9	0	26	107
8:30 AM	4	0	8	0	12	6	69	0	0	75	9	8	17	0	34	121
8:45 AM	4	0	7	0	11	3	68	0	0	71	7	9	16	0	32	114
Hourly Total	14	0	26	0	40	17	286	0	0	303	31	30	53	0	114	457
9:00 AM	3	0	11	0	14	11	62	0	0	73	6	4	19	0	29	116
9:15 AM	2	0	7	0	9	9	82	0	0	91	9	8	20	0	37	137
9:30 AM	4	0	3	0	7	1	82	0	0	83	5	2	16	0	23	113
9:45 AM	6	0	5	0	11	8	84	0	0	92	7	6	24	0	37	140
Hourly Total	15	0	26	0	41	29	310	0	0	339	27	20	79	0	126	506
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	4	0	15	0	19	3	91	0	0	94	12	5	24	0	41	154
11:15 AM	7	0	7	0	14	4	99	0	0	103	16	3	18	0	37	154
11:30 AM	7	0	12	0	19	8	78	0	0	86	8	9	25	0	42	147
11:45 AM	5	0	11	0	16	9	88	0	0	97	15	6	24	0	45	158
Hourly Total	23	0	45	0	68	24	356	0	0	380	51	23	91	0	165	613
12:00 PM	3	0	14	0	17	7	112	0	0	119	19	7	32	0	58	194
12:15 PM	6	0	13	0	19	7	84	0	0	91	11	10	23	0	44	154
12:30 PM	3	0	2	0	5	10	81	0	0	91	11	8	19	0	38	134
12:45 PM	7	0	13	0	20	12	123	0	0	135	20	6	29	0	55	210
Hourly Total	19	0	42	0	61	36	400	0	0	436	61	31	103	0	195	692
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	7	0	19	0	26	8	92	0	0	100	13	13	27	0	53	179
3:15 PM	3	0	9	0	12	11	96	0	0	107	15	14	28	0	57	176
3:30 PM	6	0	9	0	15	12	83	0	0	95	21	3	32	0	56	166
3:45 PM	4	0	8	0	12	4	80	0	0	84	19	12	23	0	54	150
Hourly Total	20	0	45	0	65	35	351	0	0	386	68	42	110	0	220	671
4:00 PM	7	0	6	0	13	6	92	0	0	98	16	7	25	0	48	159
4:15 PM	10	0	17	0	27	7	102	0	0	109	12	8	28	0	48	184
4:30 PM	8	0	15	0	23	7	105	0	0	112	18	9	24	0	51	186
4:45 PM	9	0	17	0	26	5	111	0	0	116	18	7	17	0	42	184
Hourly Total	34	0	55	0	89	25	410	0	0	435	64	31	94	0	189	713
5:00 PM	5	0	25	0	30	10	115	0	0	125	18	15	31	0	64	219
5:15 PM	5	0	17	0	22	11	92	0	0	103	17	10	36	0	63	188
5:30 PM	5	0	11	0	16	8	83	0	0	91	10	5	31	0	46	153
5:45 PM	1	0	15	0	16	5	73	0	0	78	11	7	12	0	30	124
Hourly Total	16	0	68	0	84	34	363	0	0	397	56	37	110	0	203	684
Grand Total	151	0	317	0	468	222	2806	0	0	3028	369	233	706	0	1308	4804
Approach %	32.3	0.0	67.7	0.0	-	7.3	92.7	0.0	0.0	-	28.2	17.8	54.0	0.0	-	-
Total %	3.1	0.0	6.6	0.0	9.7	4.6	58.4	0.0	0.0	63.0	7.7	4.9	14.7	0.0	27.2	-
Lights	147	0	296	0	443	215	2706	0	0	2921	364	230	684	0	1278	4642
% Lights	97.4	-	93.4	-	94.7	96.8	96.4	-	-	96.5	98.6	98.7	96.9	-	97.7	96.6
Mediums	4	0	20	0	24	7	82	0	0	89	4	3	22	0	29	142
% Mediums	2.6	-	6.3	-	5.1	3.2	2.9	-	-	2.9	1.1	1.3	3.1	-	2.2	3.0
Articulated Trucks	0	0	1	0	1	0	18	0	0	18	1	0	0	0	1	20
% Articulated Trucks	0.0	-	0.3	-	0.2	0.0	0.6	-	-	0.6	0.3	0.0	0.0	-	0.1	0.4

Report	Route Log	
CDS Route	AIRPORT WAY (175700)	
From Milepoint	0.2108	
To Milepoint	0.6114	
Filter		
	FacilityType	INTERCHANGE RAMP;NON-INVENTORY;WYE;SECONDARY FERRY ACCESS;ROUNDABOUT;PRIMARY FERRY ACCESS; NON-INTERCHANGE RAMP;MAINLINE;CONNECTOR

Milepoint	Attribute	Side	Feature CDS	Description	Viewer
0.2108	Functional Class	-	-	PRINCIPAL ARTERIAL - OTHER (Start at Milepoint 0)	★ 📷
0.2108	FHWA Urban Area	-	-	URBANIZED AREA (FAIRBANKS) (Start at Milepoint 0)	★ 📷
0.2108	✚ Intersection	B	176470	NOBLE STREET	★ 📷
0.2108	Traffic Link	-	-	Start AL001123	★ 📷
0.2786	Traffic Station	-	-	31052000	★ 📷
0.3616	Traffic Link	-	-	AL001123 -> AL001468	★ 📷
0.3616	✚ Intersection	B	176300	CUSHMAN STREET	★ 📷
0.4963	Traffic Station	-	-	31050000	★ 📷
0.6114	✚ Intersection	R	176423	BARNETTE STREET	★ 📷
0.6114	Traffic Link	-	-	End AL001468	★ 📷
0.6114	✚ Intersection	L	176421	GILLAM WAY	★ 📷

Computations and Historical Data

Project: Airport Way/Cushman St Intersection Reconstruction- **Airport Way**

Historical AADTs

					Year					
Link	Start CDS	Start Feature	End CDS	End Feature	1980	1981	1982	1983	1984	1985
1	0.211	Noble St	0.362	Cushman St						
2	0.362	Cushman St	0.611	Barnette St						

	Year														
Link	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1		21393	19279	18339	16701	14019	18331	18026	17029	18422	18133	17747	18219	17997	17673
2		23788	22312	18722	19605	21539	18909	20534	19683	18888	18622	18514	19130	18577	18826

	Year														
Link	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1		17094	16286	14735	18341	15840	13576	12296	13755	17010	18697	20609	20494	18613	17362
2		19497	18913	19538	18678	18557	19731	19143	18509	19751	17829	19149	18105	16201	17308

	Year		
Link	2016	2017	2018
1	17480	15563	16893
2	16469	15401	18087

Growth Rate 0.91% Based on historical trends and DOL forecast

Growth Factors

Year	Factor
2030	1.114
2040	1.219

Future AADT

Year	AADT
2018	17000
2030	18900
2040	20700

D Factor (30) 40-60

K-Factor (30) 10.30% Obtained from Continous Count at Airport Rd West of Steese Expy/Richardson Hwy

Design Hourly Volume (DHV)

2030	1950
2040	2130

Class Data

				Percent by Class							Total
Station ID	**Station Description**	**MP**	**Year**	**4**	**5**	**6**	**8**	**9**	**10**	**13**	**Truck %**
13120526	Airport West of Steese Expy (CCS)	0.107	0	0.20	4.10	0.20	0.20	0.10	0.00	0.00	4.80
		Load Factor		1.00	0.50	0.85	1.20	1.55	2.24	2.24	
		Number of Axles		2/3	2	3	4	5	6	7+	

Report	Route Log	
CDS Route	CUSHMAN STREET (176300)	
From Milepoint	2.7154	
To Milepoint	2.8677	
Filter		
	FacilityType	INTERCHANGE RAMP;NON-INVENTORY;WYE;SECONDARY FERRY ACCESS;ROUNDABOUT;PRIMARY FERRY ACCESS;NON-INTERCHANGE RAMP;MAINLINE;CONNECTOR

Milepoint	Attribute	Side	Feature CDS	Description	Viewer
2.7154	FHWA Urban Area	-	-	URBANIZED AREA (FAIRBANKS) (Start at Milepoint 0.2464)	★ 📷
2.7154	Functional Class	-	-	MINOR ARTERIAL (Start at Milepoint 1.1066)	★ 📷
2.7154	Traffic Link	-	-	AL001253 (Start at Milepoint 2.4111)	★ 📷
2.7154	✚ Intersection	R	175706S2	14TH (CUSHMAN) AVENUE	★ 📷
2.748	✚ Intersection	B	175700EB	AIRPORT EB WAY	★ 📷
2.748	Traffic Link	-	-	AL001253 -> AL003216	★ 📷
2.7562	✚ Intersection	B	175700	AIRPORT WAY	★ 📷
2.8247	✚ Intersection	B	150007	GAFFNEY ROAD	★ 📷
2.8677	✚ Intersection	B	150015	12TH AVENUE	★ 📷

Computations and Historical Data

Project: Airport Way/Cushman St Intersection Reconstruction- **Cushman St**

Historical AADTs

Link	Start CDS	Start Feature	End CDS	End Feature	1980	1981	1982	1983	1984	1985
1	2.411	17th Ave	2.748	Airport Way						
2	2.748	Airport Way	2.945	10th Ave						

	Year														
Link	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1		11654		11609	12290		12654			11881		10725	11032		
2															

	Year														
Link	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1				13317		14503	10104	10042	9594	9858	9317	8993	8840	8428	7965
2															

	Year		
Link	2016	2017	2018
1	8471	8238	8238
2	6498	6129	4561

Growth Rate 0.91% Based on historical trends and DOL forecast

Growth Factors

Year	Factor
2030	1.114
2040	1.219

Future AADT

Year	AADT
2018	8500
2030	9470
2040	10360

D Factor (30) 40-60

K-Factor (30) 10.30% Obtained from Continous Count at Airport Rd West of Steese Expy

Design Hourly Volume (DHV)

2030	980
2040	1070

Class Data

				Percent by Class							Total
Station ID	**Station Description**	**MP**	**Year**	**4**	**5**	**6**	**8**	**9**	**10**	**13**	**Truck %**
13120524	Cushman St @ Chena Bridge	3.266	2018	0.20	2.90	0.20	0.20	0.10	0.00	0.00	3.60
		Load Factor		1.00	0.50	0.85	1.20	1.55	2.24	2.24	
		Number of Axles		2/3	2	3	4	5	6	7+	

APPENDIX B

ENVIRONMENTAL DOCUMENT

State of Alaska
Department of Transportation & Public Facilities

CATEGORICAL EXCLUSION DOCUMENTATION FORM

(NEPA Assignment Program Projects)

The environmental review, consultation, and other actions required by the applicable Federal environmental laws for this project are being, or have been carried out by the DOT&PF pursuant to 23 U.S.C 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

I. Project Information:

A. Project Name: Airport Way/Cushman Street Intersection Reconstruction

B. Federal Project Number: 0002312

C. State Project Number: Z640780000

D. Primary/Ancillary Project Connections: None

E. CE Designation: 23 CFR 771.117(d)(13)

F. List of Attachments:

Appendix A - Environmental Figures
Appendix B - Class of Action Consultation
Appendix C - Parking Study
Appendix D - Section 106 Documentation
Appendix E - Environmental Site Inspection Report
Appendix F - Agency Scoping Documentation
Appendix G - Public Involvement Documentation
Appendix H – Preliminary Relocation Study

G. Project Scope *(Use STIP Project Description)*

Reconstruct the intersection at Airport Way and Cushman Street [NID 3843].

H. Project Purpose and Need:

The Alaska Department of Transportation & Public Facilities (DOT&PF), in cooperation with the Alaska Division of the Federal Highway Administration (FHWA), is proposing to reconstruct the Airport Way and Cushman Street intersection in Fairbanks, Alaska. The Airport Way/Cushman Street intersection has a crash rate that is higher than the statewide average for similar intersections. The intersection also creates long delays, resulting in poor traffic operations and air quality. Long crossing distances and lack of ADA facilities that are up to current design standards present a safety risk to pedestrians and bicyclists.

A Traffic Analysis Report (Kinney Engineering [KE], January 2017) found that the option with the most benefit to the Airport Way intersection with Cushman Street would have the following improvements:

- Expand the northbound approach to include two through lanes and exclusive left-turn and right-turn lanes.
- Provide right-turn channelization for all the approaches.
- Offset all left-turn lanes.

- Install flashing yellow arrows for permissive-protected left-turn movements.

The purpose of the proposed project is to modify traffic operations, improve motorist and pedestrian safety, and improve air quality by decreasing vehicle delays at the Airport Way/Cushman Street intersection.

I. Project Description:

The proposed project will reconstruct Airport Way between Barnette Street and Noble Street, and along Cushman Street between Gaffney Road and 15th Avenue. Project improvements include:

- Alter intersection geometrics and add turning lanes to reduce congestion and improve air quality
- Off-set east and westbound left-turn lanes to improve sight distance and safety
- New roadway surfacing, striping, and signage
- Upgrade traffic signal controls
- Add raised corner islands with curb ramps for improved pedestrian/bicyclist safety and Americans with Disabilities Act (ADA) accessibility
- Upgrade sidewalk and bicycle facilities
- Relocate utilities
- Relocate storm drains
- Landscaping
- Replace controlled access fencing

The proposed project is located in Section 10, Township 1 South, Range 1 West, Fairbanks Meridian (Appendix A, Figures 1 and 2).

II. Environmental Consequences

- For each "yes," summarize the activity evaluated and the magnitude of the impact.
- For any consequence category with an asterisk (*), additional information must be attached such as an alternatives analysis, agency coordination or consultation, avoidance measures, public notices, or mitigation statement.
- Include direct and indirect impacts in each analysis.

A. Right-of-Way Impacts	N/A	YES	NO
1. Additional right-of-way required. If no, skip to 2.	☐	☒	☐
a. Permanent easements required.	☐	☐	☒
Estimated number of parcels:			
b. Full or partial property acquisition required.	☐	☒	☐
Estimated number of full parcels: 13			
Estimated number of partial parcels: 22			
c. Property transfer from state or federal agency required. *If yes, list agency in No. 4 below.*	☐	☐	☒
d. Business or residential relocations required. If yes, insert the number of relocations below, summarize the findings of the conceptual stage relocation study in No. 4 below and attach the conceptual stage relocation study. If no, skip to 2.	☐	☒	☐
i. Number of business relocations: 4			

ii. Number of residential relocations: 0

e. Last-resort housing required.

2. Will the project or activity have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations as defined in E.O. 12898 (FHWA Order 6640.23A, June 2012)? ☐ ☐ ☒

3. The project will involve use of ANILCA land that requires an ANILCA Title XI approval. ☐ ☐ ☒

4. Summarize the right-of-way impacts, if any:

To accommodate the wider road surfaces, the proposed project would require acquiring approximately 1.75 acres of additional right-of-way (ROW) across 35 parcels; most would be small or sliver acquisitions along the existing ROW (Figure 5). Thrifty Liquor, The Break Room (formerly Bojangles, Barracuda Beach Bar and Greyhound Lounge), Drop Inn Lounge, and the Coin King Laundromat are near the existing ROW and would be within the new expanded ROW and need to be demolished prior to construction. The DOT&PF and KE project design team met one-on-one with the property owners in the project area. Full one-on-one meeting notes are available in Appendix G.

The owner of The Break Room, a pool hall, advised that he already has his property for sale. DOT&PF is planning an Early Acquisition (23 CFR 710.501) of the Break Room properties. On the southeast side of the intersection, the Break Room is a new business open to all ages. It was formerly a bar under many different names over several decades and no longer has a liquor license. As the property owner intends to sell his parcel, the primary impact would be converting business space on the corner to a transportation facility. Additional business space is available on the same corner in the empty, unused paved lot to the northwest.

The owner of the Coin King expressed a willingness to sell and retire from their business. DOT&PF plans to purchase the full parcel and demolish the building.

The owner of Thrifty Liquor wanted to relocate on the same quadrant of the intersection. DOT&PF plans to purchase the parcel fronting Airport Way and portions of the 2 parcels fronting Cushman Street. This will leave sufficient property to rebuild Thrifty Liquor out of the project area.

The owner of the Drop Inn Lounge did not attend the scheduled meeting. DOT&PF plans to purchase a portion of this parcel closest to Cushman Street.

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as Amended, requires an Agency to purchase only the property it needs. When an Agency does not need the entire lot, it may acquire only a portion of the property. DOT&PF would acquire the property needed for the expanded ROW and obtain Temporary Construction Easements (TCE) in order to demolish the buildings on the portion of the property retained by the owner. The amount of additional ROW required will be determined during final design.

Acquiring additional ROW on the northeast side of the intersection will also impact the shared parking lot for The Spur/Tony's Sports Bar and Grill (formerly Kodiak Jack's/Boomtown Bar and Grill - same building-Kodiak Jacks at night, Boomtown Bar and Grill during the day) and Eagle's Tailor Shop (formerly Quan's Tailor Shop) on the northeast corner of the intersection. During Friday and Saturday late evenings the available parking is already under-capacity; and this project will remove 24 parking spaces. The parking study (Appendix C) recommends improvements to the parking shortage, including a formal parking layout, agreements with adjacent property owners, or purchasing properties to the east to expand the parking area. The vacant lot adjacent to Coin King would be acquired to accommodate lost parking spaces. Acquiring Coin King would force customers to other available laundromats (the dry cleaning shut down years ago). Another laundry is available several blocks south on S. Cushman.

The northwest side of the intersection is primarily unused/empty pavement. Being unused/empty, sliver acquisitions along Airport Way and a section of the corner of the lot is not expected to have more than a minimal impact and no economic impact. Future uses would need to accommodate a smaller parcel.

On the southwest side of the intersection, demolishing Thrifty Liquor and the Drop Inn Lounge and acquiring full parcels would change the viewshed of the intersection from active businesses to empty lots. Partial acquisition would allow for new business(es) on the un-acquired remainder of the parcels, or for the existing businesses to rebuild in the remainder of the lot. Currently, much of the paved area surrounding the buildings is unused. Vacant land is also present south of the Drop Inn Lounge (see Figure 5).

Table 1: ROW Acquisitions

Parcel ID	Area Acquired Sq. Ft.	Total Parcel Area Sq. Ft.	% of Parcel to be Acquired	Remarks P = Paved V = Vacant PKG = Parking
562246	2,099	6,911	30	P/V
562254	750	5,835	13	P/V
89702	50	2,870	2	V
631777	14,389	62,378	23	V/PKG
87998	900	7,794	12	P/V/PKG
88005	3,200	6,705	48	P/V/PKG
88013	1,177	1,177	100	P/Rear Access
64840	50	7,700	1	P/V
64831	370	9,200	4	P/V
64866	837	837	100	P/V
64823	11	7,200	1	Rear Access
64882	1,871	1,871	100	Rear Access
64891	890	1,269	70	Rear Access
64807	6,000	6,000	100	*Demolish Coin King
64904	1,581	1,581	100	*Demolish Coin King
64793	6,000	6,000	100	P/PKG
64912	1,632	1,632	100	P/PKG/Rear Access
64785	836	3,151	27	Rear Access
64777	705	6,052	12	Rear Access
64769	590	7,397	8	Rear Access
88153	5,232	5,232	100	P/V
516619	4,120	10,189	40	*Demolish Thrifty Liquor
88170	2,256	10,435	22	P/V
88188	3,250	20,869	16	*Demolish Drop Inn Lounge
88196	2,496	22,686	11	P/V/PKG
88218	762	7,000	11	P/V/PKG
88234	584	7,000	8	P/V/PKG
88242	414	10,450	4	P/V/PKG
88251	103	10,241	1	P/V/PKG
88030	2,576	2,576	100	*Demolish Break Room
526657	5,613	5,613	100	*Demolish Break Room
64874	2,354	2,354	100	P/V/PKG
526631	919	919	100	P/V/PKG
526649	75	75	100	P/V
88064	1,460	20,700	7	P/V
Total	76,152			

*Note: 100% acquisition to be determined during final design and ROW phase.

B. Social and Cultural Impacts

	YES	NO
1. The project will affect neighborhoods or community cohesion.	☒	☐
2. The project will affect travel patterns and accessibility (e.g. vehicular, commuter, bicycle, or pedestrian).	☒	☐
3. The project will affect school boundaries, recreation areas, churches, businesses, police and fire protection, etc.	☒	☐
4. The project will affect the elderly, handicapped, non-drivers, transit-dependent, minority and ethnic groups, or the economically disadvantaged.	☒	☐
5. There are unresolved project issues or concerns of a federally-recognized Indian Tribe [as defined in 36 CFR 800.16(m)].	☐	☒

6. Summarize the social and cultural impacts, if any:

The nearby area has 46% minority residents versus 38% state average, and 43% low income residents versus 26% state average populations (Environmental Protection Agency (EPA) Environmental Justice Screening Tool, accessed February 12, 2018 at h ttps://ejscreen.epa.gov/mapper/index.html?wherestr=fairbanks%2C+alaska). While this intersection is the main access to nearby neighborhoods, it also serves as a main artery through Fairbanks (Airport Way) and is an important north/south Fairbanks connector.

The project will not disproportionately adversely affect minorities or low income populations. The purpose of the proposed project is to improve motorist and pedestrian safety, improve air quality, and decrease congestion at the Airport Way intersection with Cushman Street. It incorporates the beneficial improvements identified in the Traffic Analysis Report (Kinney Engineering, January 2017) to improve conditions. For example, the project will add raised corner islands with curb ramps will improve pedestrian and bicyclist safety and ADA accessibility. Sidewalks and pathways will be upgraded, and landscaping features added. These improvements are expected to enhance community cohesion, neighborhood safety, and roadway safety. No adverse social impacts are anticipated.

C. Economic Impacts

	YES	NO
1. The project will have adverse economic impacts on the regional and/or local economy, such as effects on development, tax revenues and public expenditures, employment opportunities, accessibility, and retail sales.	☐	☒
2. The project will adversely affect established businesses or business districts.	☒	☐

3. Summarize the economic impacts, if any:

No adverse economic impacts to the regional or local economy are anticipated. Both build options require demolition of Thrifty Liquor, Break Room Pool Hall, Drop Inn Lounge, and the Coin King Laundromat. These four businesses will relocate or close. Closing Coin King will likely lead to additional business for the four other laundry businesses in Fairbanks, one several blocks south. Closing the Break Room is not anticipated to have adverse economic impacts related to the project, as the owner wishes to sell regardless of this project and the business recently changed from decades of being a bar to an all-ages pool hall. Sufficient nearby property is available to relocate Thrifty Liquor, Drop Inn and the Break Room, if the owners opt to stay in business. If they opt not to stay in business, their customers have ample similar opportunities for the same products/activities in the Fairbanks area.

The improved safety would provide long-term benefits to commercial and private travelers. Refer to Section III, Part P for temporary traffic impacts due to construction.

D. Land Use and Transportation Plans

	N/A	YES	NO
1. Project is consistent with land use plan(s). Identify the land use plan(s) and date Fairbanks North Star Borough (FNSB) Regional Comprehensive Plan; September 13, 2005.	☐	☒	☐
2. Project is consistent with transportation plan(s). Identify the transportation plan(s) and date. FNSB Comprehensive Road Plan; July 11, 1991. Fairbanks Metropolitan Area Transportation System (FMATS) Transportation Improvement Program 2015, National Highway System Project. 2016-2019 Alaska Statewide Transportation Improvement Program, Amendment 3.	☐	☒	☐
3. Project would induce adverse indirect and cumulative effects on land use or transportation. *If yes, attach analysis.*	☐	☐	☒

4. Summarize how the project is consistent or inconsistent with the land use plan(s) and transportation plan(s):
The FNSB Regional Comprehensive Plan (September 2005) lists the Transportation and Infrastructure Goal 1 "To have a safe, efficient, multi-modal transportation system that anticipates community growth." This project aims to increase safety, decrease traffic wait times, and encourage safe use of the intersection by improving pedestrian and bike facilities. A safety goal of the FNSB Comprehensive Road Plan (July 1991) is "Traffic analysis and roadway improvement should ensure safe and adequate pedestrian circulation in downtown areas, activity centers, and neighborhoods." Constructing ADA compliant sidewalk, adding wayfinding signs, and improvements to bicycle facilities improve safety and pedestrian circulation to this downtown area. This project is also included in the 2017-2020 FMATS Transportation Improvement Program as a National Highway System Project. This project is included in the 2016-2019 Alaska Statewide Transportation Improvement Program, Amendment 3; Need: 3843, approved June 28, 2017.

E. Impacts to Historic Properties

Consider the February 2015 DOT&PF Cultural Resources Confidentiality Guidelines for cultural resource attachments.

	N/A	YES	NO
1. Does the project involve a road that is included on the "List of Roads Treated as Eligible" in the Alaska Historic Roads PA? *If yes, follow the Interim Guidance for Addressing Alaska Historic Roads.*	☐	☐	☒
2. Does the project qualify as a Programmatic Allowance under the Section 106 Programmatic Agreement? *If yes, attach the Section 106 PA Streamlined Project Review Screening Record approved by the Regional PQI and skip to 10.*	☐	☐	☒

3. Date Consultation/Initiation Letters sent 4/13/2017 *Attach copies to this form.*

a. List consulting parties State Historic Preservation Officer/Alaska Office of History and Archaeology, Tanana Chiefs Conference, Doyon Limited, City of Fairbanks, FNSB, Tanana-Yukon Historical Society, Denakkanaaga, FNSB-Commission on Historic Preservation.

b. If no letters were sent, explain why not. *Attach "Section 106 Proceed Directly to Findings Worksheet", if applicable* ______

4. Date "Finding of Effect" Letters sent 9/27/2017 *Attach copies to this form*

E. Impacts to Historic Properties

N/A YES NO

a. State "Finding of Effect" "No historic properties affected."

b. State any changes to consulting parties. City of North Pole added.

5. List responding consulting parties, comment date, and summarize:
State Historic Preservation Officer concurred with the finding of "no historic properties affected."

6. Are there any unresolved issues with consulting parties? ☐ ☐ ☒

If yes, the Section 106 process may not be complete, Statewide Cultural Resources Manager consultation is required. Attach consultation.

7. Date SHPO concurred with "Finding of Effect" 10/12/2017 *Attach copy to this form.*

8. Is a National Register of Historic Places listed or eligible property in the Area of Potential Effect? ☐ ☐ ☒

9. Will there be an adverse effect on a historic property? *If yes, attach correspondence (including response from ACHP) and signed MOA. If yes, Programmatic Categorical Exclusions (PCEs) do not apply.* ☐ ☐ ☒

10. Summarize any effects to historic properties. *List affected sites (by AHRS number only) and any commitments or mitigative measures. Include any commitments or mitigative measures in Section V.*
The DOT&PF determined that none of the buildings that will be demolished are eligible for the National Register of Historic Places, and no historic properties would be affected by the proposed project. The State Historic Preservation Office concurred with the finding. The Section 106 documentation is provided in Appendix D.

F. Wetland Impacts

YES NO

1. Project affects wetlands as defined by the U.S. Army Corps of Engineers (USACE). *If yes, complete the remainder of this section and document public and agency coordination required per E.O. 11990, Protection of Wetlands. If no, skip to Section G.* ☐ ☒

2. Are the wetlands delineated in accordance with the "*Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0) Sept. 2007*"? ☐ ☐

3. Estimated area of wetland involvement (acres): ______

4. Estimated fill quantities (cubic yards): ______

5. Estimated dredge quantities (cubic yards): ______

6. Is a USACE authorization anticipated? ☐ ☐
If yes, identify type:

NWP ☐ Individual ☐ General Permit ☐ Other ☐

7. Wetlands Finding *Attach the following supporting documentation as appropriate:*
☐ *Avoidance and Minimization Checklist, and Mitigation Statement*
☐ *Wetlands Delineation.*
☐ *Jurisdictional Determination.*
☐ *Copies of public and resource agency letters received in response to the request for comments.*

a. Are there practicable alternatives to the proposed construction in wetlands? *If yes, the project cannot be approved as proposed.*	☐	☐
b. Does the project include all practicable measures to minimize harm to wetlands? *If no, the project cannot be approved as proposed.*	☐	☐
c. Only practicable alternative: Based on the evaluation of avoidance and minimization alternatives, there are no practicable alternatives that would avoid the project's impacts on wetlands. The project includes all practicable measures to minimize harm to the affected wetlands as a result of construction. *If no, the project cannot be approved as proposed.*	☐	☐

8. Summarize the wetlands impacts and mitigation, if any. *Include any commitments or mitigative measures in Section V.*

Site investigation on June 8, 2017, (copy in Appendix E) indicated no wetlands or water bodies in the project area. The project area is in a highly developed urban area consisting of pavement, sidewalks, curb and gutter.

G. Water Body Involvement

	N/A	YES	NO
1. Does the project affect the following:			
a. A water body.	☐	☐	☒
b. A navigable water body as defined by USCG, (i.e. Section 9)?	☐	☐	☒
c. Waters of the U.S. as defined by the USACE, Section 404?	☐	☐	☒
d. Navigable Waters of the U.S. as defined by the USACE (Section 10)?	☐	☐	☒
e. Fish passage across a stream frequented by salmon or other fish (i.e. Title 16.05.841)?	☐	☐	☒
f. A resident fish stream (Title 16.05.841)?	☐	☐	☒
g. A cataloged anadromous fish stream, river or lake (i.e. Title 16.05.871)?	☐	☐	☒
h. A designated Wild and Scenic River or land adjacent to a Wild and Scenic River? *If yes, the Regional Environmental Manager should consult with the NEPA Program Manager to determine applicability of Section 4(f).*	☐	☐	☒
2. Proposed water body involvement: Bridge☐ Culvert☐ Embankment Fill☐ Relocation☐ Diversion☐ Temporary☐ Permanent☐ Other☐	☒	☐	☐
3. Type of stream or river habitat impacted: Spawning☐ Rearing☐ Pool☐ Riffle☐ Undercut bank☐ Other☐	☒	☐	☐

4. Amount of fill below (cubic yards):

OHW______ MHW______ HTL _____

5. Summarize the water body impacts and mitigation, if any. *Include any commitments or mitigative measures in Section V.*

Site investigation on June 8, 2017, (available in Appendix E) indicated no wetlands or water bodies in the project area. The area is a highly developed urban area consisting of mostly pavement, curb and gutter. No adverse impacts to water bodies are anticipated.

H. Fish and Wildlife	N/A	YES	NO
1. Anadromous and resident fish habitat. *Any activity or project that is conducted below the ordinary high water mark of an anadromous stream, river, or lake requires a Fish Habitat Permit.*			
a. Database name(s) and date(s) queried: Alaska Department of Fish and Game, Fish Resource Monitor; accessed February 12, 2018 (http://extra.sf.adfg.state.ak.us/FishResourceMonitor/?mode=awc).			
b. Anadromous fish habitat present in project area.		☐*	☒
c. Resident fish habitat present in project area		☐*	☒
d. Adverse effect on spawning habitat.	☒	☐*	☐
e. Adverse effect on rearing habitat.	☒	☐*	☐
f. Adverse effect on migration corridors.	☒	☐*	☐
g. Adverse effect on subsistence species.	☒	☐*	☐
2. Essential Fish Habitat (EFH). *EFH includes any anadromous stream used by any of the five species of Pacific salmon for migration, spawning or rearing, as well as other coastal, nearshore and offshore areas as designated by NMFS.*			

H. Fish and Wildlife

	N/A	YES	NO
a. Database name(s) and date(s) queried: National Oceanic and Atmospheric Administration Essential Fish Habitat Mapper (http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html accessed February 12, 2018).			
b. EFH present in project area		☐	☒
c. Project proposes construction in EFH. *If yes, describe EFH impacts in H.6.*	☒	☐	☐
d. Project may adversely affect EFH. *If yes, attach EFH Assessment.*	☒	☐	☐
e. Project includes conservation recommendations proposed by NMFS. *If NMFS conservation recommendations are not adopted, formal notification must be made to NMFS. Summarize the final conservation measures in H.6 and list in Section V.*	☒	☐	☐
3. Wildlife Resources:			
a. Project is in area of high wildlife/vehicle accidents.		☐	☒
b. Project would bisect migration corridors.		☐	☒
c. Project would segment habitat.		☐	☒
4. Bald and Golden Eagle Protection Act. *If yes to any below, consult with USFWS and attach documentation of consultation.*			
a. Eagle data source(s) and date(s): June 8, 2017 and August 16, 2017 site visits.			
b. Project visible from an eagle nesting tree?		☐	☒
c. Project within 330 feet of an eagle nesting tree?		☐	☒
d. Project within 660 feet of an eagle nesting tree?		☐	☒
e. Will the project require blasting or other activities that produce extreme loud noises within 1/2 a mile from an active nest?		☐	☒
f. Is an eagle permit required?		☐	☒
5. Is the project consistent with the Migratory Bird Treaty Act?		☒	☐

6. Summarize fish and wildlife impacts and mitigation, including timing windows, if any. *Include any commitments or mitigative measures in Section V.*

No migratory bird nests, eagles or eagle nests were observed on the June 8, 2017, and August 16, 2017, site visits (Site Visit Memo available in Appendix E). The area is a highly developed urban area. Vegetation clearing is not planned. If active bird or Bald Eagle nests are found during construction within 660 feet of the project limits (which includes primary and secondary protection zones), construction activities will cease except as permitted by Federal, State, and local laws, and approved by the Project Engineer.

The United States Fish and Wildlife Service (USFWS) IPaC database (https://ecos.fws.gov/ipac/location/WTFAAXXK7FF6FGMYHIY7OCLULU/resources), accessed February 12, 2018, indicated no critical habitat present in the project areas. The IPaC listed no endangered species, and 9 migratory bird species that may be present in the area: Bald Eagle, Fox Sparrow, Lesser Yellowlegs, Olive-sided Flycatcher, Rusty Blackbird, Short-eared Owl, Solitary Sandpiper, Upland Sandpiper, and Whimbrel.

The lack of high-quality habitat could preclude the presence of migratory birds in the project area. The project area mainly consists of asphalt and concrete.

x

I. Threatened and Endangered Species (T&E) YES NO

1. Database name(s) and date(s) queried: USFWS Critical Habitat Mapper; https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265 ad4fe09893cf75b8dbfb77 accessed February 12, 2018. USFWS IPaC database; https://ecos.fws.gov/ipac/accessed February 12, 2018.
2. Listed threatened or endangered species present in the project area. ☐ ☒
3. Threatened or endangered species migrate through the project area. ☐ ☒
4. Designated critical habitat in the project area. ☐ ☒
5. Proposed or Candidate species present in project area. ☐ ☒
6. What is the effect determination for the project? *Select one.*
   - **a.** Project has no effect on listed or proposed T&E species or designated critical habitat. ☒
   - **b.** Project is not likely to adversely affect a listed or proposed T&E species or designated critical habitat. *Informal Section 7 consultation is required. Attach consultation documentation, including concurrence from the Federal agency, to this form.* ☐
   - **c.** Project is likely to adversely affect a listed or proposed T&E species or designated critical habitat. *If yes, consult the NEPA Program Manager.* ☐
7. Summarize the findings of the consultation, conferencing, biological evaluation, or biological assessment and the opinion of the agency with jurisdiction, or state why no coordination was conducted. *Include any commitments or mitigative measures in Section V.*

   USFWS was included in the agency scoping process and did not comment. The USFWS IPaC database, accessed February 12, 2018, indicated no critical habitat or endangered species present in the project area.

J. Invasive Species YES NO

1. Database name(s) and date(s) queried: University of Alaska Anchorage's Alaska Natural Heritage Program Non-Native Plant Clearinghouse (AKEPIC, available at http://aknhp.uaa.alaska.edu/maps-js/integrated-map/akepic.php; accessed February 12, 2018).

2. Does the project include all practicable measures to minimize the introduction or spread invasive species, making the project consistent with E.O. 13112 (Invasive Species)? *If yes, list measures in J.3.* ☒ ☐

3. Summarize invasive species impacts and minimization measures, if any. *Include any commitments or mitigative measures in Section V.*
   No invasive species are reported in the project areas. The August 16, 2017, site investigation (Appendix E) found a presence of two invasive plants at gravel areas between pavement, Linaria vulgaris (butter and eggs) and Taraxacum officinale (dandelion). Project construction will likely remove the population of both invasive plants. Imported landscaping materials will comply with the project specification that prohibits noxious weeds on the Alaska Department of Natural Resources Division of Agriculture's Prohibited and Restricted Noxious Weeds list located at http://plants.alaska.gov/invasive/noxious-weeds.htm. Seed containing more than the maximum allowable tolerance of restricted noxious weeds shall be rejected.

K. Contaminated Sites

	YES	NO
1. Database name(s) and date(s) queried: Alaska Department of Environmental Conservation (ADEC), Contaminated Sites Database; accessed online at http://www.arcgis.com/home/webmap/viewer.html?webmap=315240bfbaf84aa0b8272ad1cef3cad3 on February 12, 2018).		
2. There are known or potentially contaminated sites within or adjacent to the existing and/or proposed ROW. *If yes, attach ADEC coordination documentation and summarize below in IV.K.4.*	☒	☐
3. There are contaminated sites within 1,500 feet of where excavation dewatering is anticipated? *If yes, attach ADEC coordination correspondence and summarize below in IV.K.4.*	☐	☒

4. Summarize the contaminated site impacts and mitigation, if any. *Include any commitments or mitigative measure in Section IV.*

Nortech Inc. completed a Phase I Environmental Site Assessment (ESA) for the project area (Appendix E). The project area is determined high risk based on documented soil and groundwater contamination on multiple parcels. The groundwater in the Gaffney Road area is affected by two plumes of chlorinated solvents. The ADKO Cleaner facility (currently Hair Palace) within project boundaries is identified with a leaking underground storage tank (LUST). The Nortech site inspection also observed eight buried heating oil tanks that could potentially affect the project. Nortech recommends sequencing tank removal prior to construction to reduce potential construction schedule and cost impacts. Nortech recommended that DOT&PF develop a Quality Assurance and Protection Plan (QAPP) and Contained-In determination that is approved by the Alaska Department of Environmental Conservation (ADEC) and EPA prior to demolition or construction activities. The QAPP will address worker safety and soil and groundwater handling and disposal. No excavation dewatering is anticipated. The Phase I ESA report summary is included in Appendix E.

In response to the Agency Scoping letter, ADEC responded about subsurface work in the location of known contaminated sites: Gaffney Road West/Royal Master Launderette (Haz ID 4503) and Gaffney Road East Coin King (Haz ID 25573) and ASTs and LUSTs are located in the project area that were identified during a Phase I ESA conducted by NORTECH (Appendix E). The Gaffney Road sites are former/current dry cleaners where hazardous substances (perchloroethylene) are known to have been released. ADEC concurred that an Environmental Sampling Work Plan and Environmental Quality Assurance and Protection Plan to screen and sample contaminated soils and potentially contaminated groundwater be prepared and submitted to ADEC for review and concurrence. Because dry cleaning solvents are considered Resource Conservation and Recovery Act (RCRA) hazardous materials, coordination with the U.S. EPA RCRA Program will also be necessary for contaminated soil handling and disposal options. ADEC also acknowledged Coin King will require assessment and removal of contaminated soil adjacent to and underneath the structure once it is demolished. ADEC encouraged DOT&PF to consider forming an RSA (Reimbursable Services Agreement) with ADEC to facilitate review of environmental sampling and quality assurance plans, and oversight of environmental investigations and remedial actions. ADEC correspondence is included in Appendix F, Pages 15-17.

On January 31, 2018, DOT&PF met with ADEC to discuss the contaminated groundwater plumes associated with Coin King and a former Launderette in the project area. Further discussions with DOT&PF management are planned in regard to how the contaminated area will be dealt with. The meeting notes are provided in Appendix F, pages 24-28.

L. Air Quality (Conformity)

	N/A	YES	NO
1. The project is located in an air quality maintenance area or nonattainment area (CO or PM-10 or PM-2.5). *If yes, indicate CO* ☒ *or PM-10* ☐ *or PM-2.5*☒ *, and complete the remainder of this section. If no, skip to Section M.*	☐	☒	☐
2. The project is exempt from an air quality analysis per 40 CFR 93.126 (Table 2 and Exempt Projects). *If no, a project-level air quality conformity determination is required for CO nonattainment and maintenance areas, and a qualitative project-level analysis is required for both PM-2.5 and PM-10 nonattainment and maintenance areas.*	☐	☐	☒
3. The project is included in a conforming Long Range Transportation Plan (LRTP) and Transportation Improvement Program (TIP). **a**. List dates of FHWA/FTA conformity determination: 2017-2020 FMATS TIP approved March 3, 2017.	☐	☒	☐
4. Have there been a significant change in the scope or the design concept as described in the most recent conforming TIP and LRTP? *If yes, describe changes in L.8. In addition, the project must satisfy the conformity rule's requirements for projects not from a plan and TIP, or the plan and TIP must be modified to incorporate the revised project (including a new conformity analysis).*	☐	☐	☒
5. A CO project-level analysis was completed meeting the requirements of Section 93.123 of the conformity rule. The results satisfy the requirements of Section 93.116(a) for all areas or 93.116(b) for nonattainment areas. *Attach a copy of the analysis.*	☐	☐	☒
6. A PM-2.5 project-level air quality analysis was completed meeting the requirements of Section 93.123 of the conformity rule. The results satisfy the requirements of Section 93.116. *Attach a copy of the analysis.*	☐	☐	☒

	N/A	YES	NO
7. A PM-10 project-level air quality analysis was completed meeting the requirements of Section 93.123 of the conformity rule. The results satisfy the requirements of Section 93.116. *Attach a copy of the analysis.*	☒	☐	☐

8. Summarize air quality impacts, mitigation, and agency coordination, if any. *Include any commitments or mitigative measures in Section V.*

The FNSB's carbon monoxide (CO) attainment plan was approved by EPA and became a Carbon Monoxide Maintenance Area on September 27, 2004. This project is designed to decrease delays and improve traffic flow which should improve air quality.

The FMATS Air Quality Conformity analysis for 2017-2020 Transportation Improvement Program was approved by FHWA on March 3, 2017. Fairbanks has an approved Limited Maintenance Plan and does not require an emission budget or a regional emissions analysis. Traffic Control Measures have been implemented and the requirements for CO conformity for FMATS TIP projects are met. A copy of the FHWA Air Quality Conformity approval correspondence is provided at the end of Appendix F.

The City of Fairbanks is designated as a PM-2.5 or Fine Particulate Matter National Ambient Air Quality Standard nonattainment area as of December 2009. On April 28, 2017, EPA officially re-classified the FNSB from "Moderate" to "Serious" nonattainment for PM-2.5. On August 21, 2017, the EPA approved the State Implementation Plan revisions to address PM-2.5 for the FNSB. The projects in the 2017-2020 TIP are either consistent with the 2040 Metropolitan Transportation Plan (Air Quality Conformity Analysis approved in January 2015) or exempt from conformity.

M. Floodplain Impacts (23 CFR 650, Subpart A)	YES	NO
1. Project encroaches into the base (100 year) flood plain in fresh or marine waters. Identify floodplain map source and date : 02090C4378J and 02090C4379J, March 17, 2014	☐	☒

If yes, attach documentation of public involvement conducted per E.O. 11988 and 23 CFR 650.109. Consult with the regional or Statewide Hydraulics/Hydrology expert and attach the required location hydraulic study developed per 23 CFR 650.111. Answer questions M.1.a through d.

If no, skip to M.2.

a. Is there a longitudinal encroachment into the 100-year floodplain?	☐	☐
b. Is there significant encroachment as defined by 23 CFR 650.105(q)? *If yes, attach a copy of FHWA's finding required by 23 CFR 650.115.*	☐	☐
c. Project encroaches into a regulatory floodway.	☐	☐
d. The proposed action would increase the base flood elevation one-foot or greater.	☐	☐
2. Project conforms to local flood hazard requirements.	☐	☐
3. Project is consistent with E.O. 11988 (Floodplain Protection). *If no, the project cannot be approved as proposed.*	☐	☐

4. Summarize floodplain impacts and mitigation, if any. *Include any commitments or mitigative measures in Section V.*

Project is located in Flood Zone X according to the Federal Emergency Management Agency flood map panel numbers 02090C4378J and 02090C4379J effective March 17, 2014. Zone X is classified as "Other Flood Areas: areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than one foot or with drainage areas less than one square mile; and areas protected by levees from 1% annual chance flood." The project is outside the 100-year flood hazard zone is protected from flooding by the Chena Lakes Flood Control Project.

N. Noise Impacts (23 CFR 772)

YES NO

1. Does the project involve any of the following? *If yes, complete N.2. If no, a noise analysis is not required. Skip to section O.* ☐ ☒

- **a.** Construction of highway on a new location.
- **b.** Substantial alteration in vertical or horizontal alignment as defined in 23 CFR 772.5.
- **c.** An increase in the number of through lanes.
- **d.** Addition of an auxiliary lane (except a turn lane).
- **e.** Addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange.
- **f.** Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane.
- **g.** Addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza.

2. Identify below which category of land uses are adjacent: *A noise analysis is required if any lands in C*

3. 3*ategories A through E are identified, and the response to N.1 is 'yes'.*

Category A: Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. ☐ ☐

Category B: Residential. *This includes undeveloped lands permitted for this category.* ☐ ☐

Category C (exterior): Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings. *This includes undeveloped lands permitted for this category.* ☐ ☐

Category D (interior): Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios. ☐ ☐

Category E: Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not listed above. *This includes undeveloped lands permitted for this category.* ☐ ☐

☐ ☐

3. Does the noise analysis identify a noise impact? *If yes, explain in N.4* ☐ ☐

4. Summarize the findings of the attached noise analysis and noise abatement worksheet, if applicable: The proposed project does not require a noise analysis in accordance with 23 CFR 772. The proposed project meets the criteria listed in 23 CFR 772.5 as a Type III project and is exempt. The project is in an urban setting, with businesses adjacent to the right-of-way. The project is not a Type I project, therefore a noise analysis is not required. Traffic along the existing corridor would not increase and long-term noise impacts are not anticipated.

O. Water Quality Impacts

	N/A	YES	NO
1. Project would involve a public or private drinking water source. *If yes, explain in O.7*		☐	☒
2. Project would result in a discharge of storm water to a Water of the U.S. (per 40 CFR 230.3(s))		☒	☐
3. Project would discharge storm water into or affect an ADEC designated Impaired Waterbody. *If any of the Impaired Waterbodies have an approved or established Total Maximum Daily Load, describe project impacts in O.7*		☒	☐
a. List name(s), location(s), and pollutant(s) causing impairment: The Chena River is a Category 5, Section 303(d) listed waterbody. The closest portion of the river to the project is 64° 50' 38.77" N, 147° 45' 55.39" W. The pollutant source is sediment from urban runoff.			
4. Estimate the acreage of ground-disturbing activities that will result from the project? 6 acres.			
5. Is there a Municipal Separate Storm Sewer System (MS4) APDES permit, or will runoff be mixed with discharges from an APDES permitted industrial facility?		☒	☐
a. If yes, list APDES permit number and type: MS4 APDES Permit # AKS-053406.			
6. Would the project discharge storm water to a water body within a national park or state park; a national or state wildlife refuge?		☐	☒

7. Summarize the water quality impacts and mitigation, if any. *Include any commitments or mitigative measures in Section V.*

Groundwater in the project area is 10-20 feet below ground surface depending on season and river stages. According to the ADEC Contaminated Sites reports for the area, the groundwater gradient in the project area flows northwest. Surface water drainage is conveyed through a piped storm drain system to roadside ditches along the Steese Highway which eventually drains into the Chena River. The Chena River is a Category 5/Section 303(d) listed waterbody for sediment and urban runoff, Alaska ID 40506-007.
The project area is fully developed with buildings, roads and parking lots with minimal landscaping. New lanes and sidewalk areas will displace existing buildings and parking lots, resulting in no anticipated long-term runoff increases. Drainage system modifications will be designed in accordance with the Fairbanks Alaska Pollutant Discharge Elimination System (APDES) Individual MS 4 Permit, of which DOT&PF is a Co-Permittee. APDES MS4 Permit # AKS-053406 covers the Fairbanks urbanized area, approx. 31 square miles (https://alaska.hometownlocator.com/ak/fairbanks-north-star/fairbanks.cfm), or 19,840 acres. The project extent is 6 acres, or 0.03 percent of the total runoff acreage. No waterbodies are located in the project area and almost all the project's 6 acres is already impervious. The nearest waterbody, the Chena River, is the receptacle for storm drain run-off in the urbanized Fairbanks area. The 6-acre project site is and will remain primarily paved or concrete, with little impervious area, so the majority of stormwater runoff was and will continue to be captured in the storm drain system. With no anticipated runoff increases, given Fairbank's arid climate and the size of the runoff area (0.03 percent of the watershed's 19,840 acres), no additional effects to Chena River water quality or groundwater quality are foreseen. Discharges to the storm drain system and the Chena River will be minimized during construction by compliance with the Construction General Permit, which requires implementation of Best Management Practices.

P. Construction Impacts

	N/A	YES	NO
1. There will be temporary degradation of water quality.		☒	☐
2. There will be a temporary stream diversion.		☐	☒
3. There will be temporary degradation of air quality.		☒	☐
4. There will be temporary delays and detours of traffic.		☒	☐
5. There will be temporary impacts on businesses.		☒	☐
6. There will be temporary noise impacts.		☒	☐
7. There will be other construction impacts (e.g. TCEs/TCPs, utility relocates, staging areas, etc.).		☒	☐

8. Summarize construction impacts and mitigation for each 'yes' above. *Include any commitments or mitigative measures in Section V.*

Water Quality: Temporary deterioration of water quality may result during project construction due to a minor increase of erosion and other pollutants entering storm water runoff. Implementing a Storm Water Pollution Prevention Plan (SWPPP) and best management practices (BMPs) would help alleviate temporary water quality impacts.

Stream Diversion: No streams located in or near project area.

Air Quality: Temporary impacts to air quality may result during project construction from increased equipment exhaust and dust upheaval from ground disturbance. Construction impacts to air quality will be mitigated with the use of BMPs including watering, sweeping, stabilizing construction entrances/exits, and equipment emission control devices. No permanent adverse impacts to air quality would result from the proposed project.

Traffic delays and detours: Temporary delays in traffic, rerouting of traffic, and rerouting of access to local properties and businesses may occur during project construction. Access to businesses and residences will be maintained throughout construction. A Traffic Control Plan would be implemented, and the public notified prior to construction.

Business Impacts: Access to businesses will be maintained throughout construction. A Traffic Control Plan would be implemented, and the public notified prior to construction. Temporary impacts to businesses include delays in traffic, rerouting access, reduced parking for several businesses, and impacts to Thrifty Liquor due to relocation.

Noise Impacts: A temporary increase in noise levels may result during project construction due to the use of heavy equipment and other general construction activities. Temporary noise increases could affect nearby properties and neighborhoods. However, noise impacts from construction would not result in a substantial increase or permanent change in noise levels in the project areas**.**

Other Construction Impacts: TCEs will be needed for access to the project area. Staging areas will be needed. Although the contractor selects their staging areas, the vacant, paved lot in the northeast corner is a likely location. TCPs may be needed. Utility relocates are planned. The extent of TCEs, TCPs, and utility relocates will be known at final design. Staging areas selected by the contractor will be in accordance with DOT&PF policies. DOT&PF will continue to consult with ADEC to plan for hazardous material avoidance and clean-up for the contaminated sites and groundwater contamination plumes.

Q. Section 4(f)/6(f)	YES	NO
1. Section 4(f) (23 CFR 774)		
a. Was detailed Section 4(f) resource identification conducted for this project, other than that required for Section 106 compliance? *If no, attach consultation with the NEPA Program Manager stating further Section 4(f) resource identification was not required.*	☒	☐
b. Does a Section 4(f) resource exist within the project area; or is the project adjacent to a Section 4(f) resource? *If yes, attach consultation with the NEPA Program Manager to determine applicability of Section 4(f). If no, skip to Q.2.*	☐	☒
c. Does an exception listed in 23 CFR 774.13 apply to this project? *If yes, attach consultation with the NEPA Program Manager, and documentation from the official with jurisdiction, if required.*	☐	☒
d. Does the project result in the "use" of a Section 4(f) property? *"Use" includes a permanent incorporation of land, adverse temporary occupancy, or constructive use. If no, attach consultation with the NEPA Program Manager and skip to Q.2.*	☐	☒
e. Has a *de minimis* impact finding been prepared for the project? *If yes, attach the finding.*	☐	☒
f. Has a Programmatic Section 4(f) Evaluation been prepared for the project? *If yes, attach the evaluation.*	☐	☒
g. Has an Individual Section 4(f) Evaluation been prepared for the project? *If yes, attach the evaluation.*	☐	☒
2. Section 6(f) (36 CFR 59)		
a. Were funds from the Land and Water Conservation Fund Act (LWCFA) used for improvement to a property that will be affected by this project?	☐	☒
b. Is the use of the property receiving LWCFA funds a "conversion of use" per Section 6(f) of the LWCFA? *Attach the correspondence received from the ADNR 6(f) Grants Administrator.*	☐	☒

3. Summarize Section 4(f)/6(f) involvement, if any:
The project will not affect 4(f) or 6(f) resources, as none are present within or adjacent to the project area, nor in/adjacent to the parcels proposed for acquisition.

III. Permits and Authorizations	N/A	YES	NO
1. USACE, Section 404/10 Includes Abbreviated Permit Process, Nationwide Permit, and General Permit		☐	☒
2. Coast Guard, Section 9		☐	☒
3. ADF&G Fish Habitat Permit (Title 16.05.871 and Title 16.05.841)		☐	☒
4. Flood Hazard		☐	☒
5. ADEC Non-domestic Wastewater Plan Approval		☐	☒
6. ADEC 401		☐	☒
7. ADEC APDES		☒	☐
8. Noise		☒	☐

9. Eagle Permit ☐ ☒

10. Other. If yes, list below. ☒ ☐

- A City of Fairbanks Noise Ordinance Variance Permit is needed for noise if construction activity is planned between 11:00 p.m. and 7:00 a.m.
- Compliance with the APDES MS4 permit.
- The disturbed area will be over an acre, a NOI will be filed with ADEC and a SWPPP will be submitted to ADEC for approval, and implemented during construction.

IV. Comments and Coordination

	N/A	YES	NO
1. Public/agency involvement for project. *Required if protected resources are involved.*		☒	☐
2. Public Meetings. Date(s): May 17, 2017		☒	☐

3. Newspaper ads. *Attach certified affidavit of publication as an appendix.*
Name of newspaper and date: April 19, 2017, May 13, 2017, May 17, 2017

4. Alaska Online Public Notice date: April 20, 2017

5. Agency scoping letters. Date sent: May 19, 2017

6. Agency scoping meeting. Date of meeting: N/A

7. Field review. Date: June 8, 2017, August 16, 2017

8. Summarize comments and coordination efforts for this project. Discuss pertinent issues raised. *Attach correspondence that demonstrates coordination and that there are no unresolved issues.*

Meetings with the Business and Property Owners

Businesses and property owners adjacent to the Airport Way/Cushman Street Intersection Reconstruction project corridor were invited to meet with project team members from the DOT&PF and Kinney Engineering, LLC (KE) to learn about the project. The purpose of the meeting was to solicit feedback and comments from area business owners before presenting the project to the general public at the upcoming Open House. KE hand delivered meeting invites, going door-to-door to the businesses on February 15 and 16, 2017. By going door-to-door and following up with phone calls, KE contacted all but one of the area businesses (Gene's Chrysler seasonal car lot on the NW corner). Seven businesses scheduled One-on-One meetings: Stone Soup, Thrifty Liquor, Hi-Jinx, Coin King, The Donut Shoppe, IKA Karate, and Kodiak Jacks. Meeting invites and a sign-in sheet for the meetings are attached in Appendix G.

At the start of each meeting a KE Project Engineer explained the purpose and need for the project, and provided a brief presentation of the options, and explained the potential impacts to properties under each option. Signal Option 3 and Signal Option 3 West 36" x 48" graphics were displayed, and 11" x 17" enlarged figures of the affected parcels for each of the two options were given to each property owner. After KE's presentation of the project options, a DOT&PF Project Manager, explained the purpose of the One-on-One business meetings and that an Open House for the general public will take place. The DOT&PF project manager explained the overall project schedule, currently in the preliminary engineering phase, construction is anticipated for around year 2020, and ROW acquisitions would occur approximately two years from now. The funding for this project was explained as secured, and unlikely for the project to be cancelled or put on hold. DOT&PF ROW representatives provided a general overview of property acquisition and appraisal process, provided the FHWA pamphlet with information about the property acquisition process "Acquiring Real Property for Federal and Federal-Aid Programs and Projects", and reminded business owners to "continue business as usual" until further notice.

The meetings took place on February 22, and March 1, 2017. Business owners shared concerns about the access to their businesses, and possible decreases to their parking lots. Property acquisition was agreeable to most of the business owners. The Thrifty Liquor owner was concerned about the project and voiced that it would "ruin my business," and "ruin my building." The Thrifty Liquor owner prefers his business remain on-site, and wants to be the first business on the corner. Other owners were open to selling and/or moving. Ease of access for customers and maintaining an adequate number of parking spaces was a concern for nearly all the business owners. Many owners thought the project would be an improvement for drivers and pedestrians. A detailed annotation of comments from individual meetings is included in Appendix G.

Open House

The Open House was held at the Noel Wien Library Auditorium, 1215 Cowles Street, Fairbanks, Alaska on May 17, 2017, from 4:00 PM to 7:00 PM. Postcard mailers were sent to area businesses and residents with a brief description of the project and an invitation to the Open House. A "Notice of Intent" to begin engineering and environmental studies on the project and an invitation to the Open House were printed in the Fairbanks News Miner on April 19, 2017. Public notice advertisements for the Open House were also printed in the Fairbanks News Miner on May 13 and May 17, 2017. A complete list of postcard recipients and other materials advertising the Open House are included in Appendix G. In addition, a project website was launched on April 28, 2017, to http://dot.alaska.gov/nreg/airport-cushman/.

The May 17, 2017, Open House included graphic display boards and an open forum for questions and comments. The graphic display boards highlighted the project purpose, current project phase, concerns identified, the alternatives identified and dismissed, the proposed improvements including schematic drawings, and the next steps in the project. Open House attendees received a handout with a project description and figure with proposed improvements shown. Copies of the graphic display boards, handouts, comment sheets, and sign-in sheets are included in Appendix G.

Seven members of the public commented on the project. Two comment sheets were received at the Open House, the other comments were received via the project website. Public comments on the project covered a wide variety of topics from concern for maintaining business access and parking, to improving traffic flow. One commenter was interested in saving Coin King by remodel rather than a take, wanted a fence material other than chain link along the north side of the project, turning Gaffney Road into a two-way street to avoid the drivers that turn down the wrong direction, and to make the pedestrian path from Noble to 14th easier to see. The same commenter also commented that he liked the pedestrian facilities.

Another commenter liked the proposed improvements and would like the right turn lane on south Cushman open so drivers could turn onto 14th Avenue. Several comments pertained to questions about traffic flow and project design that were answered with the presentation and handout materials at the open house. One commenter would like to see this project dropped in favor of improvements to Chena Hot Springs Road. The Fire Chief voiced the Fire Department's concerns over the intersection being IR or GPS for emergency vehicle services, and if the fire department controls for Gaffney can also control the lights at the Airport Way intersection. These comments were addressed verbally at the Open House, DOT&PF is not planning on using GPS Opticom.

