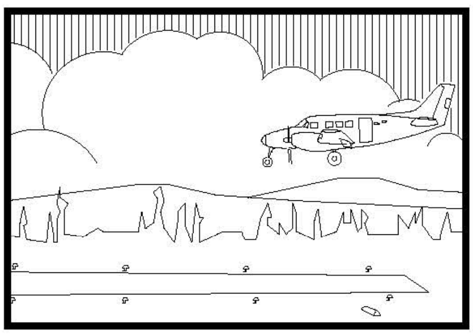
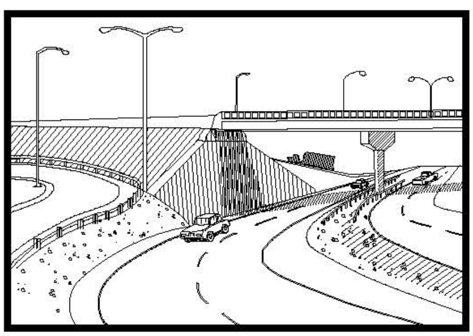
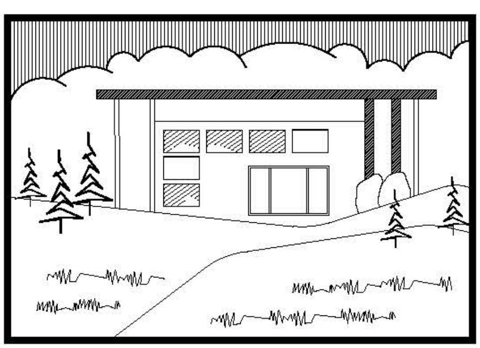
DESIGN STUDY REPORT

Old Steese Highway Reconstruction

Z624870000

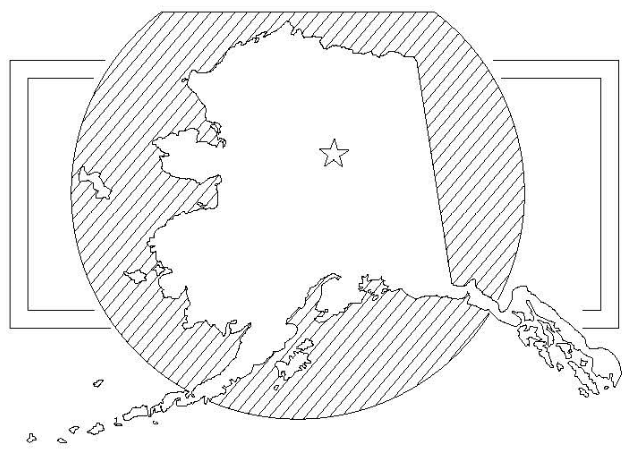






STATE OF ALASKA

Department of Transportation and Public Facilities



NORTHERN REGION

November 2020

DESIGN APPROVAL

OLD STEESE HIGHWAY RECONSTRUCTION

PROJECT NO. Z624870000

This Design Study Report replaces the project's June 2017 Design Study Report in its entirety.

Requested by: 11/30/2020

Russell M. Johnson, P.E. Date
Engineering Manager
Northern Region

Design Approval Granted: 12/3/2020

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

Distribution: NR Design Directive 20-01 Distribution

DESIGN STUDY REPORT
FOR

OLD STEESE HIGHWAY RECONSTRUCTION

PROJECT NO. Z624870000

PREPARED BY: Gary L. Jenkins II, P.E.

STATE OF ALASKA
49TH
Gary L. Jenkins II
CE-9962
11-20-20
REGISTERED PROFESSIONAL ENGINEER

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

OLD STEESE HIGHWAY RECONSTRUCTION
PROJECT NO. Z624870000

Table of Contents

LIST OF ACRONYMS iii
1.0 INTRODUCTION/HISTORY 1
2.0 PROJECT DESCRIPTION 2
3.0 DESIGN STANDARDS 4
4.0 DESIGN EXCEPTIONS AND DESIGN WAIVERS 5
5.0 DESIGN ALTERNATIVES 5
6.0 PREFERRED DESIGN ALTERNATIVE 6
7.0 3R ANALYSIS 6
8.0 TRAFFIC ANALYSIS 6
9.0 HORIZONTAL & VERTICAL ALIGNMENT 12
10.0 TYPICAL SECTION(S) 12
11.0 PAVEMENT DESIGN 15
12.0 PRELIMINARY BRIDGE LAYOUT 15
13.0 RIGHT-OF-WAY REQUIREMENTS 15
14.0 MAINTENANCE CONSIDERATIONS 16
15.0 MATERIAL SOURCES 17
16.0 UTILITY RELOCATION & COORDINATION 17
17.0 ACCESS CONTROL FEATURES 18
18.0 PEDESTRIAN/BICYCLE (ADA) PROVISIONS 18
19.0 SAFETY IMPROVEMENTS 18
20.0 INTELLIGENT TRANSPORTATION SYSTEM FEATURES 20
21.0 DRAINAGE 21
22.0 SOIL CONDITIONS 22
23.0 EROSION AND SEDIMENT CONTROL 22
24.0 ENVIRONMENTAL COMMITMENTS 23
25.0 WORK ZONE TRAFFIC CONTROL 23
26.0 VALUE ENGINEERING 23
27.0 COST ESTIMATE 24

LIST OF FIGURES

LOCATION PROJECT LIMITS .... Figure 1
3RD/MINNIE/OLD STEESE INTERSECTION IMPROVEMENTS .... Figure 2
TYPICAL SECTION STAGE 1 .... Figure 3
TYPICAL SECTION STAGE 2 .... Figure 4

LIST OF TABLES

LOS CRITERIA FOR SIGNALIZED INTERSECTIONS .... Table 1

LOS CRITERIA FOR UN-SIGNALIZED TWO-WAY STOP CONTROLLED INTERSECTION .... Table 2

STAGE 1 INTERSECTION LOS AND DELAY, EXISTING ROAD GEOMETRY & CONFIGURATION .... Table 3

STAGE 1 OVERALL INTERSECTION LOS AND DELAY, IMPROVED ROAD GEOMETRY & INTERSECTIONS .... Table 4

STAGE 2 INTERSECTION LOS AND DELAY, EXISTING ROAD GEOMETRY & CONFIGURATION .... Table 5

SUMMARY OF 5-YEAR CRASH RATES ON OLD STEESE CORRIDOR .... Table 6

FREQUENCY OF CRASHES BY TYPE, 2013-2017 CRASH DATA .... Table 7

PRELIMINARY ESTIMATED PROJECT COSTS .... Table 8

LIST OF APPENDICES

AERIAL PROJECT CORRIDOR GRAPHICS .... Appendix A
DESIGN CRITERIA .... Appendix B
ENVIRONMENTAL DOCUMENT .... Appendix C
PAVEMENT DESIGN .... Appendix D
PROPOSED ROW ACQUISITIONS .... Appendix E

LIST OF ACRONYMS

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
AAC	Alaska Administrative Code
ACGP	Alaska Construction General Permit
ACS	Alaska Communication System
ADA	Americans with Disabilities Act
AHDM	Alaska Highway Drainage Manual
APDES	Alaska Pollutant Discharge Elimination System
ARP	Alaska Renewable Pavement
AS	Alaska Statute
ATB	asphalt treated base
ATM	Alaska Traffic Manual
BMP	Best Management Practice
City	City of Fairbanks
CMP	corrugated metal pipe
CPEP	corrugated polyethylene pipe
DEC	State of Alaska Department of Environmental Conservation
DOT&PF	Alaska Department of Transportation and Public Facilities
DSR	Design Study Report
ESAL	Equivalent Single Axle Load
ESCP	Erosion and Sediment Control Plan
FHWA	Federal Highway Administration
FAST	Fairbanks Area Surface Transportation Planning
FNG	Fairbanks Natural Gas
FNSB	Fairbanks North Star Borough
GC	General Commercial
GCI	General Communications, Inc.
GIS	Geographic Information System
GP	General Policy Statement
GU	General Use
GVEA	Golden Valley Electrical Association
HCM	Highway Capacity Manual
HMA	hot mix asphalt
HPCM	Alaska Highway Preconstruction Manual
HPS	high pressure sodium
IRI	International Roughness Index
ITS	Intelligent Transportation System
LED	light emitting diode
LOS	Level of Service
MOU	Memorandum of Understanding
mph	miles per hour
MTP	Metropolitan Transportation Plan
MUTCD	Manual on Uniform Traffic Control Devices
NESC	National Electric Safety Code
NMTP	Non-Motorized Transportation Plan
PDM	Alaska Flexible Pavement Design Manual
PGDHS	A Policy on Geometric Design of Highways and Streets
PIP	Public Information Plan
RIRO	right-turn in/right-turn out
ROW	right-of-way
SEA	Systems Engineering Analysis
SF	square foot
SR	Short Range
STA	Station
SWPPP	Storm Water Pollution Prevention Plan
TCP	Traffic Control Plan
TIP	Transportation Improvement Program
TMP	Traffic Management Plan
TOP	Traffic Operations Plan
TWLTL	Two-Way Left-Turn Lane
UCR	Utility Conflict Report
USA	Utility Services of Alaska
USGS	United States Geological Survey
vpd	vehicles per day

1.0 INTRODUCTION/HISTORY

This Design Study Report (DSR) is an update and replaces the previously approved June 2017 Design Study Report (DSR). Reductions in project funding have recently driven management decisions to modify and reduce the project's previous scope and design. The current design has been developed using a systematic process that considered the needs of the project while striving to minimize impacts to private/business properties. This DSR documents the current preferred design.

The State of Alaska Department of Transportation and Public Facilities (DOT&PF), Northern Region, is proposing a project to reconstruct Old Steese Highway between Minnie/3rd Street intersection and the Johansen Expressway in Fairbanks, Alaska. Figure 1 illustrates the project limits.

Over the past 20 years, the project area has experienced rapid commercial and residential development that has increased traffic volumes and raised capacity and safety concerns. This development is illustrated in Figure 1 which shows the project area in 1996 (left) and 2017 (right). As a result of the development, the Old Steese Highway experiences heavy congestion, poor intersection performance during peak traffic periods, and crash rates at some intersections that exceed statewide averages. Traffic growth is expected to continue due to availability of vacant commercial property in the project vicinity.

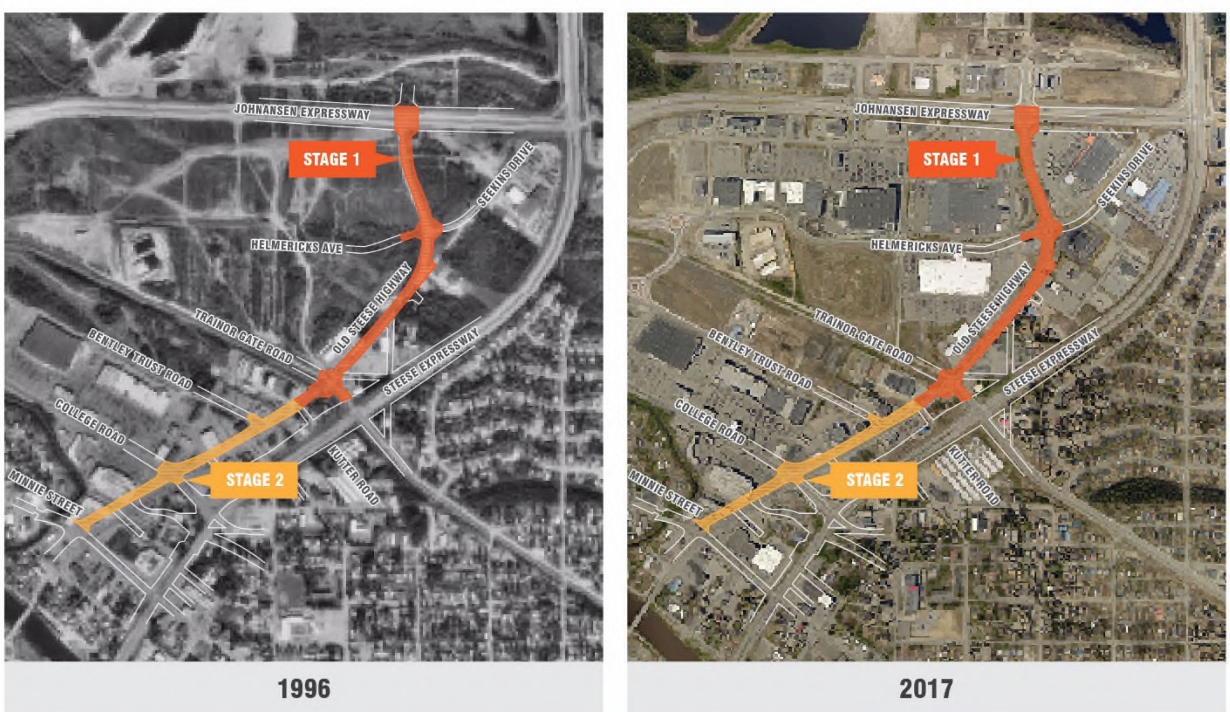


Figure 1: Location Project Limits – 1996 (left) and 2017 (right)

DOT&PF, in coordination with Fairbanks Area Surface Transportation Planning (FAST), included Old Steese Highway as a short-term priority in the 2015-2040 Metropolitan Transportation Plan (MTP) Update, published in January of 2015. The MTP recommended two projects to address growing concerns along Old Steese Highway:

- Short Range (SR) -1, Old Steese Highway – Wendell Bridge to Trainor Gate Road; and
- SR-43, Old Steese Highway Upgrade (included upgrades from Trainor Gate Road to Johansen Expressway).

In March of 2016, SR-1 and SR-43 were combined to form the Old Steese Highway Reconstruction project, which was approved in Administrative Modification #2 of the FAST 2015-2018 Transportation Improvement Program (TIP). The combined project addresses congestion, safety, pedestrian/bicycle, and maintenance issues along the Old Steese Highway corridor.

2.0 PROJECT DESCRIPTION

2.1 Location

Old Steese Highway is a secondary north-south corridor to the Steese Expressway in northeast Fairbanks, Alaska. The project corridor is approximately one mile long. It is located within Sections 2 and 11, Township 001 S, Range 001 W, Fairbanks Meridian on United States Geological Survey's (USGS) Quad Map Fairbanks D-2 SE. The approximate center-of-project coordinates are Latitude 64° 51' 04" N, Longitude -147° 41' 37" W in the Fairbanks North Star Borough (FNSB).

2.2 Existing Facilities

2.2.1 Existing Roadway Facilities

Old Steese Highway is identified by DOT&PF as Coordinated Data System (CDS) route number 150110. It is classified as an urban minor arterial, according to the DOT&PF Statewide Functional Classification Geographic Information System (GIS) Map. The function of an arterial is to provide mobility so traffic can move from one place to another quickly and safely. While arterials typically have a low degree of access to promote through traffic, minor arterials usually have greater access than major arterials. Old Steese Highway serves primarily industrial and commercial land uses by providing direct access to businesses adjacent to the highway and directing traffic to and from collector streets that serve the greater commercial district, nearby businesses, and residential communities.

Three typical roadway configurations exist along Old Steese Highway:

- 3rd Street to Kutter Road. A five-lane road consisting of two 12-foot lanes in the northbound and southbound directions and a center 12-foot Two-Way Left-Turn Lane (TWLTL) with concrete curb and gutter along the entire segment. There are no existing shoulders in this segment.
- Kutter Road to Helmericks Avenue/Seekins Ford Drive. One lane in each direction is dropped approaching the Trainor Gate Road intersection from the south, resulting in a three-lane road consisting of one 12-foot lane in each direction and a center 12-foot TWLTL. The curb and gutter from the southern end of the project corridor ends at the Trainor Gate Road intersection and transitions into 8-foot wide paved shoulders.

- Helmericks Avenue/Seekins Ford Drive to Johansen Expressway. North of the Helmericks Avenue/Seekins Ford Drive intersection, the center TWLTL along Old Steese Highway becomes a dedicated left turn bay alternating between northbound and southbound traffic. Traffic is separated by a raised asphalt median between 2 and 4 feet wide with concrete curb and gutter. The existing paved shoulders are between 4 and 6 feet wide.

Thirteen intersections are located within the project corridor: seven are stop-controlled, five are traffic signals, and one is an at-grade signalized railroad crossing. The signalized intersections are:

- Old Steese Highway and 3rd Street/Minnie Street;
- Old Steese Highway and College Road;
- Old Steese Highway and Bentley Trust Road;
- Old Steese Highway and Railroad Crossing (at Trainor Gate Road);
- Old Steese Highway and Helmericks Avenue/Seekins Ford Drive; and
- Old Steese Highway and Johansen Expressway.

2.2.2 Existing Pedestrian and Bicycle Facilities

From 3rd Street to Trainor Gate Road pedestrian facilities include six-foot wide concrete sidewalks on each side of the Old Steese Highway. This section lacks shoulders resulting in bicyclists sharing the sidewalks with pedestrians or the road with vehicles.

North of Trainor Gate Road, 8-foot wide paved shoulders accommodate bicyclists. There are no dedicated pedestrian facilities (sidewalks) which forces pedestrians to use the road shoulders. All signalized intersections within the project area have pedestrian crosswalks.

2.2.3 Existing Illumination

Old Steese Highway is currently illuminated along its entire length. Lighting consists of a combination of stand-alone poles, mast arms attached to power poles, and luminaires integrated into intersection signal poles. All lighting is spaced between 130 and 150 feet apart. South of Trainor Gate Road, the luminaires are staggered on the east and west sides of the highway. From Bentley Trust Road to Johansen Expressway, the luminaires are consistent along the west side of Old Steese Highway and are located sporadically along the east side of the highway. DOT&PF owns the illumination system, but the City operates, maintains, and pays the electric cost.

2.3 Purpose and Need

The purpose of this project is to improve operations, capacity (reduce delay), and safety for motorists, pedestrians, and bicyclists traveling through the Old Steese Highway corridor. Project needs are:

- Improve the Level of Service (LOS) – Based on traffic data collected in 2014 and projected to 2016 (with the exception of the Old Steese Highway/Chase Drive intersection, which was collected in 2016), the intersections of Old Steese Highway with Trainor Gate Road, Fred Meyer Drive/Blair Road, Helmericks Avenue/Seekins Ford Drive, and Johansen Expressway have at least one approach that operates at LOS D or worse. Several other intersections, including 3rd Street/Minnie Street, College Road, Chase Drive, and Sadlers Way, operate at LOS C. DOT&PF targets a design year LOS of C or better for stop-controlled and signal-controlled intersections. If capacity is not increased, intersection performance will deteriorate to below DOT&PF standards prior to the design year.

- Improve Intersection Safety – According to the traffic crash data from 2006 to 2010 (north of Trainor Gate Road) and 2008 to 2012 (south of Trainor Gate Road), the intersections at College Road, Trainor Gate Road, Helmericks Avenue/Seekins Ford Drive, and Johansen Expressway exceed the five-year statewide average crash rates. The Trainor Gate Road intersection exceeds the statewide average by over four times. Left unaddressed, increased traffic volumes and congestion will likely contribute to worsening safety conditions along the project corridor.
- Improve Bicycle Accommodations and Pedestrian Facilities – North of Trainor Gate Road lacks dedicated pedestrian facilities. South of Trainor Gate Road has sidewalks and intersection crosswalks but lacks bicycle accommodations. Missing and discontinuous dedicated pedestrian and bicycle accommodations discourage use and limit continued growth and economic development in the project vicinity. It also pushes non-motorized traffic onto the roadway and/or shoulders.

2.4 Proposed Design & Improvements

The project has been separated into two segments (identified as Stages in this report) as depicted in Appendix A.

Stage 1: Full roadway reconstruction between Kutter Road and the Johansen Expressway. Project improvements include:

a. Widening the roadway by the addition of one northbound and one southbound through lane north of Kutter Road.
b. 4-foot wide paved shoulders.
c. Adding 7-foot wide sidewalks to both sides of the road.
d. Installing a new traffic signal at the Fred Meyer Drive/Blair Road intersection.
e. Signal upgrades at the Helmericks Avenue/Seekins Drive and Johansen Expressway intersections.
f. Upgrade the street lighting to meet current design standards.
g. Drainage and storm drain improvements.
h. New signs.
i. Re-paving the road.

Stage 2: Pulverize and re-pave the road between 3rd Street and Kutter Road. Existing sidewalks and curb and gutter will remain (not be replaced). Project improvements include:

a. New signs.
b. Re-paving the road.
c. Re-striping the road to add 4-foot wide paved shoulders.

3.0 DESIGN STANDARDS

Design standards and guidelines that apply to the Old Steese Highway Reconstruction project are contained in the following publications:

Standards:

- Americans with Disabilities (ADA) Standards for Transportation Facilities, United States Department of Transportation, 2006.
- Americans with Disabilities Act (ADA) Standards for Accessible Design, United States Department of Justice, September 15, 2010.
- A Policy on Geometric Design of Highways and Streets (PGDHS or "Green Book"), American Association of State Highway and Transportation Officials (AASHTO), 2011.
- Alaska Flexible Pavement Design Manual (PDM), DOT&PF, 2004.
- Alaska Highway Drainage Manual (AHDM), DOT&PF, 2006.
- Alaska Highway Preconstruction Manual (HPCM), DOT&PF.
- Alaska Traffic Manual (ATM), consisting of the Manual on Uniform Traffic Control Devices (MUTCD), U.S. Department of Transportation, Federal Highway Administration (FHWA), 2009 as amended, and the Alaska Traffic Manual Supplement, State of Alaska, DOT&PF, 2016.
- Alaska Utilities Manual, DOT&PF, 2014
- Guide for the Planning, Design, and Operation of Pedestrian Facilities, AASHTO, 2004.
- IES Recommended Practice for Roadway Lighting (RP-8-14), Illuminating Engineering Society (IES), 2014.
- Roadside Design Guide, 4th Edition, AASHTO, 2011.

Guidelines:

- Proposed Accessibility Standards for Pedestrian Facilities in the Public Right of Way, United States Access Board, July 26, 2011.

See Appendix B for the project's design criteria.

4.0 DESIGN EXCEPTIONS AND DESIGN WAIVERS

None.

5.0 DESIGN ALTERNATIVES

There are no design alternatives. The typical roadway section and design features have been set, eliminating design alternatives. They include:

- Intersection configurations and geometry
- Widths for vehicle lanes, shoulders and sidewalks.
- Keeping existing utilities overhead. The current design will not convert overhead utilities to underground.
- Roadway drainage design is a combination of underground storm drain systems in coordination with above ground ditches and infiltration basins.
- LED street illumination.

6.0 PREFERRED DESIGN ALTERNATIVE

See Section 2.4 Proposed Design & Improvements.

7.0 3R ANALYSIS

This Section does not apply to this project.

8.0 TRAFFIC ANALYSIS

A Traffic and Safety Analysis (TSA) has been conducted and was used to assist DOT&PF in selecting the preferred alternative. Using existing and projected traffic volumes the analysis developed and evaluated alternatives to improve traffic operations (reduce congestion and delay experienced by motorists traveling through the project corridor) and improve safety. The analysis compared the existing roadway configuration against potential alternatives.

Recent population growth combined with several big box retail stores attracting consumers has significantly increased traffic congestion along the project corridor.

The greatest congestion and travel delays along the project corridor occur at intersections. Intersection performance is analyzed using the Level of Service (LOS) rating system, which is based on vehicle delays during peak traffic hours. DOT&PF targets LOS C or better. When LOS C cannot cost effectively be achieved, a LOS D is determined to be acceptable.

LOS criteria are defined in Tables 1 and 2 for signalized and un-signalized intersections.