Comments were focused on several main issues:

- Maintaining ease of access to businesses
- Adequate parking for businesses after project construction
- Improvements to pedestrian facilities
- Improvements to traffic flow

Agency Scoping

Agency scoping materials were mailed on May 19, 2017, with project comments due by June 22, 2017. Three agency (ADEC & FMATS) comments were received during the scoping period, and two more were received after the scoping period.

Contamination in soils and groundwater in the area, in particular under Coin King, will be an issue for construction. Jim Fish, Environmental Program Specialist with the Alaska Department of Environmental Conservation (ADEC), commented that ADEC will require assessment and removal of the contaminated soil under the Coin King building. ADEC would like DOT&PF to consider forming a Reimbursable Services Agreement with ADEC Contaminated Sites Program for review of environmental samples and quality assurance plans, and oversight of environmental investigations and remedial actions. ADEC concurred that an Environmental Sampling Work Plan and Environmental Quality Assurance and Protection Plan to screen and sample contaminated soils and groundwater be prepared and submitted to ADEC for review and concurrence.

David van den Berg, Executive Director of Fairbanks Downtown Association, commented that gateway and wayfinding features need to stay in the project design.

Bryce Ward, Policy Committee Chair of Fairbanks Metropolitan Area Transportation System FMATS supports the project as it will enhance traffic flow and safety at a problematic intersection. FMATS would like to see wayfinding and a gateway feature included in the design elements. FMATS requests that the Green Streets Policy adopted by FMATS be considered in the project design.

Jackson Fox, City of Fairbanks, commented after the agency scoping period. The City of Fairbanks wants landscaping and a gateway feature included and would sponsor the maintenance of the improvements.

Deb Hickok, President and CEO of Explore Fairbanks, commented after the agency scoping period. Explore Fairbanks was concerned that the project would not include a gateway feature and wayfinding and wants DOT&PF to "adopt a culture of wayfinding that is in line with communities throughout the country."

Copies of the Agency Scoping Letter and comments received are included in Appendix F.

V. Environmental Commitments and Mitigation Measures

List all environmental commitments and mitigation measures included in the project.

VI. Environmental Documentation Approval

	N/A	YES	NO
1. Do any unusual circumstances exist, as described in 23 CFR 771.117(b)? *If yes, attach consultation with the NEPA Program Manager demonstrating that a CE is appropriate.*		☐	☒
2. The project meets the criteria of one of the following DOT&PF Programmatic Approvals authorized in the Nov. 13, 2017 "Chief Engineer Directive – Programmatic Categorical Exclusions".		☐	☒

- *If yes, select the appropriate Programmatic Approval below, and the CE documentation form may be approved by the Regional Environmental Manager.*
- *If no, the CE documentation form must be approved by a NEPA Program Manager.*

a. Programmatic Approval 1 ☐

b. Programmatic Approval 2 ☐

c. Programmatic Approval 3 ☐

VII. Environmental Documentation Approval Signatures

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APPENDIX C

TRAFFIC ANALYSES

Airport Way/Cushman Street Intersection Reconstruction

IRIS Program No. Z640780000
Federal Project No. 0002312

Traffic and Safety Analysis Report

November 2016

Prepared For:
Alaska Department of
Transportation &
Public Facilities

Prepared By:
Kinney Engineering, LLC

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24 NOV 2016

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Table of Contents

Figures

Tables

Figures for Appendices

Tables for Appendices

Abbreviations

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
CAR	Critical Accident Rate
CRF	Crash Reduction Factor
CV%	Commercial Vehicle Percentage
DD%	Directional Distribution Percentage
DHV	Design Hour Volume
DOT&PF	Alaska Department of Transportation and Public Facilities
ESAL	Equivalent Single Axle Load
FMATS	Fairbanks Metropolitan Area Transportation System
GIS	Geographical Information System
HCM	Highway Capacity Manual
HV%	Heavy Vehicle Percentage
KE	Kinney Engineering, LLC
LOS	Level of Service (performance grade)
MACS	Metropolitan Area Commuter System
MTP	Metropolitan Transportation Plan
mph	Miles per Hour
MEV	Million Entering Vehicles
MVM	Million Vehicle Miles
NCHRP	National Cooperative Highway Research Program
NMTP	Non-Motorized Transportation Plan
PGDHS	*A Policy on Geometric Design of Highways and Streets*
PHF	Peak Hour Factor
PTR	Permanent Traffic Recorder
RV%	Recreational Vehicle Percentage
TMV	Turning Movement Volume
v/c or V/C	Volume to Capacity Ratio

Definition of Terms

Access: Ability to enter and exit a given location from a public roadway.

Annual Average Daily Traffic: Measurement of the number of vehicles traveling on a segment of highway each day, averaged over the year.

Capacity: Value of the maximum flow rate

Critical Accident Rate (CAR): Statistical measure used in crash rate analysis to determine statistical significance. If the crash rate of the location in question is above the CAR for that location, the crash rate is above the average crash rate for similar facilities to a statistically significant level.

Continuous Flow Intersection: A type of traffic control in which left-turn vehicles cross over the opposing traffic lanes prior to arriving at the intersection.

Control Delay: Portion of total delay a vehicle experiences at a traffic-controlled intersection, given in seconds per vehicle.

Coordinated Data System: Database of route numbers used to identify streets.

Crash Rate: Number of crashes per a unit of exposure. Common units of exposure include million vehicle miles traveled for roadway segments and million entering vehicles for intersections.

Crash Reduction Factor (CRF): Percentage associated with a safety treatment. Crashes for the condition without the safety treatment are multiplied by the crash reduction factor to determine the number of crashes reduced if the treatment is applied. CRFs are determined using a statistical analysis of sites with and without the treatment.

Crash Severity: Scale of bodily harm up to and including death, suffered by the occupants of the vehicle involved in a crash. There are four levels of crash severity used: property damage only (PDO), non-incapacitating/possible injury (minor injury), incapacitating injury (major injury), and fatal.

Flow Rate: Measurement of the number of vehicles passing a given point within a set amount of time, usually an hour.

Functional Area of the Intersection: The area beyond the physical intersection that encompasses the turn-lane storage lengths, the distance drivers need to make decisions and maneuver through the intersection and the distance it takes to recover from the conditions of the intersection. It is desirable to limit driveways and other access points within the functional area so that drivers can focus on safely maneuvering through the intersection.

Interchange: Set of ramps and intersections used to allow traffic to travel to and from a controlled-access freeway facility.

Level of Service (LOS): Performance measure concept used to quantify the operational performance of a facility and present the information to users and operating agencies. The actual performance measure used varies by the type of facility; however, all use a scale of A (best conditions for individual users) to F (worst conditions). Often, LOS C or D in the most congested hours of the day will provide the optimal societal benefits for the required construction and maintenance costs.

Mobility: Ability of people and goods to move from one place to another.

Parallel Bicycle Route: A bicycle route that is parallel to a roadway.

Peak Hour: Hour-long period in which the volume of a given road is the highest for the day or other time period. Morning, midday, and evening peak hours are often used for analysis, although peak hours may occur at other times, such as at school dismissal.

Peak Hour Factor (PHF): Measure of traffic variability over an hour period, calculated by dividing the hourly flow rate by the peak 15-minute flow rate. PHF values can vary from 0.25 (all traffic for the hour arrives in the same 15-minute period) to 1.0 (traffic is spread evenly throughout the hour).

Permanent Traffic Recorder (PTR): Permanently installed device that counts all vehicles on a given roadway. The device may record other information as well, such as vehicle classification.

Safety: Count of crashes by severity at a given location.

Through-about Intersection: A type of traffic control in which turning and side street traffic circulate around the intersection similar to a roundabout, while the main street traffic travels directly through the intersection.

Volume to Capacity Ratio (v/c): Measure of how much of the available capacity is being used, calculated by dividing the demand volume by the capacity of the facility. Values of 0.85 or less indicate adequate capacity to serve the demand volume. When v/c is greater than 0.85, drivers begin to feel uncomfortably crowded.

Executive Summary

The purpose of the Airport Way and Cushman Street Intersection Reconstruction project is to improve the traffic operations, safety, and capacity of the Airport Way intersection with Cushman Street. The Alaska Department of Transportation and Public Facilities (DOT&PF) has retained Kinney Engineering, LLC (KE) to prepare this Traffic and Safety Analysis Report, which analyzes the existing and future operational and safety conditions of the intersection and proposes design alternatives that address these concerns for vehicles, pedestrians, bicycles, and transit.

Existing Performance

Airport Way is a state-owned, east-west four-lane divided principal arterial roadway with limited access, traversing Fairbanks from the Fairbanks International Airport to the Steese Expressway/ Richardson Highway. Cushman Street is a city-owned, north-south minor arterial roadway. Within the study limits, Cushman Street south of Gaffney Road is a three-lane, two-way road. North of Gaffney Road, Cushman Street is a two-lane, one-way road, connecting Airport Way to the downtown area. The current lane configuration of the Airport Way and Cushman Street intersection is shown in Figure 5 on page 9.

The American Association of State Highway and Transportation Officials (AASHTO) recommends an intersection Level of Service (LOS) of at least a C at urban arterial intersections, such as those along Airport Way. The existing volume conditions at the Airport Way intersection with Cushman Street result in acceptable LOS in the morning and evening peak periods based on 2015 traffic volume observations. In the morning, traffic volumes along Airport Way are fairly low. Although the intersection as a whole operates at LOS C or better all day, northbound and southbound vehicles experience more delay, resulting in LOS D for the southbound movements in the midday and LOS E for the northbound movement in both the midday and evening peaks.

There are several driveways or local streets along Cushman Street within the functional area of the Airport Way at Cushman Street intersection, including 14th Avenue. To improve safety and operations, access to Cushman Street should be limited within the intersection functional area.

Several safety concerns were identified by an analysis of the existing conditions at the Airport Way intersection with Cushman Street. The crash history indicates the intersection has a statistically higher than average crash rate (1.980 crashes per million entering vehicles, compared to the statewide average of 1.376 crashes per million entering vehicles for similar facilities). This crash rate is higher than average to a statistically significant level (with 95% confidence), indicating that the high crash rate is not a result of chance, but is indicative of specific characteristics of the intersection or population. The crash patterns identified include:

- Rear-end and sideswipe crashes between vehicles on the northbound approach
- Left-turn crashes between eastbound and westbound vehicles
- Right-angle crashes involving eastbound vehicles

The Fairbanks Metro 2040 Metropolitan Transportation Plan also indicated that there are pedestrian and bicycle safety concerns for this intersection.

Future Performance

Future traffic volumes were forecast using a refined version of the Fairbanks Metropolitan Area Transportation System (FMATS) 2040 travel demand model. Volumes were produced for conditions with and without the Steese Expressway interchange with Airport Way. The difference between the volumes produced in the model with or without the interchange were not significant enough to affect the recommended designs for the intersection of Airport Way and Cushman Street; only the results with the Steese Expressway interchange are presented in the main body of the report. Appendix B on page 72 presents the analysis results for the volume scenario without a future interchange constructed at the Steese Expressway intersection with Airport Way.

The future intersection performance is expected to maintain LOS D or better. Under the forecasted 2040 volumes with a future interchange at the Steese Expressway, the Airport Way intersection with Cushman Street will achieve an acceptable LOS C in the morning and LOS D in the evening; however, the intersection volume meets capacity (v/c ratio = 1.0) in the evening, indicating that intersection operations may be unstable during this period. The evening movements with the worst delays include:

- Northbound movements (LOS F, v/c = 1.0)
- Southbound left (LOS E, v/c = 0.7)
- Westbound left (LOS E, v/c = 0.9)

Although the intersection is expected to operate at an acceptable LOS D, it is necessary to mitigate the identified safety concerns at the intersection. These improvements may also increase capacity, helping to stabilize future operations.

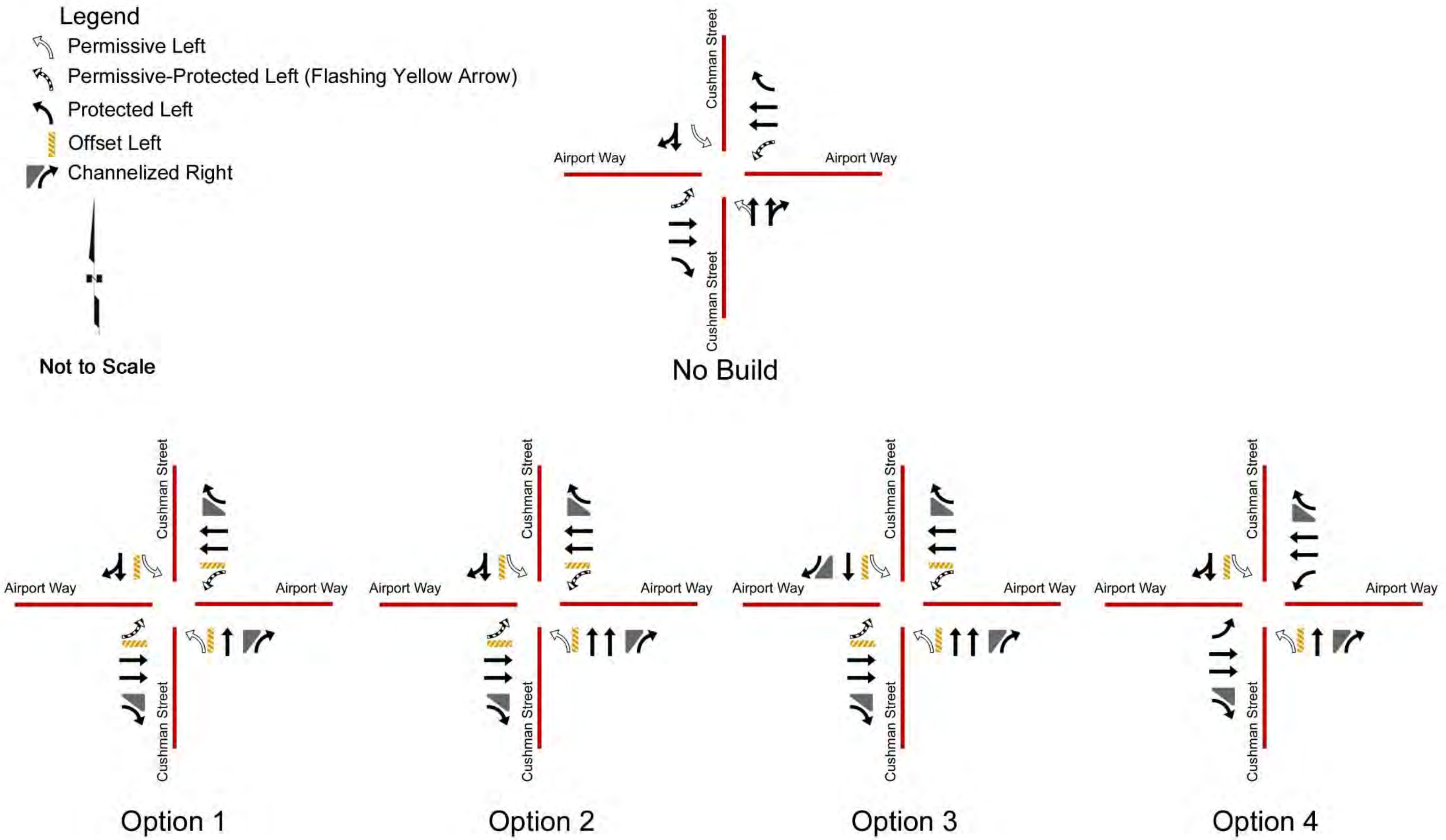
Signal Control Alternatives

Several alternative intersection designs were studied to determine if they would reduce the crash rate and improve future operations at the Airport Way intersection with Cushman Street. Four signal control configurations were analyzed and compared and several alternative intersection treatments were screened for further study.

The four signal control options that were analyzed include:

- Option 1 – Expand northbound approach to include left-turn and right-turn lanes with only one through lane; provide positive offset for all left-turn lanes; provide right-turn channelization on the eastbound, westbound, and northbound approaches.
- Option 2 – Make all Option 1 improvements, but expand northbound approach to include two through lanes.
- Option 3 – Make all Option 1 improvements; expand southbound approach to one left-turn lane, one through lane, and one right-turn channelized lane; and expand northbound approach to include two through lanes.
- Option 4 – Convert the east-west left-turn phasing to protected only; provide positive offset for northbound and southbound left-turn lanes; provide right-turn channelization on the eastbound, westbound, and northbound approaches.

The lane configurations of the various options are summarized in Figure 1.



NOTE: Permissive Left could also be operated with flashing yellow arrow

Figure 1: Executive Summary: Signal Options Summary

Adding northbound left- and right-turn lanes would separate the turning traffic from the through traffic, which eliminates the conflict between decelerating vehicles and vehicles continuing at speed through the intersection. Providing positive left-turn offsets for permissive movements would allow left-turn vehicles to see past opposing left-turns, which improves sight distance for selecting suitable gaps in opposing traffic. Channelizing the right turns shortens the pedestrian crossing distance and increases intersection capacity.

Table 1 presents the control delay and LOS of the existing configuration for each approach movement during the 2040 evening peak. The table also presents the change in delay under each of the options, as compared to the "No Build" delay, and the resulting intersection LOS under each option.

Overall, addressing the safety concerns will improve the future intersection operations from LOS D to LOS B or C conditions. All of these options would facilitate signal coordination on Airport Way. Because the signal cycle length was not changed between options, pedestrian LOS for all options remains the same (LOS E with a delay of 50 seconds). None of the options would negatively impact movements of transit vehicles through the intersection.

<u>Other Alternative Control Options</u>

Four alternative traffic control options were considered on a conceptual level and screened for possible further analysis. The four options considered were:

- Roundabout at the Airport Way intersection with Cushman Street
- Roundabouts at the 15th Avenue and Gaffney Road intersections
- Continuous flow intersection
- Modified through-about intersection

Roundabout at the Airport Way intersection with Cushman Street. A two-lane roundabout with a right-turn bypass lane on every approach was modeled using Highway Capacity Manual (HCM) methodology. A two-lane roundabout would not provide adequate LOS. The roundabout would operate at LOS E with 2040 volumes in the evening peak hour. Along Airport Way, the westbound left and through movements would experience LOS F. On Cushman Street, the northbound right movement would experience LOS E. The roundabout would also break up the platoons from the coordinated signals along Airport Way. A three-lane roundabout was rejected because of negative safety and operational impacts to pedestrians. A concept sketch of the two-lane roundabout alternative is shown in Figure 15 on page 43.

Roundabouts at the 15th Avenue and Gaffney Road intersections with Cushman Street. This alternative would prohibit eastbound and westbound left-turn movements at the Airport Way intersection with Cushman Street. Instead, the left-turning vehicles would make a right turn on to Cushman Street, make a U-turn at a roundabout at 15th Avenue or Gaffney Road, and then proceed to go either northbound or southbound through the Airport Way intersection to complete the movement. A concept sketch of this alternative is shown in Figure 16 in the body of the report on page 46.

Approach	**Movement**	**No Build**		**Option 1**		**Option 2**		**Option 3**		**Option 4**	
		Control Delay (sec/veh)	**LOS**	**Change in Delay (sec/veh)**	**LOS**	**Change in Delay (sec/veh)**	**LOS**	**Change in Delay (sec/veh)**	**LOS**	**Change in Delay (sec/veh)**	**LOS**
Northbound	Left	88	F	-48	D	-35	D	-47	D	-47	D
	Thru	**88**	**F**	**-31**	**E**	-44	D	-44	D	**-28**	**E**
	Right	88	F	-65	C	-65	C	-65	C	-65	C
Southbound	**Left**	**57**	**E**	-13	D	-14	D	-14	D	-10	D
	Thru	31	C	12	D	19	D	11	D	13	D
	Right	31	C					-14	C		
Eastbound	Left	42	D	-13	C	-17	C	-17	C	**21**	**E**
	Thru	29	C	-12	B	-14	B	-14	B	-6	C
	Right	14	B	-1	B	-1	B	-1	B	-1	B
Westbound	**Left**	**72**	**E**	-55	B	-57	B	-57	B	-30	D
	Thru	18	B	-7	B	-9	A	-9	A	-2	B
	Right	14	B	-2	B	-2	B	-2	B	-2	B
Intersection		**41**	**D**	**-19**	**C**	**-21**	**C**	**-22**	**B**	**-12**	**C**

Table 1: Executive Summary: Changes in Delay between No Build and Signal Control Options, 2040 PM Peak

Because of the increase in north- and southbound through traffic, the north- and southbound left-turn movements would operate protected-permitted rather than permitted only. Thus, while the east- and westbound left-turn phase would be eliminated, a north- and southbound left-turn phase would be introduced. Advantages of this option include that it would be compatible with the signal coordination along Airport Way and would improve LOS at the Airport Way and Cushman Street intersection. Disadvantages include that it would introduce out-of-direction travel for the east and westbound left turns and that the southbound queue at Airport Way would likely back up into the Gaffney Road roundabout. Therefore, this alternative is not recommended.

Continuous flow intersection. Continuous flow intersections improve operations by crossing left-turn vehicles over the opposing through lanes prior to arriving at the intersection. Left-turn movements can then occur simultaneously with opposing through movements, improving intersection operations. Because of the close proximity of the Noble Street signal, westbound left turns would have to cross the eastbound through lanes at the Noble Street signal. Eastbound left turns would cross mid-block between Cushman Street and Barnette Street. A concept sketch of this alternative is shown in Figure 17 on page 48.

This alternative would decrease the delay for movements at the Airport Way and Cushman Street intersection and would be compatible with the signal coordination along Airport Way. However, it would introduce additional, unprotected pedestrian crossings eastbound and westbound along Airport Way at the new right-turn ramps. Adding westbound left turns to the signal at the Noble Street intersection with Airport Way would result in unsatisfactory LOS for that intersection, with excessive delay for the southbound movements. This alternative would also have a greater impact on right-of-way than other alternatives. Due to the impacts at the Noble Street intersection, this alternative is not recommended.

Modified through-about intersection. The idea of a through-about intersection is that turning and side street traffic would travel around the intersection as if at a roundabout, while main street traffic can travel directly through the intersection. Because of the close proximity of the Gaffney Road signal, the rotating traffic on the north side of the intersection would likely have to travel through the Gaffney Road signal. Given the volumes of traffic at the Airport Way intersection with Cushman Street, the intersections where turning traffic and through traffic meet would need to be signalized. A concept sketch of this alternative is shown in Figure 18 on page 50.

The two new signals on Airport Way would be highly efficient since they would operate with only two phases, which would improve the operations on Airport Way more than any of the other conceptual alternatives considered. The signals would also be compatible with the existing signal coordination at Airport Way. All pedestrian crossings would also be significantly improved due to shorter crossing distances. Disadvantages of this alternative include out-of-direction travel for east- and westbound left-turn movements, significant right-of-way impacts, and the need for unique signage to aid motorists in navigating the intersection.

Recommendations

Signal Control Option 3 is recommended, as it provides the most benefit to the Airport Way intersection with Cushman Street. Option 3 provides an overall intersection LOS B performance. The expansion of the northbound approach to include two through lanes and exclusive left-turn and right-turn lanes improves the northbound movements from LOS F to LOS

C for the northbound right and LOS D for the northbound left and northbound through movements. The option would improve the southbound left-turns from LOS E to LOS C and would improve the westbound left-turns from LOS E to LOS B. Figure 2 presents the recommended design configuration.

Separating the decelerating northbound traffic turning right or left from the traffic continuing northbound through the intersection would mitigate the rear-end and sideswipe crash pattern identified on the northbound approach as contributing to the high crash rate. Offsetting the left-turn lanes (positive offset) would improve the sight distance of opposing left-turn vehicles to determine and select adequate gaps between opposing through vehicles. However, positive offset left-turn lanes would increase the pedestrian crossing distances on the approaches. To minimize the crossing distance for pedestrians, it is recommended that adequate sight distance be achieved but to not exceed the required distance. For east-west movements, it is recommended to offset the left turn lanes by a full lane width. This would allow for double left turn lanes in the future, if needed. For north-south movements, intersection sight distance can be achieved with minimal offset of the left turn lanes Appendix C on page 76 presents a sight distance diagram for the recommended alternative. Figure C-1 on page 77 shows that the proposed offset would achieve the required sight distance for each left-turn vehicle.

Closing 14th Avenue’s access to Cushman Street (east of Cushman Street) is also recommended; this will reduce conflicts between traffic queued at the Airport Way intersection and traffic entering and leaving 14th Avenue from Cushman Street.

Option 2 should also be looked at in detail. This option provides the same eastbound and westbound delay improvements as Option 3. Option 2 also improves the northbound and southbound movements similar to Option 3, but would do so at less construction costs.

Design designation elements for the Airport Way intersection with Cushman Street are shown in Appendix A on page 58. Figure A-1 through Figure A-3 present the design designation forms for the intersection.

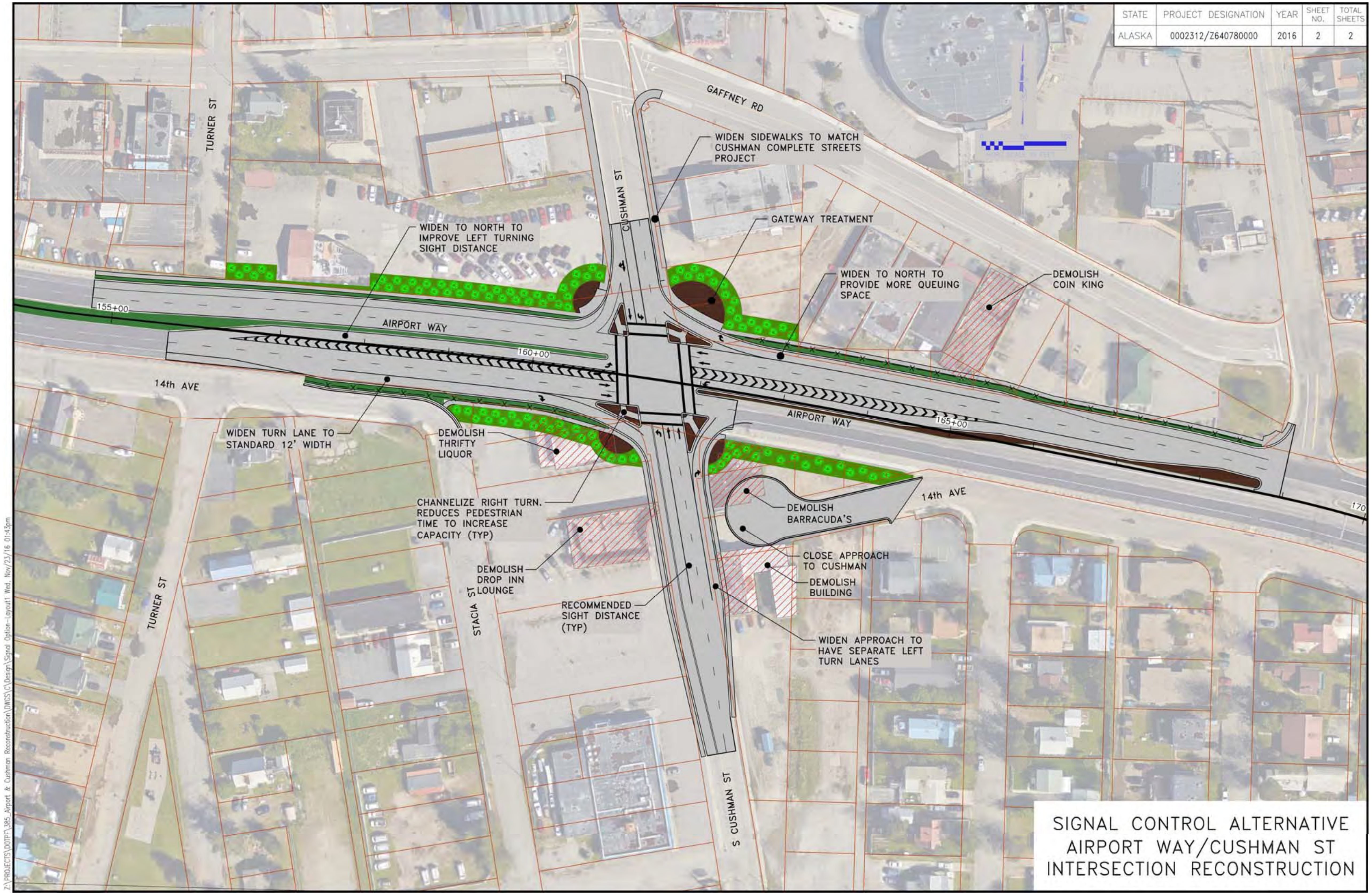


Figure 2: Executive Summary: Recommended Design Configuration

1 Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF) retained Kinney Engineering, LLC (KE) to prepare this Traffic and Safety Analysis Report for the Airport Way/ Cushman Street Intersection Reconstruction project.

The purpose of the project is to improve the traffic operations, capacity, and safety of the Airport Way intersection with Cushman Street. This Traffic and Safety Analysis Report presents the existing conditions of the intersection; future conditions based on forecast traffic volumes for the year 2040; and proposed alternatives to address safety and operations for vehicles, pedestrians, bicycles and transit. As part of this analysis, the report considers the signal coordination along Airport Way and the Complete Streets objectives of Cushman Street.

1.1 Project Location

The project is located within the city limits of Fairbanks, Alaska. As shown in Figure 3 on page 2, the study area extends along Airport Way from Barnette Street/Gillam Way to Noble Street and along Cushman Street from Gaffney Road to 15th Avenue east. The Coordinated Data System route numbers are 175700 for Airport Way and 176300 for Cushman Street.

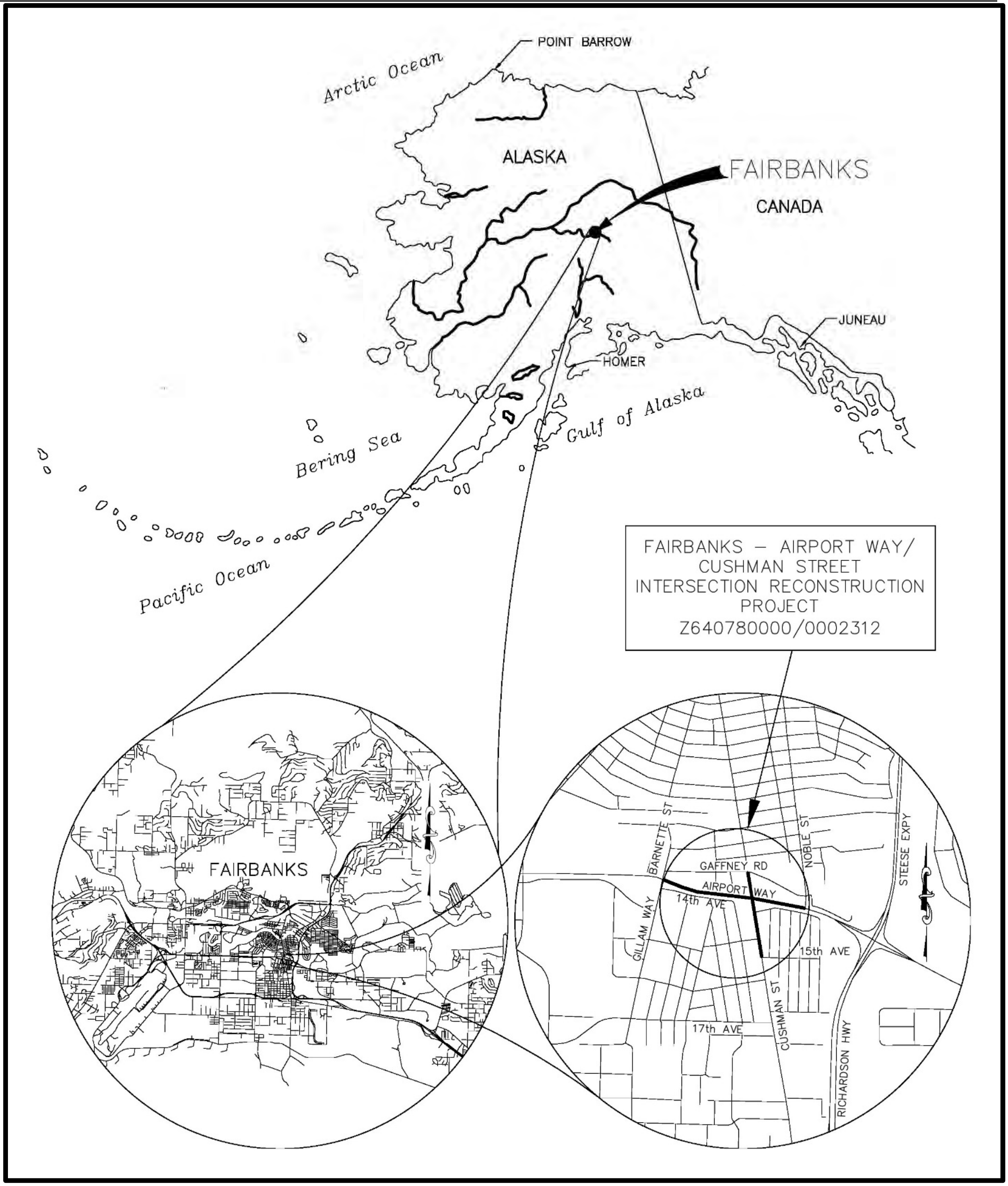


Figure 3: Project Vicinity Map

2 Planning Background

There are several planning level documents, published studies, and concurrent projects related to this intersection that should be considered.

2.1 2007 Airport Way Improvements Reconnaissance Study

The 2007 Airport Way Improvements Reconnaissance Study prepared for DOT&PF analyzed the Airport Way corridor from the Parks Highway to the Steese Expressway and proposed alternatives for the corridor.

Safety and operational issues were identified at the Airport Way intersection with Cushman Street. The safety concerns identified were that the majority of the intersection crashes were rear-end and right-angle crashes and that the majority of left-turn crashes involved the eastbound and westbound traffic. The capacity analysis yielded an acceptable Level of Service (LOS) C in year 2030; however, there were concerns that the queues on the northbound approach exceeded the existing storage and extended past 14th Avenue, affecting the traffic flow of the 14th Avenue intersection with Cushman Street. It should be noted that the forecasted capacity analysis assumed the intersection would have an exclusive southbound through lane, northbound left-turn lane, and a northbound right-turn lane by year 2030.

Public involvement comments that applied to the Airport Way at Cushman Street intersection included the following:

- All intersections in the corridor needed improvements
- The corridor was not safe for pedestrians
- Lack of access was frustrating for bicyclists
- Drivers did not want to see any more bicycles on Airport Way for safety reasons
- No roundabouts on Airport Way as they are difficult to maintain and to traverse through during winter.

Three functional alternatives were proposed for the corridor, and all three had the same proposed changes for the Airport Way at Cushman Street intersection. The proposed changes included the following:

- Exclusive northbound left-turn lane
- Northbound channelized right-turn lane
- Two westbound left-turn lanes
- Exclusive southbound through lane
- Additional southbound receiving lane that drops at 15th Avenue east
- 10-foot wide shared-used paths with landscape buffers along Airport Way on both sides
- Removal of 14th Avenue from Cushman Street to Lacey Street

The plan proposes a short-term project to update the recommendations within this study and long-term projects to implement the recommendations.

2.2 Vision Fairbanks Downtown Plan

The 2008 Vision Fairbanks Downtown Plan has been a catalyst for improvements on Cushman Street to turn it into a “signature” two-way street. The plan proposed a roundabout at the Cushman Street and Airport Way intersection for easier access to Cushman Street from Airport Way and to serve as a gateway to the downtown area.

Changes to the plan have been made since its publication in 2008. The plan initially proposed to convert Cushman Street to a two-lane, two-way roadway with on-street parking from 1st Avenue to 8th Avenue and a two-lane, two-way road with a two-way, left-turn lane from 8th Avenue to Airport Way. However, the City has decided not to convert Cushman Street to two-way traffic.

2.3 Cushman-Barnette Complete Streets Project

The Cushman-Barnette Complete Streets project is focused on improving the downtown one-way couplet (consisting of Cushman Street and Barnette Street) using Complete Streets principles. The project began as a study, completed in 2012, that considered a variety of options for re-apportioning the right-of-way to different uses of the roadways, including parking, biking, and walking in addition to vehicular travel. The study found that the roadways could be reduced from three lanes to two lanes of traffic without significant degradation in vehicular LOS. The City of Fairbanks worked with a Citizen’s Advisory Committee to determine how to re-apportion the right-of-way from vehicle travel to other uses. The Cushman Street improvements have been constructed: the road has been reduced from three lanes to two lanes, the one-way road has been extended to Gaffney Road, and sidewalks have been widened and landscaped.

2.4 2012 FMATS Non-Motorized Transportation Plan

The purpose of the Fairbanks Metropolitan Area Transportation System (FMATS) Non-Motorized Transportation Plan (NMTP), published in 2012, is to improve the safety and capacity of the non-motorized transportation network by recommending policy and infrastructure improvements.

The NMTP identified non-motorized transportation issues at the Airport Way intersection with Cushman Street. The identified concerns include:

- **High pedestrian and bicycle traffic volumes.** The Airport Way/Cushman Street intersection is ranked 3rd highest in the FMATS region for pedestrian traffic and 6th highest for bicycle traffic. (Note that subsequent counts in 2015 showed the intersection as ranked 2nd highest for pedestrians and 22nd highest for bicycle traffic.)
- **Bicycle LOS F on Cushman Street from 28th Avenue to 1st Avenue.** Bicycle LOS analysis assumes that bicyclists are riding in the street and not on the sidewalk. Thus, a lack of bicycle lanes contributes to the poor LOS. Additional factors that lower the bicycle LOS include high traffic volumes and frequent driveways and side streets. Airport Way was not evaluated for bicycle LOS, as bicycles are not allowed on Airport Way itself; however, the primary concerns identified for bicyclists riding along the Airport Way frontage roads include path continuity, maintenance, crossings, and design features that give priority at intersections to vehicles.
- **Pedestrian and bicycle intersection crashes.** From 2004 to 2008, there were one bicycle and three pedestrian crashes at the Airport Way/Cushman Street intersection. This was the highest number of pedestrian and bicycle crashes at an intersection within FMATS.

The NMTP ranks the priority bicycle network into tiers. The plan ranks Airport Way and Cushman Street north of Airport Way as Tier 1 priority bicycle roadways and South Cushman Street as a Tier 2 priority. Project B-2 and B-8 are two bicycle network projects that include the Airport Way at Cushman Street intersection. Project B-2 is a high priority project that would add signed and marked parallel routes on the north and south sides of Airport Way from the Steese Expressway to the Parks Highway. The recommended parallel route for the south side of Airport Way requires crossing the south leg of the Airport Way at Cushman Street intersection. Project B-8, another high priority project, proposes to add bicycle lanes on Cushman Street from Airport Way to the Mitchell Expressway. An alternative to the bicycle lanes is to designate a parallel route on Stacia Street and Rickert Street.

2.5 Fairbanks Metro 2040

The FMATS 2040 Metropolitan Transportation Plan (MTP) was published in 2015. The purpose of the MTP is to identify existing and future transportation deficiencies within the FMATS area and to recommend projects and programs to overcome those deficiencies, while providing a safe and efficient transportation system and extending the lifespan of the system.

The 2040 MTP identified general concerns for Airport Way and for Cushman Street in the vicinity of the intersection. The concerns include limited vehicular capacity on Airport Way between Barnette Street/Gillam Way and the Steese Expressway, limited intersection capacity at the Airport Way intersection with the Steese Expressway, and conflicts between pedestrians and bicyclists along Airport Way where the sidewalks are the designated bicycle routes. In the downtown area, the MTP identifies two freight issues: difficulty moving pallets in winter and limited freight parking. Other concerns include the need for bicycle facilities on Cushman Street and the need for bicycle and pedestrian connections and improvements on Airport Way between University Avenue and the Steese Expressway.

Projects in the MTP that affect the Airport Way at Cushman Street intersection are shown in Table 2 below.

Project Title	**Timeline/Type**	**Brief Description**
SR-30	Short-Range/ FMATS	Airport Way Beautification: Construct landscape and hardscape improvements on Airport Way.
SR-55	Short Range/ Non-FMATS	Airport Way Study Update: Update recommendations from 2007 Airport Way Improvements Reconnaissance Study.
MR-28	Medium Range/ Non-FMATS	Airport Way/Cushman Street Intersection Reconstruction: Construct capacity, traffic operations, and safety improvements. (The current project.)
MR-34	Medium Range/ Non-FMATS	Airport Way Interchange and 10th Avenue Frontage Road: Construct interchange between Airport Way and Steese Expressway. Construct improvements to pedestrian and local network as needed.
MR-40	Medium Range/ Non-FMATS	Airport Way: Steese Expressway to Parks Highway: Design and construct improvements to parallel routes either side of Airport Way.
LR-19	Long Range/ Non-FMATS	Airport Way Corridor Improvements, Stage I: Implement some recommendations of the Airport Way Improvements Reconnaissance Study.
VLR-16	Long Range/ Non-FMATS	Airport Way Corridor Improvements, Stage II: Implement additional recommendations of the Airport Way Improvements Reconnaissance Study.

Table 2: Airport Way Projects identified in the FMATS 2040 MTP

3 Existing Conditions

3.1 Functional Classification

The functional classification of a roadway is used in selecting LOS, design speed, and other geometric criteria. Airport Way and Cushman Street are functionally classified by DOT&PF and are presented in Table 3 below.

Roadway	Functional Classification
Airport Way	Principal Arterial
Cushman Street	Minor Arterial

Table 3: Functional Classification

Airport Way and Cushman Street are classified as arterial roads. Arterial roads are oriented for high mobility and low access and are designed to carry large volumes at an efficient speed. Figure 4 below presents the balance between mobility and access for each functional class.

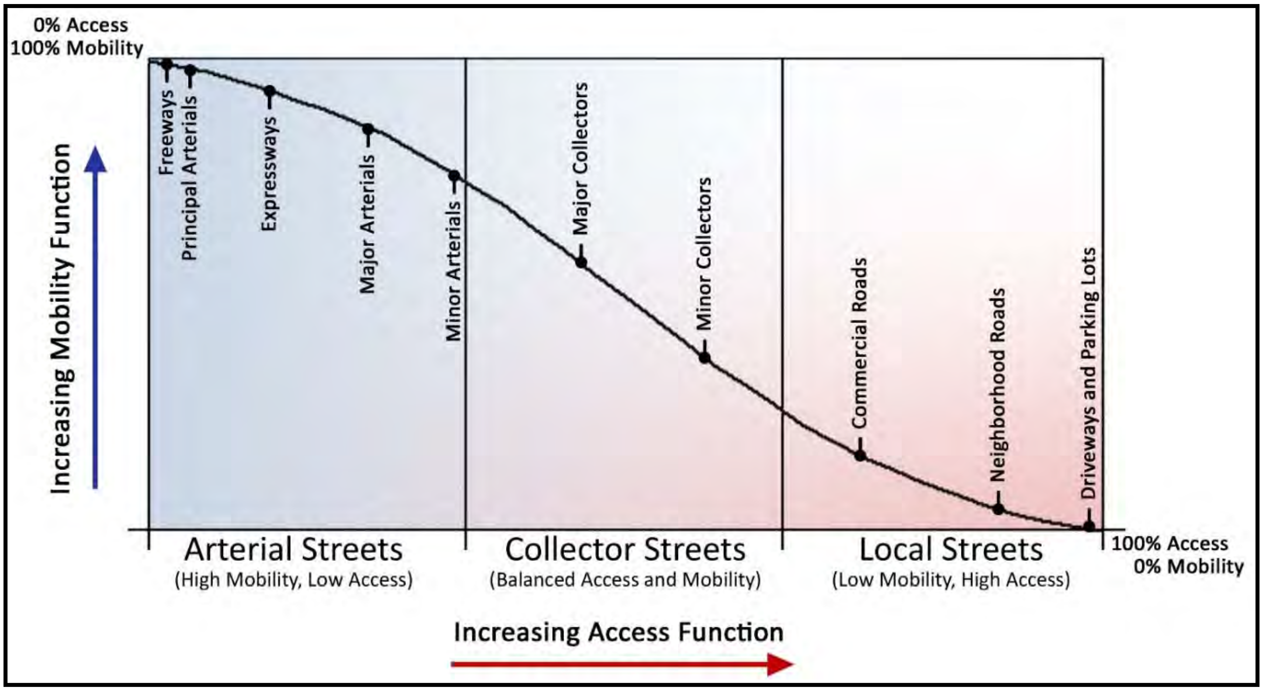


Figure 4: Functional Classification Mobility and Access Relationship

The American Association of State Highway and Transportation Officials (AASHTO)'s *A Policy on the Geometric Design of Highways and Streets* (PGDHS) describes urban areas as "those places within boundaries set by the responsible State and local officials having a population of 5,000 or more" and rural areas as "those areas outside the boundaries of urban areas."

The project study area is within the city limits of Fairbanks, which has a population of over 5,000; therefore, roads within the boundaries of Fairbanks meet the definition of urban areas.

3.2 Geometry

Airport Way is a principal arterial roadway owned and maintained by DOT&PF. It is an east/west limited access roadway with two lanes in each direction. The road extends from the Fairbanks International Airport to the Steese Expressway/Richardson Highway and is divided by a raised center median. The speed limit on Airport Way is 45 miles per hour (mph).

Cushman Street is a city-owned minor arterial roadway. North of Gaffney Road, Cushman Street is a two-lane, one-way northbound road, part of a north-south couplet that includes southbound Barnette Street to the west of Cushman Street. Between Gaffney Road and Airport Way, Cushman Street serves two-way traffic with two lanes in each direction. Between Airport Way and 15th Avenue east, Cushman Street has one southbound lane and two northbound lanes. The posted speed limit on Cushman Street is 25 mph north of Airport Way and 30 mph south of Airport Way.

The Airport Way intersection with Cushman Street is a 4-leg signalized intersection that is part of the coordinated signal system along Airport Way. The eastbound and westbound approaches both utilize four lanes: two through lanes, an exclusive left-turn lane, and an exclusive right-turn lane. The northbound approach consists of two lanes: a shared left-and-through lane and a shared right-and-through lane. The southbound traffic utilizes two lanes also: a designated left-turn lane and a shared right-and-through lane.

Figure 5 on page 9 present the existing configuration of the study area.

3.3 AADT

Average Annual Daily Traffic (AADT) volumes were collected from the DOT&PF Northern Region *Annual Traffic Volume Report(s)*. Table 4 and Table 5 on page 10 summarize, by segment, the AADT from 2004 to 2014 for Airport Way and Cushman Street.

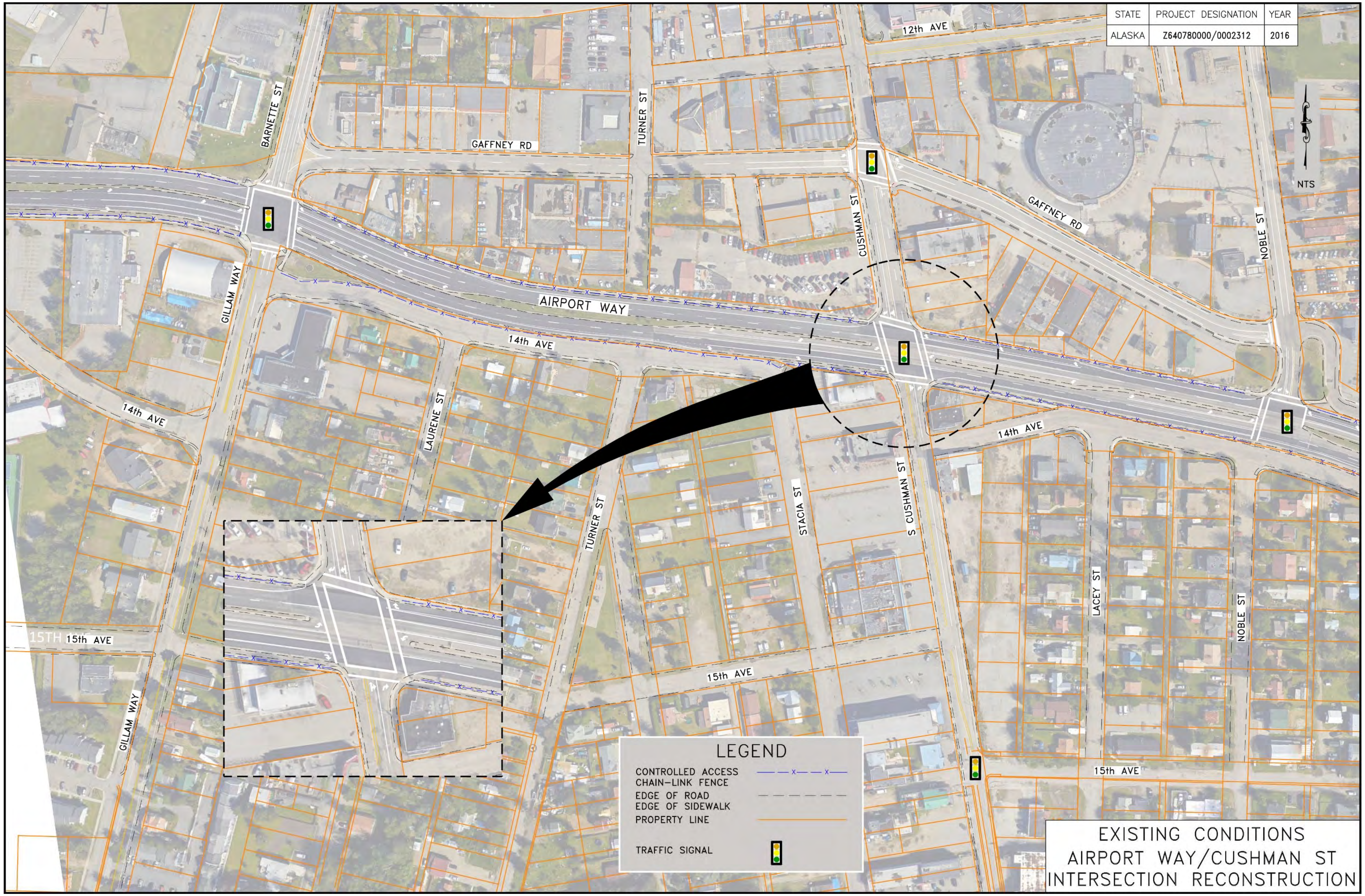


Figure 5: Existing Geometry

Segment	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Noble Street to Cushman Street	17,200	18,345	15,840	13,580	12,300	13,755	17,010	18,700	20,610	20,495	18,615
Cushman Street to Barnette Street/Gillam Way	19,550	18,680	18,560	19,735	19,145	18,510	19,755	17,830	19,150	18,105	16,205

Table 4: AADTs - Airport Way Segments (2004-2014)

Segment	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
19th/17th Avenue to Airport Way					10,045	9,595	9,860	9,320	8,995	8,840	8,430
Airport Way to 10th Avenue						8,000	5,925	5,915	5,650	4,775	5,285

Table 5: AADTs - Cushman Street Segments (2008-2014)

3.4 Safety

Crash data was provided by DOT&PF for Airport Way, Cushman Street, and major side streets for a 5-year period from 2008 to 2012. Ninety-four crashes occurred at the Airport Way intersection with Cushman Street.

3.4.1 Intersection and Segment Crash Rates

Crash rates were calculated based on the number of crashes, the number of years in the study period, and AADT. The crash rates were then compared to statewide averages for similar facilities and the Critical Accident Rate (CAR). The CAR is a threshold above which the observed rate is considered statistically higher than average at a 95% confidence level. The rate used for calculating the CAR at intersections is given in terms of crashes per million entering vehicles (MEV). The rate used for calculating the CAR on segments is given in terms of crashes per million vehicle miles (MVM). Table 6 below and Table 7 on page 12 present the crash rates for the intersections and segments within the study area.

Intersection	**Intersection Crashes**	**Average Entering AADT**	**Crashes / MEV**	**Control**	**Statewide Averages (Crashes/MEV)**	**CAR @ 95.00% Confidence (Crashes/MEV)**	**Above Average?**	**Above CAR or Critical?**
Airport Way & Cushman Street	94	26,012	1.980	Signal (4-leg)	1.376	1.666	**Yes**	**Yes**
Airport Way & Noble Street	34	20,157	0.924	Signal (3-leg)	0.868	1.134	**Yes**	no
Airport Way & Barnette Street /Gillam Way	59	24,190	1.336	Signal (4-leg)	1.376	1.678	no	no
Cushman Street & Gaffney Road	6	9,303	0.353	Signal (4-leg)	1.475	1.873	no	no
Cushman Street & 14th Avenue	8	9,563	0.458	Stop (3-leg)	0.464	0.761	no	no
Cushman Street & 15th Avenue West	6	10,125	0.325	Stop (3-leg)	0.464	0.752	no	no
Cushman Street & 15th Avenue East	15	10,043	0.818	Signal (3-leg)	0.868	1.253	no	no

Table 6: Intersection Crash Rates (2008 to 2012)

Segment	Segment Crashes	Segment Length (Miles)	Average AADT	Crashes / MVM Traveled	Statewide Averages (Crashes/MVM)	CAR @ 95.00% Confidence (Crashes/MVM)	Above Average?	Above CAR or Critical?
Barnette St/Gillam Way to Cushman St	3	0.148	18,878	0.590	1.198	2.096	no	no
Cushman St to Noble St	1	0.047	16,475	0.702	1.198	3.058	no	no

Table 7: Segment Crash Rates for Airport Way (2008 to 2012)

The crash rate analyses show that the Airport Way at Cushman Street intersection falls above both the state average and the CAR for similar intersections, indicating that the intersection has a crash rate that is statistically higher than average. As such, one concludes that the high rate is not a result of chance but due to actual deficiencies or characteristics of the intersection. The Airport Way intersection at Noble Street has an above average crash rate but it is not statistically significant, with insufficient evidence that there is a probable cause. The crash rates for the remaining intersections and segments adjacent to the Airport Way and Cushman Street intersection fall below the state average.

3.4.2 Crash Types

Table 8 below presents the crashes at the Airport Way intersection with Cushman Street by crash type for the study period of 2008-2012.

Crash Type	Crash Frequency	Percentage of Total
Rear End	37	39.3%
Left Turn	23	24.5%
Right Angle	17	18.0%
Overtaking Sideswipe	6	6.4%
Head On	3	3.2%
Fixed Object (fence, tree, pole, etc.)	2	2.1%
Pedestrian / Bicycle	2	2.1%
Head On Sideswipe	1	1.1%
Parked	1	1.1%
Right-Left Turn Sideswipe	1	1.1%
U Turns	1	1.1%
Grand Total	**94**	

Table 8: Crash Type Distribution for the Airport Way Intersection with Cushman Street (2008 to 2012)

The predominant crash types at the Airport Way intersection with Cushman Street were rear-end, left-turn, right-angle crashes, and overtaking sideswipe crashes, making up almost 88% of all crashes at this intersection. Looking in more detail at combined rear-end and sideswipe crashes, 17 crashes (40% of rear-end and sideswipe crashes) involved northbound vehicles. The remainder of the rear-end and sideswipe crashes were distributed fairly evenly over the other three approaches. Of the left-turn crashes, 17 crashes (83%) involved eastbound and westbound vehicles on Airport Way. For right-angle crashes, eastbound vehicles were the at-fault driver in nine crashes (53%).

One bicycle and one pedestrian crash occurred at the intersection during the 5-year study period. The bicycle crash occurred in July of 2011 during a clear afternoon, where a southbound bicycle was struck by an opposing vehicle slowing down, resulting in a major injury to the bicyclist. The bicyclist was suspected of being intoxicated and was cited for a bicycle moving violation. The bicyclist was also using his cellphone when the crash occurred. The pedestrian crash occurred on a snowy evening in November of 2011, where a pedestrian was struck by a westbound vehicle turning left, resulting in a minor injury to the pedestrian. The driver was on prescription medication and was cited for driving while intoxicated. The crash occurred at night on a lighted roadway with snow on the surface.

3.4.3 Crash Severity

Table 9 below presents the crash severity of the crashes at the intersection. Looking at severity by crash type, left-turn crashes tend to be the most severe, with one fatal crash and nine injury crashes (40% of left-turn crashes) during the study period, while only 30% of rear-end crashes and 24% of right-angle crashes resulted in injuries.

Crash Severity	Crash Frequency	Percentage of Total
Fatality	1	1%
Incapacitating Injury	3	3%
Non-Incapacitating Injury/ Possible Injury	23	25%
Property Damage Only	67	71%
Grand Total	**94**	

Table 9: Crash Severity on the Airport Way intersection with Cushman Street (2008 to 2012)

The fatal left-turn crash occurred in August of 2011 in the afternoon. An eastbound motorcycle turning left was struck by an oncoming westbound vehicle. The crash happened on a clear day, in daylight, on a dry road surface.

3.4.4 Other Factors

Crash patterns related to road surface condition and lighting are typical of those found throughout Fairbanks, with more crashes occurring in winter months (September through March) than in summer months (April through August). All crashes between November and February occurred in ice and snow conditions. Crashes during dark conditions only occur during September through March and make up a greater percentage of the crashes in the darkest months (December and January).

3.4.5 Crash Summary

The crash rate at the intersection of Airport Way at Cushman Street is above average to a statistically significant level (1.980 crashes per MEV compared to the statewide average for similar facilities of 1.376 crashes per MEV). Several crash patterns that could be partially addressed with engineering measures were identified, including:

- Rear-end and sideswipe crashes between vehicles on the northbound approach
- Left-turn crashes between eastbound and westbound vehicles
- Right-angle crashes involving eastbound vehicles.

Pedestrian and bicycle safety is also a primary concern for this intersection.

3.5 Possible Mitigation for Identified Safety Concerns

Potential mitigation measures were considered to address the identified safety concerns and to reduce the higher than expected crash rate at the intersection. The mitigation measures were compared to the corresponding Crash Reduction Factor (CRF). A CRF is the percentage reduction in crashes that might be expected if a mitigation measure is implemented. Table 10 below presents the CRF for the proposed mitigations gathered from either the 2016 Alaska Highway Safety Improvement Program Handbook or the Crash Modification Factors Clearinghouse website. The table also shows the number of affected crashes and the number of crashes that would not have occurred during the study period if the mitigation had been in place.

Mitigation	**CRF**	**Number and type of affected crashes**	**Change in number of crashes**
Construct northbound left- and right-turn lanes	15%	20 northbound rear-end and sideswipe crashes	-3
Construct positive offset for all left-turn lanes	38%	23 left-turn crashes	-9
	32%	26 injury crashes	-8
Change left-turn phasing to flashing yellow arrow	30%	19 east-west left-turn crashes	-6
Change left-turn phasing to protected only	60%	19 east-west left-turn crashes	-11

Table 10: Potential Mitigation Measures for Airport Way intersection with Cushman Street

Additional discussion on these countermeasures follow.

3.5.1 Left-Turn Auxiliary Lanes

At this intersection, the northbound inside lane is a shared left-and-through lane where all turns are made permissively. Under these conditions, any left-turning vehicle stopped in the lane to await suitable gaps to complete the turn, or to yield to crossing pedestrians, becomes a potential target for following vehicles. Furthermore, higher congestion, such as this intersection’s LOS E for northbound operations indicate that left-turning traffic will be significantly delayed with turning, thus increasing exposure for themselves or other vehicles in the queue behind them. Providing a separate lane is an effective countermeasure for rear-end and sideswipe collisions.

The auxiliary lane length should be long enough to contain design year queues, typically the 95th percentile queue. Deceleration will not need to be accommodated, as approach speeds do not exceed 35 mph.