Table 1: LOS Criteria for Signalized Intersections (Average of All Movements)

Level of Service (LOS)	Average Delay (sec/veh)	General Description
A	≤ 10	Free Flow
B	> 10-20	Stable Flow (slight delays)
C	> 20-35	Stable Flow (acceptable delays)
D	> 35-55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	> 55-80	Unstable flow (intolerable delay)
F	> 80	Forced flow (jammed)

Table 2: LOS Criteria for Un-signalized Two-Way Stop Controlled Intersection

Level of Service (LOS)	Worst Approach Delay (sec/veh)	General Description
A	≤ 10	Free Flow
B	> 10-15	Stable Flow (slight delays)
C	> 15-25	Stable Flow (acceptable delays)
D	> 25-35	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	> 35-50	Unstable flow (intolerable delay)
F	> 50	Forced flow (jammed)

In addition to Level of Service, crash rates were compared to the statewide average at intersections and segments of similar configurations. Crashes were also sorted by crash type to identify any trends and/or abnormalities that indicate possible existing geometric configuration(s) that may be contributing to the number/type of crashes.

Stage 1 Existing Road Geometry & Configuration: Properties along and around the Old Steese Highway, north of Trainer Gate Road have experienced rapid development of major trip generators consisting of several big box retail stores, surrounded by active commercial/retail businesses with scattered industrial use. Results of analyzing the existing road geometry and configuration:

- Using existing traffic volumes, four intersections (Trainor Gate Road, Sadler Way, Helmericks Avenue/Seekins Drive, & Home Depot/Walmart Entrances) meet the minimum LOS C delay threshold. The Blair Road/Fred Meyer Entrance and northbound approach to the Johansen Expressway operate below LOS C (see Table 3).
- In the design year 2040, five intersections (Trainer Gate Road, Blair Road/Fred Meyer Entrance, northbound approach to the Johansen Expressway, Helmericks Avenue/Seekins Drive, and Sadler Way) are anticipated to operate below the minimum LOS C delay threshold (see Table 3).
- Crash rates at Trainor Gate Road, Johansen Expressway, and Helmericks Avenue/Seekins Drive intersections (see Section 19.0 – Safety Improvements, Tables 6 and 7) exceeded statewide averages:
    - The Trainor Gate Road Intersection has the highest crash rate along the corridor. Many of the crashes are attributed to failure to yield or improper merging. Contributing factors include driver confusion, congestion and unique intersection geometry.
    - The northbound approach to the Johansen Expressway intersection had the second highest crash rate with 42% of the crashes being angle crashes. Most of these crashes involved conflict between left-turning and thru traffic movements with failure to yield identified as a common contributing factor.
    - At the Helmericks Avenue/Seeking Drive intersection northbound and southbound rear end crashes on the Old Steese Highway are the most common with icy roads being a primary contributing factor. Angle crashes mostly involved conflicts between left turning and through traffic movements.

Table 3: Stage 1 Intersection LOS and Delay, Existing Road Geometry & Configuration

Intersection	Design Year	Intersection Overall		Worst Approach		
		Delay	LOS	App	Delay	LOS
Old Steese Highway & Trainor Gate Road	2016	-	-	WB	70.3	F
	2030	-	-	WB	277.2	F
	2040	-	-	WB	>300[$]	F
Old Steese Highway & Blair Road/Fred Meyer Driveway	2016	-	-	WB	72.0	F
	2030	-	-	WB	>300[$]	F
	2040	-	-	WB	>300[$]	F
Old Steese Highway & Sadler Way	2016	-	-	WB	20.9	C
	2030	-	-	WB	30.9	D
	2040	-	-	WB	44.6	E
Old Steese Highway & Helmericks Avenue/Seekins Drive	2016	68.7	E	EB	171.3	F
	2030	121.6	F	EB	>300[$]	F
	2040	158.9	F	EB	>300[$]	F
Old Steese Highway & Home Depot/Walmart Entrance	2016	-	-	WB	11.7	B
	2030	-	-	WB	13.7	B
	2040	-	-	WB	15.3	C
Old Steese Highway/Northside Boulevard & Johansen Expressway	2016	26.2	C	NB	46.7	D
	2030	35.9	D	SB	51.6	D
	2040	54.5	D	SB	116.8	F

Note: Two-way stop-controlled intersections LOS were determined based on the worst approach delay.

Stage 1 Proposed Design: Projected increases in traffic and intersection crash rates support the need to upgrade the corridor to accommodate traffic volumes, reduce congestion/delay, and improve safety. Table 4 shows the operational improvement in LOS of intersections resulting from the upgrades. The following summarizes the proposed improvements:

- Intersections are forecast to operate at LOS C or better, except two will be at LOS D:
  - With the 5-lane upgrade, the Sadler Way intersection improves to LOS D in 2040. To achieve LOS C, it would need to be signalized. Adding a new signal here is too close to the new signal at Blair Road / Fred Meyer driveway.
  - The Johansen Expressway intersection is improved by this project but will still be at LOS D in 2030 and 2040. The higher volume of vehicles on eastbound and westbound Johansen Expressway cause the north and southbound movements to have longer delays. No changes can be made under this project to further improve upon this.
- The chosen and preferred design alternative for Stage 1 consists of two northbound and two southbound lanes with a center TWLTL, shoulders, sidewalks and signalized intersections. See Section 10 for the Stage 1 Typical Section and Appendix A for graphics depicting the preferred and chosen design.
- A new signal system will be constructed at the Fred Meyer Driveway/Blair Road intersection to improve intersection performance and safety.

- Eastbound and southbound auxiliary right-turn lanes will be constructed at the Old Steese/Helmericks Avenue intersection.
- Adjust the lane configuration at the Trainor Gate Road intersection to provide westbound right-turning traffic with an exclusive receiving lane on Old Steese Highway. The northbound right lane on Old Steese Highway will remain a dedicated right turn lane at the intersection. This adjustment will reduce delay for westbound traffic and prevent long queues on Trainor Gate Road that impact the Steese Expressway intersection. A tradeoff will be weaving on Old Steese Highway north of Trainor Gate Road.
- Optimize and coordinate signal traffic phasing to decrease delays and allow for vehicle platoons that create gaps needed for non-signalized access points along the corridor.

Table 4: Stage 1 Overall Intersection LOS and Delay, Improved Road Geometry & Intersections

Intersection	Design Year	Existing (No Build)		Preferred Alternative (5-Lane + TWLTL)	
		Delay	LOS	Delay	LOS
Old Steese Highway & Trainor Gate Road	2016	70.3	F	9.8	A
	2030	277.2	F	14.1	B
	2040	>300	F	19.2	C
Old Steese Highway & Blair Road/Fred Meyer Entrance	2016	72.0	F	9.9	A
	2030	>300	F	13.0	B
	2040	>300	F	22.0	C
Old Steese Highway & Sadler Way	2016	20.9	C	16.5	C
	2030	30.9	D	21.9	C
	2040	44.6	E	27.8	D
Old Steese Highway & Helmericks Avenue/Seekins Drive	2016	68.7	E	25.4	C
	2030	121.6	F	28.0	C
	2040	158.9	F	31.4	C
Old Steese Highway & Home Depot/Walmart Entrance	2016	11.7	B	10.0	B
	2030	13.7	B	10.9	B
	2040	15.3	C	11.45	B
Old Steese Highway/Northside Boulevard & Johansen Expressway	2016	26.2	C	30.3	C
	2030	35.9	D	37.9	D
	2040	54.5	D	47.0	D

Note: Stop-controlled intersections LOS were determined based on the worst approach delay.
Signalized intersections LOS were determined based on the average delay for all vehicles

Stage 2 Existing Road Geometry & Configuration: Properties along and around the Old Steese Highway, south of Trainer Gate Road consist primarily of commercial/retail businesses industrial land use. Results of analyzing the existing road geometry and configuration:

- Using existing traffic volumes, three intersections (3rd Street, College Road, & Bentley Trust Road) meet the minimum LOS C delay threshold. One intersection (Chase Drive) operated at LOS D.

- In the design year 2040, two intersections (College Road and Chase Drive) are anticipated to operate below the minimum LOS C delay threshold.
    - College Road is close to LOS C and is worsened by adding a second northbound and southbound left-turn lane. Maintaining the existing lane configuration is the preferred alternative.
    - Chase Drive is a minor side street with lower traffic volumes. No change is recommended.
- The Bentley Trust Road intersection is expected to operate at LOS B.
- Crash rates along the corridor were close to or below the statewide average, so there are no recommendations for improvements based on the crash analysis.

Table 5: Stage 2 Intersection LOS and Delay, Existing Road Geometry & Configuration

Intersection	Design Year	Intersection Overall		Worst Approach		
		Delay(s)	LOS	Approach	Delay(s)	LOS
Old Steese Highway & 3rd Street*	2017	20.3	C	-	-	-
	2030	19.7	B	-	-	-
	2040	20.8	C	-	-	-
Old Steese Highway & College Road	2015	22.1	C	-	-	-
	2030	31.8	C	-	-	-
	2040	38.1	D	-	-	-
Old Steese Highway & Chase Drive	-	-	-	EB	31.3	D
	2030	-	-	EB	154.4	F
	2040	-	-	EB	>300	F
Old Steese Highway & Bentley Trust	2015	7.5	A	-	-	-
	2030	6.3	A	-	-	-
	2040	10.1	B	-	-	-

*LOS Data from 3rd Street Widening capacity analysis (July 2015).

Note: Two-way stop-controlled intersections LOS were determined based on the worst approach delay

The traffic and safety analysis did not identify significant congestion or safety concerns for Stage 2 (see Table 5). Therefore, no geometry or signalized intersection changes are proposed under this project. To improve safety for pedestrians and bicyclists, the existing vehicle lanes will be restriped to provide a paved shoulder. See the Stage 2 Typical Section in Section 10.

Currently DOT&PF has two separate projects that will modify and improve the LOS of the 3rd Street/Minnie Street/ Old Steese Highway intersection (see Figure 2).

1. Wendell Avenue Bridge (# NFHWY00511) – this project is currently being constructed and is scheduled to be completed the fall of 2021. On the Old Steese highway, the project will eliminate the dual southbound thru lanes by converting the outer right-hand lane to an exclusive right only turn lane onto Minnie Street.

2. 3rd Street Widening (# Z625410000) – currently preparing the project to advertise for construction bids during the winter of 2020/2021. This anticipated 1-year construction project is scheduled to begin the spring of 2021. 3rd Street will be converted to a 4-lane facility having 2 west bound and 2 east bound lanes between the Old Steese Highway and Steese Highway. Along 3rd Street the project will:
    a. Add an additional eastbound thru lane on Minnie Street and create dual eastbound lanes along 3rd Street
    b. Add an exclusive westbound right only turn lane on 3rd Street

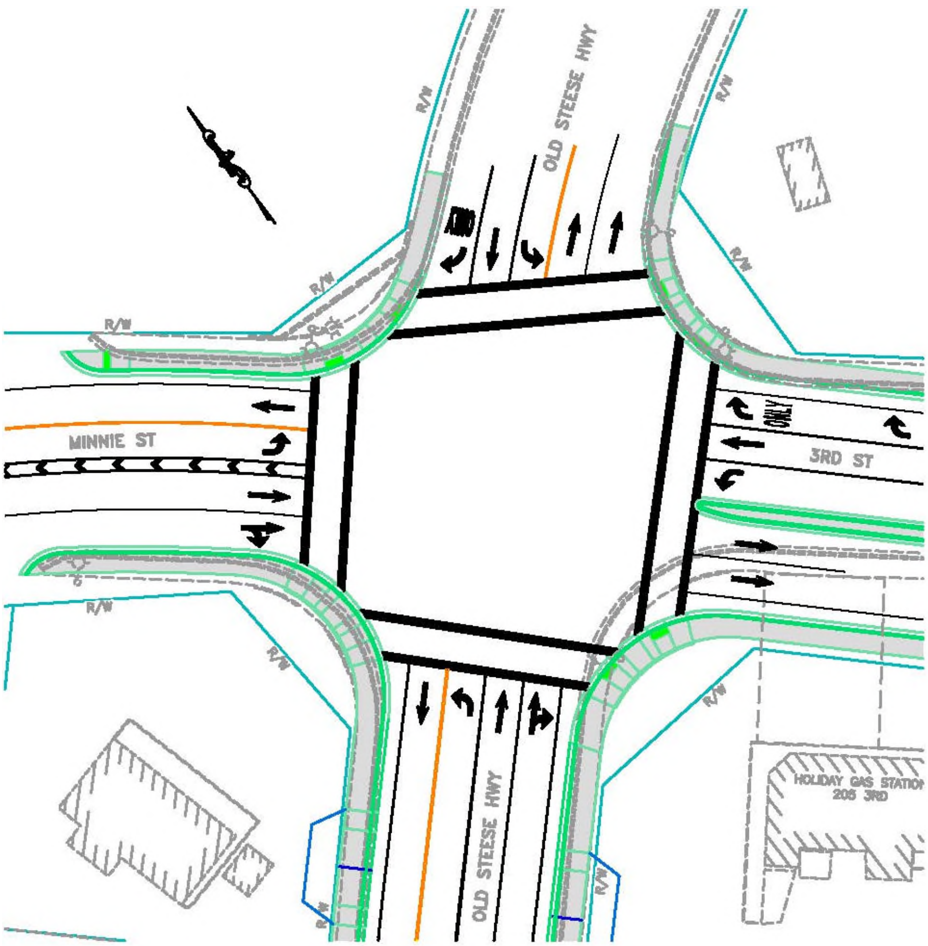


Figure 2: 3rd Street/Minnie Street/Old Steese Hwy Intersection Improvements

9.0 HORIZONTAL & VERTICAL ALIGNMENT

The Old Steese Highway is a low-speed (35 mph design speed) urban road, so a normal 2 percent crown is acceptable and will be used. A normal crown is preferable in urban areas to facilitate drainage.