3.5.2 Left-Turn Offsets

Where opposing left-turn lanes are present, a left-turning vehicle has the potential to obstruct the view of the opposing left-turn vehicle. In fact, the high incidence of east-west left-turn crashes may be attributed to the left-turn lane negative offset (sight lines blocked by vehicles in the opposing left-turn lanes) and also by the horizontal curvature on Airport Way through the project area. Positive left-turn offset lanes can potentially improve the sight distance for left-turning vehicles by shifting the left-turn lane further to the left in such a way that left-turn vehicles do not restrict the views of opposing left-turn vehicles.

Positive offsetting should be considered where approaching geometry would adversely affect sight lines between opposing through traffic and opposing left-turn vehicles. Protected-only phasing is usually installed where left-turn sight distance is restricted by geometry and not by the restrictions caused by the opposing left-turn vehicle. Not offsetting the left-turn lanes could introduce the potential for left-turn inefficiency in signal operation.

Offsetting left turns at signalized intersections can be ideal where dual left-turn lanes are required later in the design life. In this case, the dual left turn lanes are designed and then the lane next to the through lanes is striped out to provide the offset until volumes warrant the dual left-turn lane.

Left-turn offsets have the potential to improve sight distance for left-turning vehicles, potentially reducing crashes and crash severity. Offsetting the lanes, however, does widen the roadway, which increases the pedestrian crossing distance.

3.5.3 Auxiliary Right-Turn Lanes and Right-Turn Channelization

Auxiliary right-turn lanes can provide mitigation for rear-end and sideswipe crashes, although the benefit is less than left-turn lanes because the right-turns from a shared lane usually only slow to turn and only stop for pedestrians. Therefore, exposure of right turn vehicles as a target for following vehicles is greatly reduced when compared to left turn vehicles. Nevertheless, a right-turn auxiliary lane may help reduce congestion and separate conflicts, both which are contributing factors for the rear-end collision pattern.

Right-turn channelization should be considered where right-turn volumes are heavy or where the design vehicle requires large turning radii. The channelizing island separates the right-turn traffic from the other intersection traffic, allowing more freedom of movement. Large turning radii have the potential for smaller vehicles to have difficulty finding the correct path and increases pedestrian exposure and crossing distance. The channelizing island helps delineate the turning pathway for the smaller vehicles and reduces the crossing distance for pedestrians.

Right-turn channelization has the potential to increase the capacity at intersections and to reduce the right-turn delay. A study published in *National Cooperative Highway Research Program (NCHRP) Report 208: Design Guidance for Channelized Right-Turn Lanes* states that channelized right-turn lanes with yield control reduce right-turn delay by approximately 25-75%. The study also indicates that the delay is further reduced by approximately 10-20% for every 5 mph increase in the right-turn design speed.

Channelizing the right turn has potential benefits for pedestrians. The channelization islands reduce the crossing distance for pedestrians, thus reducing their exposure to traffic. It is often easier for pedestrians to cross the channelized right-turn lane because the roadway is not as wide and traffic is approaching from only one direction. The islands also serve as a refuge area for pedestrians waiting to cross with the signal.

For right-turn channelization, *NCHRP 208* studied the safety performances for various right-turn lane treatments, including channelized right-turn lanes, shared right-and-through lanes, and conventional right-turn lanes. The study indicates that all three right-turn lane treatments had similar vehicle safety performance and there were no significant crashes associated with any one treatment. For pedestrian crashes, channelized right-turn lanes and shared right-and-through lanes have similar crash frequencies and pedestrian safety performance. Pedestrian crashes with channelized right-turn lanes and shared right-and-through lanes were 70-80% lower than with conventional right-turn lanes. The channelized islands improve pedestrian crossing by reducing the pedestrian’s exposure and shortening the crossing distance. The study shows that most vehicles yielded to pedestrians in the channelized right-turn lane crosswalk.

3.6 Operations

3.6.1 Turning Movement Volumes

Turning movement volumes (TMVs) for the Airport Way intersection with Cushman Street were collected by DOT&PF in May of 2013. Figure 6 on page 17 shows the TMVs during the morning, midday, and evening peaks.

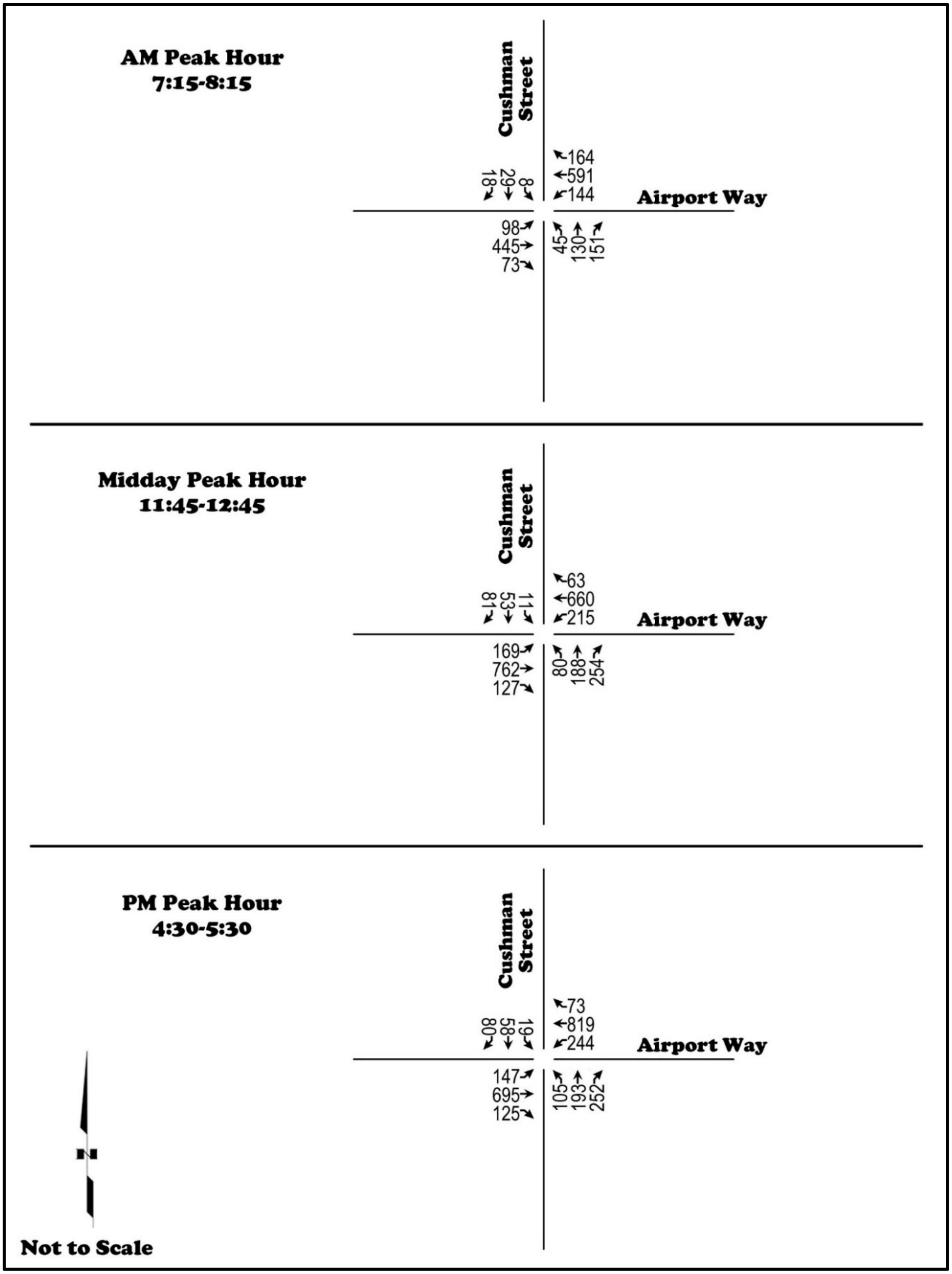


Figure 6: Turning Movement Volumes Summary (Counted May 23, 2013)

Peak hour factors (PHFs) convert hourly volumes to 15-minute design flow rates for capacity analyses. They represent the uniformity of traffic volumes over an hourly period and range from 0.25 (all traffic arrives in one 15-minute period and no additional traffic arrives for the rest of the hour) to 1.0 (equal number of vehicles arrive during each 15-minute period).

Table 11 below presents the intersection PHFs for the morning, midday, and evening peaks.

Period	PHF
AM Peak	0.87
Midday Peak	0.91
PM Peak	0.91

Table 11: Existing PHFs for Major Peak Periods

The high PHFs during the midday and PM peak suggest that traffic is fairly consistent during those peak hours.

3.6.2 Capacity

Capacity analyses were conducted using Highway Capacity Manual (HCM) methodologies using Synchro software. As part of an urban street network, the facility is under the interrupted-flow regime; therefore, intersection operations dominate operational quality and LOS.

The existing PHFs mentioned above were used to approximate conditions during the highest 15-minute period of each peak hour. Heavy vehicle percentages (HV%) were determined using historical data from the permanent traffic recorders (PTRs) located on Airport Way between Noble Street and the Steese Expressway and on the Cushman Street Bridge over the Chena River. Based on this data, a 4% HV% was used.

Capacity analyses at signalized intersections focus on control delay by movement, by approach, or for the entire intersection, to determine the LOS for the approach, lane group, or intersection. Table 12 on page 19 summarizes the results for each movement: volume to capacity ratio (v/c), 95th percentile queue length, control delay, and the LOS.

The eastbound and westbound movements operate between LOS A and B throughout the day, with the exception of the westbound right turns operating at LOS C during the AM peak and the westbound left turns operating at LOS C during the midday and PM peaks. Northbound and southbound traffic have LOS C conditions during the morning peak hour. The southbound movements operate at LOS D in the midday and LOS C in the evening. The northbound movements experience LOS E conditions during the midday and PM peaks.

Approach	**Movement**	**AM Peak**				**Midday Peak**				**PM Peak**			
		V/C Ratio	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**
Northbound	Left+Thru and Thru+Right	0.5	125	35	C	0.9	275	61	E	0.9	325	63	E
Southbound	Left	0.1	25	31	C	0.2	25	35	D	0.3	25	34	C
	Thru+Right	0.1	50	31	C	0.2	100	36	D	0.3	100	34	C
Eastbound	Left	0.3	25	7	A	0.4	75	10	A	0.5	75	14	B
	Thru	0.3	75	9	A	0.5	275	14	B	0.5	250	17	B
	Right	0.1	< 25	3	A	0.1	< 25	3	A	0.1	25	6	A
Westbound	Left	0.3	100	11	B	0.6	125	20	C	0.6	150	24	C
	Thru	0.4	175	14	B	0.4	125	10	A	0.5	125	9	A
	Right	0.1	75	24	C	0.1	< 25	2	A	0.1	< 25	1	A
Intersection		**0.4**		**17**	**B**	**0.6**		**20**	**C**	**0.7**		**24**	**C**

Table 12: Existing LOS for the Airport Way Intersection with Cushman Street

3.6.3 Functional Area of Intersection

The functional area of an intersection represents the area upstream and downstream of the physical intersection where the traffic control of the intersection contributes to the cognitive load of drivers, increasing the number of things drivers must think about and actions the driver must take. The upstream functional area encompasses the turn-lane storage lengths and the distance vehicles need to make decisions and movements before reaching the physical intersection, such as changing lanes, decelerating, and watching for pedestrians. The downstream functional area includes the distance it takes to recover from the conditions of the intersection, for instance the distance to accelerate back up to travel speed. It is desirable to limit access within the functional area of the intersection so that drivers can focus on the tasks of safely maneuvering through the intersection.

Figure 7 below presents the functional area of the Airport Way at Cushman Street intersection and access points within the functional area. The figure shows eight access points along Cushman Street, including 14th Avenue, within the functional area of the intersection. Vehicles entering and leaving these access points create additional conflicts for vehicles traveling through the Airport Way intersection with Cushman Street.

Figure 7: Functional Area of Airport Way intersection with Cushman Street

Several of the properties using the driveways within the functional area have other access points outside of the functional area. North of Airport Way, all but one property can be accessed from Gaffney Road. The lot northwest of the intersection does not have any other access to the property. South of Airport Way, the properties on the west side of Cushman Street can be accessed using the driveways on Cushman Street that are not within the functional area or the driveways on Stacia Street. The properties on the east side of Cushman Street can be accessed by turning into 15th Avenue east and driving north to 14th Avenue.

The Airport Way Reconnaissance Study proposed removing 14th Avenue from Cushman Street to Lacey Street. KE counted traffic turning into and out of 14th Avenue during the Airport Way and Cushman Street intersection peak hours on April 5, 2016. The observed traffic is shown in Table 13 below. If 14th Avenue were to be removed, these vehicles would use 15th Avenue east as the access point onto Cushman Street.

	Turning into 14th Avenue	**Turning out of 14th Avenue**
AM Peak	12	10
Midday Peak	12	7
PM Peak	15	7

Table 13: Traffic Entering and Exiting 14th Avenue (April 5, 2016)

3.6.4 Pedestrians and Bicycles

Bicycles and pedestrians are prohibited from entering Airport Way, except on designated crosswalks at signalized intersections. Pedestrians and bicycles must use the fenced-off sidewalks and shared-use paths on either side of Airport Way. Frontage roads serve the bicycle traffic where shared-use paths are not present.

The turning movement counts, discussed in Section 3.6.1 on page 16, included observations of pedestrian and bicycle movements. The counts captured a total of eight hours of the day, including major peak hours.

Table 14 below presents the pedestrian and bicycle counts observed at the Airport Way at Cushman Street intersection on May 23, 2013.

User Type Counted	**Total (8-Hrs)**	**Crossing…**			
		North Approach	**South Approach**	**East Approach**	**West Approach**
Pedestrian Counts	356	109	177	29	41
Bicycle Counts	109	32	52	12	13

Table 14: 2013 Pedestrian and Bicycle Crossings (8-Hour Counts)

Table 15 below presents the pedestrian and bicycle volumes during the pedestrian peak hours. Note that the bicycle counts are included in the pedestrian counts.

Peak Period	**Pedestrian Peak Hour**	**Crossing…**			
		North Approach	**South Approach**	**East Approach**	**West Approach**
AM Peak	9:00 p.m. – 10:00 p.m.	36	32	8	13
Midday Peak	12:00 p.m. - 1:00 p.m.	15	31	10	8
PM Peak	3:00 p.m. - 4:00 p.m.	16	31	10	9

Table 15: 2013 Pedestrian and Bicycle Crossings at Pedestrian Peak Hours (1-Hour Counts)

In addition, FMATS conducted bicycle and pedestrian counts for 31 intersections, including the Airport Way at Cushman Street intersection, in May of 2015 from 4:30 p.m. to 6:30 p.m. The study observed 108 pedestrians and 22 bicycles crossing Airport Way at the Cushman Street intersection during the 2-hour period. Table 16 below shows this information.

User Type Counted	Total (2-Hrs)	Crossing	
		Airport Way	Cushman Street
Pedestrian Counts	108	33	75
Bicycle Counts	22	4	18

Table 16: 2015 Pedestrian and Bicycle Crossings (2-Hour Counts)

Compared to the other intersections counted by FMATS, this intersection ranked 2nd highest for pedestrian traffic and 22nd highest for bicycle traffic.

The HCM was used to determine pedestrian LOS at the intersection. Pedestrian LOS at signalized intersections is based on pedestrian delay due to the timing of the traffic signal.

Table 17 below presents the existing signalized pedestrian LOS during the morning and evening traffic peak hours. The Airport Way intersection with Cushman Street has a pedestrian LOS of E for both morning and evening peaks. Long periods of delay can cause pedestrians to become impatient at crosswalks; therefore, at LOS E conditions, the likelihood that pedestrians will disregard the pedestrian signal and cross during the no-walk phase is high.

	Delay (sec)	LOS	Likelihood of Noncompliance
AM Peak	41	E	High
PM Peak	50	E	High

Table 17: Existing Pedestrian LOS for the Airport Way Intersection with Cushman Street

3.6.5 Transit

Three Metropolitan Area Commuter System (MACS) transit lines utilize the Airport Way at Cushman Street intersection: the black line, purple line, and green line.

The black line is a long distance route that runs from the Transit Center (located on Cushman Street and 4th Avenue) to North Pole, the Eielson Air Force Base, and Salcha using the Richardson Highway. The route does not have bus stops near the vicinity of the Airport Way at Cushman Street intersection. The black line makes a westbound right turn at the Airport Way at Cushman Street intersection four times on weekdays and is not operational on weekends. The westbound right turn experiences 25 seconds of delay (LOS C) in the morning and little delay (<10 seconds per vehicle – LOS A) throughout the rest of day.

The purple line serves the downtown and south Fairbanks areas, with stops including the health centers and the Fairbanks Memorial Hospital. The route also stops at various locations on Cushman Street, including one at the 15th Avenue east intersection, and has three stops on Gaffney Road. The purple line goes southbound through the Airport Way at Cushman Street intersection 22 times on weekdays, 12 times on Saturdays and is not in service on Sundays. The southbound through movement experiences 30 to 45 seconds of delay (LOS C to D) throughout the day.

The green line starts at the Transit Center and uses South Cushman Street to enter the Richardson Highway. The line then serves the areas on Badger Loop Road and ends in North Pole before heading back to Fairbanks. The bus has one stop on Gaffney Road and one stop at the Cushman Street intersection with 15th Avenue east. The green line goes through the Airport Way at Cushman Street intersection twice in one circulation (a westbound right turn headed to the transit center - LOS C - and southbound leaving the transit center – LOS C to D), passing through the intersection a total of 18 times on weekdays and 12 times on Saturdays. The route is not operational on Sundays.

3.6.6 Operations Summary

Under existing conditions, traffic volumes along Airport Way are fairly low in the morning, resulting in LOS B for the intersection as a whole in the morning peak period, with every movement experiencing LOS C or better. As volumes pick up in the midday and evening, vehicles experience more congestion. Although the intersection as a whole operates at LOS C or better all day, northbound and southbound vehicles experience more delay, resulting in LOS D for the southbound movements in the midday and LOS E for the northbound movement in both the midday and evening peaks.

While there is full access control on Airport Way between the signalized intersections, there are many driveways accessing Cushman Street directly, including seven driveways and the 14th Avenue local street within the functional area of the Airport Way/Cushman Street intersection. It is desirable to limit access to Cushman Street within the functional area of the intersection to improve safety and operations.

Pedestrian volumes are also relatively high for the Airport Way at Cushman Street intersection. In an FMATS May 2015 study, the pedestrian volumes at this intersection were the second highest of 31 Fairbanks-area intersections counted. Pedestrians experience LOS E crossing the intersection throughout the day.

Three MACS transit routes also use the Airport Way at Cushman Street intersection: the black, purple, and green lines. These vehicles either make westbound right turns, travel through the intersection southbound, or both. The westbound right turn experiences more delay in the morning (LOS C) and little delay in the midday and evening (LOS A). Southbound, the buses start to experience more delay in the midday and evening (LOS C or D).

4 Traffic Volume Forecasts

4.1 Travel Demand Model

Design volumes were forecasted based on the 2040 FMATS Travel Demand Model.

The FMATS 2040 travel demand model is a TransCAD based system of GIS (geographical information system) database files. The model calculates future traffic volume generation and origin/destination values at various nodes throughout the region and then distributes the generated traffic throughout the network. Future traffic generation in the model is based on land use and development forecasts derived from estimates of population and employment growth from various sources. Population and employment growth within the model containment area were projected to be 1.1%; however, the local traffic growth may vary due to available undeveloped land. The distribution of traffic is based on segment capacity and travel time.

The base year for the model is 2013, which is the year for which the model was calibrated and validated. The model is designed to produce daily volumes as well as volumes in the AM and PM peak hours. The Airport Way and Cushman Street intersection study uses only the daily volume outputs from the model and applies observed design hour volume percentages to derive AM and PM peak hour estimates. The model is designed to include all road improvement projects that were published in the FMATS 2040 MTP, which includes the construction of the future interchanges along the Steese Expressway, including at Airport Way.

The original model was refined, as needed, by modifying the traffic generation nodes within the study area to increase their density. The population and employment values in the existing nodes were distributed among new nodes representing smaller portions of the same area. The redistributions were primarily made based on proportion of land in each region. However, in some cases population and employment values were redistributed separately based on existing land use. The purpose of the node refinement was to better distribute the traffic generation on the minor road network.

4.1.1 Steese Expressway Interchange Sensitivity Analysis

The future interchanges along the Steese Expressway are forecasted to be constructed around the year 2040, which is the design year of the Airport Way and Cushman Street intersection project. Therefore, it is likely that the Airport Way and Cushman Street intersection will need to perform for most of its design life without an interchange at the intersection of Airport Way and Steese Expressway. For this reason, a model scenario was created which did not include the new interchange. Future turning movement volumes were calculated and future operations were compared for the scenarios with and without the interchange. Because the difference between the two models was not significant enough to change any of the recommended designs or their performance grades, the results presented in this traffic analysis report use the volumes with the Steese Expressway interchange at Airport Way.

4.1.2 Screenline Analysis

NCHRP Report 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design presents guidelines for working with model results. In accordance with *NCHRP 765*, postproduction methodology was used to further refine the results of the travel demand model using a screenline refinement process. A screenline is drawn across parallel routes in a traffic model to help balance the model volumes across the routes based on the following considerations:

1. The over and under-estimation of model volumes, based on the difference between the observed base year volumes and the model-generated base year volumes.

2. The natural redistribution of traffic off routes with high volume-to-capacity ratios to parallel routes with lower volume-to-capacity ratios.

3. The unpredictable characteristics of a road that might make it a more attractive or efficient route choice, based on the current imbalance of volume-to-capacity ratios.

A screenline analysis was applied to the network, using *NCHRP 765* methodology. The screenline crossed just south of Airport Way on Cushman Street and Richardson Highway and south of the 14th Avenue frontage road on Cowles Street and Gillam Way.

The effect of the screenline on the final 2040 model volumes is presented in Table 18.

Street Segment	**2013 Model Volumes**	**2013 Recorded Volumes**	**Original 2040 Model Volumes**	**Final 2040 Screenline Volumes**
Cowles Street	13,258	9,035	12,368	**11,915**
Gillam Way	1,403	3,255	1,810	**4,575**
Cushman Street	13,407	8,840	16,204	**10,823**
Richardson Highway	24,780	20,350	37,722	**28,200**
Summation across screenline	*52,848*	*41,480*	*68,104*	***55,513***

Table 18: Effects of Screenline Analysis

Note that the sum of the final 2040 screenline volumes is less than the sum of the original 2040 model volumes, just as the actual 2013 volumes are smaller than the 2013 model volumes. Additionally, the post processing techniques redistributed traffic to travel on Gillam Way because the actual 2013 volumes are relatively higher on Gillam Way as compared to the modeled distribution.

A screenline north of Airport Way across Cowles Street, Barnette Street, Cushman Street, and the Steese Expressway did not result in differences in volumes that were significant at this level of analysis. Therefore, the original model volumes were used. Screenlines across east-west roads (Johansen Parkway, Airport Way, and the Richardson Highway) were not used because these are major arterials that would have been included in the validation of the model.

Figure 8 on page 26 presents a summary of the results of the travel demand model. Screenline volume results are highlighted. The annual growth rate from 2013 to 2040 is 1.2% on Airport Way, 1.6% on Cushman Street north of Airport Way, and 0.7% on Cushman Street south of Airport Way.

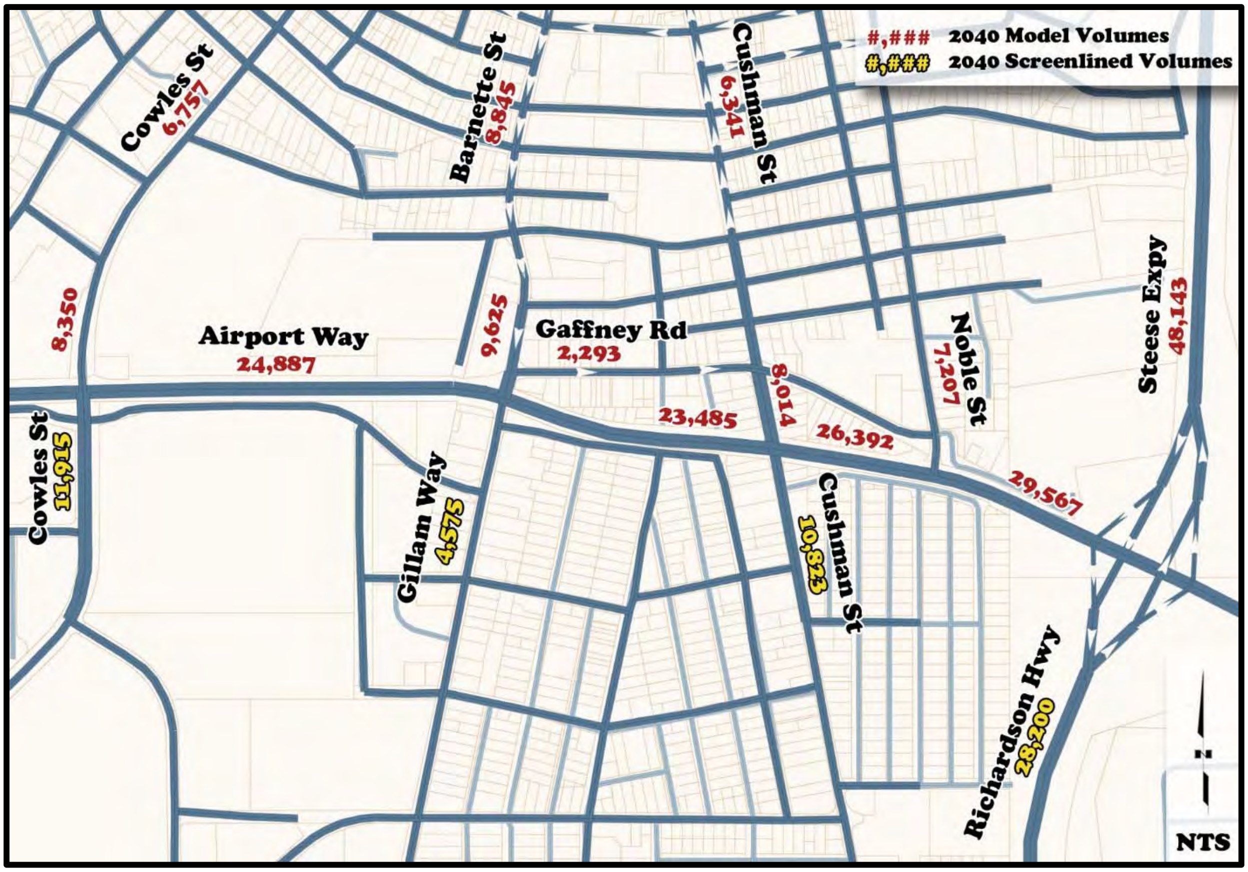


Figure 8: 2040 AADT Volume Summary Map

4.2 Design Turning Movements

Future intersection turning movement volumes (TMVs) were calculated using the methodology found in the *NCHRP Report 765*. The methodology predicts future intersection peak hour movements based on AADT projections for the approach roads, design hour volumes of AADT, and expected turning movement proportions. The turning movement proportions in this case were taken from the observed counts shown in Figure 6 on page 17 and the design volumes output by the FMATS 2040 travel demand model. The design turning movements in Figure 9 below present the design turning movement volumes under the Steese Expressway interchange scenario. Design turning movements under the at-grade intersection scenario can be found in Appendix B.

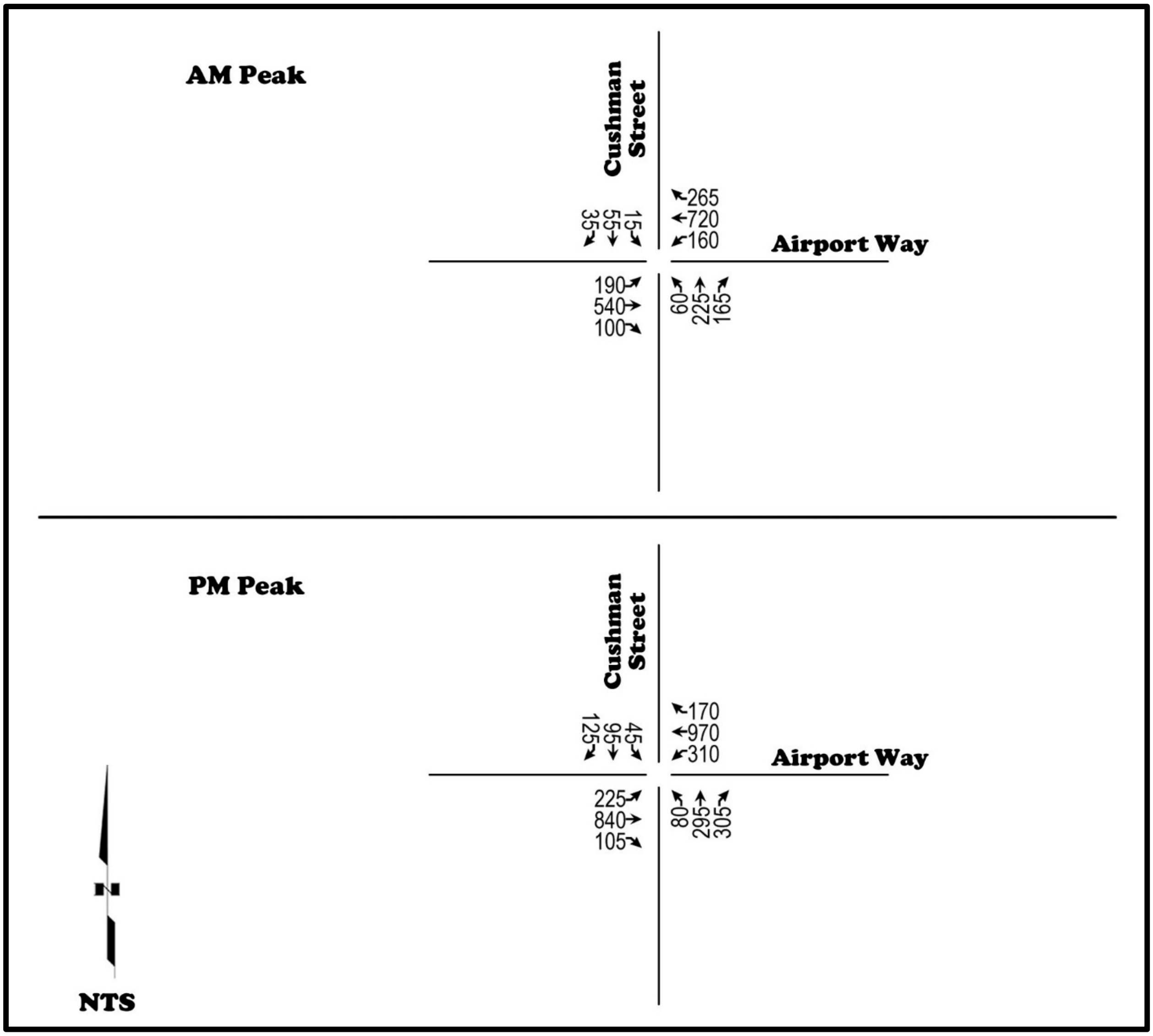
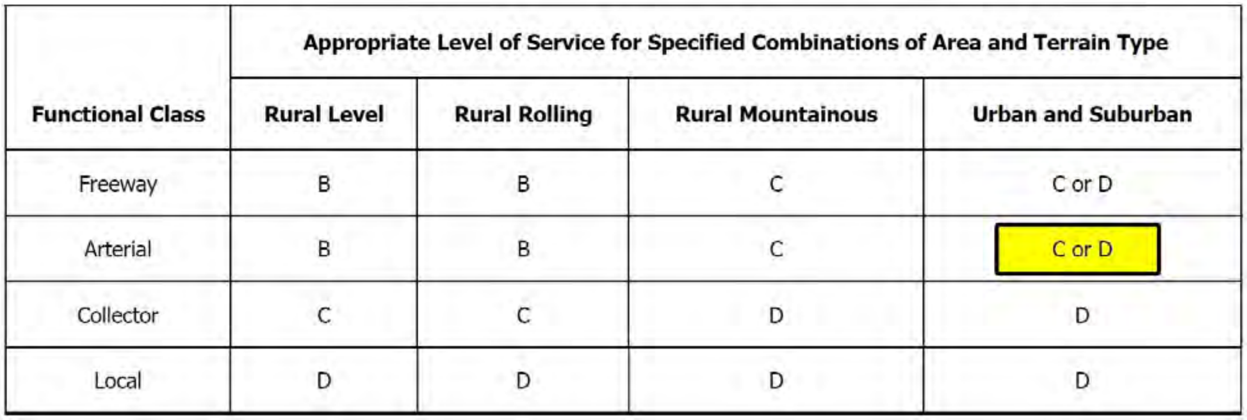


Figure 9: 2040 Turning Movement Volumes under Steese Expressway Interchange Scenario

4.3 Future Operations

AASHTO’s PGDHS has guidelines for appropriate LOS thresholds for different functional classifications and area and terrain types. Figure 10 below presents these recommendations. Based on the figure, the Airport Way intersection with Cushman Street is recommended to operate at LOS C or D in the design year.



Functional Class	Appropriate Level of Service for Specified Combinations of Area and Terrain Type			
	Rural Level	Rural Rolling	Rural Mountainous	Urban and Suburban
Freeway	B	B	C	C or D
Arterial	B	B	C	C or D
Collector	C	C	D	D
Local	D	D	D	D

Note: Modified from AASHTO PGDHS Table 2-5

Figure 10: Level of Service Recommendations

The forecasted 2040 volumes were used to model the future performances for the Airport Way intersection with Cushman Street. The capacity analysis results are presented in Table 19 on page 29.

In the morning, the overall LOS will be C; however, the northbound movements will operate at LOS D. In the evening, the overall intersection will operate at LOS D, with failing northbound through, southbound left and westbound left movements. Additionally, the v/c ratio in the evening will be 1.0. The v/c ratio is important because at v/c ratios over 0.9, traffic volumes frequently become unstable and small changes can result in very high delays.

Appendix B on page 72 presents a summary of the analysis results for the volume scenario without an interchange constructed at the Steese Expressway intersection with Airport Way. The analysis indicates that the operation of the intersection at Airport Way and Cushman Street is not significantly sensitive to the installation of the interchange.

Approach	**Movement**	**AM Peak**				**PM Peak**			
		V/C Ratio	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**
Northbound	**Left+Thru and Thru+Right**	0.8	225	41	D	**1.0**	**525**	**88**	**F**
Southbound	**Left**	0.2	25	29	C	**0.7**	**100**	**57**	**E**
	Thru+Right	0.2	75	29	C	0.4	175	31	C
Eastbound	Left	0.6	100	17	B	0.9	175	42	D
	Thru	0.4	125	13	B	0.8	275	29	C
	Right	0.1	25	7	A	0.1	25	14	B
Westbound	**Left**	0.4	100	16	B	**0.9**	**300**	**72**	**E**
	Thru	0.5	200	19	B	0.8	200	18	B
	Right	0.3	100	25	C	0.2	25	14	B
Intersection		**0.6**		**22**	**C**	**1.0**		**41**	**D**

Table 19: 2040 No Build - Intersection Delay, Steese Expressway Interchange Conditions

5 Design Alternatives

The primary concerns identified for the Airport Way and Cushman Street intersection include the following:

- Higher than average crash rate compared to similar facilities statewide. Identified crash patterns include the following:
  - Rear-end and sideswipe crashes on northbound approach
  - Left-turn crashes between eastbound and westbound vehicles
  - Right-angle crashes involving eastbound through vehicles
- Numerous access points on Cushman Street within the functional area of the intersection
- Poor LOS for the northbound movements (LOS E)
- Inadequate capacity in the 2040 design year to serve the forecasted traffic, resulting in poor LOS for certain intersection movements in the 2040 design year. Identified movements with operational concerns include the following:
  - Northbound movements (LOS F)
  - Westbound left turns (LOS E)
  - Southbound left turns (LOS E)

The intersection is expected to operate at LOS D, satisfying AASHTO’s LOS guidelines; however, safety improvements at the intersection are necessary. Potential mitigation measures to reduce the higher than expected crash rate at the Airport Way intersection with Cushman Street and to improve future intersection operations include:

- Installing a northbound left-turn only lane to separate decelerating and or stopped traffic preparing to turn and the through traffic continuing at speed through the intersection.
- Providing positive offsets for the left-turn lanes, allowing opposing left-turn vehicles to better see past each other to find gaps in the opposing traffic.
- Constructing a roundabout.
- Changing the left-turn phasing for eastbound and westbound approaches to either flashing yellow arrow or protected only.
- Limiting driveway and street access to Cushman Street within the functional area of the intersection.
- Channelizing right-turn lanes to reduce the pedestrian crossing distance while increasing intersection capacity.

Several options for the signalized intersection were developed using the proposed mitigations:

- Option 1 – Expand northbound approach to include left-turn and right-turn lanes with only one through lane; provide positive offset for all left-turn lanes; and provide right-turn channelization on the eastbound, westbound, and northbound approaches.
- Option 2 – Make all Option 1 improvements, but expand northbound approach to include two through lanes.
- Option 3 – Make all Option 1 improvements; expand southbound approach to one left-turn lane, one through lane, and one right-turn channelized lane; and expand northbound approach to include two through lanes.
- Option 4 – Convert the east-west left-turn phasing to protected only; positive offset northbound and southbound left-turn lanes; and provide right-turn channelization on the eastbound, westbound, and northbound approaches.

Additionally, several alternative intersection control options were considered:

- Roundabout at the Airport Way intersection with Cushman Street
- Roundabouts at the 15th Avenue and Gaffney Road intersections with Cushman Street
- Continuous Flow – Divert westbound left turns
- Modified Through-about intersection

These alternatives are analyzed in more detail in the following sections.

5.1 Signal Control Alternative

Four signal control options were developed to mitigate the operational and safety concerns identified at the Airport Way intersection with Cushman Street.

To keep the functional area of the intersection clear, it is recommended for all the options that 14th Avenue be closed at Cushman Street to remove the conflicts associated with queues from Airport Way extending into the intersection of 14th Avenue with Cushman Street. Traffic that currently uses 14th Avenue would be diverted to the signalized intersection at 15th Avenue east and Cushman Street.

Left-turn phasing for the options was determined using *NCHRP Synthesis Report 225: Left-Turn Treatments at Intersections*. The left-turn phasing is based on traffic volumes, cycle length, speed, sight distance, and frequency of left-turn crashes. In general, permissive-protected phasing was selected for the eastbound and westbound left turns (Airport Way) and permissive-only phasing was selected for the northbound and southbound left turns (Cushman Street). For Airport Way, installing flashing yellow arrow to implement the permissive-protected phasing is desirable to improve signal coordination on Airport Way, to provide guidance to the drivers as to the position of the lane because the signal head would be centered on the lane, and to improve safety. On Cushman Street, the permissive phasing can be implemented using either a green ball or a flashing yellow arrow signal head. Consideration could be given to installing a four-section flashing yellow signal head (or designing the signal mast arm and pole to handle a four-section head), as this would allow for future flexibility in implementing either permissive-protected or protected-only phasing.

5.1.1 Option 1

Option 1 proposes four main improvements, depicted in Figure 11:

- Expand the northbound approach to include exclusive left-turn and right-turn lanes and reduce the northbound through movements to just one lane. This would remove the turning traffic from the through lane and provide adequate capacity to serve all northbound movements.
- Provide right-turn channelization for all the approaches with right-turn lanes (the eastbound, westbound, and northbound approaches). Since the existing southbound lanes have sufficient capacity for the expected volumes, a separate right-turn lane would not be provided for the southbound approach.
- Offset all left-turn lanes. This would allow vehicles in oncoming left-turn lanes to see past each other, improving safety for left-turn movements.
- Install flashing yellow arrows for permissive-protected left-turn movements.

Figure 11 presents the movements and control for Signal Option 1.

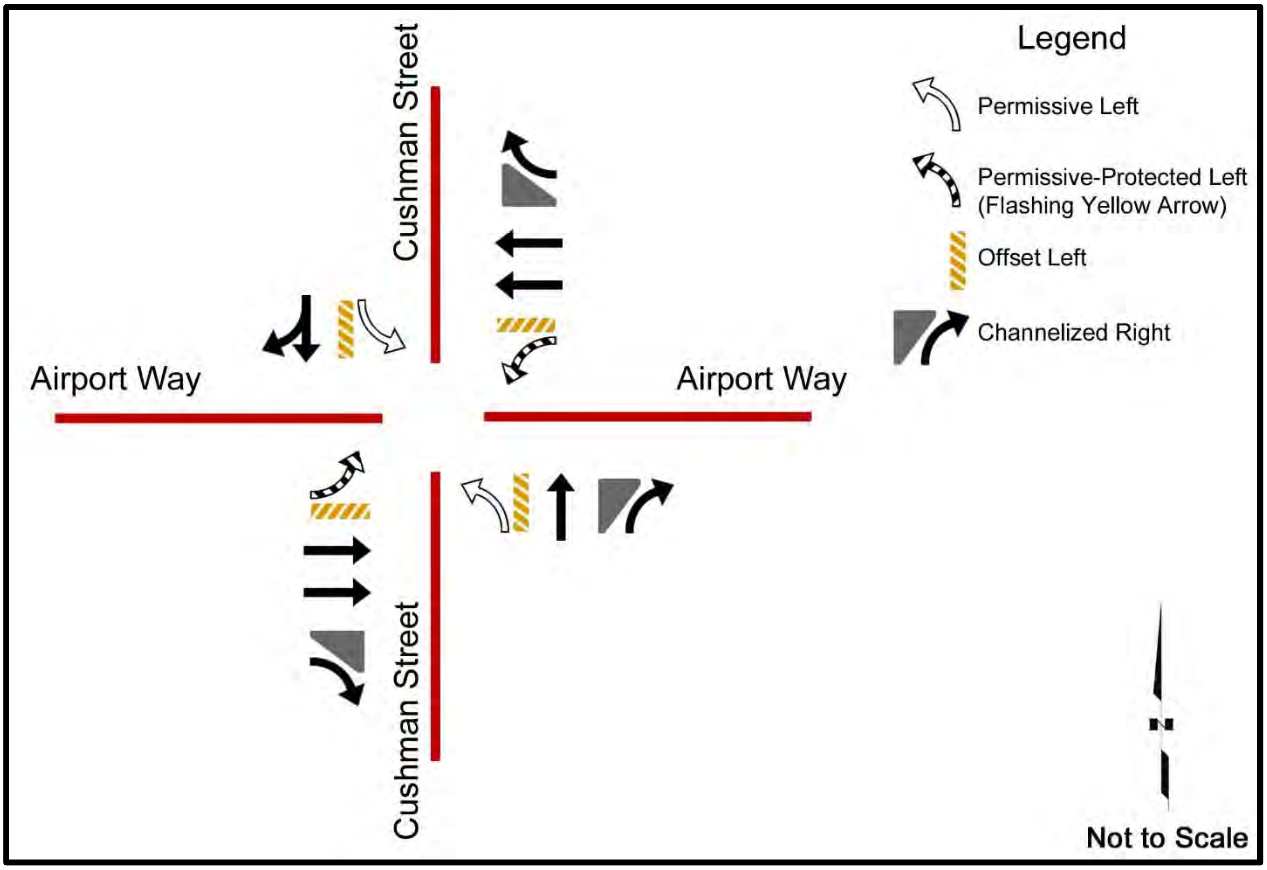


Figure 11: Lane Configurations - Signal Option 1

During the 2008 to 2012 study period, there were 94 crashes at the intersection. Based on the CRF values for the proposed Option 1 improvements, the mitigations would have reduced the number of crashes during the study period by 13 of the 94 crashes. Crashes involving pedestrians and right-turning vehicles are 70-80% lower on channelized right-turn lanes and shared right-and-through lanes than on conventional right-turn lanes. The left-turn offset lanes would improve the sight distance for opposing left-turning vehicles so they could determine available gaps between the through vehicles. However, the offsets would also increase the pedestrian crossing distance; therefore, it is recommended that the offsets be designed to provide adequate sight distance, but not exceed the required offset distance.

Table 20 below presents the v/c ratio, 95th percentile queue length, control delay, and LOS for each movement.

Approach	**Movement**	**AM Peak**				**PM Peak**			
		V/C Ratio	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**
Northbound	Left	0.2	75	31	C	0.5	100	40	D
	Thru	0.6	225	38	D	**0.8**	**325**	**57**	**E**
	Right	0.3	25	13	B	0.6	100	23	C
Southbound	Left	0.1	25	32	C	0.5	75	44	D
	Thru+Right	0.2	75	33	C	0.6	200	43	D
Eastbound	Left	0.5	75	10	A	0.7	125	29	C
	Thru	0.3	125	11	B	0.6	225	17	B
	Right	0.2	25	11	B	0.2	25	13	B
Westbound	Left	0.3	25	3	A	0.7	225	17	B
	Thru	0.5	50	4	A	0.6	175	12	B
	Right	0.4	50	14	B	0.3	25	12	B
Intersection		**0.5**		**13**	**B**	**0.8**		**22**	**C**

Table 20: 2040 Signal Control Option 1 - Intersection Delay

In the morning, the northbound through movement will operate at LOS D. In the evening, the northbound through movement will experience the most delay and have an LOS of E. The northbound left and southbound movements will operate at LOS D. The signal coordination along Airport Way would be compatible with this option.

Left-turn offsets increase the pedestrian crossing distance on all approaches. The right-turn channelization islands also increase the number of crossings for pedestrians and bicyclists. For bicyclists utilizing the proposed parallel bicycle route south of Airport Way, the channelization islands would require bicyclists to cross three crosswalks to cross Cushman Street. This option is expected to have an overall pedestrian LOS E. Pedestrians are expected to experience LOS E crossing the signalized approaches and LOS A crossing the channelized right-turn lanes.

The transit routes utilize the westbound right and southbound through movements. The channelized westbound right-turn lane allows the right-turning vehicles to move independent of the signal at the intersection. The westbound right turn movement is expected to operate at LOS B for both morning and evening peak hours. The southbound through movement is expected to experience LOS C in the morning and LOS D in the evening.

5.1.2 Option 2

Option 2 proposes the same four improvements as Option 1, with the exception that the northbound approach would be expanded to include two exclusive through lanes, in addition to exclusive left- and right-turn lanes.

The lane configuration is shown in Figure 12 below. This adds capacity to the northbound approach, allowing the northbound traffic to be served in a shorter time frame and shift some of the cycle time to other movements; however, the crossing distance on the south approach is lengthened.

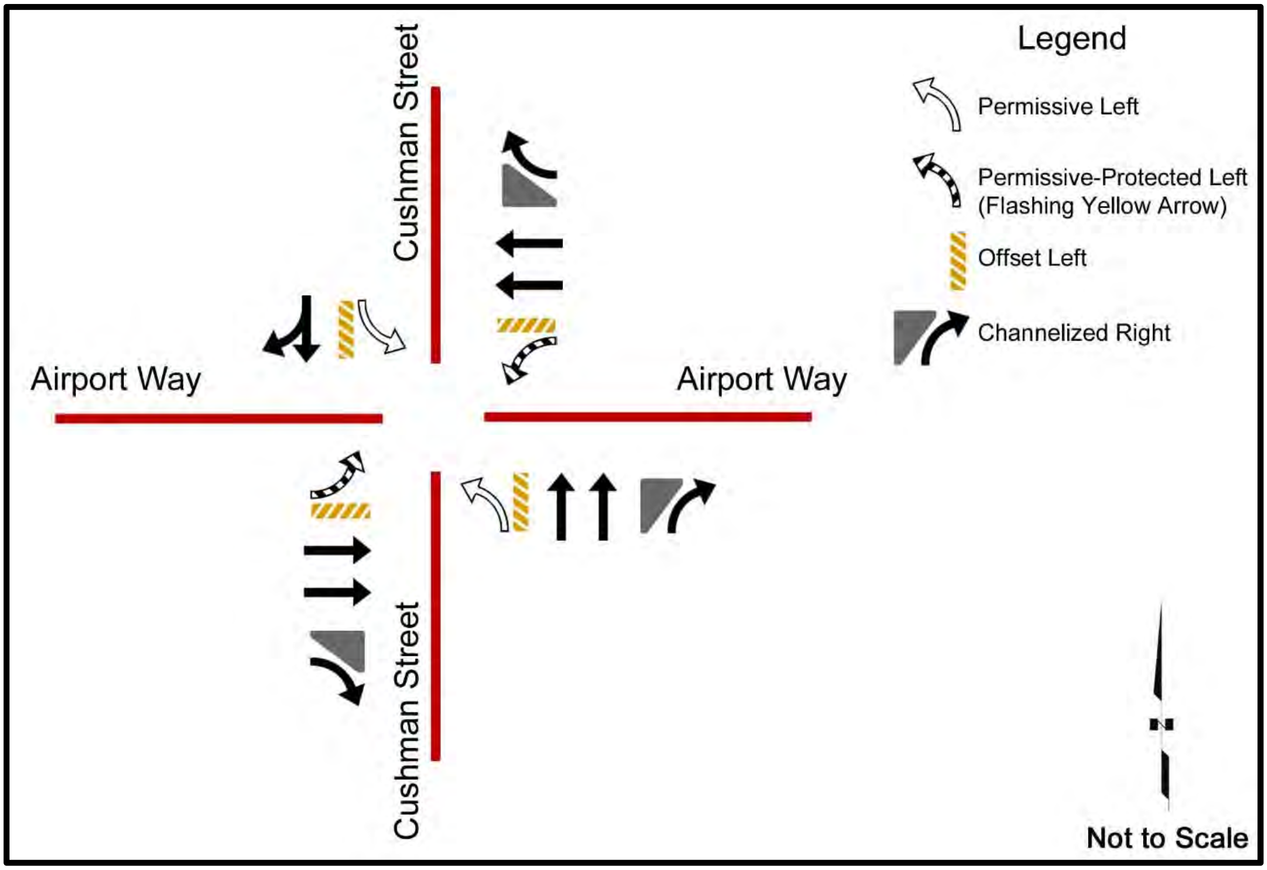


Figure 12: Lane Configurations - Signal Option 2

This option separates the northbound left-turn vehicles from the northbound through vehicles, provides positive offsets for all the left-turn lanes, and changes the eastbound and westbound left-turn phasing to flashing yellow arrows. Based on the CRF values for these improvements, the mitigations would have reduced the crashes during the study period by 13 of the 94 crashes. The left-turn offset lanes would improve the sight distance for opposing left-turning vehicles to determine available gaps between the through vehicles. The offset lanes, along with the additional northbound through lane, would increase the pedestrian exposure to the road on all approaches. Based on *NCHRP 208*, pedestrian crashes involving right-turning vehicles on channelized right-turn lanes and shared right-and-through lanes are 70-80% lower than on conventional right-turn lanes.

Table 21 below presents the v/c ratio, 95th percentile queue length, control delay, and LOS for each movement.

Approach	Movement	AM Peak				PM Peak			
		V/C Ratio	Queue Length (ft)	Control Delay (sec/veh)	LOS	V/C Ratio	Queue Length (ft)	Control Delay (sec/veh)	LOS
Northbound	Left	0.2	75	32	C	0.7	125	53	D
	Thru	0.4	100	35	D	0.5	150	44	D
	Right	0.3	25	13	B	0.6	100	23	C
Southbound	Left	0.1	25	33	C	0.4	75	43	D
	Thru+Right	0.2	75	34	C	0.7	225	50	D
Eastbound	Left	0.5	75	9	A	0.6	100	26	C
	Thru	0.3	125	11	B	0.6	225	16	B
	Right	0.2	25	11	B	0.2	25	13	B
Westbound	Left	0.3	25	2	A	0.7	225	15	B
	Thru	0.4	25	3	A	0.6	175	9	A
	Right	0.4	50	14	B	0.3	25	12	B
Intersection		**0.4**		**12**	**B**	**0.7**		**20**	**C**

Table 21: 2040 Signal Control Option 2 - Intersection Delay

In the morning, the northbound through movement will operate at LOS D. In the evening, the northbound left, northbound through, and all southbound movements will operate at LOS D. The signal would be compatible with the coordinated signals along Airport Way.

This option will increase the crossing distance for pedestrians on all approaches because of the positive left-turn offset lanes. The crosswalk distance for the southbound approach will increase by one full lane width, while the increase on the eastbound and westbound approach crossing distances will be less than a full lane because of the channelized right-turn lanes. The crosswalk on the northbound approach will increase the most with the offset lane and the additional through lane. The right-turn channelization islands will require pedestrians and bicyclists to cross more crosswalks. The channelized islands on the eastbound and northbound approaches require bicyclists traveling on the proposed bicycle route along the south side of Airport Way to travel across three crosswalks to cross Cushman Street. Option 2 is expected to have a signalized pedestrian LOS of E and an unsignalized (crossing the channelized right-turn lane) pedestrian LOS of A.

The transit buses making the southbound through movement will experience LOS C in the morning and LOC D in the evening. The lines making the westbound right movement will experience LOS B throughout the day.

5.1.3 Option 3

Option 3, depicted in Figure 13 below, proposes the same four improvements as Option 1 with two alterations:

- Expand the northbound approach to include two northbound through lanes, in addition to the exclusive left-turn and right-turn lanes.
- Install a southbound right-turn lane and channelize all right turns.

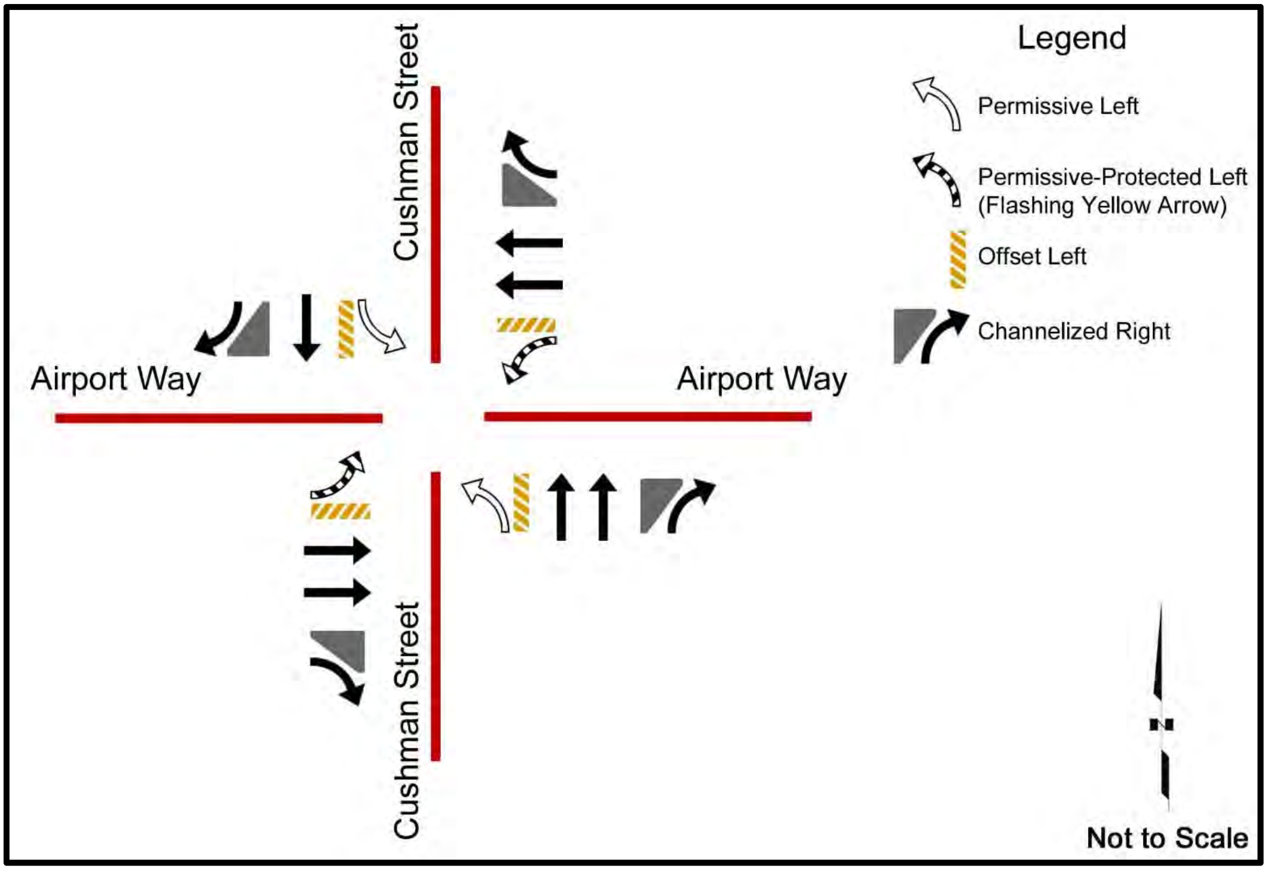


Figure 13: Lane Configurations - Signal Option 3

This option separates the northbound left-turn vehicles from the northbound through vehicles, provides positive offsets for all the left-turn lanes, and changes the eastbound and westbound left-turn phasing to flashing yellow arrows. Based on the CRF values, these improvements would have reduced the crashes during the study period by 13 of the 94 crashes. The left-turn offset lanes would improve the sight distance for opposing left-turning vehicles to determine available gaps between the through vehicles and would increase the pedestrian exposure to the road. The additional northbound through lane would further increase the pedestrian exposure on the northbound approach. The right-turn channelization study in *NCHRP 208* reported that crashes involving right-turning vehicles and pedestrians are 70-80% lower on channelized right-turn lanes and shared right-and-through lanes than on conventional right-turn lanes.

Table 22 on page 37 presents the v/c ratio, 95th percentile queue length, control delay, and LOS for each movement.

Approach	**Movement**	**AM Peak**				**PM Peak**			
		V/C Ratio	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**
Northbound	Left	0.2	75	32	C	0.4	100	41	D
	Thru	0.4	100	35	D	0.5	150	45	D
	Right	0.3	25	13	B	0.6	100	23	C
Southbound	Left	0.1	25	33	C	0.4	75	43	D
	Thru	0.2	50	34	C	0.3	125	43	D
	Right	0.1	25	13	B	0.3	25	18	C
Eastbound	Left	0.5	75	9	A	0.6	100	26	C
	Thru	0.3	125	11	B	0.6	225	16	B
	Right	0.2	25	11	B	0.2	25	13	B
Westbound	Left	0.3	25	3	A	0.7	225	16	B
	Thru	0.4	50	3	A	0.6	175	9	A
	Right	0.4	50	14	B	0.3	25	12	B
Intersection		**0.5**		**12**	**B**	**0.7**		**19**	**B**

Table 22: 2040 Signal Control Option 3 - Intersection Delay

During the morning peak, the northbound through movement will operate at LOS D. In the evening, the northbound left, northbound through and southbound movements will operate between LOS C and D. This option would be compatible with the coordination of the Airport Way signals.

The left-turn offsets will increase the crossing distance for all the approaches. The northbound approach would have the greatest increase with the additional through lane. The right-turn channelization islands would increase the number of pedestrian crossings on all the approaches. For bicyclists utilizing the proposed parallel bicycle route south of Airport Way, the islands would require bicyclists to travel across three crosswalks to cross Cushman Street. Pedestrians are expected to experience LOS E crossing the signalized crosswalks and LOS A crossing the channelized right-turn lanes.

The transit buses making the southbound through movement will experience LOS C in the morning and LOS D in the evening. The transit buses making the westbound right movement will experience LOS B in the morning and evening.

5.1.4 Option 4

Option 4 considers the effects of converting the eastbound and westbound left-turn phasing from protected-permissive to protected only. The northbound approach would be expanded to include exclusive left-turn and right-turn lanes, with a single northbound through lane. The eastbound, westbound, and northbound approaches would have channelized right-turn lanes and the northbound and southbound approaches would have positive offset left-turn lanes. Figure 14 on page 38 presents the intersection configuration for this option.

Protected-only left-turn phasing was selected based on safety to mitigate the identified east-west left-turn crash pattern.

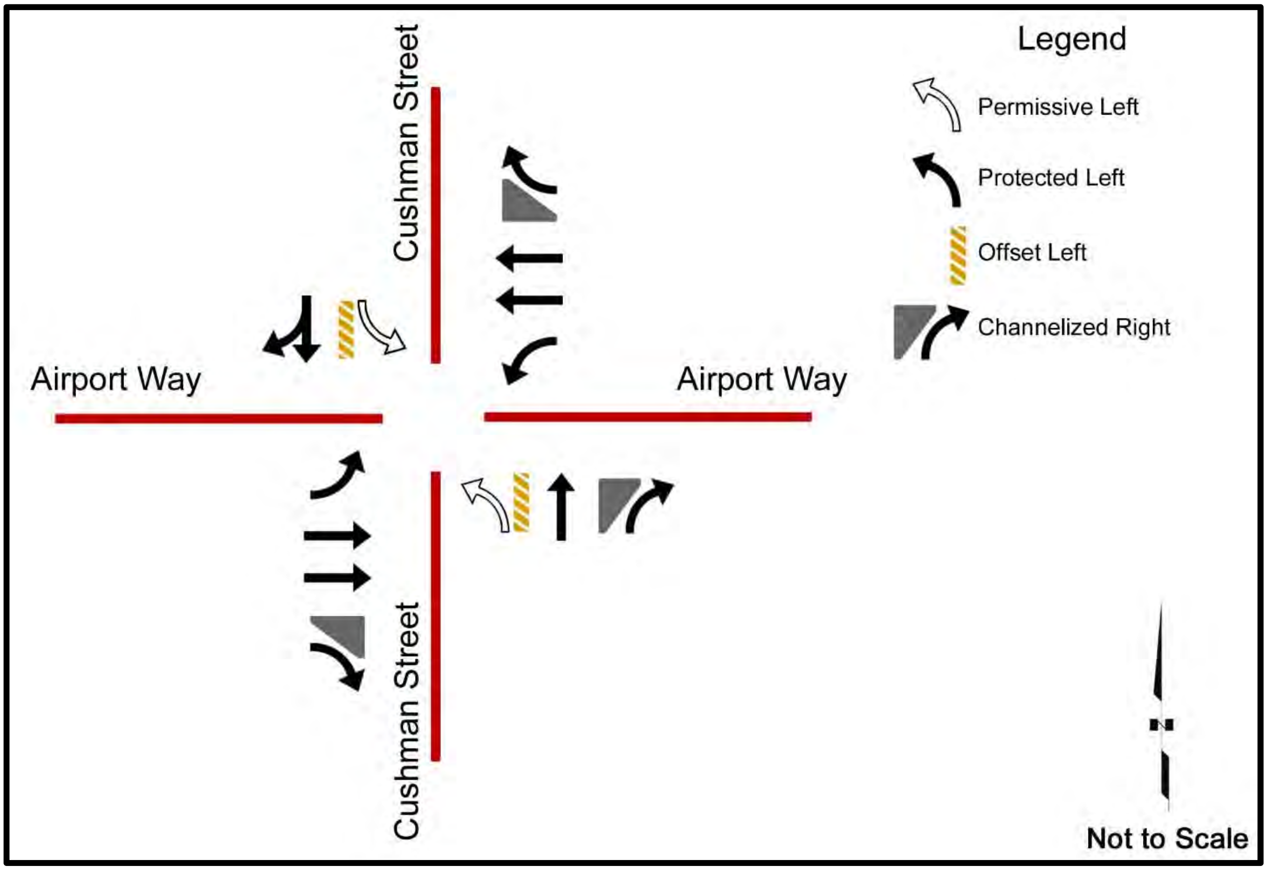


Figure 14: Lane Configurations - Signal Option 4

Option 4 separates the northbound left-turn vehicles from the northbound through vehicles, offsets the northbound and southbound left turns and changes the eastbound and westbound left-turn phasing to protected only. Based on the CRF values for these changes, the improvements would have reduced the total number of crashes during the study period by 16 of 94 crashes. The left-turn offset lanes would improve the sight distance for opposing left-turning vehicles to determine available gaps between the through vehicles but would increase pedestrian exposure. The protected-only phasing eliminates the interaction between pedestrians and permissive eastbound and westbound left-turn vehicles. Pedestrian crashes involving right-turning vehicles and pedestrians are 70-80% lower on channelized right-turn lanes and shared right-and-through lanes than on conventional right-turn lanes.

Table 23 on page 39 presents the v/c ratio, 95th percentile queue length, control delay, and LOS for each movement for the Steese Expressway interchange volume scenario.

Approach	**Movement**	**AM Peak**				**PM Peak**			
		V/C Ratio	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**
Northbound	Left	0.3	75	33	C	0.5	100	41	D
	Thru	0.7	225	42	D	**0.9**	**325**	**60**	**E**
	Right	0.3	25	13	B	0.6	100	23	C
Southbound	Left	0.1	25	34	C	0.6	75	47	D
	Thru+Right	0.2	75	34	C	0.6	200	44	D
Eastbound	**Left**	0.8	200	51	D	**0.9**	**250**	**63**	**E**
	Thru	0.4	150	12	B	0.7	275	23	C
	Right	0.2	25	11	B	0.2	25	13	B
Westbound	Left	0.7	150	31	C	0.9	350	43	D
	Thru	0.5	225	19	B	0.7	225	16	B
	Right	0.4	50	14	B	0.3	25	12	B
Intersection		**0.6**		**22**	**C**	**0.8**		**30**	**C**

Table 23: 2040 Signal Control Option 4 - Intersection Delay

In the morning, the northbound through and eastbound left movements operate at LOS D conditions. The evening peak has the northbound through and eastbound left movements operating at LOS E. The southbound approach, westbound left turns, and northbound left turns will operate at LOS D. It should also be noted that the westbound queue length is larger than the 325-foot turn lane. The queue would back out of the turn lane and block the westbound through movement. Option 4 is compatible with the signal coordination along Airport Way.

This option will increase the crossing distance on the northbound and southbound approaches because of the positive offset left-turn lanes. On the eastbound and westbound approaches, not offsetting the left-turn lanes and channelizing the right-turn lanes will reduce the crossing distances on the eastbound and westbound approaches. The right-turn channelization islands will also increase the number of crossings on all the approaches. For bicyclists using the proposed parallel bicycle path south of Airport Way, the channelization islands will require the bicyclist to travel across three crosswalks to cross Cushman Street. Option 4 is expected to have pedestrian LOS E on the signalized crosswalks and LOS A on the channelized right-turn lane crosswalks.

The transit buses make southbound through and westbound right movements at the intersection. The southbound through movement is expected to experience LOS C in the morning and LOS D in the evening. The westbound right-turn movements is expected to experience LOS B throughout the day.

5.1.5 Signal Control Alternative Summary

The signal control alternative considered options to mitigate the operational and safety concerns at the Airport Way intersection with Cushman Street. The four options analyzed include:

- Option 1 – Expand northbound approach to include left-turn and right-turn lanes with only one through lane, positive offset all left-turn lanes, provide right-turn channelization on the eastbound, westbound, and northbound approaches.
- Option 2 – Make all Option 1 improvements, but expand northbound approach to include two through lanes.
- Option 3 – Make all Option 1 improvements, expand the northbound approach to include two through lanes, and expand southbound approach to one left-turn lane, one through lane, and one right-turn channelized lane.
- Option 4 – Convert the east-west left-turn phasing to protected only, positive offset northbound and southbound left-turn lanes, provide right-turn channelization on the eastbound, westbound, and northbound approaches.

During the 2008 to 2012 study period, 94 crashes occurred at the Airport Way intersection with Cushman Street. Based on the CRF values, the mitigations would have reduced the number of crashes that occurred during the 5-year study period: Option 1 by 13 crashes, Option 2 by 13 crashes, Option 3 by 13 crashes, and Option 4 by 16 crashes. The positive left-turn offset lanes would improve the sight distance for opposing left-turning vehicles to determine available gaps between the through vehicles. The positive offsets also increase pedestrian exposure to the road. The increased number of northbound through lanes from one lane to two in Option 2 and Option 3 further increases the pedestrian exposure to traffic. *NCHRP 208* reported that crashes involving right-turning vehicles and pedestrians on channelized right-turn lanes and shared right-and-through lanes are 70-80% lower than on conventional right-turn lanes.

Table 24 on page 41 presents the control delay and LOS of the 2040 “No Build” configuration for each movement during the PM peak compared with the four options.

Approach	**Movement**	**No Build**			**Option 1**			**Option 2**			**Option 3**			**Option 4**		
		V/C Ratio	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Control Delay (sec/veh)**	**LOS**
Northbound	Left				0.5	40	D	0.7	53	D	0.4	41	D	0.5	41	D
	Thru	**1.0**	**88**	**F**	**0.8**	**57**	**E**	0.5	44	D	0.5	45	D	**0.9**	**60**	**E**
	Right				0.6	23	C	0.6	23	C	0.6	23	C	0.6	23	C
Southbound	**Left**	**0.7**	**57**	**E**	0.5	44	D	0.4	43	D	0.4	43	D	0.6	47	D
	Thru	0.4	31	C	0.6	43	D	0.7	50	D	0.3	43	D	0.6	44	D
	Right										0.3	18	C			
Eastbound	Left	0.9	42	D	0.7	29	C	0.6	26	C	0.6	26	C	**0.9**	**63**	**E**
	Thru	0.8	29	C	0.6	17	B	0.6	16	B	0.6	16	B	0.7	23	C
	Right	0.1	14	B	0.2	13	B	0.2	13	B	0.2	13	B	0.2	13	B
Westbound	**Left**	**0.9**	**72**	**E**	0.7	17	B	0.7	15	B	0.7	16	B	0.9	43	D
	Thru	0.8	18	B	0.6	12	B	0.6	9	A	0.6	9	A	0.7	16	B
	Right	0.2	14	B	0.3	12	B	0.3	12	B	0.3	12	B	0.3	12	B
Pedestrian (Signalized)			50	E		50	E		50	E		50	E		50	E
Intersection		**1.0**	**41**	**D**	**0.8**	**22**	**C**	**0.7**	**20**	**C**	**0.7**	**19**	**B**	**0.8**	**30**	**C**

Table 24: 2040 Comparison of Signal Control Options, PM Peak

The proposed signal control options will improve the intersection operation from LOS D to LOS B and C. The options will increase the delay on the southbound through movements, but will decrease the delays for the remaining intersection movements.

The westbound right and southbound through are the movements the transit buses use at the Airport Way intersection with Cushman Street. Channelizing the westbound right turns allows the movement to move independent of the signals. Thus, the options will operate at the same LOS B for the westbound right turn. The southbound through movements will experience LOS B in the morning and LOS D in the evening for all the options.

5.2 Other Alternative Control Options

In addition to the signal control options, other alternative intersection concepts were considered which would possibly improve the safety and operations of the Airport Way intersection with Cushman Street, but would have a larger impact on right-of-way, or would extend beyond the immediate scope of the intersection. For this reason, these options were not analyzed in depth, but were considered on a conceptual level and screened for possible further analysis. The four options considered were:

- Roundabout at the Airport Way intersection with Cushman Street
- Roundabouts at the 15th Avenue and Gaffney Road intersections
- Continuous flow – divert westbound left turns
- Modified through-about intersection

5.2.1 Roundabout

This alternative considers a roundabout to replace the signal control at the Airport Way intersection with Cushman Street. Constructing a roundabout eliminates the left-turn crash concern identified at the intersection.

Figure 15 on page 43 conceptually shows the key features of this alternative. A two-lane roundabout with a right-turn bypass lane on all approaches was analyzed using the HCM methodology in the Highway Capacity Software. The v/c ratio, 95th percentile queue length, and control delay for each movement of this roundabout is presented in Table 25 on page 44.

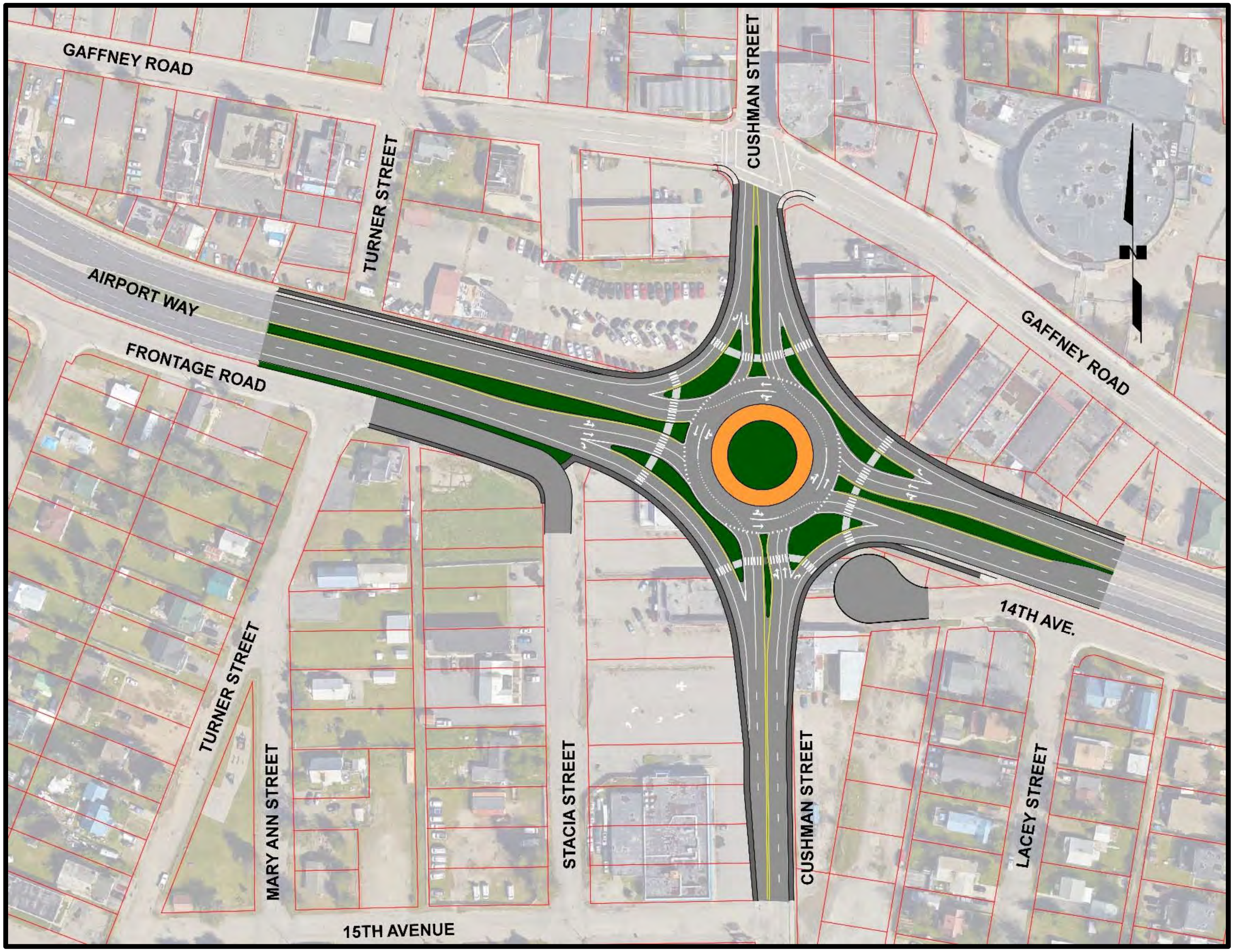


Figure 15: Alternative Control Concept: Roundabout

Approach	Movement	V/C Ratio	Queue Length (ft)	Control Delay (sec/veh)	LOS
Northbound	Left	0.5	50	18	C
	Thru	0.5	75	18	C
	Right	0.8	200	44	E
Southbound	Left	0.4	50	19	C
	Thru	0.4	50	19	C
	Right	0.4	50	20	C
Eastbound	Left	0.7	175	21	C
	Thru	0.8	225	26	D
	Right	0.2	25	7	A
Westbound	Left	1.0	400	62	F
	Thru	1.1	525	88	F
	Right	0.3	25	10	B
Intersection				**42**	**E**

Table 25: 2040 Roundabout - Intersection Delay, PM Peak

The two-lane roundabout resulted in heavy delay and poor LOS conditions. The roundabout will operate at LOS E, with westbound left and through movements experiencing the most delay (operating at LOS F and with v/c at or above 1.0). The northbound right turns will experience LOS E and eastbound through movements will experience LOS D. A three-lane roundabout was considered and rejected because of the negative safety and operational impacts it would have on pedestrians.

An additional disadvantage of the roundabout is that it would disrupt the platoons originating from the coordinated signals along Airport Way.

In terms of safety, constructing a roundabout would remove left-turn movements at the intersection, eliminating the identified safety concern of left-turn crashes. Based on the CRF, constructing a roundabout would have reduced the crashes during the study period by 8 out of 94 crashes.

Pedestrians and bicyclists would travel across three unsignalized crosswalks on all the approaches. The splitter islands between the crosswalks provide refuge for the pedestrians waiting for a gap to cross and allows the pedestrians to cross with traffic approaching from only one direction. Pedestrians crossing the entry and exit lanes of the roundabout would be required to cross two lanes of traffic at a time. The pedestrian LOS in the evening is shown in Table 26 on page 45. Pedestrians crossing the eastbound or westbound approach of Airport Way would experience significant delay (LOS F), which may result in pedestrians accepting smaller gaps, causing conflicts between vehicles and pedestrians.

Crosswalk Location	Average Delay (Sec)	Pedestrian LOS
Northbound Approach	8	B
Southbound Approach	12	C
Eastbound Approach	49	F
Westbound Approach	81	F

Table 26: 2040 Pedestrian LOS with Roundabout Alternative, PM Peak

The transit buses would not experience significant delay (LOS B or C) as they traversed the roundabout.

5.2.2 Indirect Left Turns with Roundabouts

Roundabouts at the 15th Avenue and Gaffney Road intersections with Cushman Street were proposed to mitigate the operational and safety concerns related to the eastbound and westbound left movements. This alternative would prohibit eastbound and westbound left movements at the Airport Way intersection with Cushman Street. Instead, eastbound and westbound left-turning vehicles would make a right turn onto Cushman Street, make a U-turn at a roundabout at 15th Avenue or Gaffney Road, and then proceed to go either northbound or southbound through the Airport Way intersection to complete the desired movement.

Figure 16 on page 46 conceptually shows the key features of this alternative and indicates the path of east and westbound left turns.

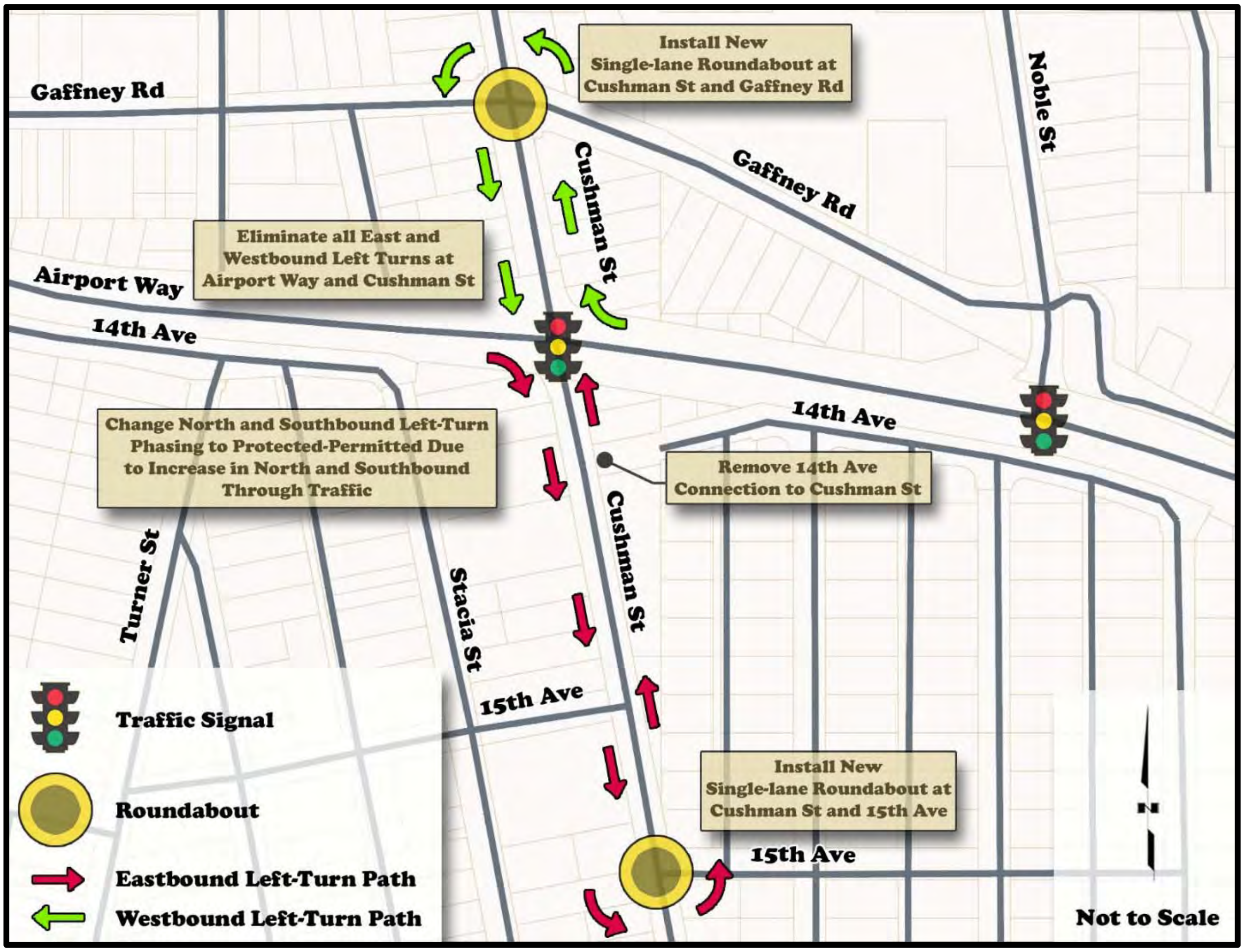


Figure 16: Alternative Control Concept: Indirect Left Turns with Roundabouts

This alternative would require switching the northbound and southbound left-turn phasing from permissive-only to protected-permitted phasing because of the increase in northbound and southbound through traffic. This alternative would improve the operations at the Airport Way and Cushman Street intersection and would be compatible with coordination along Airport Way. However, this alternative would introduce out-of-direction travel for the east- and westbound left turns and preliminary models indicate that the queue at Airport Way would likely back up into the Gaffney Road roundabout.

This alternative prevents the eastbound and westbound traffic from turning left at the intersection and diverts the vehicles to use the roundabouts to complete their movements. This eliminates the eastbound and westbound left-turn crash concern previously identified.

At the Airport Way intersection with Cushman Street, pedestrians and bicyclists crossing Cushman Street on the northbound and southbound approaches would not have to interact with eastbound and westbound left-turn vehicles under the permitted phase.

The roundabouts at 15th Avenue and Gaffney Road would require the transit buses to maneuver around the roundabouts but would not cause any out-of-direction travel. The buses would still be able to make southbound through and westbound right-turn movements.

5.2.3 Continuous Flow

A continuous flow intersection at Airport Way and Cushman Street is another possible alternative for addressing the safety and operational concerns at this intersection. In this configuration the eastbound and westbound left-turns vehicles would cross over the opposing through lanes prior to arriving at the intersection. The left-turn movement onto Cushman Street would occur simultaneously with opposing through traffic green, which would improve intersection operations. Figure 17 on page 48 conceptually shows the key features of this alternative and indicates the path of east and westbound left turns.

Because of the close proximity of the Noble Street signal, the westbound left turns would cross over the opposing direction Airport Way traffic at the Noble Street intersection and then would travel on a new access road south of Airport Way and north 14th Avenue. Similarly, the eastbound left turns would be diverted onto a new access road north of Airport Way between Barnette Street and Cushman Street. The eastbound and westbound right turns would also divert and access Cushman Street in a way that would allow the right-turn movements to yield to the diverted left turns. All through and left-turn movements would be signalized and would be controlled by the same signal controller.

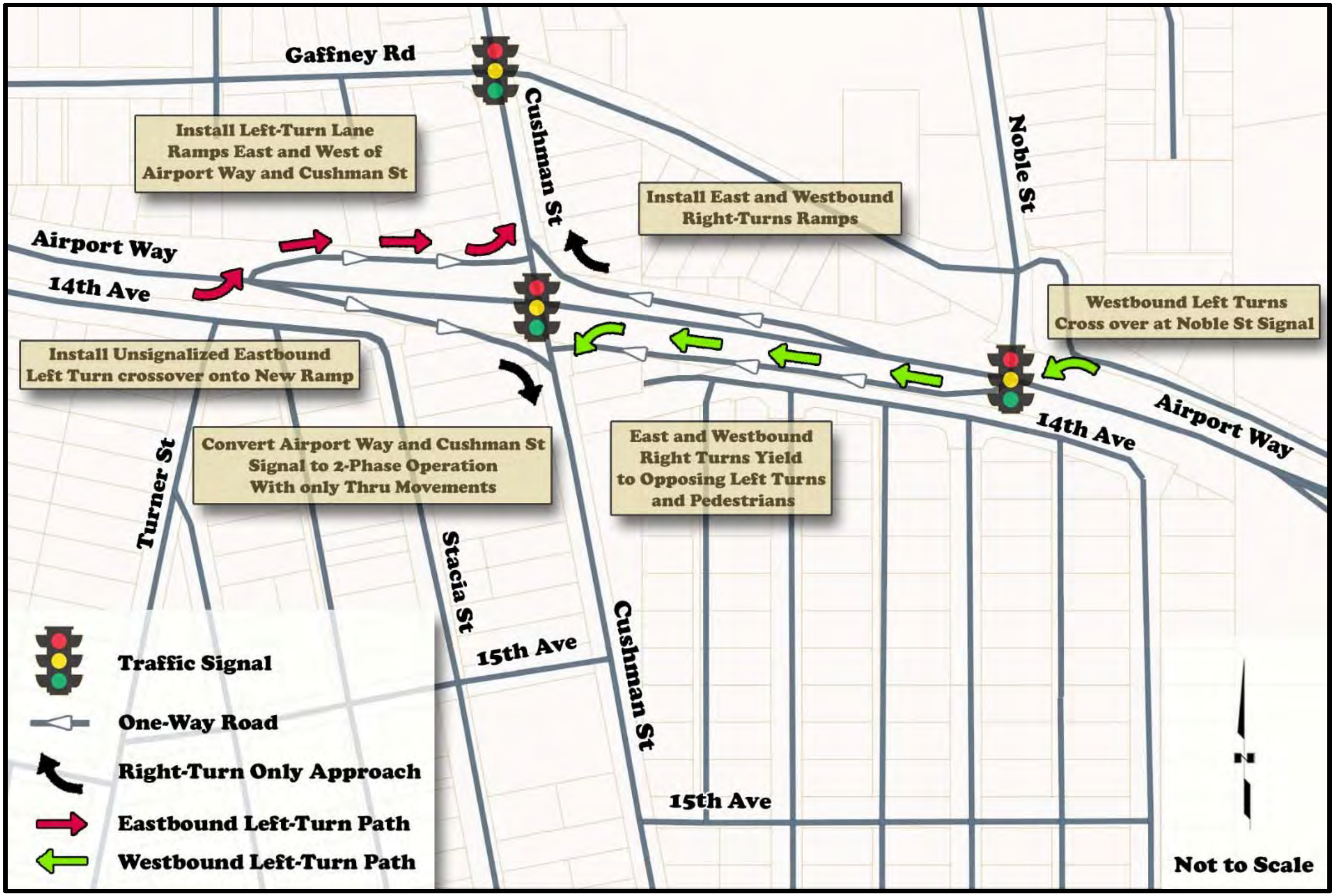


Figure 17: Alternative Control Concept: Continuous Flow Intersection

This alternative would decrease the delay for movements at the Airport Way and Cushman Street intersection. Signal timing for this alternative could also be compatible with the coordination along Airport Way. However, models indicate that the operation of the signal at Noble Street and Airport Way would be unsatisfactory, with excessive delay for the southbound and westbound left movements. This alternative would also require additional right-of-way purchases along Airport Way.

This alternative would introduce additional, uncontrolled, pedestrian crossings along Airport Way at the diverted left-turn and right-turn ramps.

In terms of safety, the continuous flow intersection would prohibit left turns at the Cushman Street intersection, eliminating the eastbound and westbound left-turn crash concerns previously identified. However, the new westbound left-turn lane at Noble Street and mid-block eastbound left turn crossover would need to be carefully designed to ensure that the left-turn crashes are not simply moved to these new locations.

For pedestrians and bicyclists, the alternative intersection control could introduce more conflicts. Pedestrian and bicycle routing and needs would have to be carefully considered during design.

The transit buses making southbound through movements would not be affected by the continuous flow intersection. The additional signals north and south of the Airport Way intersection with Cushman Street would be in coordination with the signals at Airport Way. The transit buses making westbound right movements would be diverted onto the new right-turn ramp prior to the intersection between Cushman Street and Noble Street and would yield to the eastbound left movements at Cushman Street.

5.2.4 Modified Through-About

A modified through-about intersection at the Airport Way intersection with Cushman Street was also considered. The idea of a through-about intersection is for turning and side street traffic to travel around the intersection similar to a roundabout, while the major street traffic can travel directly through the intersection. Eastbound and westbound left-turn movements would be prohibited at the intersections. These left-turn movements would make a right turn and travel around the “roundabout”-type roadway to complete the movement.

Signals would be installed at the two intersections where through traffic on Airport Way would cross the turning and side street traffic. The two signalized intersections would be placed approximately 250 feet apart. Because of the close proximity of the Gaffney Road signal on Cushman Street, the rotating traffic on the north side of the intersection would likely have to travel through the signalized Gaffney Road intersection with Cushman Street. Northbound and southbound left turns would be allowed to turn left at the signalized intersections with Airport Way. The configuration of the through-about intersection and the movements the eastbound and westbound left turns would need to take is shown in Figure 18 on page 50.

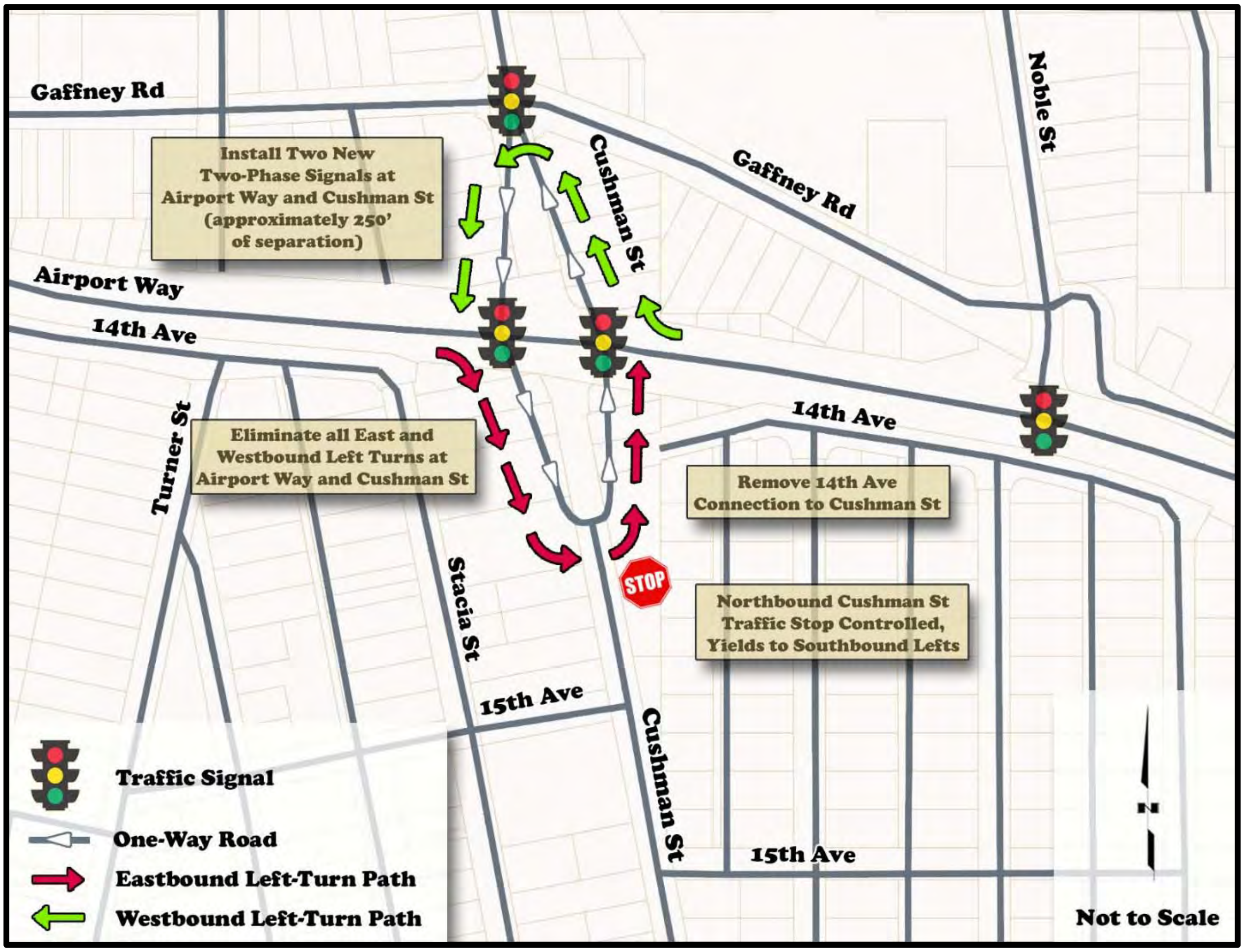


Figure 18: Alternative Control Concept: Modified Through-about Intersection

The two new signals on Airport Way would be highly efficient since they would operate with only two phases, which would improve the operation on Airport Way more than any of the other conceptual alternatives considered. The signals would also be compatible with coordination along Airport Way. All pedestrian crossings would be significantly improved due to shorter crossing distances and protected phasing. However, this option would also introduce out-of-direction travel for all eastbound and westbound left-turn movements and would require significant impacts to, or full acquisition of, many properties between 15th Avenue and Gaffney Road in order to construct the couplet.

In terms of safety, the through-about prohibits the eastbound and westbound left-turn movements from Airport Way at the intersection and splits the northbound and southbound vehicles into separate intersections with Airport Way, eliminating the left-turn crash concerns for all approaches.

Pedestrians or bicyclists traveling along Airport Way would have two crossings at Cushman Street, but pedestrians would experience shorter crossing distances at each crossing. Pedestrians traveling along Cushman Street would only be allowed to cross Airport Way on the outside legs of the couplet: on the eastbound approach at the southbound Cushman Street intersection and on the westbound approach at the northbound Cushman Street intersection.

The transit buses making the southbound through and westbound right movements would not need to make any out-of-direction travel. The southbound through movements would be allowed to travel through the Airport Way intersection with southbound Cushman Street and the westbound right movements would turn at the Airport Way intersection with northbound Cushman Street.

6 Recommendations

The identified concerns for the intersection include the following:

- Higher than average crash rate compared to similar facilities.
    - Rear-end and sideswipe crashes on northbound approach
    - Left-turn crashes between eastbound and westbound vehicles
    - Right-angle crashes involving eastbound through vehicles
- Poor LOS for the northbound movements
- Inadequate capacity in the 2040 design year
    - Northbound movements (LOS F)
    - Westbound left turns (LOS E)
    - Southbound left turns (LOS E)
- Numerous access points on Cushman Street within the functional area of the intersection

Signal Control Option 3 is recommended, as it provides the most benefit to the Airport Way intersection with Cushman Street. Option 3 has the following improvements:

- Expand the northbound approach to include two through lanes and exclusive left-turn and right-turn lanes.
- Provide right-turn channelization for all the approaches.
- Offset all left-turn lanes.
- Install flashing yellow arrows for permissive-protected left-turn movements.

Based on the CRF values for the proposed improvements, Option 3 would have reduced the crashes during the study period by 18 of the 94 crashes. Providing an exclusive northbound left-turn lane would remove the decelerating left-turning traffic from the traffic continuing at speed through the intersection, possibly reducing the number of rear-end and sideswipe crashes on the northbound approach. To mitigate the left-turn crashes, the positive offset left-turn lanes would improve the sight distance for opposing left-turning traffic to determine available gaps between the through vehicles. However, expanding the northbound approach and offsetting the left-turn lanes would increase the crossing distances on all the approaches. The proposed right-turn channelization would help reduce crossing distance, but increase the number of crossings pedestrians and bicyclists would need to cross the intersection.

Under Option 3, the intersection as a whole is expected to operate at LOS B. The added northbound through lane increases the northbound approach capacity and improves the northbound movements from LOS F to LOS C for the northbound right and to LOS D for the northbound left and northbound through movements. The southbound left-turn movement would improve from LOS E to LOS D. This option also has the greatest positive effect on the westbound left turn delay, improving the movement from LOS E to LOS B. Additionally, in comparison to the other proposed options, Option 3 has the shortest increase in delay for the southbound through movements.

Option 2 should also be looked at in more detail. This option results in the same delay improvements for the southbound left and all eastbound and westbound movements as Option 3. Option 2 also has similar improvements on the northbound approach as Option 3 (LOS F to LOS

C or D) but with slightly longer delays. Construction costs may be lower for Option 2 as compared to Option 3.

The turn-lane lengths were calculated using *NCHRP Report 279: Intersection Channelization Design Guide*. The turn-lane lengths are based on 95th percentile queues and, if approaching speeds exceed 35 mph, deceleration. Table 27 below present the recommended turn-lane lengths.

Turn Lane Movement	Turn-Lane Length (ft)
Northbound Left-Turn	150
Northbound Right-Turn	150
Westbound Left-Turn	400
Westbound Right-Turn	350
Eastbound Left-Turn	400
Eastbound Right-Turn	350

Table 27: Recommended Turn-Lane Lengths

In terms of the functional area of the intersection, the northbound left-turn and right-turn lanes would extend past 14th Avenue to the east of Cushman Street, creating more conflicts at this access point. The westbound left vehicles exiting and southbound left vehicles entering 14th Avenue would be required to traverse through four lanes in order to complete the turning movement. Thus, closing 14th Avenue's access to Cushman Street is also recommended; this will reduce conflicts between traffic queued at the Airport Way intersection and traffic entering and leaving 14th Avenue from Cushman Street.

The recommended turn lane lengths would also lengthen the upstream functional area on Airport Way; however, no driveways are affected because of the controlled-access on Airport Way.

Option 3 is consistent with most of the objectives of the planning studies. The purpose of the Airport Way Reconnaissance Study and the MTP were to develop alternatives to mitigate the deficiencies identified on the corridor. Of all the proposed options, Option 3 would provide the most operational benefit, while mitigating the identified safety concerns. To reduce the pedestrian crossing distance increased by the positive offset left-turn lanes and be consistent with the NMTP's objective to improve the safety of non-motorized transportation, it is recommended that the left-turns be offset to meet but not exceed the required sight distance. Option 3 is inconsistent with the roundabout proposed in the Vision Fairbanks Downtown Plan but has the potential to be landscaped in such a way to serve as a gateway to the downtown area.

Figure 19 on page 54 presents a preliminary concept with recommended lane geometry. The proposed posted speed is 45 mph on Airport Way, 25 mph on Cushman Street north of Airport Way, and 30 mph on Cushman Street south of Airport Way. This concept widens Airport Way to the north to accommodate the offset left-turn lanes. To preserve the two-way use of the 14th Avenue frontage roads, it was necessary to widen Airport Way to the north, as opposed to the south. This concept widens the northbound approach to include a left-turn lane, two through lanes, and a right-turn lane. The widening occurs on both sides of the Cushman Street to allow the southbound approach to remain on its existing alignment. This concept was used to estimate the approximate cost of construction, which is shown in Table 28 on page 55.

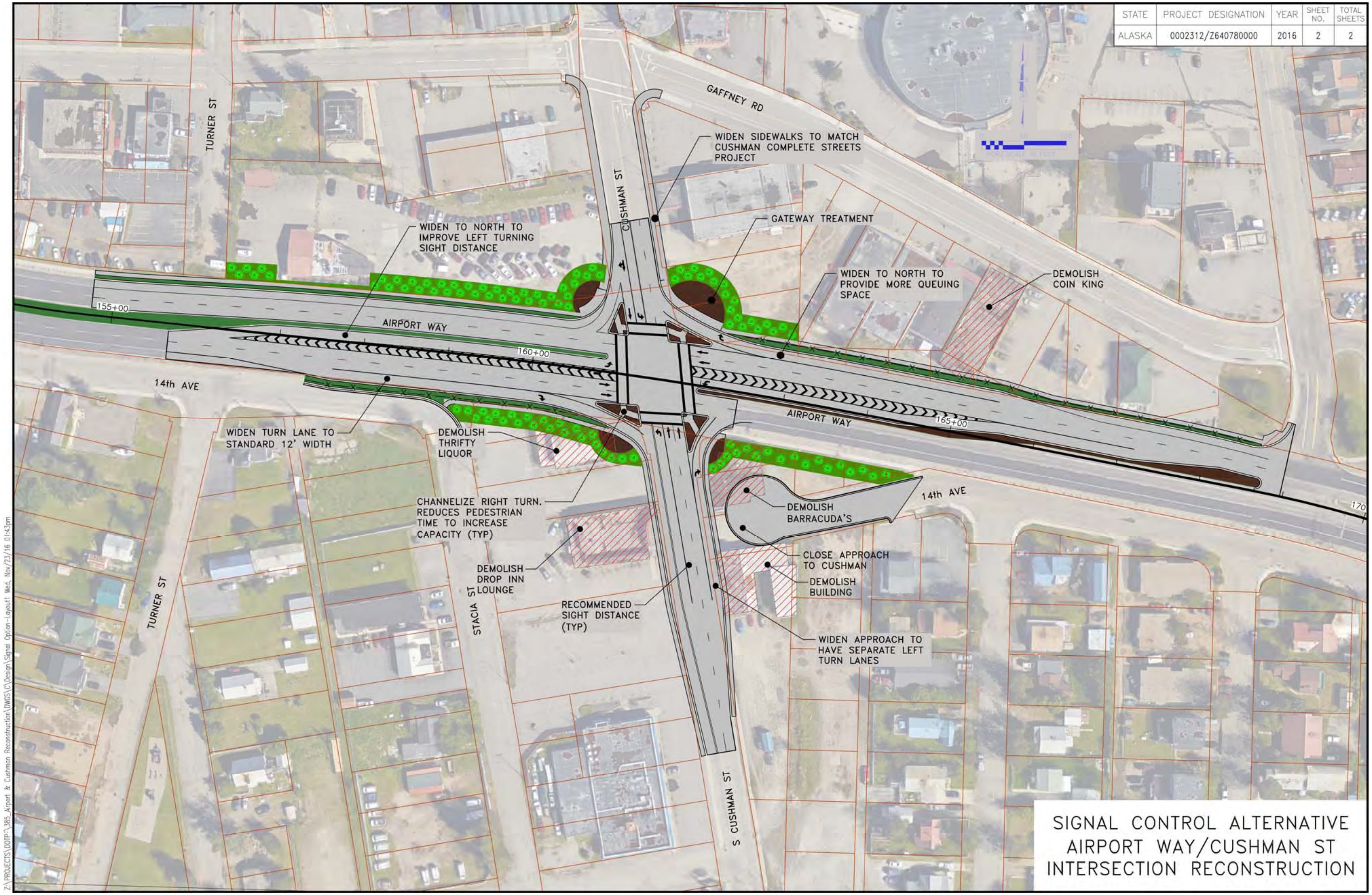


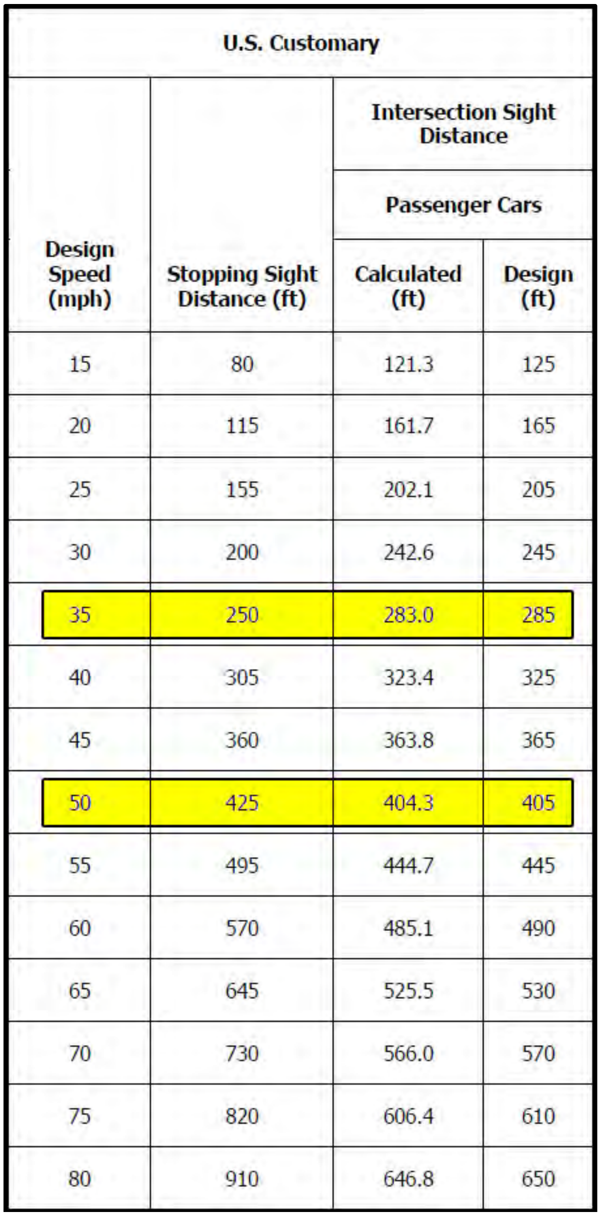
Figure 19: Recommended Design Configuration

Item	Cost
Construction	$6,400,000
Right-of-Way	$3,034,000
Building Demolition & Business Relocation	$530,000
Utilities	$1,170,000
Total	**$11,134,000**

Table 28: Cost Estimates for Recommended Option

To accommodate this concept, right-of-way will be required from 24 parcels. Five buildings will need to be partially or completely demolished. However, it may be possible to adjust the improvements to avoid certain buildings or impacts. Utility impacts include relocating 10 utility poles, a fire hydrant, a gas line along South Cushman Street, and the communications duct bank in the east sidewalk on South Cushman Street.

Positive left-turn offsets increase the pedestrian crossing distances on the approaches. To minimize the increase in crossing distance, it is recommended that the offsets be designed to provide the required sight distance but not to exceed the required offset distance. AASHTO's PGDSH has guidelines for intersection sight distances. Figure 20 on page 56 presents the recommendations used to determine the left-turn sight distances.



U.S. Customary			
		Intersection Sight Distance	
		Passenger Cars	
Design Speed (mph)	Stopping Sight Distance (ft)	Calculated (ft)	Design (ft)
15	80	121.3	125
20	115	161.7	165
25	155	202.1	205
30	200	242.6	245
35	250	283.0	285
40	305	323.4	325
45	360	363.8	365
50	425	404.3	405
55	495	444.7	445
60	570	485.1	490
65	645	525.5	530
70	730	566.0	570
75	820	606.4	610
80	910	646.8	650

Note: Modified from AASHTO PGDHS Table 9-14

Figure 20: Sight Distance Recommendations - Case F

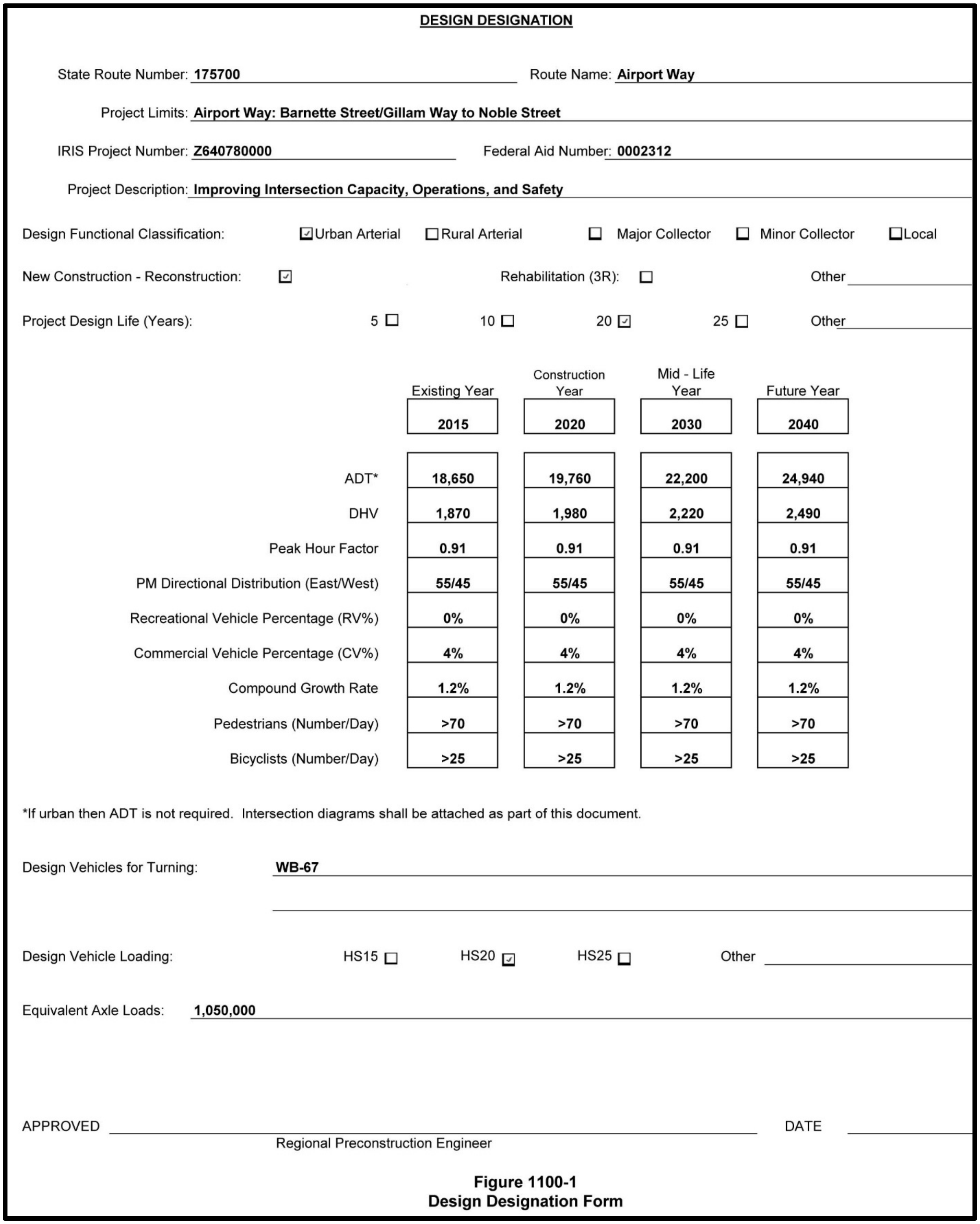
Airport Way has a 50 mph design speed and Cushman Street has a 35 mph design speed. The recommended sight distances are 425 feet for eastbound and westbound left turns, 285 feet for northbound left turns, and 310 feet for southbound left-turns. 310 feet is recommended for the southbound left-turns so that the sight distance would reach the center of the opposing through lanes. Figure C-1 on page 77 in Appendix C presents the area of visibility of each left-turn approach for the recommended lane geometry. The figure shows that all left-turn approaches have adequate sight distance.

Appendix A on page 58 presents the design designation elements for the Airport Way intersection with Cushman Street. The design designation forms are shown in Figure A-1 through Figure A-3.

7 References

- *Alaska Highway Safety Improvement Program Handbook 16th Edition*, DOT&PF, 2016.
- *Airport Way Improvements Reconnaissance Study*, Final Report, January 2007.
- Crash Modification Factor Clearinghouse. U.S. Department of Transportation Federal Highway Administration. Web. 16 May 2016. <http://www.cmfclearinghouse.org>.
- *FMATS Non-Motorized Transportation Plan*, Fairbanks Metropolitan Area Transportation System, March 2012.
- *A Policy on Geometric Design of Streets and Highways*, American Association of State Highway and Transportation Officials, 2011.
- *Fairbanks Metro 2040*, Fairbanks Metropolitan Area Transportation System, January 2015.
- *NCHRP Report 208: Design Guidance for Channelized Right-Turn Lanes*. Potts, et al. Transportation Research Board, 2011
- *NCHRP Report 279: Intersection Channelization Design Guide*. Neuman; Transportation Research Board, 1985.
- *NCHRP Report 765: Highway Analytical Travel Forecasting Approaches for Project-Level Planning and Design: Traffic Data for Urbanized Area Project Planning and Design*, Pederson and Samdahl; Transportation Research Board, 2014.
- *NCHRP Synthesis Report 225: Left-Turn Treatments at Intersections*, Pline; Transportation Research Board, 1996.
- *Northern Region Annual Traffic Report*, DOT&PF, Volumes for 2004 to 2014.
- *Vision Fairbanks Downtown Plan*, Downtown Association of Fairbanks, 2008.

Appendix A Design Designations



DESIGN DESIGNATION

State Route Number: **175700** Route Name: **Airport Way**

Project Limits: **Airport Way: Barnette Street/Gillam Way to Noble Street**

IRIS Project Number: **Z640780000** Federal Aid Number: **0002312**

Project Description: **Improving Intersection Capacity, Operations, and Safety**

Design Functional Classification: ☑ Urban Arterial ☐ Rural Arterial ☐ Major Collector ☐ Minor Collector ☐ Local

New Construction - Reconstruction: ☑ Rehabilitation (3R): ☐ Other

Project Design Life (Years): 5 ☐ 10 ☐ 20 ☑ 25 ☐ Other

	Existing Year	Construction Year	Mid - Life Year	Future Year
	2015	**2020**	**2030**	**2040**
ADT*	**18,650**	**19,760**	**22,200**	**24,940**
DHV	**1,870**	**1,980**	**2,220**	**2,490**
Peak Hour Factor	**0.91**	**0.91**	**0.91**	**0.91**
PM Directional Distribution (East/West)	**55/45**	**55/45**	**55/45**	**55/45**
Recreational Vehicle Percentage (RV%)	**0%**	**0%**	**0%**	**0%**
Commercial Vehicle Percentage (CV%)	**4%**	**4%**	**4%**	**4%**
Compound Growth Rate	**1.2%**	**1.2%**	**1.2%**	**1.2%**
Pedestrians (Number/Day)	**>70**	**>70**	**>70**	**>70**
Bicyclists (Number/Day)	**>25**	**>25**	**>25**	**>25**

*If urban then ADT is not required. Intersection diagrams shall be attached as part of this document.

Design Vehicles for Turning: **WB-67**

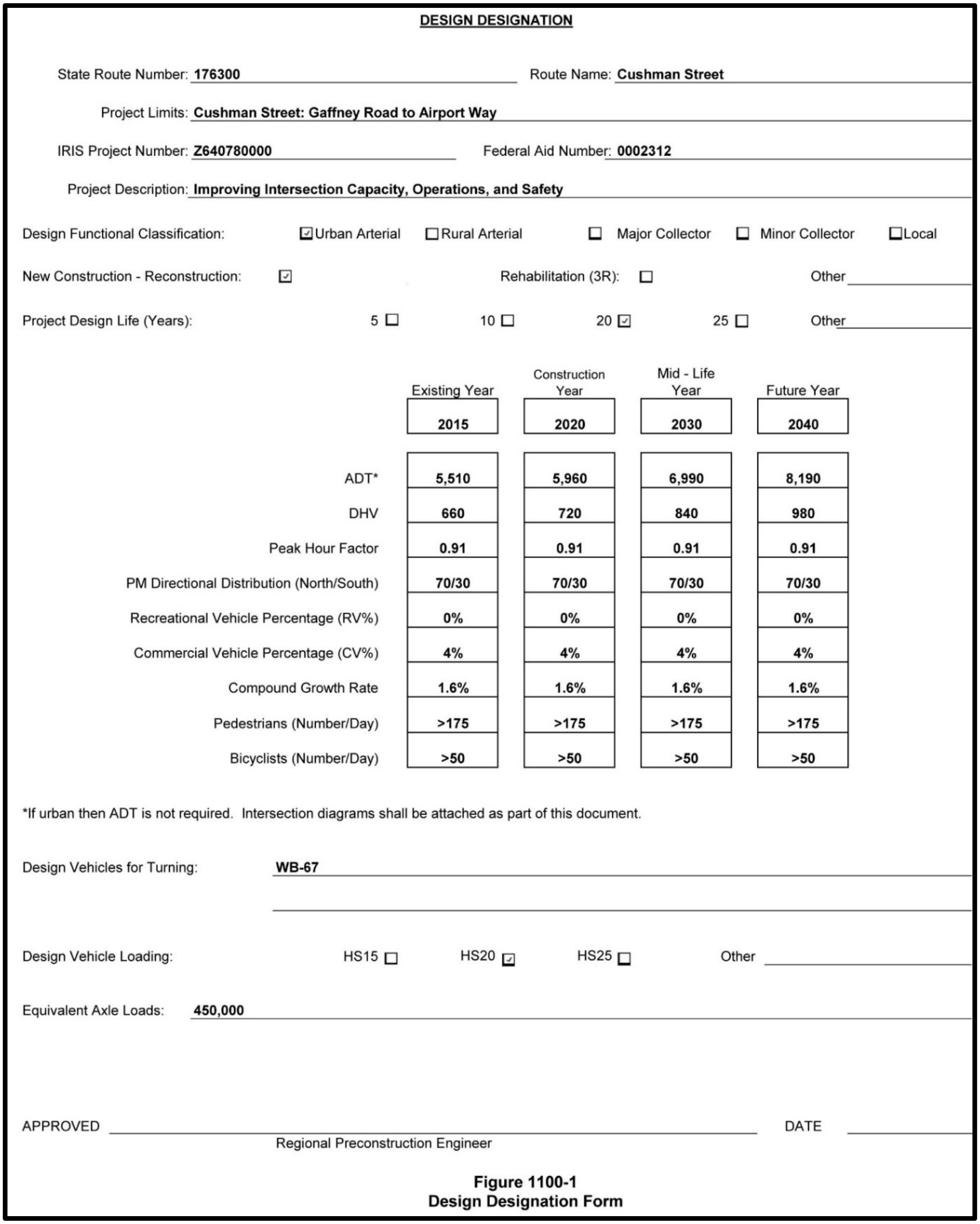
Design Vehicle Loading: HS15 ☐ HS20 ☑ HS25 ☐ Other

Equivalent Axle Loads: **1,050,000**

APPROVED ______________________ DATE __________
Regional Preconstruction Engineer

Figure 1100-1
Design Designation Form

Figure A-1: Design Designations Form - Airport Way: Barnette Street/Gillam Way to Noble Street



DESIGN DESIGNATION

State Route Number: **176300** Route Name: **Cushman Street**

Project Limits: **Cushman Street: Gaffney Road to Airport Way**

IRIS Project Number: **Z640780000** Federal Aid Number: **0002312**

Project Description: **Improving Intersection Capacity, Operations, and Safety**

Design Functional Classification: ☑ Urban Arterial ☐ Rural Arterial ☐ Major Collector ☐ Minor Collector ☐ Local

New Construction - Reconstruction: ☑ Rehabilitation (3R): ☐ Other

Project Design Life (Years): 5 ☐ 10 ☐ 20 ☑ 25 ☐ Other

	Existing Year	Construction Year	Mid - Life Year	Future Year
	2015	**2020**	**2030**	**2040**
ADT*	**5,510**	**5,960**	**6,990**	**8,190**
DHV	**660**	**720**	**840**	**980**
Peak Hour Factor	**0.91**	**0.91**	**0.91**	**0.91**
PM Directional Distribution (North/South)	**70/30**	**70/30**	**70/30**	**70/30**
Recreational Vehicle Percentage (RV%)	**0%**	**0%**	**0%**	**0%**
Commercial Vehicle Percentage (CV%)	**4%**	**4%**	**4%**	**4%**
Compound Growth Rate	**1.6%**	**1.6%**	**1.6%**	**1.6%**
Pedestrians (Number/Day)	**>175**	**>175**	**>175**	**>175**
Bicyclists (Number/Day)	**>50**	**>50**	**>50**	**>50**

*If urban then ADT is not required. Intersection diagrams shall be attached as part of this document.