The proposed horizontal alignment generally follows the existing alignment with only minor adjustments. The corridor contains 10 horizontal curves with all curves exceeding the minimum curve radius of 510 feet. The low design speed and curve radii meet standards for driver comfort and safety.

The existing vertical alignment is flat with grades ranging from 0.30 to 1.91 percent. The proposed vertical alignment generally follows existing, with minor modifications to ensure positive drainage and minimize ROW and utility impacts. All vertical grades meet or exceed the minimum 0.3 percent grade.

10.0 TYPICAL SECTION(S)

The typical sections generally consist of five lanes, including two northbound, two southbound, and a middle turn lane. They will have paved shoulders, curb and gutter, and sidewalks. See Figures 3 and 4 for the Stage 1 and Stage 2 typical section, respectively.

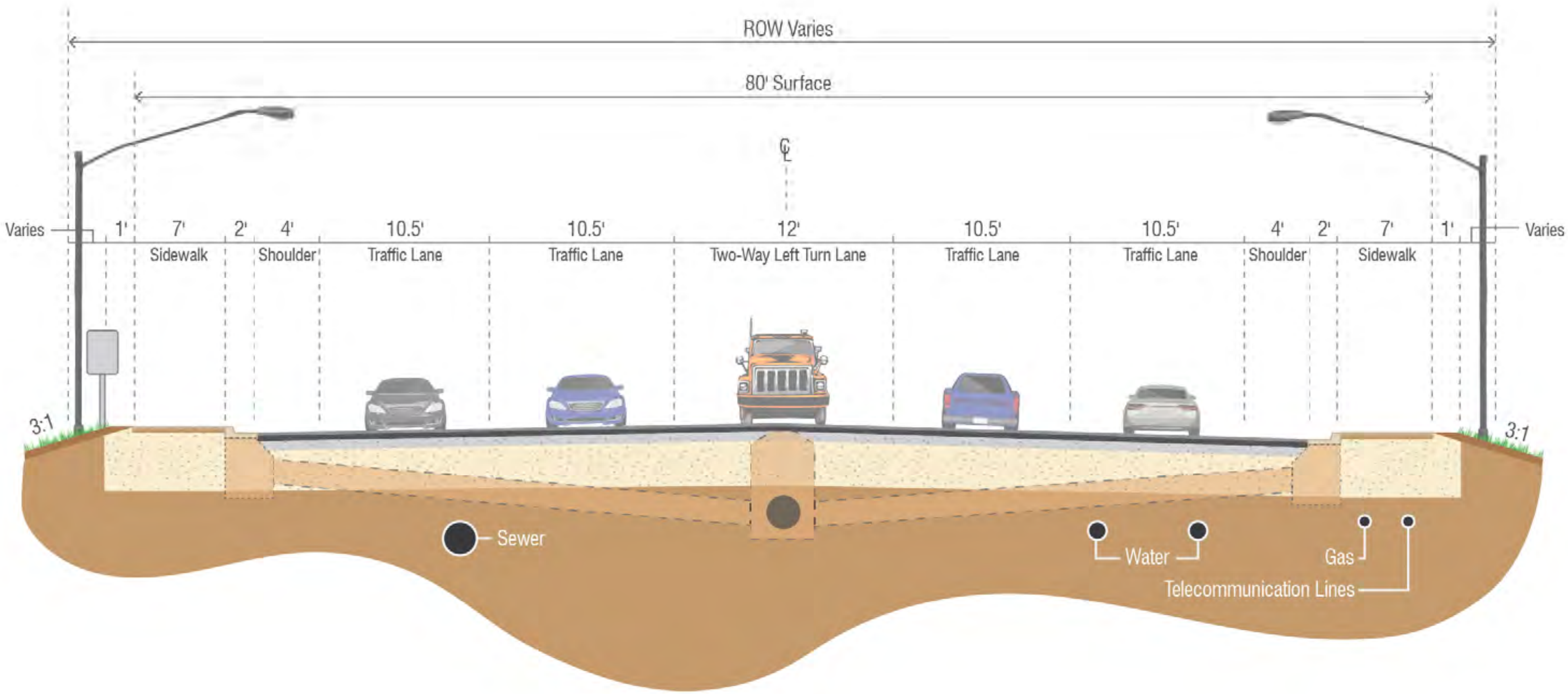


Figure 3: Typical Section Stage 1

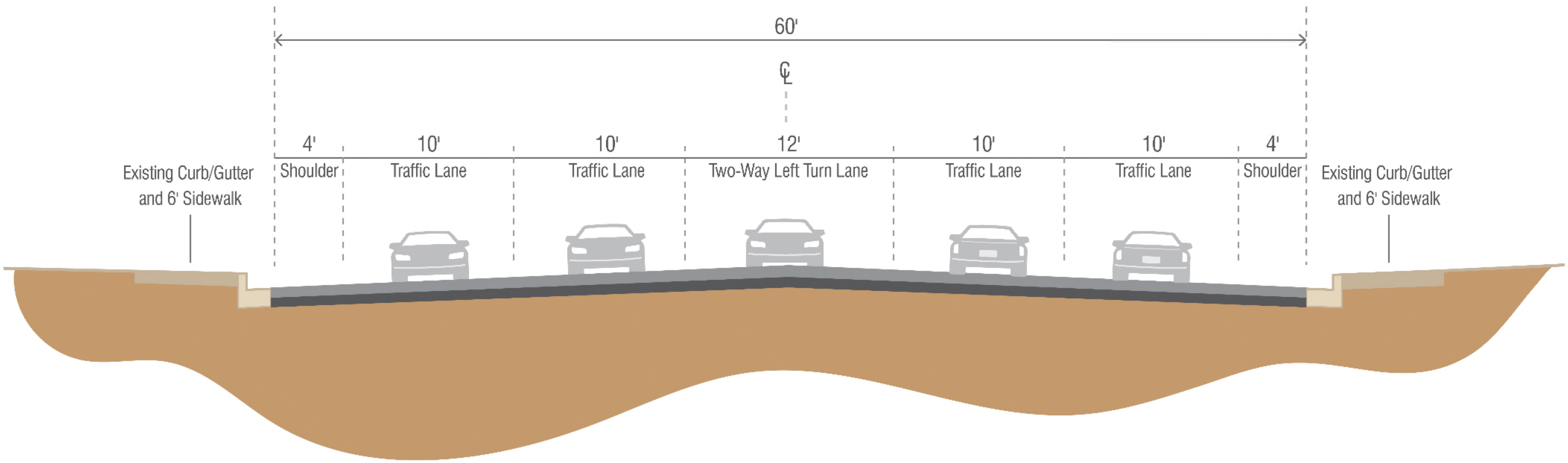


Figure 4: Typical Section Stage 2

11.0 PAVEMENT DESIGN

As-builts indicate the existing asphalt ranges from 3 to 4 inches thick on the Old Steese Highway depending on location. The base course generally consists of 6 inches of crushed aggregate and the subbase is 18 to 24 inches of Type A Selected Material. See Section 22.0 for information on subgrade soils.

11.1 Proposed Flexible Pavement Design

The proposed pavement design for Old Steese Highway is based on as-builts, future traffic-loading and limited geotechnical data. Boring logs north of Trainor Gate Road indicate that areas outside of the existing shoulders contain frost-susceptible silt.

The proposed pavement design for Stage 1 is the following:

- Two (2) inches of hot mix asphalt (HMA); over
- Three (3) inches of Asphalt Treated Base; over
- Four (4) inches aggregate base course, grading D-1; over
- Twelve (12) inches minimum of existing Selected Material, Type A in currently paved areas, or providing twenty-four (24) inches of Subbase, Grading F in existing un-paved areas.

The proposed pavement design for Stage 2 is the following:

- Three (3) inches of HMA; over
- Three (3) inches of crushed asphalt base course

See Appendix D for the pavement design analysis.

11.2 Proposed Rigid Pavement Design

Within Stage 1, the new sidewalks, curb, and gutter are underlain by frost-susceptible silty soils. These soils will be removed to a depth consistent with the roadway. The sidewalks, curb, and gutter rigid pavement structure will be Portland Cement Concrete over aggregate base course and subbase.

12.0 PRELIMINARY BRIDGE LAYOUT

The project corridor does not contain any bridges.

13.0 RIGHT-OF-WAY REQUIREMENTS

General Obligation (GO) Bond funding will be used to acquire Right-of-Way (ROW), including Stage 2 in anticipation of a future build out (widening) design that matches the Stage 1 roadway width(s) (lane, shoulder and sidewalk widths). Future Stage 2 roadway widening will not be designed or constructed under this project because the costs exceed the project's budget.

All ROW acquisitions will be from commercial properties. Temporary construction easements and/or permits are required throughout the project. In general, parcels north of College Road are zoned General Use (GU-1) and south of College Road are zoned General Commercial (GC). Final ROW acquisition limits are subject to change as the detailed design progresses. See Appendix E for proposed ROW acquisition drawings and summaries.

<u>Stage 1.</u> Approximately 1.30 acres (56,546 SF) of permanent partial-lot ROW acquisition is needed from 13 parcels to widen the roadway, develop surface storm water retention/drainage areas, relocate utilities, and provide legal access to one property.

<u>Stage 2</u> Approximately 0.03 acres (1,505 SF) of permanent partial-lot ROW acquisition is needed from 4 parcels in preparation of a future widening project. A future widening project would create a consistent and uniform roadway width (lane, shoulder and sidewalks) between the 3rd Street and Johansen Expressway intersections.

14.0 MAINTENANCE CONSIDERATIONS

In general, the City of Fairbanks is responsible for maintaining all elements of the Old Steese Highway from 3rd Street to the Johansen Expressway. Under separate reimbursable agreements, DOT&PF maintains the traffic signal controllers and emergency services system for the signals at 3rd Street, College Road, Bentley Trust Road, and Helmericks Avenue. DOT&PF is responsible for maintenance of the Johansen Expressway intersection. The City's primary obligations of roadway maintenance include snow removal, pavement management, and street sweeping.

The reconstructed roadway is anticipated to result in the following changes to maintenance responsibilities:

- <u>Roadway:</u> The City maintains approximately 2.6 lane-miles of roadway in the Stage 1 segment and approximately 2.1 lane-miles in the Stage 2 segment. Stage 1 will add an additional 1.2 lane-miles of roadway. Stage 2 will add no new lane-miles.
- <u>Sidewalks:</u> The City maintains approximately 5,400 linear feet of 6-foot sidewalk within the project corridor. Stage 1 will construct an additional 5,600 linear feet of 7-foot sidewalk. Stage 2 will add no new sidewalk.
- <u>Storm Drain:</u> The installation of curb and gutter for Stage 1 will reduce ditch cleaning and mowing and weed prevention efforts. Maintenance will be needed for the new surface retention ponds and piped storm drain system north of Trainor Gate Road. Maintenance for the piped storm drain system south of Trainor Gate Road will remain the same.
- <u>Street Lighting:</u> The number of streetlights along Old Steese Highway will increase to provide uniform lighting on both sides of the highway per current design standards. The City pays for illumination power and will maintain and operate the lights. There is an increased number of lights; however, due to energy efficient LED fixtures and longer fixture life, overall life cycle costs are lower. The City has agreed to maintain the illumination per the new MOA.
- <u>Traffic Signals:</u> Old Steese Highway currently has four four-way traffic signals and one three-way traffic signal. This project proposes to add one additional four-way traffic signal at the Fred Meyer Drive/Blair Road intersection and additional signal heads at other signals to meet current traffic standards, resulting in about a 20 percent increase in the City's required signal maintenance. The DOT&PF maintains the traffic signal controller at Helmericks Avenue and the complete Johansen Expressway intersection.
- <u>Shoulders:</u> The addition of 4-foot wide shoulders along Stage 2 will reduce wintertime maintenance by providing room for temporary snow storage.

15.0 MATERIAL SOURCES

All material sources will be Contractor-furnished. Materials of appropriate quality are available in sufficient quantities from private and commercial sources in the project vicinity.

16.0 UTILITY RELOCATION & COORDINATION

16.1 Existing Utilities

Numerous utilities run parallel to and/or cross the Old Steese Highway corridor. These utilities include:

- Alaska Railroad Corporation (ARRC);
- Golden Valley Electrical Association (GVEA), electric power;
- MTA-Communications, fiber optic telecommunications;
- General Communications, Inc. (GCI), fiber optic and cable telecommunications;
- Alaska Communications Systems (ACS), telephone and fiber optic telecommunications;
- AT&T, telephone communications
- Utility Services of Alaska (USA), wastewater and water utilities; and
- Fairbanks Natural Gas (FNG), gas lines.

The existing utility information is based on as-builts, utility system maps, field-surveyed locates, and information provided by utility companies. Additional utilities may be located within the project area that are unknown and/or have been installed since the initial utility information was received in January of 2014.

16.2 Utility Conflicts

Standards for determining adequate cover, vertical and horizontal clearance, horizontal placement, and relocation eligibility of existing utilities within the project corridor will follow requirements found in Alaska Statute (AS) 19.25.010-270 and 17 Alaska Administrative Code (AAC) 15, the HPCM, the National Electric Safety Code (NESC), and the Utility Permit if applicable.

The following utility impacts are anticipated for Stage 1 and will be addressed in the design phase of this project:

- Power poles that conflict with existing and proposed sidewalks will be relocated if the clear walking distance is less than 48 inches (no guys or anchors will remain in the sidewalk);
- Telephone lines, cabling systems, and service drops will be modified as required due to relocated power poles;
- Manholes for buried communication cabling systems that conflict with roadway or sidewalk improvements will be modified or replaced.
- Buried gas lines will be protected in place, and all reasonable effort will be taken to avoid impacts. Gas line relocations are expected at Blair Road and for a conflict with the new storm drain pipe;

- Water mains in conflict with the new storm drain system will be relocated at several locations;
- Fire hydrants in conflict with the new sidewalk will be relocated; and
- ARRC will design and construct a new railroad signal crossing.
- Existing manholes to remain will have their lid elevations adjusted to match finish grades.

17.0 ACCESS CONTROL FEATURES

Currently there are five signalized intersections that control access onto the corridor:

- Old Steese Highway and 3rd Street/Minnie Street;
- Old Steese Highway and College Road;
- Old Steese Highway and Bentley Trust Road;
- Old Steese Highway and Helmericks Avenue/Seekins Ford Drive; and
- Old Steese Highway and Johansen Expressway.

A new signalized intersection will be constructed at Fred Meyer Drive/Blair Road.

There are currently 53 driveways accessing parcels with frontage on Old Steese Highway. Forty of these driveways directly access Old Steese Highway and the remaining 13 are off intersecting streets. The highest density of driveways is south of Trainor Gate Road.

Consolidating and/or removing driveways will be reviewed during detailed design with the goal of limiting driveways to reduce crashes and congestion while still maintaining adequate access to adjacent properties.

18.0 PEDESTRIAN/BICYCLE (ADA) PROVISIONS

Stage 1 will construct 4-foot wide shoulders (to accommodate bicyclists) and 7-foot wide sidewalks with new ADA curb ramps along both sides of the road to accommodate pedestrians.

Stage 2 will create 4-foot wide shoulders along both sides of the road to accommodate bicyclists. The existing 6-foot wide sidewalks (with curb & gutter) will remain to accommodate pedestrians. Existing curb ramps at intersections and curb cuts at driveways that do not meet current ADA standards will be removed and replaced.

19.0 SAFETY IMPROVEMENTS

Two traffic safety analyses were conducted within the project area:

1. *Stage I Old Steese Highway Traffic and Safety Analysis Report* (DOWL, 2014/2016) used traffic crash data from 2006-2010
2. *Stage II Old Steese Highway Traffic and Safety Analysis Report* (DOWL, 2016) used traffic crash data from 2008-2012.

Four of the seven major intersections along the project corridor have five-year crash rates that exceed the statewide average for similar intersections, as shown in Table 6.

Table 6: Summary of 5-Year Crash Rates on Old Steese Corridor

Intersection	5 – Year Crash Rate
Old Steese/College	1.02x State Average
Old Steese/Trainor Gate	4.17x State Average
Old Steese/Helmericks/Seekins	1.10x State Average
Old Steese/Johansen	1.72x State Average

Table 7: Frequency of Crashes by Type, 2013-2017 Crash Data

Old Steese Highway Intersection	Crash Type							
	Angle	Rear End	Head On	Sideswipe	Pedestrian	Fixed Object	Other	Total
3rd Street	13	9	1	3	0	0	3	29
College Road	9	7	0	1	0	0	4	21
Chase Drive	6	0	0	0	0	0	1	7
Bentley Trust Road	8	2	1	1	0	0	4	16
Trainor Gate Road	5	13	1	4	0	0	0	23
Blair Road/Fred Meyer Entrance	3	6	0	0	0	0	1	10
Helmericks Ave./Seekins Drive	6	14	1	0	0	0	3	24
Johansen Expressway	1	6	0	0	0	0	3	10
Segments: Old Steese Corridor	0	4	1	1	0	0	4	10
Total	**51**	**61**	**5**	**10**	**0**	**0**	**23**	**150**
Percent of Total	34%	41%	3%	7%	0%	0%	15%	100%

Table 7 summarizes the crashes in the corridor by intersection and intermediate road segments. Intersections account for a majority of crashes within the project limits. There were 10 corridor crashes (not related to the intersection crashes) which resulted in 5 minor injuries with no major injuries or fatalities. The absence of major injuries and fatalities can be attributed to the slow posted speed limit (35 mph) along the project corridor.

Dedicated pedestrian and bicycle accommodations along Old Steese Highway are missing or inconsistent throughout the corridor. One vehicle/pedestrian crash occurred near Trainor Gate Road between 2006 and 2010.

Safety will be improved by:

- Adding an additional through lane in each direction north of Trainor Gate Road will improve mobility which reduces delays. Long delay times tend to make drivers impatient which leads to taking bigger risks in judging acceptable gaps in traffic.
- Signalizing the Fred Meyer Drive/Blair Road intersection to improve intersection performance and protect left turns;
- Providing updated signal timings to coordinate the signals within the corridor and at adjacent high-volume intersections on the Steese Expressway;
- Adding and/or maintaining warranted designated left- and right-turn pockets at intersections to reduce the likelihood of angle and rear-end collisions;
- Adding flashing yellow arrows for left turns at all signalized intersections;
- Providing an exclusive receiving lane on Old Steese Highway for westbound right-turning traffic off Trainor Gate Road to facilitate a smoother traffic pattern and reduce the likelihood of crashes resulting from merging at a yield sign. The north bound right lane approaching Trainor Gate Road will remain right-turn only;
- Adding 7-foot concrete sidewalks north of Kutter Road on both sides of the Old Steese Highway for pedestrian safety, including pedestrian crosswalks, pedestrian phasing at signals, and ADA compliant curb ramps;
- Providing 4-foot paved shoulders on both sides of the road that can be used by bicyclists and for temporary snow storage throughout the length of the project. This will improve bicycle safety, minimize conflicts with pedestrians and vehicles, and improve maintenance operations;
- Reconstructing the road surface to create a smooth, comfortable driving surface and restriping for improved lane visibility;
- For Stage 1, upgrading street lighting on both sides of the road and at intersections to improve driver and pedestrian visibility at night.
- For Stage 1, adding curb and gutter provides a visual cue to drivers that separate the driving lane from pedestrian space.

20.0 INTELLIGENT TRANSPORTATION SYSTEM FEATURES

One new signal will be installed within the project corridor at the intersection of Old Steese Highway and Fred Meyer Drive/Blair Road. Installation will require preemption detectors, signal displays, wiring, junction boxes, signal interconnect, signal controllers, mast arm poles, and foundations. All hardware will be fully compatible with DOT&PF Northern Region traffic signalization standards.

A concurrent signal interconnect project is anticipated to be constructed as part of this project which will facilitate maximized signal timing and improve overall traffic operations.

This project is considered an ITS project according to Section 485.4 of the HPCM. However, it is non-significant because it does not interact with any other system (e.g., 511). For this reason, a Systems Engineering Analysis (SEA) is not required and will not be conducted.

21.0 DRAINAGE

21.1 Existing Drainage Conditions

21.1.1 Existing Drainage Patterns

All drainage in the project area tends to flow towards the south and west. The terrain is gently sloped, with slopes ranging from about 0.3 percent to 1.6 percent. The project area is underlain by generally well-draining soils. Groundwater was encountered at 15 feet in bore logs drilled north of Trainor Gate Road and the water table is assumed to follow the regional topographic gradient from east to west.

No wetlands, fish-bearing streams, lakes, or stream crossings are within the project area. Chena River and Noyes Slough is immediately adjacent to the southern end of the project. The project is protected from the 100-year flood by a levee system.

North of Trainor Gate Road there is a local low point between Blair Road and Sadler Way. Runoff does not appear to discharge by surface flow except during breakup or heavy or prolonged rain events. When runoff occurs, it discharges to the ditch between Trainor Gate Road and the Alaska Railroad tracks and flows west out of the project area. The downstream receiving water is Noyes Slough, located approximately 4,400 feet west of the discharge point.

South of Trainor Gate Road the project is served by a underground piped storm drain system. The system extends from 300 feet south of Trainor Gate Road to 190 feet south of 3rd Street and discharges to Noyes Slough about 120 feet west of Old Steese Highway. The drainage area of this system is approximately 18.2 acres.

21.1.2 Existing Drainage Structures

Stage 1: Existing drainage structures along Old Steese Highway north of Trainor Gate Road include roadside ditches, swales, small local piped systems, and detention areas with perched culverts. Some detention areas straddle the ROW line and receive runoff from both the road and commercial parking lots on abutting property. Two short piped storm water systems, one located along Blair Road on the east side of Old Steese Highway and one along Trainor Gate Road east of Old Steese Highway, discharge into ditches within the project area. Blair Road does not contain curb and gutter, but grated field inlets collect runoff in shallow roadside ditches and transfer water to the west side of Old Steese Highway. Trainor Gate Road has curb, gutter, and inlets that transfer water west of Old Steese Highway.

Stage 2: South of Trainor Gate Road, Old Steese Highway is served by underground piped storm water drainage systems that include curb, gutter, curb inlets, and catch basins. The integrity of the corrugated metal pipe (CMP) pipe has no reported problems.