Design Vehicles for Turning: **WB-67**

Design Vehicle Loading: HS15 ☐ HS20 ☑ HS25 ☐ Other

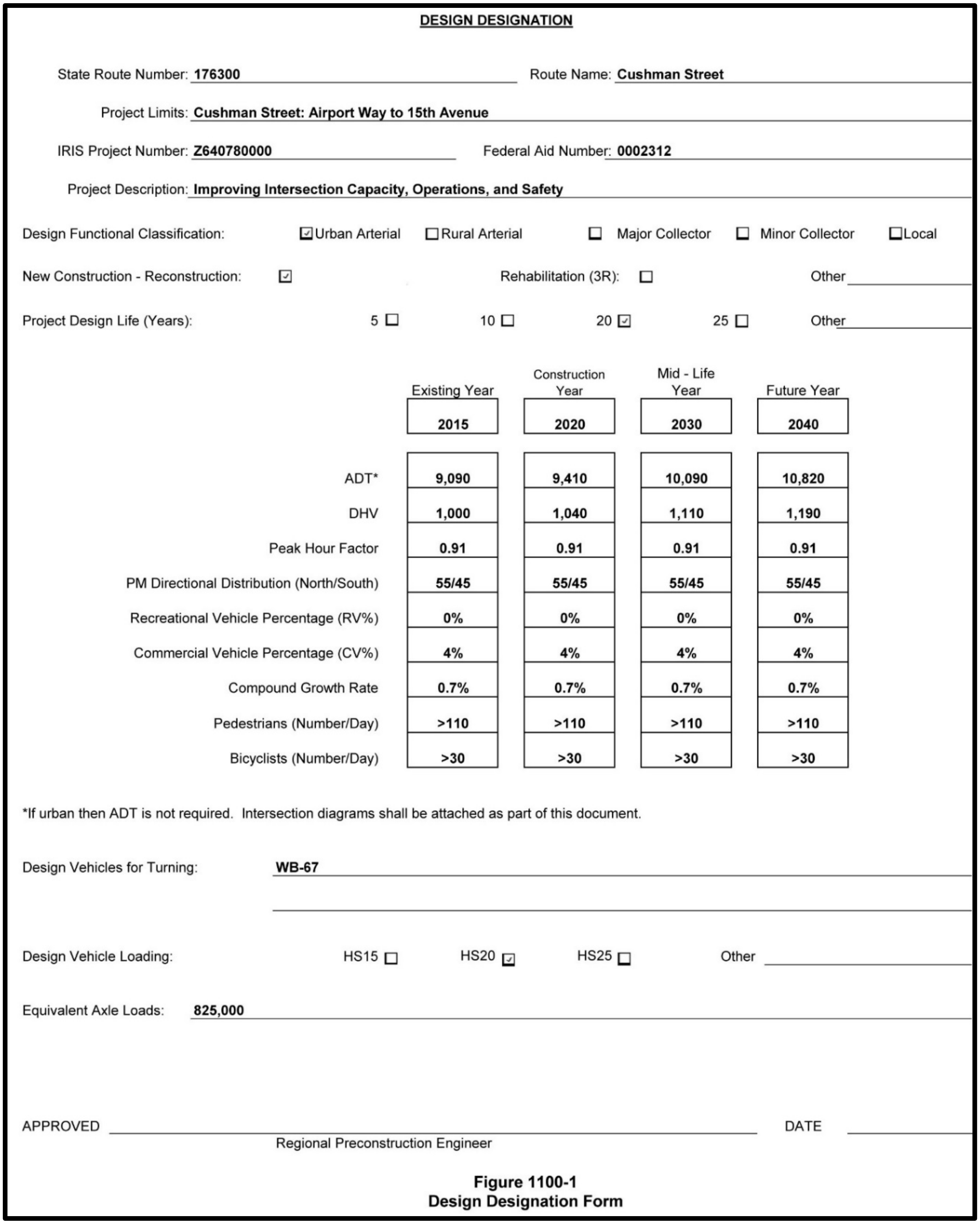
Equivalent Axle Loads: **450,000**

APPROVED DATE

Regional Preconstruction Engineer

Figure 1100-1
Design Designation Form

Figure A-2: Design Designation Form - Cushman Street: Gaffney Road to Airport Way



DESIGN DESIGNATION

State Route Number: **176300** Route Name: **Cushman Street**

Project Limits: **Cushman Street: Airport Way to 15th Avenue**

IRIS Project Number: **Z640780000** Federal Aid Number: **0002312**

Project Description: **Improving Intersection Capacity, Operations, and Safety**

Design Functional Classification: ☑ Urban Arterial ☐ Rural Arterial ☐ Major Collector ☐ Minor Collector ☐ Local

New Construction - Reconstruction: ☑ Rehabilitation (3R): ☐ Other ______

Project Design Life (Years): 5 ☐ 10 ☐ 20 ☑ 25 ☐ Other ______

	Existing Year	Construction Year	Mid - Life Year	Future Year
	2015	**2020**	**2030**	**2040**
ADT*	**9,090**	**9,410**	**10,090**	**10,820**
DHV	**1,000**	**1,040**	**1,110**	**1,190**
Peak Hour Factor	**0.91**	**0.91**	**0.91**	**0.91**
PM Directional Distribution (North/South)	**55/45**	**55/45**	**55/45**	**55/45**
Recreational Vehicle Percentage (RV%)	**0%**	**0%**	**0%**	**0%**
Commercial Vehicle Percentage (CV%)	**4%**	**4%**	**4%**	**4%**
Compound Growth Rate	**0.7%**	**0.7%**	**0.7%**	**0.7%**
Pedestrians (Number/Day)	**>110**	**>110**	**>110**	**>110**
Bicyclists (Number/Day)	**>30**	**>30**	**>30**	**>30**

*If urban then ADT is not required. Intersection diagrams shall be attached as part of this document.

Design Vehicles for Turning: **WB-67**

Design Vehicle Loading: HS15 ☐ HS20 ☑ HS25 ☐ Other ______

Equivalent Axle Loads: **825,000**

APPROVED ______________________ DATE ______
Regional Preconstruction Engineer

Figure 1100-1
Design Designation Form

Figure A-3: Design Designation Form - Cushman Street: Airport Way to 15th Avenue east

This section summarizes the main points of the Design Designations elements for this project. The following address each of the design designations elements:

- Segment Limits
- Design Functional Classification and Area Type
- Construction Type
- Design Life
- Compound Growth Rate
- Traffic Volumes
    - AADT
    - Peak hour TMVs
- Design Hour Volume
- Peak Hour Factor
- Directional Distribution Percent
- Percent Recreational Vehicles
- Percent Commercial Trucks
- Pedestrian and Bicyclists
- Equivalent Single Axle Loads

Segment Limits

The design designations are divided into three segments. The extents of each segment are shown in Table A-1.

Roadway	Segment Limits
Airport Way	From Barnette Street/Gillam Way to Noble Street
Cushman Street	From Gaffney Road to Airport Way
Cushman Street	From Airport Way to 15th Avenue east

Table A-1: Project Segment Identifications

Design Functional Classification and Area Type

The functional classification and area type of Airport Way and Cushman Street are discussed in Section 3.1 on page 7. The recommended Functional Classifications for each segment are presented in Table A-2.

Segment	Area Type	Functional Classification
Airport Way: Barnette St/Gillam Way to Noble St	Urban	Principal Arterial
Cushman St: Gaffney Rd to Airport Way	Urban	Minor Arterial
Cushman St: Airport Way to 15th Ave	Urban	Minor Arterial

Table A-2: Project Segment Functional Classifications

Construction Type

The project will be a reconstruction project.

Project Design Life

The project design life is 20 years. The "existing" or base year is 2015. For the purposes of this report, the construction year will be 2020, the mid-life year will be 2030, and the design year will be 2040.

Compound Growth Rate

The design year volumes were taken from the FMATS 2040 travel demand model. The 2040 volumes were compared to the recorded 2013 volumes to determine compound growth rates on each segment. Table A-3 presents the growth rates for Airport Way and Cushman Street segments.

Segment	Growth Rate
Airport Way: Barnette St/Gillam Way to Noble St	1.2%
Cushman St: Gaffney Rd to Airport Way	1.6%
Cushman St: Airport Way to 15th Ave	0.7%

Table A-3: Project Segment Compound Growth Rates

Annual Average Daily Traffic Volumes

The traffic volumes on Airport Way and Cushman Street have been steadily declining since 2012. Since the cause of the decrease in volume is unknown, it is reasonable to assume that the volumes, which existed before the decline, could return in the future, especially after the completion of the Cushman Complete Streets project and after improvements to the intersection have been made. Therefore, the "existing year" volumes were taken as the average AADT for the past 5 years of volume reporting.

The design volume AADTs for Airport Way and Cushman Street are presented in Table A-4. Figure A-4 through Figure A-6 present the design TMVs.

Segment	Year			
	2015	2020	2030	2040
Airport Way: Barnette St/ Gillam Way to Noble St	18,650	19,760	22,200	24,940
Cushman St: Gaffney Rd to Airport Way	5,510	5,960	6,990	8,190
Cushman St: Airport Way to 15th Ave	9,090	9,410	10,090	10,820

Table A-4: AADT Design Volumes

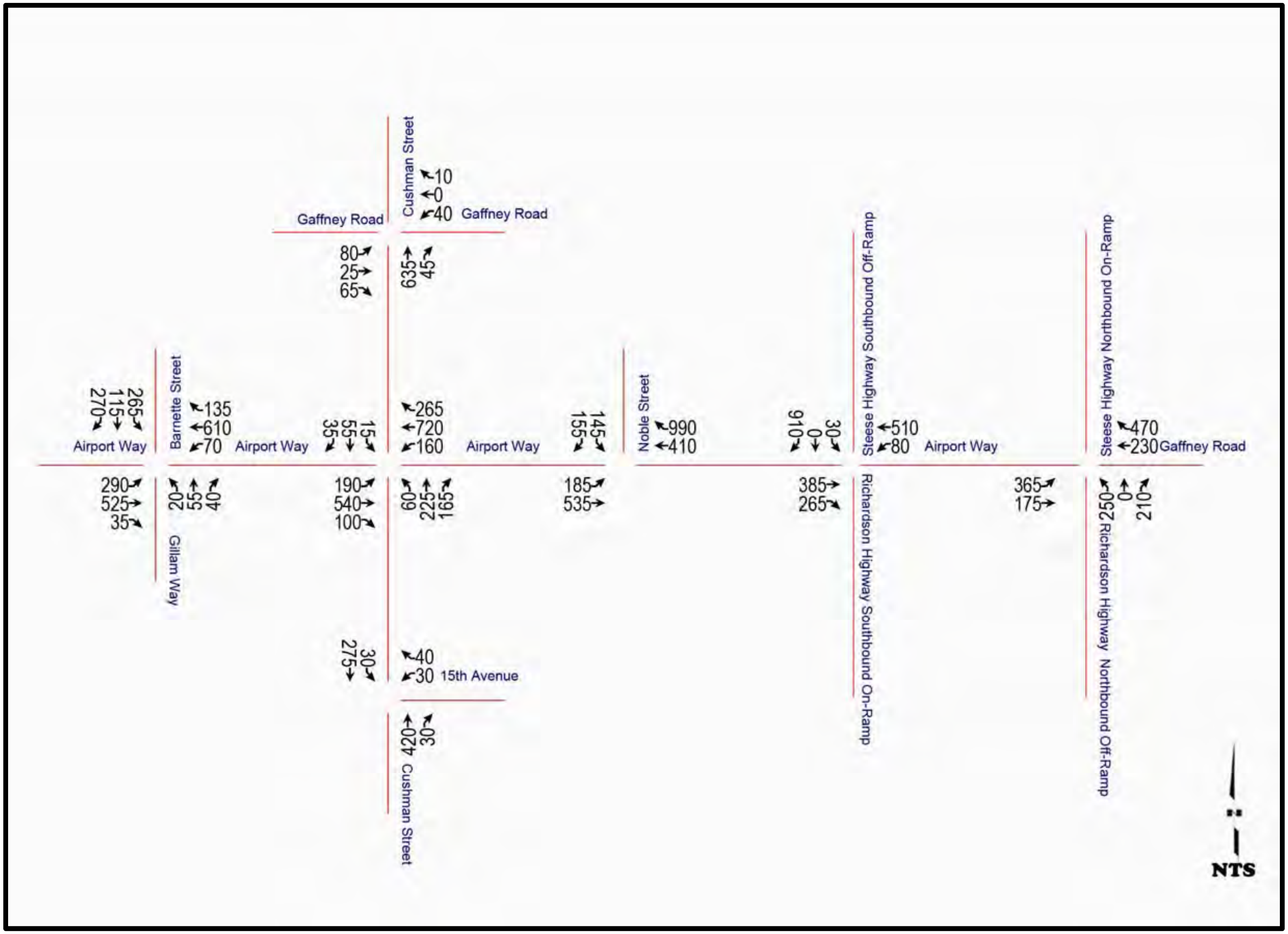


Figure A-4: 2040 AM Turning Movement Volumes Forecasts

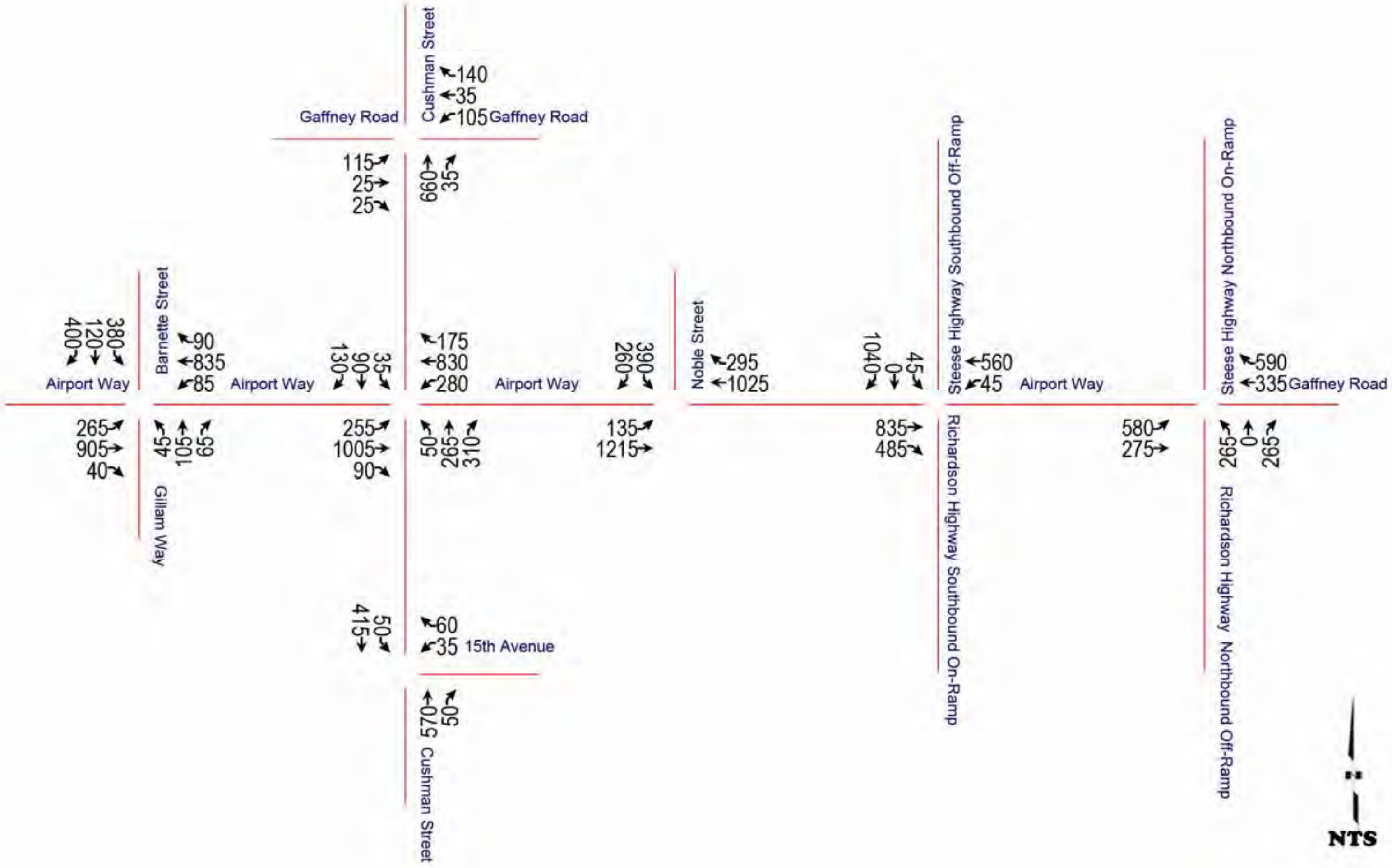


Figure A-5: 2040 Noon Turning Movement Volumes Forecasts

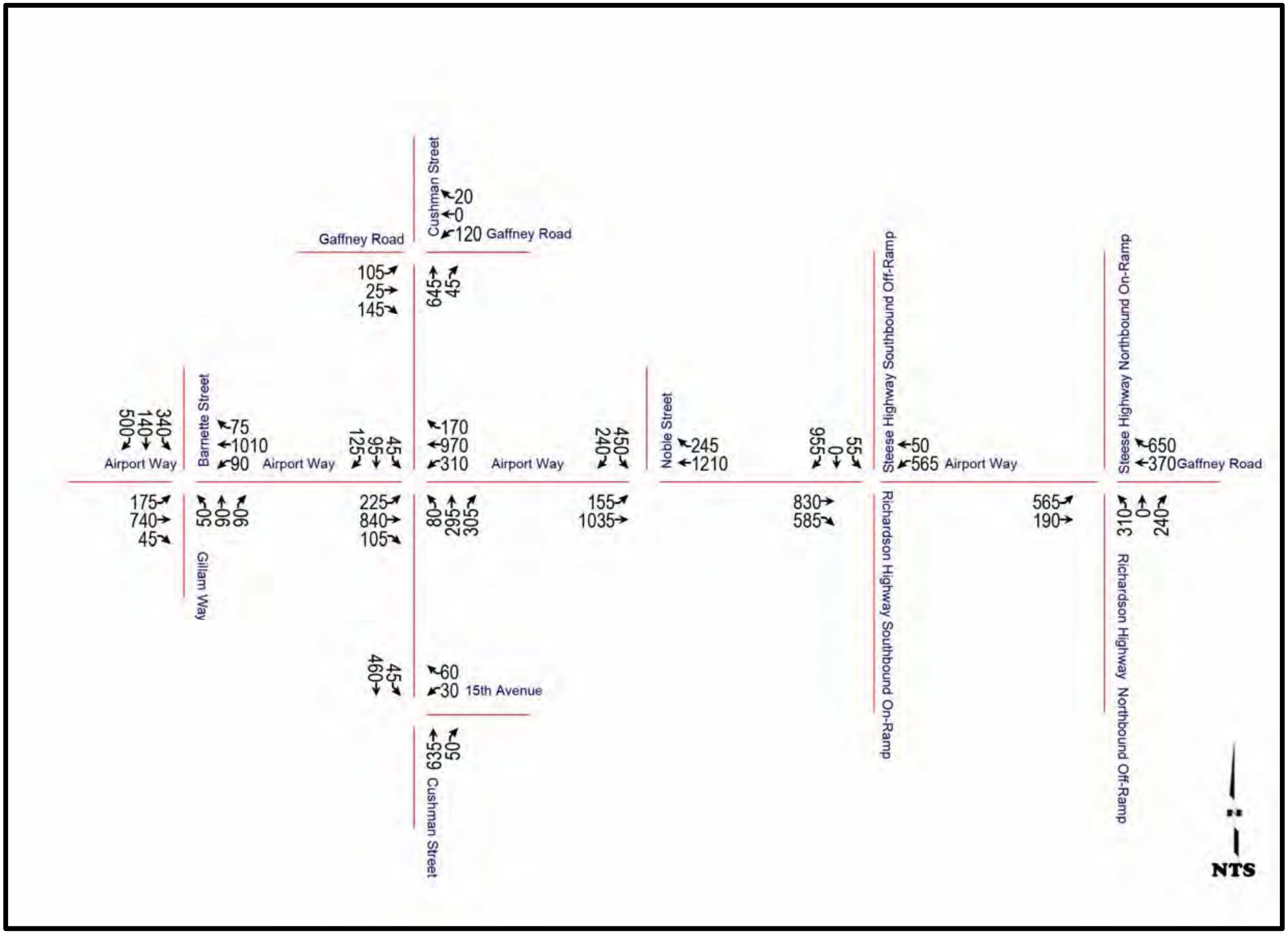


Figure A-6: 2040 PM Turning Movement Volumes Forecasts

Design Hour Volume Percentage

The intent of the design hour volume (DHV) percentage is to represent an approximate peak hour volume for design, which is greater than approximately 85% of the annual peak hours.

The DHV percentage for the Airport Way at Cushman Street intersection segments were calculated using the turning movement counts and comparing the peak hour traffic to historical AADT traffic. Table A-5 presents the DHV percentage of the segments.

Segment	DHV Percentage
Airport Way: Barnette St/Gillam Way to Noble St	10%
Cushman St: Gaffney Rd to Airport Way	12%
Cushman St: Airport Way to 15th Ave	11%

Table A-5: Design Hour Volume Percentages

Peak Hour Factors

The existing year PHFs are summarized in Table 11 on page 18. The Airport Way at Cushman Street intersection currently operates with an approximate PHF of 0.91 during the weekday PM peak hour.

Directional Distribution Percent

Directional distribution percentages (DD%) are used to adjust peak hour volumes into directional volumes on road segments. DD% was determined from the turning movement counts for the Airport Way intersection at Cushman Street. The directional distribution for each segment is presented in Table A-6.

Segment	Direction	Distribution
Airport Way: Barnette St/Gillam Way to Noble St	East/West	55/45
Cushman St: Gaffney Rd to Airport Way	North/South	55/45
Cushman St: Airport Way to 15th Ave	North/South	70/30

Table A-6: Recommended Directional Distributions

Heavy Vehicle Percentages

The heavy vehicle percentage (HV%) is the percentage of the AADT that is made up of heavy vehicles. The HV% is used in capacity analysis and in the calculation of equivalent single axle loads (ESALs) for pavement design.

The HV% for Airport Way was determined using historical data from the permanent traffic recorder (PTR) on Airport Way between Noble Street and the Steese Expressway.

The design designation forms report the commercial vehicle percentage (CV%) and recreational vehicle percentage (RV%), not HV%. The HV% reported in the Annual Traffic Reports do not distinguish between commercial and recreational vehicles. An RV% of 0% was used in the design designations forms. Table A-7 presents the recommended heavy vehicle percentages.

Segment	RV% of AADT	CV% of AADT
Airport Way: Barnette St/Gillam Way to Noble St	0%	4%
Cushman St: Gaffney Rd to Airport Way	0%	4%
Cushman St: Airport Way to 15th Ave	0%	4%

Table A-7: Recommended Heavy Vehicle Percentages

Pedestrian and Bicyclists

The turning movement counts at the Airport Way intersection with Cushman Street included 8-hours of pedestrian and bicycle traffic, including major peak periods. As such, it can be concluded that most of the pedestrian and bicycle traffic were captured during the 8-hour count period. Table 14 on page 21 presents the total 8-hour count observed at the Airport Way intersection with Cushman Street and Table 15 on page 21 presents the counts during the morning, midday, and evening peak hours.

Equivalent Single Axle Loads

ESALs are used for pavement design using DOT&PF calculation methods and forms.

These calculations require the percent of truck type according to axle grouping. The following tables present the calculated axle grouping distribution used to calculate ESALs for Airport Way and Cushman Street.

Truck Axles	Percent of AADT
2	3.75%
3	0.16%
4	0.03%
5	0.05%
6	0.00%
Total HV%	4%

Table A-8: Percent of Truck Axles per AADT on Airport Way

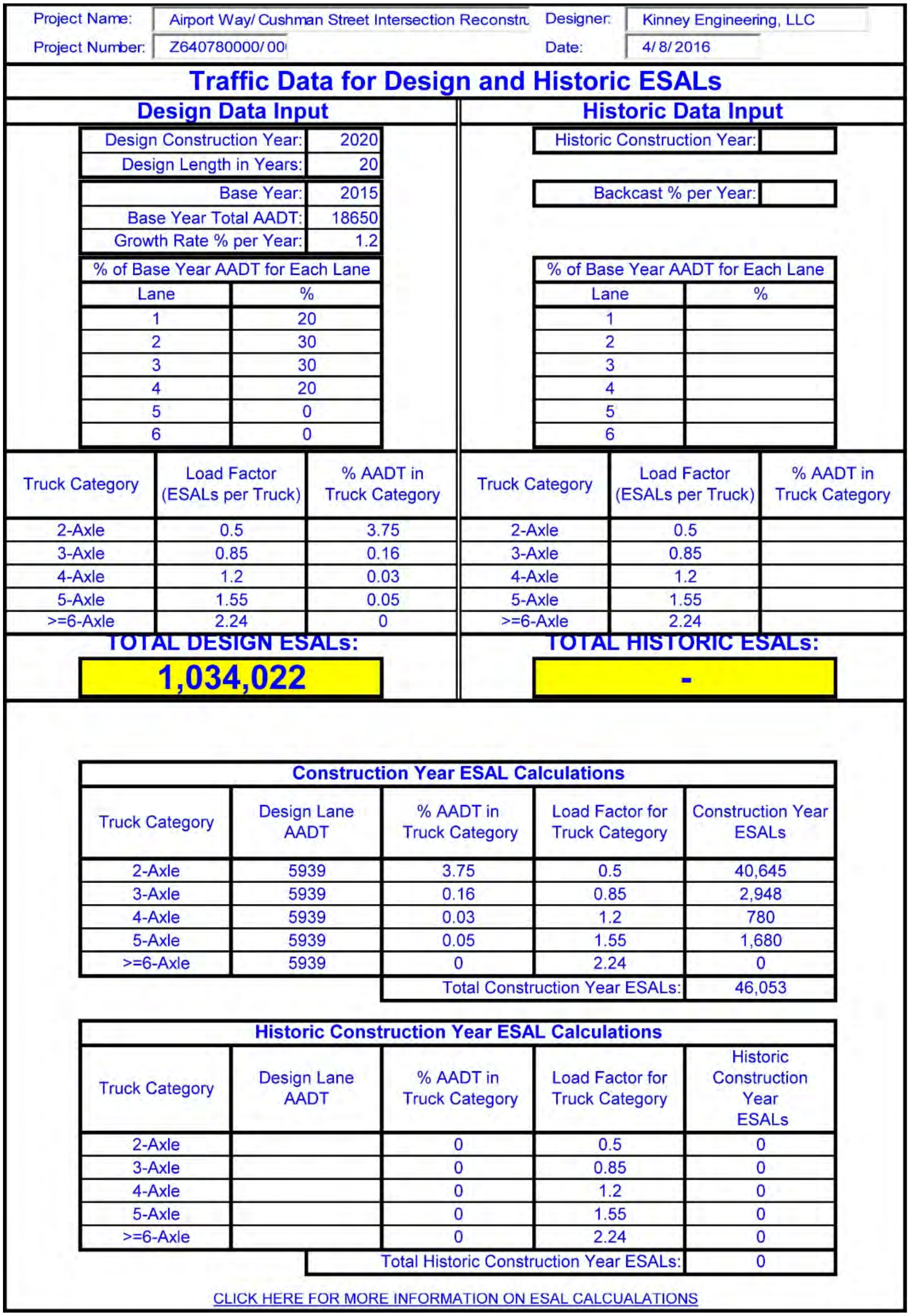
Truck Axles	Percent of AADT
2	3.32%
3	0.55%
4	0.03%
5	0.02%
6	0.00%
Total HV%	4%

Table A-9: Percent of Truck Axles per AADT on Cushman Street

The summary of design ESALs recommended for the life of the project is presented in Table A-10. Figure A-7 to Figure A-9 present the ESAL computation sheets for each segment.

Segment	**20-Year Design ESALs (2020 to 2040)**
	Steese Interchange
Airport Way: Barnette St/Gillam Way to Noble St	1,050,000
Cushman St: Gaffney Rd to Airport Way	450,000
Cushman St: Airport Way to 15th Ave	825,000

Table A-10: Design ESALs



Project Name:	Airport Way/ Cushman Street Intersection Reconstru	Designer:	Kinney Engineering, LLC
Project Number:	Z640780000/ 00	Date:	4/ 8/ 2016

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2020
Design Length in Years:	20
Base Year:	2015
Base Year Total AADT:	18650
Growth Rate % per Year:	1.2

% of Base Year AADT for Each Lane

Lane	%
1	20
2	30
3	30
4	20
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	3.75
3-Axle	0.85	0.16
4-Axle	1.2	0.03
5-Axle	1.55	0.05
>=6-Axle	2.24	0

TOTAL DESIGN ESALs:

1,034,022

Historic Data Input

Historic Construction Year:	
Backcast % per Year:	

% of Base Year AADT for Each Lane

Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	
3-Axle	0.85	
4-Axle	1.2	
5-Axle	1.55	
>=6-Axle	2.24	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

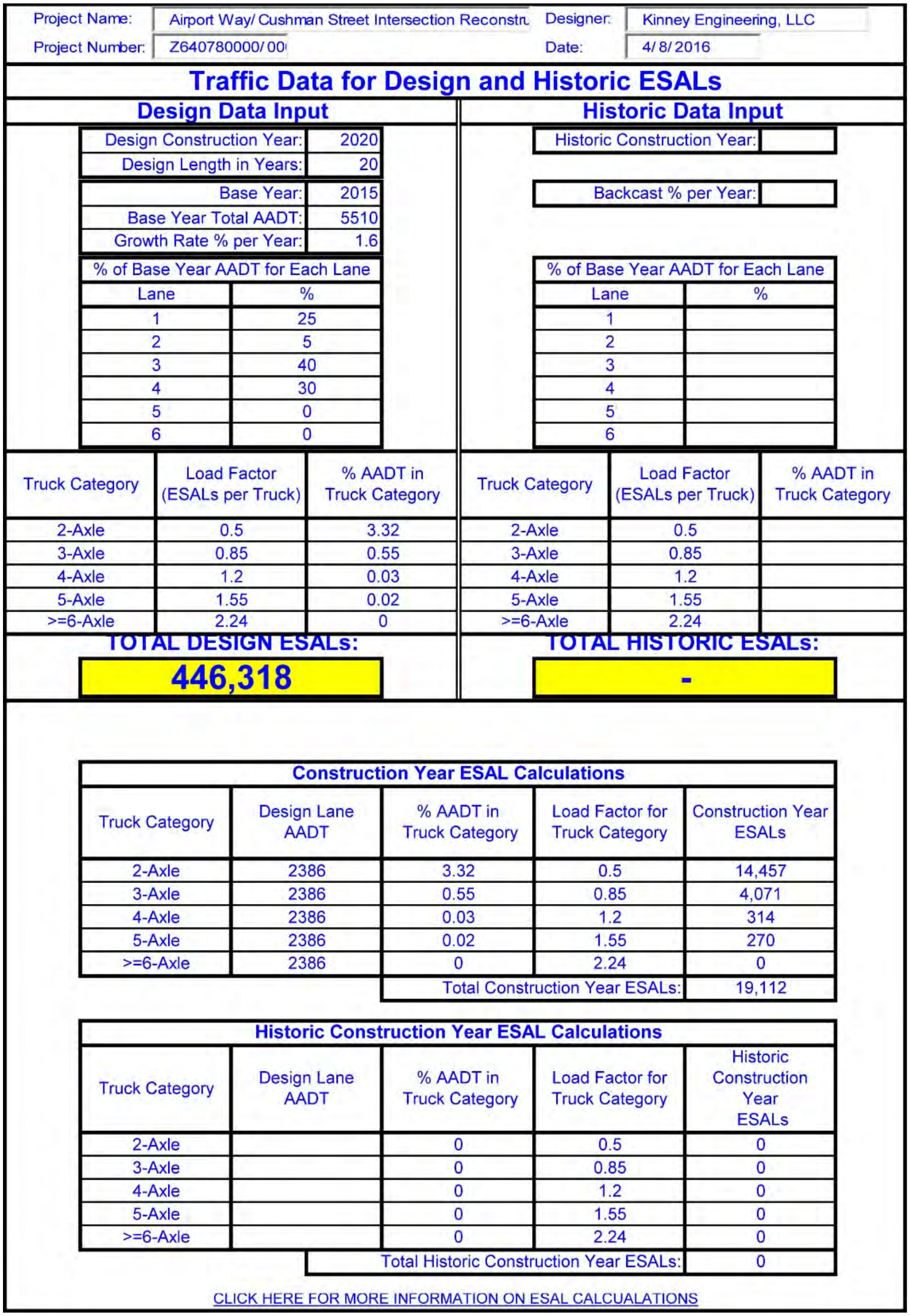
Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	5939	3.75	0.5	40,645
3-Axle	5939	0.16	0.85	2,948
4-Axle	5939	0.03	1.2	780
5-Axle	5939	0.05	1.55	1,680
>=6-Axle	5939	0	2.24	0
		Total Construction Year ESALs:		46,053

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
2-Axle		0	0.5	0
3-Axle		0	0.85	0
4-Axle		0	1.2	0
5-Axle		0	1.55	0
>=6-Axle		0	2.24	0
		Total Historic Construction Year ESALs:		0

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Figure A-7: 20-Year ESAL Calculation - Airport Way: Barnette Street/Gillam Way to Noble Street



Project Name:	Airport Way/ Cushman Street Intersection Reconstru	Designer:	Kinney Engineering, LLC
Project Number:	Z640780000/ 00	Date:	4/ 8/ 2016

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2020
Design Length in Years:	20
Base Year:	2015
Base Year Total AADT:	5510
Growth Rate % per Year:	1.6

% of Base Year AADT for Each Lane

Lane	%
1	25
2	5
3	40
4	30
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	3.32
3-Axle	0.85	0.55
4-Axle	1.2	0.03
5-Axle	1.55	0.02
>=6-Axle	2.24	0

TOTAL DESIGN ESALs:

446,318

Historic Data Input

Historic Construction Year:	
Backcast % per Year:	

% of Base Year AADT for Each Lane

Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	
3-Axle	0.85	
4-Axle	1.2	
5-Axle	1.55	
>=6-Axle	2.24	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

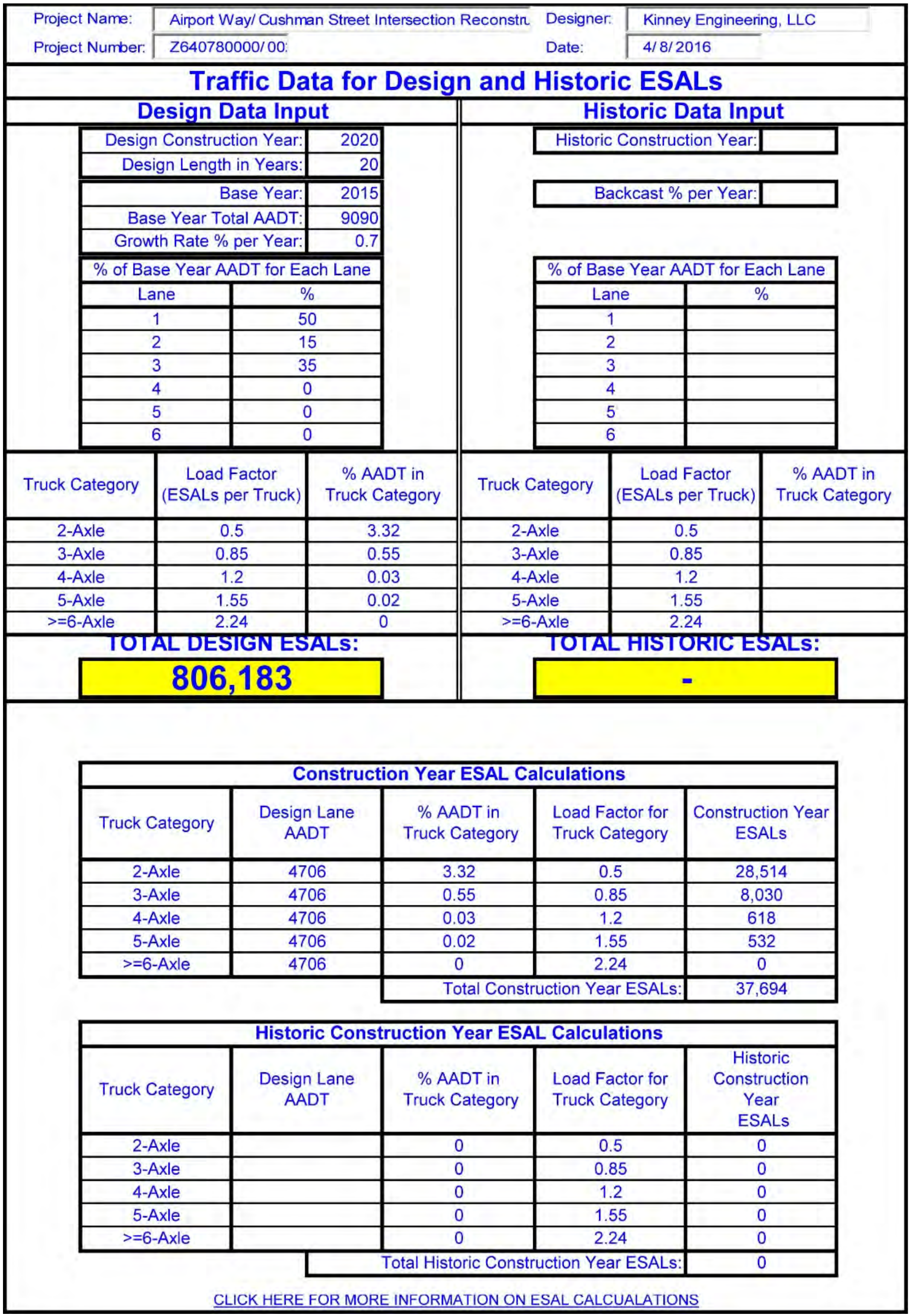
Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	2386	3.32	0.5	14,457
3-Axle	2386	0.55	0.85	4,071
4-Axle	2386	0.03	1.2	314
5-Axle	2386	0.02	1.55	270
>=6-Axle	2386	0	2.24	0
		Total Construction Year ESALs:		19,112

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
2-Axle		0	0.5	0
3-Axle		0	0.85	0
4-Axle		0	1.2	0
5-Axle		0	1.55	0
>=6-Axle		0	2.24	0
	Total Historic Construction Year ESALs:			0

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Figure A-8: 20-Year ESAL Calculation - Cushman Street: Gaffney Road to Airport Way



Project Name:	Airport Way/ Cushman Street Intersection Reconstru	Designer:	Kinney Engineering, LLC
Project Number:	Z640780000/ 00:	Date:	4/ 8/ 2016

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2020
Design Length in Years:	20
Base Year:	2015
Base Year Total AADT:	9090
Growth Rate % per Year:	0.7

% of Base Year AADT for Each Lane

Lane	%
1	50
2	15
3	35
4	0
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	3.32
3-Axle	0.85	0.55
4-Axle	1.2	0.03
5-Axle	1.55	0.02
>=6-Axle	2.24	0

TOTAL DESIGN ESALs:

806,183

Historic Data Input

Historic Construction Year:	
Backcast % per Year:	

% of Base Year AADT for Each Lane

Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	
3-Axle	0.85	
4-Axle	1.2	
5-Axle	1.55	
>=6-Axle	2.24	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	4706	3.32	0.5	28,514
3-Axle	4706	0.55	0.85	8,030
4-Axle	4706	0.03	1.2	618
5-Axle	4706	0.02	1.55	532
>=6-Axle	4706	0	2.24	0
		Total Construction Year ESALs:		37,694

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
2-Axle		0	0.5	0
3-Axle		0	0.85	0
4-Axle		0	1.2	0
5-Axle		0	1.55	0
>=6-Axle		0	2.24	0
	Total Historic Construction Year ESALs:			0

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Figure A-9: 20-Year ESAL Calculation - Cushman Street: Airport Way to 15th Avenue east

Appendix B Steese Expressway At-Grade Intersection Analysis

The following section presents the results of the analysis for the signal options using the data from an FMATS travel demand model altered to include an at-grade intersection rather than a new interchange at the intersection of Steese Highway and Airport Way and Cushman Street.

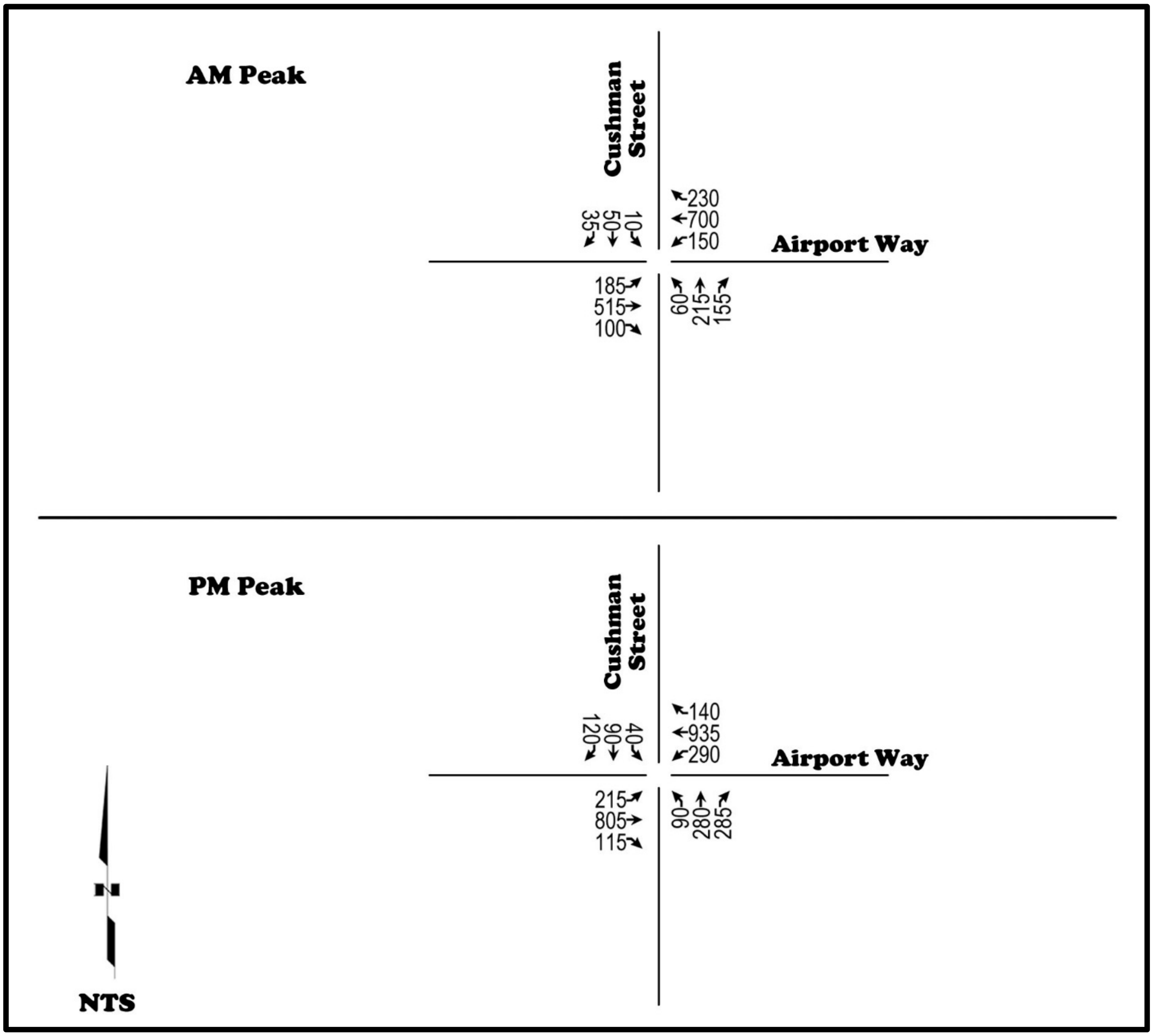


Figure B-1: 2040 Turning Movement Volumes under Steese Expressway At-Grade Intersection Scenario

Approach	**Movement**	**AM Peak**				**PM Peak**			
		V/C Ratio	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**
Northbound	**Left+Thru and Thru+Right**	0.7	200	39	D	**1.0**	**500**	**82**	**F**
Southbound	Left	0.1	25	29	C	0.6	75	38	D
	Thru+Right	0.2	50	29	C	0.4	175	31	C
Eastbound	Left	0.5	125	17	B	0.8	175	40	D
	Thru	0.4	125	12	B	0.7	275	25	C
	Right	0.1	< 25	5	A	0.1	< 25	7	A
Westbound	**Left**	0.4	100	15	B	**0.8**	**275**	**57**	**E**
	Thru	0.5	175	18	B	0.7	175	17	B
	Right	0.2	75	30	C	0.1	25	11	B
Intersection		**0.6**		**21**	**C**	**0.9**		**37**	**D**

Table B-1: 2040 No Build - Intersection Delay

Approach	**Movement**	**AM Peak**				**PM Peak**			
		V/C Ratio	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**
Northbound	Left	0.2	75	31	C	0.6	125	43	D
	Thru	0.6	200	38	D	**0.8**	**300**	**56**	**E**
	Right	0.3	25	12	B	0.6	100	20	C
Southbound	Left	0.1	25	32	C	0.5	75	42	D
	Thru+Right	0.2	75	33	C	0.6	200	43	D
Eastbound	Left	0.5	75	9	A	0.6	100	24	C
	Thru	0.3	100	11	B	0.5	225	16	B
	Right	0.2	25	11	B	0.2	25	13	B
Westbound	Left	0.3	25	2	A	0.7	200	17	B
	Thru	0.4	25	4	A	0.6	175	9	A
	Right	0.4	50	13	B	0.2	25	12	B
Intersection		**0.5**		**12**	**B**	**0.7**		**21**	**C**

Table B-2: 2040 Signal Control Option 1 - Intersection Delay

Approach	Movement	AM Peak				PM Peak			
		V/C Ratio	Queue Length (ft)	Control Delay (sec/veh)	LOS	V/C Ratio	Queue Length (ft)	Control Delay (sec/veh)	LOS
Northbound	Left	0.2	75	32	C	0.7	125	56	E
	Thru	0.4	100	35	D	0.5	150	44	D
	Right	0.3	25	12	B	0.6	100	20	C
Southbound	Left	0.1	25	33	C	0.3	75	43	D
	Thru+Right	0.2	75	34	C	0.6	200	48	D
Eastbound	Left	0.5	75	8	A	0.6	100	21	C
	Thru	0.3	125	11	B	0.5	225	15	B
	Right	0.2	25	11	B	0.2	25	13	B
Westbound	Left	0.3	25	3	A	0.6	200	16	B
	Thru	0.4	50	4	A	0.5	125	6	A
	Right	0.4	50	13	B	0.2	25	12	B
Intersection		**0.4**		**12**	**B**	**0.7**		**19**	**B**

Table B-3: 2040 Signal Control Option 2 - Intersection Delay

Approach	Movement	AM Peak				PM Peak			
		V/C Ratio	Queue Length (ft)	Control Delay (sec/veh)	LOS	V/C Ratio	Queue Length (ft)	Control Delay (sec/veh)	LOS
Northbound	Left	0.2	75	32	C	0.4	125	42	D
	Thru	0.4	100	35	D	0.5	150	44	D
	Right	0.3	25	12	B	0.6	100	20	C
Southbound	Left	0.1	25	33	C	0.3	75	43	D
	Thru	0.2	50	34	C	0.3	100	43	D
	Right	0.1	0	12	B	0.3	25	17	C
Eastbound	Left	0.4	75	8	A	0.6	100	20	C
	Thru	0.3	125	11	B	0.5	225	14	B
	Right	0.2	25	11	B	0.2	25	13	B
Westbound	Left	0.3	25	3	A	0.6	200	15	B
	Thru	0.4	50	4	A	0.5	150	7	A
	Right	0.4	50	13	B	0.2	25	12	B
Intersection		**0.4**		**12**	**B**	**0.6**		**17**	**B**

Table B-4: 2040 Signal Control Option 3 - Intersection Delay

Approach	**Movement**	**AM Peak**				**PM Peak**			
		V/C Ratio	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**	**V/C Ratio**	**Queue Length (ft)**	**Control Delay (sec/veh)**	**LOS**
Northbound	Left	0.3	75	33	C	0.6	125	45	D
	Thru	0.7	225	42	D	**0.8**	**300**	**60**	**E**
	Right	0.3	25	12	B	0.6	100	20	C
Southbound	Left	0.1	25	34	C	0.5	75	44	D
	Thru+Right	0.2	75	34	C	0.6	200	44	D
Eastbound	**Left**	0.8	200	48	D	**0.8**	**250**	**59**	**E**
	Thru	0.3	125	12	B	0.6	275	23	C
	Right	0.2	25	11	B	0.2	25	13	B
Westbound	Left	0.7	150	32	C	0.8	350	47	D
	Thru	0.5	200	18	B	0.6	225	13	B
	Right	0.4	50	13	B	0.2	25	12	B
Intersection		**0.6**		**22**	**C**	**0.8**		**29**	**C**

Table B-5: 2040 Signal Control Option 4 - Intersection Delay

Appendix C Sight Distance Diagram for Recommended Alternative

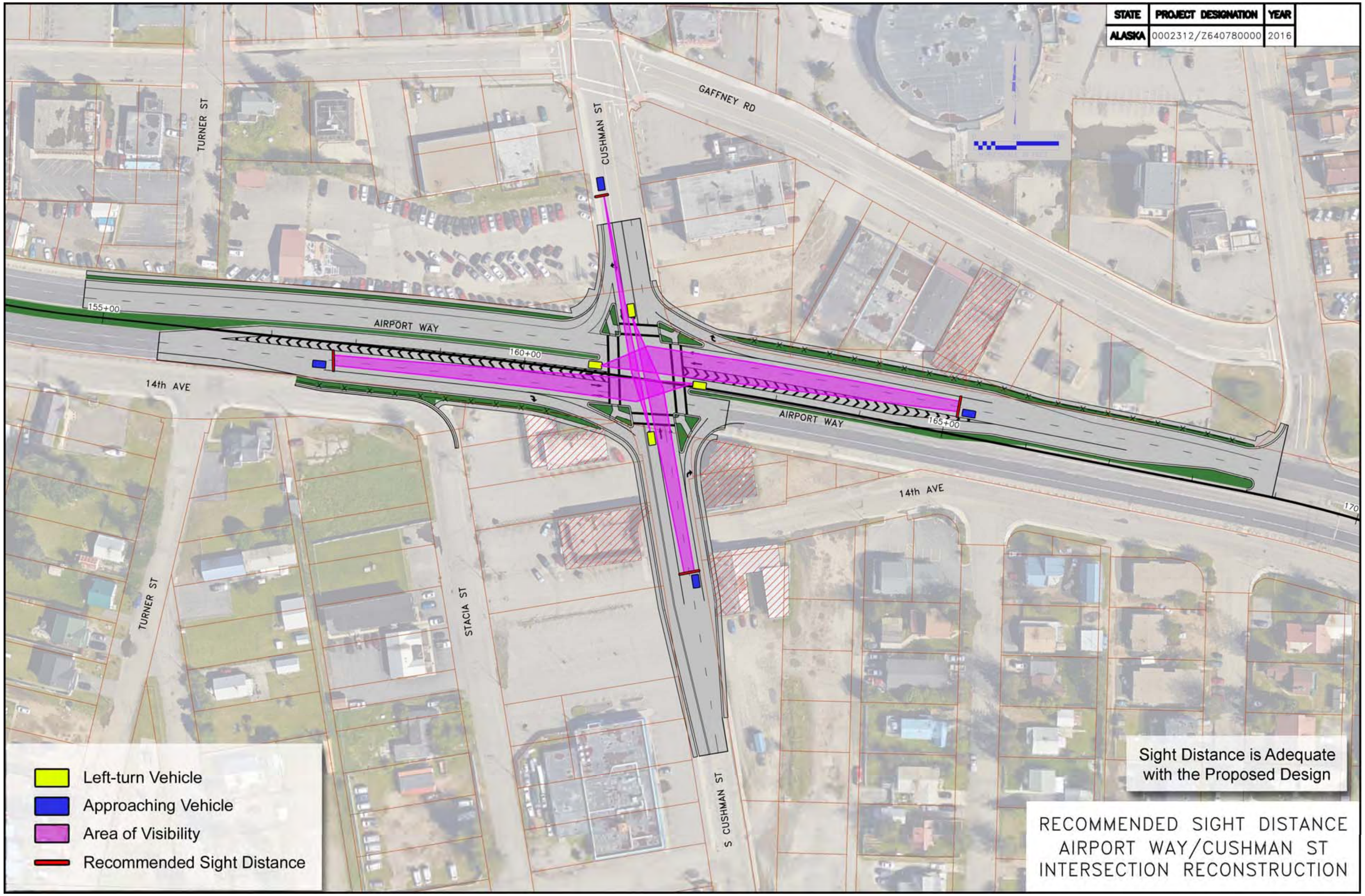


Figure C-1: Sight Distance in Left-turn Movements for Recommended Alternative

APPENDIX D

DESIGN MEMORANDUMS

Technical Memorandum

Date: July 18, 2019

W.O.#: 00385

To: Josh Cross, P.E.

cc:

From: Gordon Dufseth, E.I.T., Leon Galbraith, P.E.

Subject: Airport & Cushman Reconstruction
Lighting Design Memo

This memo outlines the analysis performed to determine the best design for using Light Emitting Diode (LED) lighting technology to illuminate the intersection and pedestrian facilities for this subject project.

The purpose of this work is to replace the highway street lighting systems in the project area to more efficient and cost-effective lighting technology. When constructed, this lighting will reduce DOT&PF's maintenance and operations costs, improve highway safety because of improved roadway lighting levels and uniformity, provide better operational reliability, and reduce maintenance response effort to repair malfunctioning lights/outages.

The street lighting systems are maintained by the Department of Transportation and Public Facilities (DOT&PF) Northern Region maintenance and operations (M&O) staff. The new LED luminaires will use approximately half the electricity consumption as the existing High-Pressure Sodium (HPS) luminaires. In addition, LED luminaires are specified to have a 10-year replacement warranty and should last between 10-20 years before replacement is needed.

The design of street lighting on DOT&PF projects is guided by the NR DOT&PF lighting memo, as well as the Alaska Highway Preconstruction Manual (HPM), Chapter 11. A recent update to the DOT&PF HPM requires the use of Illuminating Engineering Society (IES) Recommended Practice for Roadway Lighting, RP-8-14.

There are two design methods given for roadway lighting, known as "luminance" and "illuminance". Luminance is the selected design method for straight roadways and streets and horizontal illuminance is used for intersections, interchanges, and pedestrian walkways.

The HPM recommends the use of cutoff luminaires. Modern LED fixtures meets this criterion. The basis of design LED fixtures for this project are:

CREE RSW Series LED – Extra Large (250W to 400W HPS "cobra-head" replacements)
Sternberg Lighting 1521LED Omega Series

All design LED replacement fixtures are 4000K color temperature.

The lighting level targets stated below are based on the assumed roadway classification and estimated level of pedestrian use. Medium pedestrian conflict area is defined by IES as 1 to 100 pedestrians per hour, and high pedestrian conflict area is defined as over 100 pedestrians per hour.

Table 1: IES RP-8-14 Values for Illuminance	Avg. Horizontal Illuminance E_{avg} (fc)	Uniformity Ratio E_{avg}/E_{min}	Min. Horizontal Illuminance E_{min} (fc)	Min. Vertical Illuminance EV_{min} (fc)
Airport / Cushman Intersection Major/Major Medium Ped Conflict Area	2.6	3.0	As Req.	
Crosswalks at non-signalized, uncontrolled traffic free-right slip lanes High Ped Conflict Area	2.0	4.0	0.5	1.0
Crosswalks at signalized intersections Medium Ped Conflict Area	2.6	3.0	As Req.	0.2

E_{avg} – minimum maintained average horizontal illuminance at pavement
E_{min} – minimum horizontal illuminance at pavement
EV_{min} – minimum vertical illuminance measured 5 feet above pedestrian walkway, calculated for both directions of traffic flow for crosswalks
fc – foot-candle

The existing intersection lighting system is comprised of 400W HPS cobra-head type fixtures at a lowered mounting height with 15’ mast arms.

For the proposed LED analysis, a lamp lumen depreciation factor of 0.92 was applied, as well as a luminaire dirt depreciation factor of 0.92. Combined LED LLF is 0.85. Using AGI32 lighting design software, the proposed LED luminaires were modeled with the new lane and crosswalk geometry on both roadways. The signal pole luminaires are at a 40’ mounting height on 22’ mast arms. The right turn slip lane approach lights are at a 40’ mounting height on various mast arm lengths. These supplemental intersection lights are necessary to provide the recommended level of vertical illuminance in the slip lane crosswalks.

The following table displays the results of the LED lighting analysis and design. More information regarding the analysis and design can be found in the attachment.