21.2 Proposed Drainage Improvements

Stage 1: To minimize ROW impacts, curb and gutter with drop inlets and ditches/swales will be constructed to accommodate drainage:

- Between Kutter Road and Helmericks Avenue new curb and gutter with drop inlets will feed into a piped storm drainage system. This system will discharge to a proposed surface infiltration basin located northwest of the Old Steese/Trainor Gate Road intersection.
- Between Helmericks Avenue and the Johansen Expressway new curb and gutter will collect drainage that will drain into grass lined ditches/swales on each side of the road. The ditches will flow south and drain into existing and new infiltration basins located at the

Helmericks/Seekins/Old Steese intersection.

- The new storm drain system design will be submitted to the Alaska Department of Environmental Conservation (ADEC) for a "Letter-of-Nonobjection" of the permanent stormwater system.

Stage 2: There are no changes to the existing drainage patterns. The existing curb and gutter and underground storm drain system will not be replaced or modified.

22.0 SOIL CONDITIONS

The project corridor is located in the Continental Climatic Zone of Alaska. The area experiences an average of 13,917 heating degree days and 58 cooling degree days for a 65 degree base temperature.

A 2015 Geotechnical Memorandum was completed during initial scoping for the Old Steese Highway project, when the proposed corridor was limited to Stage 1 (no geotechnical investigation was performed south of Trainor Gate Road).

The test holes drilled found soils consistent with the typical sections in the 1989 and 1999 as-built documents. Holes in the embankment (paved areas) found 1 to 4.5 feet of poorly or well-graded gravel with sand (fill) underlain by loose poorly or well-graded sand with silt and/or gravel, silty sand, or silty sand with gravel. Un-paved areas encountered silty soils underlain by loose to very loose poorly-graded sand with silt. Groundwater was intercepted in two holes in un-paved areas at approximately 15 feet. Wet sand in these test holes liquefied when agitated, which suggests the potential for liquefaction. Permafrost has been observed in the vicinity of the project area at depths ranging from 8 to 40 feet below the ground surface; however, none of the borings encountered ice. Seasonal frost was intercepted in one hole from approximately 5 to 6.5 feet below finished grade.

23.0 EROSION AND SEDIMENT CONTROL

The Erosion and Sediment Control Plan (ESCP) specifies environmentally sensitive areas and provides an overview of anticipated sources of sediment to be controlled during construction. The construction Contractor will prepare a Storm Water Pollution Prevention Plan (SWPPP) that conforms to the Alaska Construction General Permit (ACGP), DOT&PF's Best Management Practices (BMPs) for erosion and sediment control, and project specifications. The Contractor will submit the SWPPP to DOT&PF for approval and keep the approved SWPPP on-site at all times during construction. All construction activity will be conducted in accordance with the SWPPP, and the SWPPP will be updated throughout construction as different areas of the project are disturbed.

The area of ground disturbance for the Old Steese Highway Reconstruction project is approximately 13 acres, not including material sites or staging areas. The project corridor is located in an urban area, with ground cover being predominately concrete or asphalt pavement and very little previously undisturbed ground.

Temporary erosion control measures may include, but are not limited to:

- Preservation of existing vegetation;
- Erosion control mats;
- Velocity control BMPs, including silt fence or fiber rolls;

- Watering and/or chemical stabilization for dust control;
- Perimeter controls; and
- Good housekeeping practices.

Sediment filtration BMPs will be installed and maintained at all existing and new inlet structures and the Trainor Gate Road discharge point. Ground disturbance will be minimized as much as reasonably possible throughout the project to prevent excessive erosion and dust.

All disturbed ground will be reseeded or receive other surface treatment for permanent stabilization at the conclusion of construction activity. The site will be monitored at the frequency indicated in the ACGP until final stabilization has been achieved.

24.0 ENVIRONMENTAL COMMITMENTS

The Old Steese Highway project area is an urban area that has been previously disturbed, so construction activities are not expected to involve significant environmental impacts. A preliminary Environmental Checklist was completed according to Chapter 9 of the Alaska FHWA Program Environmental Procedures Manual. The Checklist summarizes the affected environment, anticipated impacts, proposed mitigation, and public and agency outreach/consultation. Refer to the State Project Environmental Form for further details. The signature page is located in Appendix C.

The project will require coordination with appropriate resource agencies to obtain necessary permits and minimize environmental impacts during and after construction. Necessary permits, authorizations, and/or consultations required for this project include, but are not limited to:

- Alaska Pollutant Discharge Elimination System (APDES) Construction General Permit (AKR10000), including a courtesy copy of the approved SWPPP sent to the City of Fairbanks;
- State of Alaska Department of Environmental Conservation (DEC) Non-Domestic Wastewater (Storm Water) Engineering Plan Review (Letter of Non-Objection);
- Piped Distribution Engineering Plan Review to DEC’s Drinking Water Program for relocation of fire hydrants and water mains.

25.0 WORK ZONE TRAFFIC CONTROL

Each Stage is expected to take one summer season to construct. There will be traffic detours and alterations to intersection signal timing during construction. DOT&PF will provide general traffic control and road closure guidance. The construction Contractor will be responsible for developing the phasing and sequencing of construction activities to minimize impacts to the traveling public. Pedestrian, bicycle, and motorized access to all businesses along the project corridor will be provided and maintained during construction.

26.0 VALUE ENGINEERING

A value engineering study is not required since the total project cost will not exceed $40 million. A study has been considered but will not be done for this project.

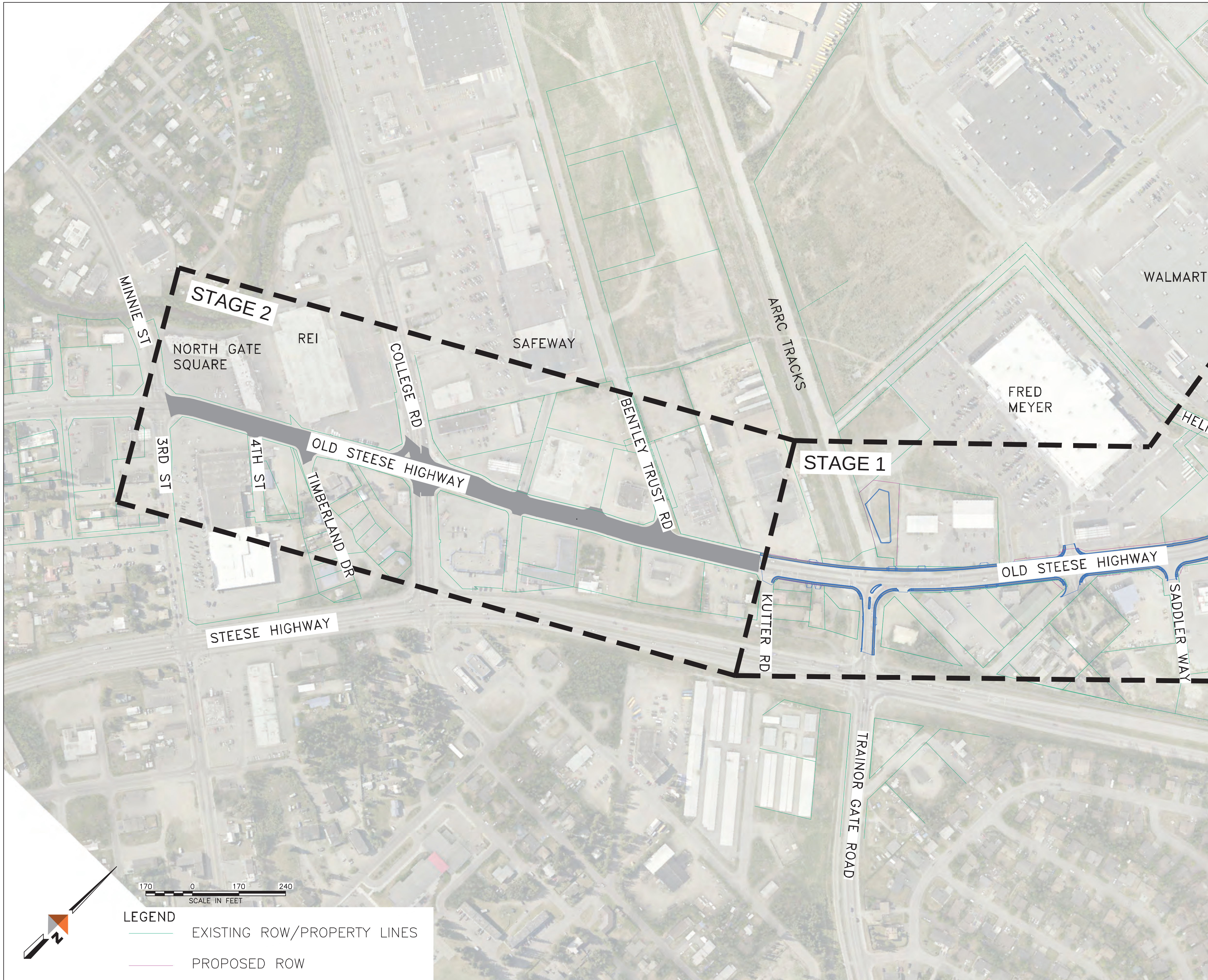
27.0 COST ESTIMATE

Table 8: Preliminary Estimated Project Costs

Category	**Estimated Cost**
Design	$3,000,000
Right-of-Way	$2,105,000
Utilities	$2,085,000
Construction (includes 15% Construction Engineering)	$10,400,000 (Stage 1) $3,000,000 (Stage 2)
Total	$20,590,000

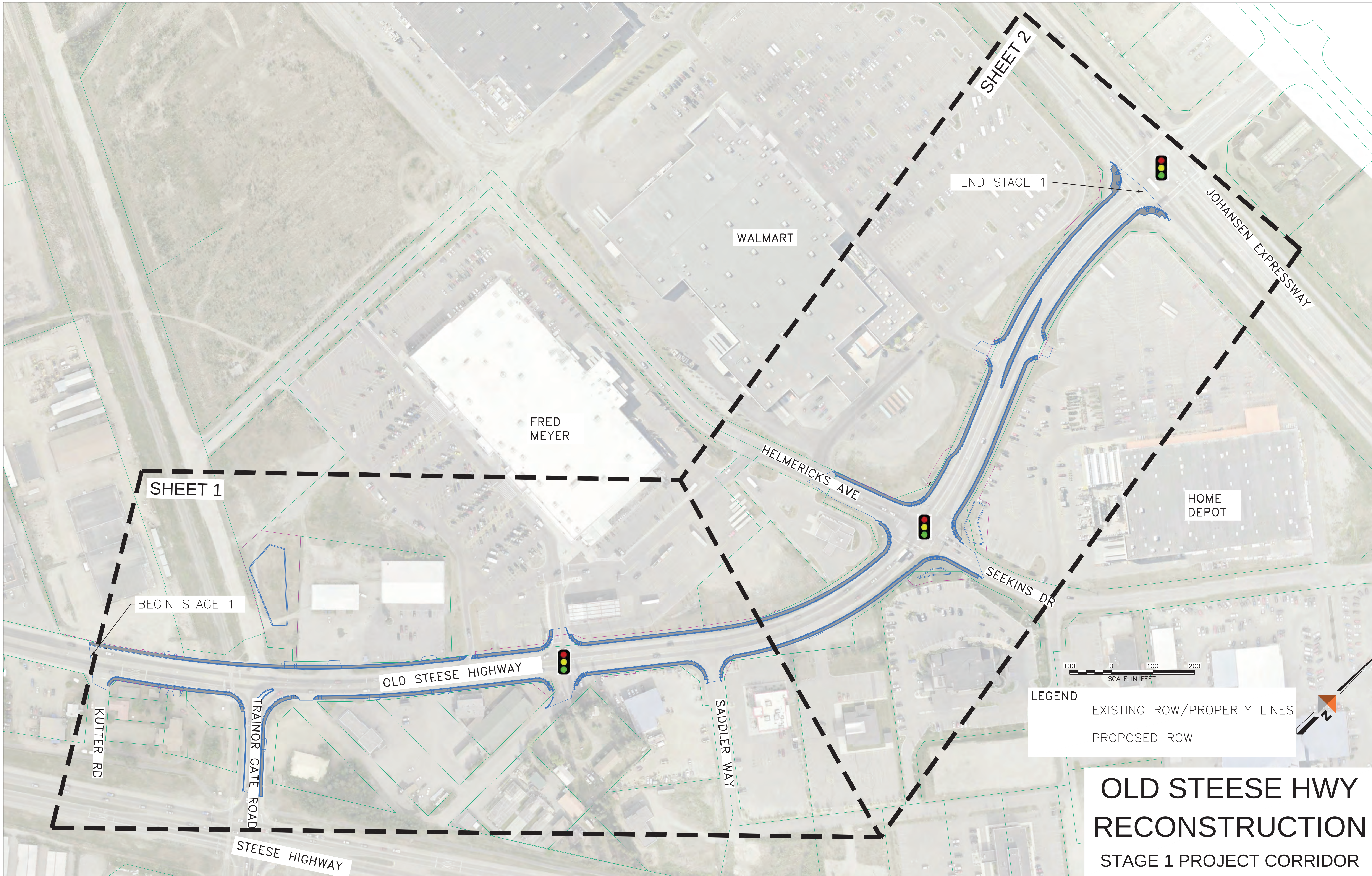
APPENDIX A

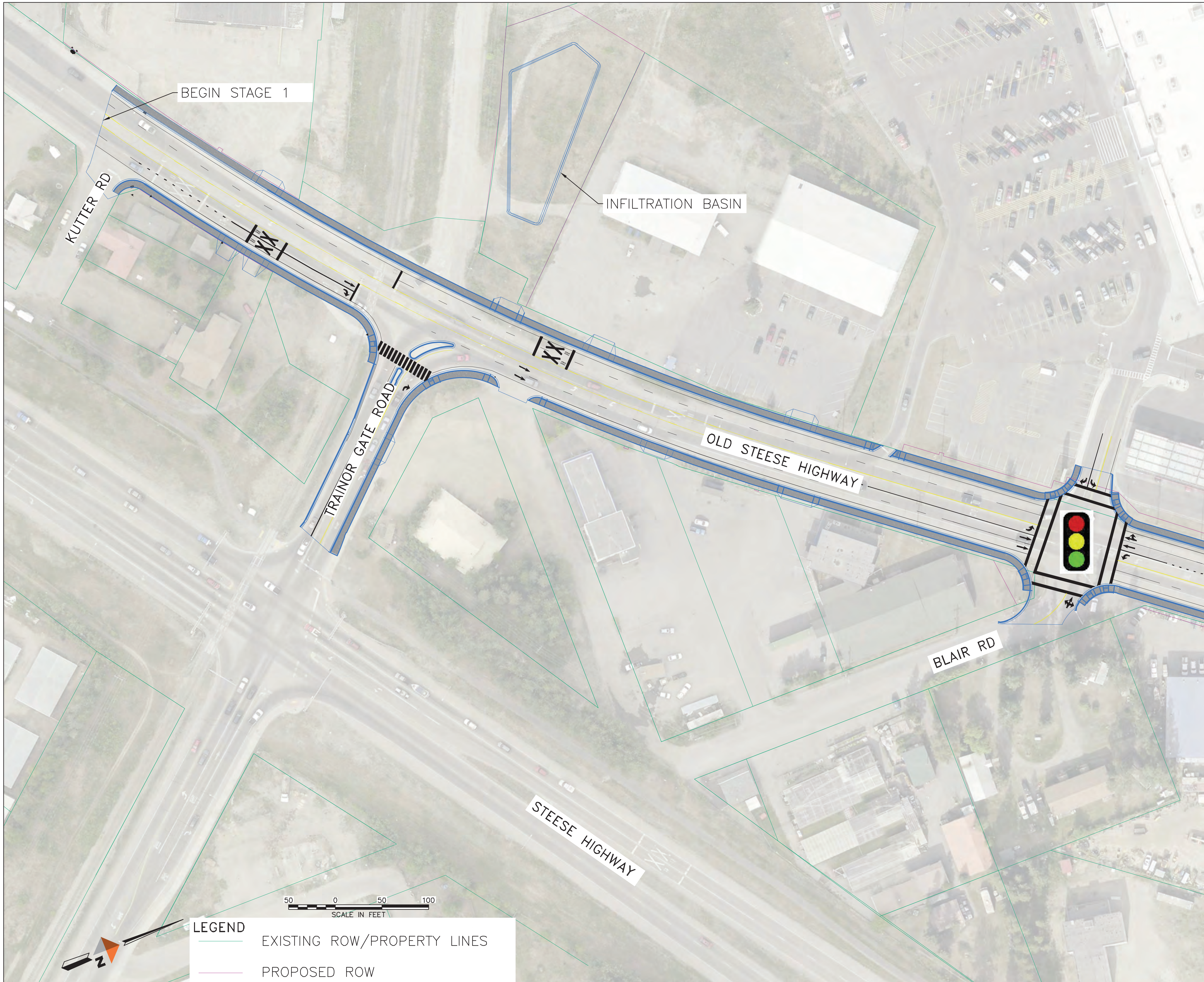
AERIAL PROJECT CORRIDOR GRAPHICS



OLD STEESE HWY RECONSTRUCTION

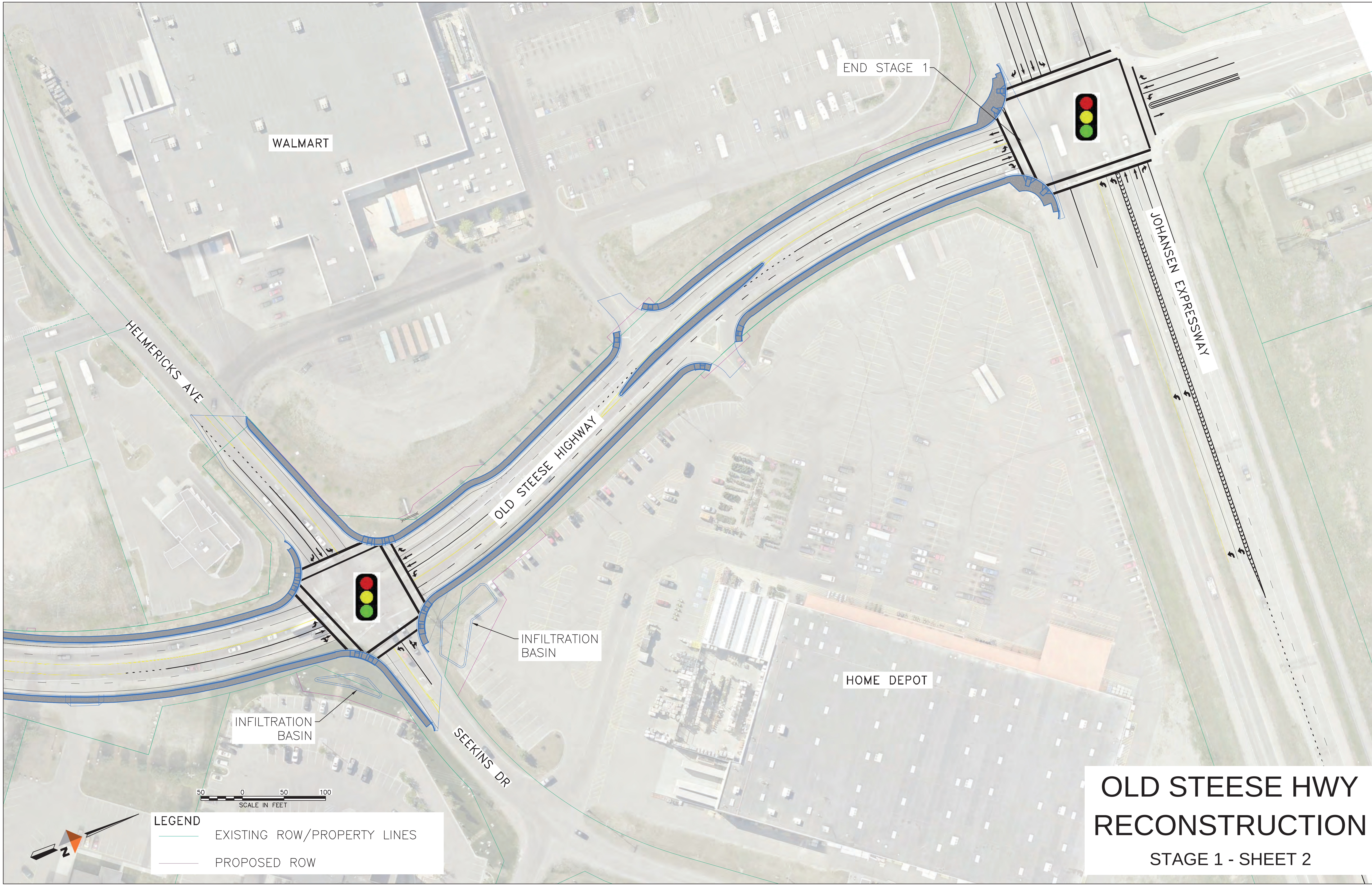
PROJECT CORRIDOR


SHEET 1
SHEET 2
END STAGE 1
BEGIN STAGE 1
WALMART
FRED MEYER
HOME DEPOT
JOHANSEN EXPRESSWAY
HELMERICKS AVE
SEEKINS DR
OLD STEESE HIGHWAY
STEESE HIGHWAY
KUTTER RD
TRAINOR GATE ROAD
SADDLER WAY
100 0 100 200
SCALE IN FEET
LEGEND
EXISTING ROW/PROPERTY LINES
PROPOSED ROW
N
OLD STEESE HWY RECONSTRUCTION
STAGE 1 PROJECT CORRIDOR