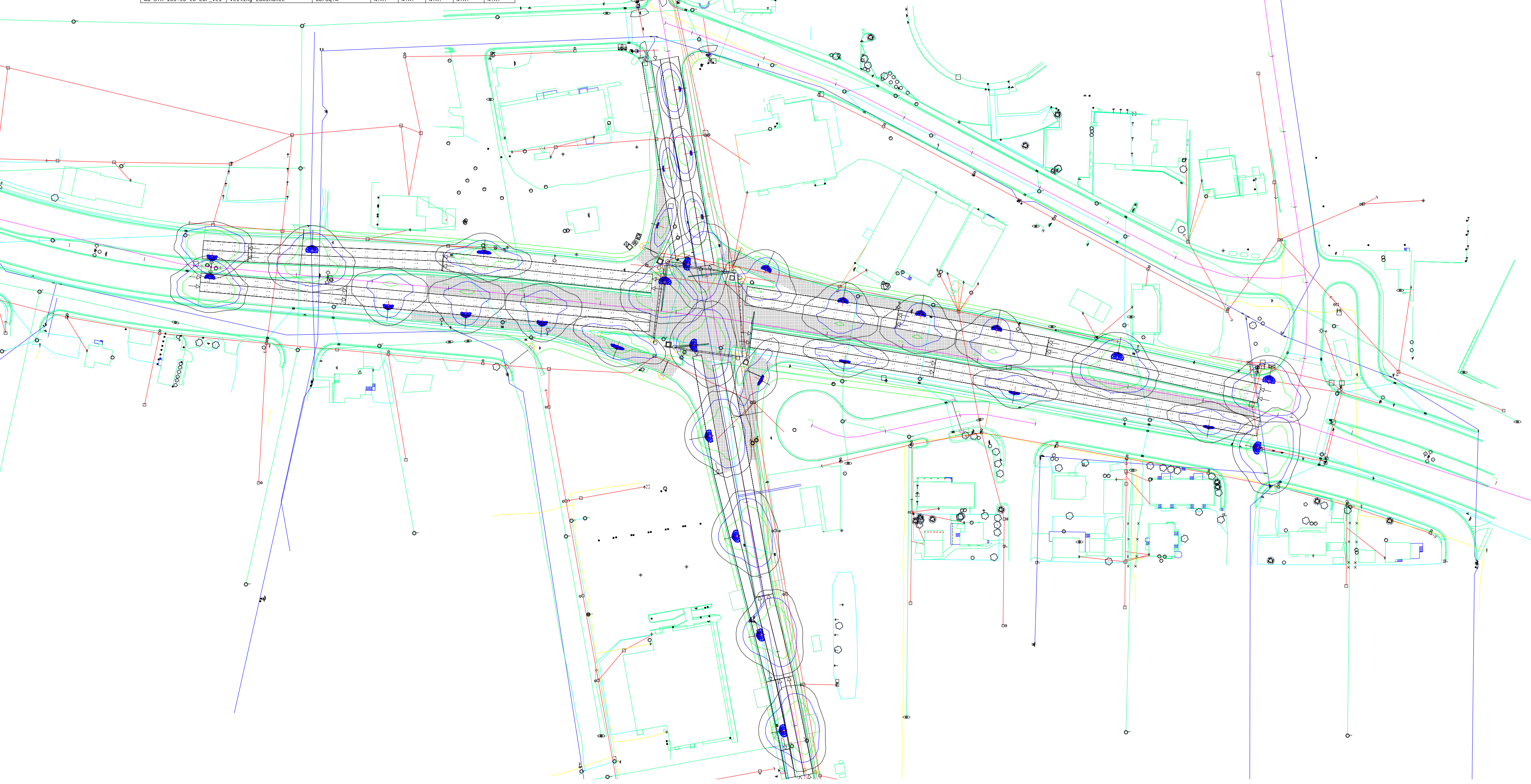
Table 2: Design Values for Illuminance	Avg. Horizontal Illuminance E_{avg} (fc)	Uniformity Ratio E_{avg}/E_{min}	Min. Horizontal Illuminance E_{min} (fc)	Min. Vertical Illuminance EV_{min} (fc)
Airport / Cushman Intersection Major/Major Medium Ped Conflict Area	3.2	2.2	As Req.	
Crosswalks at non-signalized, uncontrolled traffic free-right slip lanes High Ped Conflict Area	2.0	2.5	0.8	1.0
Crosswalks at signalized intersections Medium Ped Conflict Area	3.2	2.2	As Req.	0.3

Load Centers:

Load center replacements and modifications will involve coordination with Golden Valley Electric Association (GVEA) to de-energize existing load centers designated for replacement and re-energize the new installations.

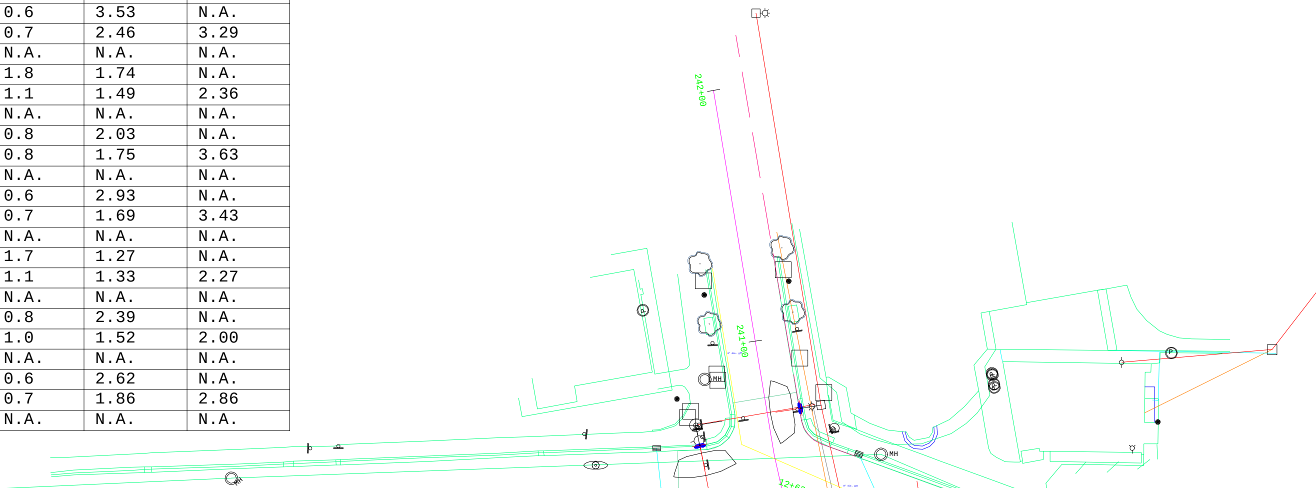
For this project, all LED luminaires will be scheduled on the Plans to be installed on their own new dedicated 240-volt circuits. This will ensure that these lighting circuits are not running a 480-volt system through signal system junction boxes. The DOT NR LED Replacement Project will be retrofitting luminaires to LED at the limits of this project’s circuits. All new LED luminaires will be scheduled on the Plans to be installed with a wireless node for remote gateway control.

WB STA 165+90 to EOP_Lum	Luminance	Cd/Sq.m	1.30	2.0	0.7	1.86	2.86
WB STA 165+90 to EOP_Vei	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.



Calculation Summary

Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
EB LT turn lane	Illuminance	Fc	2.12	3.5	1.1	1.93	N.A.
EB LT turn lane Noble	Illuminance	Fc	1.81	3.1	0.9	2.01	N.A.
EB RT turn lane	Illuminance	Fc	1.79	2.8	1.1	1.63	N.A.
Intersection Xwalks VERT	Illuminance	Fc	0.78	2.3	0.3	2.60	7.67
NB LT turn lane	Illuminance	Fc	2.62	3.3	1.7	1.54	N.A.
NB RT turn lane	Illuminance	Fc	2.23	3.2	1.1	2.03	N.A.
NE Corner RT Slip VERT	Illuminance	Fc	1.53	1.9	1.2	1.28	1.58
NW Corner RT Slip VERT	Illuminance	Fc	1.68	2.0	1.0	1.68	2.00
SB RT tur lane	Illuminance	Fc	2.09	3.3	0.8	2.61	N.A.
SE Corner RT Slip VERT	Illuminance	Fc	1.06	1.1	1.0	1.06	1.10
SW Corner RT Slip VERT	Illuminance	Fc	1.45	1.7	1.1	1.32	1.55
WB LT turn lane	Illuminance	Fc	2.12	3.0	1.4	1.51	N.A.
WB RT turn lane	Illuminance	Fc	1.75	2.8	1.1	1.59	N.A.
EB 164+45 to EOP_Illum	Illuminance	Fc	1.72	3.1	0.7	2.46	N.A.
EB 164+45 to EOP_Luminan	Luminance	Cd/Sq.m	1.14	2.2	0.8	1.43	2.75
EB 164+45 to EOP_Veil_Lu	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
EB BOP to STA 156+65_Ill	Illuminance	Fc	1.80	4.5	0.8	2.25	N.A.
EB BOP to STA 156+65_Lum	Luminance	Cd/Sq.m	1.19	1.8	0.8	1.49	2.25
EB BOP to STA 156+65_Vei	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
EB STA 156+65 to 160+65_	Illuminance	Fc	2.07	2.4	1.2	1.73	N.A.
EB STA 156+65 to 160+65_	Luminance	Cd/Sq.m	1.34	2.0	0.9	1.49	2.22
EB STA 156+65 to 160+65_	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
EB STA 162+00 to 164+45_	Illuminance	Fc	1.85	2.8	0.8	2.31	N.A.
EB STA 162+00 to 164+45_	Luminance	Cd/Sq.m	1.30	2.3	0.8	1.63	2.88
EB STA 162+00 to 164+45_	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
Intersection	Illuminance	Fc	3.19	4.54	1.47	2.17	3.09
NB BOP to STA 231+65_Ill	Illuminance	Fc	1.98	3.0	1.0	1.98	N.A.
NB BOP to STA 231+65_Lum	Luminance	Cd/Sq.m	1.24	1.8	1.0	1.24	1.80
NB BOP to STA 231+65_Vei	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
NB STA 231+65 to 232+75_	Illuminance	Fc	2.23	3.3	1.6	1.39	N.A.
NB STA 231+65 to 232+75_	Luminance	Cd/Sq.m	1.38	2.1	1.1	1.25	1.91
NB STA 231+65 to 232+75_	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
NB STA 232+75 to 235+85_	Illuminance	Fc	2.34	3.6	1.3	1.80	N.A.
NB STA 232+75 to 235+85_	Luminance	Cd/Sq.m	1.27	2.0	0.9	1.41	2.22
NB STA 232+75 to 235+85_	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
NB STA 237+15 to EOP_Ill	Illuminance	Fc	2.50	4.2	1.0	2.50	N.A.
NB STA 237+15 to EOP_Lum	Luminance	Cd/Sq.m	1.38	2.4	0.5	2.76	4.80
NB STA 237+15 to EOP_Vei	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
SB 231+70 to 232+25_Illu	Illuminance	Fc	1.88	2.8	1.1	1.71	N.A.
SB 231+70 to 232+25_Lumi	Luminance	Cd/Sq.m	1.48	1.6	1.4	1.06	1.14
SB 231+70 to 232+25_Veil	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
SB BOP to STA 230+70_Ill	Illuminance	Fc	1.13	1.7	0.6	1.88	N.A.
SB BOP to STA 230+70_Lum	Luminance	Cd/Sq.m	0.37	0.5	0.2	1.85	2.50
SB BOP to STA 230+70_Vei	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
SB STA 230+70 to 231+70_	Illuminance	Fc	1.85	2.7	1.1	1.68	N.A.
SB STA 230+70 to 231+70_	Luminance	Cd/Sq.m	1.07	1.6	0.6	1.78	2.67
SB STA 230+70 to 231+70_	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
SB STA 232+25 to 234+45_	Illuminance	Fc	1.67	2.8	0.9	1.86	N.A.
SB STA 232+25 to 234+45_	Luminance	Cd/Sq.m	1.64	2.0	1.5	1.09	1.33
SB STA 232+25 to 234+45_	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
SB STA 235+45 to 236+00_	Illuminance	Fc	2.31	3.1	1.4	1.65	N.A.
SB STA 235+45 to 236+00_	Luminance	Cd/Sq.m	1.94	2.4	1.4	1.39	1.71
SB STA 235+45 to 236+00_	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
SB STA 237+25 to EOP_Ill	Illuminance	Fc	2.12	3.5	0.6	3.53	N.A.
SB STA 237+25 to EOP_Lum	Luminance	Cd/Sq.m	1.72	2.3	0.7	2.46	3.29
SB STA 237+25 to EOP_Vei	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
WB BOP to STA 155+35_Ill	Illuminance	Fc	3.14	4.4	1.8	1.74	N.A.
WB BOP to STA 155+35_Lum	Luminance	Cd/Sq.m	1.64	2.6	1.1	1.49	2.36
WB BOP to STA 155+35_Vei	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
WB STA 155+35 to 157+90_	Illuminance	Fc	1.62	2.8	0.8	2.03	N.A.
WB STA 155+35 to 157+90_	Luminance	Cd/Sq.m	1.40	2.9	0.8	1.75	3.63
WB STA 155+35 to 157+90_	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
WB STA 157+90 to 160+65_	Illuminance	Fc	1.76	3.1	0.6	2.93	N.A.
WB STA 157+90 to 160+65_	Luminance	Cd/Sq.m	1.18	2.4	0.7	1.69	3.43
WB STA 157+90 to 160+65_	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
WB STA 162+00 to 163+90_	Illuminance	Fc	2.16	2.8	1.7	1.27	N.A.
WB STA 162+00 to 163+90_	Luminance	Cd/Sq.m	1.46	2.5	1.1	1.33	2.27
WB STA 162+00 to 163+90_	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
WB STA 163+90 to 165+90_	Illuminance	Fc	1.91	2.4	0.8	2.39	N.A.
WB STA 163+90 to 165+90_	Luminance	Cd/Sq.m	1.52	2.0	1.0	1.52	2.00
WB STA 163+90 to 165+90_	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.
WB STA 165+90 to EOP_Ill	Illuminance	Fc	1.57	3.4	0.6	2.62	N.A.
WB STA 165+90 to EOP_Lum	Luminance	Cd/Sq.m	1.30	2.0	0.7	1.86	2.86
WB STA 165+90 to EOP_Vei	Veiling Luminance	Cd/Sq.m	N.A.	N.A.	N.A.	N.A.	N.A.



ALTERNATIVES ANALYSIS

431 GAFFNEY ROAD
FAIRBANKS, ALASKA

JUNE 28, 2019

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TABLE OF CONTENTS

LIST OF APPENDICES

1.0 EXECUTIVE SUMMARY

NORTECH has completed this alternatives analysis of the Coin King property (the Site) in Fairbanks, Alaska as part of the Airport Way/Cushman Street Intersection (Intersection) Project. The Site has been identified as the source of a chlorinated solvent plume and is currently under consideration for acquisition by the Alaska Department of Transportation and Public Facilities (ADOT&PF) as part of the planned Intersection Project. The Site consists of seven contiguous parcels on the north side of Airport Way, with the Coin King Laundromat located on two of seven parcels and addressed as 431 Gaffney Road. Coin King first opened in the 1960s and dry-cleaning services ceased in the 1990s. The facility closed permanently in early 2019.

Multiple environmental investigations and assessments of the area between Airport Way and Gaffney Road east of Cushman Street delineated a PCE contamination plume in the mid-2000s. In these reports, the plume is referred to as the Gaffney East Plume and Coin King is the eastern-most structure of four independent buildings sometimes referred to as the "Fourplex." Due to property access issues, the Coin King property was not directly assessed until the 2013 Site Inspection. This included soil and groundwater across the site, but not soil or groundwater sampling beneath the Coin King building. The 2013 Site Inspection report identified Coin King as the likely source of the Gaffney East Plume.

Since the Site is the source of soil and groundwater contamination, ADEC regulations identify the landowner as the Responsible Party (RP) for monitoring and remediation of the contaminated media. Any buyer, including ADOT&PF, will immediately become the new RP for the Gaffney East Plume and ADEC will expect the RP to complete assessment of soil and groundwater under the building, as well long-term monitoring of the Gaffney East Plume. Excavation and off-site disposal of contaminated soil could potentially reduce the long-term monitoring requirements. All monitoring and remediation will require development of work plans for approval by ADEC.

This alternatives analysis identified and provides rough order of magnitude (ROM) estimates for four potential alternatives for the Site to be addressed by the Intersection Project. Alternative #1 avoids acquisition of the Coin King parcel by changing the road/parking design and acquiring one or more different parcels for the necessary space. Alternatives #2 – #4 have long-term groundwater monitoring and provide different options to address the building, ground surface, and subsurface soils. Alternative #1 is potentially the least expensive (<$1M), but results in providing parking to a restaurant/bar across Cushman Street from that establishment and does the least to reduce pedestrian safety concerns at the intersection. Alternatives #2 and #3 are approximately $2M and address long-term groundwater monitoring of the source area. Alternative #4 adds remediation of the most contaminated soils at the Site, which could significantly reduce the groundwater monitoring period and increases the total cost to approximately $8M.

While the ROM values may be subject to change based on more detailed discussions about specific topics or regulatory personnel, the overall approaches and differential costs between the alternatives are likely to remain consistent. ***NORTECH*** recommends that these alternatives be evaluated within the goals and budget capacity of the project to determine the most reasonable path forward for the project.

2.0 INTRODUCTION

Coin King Laundry is a laundromat facility located at 431 Gaffney Road in Fairbanks, Alaska. The facility has been in operation at this location for 64 years. The Coin King laundromat is located on two of seven adjacent parcels owned by Coin Op LLC. Most recently this facility provides wash, dry, and fold services as well as self-serve laundry machines. Coin King personnel reported that the facility also provided dry cleaning services from as early as the 1960s until they discontinued the service in the 1990s.

This facility is located within a known area of chlorinated solvent contamination in the groundwater. The dissolved solvent plume has been delineated into two lobes described as Gaffney East and Gaffney West. Specific contaminants identified in soil and groundwater include tetrachloroethene (PCE) and degradation products trichloroethene (TCE) and cis-1,2-dichloroethene (DCE). Extensive soil and groundwater sampling have been performed in the area and on the Coin King property, however, sampling below the Coin King building has not been conducted.

ADOT&PF is working on the design of a project that will increase the safety of vehicles and pedestrians at the intersection of Airport Way and Cushman Street, west of the Coin King property. As currently envisioned, the reconstructed intersection will have a dedicated right turn lane from west on Airport Way to north on Cushman Street that will be within the building footprint. In addition, other portions of the project will impact the available parking at other commercial establishments on the same block as Coin King. The Coin King property provides potential parking for these operations without the need for patrons to cross Airport Way or Cushman Street.

3.0 COIN KING HISTORY

3.1 Fourplex Feasibility Study, June 2010, Oasis Environmental

Coin King is the easternmost unit in a strip of four buildings located north of Airport Way and south of Gaffney Road, on the east side of Cushman Street. Collectively, these four individual buildings are referred to as “the Fourplex” in this report. This report documents the feasibility of four remedial alternatives for vadose zone contamination located adjacent to the Fourplex. The remedial action alternatives included the following:

- No Action
- Excavation and Treatment of Contaminated Soil and Sub-slab Depressurization (SSD)
- Asphalt Cap, Soil Vapor Extraction (SVE), and SSD
- Chemical Oxidation and SSD

Soil and groundwater sampling conducted in 2008 and 2009 confirmed vadose zone (above the groundwater) soil contamination was present near the buildings. Sampling events conducted in 2009 and 2010 included sub slab and indoor air sampling. This work positively identified vapor intrusion from the contaminants in soil as a significant health risk.

Significant sampling via test borings was performed to the north, west, and south of the Fourplex buildings. Sampling conducted south of the Fourplex was conducted primarily within the Airport Way right of way. Based on the information provided in the reported figures, no test borings were advanced within the property boundaries of the Coin King.

Sample results indicate that a large area of significant PCE contamination is located south of the buildings. Concentrations of 100 ug/mg or greater are nearest the building, and concentrations of 24 ug/mg are located just south of that. These results are consistent with the location of the wood stave sewer line, also denoted on Oasis Figure 3.

Vapor intrusion results correlate with soil contamination results. Indoor air samples were collected from three of four Fourplex buildings, the Coin King building was not included due to access restrictions. Sub-slab sample results ranged from 3,740 ug/m^3 to 9,790 ug/m^3. The target level for indoor air at the time of the sampling was 21 ug/m^3. Sub-slab sample results ranged from 3,740 ug/m^3 to 9,790 ug/m^3. Indoor sample results in Stone Soup (west adjacent) were 23 ug/m^3 and in Forget-Me-Not Books was 18 ug/m^3 (farthest west).

Groundwater remediation was not included in the scope of this feasibility study. However, it was noted that the groundwater plume had been delineated to the northwest, but not to the southeast due to access restrictions during previous investigations. The maximum PCE concentration detected in the plume was 700 ug/L from monitoring well MW-33 located behind (south of) the Fourplex.

The study concluded that SVE was the most cost effective and efficient for remediation of contaminants, both under the buildings and under Airport Way, as well as mitigating any vapor intrusion concerns. SVE offers protection of people and the environment. It has demonstrated long-term effectiveness in similar applications and is capable of large treatment areas.

3.2 2013 Coin King Laundromat Site Inspection

A Site Inspection of the Coin King property was requested by the United States Environmental Protection Agency (EPA) and completed by Ecology and Environmental, Inc. (E & E). Sampling was performed over the course of 10 days in September 2013, the report is dated February 2014. Prior to this investigation, no sampling had been performed within the Coin King property boundaries, however, extensive investigation and sampling efforts have been conducted on surrounding properties. For the purpose of this investigation, limited sampling was performed on adjacent properties.

Soil, groundwater, and soil gas samples were collected from the Coin King property based on the data gaps presented by other assessment efforts previously performed in the area. Historical records and those knowledgeable about facility operations report that 55-gallon drums of PCE used for dry cleaning were stored near the southern building exterior. Additionally, the building has two sewer connections, one connection is with a wood-stave main.

A total of 77 samples, including eight background samples, five investigation-derived waste (IDW) samples, and eight quality assurance (QA) samples were collected as part of this assessment. A total of 44 soil samples were collected from 14 locations, both on and off site. Samples were collected using direct push methods. At least one groundwater sample was collected from each borehole. Additionally, two outdoor air samples and three indoor air samples were collected from the Coin King facility. All samples were analyzed for VOCs.

Soil and groundwater sample results indicated significant concentrations of PCE and TCE within the Coin King property boundaries. The highest concentrations were observed near the southeast property corner where drums of chlorinated solvents were reportedly stored. PCE was detected in elevated concentrations from the ground surface to approximately 15 feet below ground surface. In general, two areas of contamination were identified, one at the former drum storage location and the second near an abandoned sewer line near the former Adko Cleaner (407 Gaffney Road, east of Coin King) location. The report inferred that the area of contamination is a migration hotspot with a preferential pathway via the abandoned sewer line. It was estimated that 2,400 cubic yards of contaminated soil were identified during this investigation. PCE concentrations in groundwater were consistent with soil sample results in that the highest concentrations were recorded near the drum storage area and near the wood stave sewer line. VOCs, including PCE, were also present in the indoor ambient air samples.

This investigation concluded that, based on historic operations at the property, the Coin King facility is a source for PCE contamination in the area. Historical operations, including dry cleaning services, solvent storage practices, and the wood stave sewer are likely the primary source from this property. This information, paired with the extensive sampling performed on the Gaffney East Plume, indicates that the contamination has migrated offsite to the northwest.

3.3 SFY 2014 Gaffney East Groundwater Monitoring and Limited Additional Characterization Report

This report summarizes the most recent groundwater monitoring and additional characterization efforts of the Gaffney Road East plume. Field work was conducted in 2013 and the report was dated October 2014. Field efforts included Colortec field screening, soil boring sampling, and installation of eight new monitoring wells coupled with sampling of a total of 17 wells. Geotechnical parameters, well surveying, and groundwater elevations were also documented. Contaminants of concern (COCs) included PCE, TCE, and cis- and trans- 1,2-dichloroethene (cDCE and tDCE). The report noted that vinyl chloride has not been detected at the site during the last 15 years of investigations.

The results from this effort indicated that PCE and TCE exceed ADEC groundwater cleanup levels at the time of the assessment. COC concentrations above the groundwater cleanup level were documented with the southern plume extent southeast of Coin King and accompanying fourplex buildings and the northwest extent of the plume was documented to be just south of 12th Avenue (northern boundary near MW-34) and south of the Fourplex at Airport Way (southern boundary near MW-31). Two areas of localized PCE and TCE contamination were identified near the sewer line south of Coin King. Areas of contamination and sample locations are shown on Ahtna Figure 3 included in Appendix 1.

Vertical extents of contamination were also determined during the 2013/2014 sampling event. Results indicated that PCE and TCE concentrations in exceedance of the groundwater cleanup levels are present from the top of the groundwater table to approximately 30-40 feet below ground surface in areas near MW-32 and MW-34, both located downgradient from Coin King and north of Gaffney Road.

Soil samples were collected from the top of the groundwater table at select borings and analyzed for PCE, TCE, and degradation products. Results noted that PCE was the only contaminant above cleanup levels, indicating a contaminated smear zone downgradient of Coin King. Evidence of the smear zone contamination was documented as far downgradient as the area near MW-32.

This sampling effort confirmed that 1,1 DCE is not present in soil or groundwater and is not considered a COC for the Gaffney East plume. Degradation of PCE to TCE and of TCE to cis-DCE were documented.

4.0 INTERVIEW AND SITE INSPECTION

Hilary Clifton and Doug Dusek of ***NORTECH*** met with Wayne Webster, property manager, at the Coin King to perform an inspection of the Site and discuss current and historic operations. Mr. Webster has been associated with the Site since the early 1970s. He stated that the facility has operated as a laundromat since it opened in the mid to late 1950s. They offered dry cleaning services for about 30 years, which ended in the 1990s. The dry-cleaning machines were removed from the facility after they stopped offering the service.

He stated that the machines utilized “perc” (also known as perchloroethylene and tetrachloroethylene (PCE)) as the dry-cleaning solvent. PCE was delivered in 55-gallon drums to the facility. Some drums were stored inside, near the loading dock area with an overhead door at the south of the building, or just outside the south end of the building. When asked if they had ever had a release or spill related to the dry-cleaning operations, Mr. Webster stated that they had not. He did mention that wood stave sewer lines, commonly used during the time of the building construction, were not water tight or leakproof.

The building is of concrete block construction. There is a small basement area located near the southwest corner of the building. This basement houses primarily plumbing/piping runs and a large hot water heater. Some tools are stored in the basement, however, no materials or chemicals are stored in this lower section. The south end of the building is considered the original footprint of the facility and the square footage was doubled to the north following damage from a fire in the 1960s. There is no crawlspace or basement under the northern building addition.

A buried heating oil tank is located adjacent to the west side of the southwest building exterior. According to Mr. Webster it’s 2500-3000 gallons in size and is filled every two weeks. The tank fuels two three-pass steam boilers that provide heat and steam to the building and the clothes drying machines.

Most of the building interior is occupied by clothes washing and drying machines. There are both top and front-loading washers that vary in size, and all dryers are steam dryers. Soaps, bleach, and dryer sheets are ordered in bulk and available for purchase are stored in the loading dock area at the south end of the building.

A car wash is located east-adjacent to the Site and the Stone Soup Kitchen is located immediately to the west (another of the Fourplex Buildings). Airport Way and Gaffney Road border the Site to the south and north respectively. The Co-Op Market and Grocery Deli is located north of Gaffney Road.

5.0 ANALYSIS AND DISCUSSION

5.1 Property Summary

NORTECH has completed a review of existing environmental documents and an alternatives analysis of potential approaches to the Coin King property (the Site) in Fairbanks, Alaska as part of the Airport Way/Cushman Street Intersection Project. The Site has been identified as the source of a chlorinated solvent plume and is currently under consideration for acquisition by the Alaska Department of Transportation and Public Facilities (ADOT&PF) as part of the planned Intersection Project. The Site consists of seven contiguous parcels on the north side of Airport Way, with the Coin King Laundromat located on two of seven parcels and addressed as 431 Gaffney Road.

Coin King has historically operated as a laundromat and first opened in the 1960s. Dry cleaning services were provided at the facility for approximately 30 years and ceased in the 1990s. The dry cleaning machines were removed from the facility at that time. The facility closed permanently in early 2019. The Site is currently owned by Coin Op LLC.

Dry cleaning facilities and their associated operations are often identified as sources for soil and groundwater contamination due to historical waste disposal practices and the Coin King facility is no exception. Multiple investigations and assessments of the area between Airport Way and Gaffney Road east of Cushman Street delineated a PCE contamination plume in the mid-2000s. This plume is referred to as the Gaffney East Plume and is distinct from the larger plume that originates on the west side of Cushman Street. Both plumes have migrated northwest with the regional groundwater flow and impacted off-site properties. In several assessment reports Coin King and the three adjacent buildings located south of Airport Way are referred to as the “Fourplex”, although the four buildings do not share structural walls. Coin King is the eastern-most structure of the Fourplex.

Due to property access issues, the Coin King property was not directly assessed until the 2013 Site Inspection. The 2013 Site Inspection included soil and groundwater on the Site including the parking areas and around the building. This work did not include soil or groundwater sampling beneath the Coin King building. The 2013 Site Inspection report identified Coin King as the likely source of the Gaffney East Plume.

5.2 Alternatives for Analysis

Since the Site is the source of soil and groundwater contamination, ADEC regulations identify the landowner as the Responsible Party (RP) for remediation of the contamination. While the existing site assessments have been completed using state funding and brownfield grants, future work at the site is likely to require funding through the RP. Any buyer of the site will immediately become the new RP. Although ADEC and the Alaska Department of Law (ADOL) have considered signing “prospective purchaser agreements” (PPAs) that indicate a new purchaser may not be liable for costs associated with future cleanup, these documents do not identify an alternate funding source for the remediation of the property. PPAs appear to be most effective at limiting liability associated with current and former ADEC-led assessment and remediation costs, but do little to limit the potential costs of contaminated media during redevelopment of a parcel by a new owner.

Purchase of Coin King will result in ADOT&PF taking responsibility for the overall Gaffney East Plume. Depending on project plans, this is expected to include long-term monitoring, potential assessment of soil and groundwater under the building, and possible soil remediation. This alternatives analysis identified and provides rough order of magnitude (ROM) estimates for four potential alternatives for the Site to be addressed by the Intersection Project.

Regardless of the Coin King purchase, the proximity of the Gaffney East Plume will require the Intersection Project to develop a Quality Assurance Project Plan (QAPP) to address the potential for encountering contaminated media during construction activities. This plan would provide detailed specifications and limitations for field screening, laboratory sampling, soil handling, and dewatering activities during the project. This plan will also address the potential concerns associated with current/former heating oil tanks and other potentially contaminated sites. Because this plan will be necessary for any alternative, the cost for development and implementation of the QAPP is not included in this budgetary analysis.

Alternative 1: Do Not Purchase Source – Avoid Property

The first option for this property would be to re-design the Intersection Project to eliminate components that require the acquisition of the Coin King property. Under this alternative, acquisition of Coin King is avoided completely. By avoiding the purchase of the source, the Intersection Project and ADOT&PF would have no short-term or long-term responsibility or obligation to remediate or manage any soil on the Coin King property.

Based on conceptual discussions about the overall project, this option does incur costs to change the intersection design to a less preferred intersection layout. In addition, this would eliminate use of the Coin King parcels for parking, so other new parking areas would have to be identified for the project. Preliminary discussions suggested that this may require acquisition of additional parcels west of Cushman Street or south of Airport Way for bar/restaurant parking, which would then require the routing of patrons across either Cushman Street or Airport Way. In addition, some of these alternative parcels are like to have petroleum and/or solvent contamination that may require remediation.

This option does not provide any additional assessment or remediation to the known environmental conditions of the Gaffney East Plume. While this is not specifically an ADOT&PF responsibility, one of the elements of the Intersection Project is to increase the safety of the intersection within a framework of future growth. Continued non-action or limited ADEC-funded action on the Gaffney East Plume will continue to limit the potential growth of this area.

Alternative 2: Purchase Source – Do Not Demolish Building

A second option is to purchase the Coin King property and maintain the existing building. This would maintain the existing conditions and the Intersection Project may have to be modified slightly to avoid impacts to the structure. Since the building would not be demolished, the area beneath the building would remain inaccessible for addition assessment and/or remediation. A long-term monitoring program would be established to confirm and monitoring the groundwater conditions of the Gaffney East Plume.

During design, the parking situation in this area would be evaluated and laid out in a manner that met the needs of each facility on this block. Depending on the final project layout, the Coin King building and some adjacent Coin King parcels would likely be available for ADOT&PF to sell after the project. While the number of entities interested in buying the source of the Gaffney East Plume would continue to be limited, ADOT&PF would work with ADEC to establish the long-term monitoring program, which would provide potential buyers with a clear understanding of the long-term costs of ownership of the Coin King property. Some of these long-term costs would potentially have to be worked into a sales contract for the property. The potential re-sale value of the property has been included in the ROM.

In addition to establishing and implementing the long-term monitoring program, ADOT&PF would be responsible for maintaining the building during the project. The best method to do this would likely be to use the building as a project office or in some other capacity, instead of boarding the building up and trying to provide security for an unoccupied building for years. Using the building may require some renovation work, as well as potential assessment and mitigation of vapor intrusion concerns. This has been included in the ROM as an annual cost of maintenance for five years, regardless of the use.

Alternative 3: Purchase Source – Demolish Building and Pave
The third option is to acquire the Coin King property and then utilize the entire property as paved parking. This includes demolition of the building and paving of the building footprint. This maintains the impermeability of the ground surface, effectively maintaining the existing conditions while removing the annual maintenance cost and overall liability associated with the building. This includes the long-term monitoring from Alternative 2 and adds a soil and groundwater assessment beneath the building, since this area is no longer beneath the building. Although some portion of the parcels may not be necessary for parking and may have a potential resale value, this is expected to be minimal because no building is present.

Alternative 4: Purchase Source – Demolish Building, Remediate, and Pave
The fourth option is to complete the acquisition and demolition as described in Alternative 3 and add a soil remediation project between the demolition of the building and the paving of the building footprint. The intent of this soil remediation project would be to remove a significant quantity of the PCE contaminant mass from the ground through excavation and off-site disposal. The cost for this remediation is high because the soil will be a RCRA regulated waste that must be shipped out of state for disposal. The soil remediation effort is expected to reduce the duration of the long-term monitoring program, as well as increase the redevelopment potential of the property for future commercial operations. These long-term cost reductions are significantly lower than the cost of the remediation.

5.3 Projected Costs

NORTECH has attempted to estimate costs for these alternatives by identifying the major work tasks of each alternative and using reasonably available information from recent projects. Table 1, below, provides a list of anticipated work tasks and a description of the scope and the rationale for the cost used. Table 2, below Table 1, provides a summary of the work tasks and costs that are expected to be included in each of the four alternatives. Table 3, which is attached, provides a more slightly detailed description of the cost basis and identifies the alternative(s) that will require each work task.

Each work task and associated cost is based on a major component of work that will be necessary to complete one or more of the alternatives. These work tasks and associated costs are based on previous experience with similar projects. While detailed costs for each work task have not been developed, the estimated costs are considered adequate to understand the rough order of magnitude (ROM) of each alternative relative to the other alternatives. More detailed information regarding the rationales, regulatory acceptability, and detailed costs for specific work tasks are recommended after the list of alternatives has been reduced based on review of the conceptual viability of each alternative as described in this document.

Table 1 – Work Task Descriptions

Work Task Name	Description
Cost of Changes to Design Approach	Changes in design fees, update of public information documents, update environmental documents
Acquisition of Alternate Property Costs	Cost estimated using 3x the 2018 assessment of half the lot west of Cushman Street ($550,000)
Coin King Acquisition Price	Cost estimated using 3x the 2018 assessment ($385,000 for all parcels)
Coin King Annual Building O&M Costs	Estimated cost of utilities and security/renovation for building until divestment of economic remainder following project
Coin King Re-sale Value	Estimated at 50% of the current assessed value ($385,000) due to environmental impairments
Coin King Demolition Price	Cost estimated using 1.5x the demolition estimate for Airport Way West
Additional Site Assessment	Soil/Groundwater beneath building footprint. Cost estimated based on 2018 Third Street Assessment contract value
Soil Remediation (All Environmental Services)	Environmental Services include excavation, transportation, disposal, testing/report, regulatory coordination.
Long Term Groundwater Monitoring	Cost based on Third Street long term monitoring plan
Long Term Monitoring Decommissioning	Decommission wells after LTM is complete

Table 2 – Alternative Cost Summary

Work Task	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Cost of Changes to Design Approach	$100,000	-	-	-
Acquisition of Alternate Property Costs	$825,000			
Coin King Acquisition Price	-	$1,155,000	$1,155,000	$1,155,000
Coin King Annual Building Costs	-	$750,000		
Coin King Re-sale Value		($192,500)		
Coin King Demolition Price	-	-	$400,000	$400,000
Additional Site Assessment	-		$75,000	$75,000
Soil Remediation (All Environmental Services)	-	-	-	$6,000,000
Long Term Groundwater Monitoring	-	$300,000	$300,000	$150,000
Long Term Monitoring Decommissioning	-	$30,000	$30,000	$30,000
Total Cost	**$925,000**	**$2,042,500**	**$1,960,000**	**$7,810,000**

6.0 CONCLUSIONS AND RECOMMENDATIONS

NORTECH has completed an analysis of four alternative approaches to addressing the potential acquisition of the Coin King property as part of the Airport Way and Cushman Street Intersection Project. The property is located at 431 Gaffney Road in Fairbanks, Alaska and is the likely source of the chlorinated solvent groundwater contamination known as the Gaffney East Plume.

This analysis describes four possible approaches to the project and provides budgetary cost estimates for the work tasks expected to be necessary to complete each approach. Based on this analysis, ***NORTECH*** has developed the following conclusions:

- Alternative 1: Do Not Purchase Source – Avoid Property
    - Least expensive alternative assuming that alternative properties are available
    - May not meet project goals for improved safety of pedestrians
    - Decision point of this alternative appears to be to in the evaluation and risk associated with pedestrian safety
- Alternative 2: Purchase Source – Do Not Demolish Building
    - Minimizes on-site assessment and soil remediation costs
    - Establishes long-term groundwater monitoring program for plume
    - Requires operation and/or renovation of the building
    - Assumes that sufficient right of way space is available to eventually sell building with sufficient parking
    - Decision point of this alternative appears to be potential for ADOT&PF to maintain the building during the property and re-sell the property after the project is complete
- Alternative 3: Purchase Source – Demolish Building and Pave
    - Provides high level of flexibility for access and parking layouts
    - Provides option to sell undeveloped land east of Coin King
    - Established long-term groundwater monitoring program for plume
    - Likely to be regulatorily acceptable as long as building footprint and adjacent ground surface remains impervious
    - This appears to be the default option if the other three options are considered unacceptable
- Alternative 4: Purchase Source – Demolish Building, Remediate, and Pave
    - Same level of flexibility and options and Alternative 3
    - Soil excavation and remediation will remove significant potion of contaminant mass from the subsurface
    - Soil remediation will shorten the duration of long-term groundwater monitoring
    - Reduction in long-term monitoring cost is much lower than cost of soil remediation
    - Decision to complete soil remediation appears to be based on potentially available funding to complete the project

The potential viability of these alternatives should be explored at the conceptual level, including the ability of the project to provide funding for the necessary work tasks. This is expected to include a variety of stakeholders within ADOT&PF, as well as regulators at ADEC and project funding entities. A more detailed cost estimate of one or more specific alternatives is recommended following the conceptual viability review.

7.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

NORTECH is a Fairbanks-based, professional consulting firm, established in 1981, offering environmental engineering, civil engineering, and industrial hygiene consulting services. ***NORTECH*** has offices in Fairbanks, Anchorage, and Juneau, and has completed numerous property and/or building inspections across Alaska.

Peter Beardsley

Hilary Clifton
Staff Scientist

Peter Beardsley, PE
President and CEO

Appendix 1

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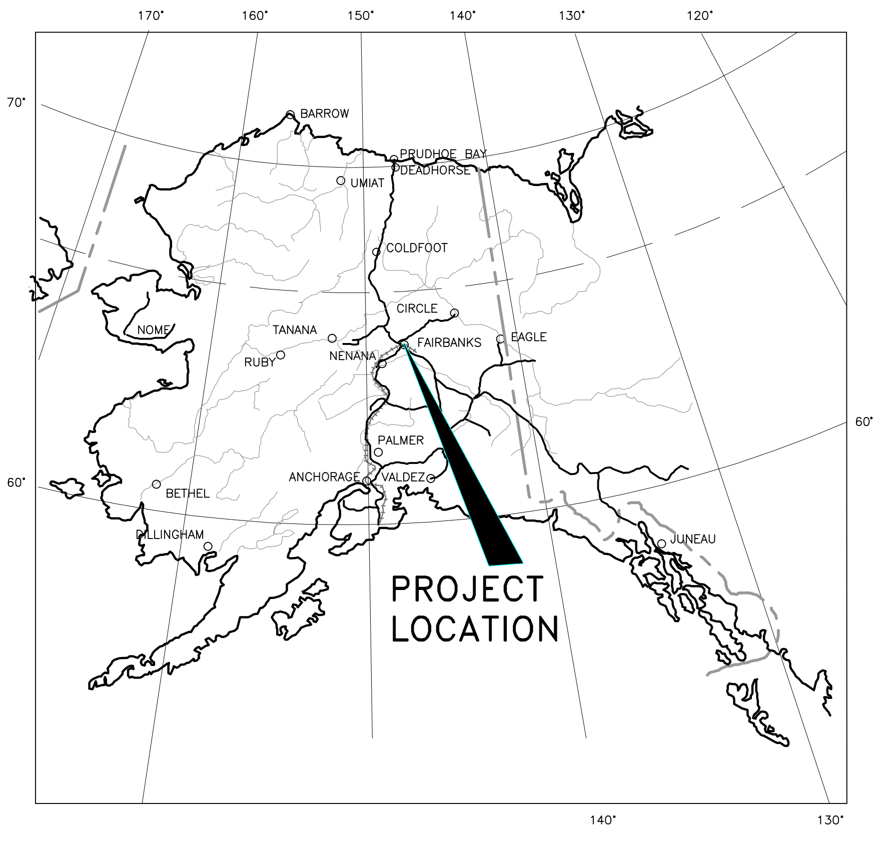
REVISIONS			STATE	PROJECT NUMBER	YEAR	SHEET NO.	TOTAL SHEETS
NO.	DATE	DESCRIPTION	ALASKA	0002312/Z640780000	2019	1	3

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
&
PUBLIC FACILITIES

AIRPORT–CUSHMAN ESA PARCEL BOUNDARIES

INDEX OF SHEETS

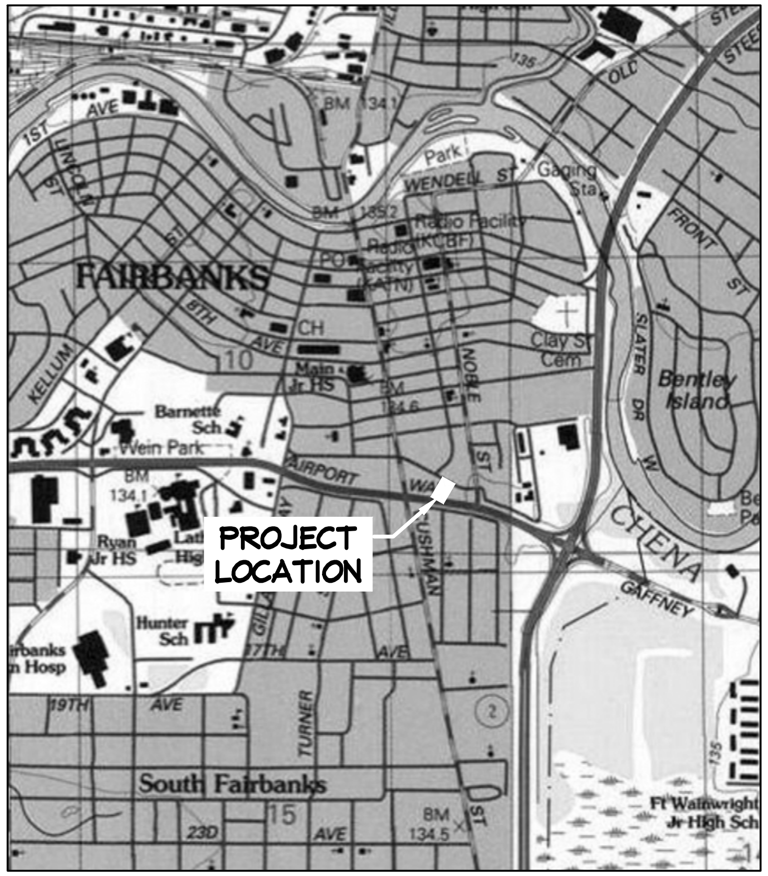
SHEET NO.	DESCRIPTION
1	TITLE SHEET, LOCATION, VICINITY AND AREA MAPS
2	CONTAMINATED SITE LOCATIONS
3	AIRPORT – CUSHMAN ESA PARCEL BOUNDARIES



LOCATION MAP

AKSAS PROJECT NO. 0002312/Z640780000

VICINITY MAP



SCALE:1"=2,000'

AREA MAP

SCALE:1"=300'

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

AIRPORT – CUSHMAN ESA
PARCEL BOUNDARIES

TITLE PAGE
LOCATION, VICINITY, AND AREA MAPS

PLANS PREPARED BY NORTECH, INC.
IN COOPERATION WITH Kinney Engineering

REVISIONS		
NO.	DATE	DESCRIPTION

STATE	PROJECT NUMBER	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0002312/Z640780000	2019	2	3

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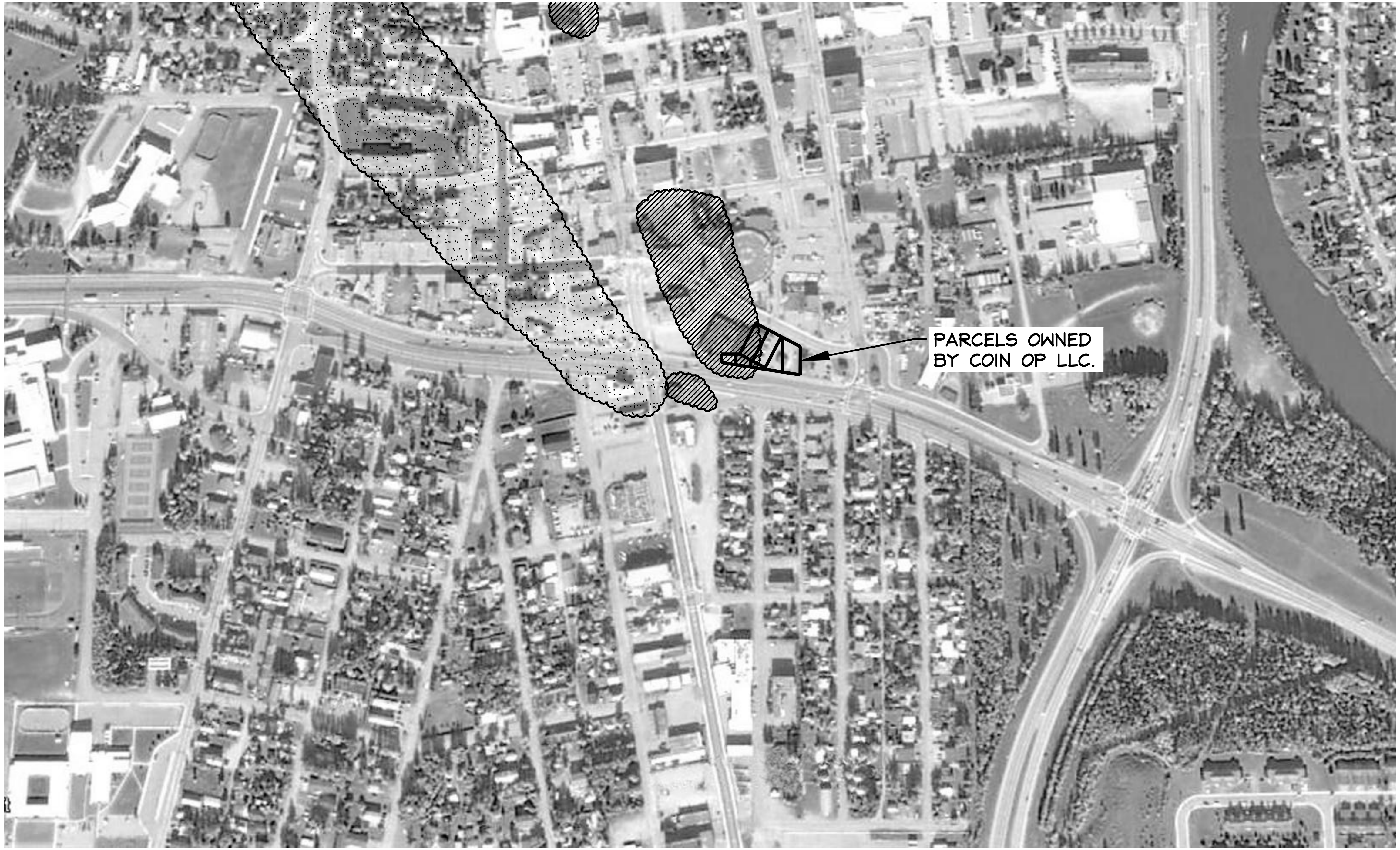

N

LEGEND

▨ GAFFNEY EAST PLUME

░ GAFFNEY WEST PLUME

SCALE IN FEET

0 12.5 25 37.5 50

0 25 50

SCALE: 1" = 400'

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

AIRPORT – CUSHMAN ESA

CONTAMINATED SITE LOCATIONS

PLANS PREPARED BY NORTECH, INC.
IN COOPERATION WITH Kinney Engineering

REVISIONS			STATE	PROJECT NUMBER	YEAR	SHEET NO.	TOTAL SHEETS
NO.	DATE	DESCRIPTION	ALASKA	0002312/Z640780000	2019	3	3

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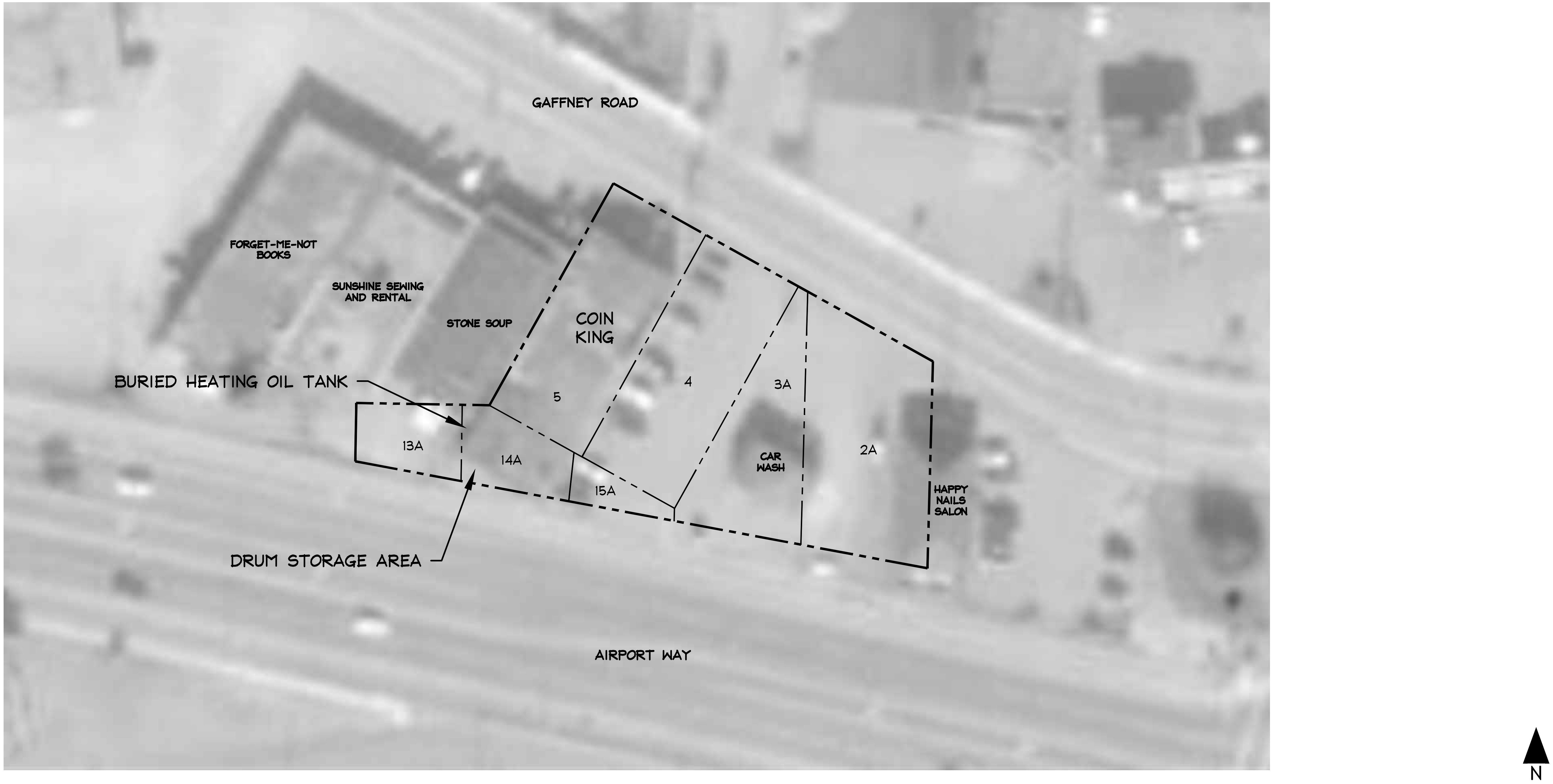


LEGEND

— - - —	PROPERTY BOUNDARY
##	LOT NUMBER

SCALE IN FEET

0 12.5 25 37.5 50

0 25 50

SCALE: 1" = 50'

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

AIRPORT – CUSHMAN ESA

PARCEL BOUNDARIES

PLANS PREPARED BY NORTECH, INC.
IN COOPERATION WITH Kinney Engineering

Appendix 2

Table 3
Coin King Alternative Options Cost Analysis

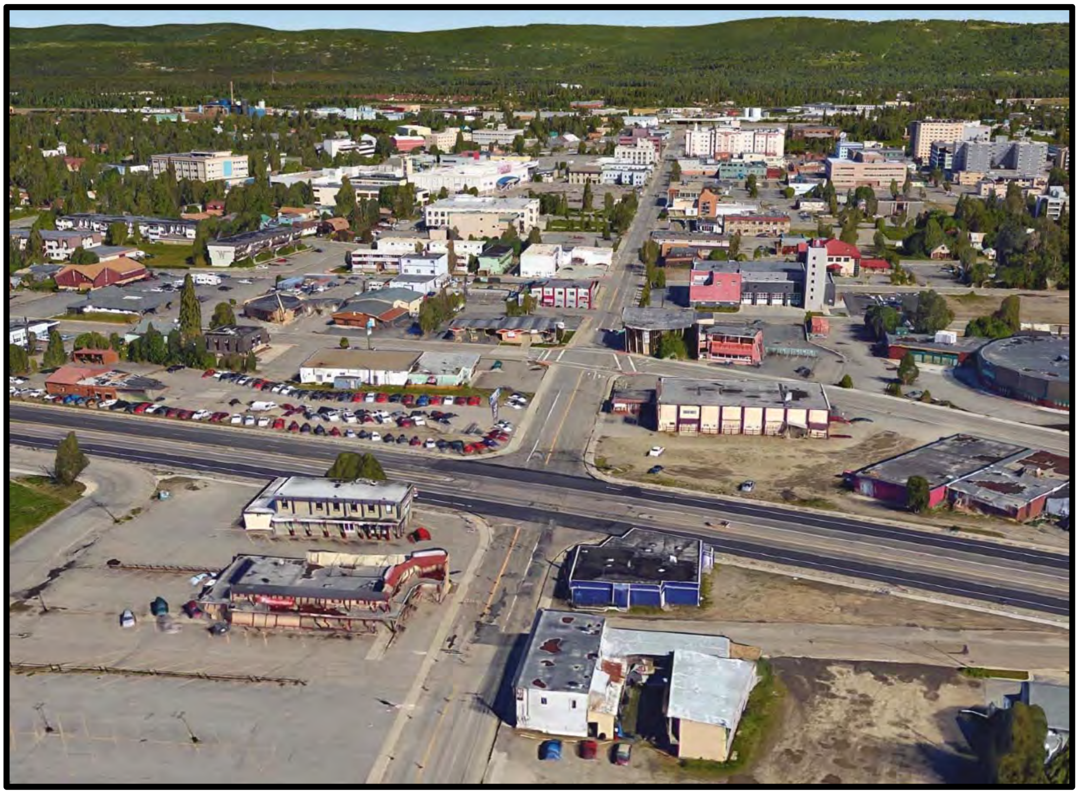
Work Task	Unit	Unit Cost	Quantity	Total Cost per Task	Alternatives	Description/Notes
Cost of Changes to Design Approach	event	$100,000	1	$100,000	1	Changes in design fees, update of public information documents, update environmental documents
Acquisition of Alternate Property Costs	event	$825,000	1	$825,000	1	Cost estimated using 3x the 2018 assessment of half the lot west of Cushman Street ($550,000)
Coin King Acquisition Price	building	$1,155,000	1	$1,155,000	2, 3, 4	Cost estimated using 3x the 2018 assessment ($385,000 for all parcels)
Coin King Annual Building Costs	year	$150,000	5	$750,000	2	Estimated cost of utilities and security/renovation for building until divestment of economic remainder following project
Coin King Re-sale Value	building	($192,500)	1	($192,500)	2	Estimated at 50% of the current assessed value ($385,000) due to environmental impairments
Coin King Demolition Price	building	$400,000	1	$400,000	3, 4	Cost estimated using 1.5x the demolition estimate for Airport Way West
Additional Site Assessment	event	$75,000	1	$75,000	3, 4	Soil/Groundwater beneath building footprint. Cost estimated based on 2018 Third Street Assessment contract value
Soil Remediation (All Environmental Services)	tons	$2,000	3000	$6,000,000	4	Environmental Services include excavation, transportation, disposal, testing/report, regulatory coordination. Assume 1.5 tons/yard
Long Term Groundwater Monitoring	event	$15,000	20	$300,000	2, 3, 4	Cost based on Third Street long term monitoring plan. Assume 8 wells sampled quarterly for years 1 & 2, semi annual for year 3, and once every 5 years for the next 50 years. Cost reduced by 50% if soil remediation occurs
Long Term Monitoring Decommissioning	event	$30,000	1	$30,000	2, 3, 4	Decommission wells after LTM is complete

Airport Way/Cushman Street Intersection Reconstruction

IRIS Program No. Z640780000
Federal Project No. 0002312

Final Parking Utilization Study

February 2018



Prepared For:
State of Alaska
Department of
Transportation and
Public Facilities

Prepared By:
Kinney Engineering, LLC
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Fairbanks, AK 99701
907-456-1420
AECL1102

Table of Contents

Figures

Tables

Abbreviations

COF	City of Fairbanks
DOT&PF	Alaska Department of Transportation and Public Facilities
FNSB	Fairbanks North Star Borough
FT^2	Square Feet
GFA	Gross Floor Area
GLA	Gross Land Area
ITE	Institute of Transportation Engineers
KE	Kinney Engineering
ULI	Urban Land Institute

1 Introduction

Kinney Engineering, LLC (KE), has been retained by the Alaska State Department of Transportation and Public Facilities (DOT&PF) to conduct this parking utilization analysis as part of the Airport Way/Cushman Street Intersection Reconstruction project. The goal of this project is to improve safety for all users in and around the intersection as well as reducing vehicle delay for improved air quality. This report provides an analysis of existing parking supply for impacted businesses near the project and how the project improvements affect the available parking supply.

There are several businesses located adjacent to the Airport Way and Cushman Street intersection, including restaurants, pull tabs, night clubs, a liquor store, and a tailor shop. These businesses all have off-street parking for their patrons. No on-street parking is allowed on Gaffney Road, Airport Way, and Cushman Street. To understand the parking demand, KE performed parking usage counts during various peak hours at the affected locations, compared those values to parking generation values using the ITE methodology, and considered the parking requirements for the Fairbanks North Star Borough (FNSB).

2 Parking Study

Figure 1 shows the study areas of the lots that are affected by the project and will remain once the project is constructed. The businesses located in Lot 1 are The Donut Shoppe and Motherlode Pull Tabs. Kodiak Jack’s, Boomtown Bar and Grill, and Quan’s Tailor Shop are located in Lot 2. Lot 3 has a strip mall that houses the restaurants Gallantino’s and Nim’s Thai Food. Currently, there are two vacant units. To the north of the building there is additional parking.

Table 1 shows the available spaces in each lot. For lots that were unstriped, an estimate of the number of spaces was done using a scaled aerial image and 9’ wide by 18’ deep parking spaces. These are the minimum required dimensions stipulated in the FNSB Code of Ordinances. Figures 2 and 3 show the estimated layouts of the unstriped lots.

There are also various parking arrangements made between some business owners in the study areas. Lot 1 allows patrons of the Donut Shoppe to park in front of Motherlode Pull Tab until 11 AM. The owners of Lot 2 allow the employees of the nearby Literacy Council of America and Forget Me Not Books to park on their property during the daytime. Although there is no known agreement between property owners, Kodiak Jack’s parking will spill over into surrounding parking areas during peak times (late evenings).

Figure 1- Study Areas

	Number of Parking Stalls
Lot 1	14*
Lot 2	83*
Lot 3	60

*-Assumed number of spaces

Table 1- Number of Available Parking Stalls

Figure 2- Assumed Parking Lot 1 Layout

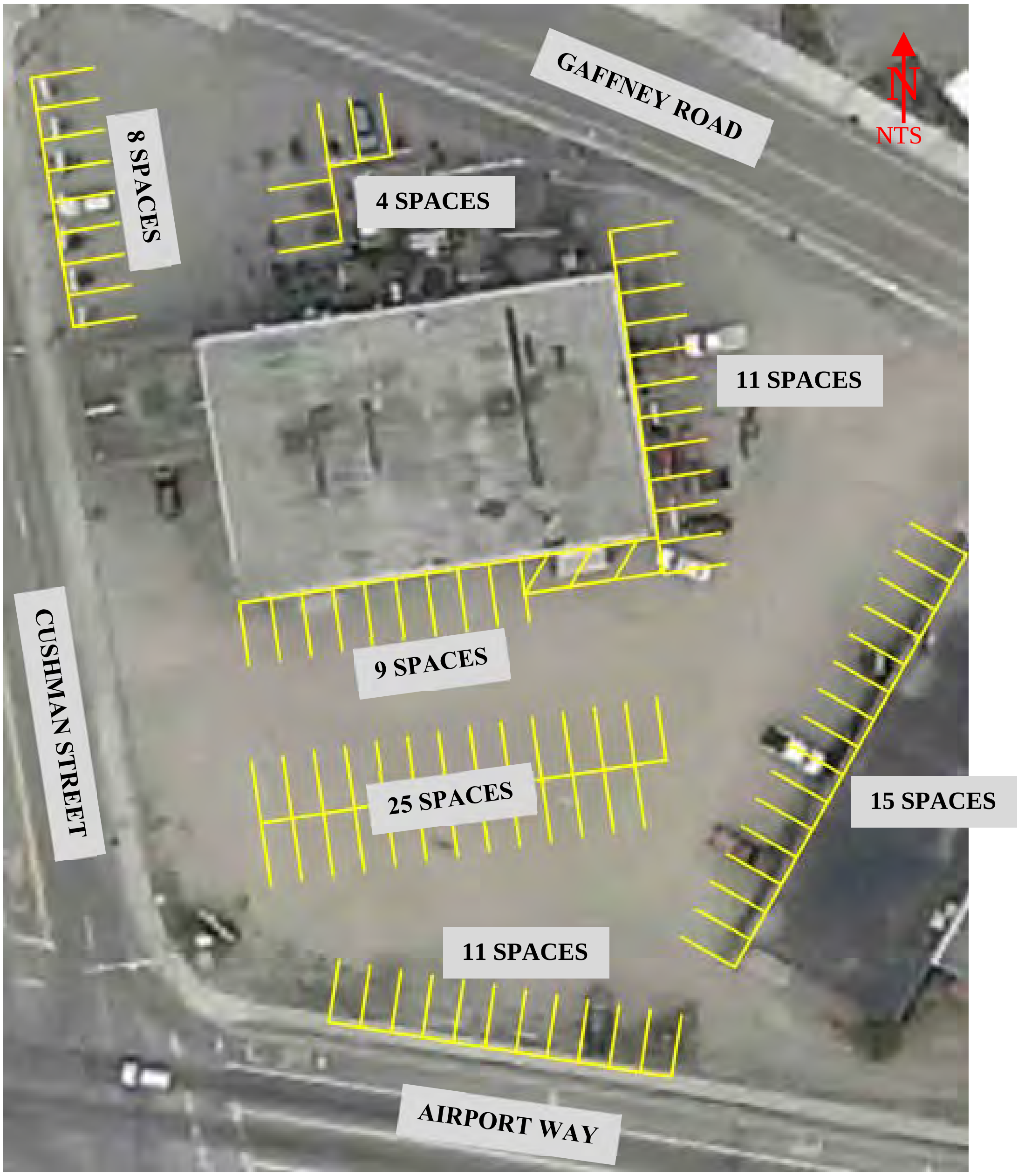


Figure 3- Assumed Parking Lot 2 Layout

To determine the peak hours to count, KE referenced land uses that matched available data from the ITE Parking Generation Manual, as well as crowd-sourced data provided by Google search. For restaurants, the peak hours to count would be lunch time between noon and 1 PM and dinner time between 6 PM and 7 PM. The Donut Shoppe peak hour would be during the morning coffee rush between 7:30 AM to 8:30 AM. Pull tab establishments do not have peak hours available so the counts were conducted at the same time as the restaurant counts. Kodiak Jack's, a local night club, attracts large late-night crowds Thursday through Saturday. KE reached out to the owners of Kodiak Jack's to determine their peak hour. Kodiak Jack's is one of the last closing bars in Fairbanks; their peak hour is 1:30 AM to 2:30 AM. This time period will account for patrons that will head over to continue their evening once their original bar of choice is closed.

Figure 4 shows parking occupancy for each lot during weekday afternoons. No lots are near capacity.

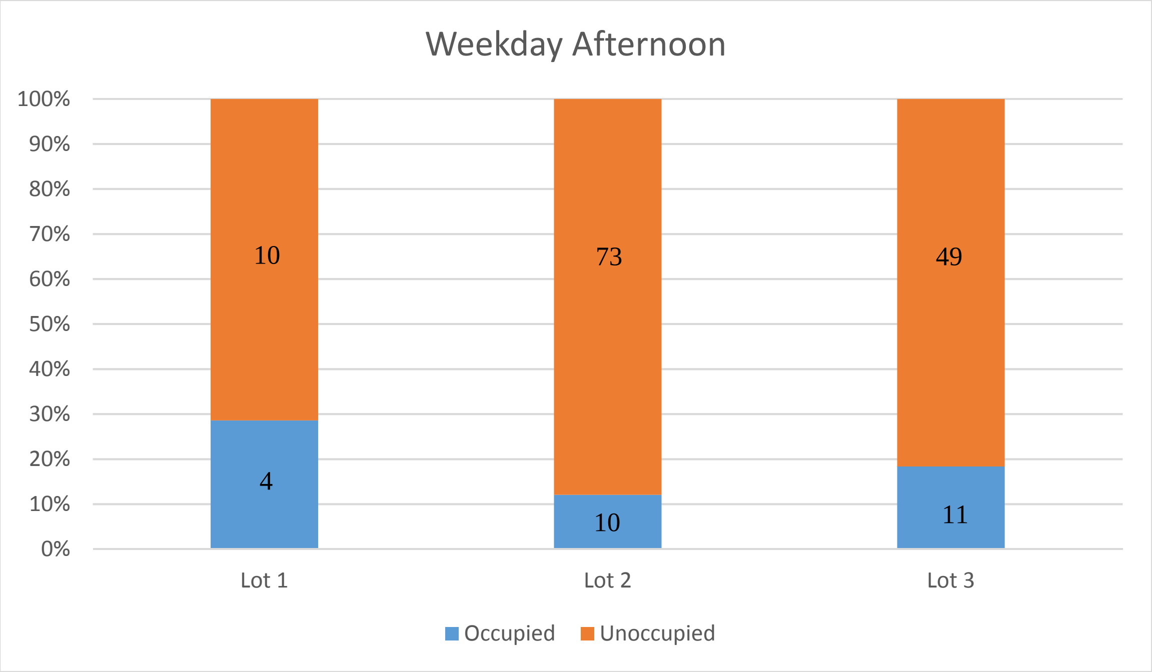


Figure 4- Weekday Afternoon Count (12 PM to 1 PM)

Figure 5 shows parking occupancy for each lot during weekday evenings. No lots are near capacity.

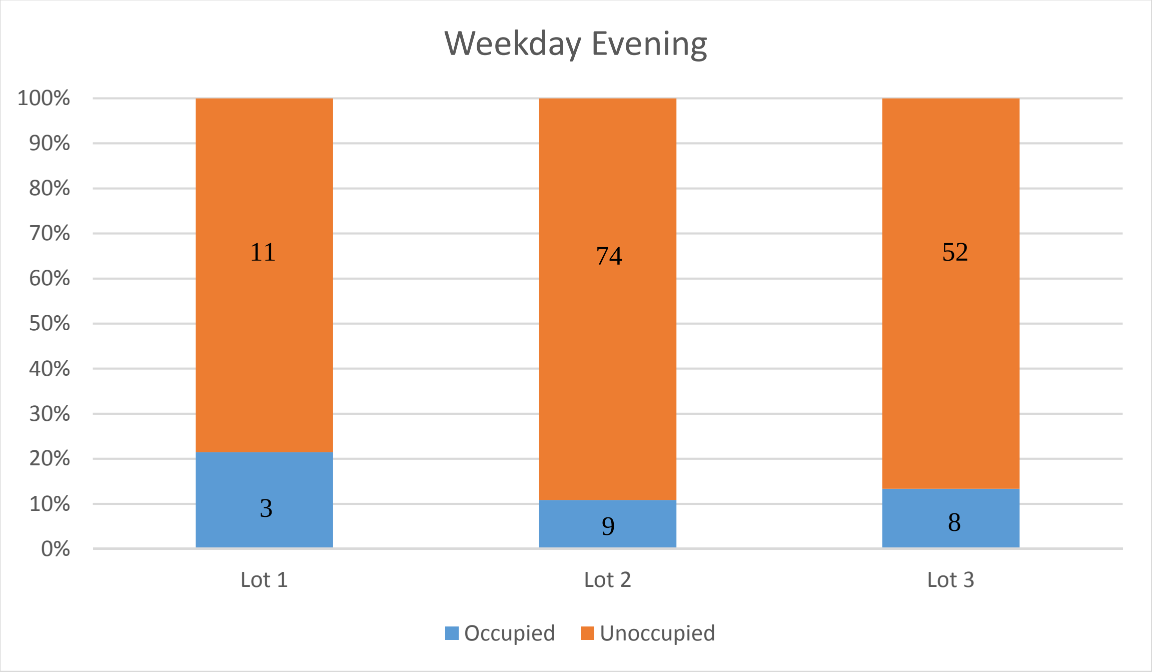


Figure 5- Weekday Evening Count (6 PM to 7 PM)

Figure 6 shows parking occupancy for Lot 1 during weekday mornings. The lot was nearly half full during the peak hour.

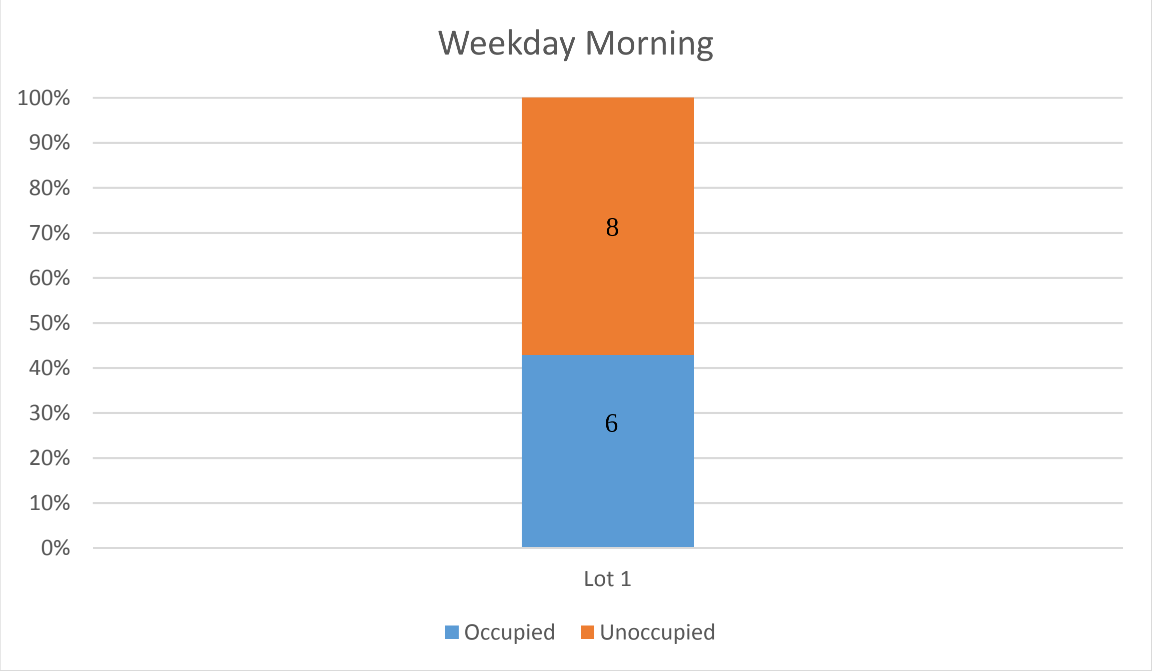


Figure 6- Weekday Morning Count (7:30 AM to 8:30 AM)

Figure 7 shows parking occupancy for Lot 2 during weekend evenings. Lot 2 is over capacity during the peak hour. Vehicles parked near the SE quadrant of Cushman Street and Gaffney Road intersection were parked in a manner that impeded proper circulation of the parking area.

Parking spilled over into other lots during the peak hour. KE observed approximately 20 vehicles parked in front of the buildings located to the east of Kodiak Jack’s, and 13 vehicles in the parking lot across Gaffney Road from Kodiak Jack’s.

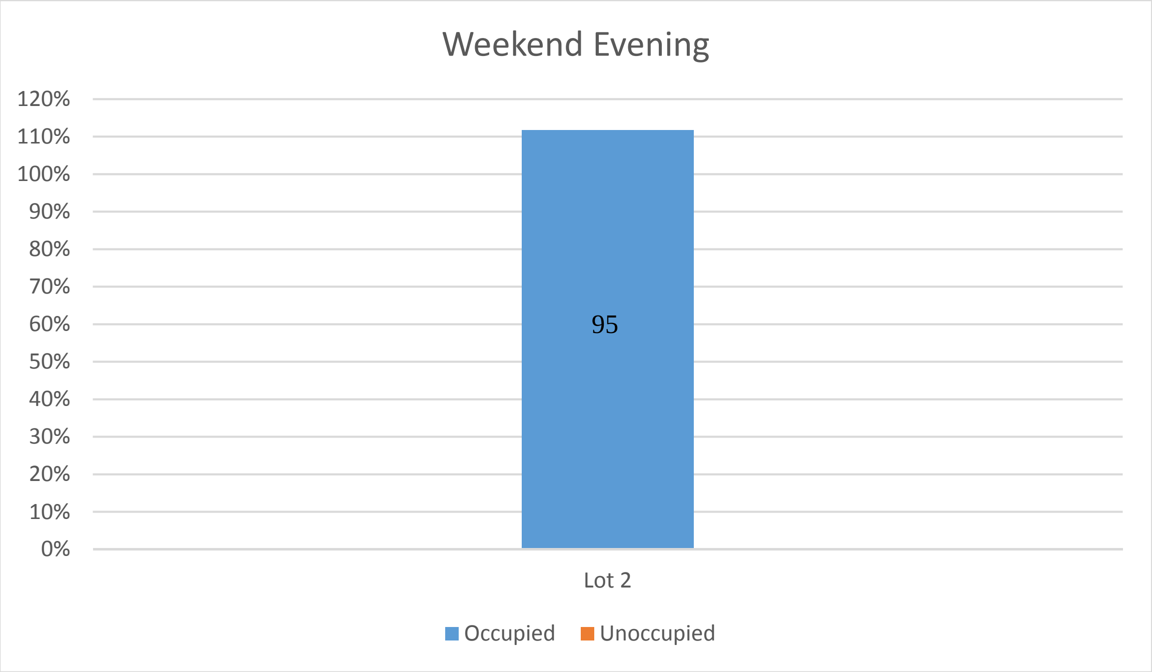


Figure 7- Weekend Evening Count (1:30 AM to 2:30 AM)

3 Forecast Peak Parking Needs

In addition to measuring parking demand directly, peak parking demand was estimated using the Institute of Transportation Engineers (ITE) reference *Parking Generation, 3rd Edition* and the Urban Land Institute (ULI) reference *Shared Parking, 2nd Edition*. Table 2 compares the parking lot supply and demand using the gross floor area (GFA). Lot 1 has adequate capacity for the demand during the peak hour. Boomtown Bar and Grill and Kodiak Jack's operate as one establishment, so Lot 2 does not have capacity for the estimated demand during the peak hour. Both Gallantino's and Nim's Thai Food peak hours occur simultaneously, therefore the peak estimated demand is the sum of the demand for both establishments. This lot currently does not have adequate capacity based on demand estimates.

	Location	Facility Size		Facility Type	Patron Factor	Employee Factor	Estimated Demand	Capacity	Method
Lot 1	Donut Shoppe Motherlode Pulltabs	2,522	ft^2	Fast Food Restaurant w/o Drive-Thru Window	8.2	-	21	14	ITE
Lot 2	Boomtown Bar & Grill	1,620	ft^2	High Turnover Restaurant w/ Bar or Lounge	16.3	2.75	31	83	ULI
	Kodiak Jack's	8,175	ft^2	Nightclub	17.5	1.5	156		
	Quan's Tailor Shop	975	ft^2	Dry Cleaners	1.4	-	2		
Lot 3	Gallantino's	5,000*	ft^2	High Turnover Restaurant w/ Bar or Lounge	16.3	2.75	90	60	ULI
	Nim's Thai Food	2,500*	ft^2	High Turnover Restaurant w/o Bar or Lounge	13.5	1.5	27		
	Vacant Restaurant	5,000*	ft^2	High Turnover Restaurant w/o Bar or Lounge	13.5	1.5	75		

*-Estimated GFA

Table 2- Parking Supply and Forecast Peak Parking Demand

4 Local Ordinance Requirements

The FNSB off-street parking requirements are defined in Section 18.96.060 of the FNSB Code of Ordinances. Below are the land types used for this study:

Restaurant	1 space per 3 seats
All other commercial, not designated	3 spaces per 4 employees

The minimum total off-street parking spaces required by FNSB code are shown in Table 3. These requirements are the minimum needed and do not necessarily reflect the peak demand for a business like Kodiak Jack’s. The Combined Minimum column reflects the total number of spaces the lot should provide for businesses that operate at the same time.

KE visited the businesses located in the study area to count the available seats. The results of these counts are listed in Table 3. For Kodiak Jack’s, the maximum occupancy limit was used for the number of seats. This value was obtained from the City of Fairbanks Fire Department.

	Location	Facility Size		FNSB Factor	Minimum Spaces	Combined Minimum	ULI/ITE Forecasts	Existing Capacity
Lot 1	Donut Shoppe	22	seats	0.33	8	11	21	14
	Motherlode Pulltabs	4*	employees	0.75	3			
Lot 2	Boomtown Bar & Grill	85	seats	0.33	29	120	31	83
	Kodiak Jack's	275	seats	0.33	91		156	
	Quan's Tailor Shop	4*	employees	0.75	3		2	
Lot 3	Gallantino's	166	seats	0.33	55	125	90	60
	Nim's Thai Food	44	seats	0.33	15		27	
	Vacant Restaurant	166*	seats	0.33	55		75	

*- Assumed number

Table 3- Demand Based on FNSB Code Requirements

In addition to the off-street parking requirements stipulated in the FNSB Code of Ordinances, the City of Fairbanks (COF) Landscape Ordinance also requires that landscaping be incorporated into the design of any off-street parking facility in the Central Business District. Based on the ordinance, a vegetative screen or buffer will be maintained around any parking facility. This buffer area should contain trees and shrubs planted at intervals stipulated in the COF Landscape Ordinance.

5 Conclusions

The existing conditions of Lot 1 (Donut Shoppe and Motherlode Pulltabs) meet the current FNSB requirements for number of parking spaces, but cannot accommodate the estimated demand. The proposed design will not reduce the number of parking spaces.

Under the existing conditions, Lot 2 does not provide Kodiak Jack's with the minimum 120 spaces required by FNSB code. Moreover, the estimated parking demand is greater than what can be accommodated on the existing lot. Approximately 7,000 ft^2 of Lot 2's existing parking area (for Kodiak Jack's, Boomtown Bar and Grill, and Quan's Tailor Shop) will no longer be available once the project is constructed. Figure 8 depicts the impact area, in red, the proposed design will have on Lot 2, and the resulting probable parking lot layout after construction.

The proposed construction project will reduce the number of parking spaces available on Lot 2 from about 83 to about 59, therefore the DOT&PF is responsible for mitigating the impacts caused by the project. To offset the capacity loss, the project will acquire additional properties to the east for construction of a public parking lot that provides the same number of spots impacted by the project. A depiction of the new public parking lot is shown in Figure 9. The green hatched area represents the landscape buffer required by COF Landscape Ordinance.

This project will have a small impact to Lot 3 (Gallantino's and Nim's), but will not reduce the number of parking spaces nor affect the functionality of the lot. Figure 10 shows the impact area, in red, of the proposed design on Lot 3. There is still adequate room for a 24-foot drive lane that would parallel South Cushman Street.

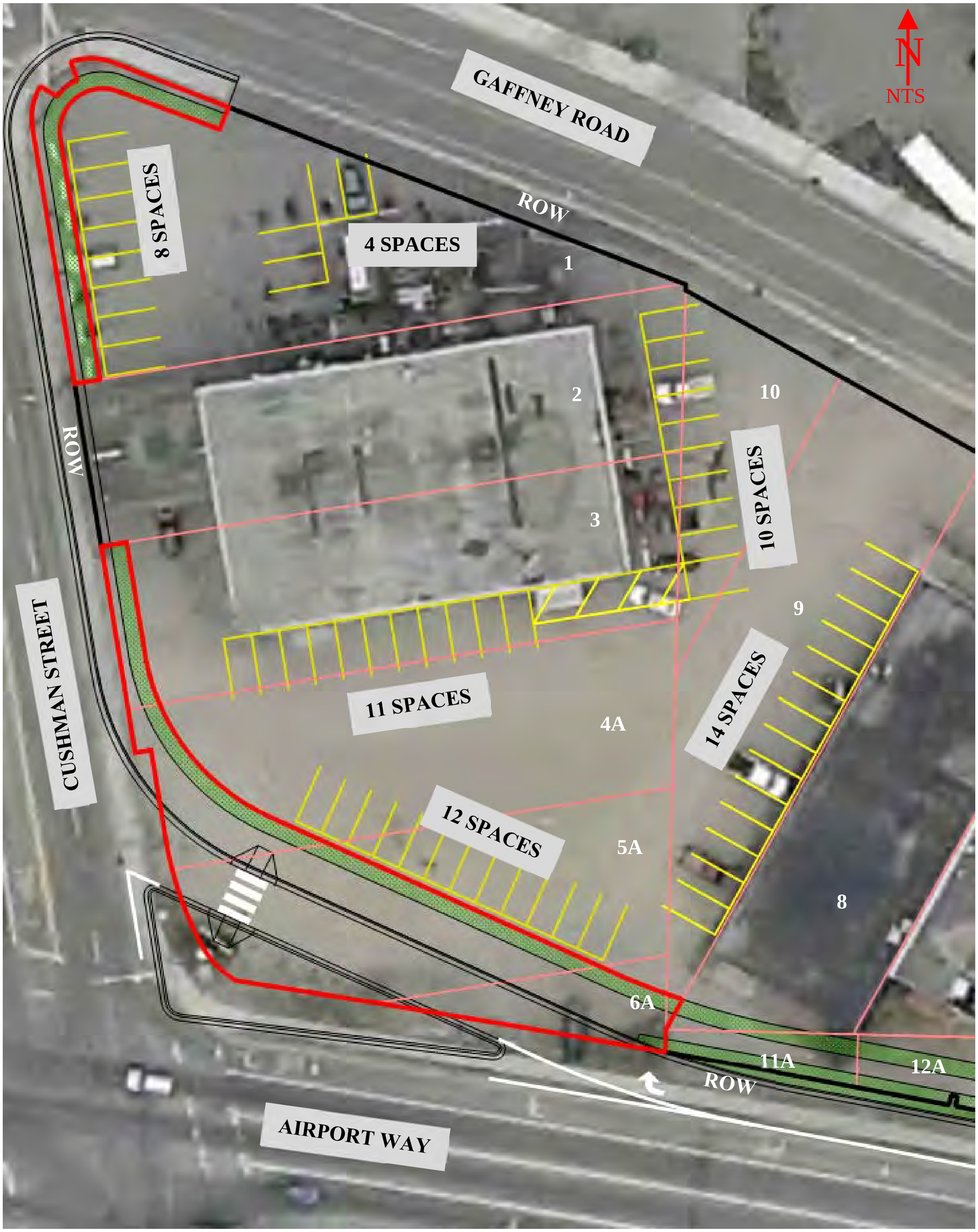


Figure 8- Project Impact on Lot 2 (59 Total Spaces)

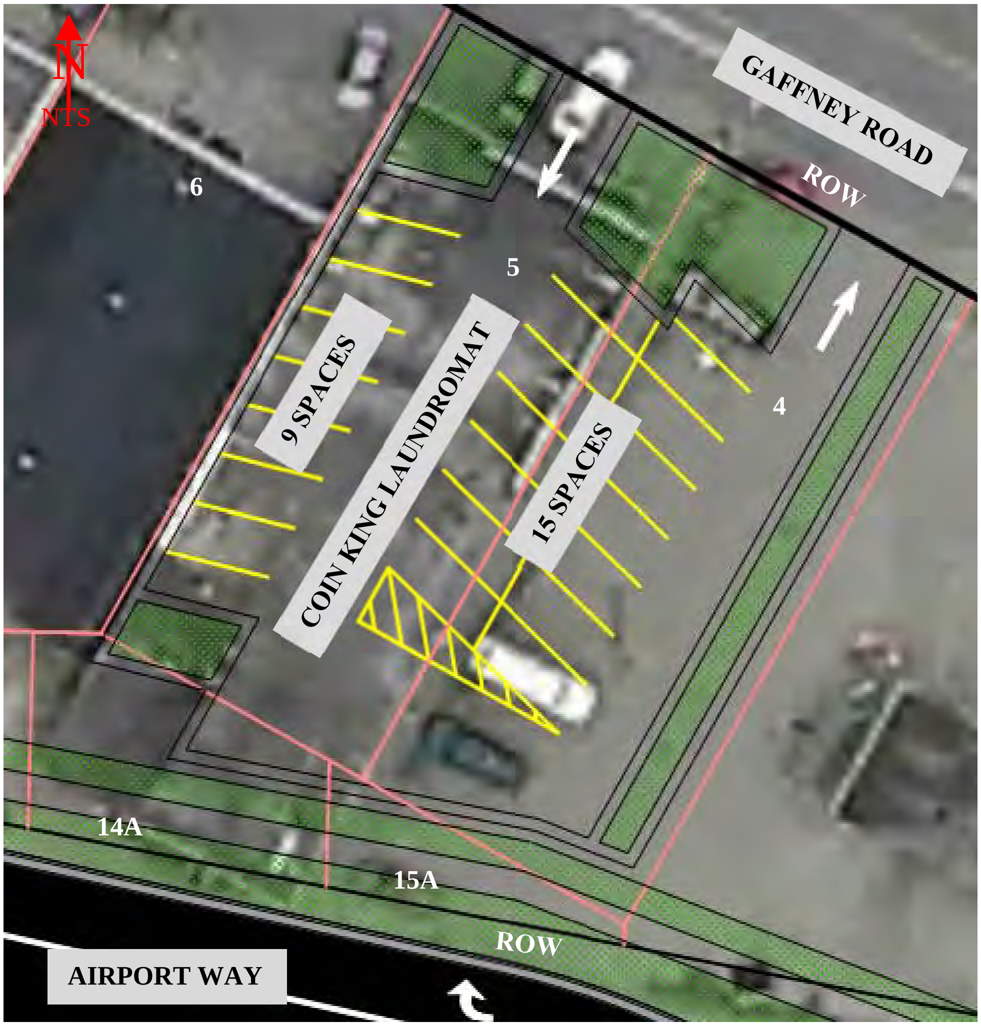


Figure 9- Proposed New Parking Lot (24 Total Spaces)

Figure 10- Project Impact on Lot 3

On-site parking for Lot 3 does not meet the minimum required number of parking stalls based on FNSB requirements. The forecasted parking demand also exceeds the capacity of available parking stalls. The proposed intersection improvements will not have a negative effect on parking capacity or functionality.

APPENDIX E

PAVEMENT DESIGN

Project Name: Airport Way/ Cushman Street Intersection Recon
Designer: Kinney/ ljw
Project Number: Z640780000
Date: 5-5-2020

Traffic Data for Design and Historic ESALs

Design Data Input

Estimated Construct Year:	2020
Project Design Life (Yrs):	30
Base Year	2018
Base Year ADT	17000
Growth Rate % per Year:	0.91

% Base Year AADT for Each Lane

Lane	%
1	22
2	33
3	27
4	18
5	0
6	0

Truck Class	Load Factor (ESALs per Truck)	% AADT in Truck Category
4	1	0.2
5	0.5	4.1
6	0.85	0.2
8	1.2	0.2
9	1.55	0.1

TOTAL DESIGN ESALs:

2,014,371

Historic Data Input

Historic Construct Year:	
Backcast % per Year:	

% Base Year AADT for Each Lane

Lane	%
1	
2	
3	
4	
5	
6	

Truck Class	Load Factor (ESALs per Truck)	% AADT in Truck Category
4	1	
5	0.5	
6	0.85	
8	1.2	
9	1.55	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

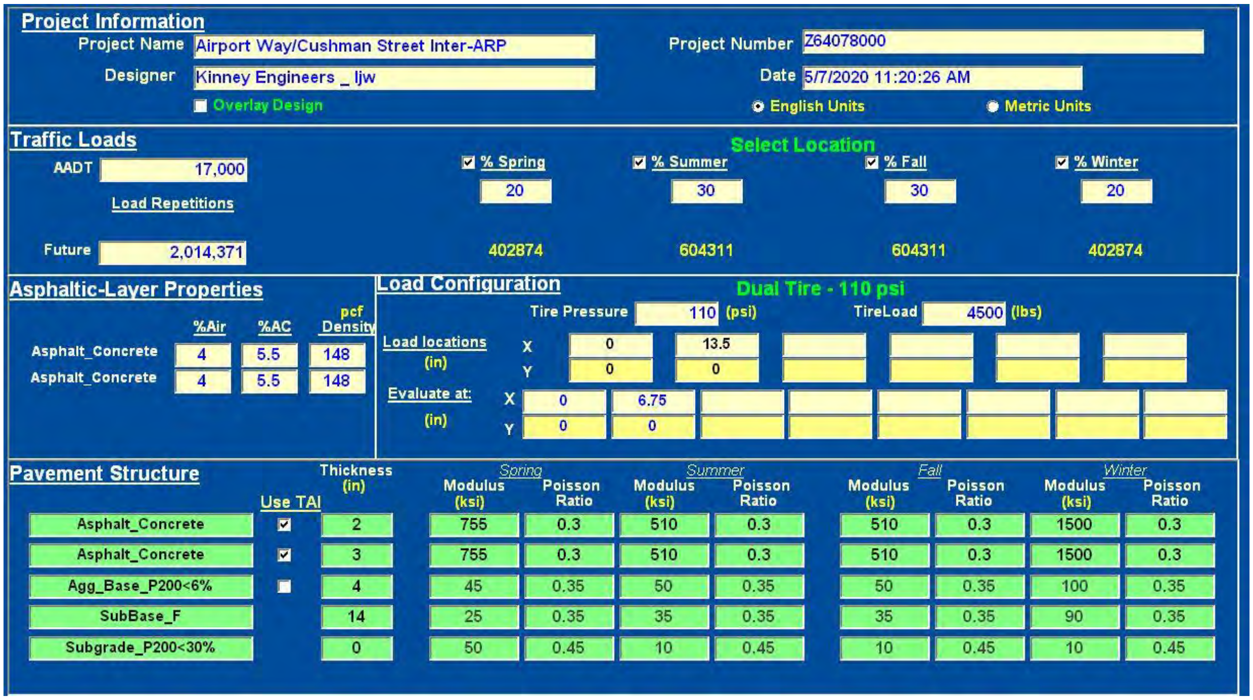
Truck Class	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
4	5713	0.2	1	4,170
5	5713	4.1	0.5	42,748
6	5713	0.2	0.85	3,545
8	5713	0.2	1.2	5,005
9	5713	0.1	1.55	3,232
		Total Construction Year ESALs:		58,700

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
4		0	1	0
5		0	0.5	0
6		0	0.85	0
8		0	1.2	0
9		0	1.55	0
	Total Historic Construction Year ESALs:			0

Airport Way-Meets Alaska Renewable Pavement Design Criteria

Meets Group Policy GP-7 (Alaska Renewable Pavement) of the Alaska Flexible Pavement Design Manual



Project Information

Project Name: Airport Way/Cushman Street Inter-ARP
Project Number: Z64078000
Designer: Kinney Engineers _ ljw
Date: 5/7/2020 11:20:26 AM
☐ Overlay Design
● English Units ○ Metric Units

Traffic Loads

AADT: 17,000
Load Repetitions
Select Location

	☑ % Spring	☑ % Summer	☑ % Fall	☑ % Winter
	20	30	30	20
Future 2,014,371	402874	604311	604311	402874

Asphaltic-Layer Properties

	%Air	%AC	pcf Density
Asphalt_Concrete	4	5.5	148
Asphalt_Concrete	4	5.5	148

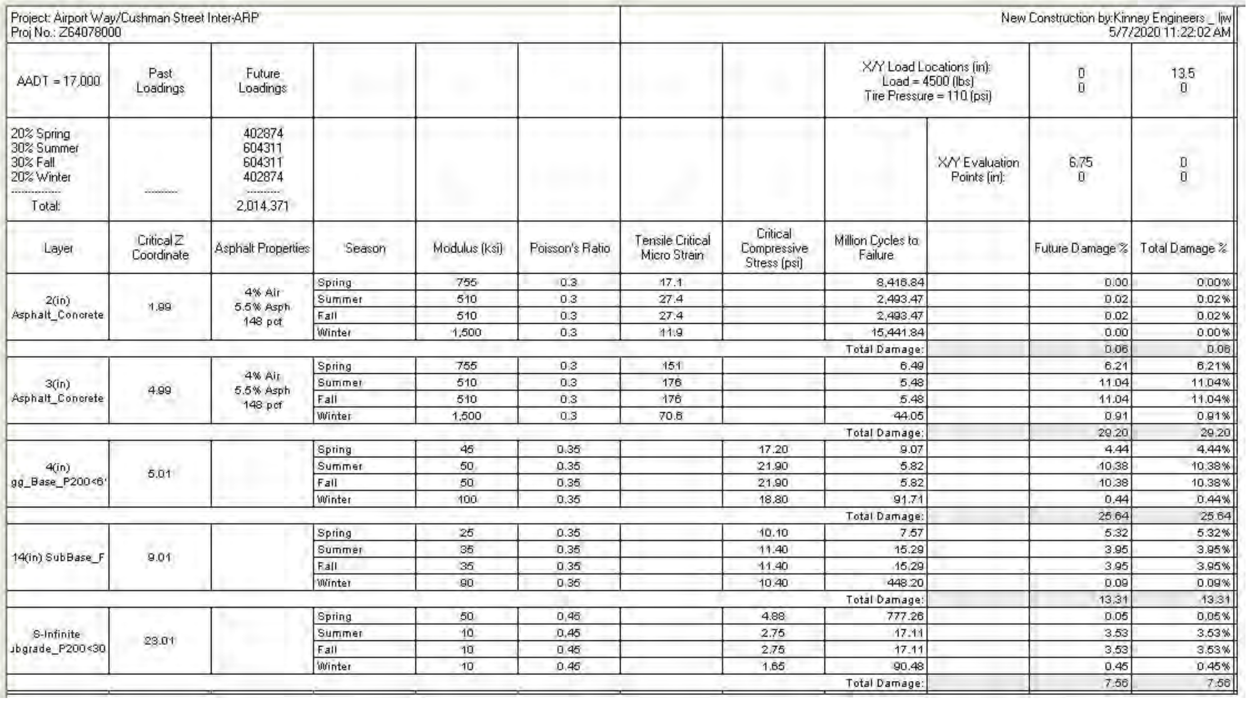
Load Configuration — Dual Tire - 110 psi

Tire Pressure: 110 (psi)
TireLoad: 4500 (lbs)

Load locations (in)	X	0	13.5
	Y	0	0
Evaluate at: (in)	X	0	6.75
	Y	0	0

Pavement Structure

	Use TAI	Thickness (in)	Spring Modulus (ksi)	Spring Poisson Ratio	Summer Modulus (ksi)	Summer Poisson Ratio	Fall Modulus (ksi)	Fall Poisson Ratio	Winter Modulus (ksi)	Winter Poisson Ratio
Asphalt_Concrete	☑	2	755	0.3	510	0.3	510	0.3	1500	0.3
Asphalt_Concrete	☑	3	755	0.3	510	0.3	510	0.3	1500	0.3
Agg_Base_P200<6%	☐	4	45	0.35	50	0.35	50	0.35	100	0.35
SubBase_F		14	25	0.35	35	0.35	35	0.35	90	0.35
Subgrade_P200<30%		0	50	0.45	10	0.45	10	0.45	10	0.45



Project: Airport Way/Cushman Street Inter-ARP
Proj No.: Z64078000

New Construction by:Kinney Engineers _ ljw
5/7/2020 11:22:02 AM

AADT = 17,000	Past Loadings	Future Loadings	X/Y Load Locations (in): Load = 4500 (lbs) Tire Pressure = 110 (psi)	0 0	13.5 0
20% Spring 30% Summer 30% Fall 20% Winter --------------- Total:	----------	402874 604311 604311 402874 ---------- 2,014,371	X/Y Evaluation Points (in):	6.75 0	0 0

Layer	Critical Z Coordinate	Asphalt Properties	Season	Modulus (ksi)	Poisson's Ratio	Tensile Critical Micro Strain	Critical Compressive Stress (psi)	Million Cycles to Failure		Future Damage %	Total Damage %
2(in) Asphalt_Concrete	1.99	4% Air 5.5% Asph 148 pcf	Spring	755	0.3	17.1		8,416.84		0.00	0.00%
			Summer	510	0.3	27.4		2,493.47		0.02	0.02%
			Fall	510	0.3	27.4		2,493.47		0.02	0.02%
			Winter	1,500	0.3	11.9		15,441.84		0.00	0.00%
								Total Damage:		0.06	0.06
3(in) Asphalt_Concrete	4.99	4% Air 5.5% Asph 148 pcf	Spring	755	0.3	151		6.49		6.21	6.21%
			Summer	510	0.3	176		5.48		11.04	11.04%
			Fall	510	0.3	176		5.48		11.04	11.04%
			Winter	1,500	0.3	70.8		44.05		0.91	0.91%
								Total Damage:		29.20	29.20
4(in) gg_Base_P200<6'	5.01		Spring	45	0.35		17.20	9.07		4.44	4.44%
			Summer	50	0.35		21.90	5.82		10.38	10.38%
			Fall	50	0.35		21.90	5.82		10.38	10.38%
			Winter	100	0.35		18.80	91.71		0.44	0.44%
								Total Damage:		25.64	25.64
14(in) SubBase_F	9.01		Spring	25	0.35		10.10	7.57		5.32	5.32%
			Summer	35	0.35		11.40	15.29		3.95	3.95%
			Fall	35	0.35		11.40	15.29		3.95	3.95%
			Winter	90	0.35		10.40	448.20		0.09	0.09%
								Total Damage:		13.31	13.31
S-Infinite ubgrade_P200<30	23.01		Spring	50	0.45		4.88	777.26		0.05	0.05%
			Summer	10	0.45		2.75	17.11		3.53	3.53%
			Fall	10	0.45		2.75	17.11		3.53	3.53%
			Winter	10	0.45		1.65	90.48		0.45	0.45%
								Total Damage:		7.56	7.56

Project Name: Airport Way/ Cushman Street Intersection Recon
Designer: Kinney/ ljw
Project Number: Z640780000
Date: 5-5-2020

Traffic Data for Design and Historic ESALs

Design Data Input

Estimated Construct Year:	2020
Project Design Life (Yrs):	20
Base Year	2018
Base Year ADT	17000
Growth Rate % per Year:	0.91

% Base Year AADT for Each Lane	
Lane	%
1	22
2	33
3	27
4	18
5	0
6	0

Truck Class	Load Factor (ESALs per Truck)	% AADT in Truck Category
4	1	0.2
5	0.5	4.1
6	0.85	0.2
8	1.2	0.2
9	1.55	0.1

TOTAL DESIGN ESALs:

1,281,254

Historic Data Input

Historic Construct Year:	
Backcast % per Year:	

% Base Year AADT for Each Lane	
Lane	%
1	
2	
3	
4	
5	
6	

Truck Class	Load Factor (ESALs per Truck)	% AADT in Truck Category
4	1	
5	0.5	
6	0.85	
8	1.2	
9	1.55	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

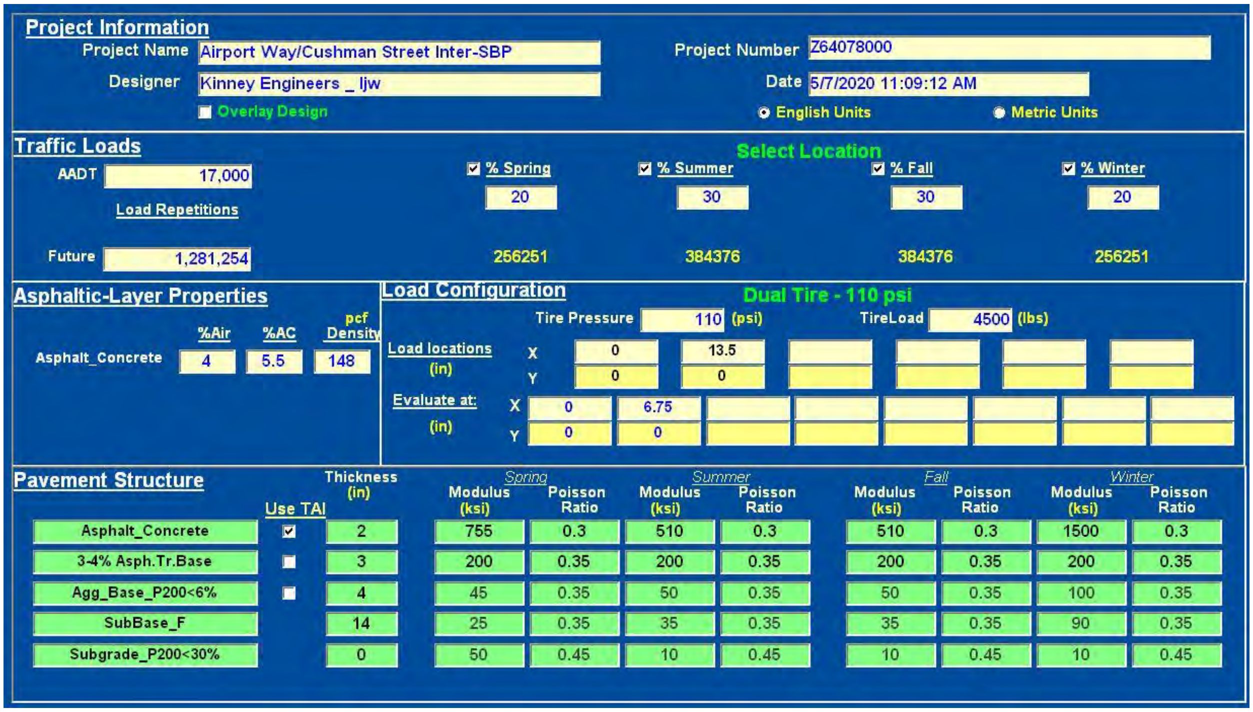
Truck Class	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
4	5713	0.2	1	4,170
5	5713	4.1	0.5	42,748
6	5713	0.2	0.85	3,545
8	5713	0.2	1.2	5,005
9	5713	0.1	1.55	3,232
		Total Construction Year ESALs:		58,700

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
4		0	1	0
5		0	0.5	0
6		0	0.85	0
8		0	1.2	0
9		0	1.55	0
	Total Historic Construction Year ESALs:			0

Airport Way-Meets Stabilized Base Criteria

Meets Stabilized Base Policy



Project Information

Project Name: Airport Way/Cushman Street Inter-SBP

Project Number: Z64078000

Designer: Kinney Engineers _ ljw

Date: 5/7/2020 11:09:12 AM

☐ Overlay Design

● English Units ○ Metric Units

Traffic Loads

AADT: 17,000

Load Repetitions

Future: 1,281,254

Select Location

	☑ % Spring	☑ % Summer	☑ % Fall	☑ % Winter
	20	30	30	20
Future	256251	384376	384376	256251

Asphaltic-Layer Properties

	%Air	%AC	pcf Density
Asphalt_Concrete	4	5.5	148

Load Configuration

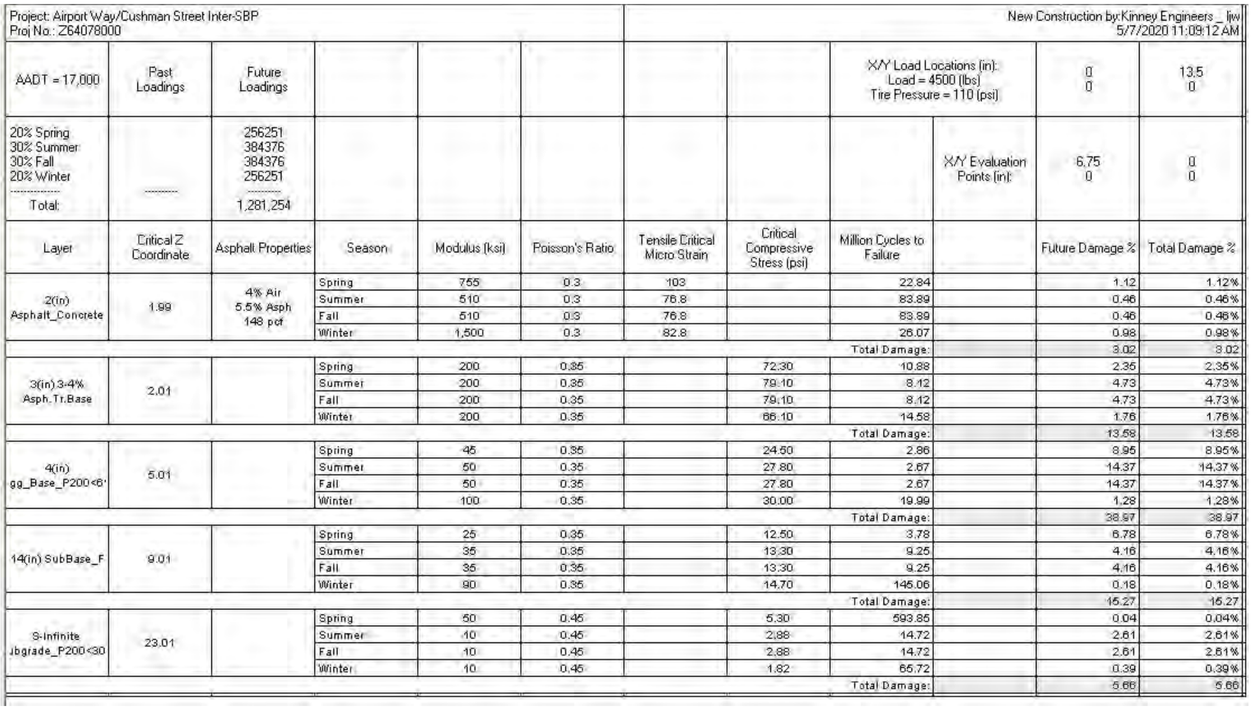
Dual Tire - 110 psi

Tire Pressure: 110 (psi) TireLoad: 4500 (lbs)

Load locations (in)	X	0	13.5					
	Y	0	0					
Evaluate at: (in)	X	0	6.75					
	Y	0	0					

Pavement Structure

	Use TAI	Thickness (in)	Spring Modulus (ksi)	Spring Poisson Ratio	Summer Modulus (ksi)	Summer Poisson Ratio	Fall Modulus (ksi)	Fall Poisson Ratio	Winter Modulus (ksi)	Winter Poisson Ratio
Asphalt_Concrete	☑	2	755	0.3	510	0.3	510	0.3	1500	0.3
3-4% Asph.Tr.Base	☐	3	200	0.35	200	0.35	200	0.35	200	0.35
Agg_Base_P200<6%	☐	4	45	0.35	50	0.35	50	0.35	100	0.35
SubBase_F		14	25	0.35	35	0.35	35	0.35	90	0.35
Subgrade_P200<30%		0	50	0.45	10	0.45	10	0.45	10	0.45



Project: Airport Way/Cushman Street Inter-SBP
Proj No.: Z64078000

New Construction by:Kinney Engineers _ ljw
5/7/2020 11:09:12 AM

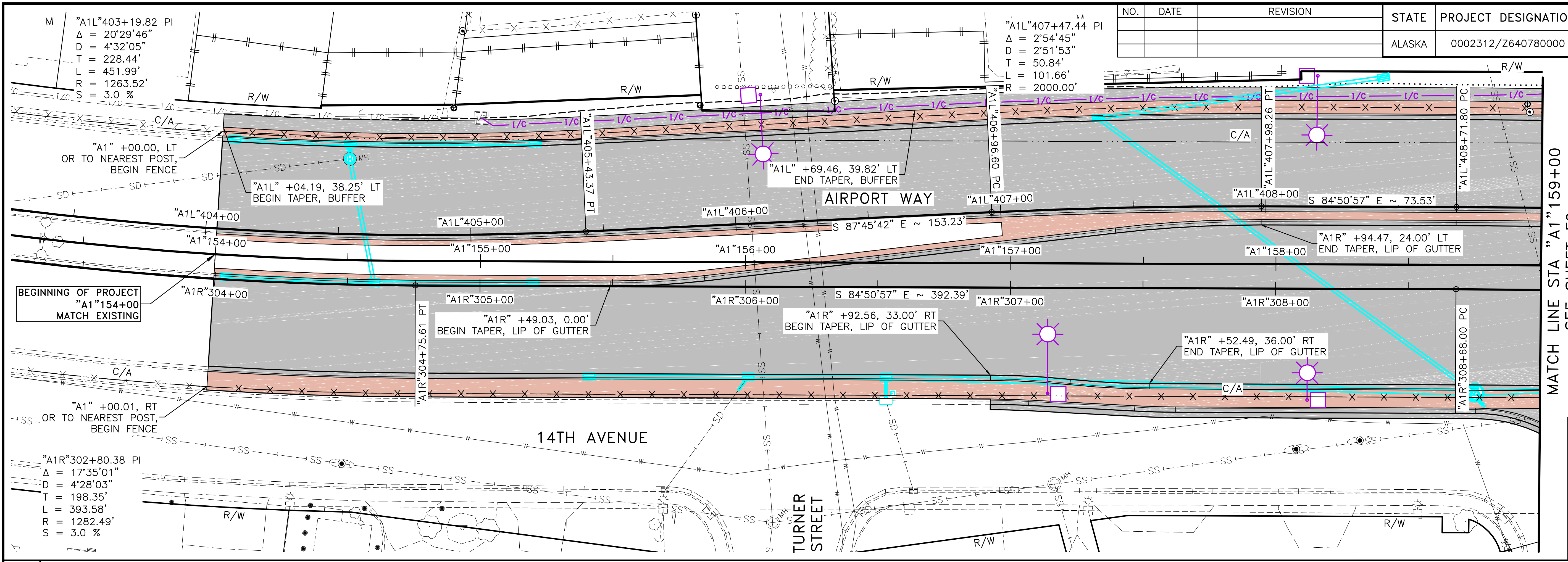
AADT = 17,000	Past Loadings	Future Loadings						X/Y Load Locations (in): Load = 4500 (lbs) Tire Pressure = 110 (psi)		0 0	13.5 0
20% Spring 30% Summer 30% Fall 20% Winter --------------- Total:	-----------	256251 384376 384376 256251 ----------- 1,281,254							X/Y Evaluation Points (in):	6.75 0	0 0
Layer	Critical Z Coordinate	Asphalt Properties	Season	Modulus (ksi)	Poisson's Ratio	Tensile Critical Micro Strain	Critical Compressive Stress (psi)	Million Cycles to Failure		Future Damage %	Total Damage %
2(in) Asphalt_Concrete	1.99	4% Air 5.5% Asph 148 pcf	Spring	755	0.3	103		22.84		1.12	1.12%
			Summer	510	0.3	76.8		83.89		0.46	0.46%
			Fall	510	0.3	76.8		83.89		0.46	0.46%
			Winter	1,500	0.3	82.8		26.07		0.98	0.98%
								Total Damage:		3.02	3.02
3(in) 3-4% Asph.Tr.Base	2.01		Spring	200	0.35		72.30	10.88		2.35	2.35%
			Summer	200	0.35		79.10	8.12		4.73	4.73%
			Fall	200	0.35		79.10	8.12		4.73	4.73%
			Winter	200	0.35		66.10	14.58		1.76	1.76%
								Total Damage:		13.58	13.58
4(in) gg_Base_P200<6'	5.01		Spring	45	0.35		24.50	2.86		8.95	8.95%
			Summer	50	0.35		27.80	2.67		14.37	14.37%
			Fall	50	0.35		27.80	2.67		14.37	14.37%
			Winter	100	0.35		30.00	19.99		1.28	1.28%
								Total Damage:		38.97	38.97
14(in) SubBase_F	9.01		Spring	25	0.35		12.50	3.78		6.78	6.78%
			Summer	35	0.35		13.30	9.25		4.16	4.16%
			Fall	35	0.35		13.30	9.25		4.16	4.16%
			Winter	90	0.35		14.70	145.06		0.18	0.18%
								Total Damage:		15.27	15.27
S-Infinite ıbgrade_P200<30	23.01		Spring	50	0.45		5.30	593.85		0.04	0.04%
			Summer	10	0.45		2.88	14.72		2.61	2.61%
			Fall	10	0.45		2.88	14.72		2.61	2.61%
			Winter	10	0.45		1.82	65.72		0.39	0.39%
								Total Damage:		5.66	5.66

APPENDIX F

PRELIMINARY PLAN AND PROFILE SHEETS

NO.	DATE	REVISION

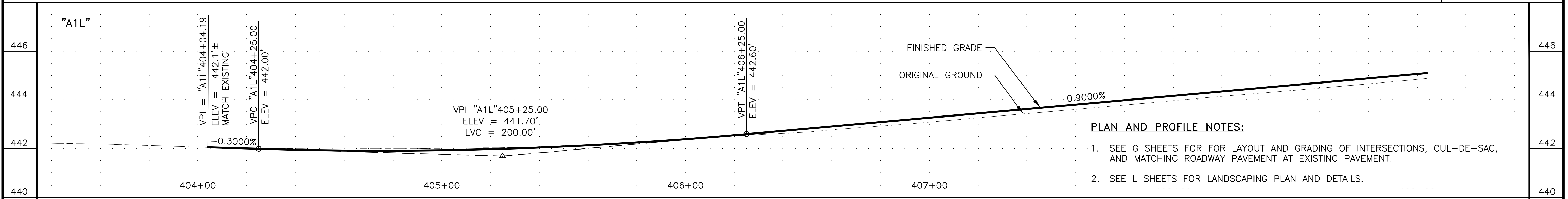
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0002312/Z640780000	2020	F1	F7



PLANS DEVELOPED BY:
KINNEY ENGINEERING, LLC

5/29/2020
PLANS-IN-HAND

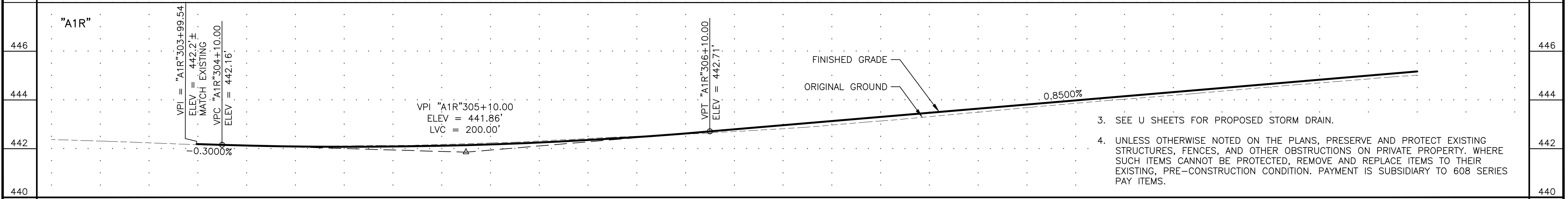
3/29/2019



FG					442.01	441.96	441.93	441.92	441.94	441.98	442.05	442.14	442.25	442.39	442.55	442.73	442.91	443.09	443.27	443.45	443.63	443.81	443.99	444.17	444.35	444.53	444.71	444.89	445.07
EG	442.2	442.2	442.1	442.1	442.0	442.0	442.0	442.0	442.0	442.0	442.1	442.2	442.3	442.4	442.5	442.6	442.8	442.9	443.1	443.3	443.4	443.6	443.8	444.0	444.1	444.3	444.5	444.7	444.8

PLAN AND PROFILE NOTES:

1. SEE G SHEETS FOR FOR LAYOUT AND GRADING OF INTERSECTIONS, CUL-DE-SAC, AND MATCHING ROADWAY PAVEMENT AT EXISTING PAVEMENT.
2. SEE L SHEETS FOR LANDSCAPING PLAN AND DETAILS.



3. SEE U SHEETS FOR PROPOSED STORM DRAIN.
4. UNLESS OTHERWISE NOTED ON THE PLANS, PRESERVE AND PROTECT EXISTING STRUCTURES, FENCES, AND OTHER OBSTRUCTIONS ON PRIVATE PROPERTY. WHERE SUCH ITEMS CANNOT BE PROTECTED, REMOVE AND REPLACE ITEMS TO THEIR EXISTING, PRE-CONSTRUCTION CONDITION. PAYMENT IS SUBSIDIARY TO 608 SERIES PAY ITEMS.

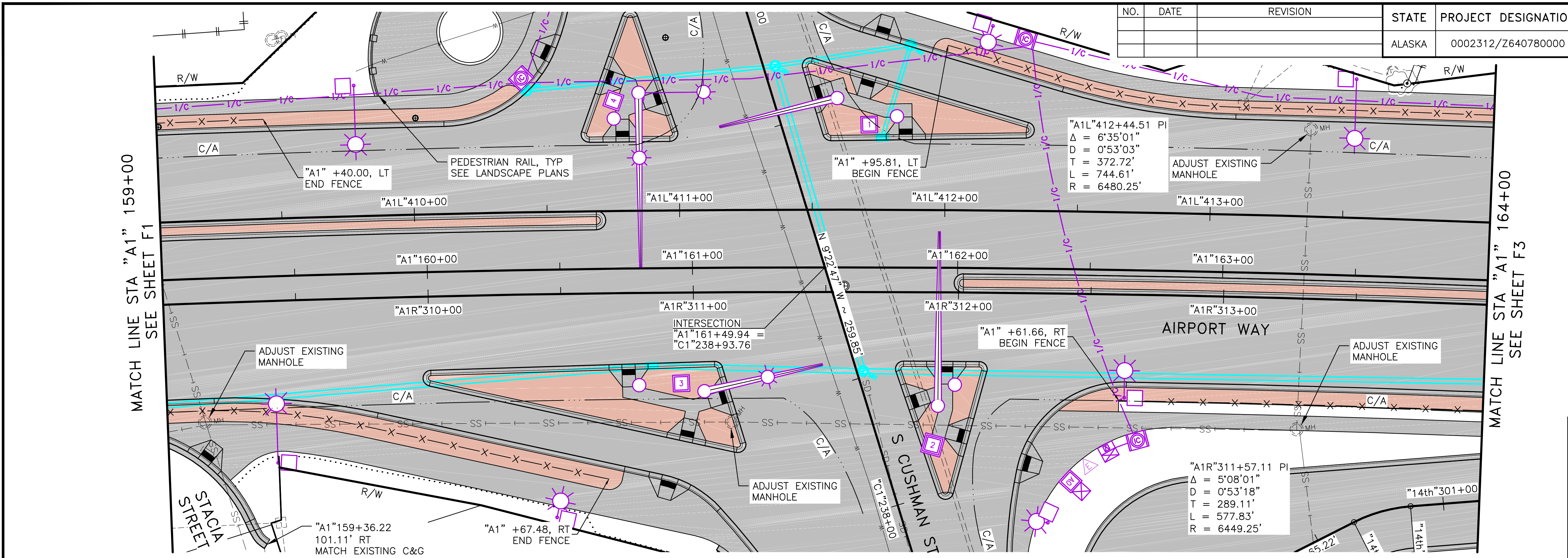
FG				442.19	442.13	442.09	442.08	442.09	442.12	442.17	442.25	442.35	442.48	442.62	442.79	442.96	443.13	443.30	443.47	443.64	443.81	443.98	444.15	444.32	444.49	444.66	444.83	445.00	445.17
EG	442.4	442.3	442.2	442.2	442.1	442.1	442.1	442.1	442.2	442.2	442.3	442.4	442.5	442.6	442.7	442.8	443.0	443.1	443.3	443.5	443.7	443.9	444.0	444.2	444.4	444.5	444.7	444.9	445.0

304+00 305+00 306+00 307+00 308+00 309+00

PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd. Suite 400 Anchorage, Alaska 99503 (907) 346-2373CERT. OF AUTH. NO. AECL 1102

NO.	DATE	REVISION

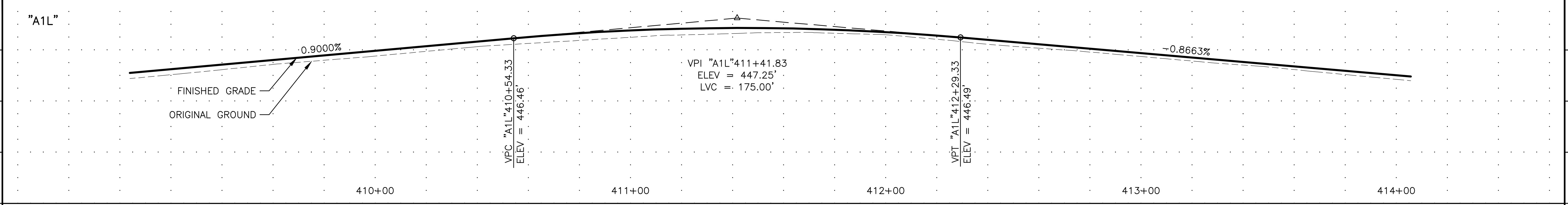
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0002312/Z640780000	2020	F2	F7



PLANS DEVELOPED BY:
KINNEY ENGINEERING, LLC

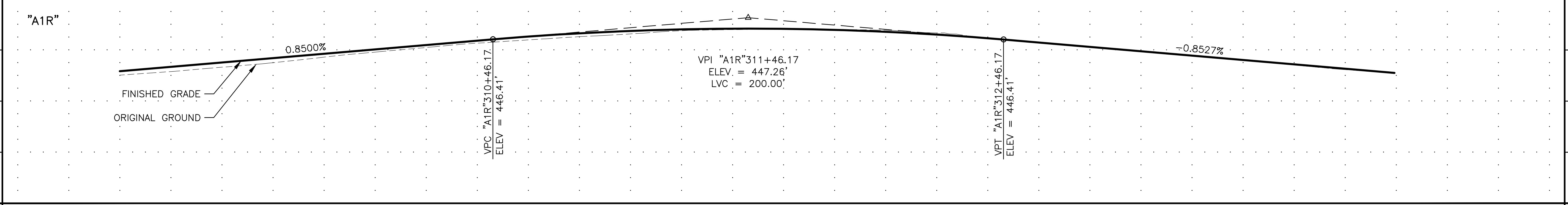
5/29/2020
PLANS-IN-HAND

3/29/2019



FG	445.11	445.25	445.43	445.61	445.79	445.97	446.15	446.33	446.51	446.66	446.77	446.83	446.86	446.85	446.79	446.70	446.57	446.40	446.22	446.05	445.88	445.70	445.53	445.36	445.18	445.01
EG	444.9	445.0	445.2	445.4	445.6	445.8	445.9	446.1	446.3	446.4	446.5	446.6	446.6	446.7	446.7	446.6	446.4	446.2	446.1	445.9	445.7	445.6	445.4	445.2	445.0	444.8

448



FG	445.17	445.34	445.51	445.68	445.85	446.02	446.19	446.36	446.52	446.65	446.75	446.81	446.84	446.83	446.79	446.71	446.61	446.46	446.29	446.12	445.95	445.78	445.61	445.44	445.27	445.11
EG	445.0	445.2	445.3	445.5	445.7	445.9	446.1	446.3	446.4	446.5	446.6	446.8	446.8	446.8	446.8	446.8	446.7	446.4	446.3	446.1	446.0	445.8	445.6	445.4	445.2	445.1

310+00 311+00 312+00 313+00

PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd. Suite 400 Anchorage, Alaska 99503 (907) 346-2373CERT. OF AUTH. NO. AECL 1102
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(Sophia Huff) KE#: 00385

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
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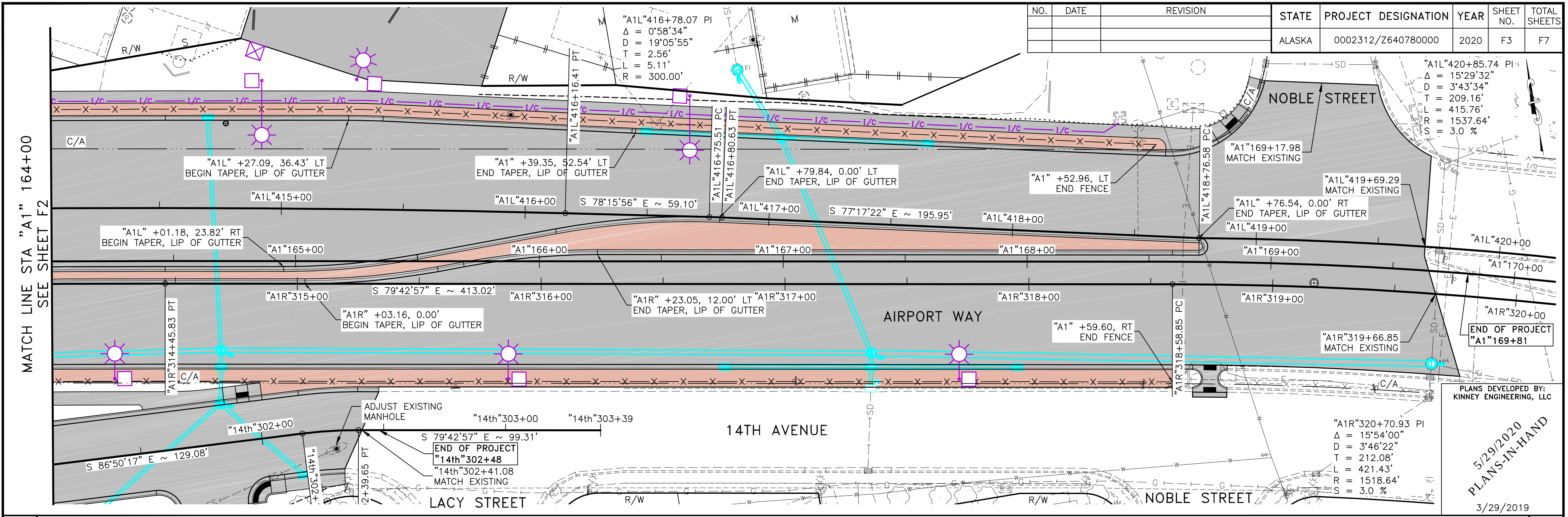

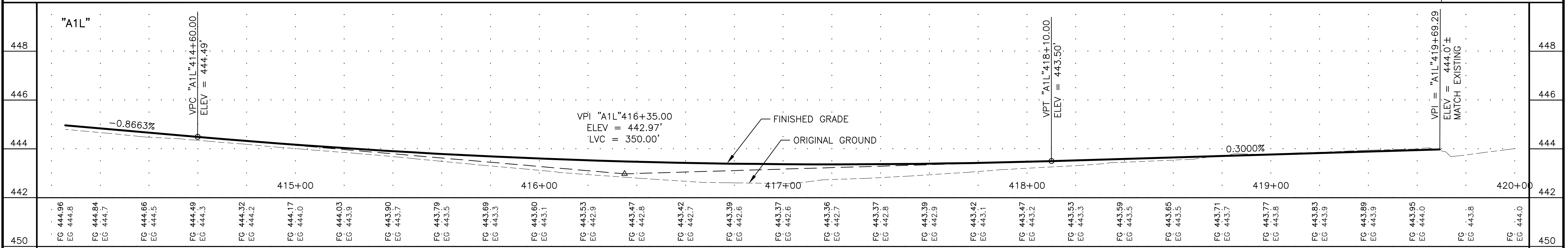

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FG 444.49	EG 444.3
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FG 444.03	EG 443.9
FG 443.90	EG 443.7
FG 443.79	EG 443.5
FG 443.69	EG 443.3
FG 443.60	EG 443.1
FG 443.53	EG 442.9
FG 443.47	EG 442.8
FG 443.42	EG 442.7
FG 443.39	EG 442.6
FG 443.37	EG 442.6
FG 443.36	EG 442.7
FG 443.37	EG 442.8
FG 443.39	EG 442.9
FG 443.42	EG 443.1
FG 443.47	EG 443.2
FG 443.53	EG 443.3
FG 443.59	EG 443.5
FG 443.65	EG 443.5
FG 443.71	EG 443.7
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FG 443.83	EG 443.9
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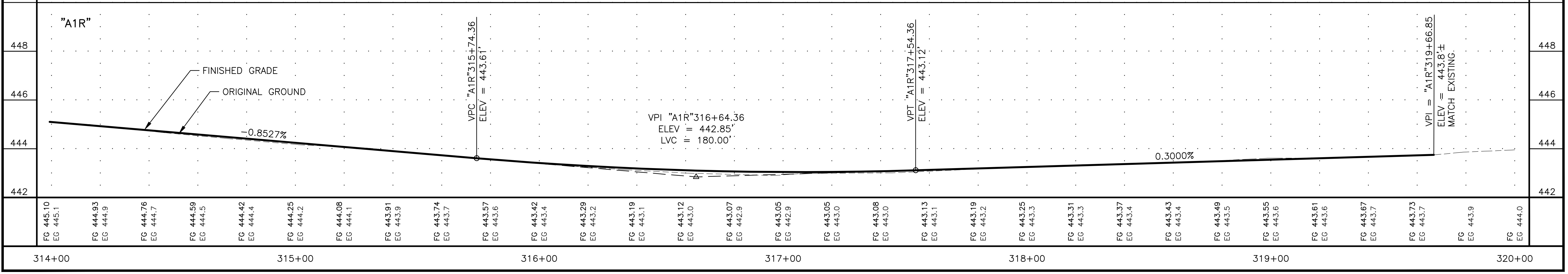
FG	EG 443.8
FG	EG 444.0



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FG 444.93	EG 444.9
FG 444.76	EG 444.7
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FG 444.42	EG 444.4
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FG 444.08	EG 444.1
FG 443.91	EG 443.9
FG 443.74	EG 443.7
FG 443.57	EG 443.6
FG 443.42	EG 443.4
FG 443.29	EG 443.2
FG 443.19	EG 443.1
FG 443.12	EG 443.0
FG 443.07	EG 442.9
FG 443.05	EG 442.9
FG 443.05	EG 443.0
FG 443.08	EG 443.0
FG 443.13	EG 443.1
FG 443.19	EG 443.2
FG 443.25	EG 443.3
FG 443.31	EG 443.3
FG 443.37	EG 443.4
FG 443.43	EG 443.4
FG 443.49	EG 443.5
FG 443.55	EG 443.6
FG 443.61	EG 443.6
FG 443.67	EG 443.7
FG 443.73	EG 443.7
FG	EG 443.9
FG	EG 444.0

PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373CERT. OF AUTH. NO. AECL 1102
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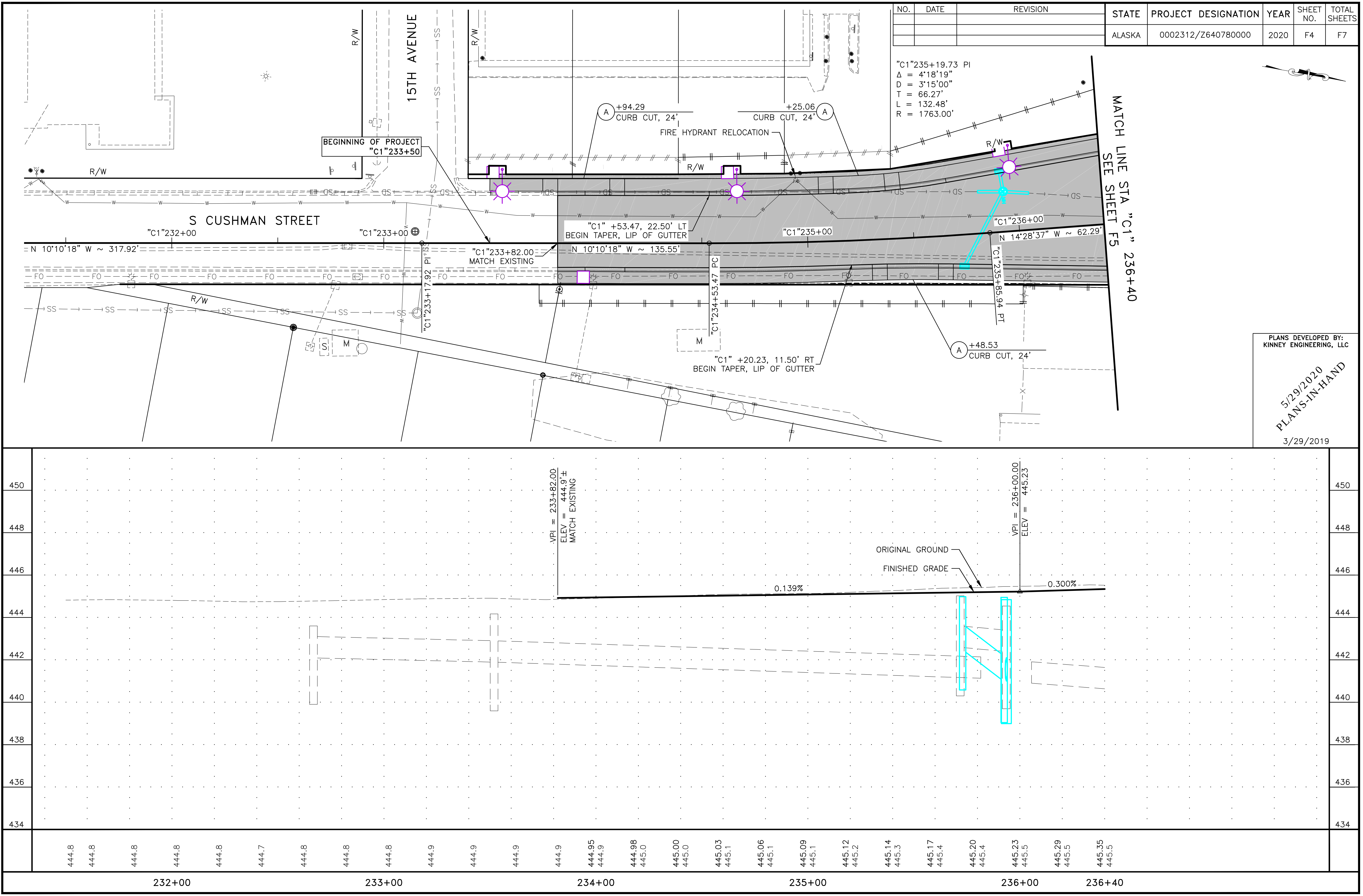
(Sophia Huff) KE#: 00385

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0002312/Z640780000	2020	F4	F7



PLANS DEVELOPED BY:
KINNEY ENGINEERING, LLC

5/29/2020
PLANS-IN-HAND

3/29/2019

PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373CERT. OF AUTH. NO. AECL 1102
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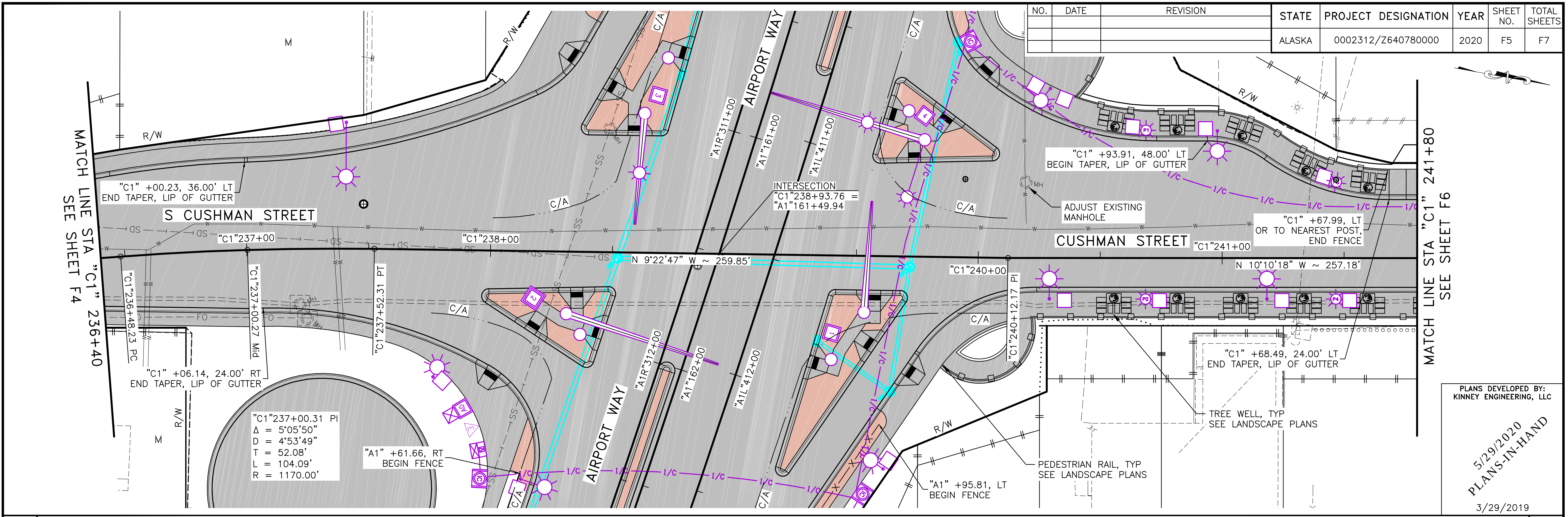
NO.	DATE	REVISION

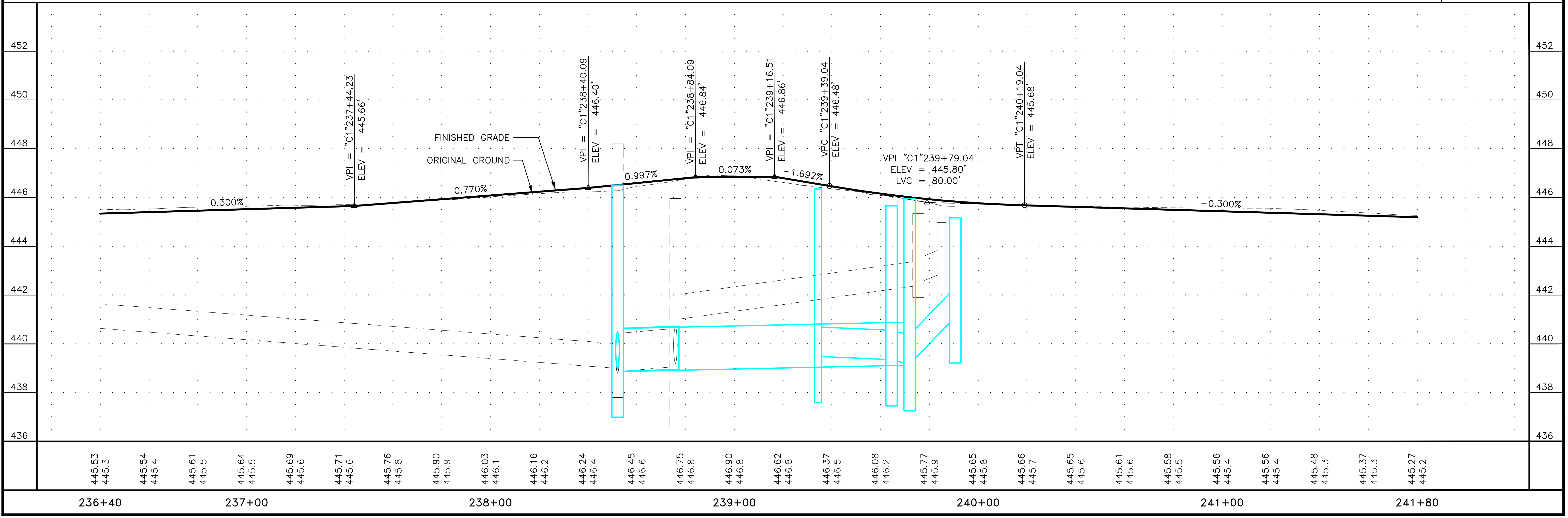
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0002312/Z640780000	2020	F5	F7



PLANS DEVELOPED BY:
KINNEY ENGINEERING, LLC

5/29/2020
PLANS-IN-HAND

3/29/2019



PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373CERT. OF AUTH. NO. AECL 1102
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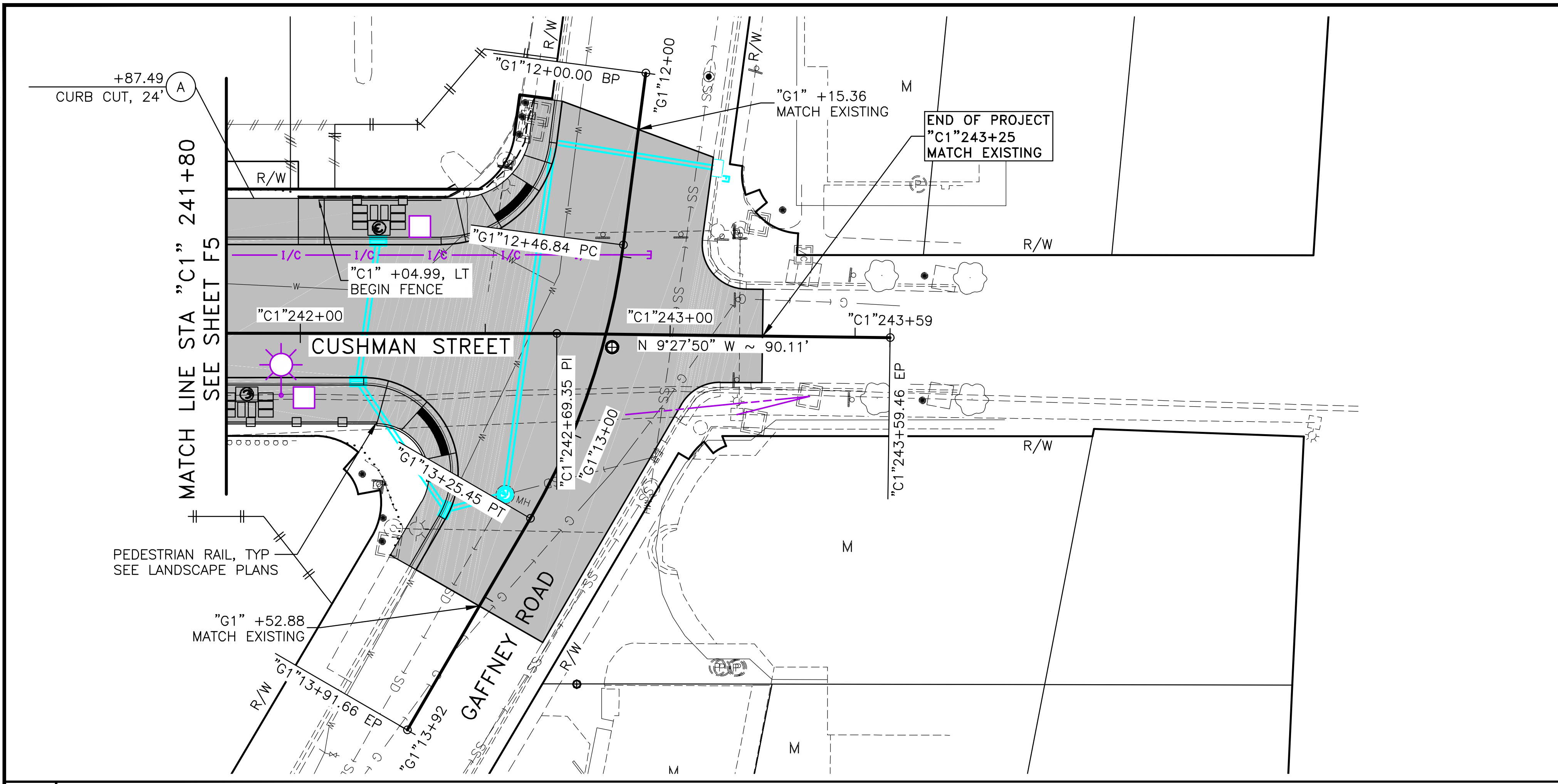
(Sophia Huff) KE#: 00385

NO.	DATE	REVISION

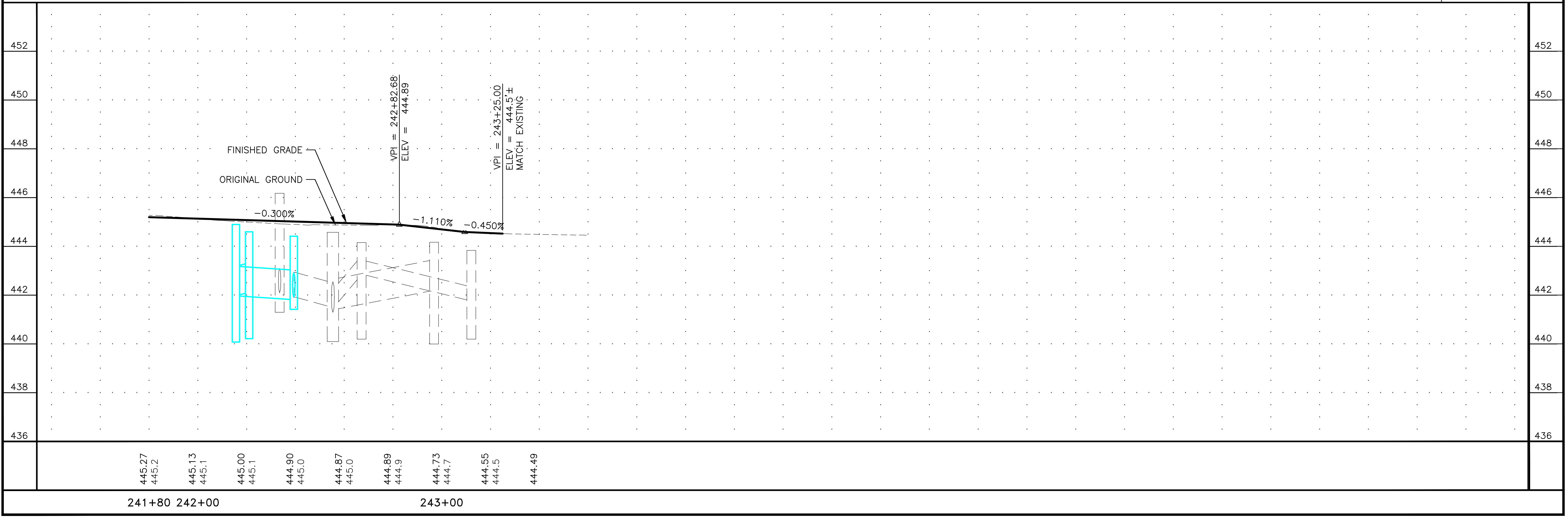
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0002312/Z640780000	2020	F6	F7



PLANS DEVELOPED BY:
KINNEY ENGINEERING, LLC

5/29/2020
PLANS-IN-HAND

3/29/2019



PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373CERT. OF AUTH. NO. AECL 1102

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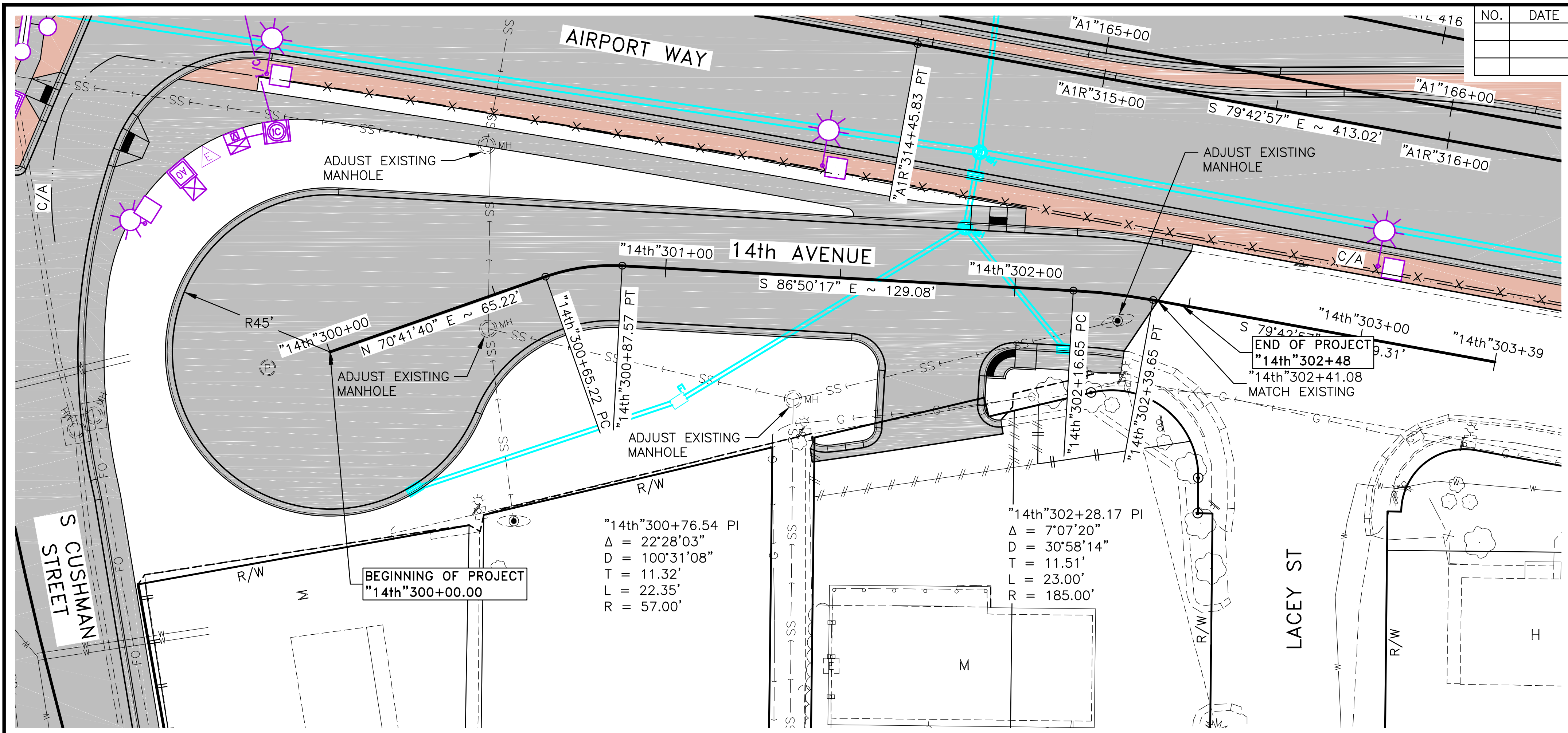
(Sophia Huff) KE#: 00385

NO.	DATE	REVISION

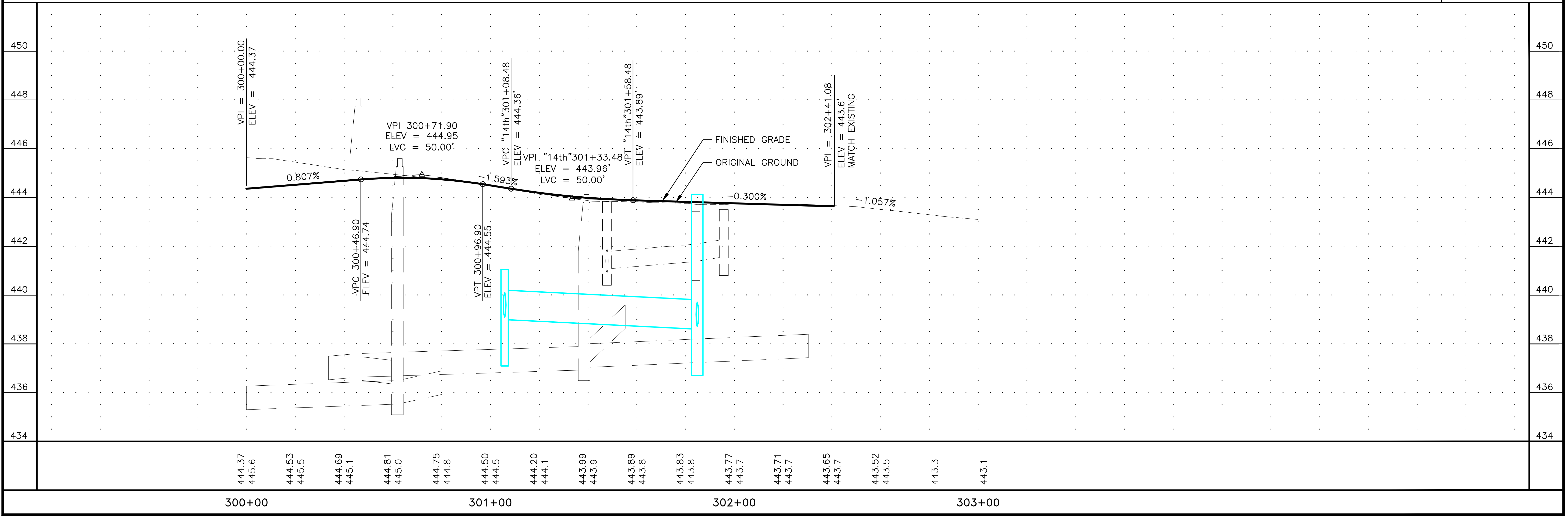
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0002312/Z640780000	2020	F7	F7



PLANS DEVELOPED BY:
KINNEY ENGINEERING, LLC

5/29/2020
PLANS-IN-HAND

3/29/2019



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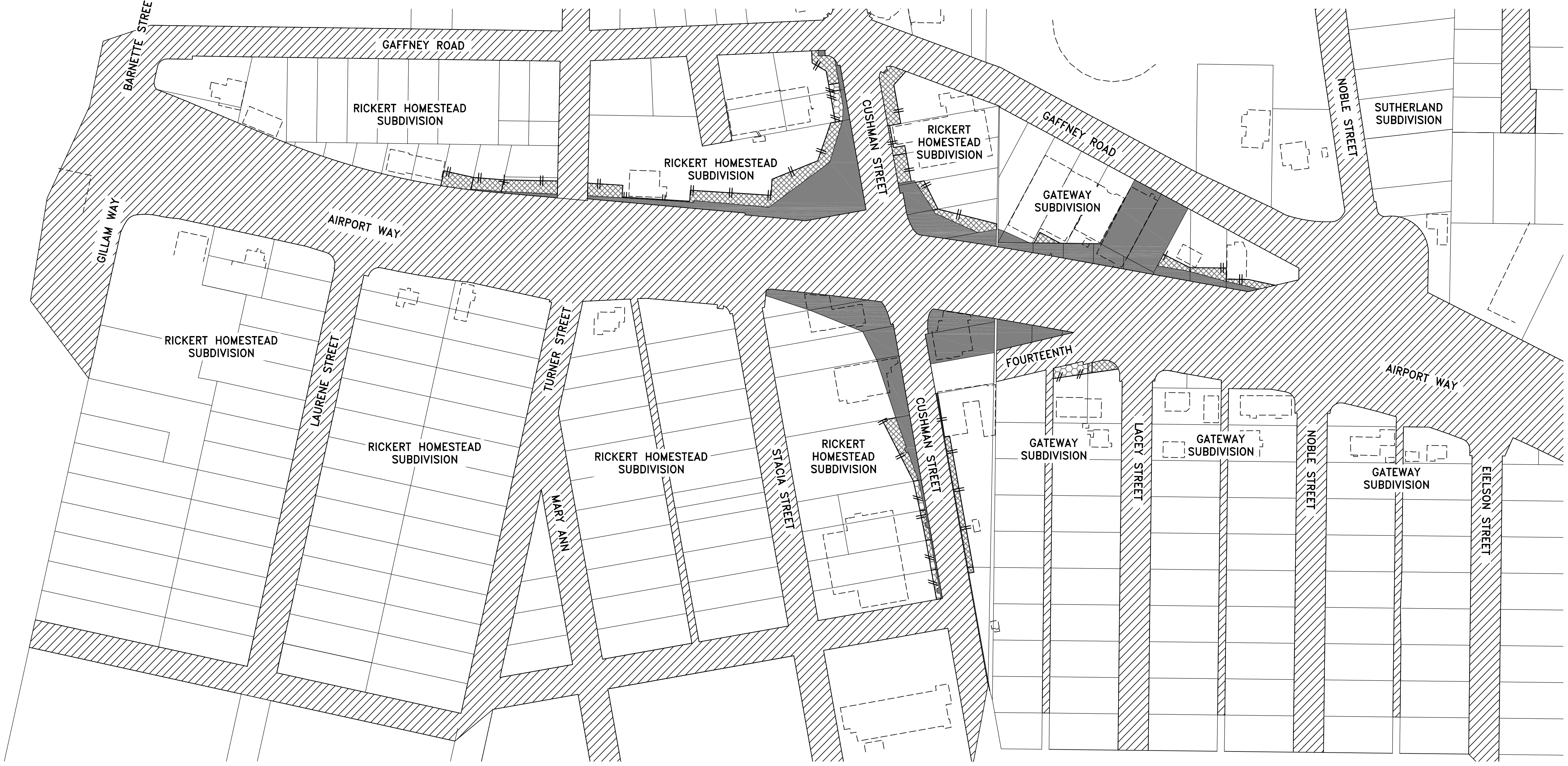
APPENDIX G

PRELIMINARY RIGHT-OF-WAY CONCEPT PLANS

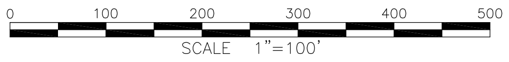


▨ EXITING RIGHT OF WAY

■ FEE ACQUISTION

▩ TEMPORARY CONSTRUCTION EASEMENT

▩ TEMPORARY CONSTRUCTION PERMIT



DATE: MAY 2020

DATE OF SURVEY Beginning: MAY 2020 Ending: MAY 2020	NAME AND ADDRESS: Department of Transportation and Public Facilities (DOT&PF) 2301 Peger Road Fairbanks, Alaska 99709

RIGHT OF WAY EXHIBIT

AIRPORT WAY / CUSHMAN ST INTERSECTION
0002312 / Z640780000
within
SECTION 10
TOWNSHIP 1 SOUTH RANGE 1 WEST
FAIRBANKS MERIDIAN, ALASKA
FAIRBANKS RECORDING DISTRICT

DRAWN BY:	SCALE:	CHECKED BY:	SHEET NO.:
CAW	1"=100'	CAW	1 OF 1

APPENDIX H

DESIGN EXCEPTIONS AND DESIGN WAIVERS
(Pending)

APPENDIX I

UTILITY CONFLICTS

Utility Conflict Matrix

Project Owner: DOT&PF
Project No. : 0002312/Z640780000
Project Description: Airport Way at Cushman Street
Highway or Route: Airport Way (CDS 175700)

Utility Conflict Matrix Developed/Revised By: Kinney Engineering, LLC
Date: 5/15/2020
Reviewed By:
Date:

Utility Owner and/or Contact Name	Conflict ID	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Recommended Action or Resolution
ACS	C1	Communications	Overhead Phone Line, co-located with GVEA Pole	In embankment work	"A1" 154+85.51	55.39' LT			Relocate pole and/or realign anchor
ACS	C2	Communications	Overhead Phone Line, co-located with GVEA Pole	In sidewalk	"A1" 155+76.75	55.35' LT			Relocate
GCI	C4	Communications	Overhead Phone Line	Overhead Clearance 14.43'	"A1" 161+86.19	CL			Raise
ACS	C5	Communications	Telephone Ductbank 2-Way 4" Fiber Duct, Concrete Encased	New SD line crossing	"A1" 161+84.09	38.66' RT			Protect in Place or relocate per conflict C7
ACS	C7	Communications	Telephone Ductbank 2-Way 4" Fiber Duct, Concrete Encased	In intersection and within limits of two (2) pedestrian refuge islands.	"C1" 237+21.87	22.73' RT	"C1" 239+97.32	18.60' RT	Relocate between MH at 237+22 and MH at 240+24
ACS	C7a	Communications	Telephone Ductbank 2-Way 4" Fiber Duct, Concrete Encased	Signal pole foundation on pedestrian reguge island adjacent to the ductbank	"C1" 239+53.44	23.16' RT			Relocate between MH at 237+22 and MH at 240+25
ACS	C7b	Communications	Telephone Ductbank 2-Way 4" Fiber Duct, Concrete Encased	Signal pole foundation on pedestrian reguge island adjacent to the ductbank	"C1" 238+31.36	25.42' RT			Relocate between MH at 237+22 and MH at 240+26
GCI	C8	Communications	Overhead Phone Line, co-located with GVEA Pole w-service drop	In conflict with road widening and fenceline/sidewalk; Proposed design provides limited ROW for relocation	"A1" 163+06.37	63.37' LT			Relocate (assume underground required Sta. 161+65 to 166+48 due to ROW constraints)
GCI	C9	Communications	Pole guy anchor	In conflict with road widening and fenceline/sidewalk; Proposed design provides limited ROW for relocation	"A1" 163+04.30	56.08' LT			Relocate (see conflict C8)
GCI	C10	Communications	Overhead Phone Line w-service drop, co-located with GVEA Pole	In conflict with road widening and fenceline/sidewalk; Proposed design provides limited ROW for relocation	"A1" 164+64.12	57.41' LT			Relocate (see conflict C8)
GCI	C11	Communications	Overhead Phone Line w-service drop, co-located with GVEA Pole	In conflict with road widening and fenceline/sidewalk; Proposed design provides limited ROW for relocation	"A1" 166+47.95	55.83' LT			Relocate (see conflict C8)
GCI	C12	Communications	Pole guy anchor co-located with GVEA Pole	In conflict with road widening and fenceline/sidewalk; Proposed design provides limited ROW for relocation	"A1" 166+76.91	55.78' LT			Relocate (see conflict C8)
ACS	C14	Communications	Telephone Ductbank 6-Way 4" Ducts in S/W	In conflict with sidewalk replacement.	"C1" 233+82.59	15.68' RT	"C1" 237+24.71	28.38' RT	Relocate between BOP and MH at "C1" 237+25, 29' RT

Utility Conflict Matrix

Project Owner: DOT&PF
Project No. : 0002312/Z640780000
Project Description: Airport Way at Cushman Street
Highway or Route: Airport Way (CDS 175700)

Utility Conflict Matrix Developed/Revised By: Kinney Engineering, LLC
Date: 5/15/2020
Reviewed By:
Date:

Utility Owner and/or Contact Name	Conflict ID	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Recommended Action or Resolution
GCI	C15	Communications	Overhead Phone Line, co-located with GVEA Pole w-service drop	In road	"C1" 237+75.00	33.59' RT			Relocate
ACS	C16	Communications	Telephone Ductbank 2-Way 4" Fiber Duct, Concrete Encased	In road	"C1" 233+82.58	4.05' RT	"C1" 237+21.87	22.73' RT	Protect in Place
ACS	C17	Communications	Telephone Manhole in road	In road	"C1" 237+21.87	22.73' RT			Adjust to FG
GCI	C18	Communications	Overhead Phone Line, co-located with GVEA Pole	In curb & gutter of pedestrian refuge island	"C1" 239+82.70	40.41' LT			Relocate
ACS	C19	Communications	Telephone Manhole in sidewalk	In conflict with sidewalk replacement	"C1" 237+24.71	28.38' RT			Relocate
ACS	C20	Communications	Telephone Ductbank 2-Way 4" Fiber Duct, Concrete Encased	New SD line crossing	"C1" 239+69.67	19.61' RT			Protect in Place
GCI	C21	Communications	Overhead Phone Line w-service drop, co-located with GVEA Pole	In road	"C1" 241+36.66	34.52' LT			Relocate
ACS	C22	Communications	Telephone Ductbank 2-Way 4" Fiber Duct, Concrete Encased	In sidewalk	"C1" 240+09.67	18.08' RT	"C1" 242+29.54	17.53' RT	Protect in Place (partial relocate per conflict C26)
ACS	C23	Communications	Telephone Manhole in sidewalk	In sidewalk	"C1" 240+23.72	19.68' RT			Relocate
ACS	C24	Communications	Telephone Ductbank 2-Way 4" Fiber Duct, Concrete Encased	New SD line crossing	"C1" 242+18.72	17.39' RT			Protect in Place
ACS	C25	Communications	Telephone Ductbank 2-Way 4" Fiber Duct, Concrete Encased	In Road and sidewalk	"C1" 242+32.84	17.39' RT	"C1" 243+07.18	14.70' RT	Protect in Place
ACS	C26	Communications	Telephone Ductbank 2-Way 4" Fiber Duct, Concrete Encased	In conflict with landscaping tree wells/root cells, and pedestrian lighting	"C1" 240+48.46	18.91' RT	"C1" 241+92.71	17.21' RT	Relocate from MH at 240+24, re-join existing comm duct at Approx. Sta. 240+10 RT
ACS	C27	Communications	Telephone Ductbank 2-Way 4" Fiber Duct, Concrete Encased	New SD line crossing	"C1" 235+75.35	10.94' RT			Protect in Place
GCI	C28	Communications	Overhead Phone Line, co-located with GVEA Pole	In pedestrian refuge island	"C1" 239+55.88	35.26' RT			Relocate
GCI	C29	Communications	Pole guy anchor	In pedestrian refuge island curb ramp	"C1" 239+88.19	56.34' LT			Relocate

Utility Conflict Matrix

Project Owner: DOT&PF
Project No. : 0002312/Z640780000
Project Description: Airport Way at Cushman Street
Highway or Route: Airport Way (CDS 175700)

Utility Conflict Matrix Developed/Revised By: Kinney Engineering, LLC
Date: 5/15/2020
Reviewed By:
Date:

Utility Owner and/or Contact Name	Conflict ID	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Recommended Action or Resolution
GVEA	E1	Electric	Power Pole and anchor, C Ø OH Primary	In embankment work	"A1" 154+85.51	55.39' LT			Relocate pole and/or anchor
GVEA	E2	Electric	Power Pole, C Ø OH Primary w-service	In sidewalk	"A1" 155+76.75	55.35' LT			Relocate has COF light on it
GVEA	E3	Electric	Power Pole, C Ø OH Primary w- service drop	In fenceline	"A1" 156+88.84	54.75' LT			Relocate
GVEA	E4	Electric	Power Pole, C Ø OH Primary w- service drop	In curb & gutter and new SD	"A1" 157+94.78	55.34' LT			Relocate away from SD
GVEA	E5	Electric	Power Pole, stub pole C Ø OH Primary	In curb & gutter	"A1" 158+41.96	55.55' LT			Relocate
Private	E6	Electric	Pole w/meter, C Ø OH Primary	In fenceline	"A1" 158+56.70	57.76' LT			Relocate
Private	E6a	Electric	Lighting w/UGE	In fenceline	"A1" 158+72.27	60.51' LT			Relocate
Private	E6b	Electric	Lighting w/UGE	In fenceline	"A1" 159+62.42	59.89' LT			Relocate
Private	E6c	Electric	Lighting w/UGE	In fenceline	"A1" 160+50.63	78.16' LT			Relocate
GVEA	E7	Electric	Pole Anchor, C Ø OH Primary	Guy anchor in curb & gutter	"A1" 158+70.68	55.32' LT			Relocate
GVEA	E8	Electric	Power Pole, 3 Ø OH Primary w- service drop	In conflict with road widening and fenceline/sidewalk; Proposed design provides limited ROW for relocation	"A1" 163+06.37	63.37' LT			Relocate (assume underground required Sta. 161+65 to 166+48 due to ROW constraints)
GVEA	E9	Electric	Power Pole guy anchor	In conflict with road widening and fenceline/sidewalk; Proposed design provides limited ROW for relocation	"A1" 163+04.30	56.08' LT			Relocate (see conflict E8)
GVEA	E10	Electric	Power Pole, 3 Ø OH Primary w- service drop	In conflict with road widening and fenceline/sidewalk; Proposed design provides limited ROW for relocation	"A1" 164+64.12	57.41' LT			Relocate (see conflict E8)
GVEA	E11	Electric	Power Pole, 3 Ø OH Primary w- service drop	In conflict with road widening and fenceline/sidewalk; Proposed design provides limited ROW for relocation	"A1" 166+47.95	55.83' LT			Relocate (see conflict E8)
GVEA	E12	Electric	Pole Anchor, 3 Ø OH Primary w- service drop	In conflict with road widening and fenceline/sidewalk; Proposed design provides limited ROW for relocation	"A1" 166+76.91	55.78' LT			Relocate (see conflict E8)

Utility Conflict Matrix

Project Owner: DOT&PF
Project No. : 0002312/Z640780000
Project Description: Airport Way at Cushman Street
Highway or Route: Airport Way (CDS 175700)

Utility Conflict Matrix Developed/Revised By: Kinney Engineering, LLC
Date: 5/15/2020
Reviewed By:
Date:

Utility Owner and/or Contact Name	Conflict ID	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Recommended Action or Resolution
GVEA	E13	Electric	Electric Transformer	Behind sidewalk	"A1" 168+49.77	59.08' LT			Protect in Place
GVEA	E14	Electric	Electric Switch	Behind sidewalk	"A1" 168+51.31	59.25' LT			Protect in Place
GVEA	E15	Electric	Power Pole w/Luminaire, 3 Ø OH Primary w- service drop	In road	"C1" 237+75.00	33.59' RT			Relocate pole w/o luminaire
GVEA	E16	Electric	Power Pole, 3 Ø OH Primary	In road adjacent to pedestrian refuge island	"C1" 238+55.84	85.17' LT			Relocate
GVEA	E17	Electric	Power Pole, 3 Ø OH Primary w- services	In pedestrian refuge island curb ramp	"C1" 239+55.88	35.26' RT			Relocate
GVEA	E18	Electric	Power Pole, 3 Ø OH Primary	In curb & gutter of pedestrian refuge island	"C1" 239+82.70	40.41' LT			Relocate
GVEA	E19	Electric	Anchor 3 Ø OH Primary	In pedestrian refuge island curb ramp	"C1" 239+88.19	56.34' LT			Relocate
GVEA	E20	Electric	Electric Manhole in sidewalk	In road	"C1" 240+19.53	31.07' LT			Adjust
GVEA	E21	Electric	Power Pole with service drop, 3 Ø OH Primary	In road	"C1" 241+36.66	34.52' LT			Relocate
GVEA	E22	Electric	Electric Junction Box	Behind sidewalk	"C1" 242+23.93	57.34' RT			Protect in Place

Utility Conflict Matrix

Project Owner: DOT&PF
Project No. : 0002312/Z640780000
Project Description: Airport Way at Cushman Street
Highway or Route: Airport Way (CDS 175700)

Utility Conflict Matrix Developed/Revised By: Kinney Engineering, LLC
Date: 5/15/2020
Reviewed By:
Date:

Utility Owner and/or Contact Name	Conflict ID	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Recommended Action or Resolution
FNG	G1	Gas	8" dia. gas line	In Road	"C1" 242+51.10	75.22' RT	"C1" 243+24.86	9.83' LT	Protect in Place
FNG	G2	Gas	2" dia. gas line	Adjacent to curb & gutter and across driveway	14th 301+62.19	38.91 RT	"14th" 301+93.19	33.61 RT	Protect in Place

Utility Conflict Matrix

Project Owner: DOT&PF
Project No. : 0002312/Z640780000
Project Description: Airport Way at Cushman Street
Highway or Route: Airport Way (CDS 175700)

Utility Conflict Matrix Developed/Revised By: Kinney Engineering, LLC
Date: 5/15/2020
Reviewed By:
Date:

Utility Owner and/or Contact Name	Conflict ID	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Recommended Action or Resolution
GHU	SS1	Sanitary Sewer	10" WSP	New SD line crossing	"A1" 156+06.50	43.25' RT			Protect in Place
GHU	SS2	Sanitary Sewer	8" WSP	New SD line crossing	"A1" 159+12.40	46.78' RT			Protect in Place
GHU	SS3	Sanitary Sewer	Manhole	In sidewalk and planting bed	"A1" 159+14.17	54.17' RT			Adjust and Spin
GHU	SS4	Sanitary Sewer	Manhole	In pedestrian refuge	"A1" 161+14.61	58.21' RT			Adjust and Spin
GHU	SS4a	Sanitary Sewer	8" WSP	Removal of signal pole	"A1" 161+38.35	59.49' RT			Protect in Place
GHU	SS5	Sanitary Sewer	Manhole	In 14th Ave sidewalk	"A1" 163+29.48	58.59' RT			Adjust
GHU	SS6	Sanitary Sewer	8" WSP	New SD line crossing	"A1" 163+29.91	37.76' RT			Protect in Place
GHU	SS7	Sanitary Sewer	Manhole	In Road	"A1" 163+31.83	54.58' LT			Adjust
GHU	SS9	Sanitary Sewer	Manhole	Adjacent to roadwork	"C1" 242+95.31	41.42' RT			Protect in Place
GHU	SS10	Sanitary Sewer	Manhole	In 14th Ave cul-de-sac	14th 300+44.92	8.67' RT			Adjust
GHU	SS11	Sanitary Sewer	Flushwell	Adjacent to 14th Ave cul-de-sac	14th 300+33.62	62.99' RT			Protect in Place
GHU	SS12	Sanitary Sewer	Manhole	In Road	14th 301+38.45	35.45' RT			Adjust
GHU	SS13	Sanitary Sewer	10" Ductile Iron line	New SD line crossing	14th 302+11.94	13.29' RT			Protect in Place
GHU	SS14	Sanitary Sewer	Flushwell	In Road	14th 302+30.38	7.41' RT			Adjust
GHU	SS15	Sanitary Sewer	8" WSP	New SD line crossing	"C1" 238+12.69	59.59' RT			Protect in Place
GHU	SS16	Sanitary Sewer	8" WSP	New SD line crossing	"C1" 243+06.63	45.95' LT			Protect in Place
GHU	SS17	Sanitary Sewer	10" Ductile Iron line	New SD line crossing	14th 300+37.30	45.34' RT			Protect in Place
GHU	SS18	Sanitary Sewer	8" WSP	New SD line crossing	14th 301+15.21	31.40' RT			Protect in Place

Utility Conflict Matrix

Project Owner: DOT&PF
Project No. : 0002312/Z640780000
Project Description: Airport Way at Cushman Street
Highway or Route: Airport Way (CDS 175700)

Utility Conflict Matrix Developed/Revised By: Kinney Engineering, LLC
Date: 5/15/2020
Reviewed By:
Date:

Utility Owner and/or Contact Name	Conflict ID	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Recommended Action or Resolution
GHU	W2	Water	16" 10 ga Steel Pipe	New SD line crossing	"A1" 156+29.44	43.25' RT			Protect in Place
GHU	W4	Water	6" HDPE line	New SD line crossing	"A1" 156+32.99	43.25' RT			Protect in Place
GHU	W5	Water	6" HDPE line	In new curb line	"A1" 157+95.35	57.49' RT			Protect in Place
GHU	W7	Water	Hydrant	In Road	"C1" 234+93.65	29.28' LT			Relocate
GHU	W8	Water	6" DIP line	New SD line crossing	"C1" 235+86.80	7.84' LT			Protect in Place
GHU	W9	Water	6" DIP line	New SD line crossing	"C1" 238+55.87	9.01' LT			Protect in Place
GHU	W10	Water	6" DIP line	New SD line crossing	"C1" 239+75.22	12.21' LT			Protect in Place
GHU	W11	Water	Valve	In Road	"C1" 239+82.06	11.81' LT			Adjust
GHU	W12	Water	Valve	In Road	"C1" 240+19.96	13.92' LT			Adjust
GHU	W13	Water	6" DIP line	New SD line crossing	"C1" 242+19.25	11.54' LT			Protect in Place
GHU	W14	Water	10" 10 ga Steel Pipe	Inlet box on top of line	"C1" 242+39.38	47.72' RT			Protect in Place
GHU	W15	Water	Hydrant	Back of existing sidewalk	"C1" 242+45.00	35.69' LT			Protect in Place
GHU	W16	Water	Valve	In Road	"C1" 242+69.34	12.34 LT			Adjust
GHU	W17	Water	Valve	In Road	"C1" 242+69.55	15.72' LT			Adjust
GHU	W18	Water	10" 10 ga Steel Pipe	New SD line crossing	"C1" 242+61.14	2.54' RT			Protect in Place
GHU	W19	Water	6" DIP line	New SD line crossing	"C1" 242+63.70	16.11' LT			Protect in Place
GHU	W20	Water	12" 10 ga Steel Pipe	New SD line crossing	"C1" 242+73.84	50.83' LT			Protect in Place
GHU	W21	Water	8" 10 ga Steel Pipe	New SD line crossing	"A1" 168+88.06	40.08' RT			Protect in Place