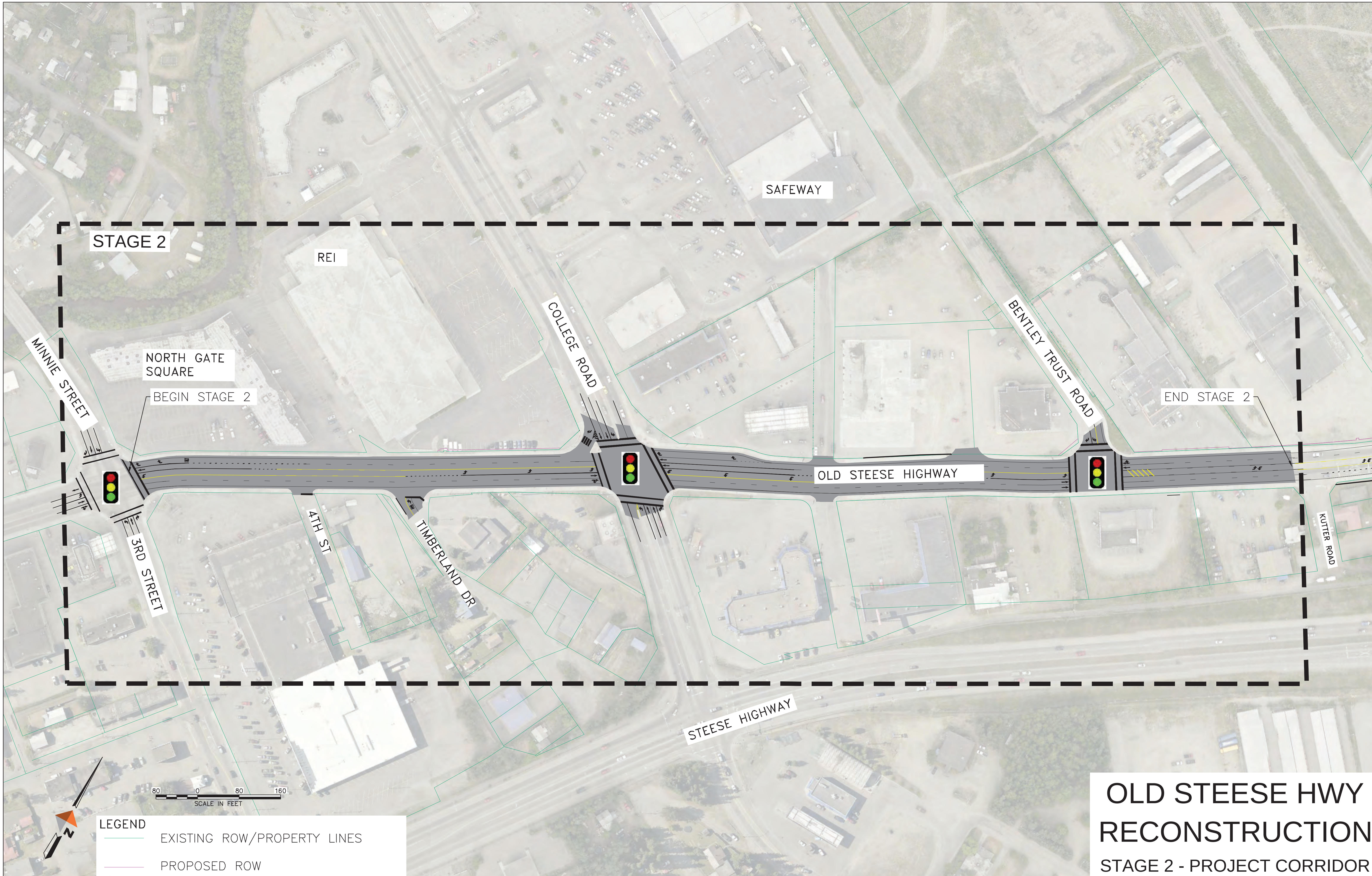


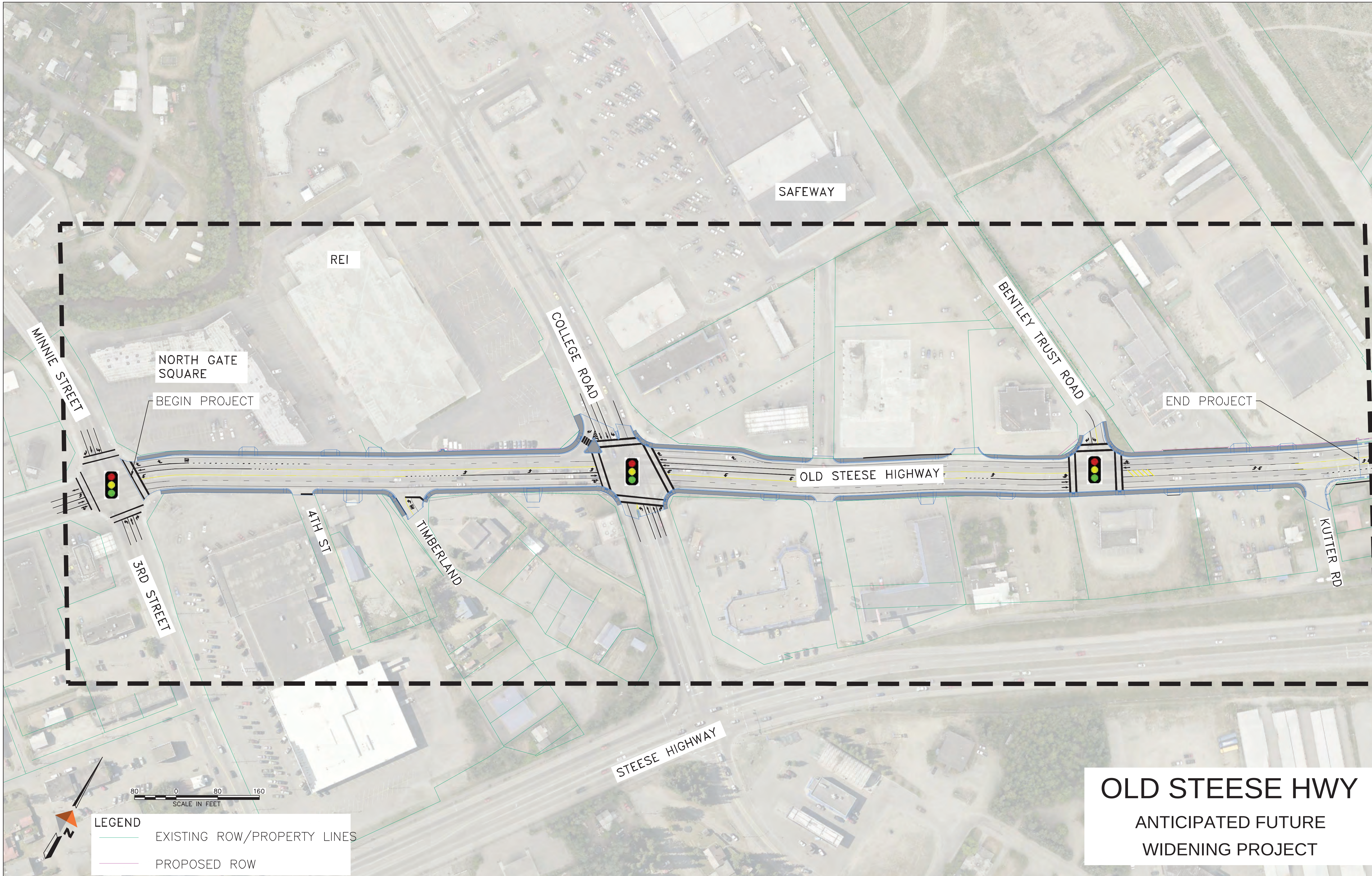
OLD STEESE HWY RECONSTRUCTION

STAGE 1 - SHEET 1



WALMART
END STAGE 1
HELMERICKS AVE
OLD STEESE HIGHWAY
JOHANSEN EXPRESSWAY
INFILTRATION BASIN
INFILTRATION BASIN
HOME DEPOT
SEEKINS DR
50 0 50 100
SCALE IN FEET
N
LEGEND
EXISTING ROW/PROPERTY LINES
PROPOSED ROW
OLD STEESE HWY RECONSTRUCTION
STAGE 1 - SHEET 2


STAGE 2
SAFEWAY
REI
NORTH GATE SQUARE
BEGIN STAGE 2
MINNIE STREET
COLLEGE ROAD
BENTLEY TRUST ROAD
END STAGE 2
OLD STEESE HIGHWAY
3RD STREET
4TH ST
TIMBERLAND DR
KUTTER ROAD
STEESE HIGHWAY
80 0 80 160
SCALE IN FEET
LEGEND
EXISTING ROW/PROPERTY LINES
PROPOSED ROW
OLD STEESE HWY RECONSTRUCTION
STAGE 2 - PROJECT CORRIDOR



OLD STEESE HWY

ANTICIPATED FUTURE WIDENING PROJECT

APPENDIX B

DESIGN CRITERIA

ALASKA DOT&PF PRECONSTRUCTION MANUAL
Chapter 11 - Design
PROJECT DESIGN CRITERIA

Project Name:	Old Steese Highway Reconstruction			
☑ New Construction/Reconstruction	☐ 3R	☐ PM	☐ Other:	
Project Number: Z624870000			☐ NHS	☑ Non NHS
Functional Classification:	Urban Minor Arterial			
Design Year:	2040	**Present ADT:**		15,800 (2014)
Design Year ADT:	24,400	**Mid Design Period ADT:**		21,050 (2030)
DHV:	2,810	**Directional Split:**		45-55
Percent Trucks:	11.5%	**Equivalent Axle Loading:**		2,500,700
Pavement Design Year:	2040	**Design Vehicle:**		WB-67 / WB-62
Terrain:	Level	**Number of Roadways:**		One (5-lane facility)
Design Speed:	35 mph			
Width of Traveled Way:	54 feet (Kutter to Johansen), 52 feet (3rd Street to Kutter)			
Width of Shoulders:	**Outside:**	4 feet to gutter lip	**Inside:**	N/A
Cross Slope:	2%			
Superelevation Rate:	None			
Minimum Radius of Curvature:	510 feet			
Min. K-Value for Vert. Curves:	**Sag:**	49	**Crest:**	29
Maximum Allowable Grade:	7%			
Minimum Allowable Grade:	0.3%			
Stopping Sight Distance:	250 ft			
Lateral Offset to Obstruction:	1.5 ft between intersections; 3 ft at intersections (behind face of curb)			
Vertical Clearance:	18.5 feet (signal housing); 20.5 feet (overhead utility)			
Bridge Width:	N/A			
Bridge Structural Capacity:	N/A			
Passing Sight Distance:	N/A			
Surface Treatment:	**T/W:**	AC Pavement	**Shoulders:**	AC Pavement
Side Slope Ratios:	**Foreslopes:**	3H:1V or flatter	**Backslopes:**	2H:1V or flatter
Degree of Access Control:	Signalized Intersections, Stop Control, and Driveways			
Median Treatment:	TWLTL with isolated raised medians to prevent left turns from some driveways			
Illumination:	Continous			
Curb Usage and Type:	Standard Curb & Gutter			
Bicycle Provisions:	Shared Roadway with Shoulder			
Pedestrian Provisions:	Sidewalk, crosswalks, ADA ramps			
Misc. Criteria:	None			

Proposed - Designer/Consultant: [signature] **Date:** 5-8-20

Endorsed - Engineering Manager: [signature] **Date:** 5/8/2020

Approved - Preconstruction Engineer: [signature] **Date:** 12/3/2020

Shaded criteria are commonly referred to as the *FWHA 13 controlling criteria*. For NHS routes only, these criteria must meet the minimums established in the Green Book (*AASHTO A Policy on Geometric Design of Highways and Streets*). For all other routes, these criteria must meet the minimums established in the *Alaska Highway Preconstruction Manual*. Otherwise a Design Exception must be approved.

Design Criteria marked with a " # " do not meet minimums and must have a Design Exception(s) and/or Design Waiver(s) approved. See the Design Study Report for Design Exception/Design Waiver approval(s) and approved design criteria values.

APPENDIX C

ENVIRONMENTAL DOCUMENT

- The FNSB commented the project appears to be consistent with the FNSB Comprehensive Plan and they are in support of the project. They recommended DOT&PF change the functional classification/design elements of the roadway to a collector, and accommodate transit elements into the project. The project is not located within the floodplain.

Public Meeting #4 – Expanded Project Scope, Area Business Owners, March 31, 2016
Summary of issues raised:
- Concerns about utility service interruptions during construction
- Concerns regarding construction scheduling to minimize business impacts

Public Meeting #5 – Expanded Project Scope, Public Open House, April 7, 2016
Summary of issues raised:
- A raised median or similar is needed between College Road and Johansen to reduce left turns
- The posted speed on Old Steese Highway is too high
- Positive response for bike/pedestrian facilities

See Attachment 6 – Comments and Coordination for details.

VII. Environmental Commitments / Mitigation Measures:

	N/A	YES	NO
1. Environmental commitments or mitigative measures have been included in the project.	☐	☐	☒

2. List environmental commitments or mitigative measures.

None.

VIII. Signatures

Prepared by: [signature] Date: 07/25/2017
Environmental Impact Analyst

Reviewed by: [signature] Date: 7/27/17
Engineering Manager

Approved by: Brett D Nel[signature] Date: 9-14-17
Regional Environmental Manager

APPENDIX D

PAVEMENT DESIGN

MEMORANDUM

TO:	Albert Beck, P.E. State of Alaska Department of Transportation and Public Facilities
FROM:	Aaron K. Marsh, E.I., through Zaid S. Hussein, P.E.; and Gary Jenkins II, P.E. DOWL
DATE:	May 18, 2016
SUBJECT:	Old Steese Highway Upgrade, Johansen Expressway to Wendell Avenue Pavement Design State of Alaska Department of Transportation and Public Facilities Project No. 62487

This Pavement Design Memorandum was prepared for the Old Steese Highway Upgrade from Johansen Expressway to 2nd Street. The project is being administered by the State of Alaska Department of Transportation and Public Facilities (DOT&PF). Anticipated work will include:

- Widening the road to allow additional and/or wider lanes/shoulders,
- Constructing intersection improvements, and
- Enhancing bicycle and pedestrian facilities and connectivity.

The objective of this analysis is to determine the minimum required pavement structural section(s) for the project from a traffic-loading requirement. This design is based on the anticipated Equivalent Single Axle Loads (ESALs) for the 30-year design life (see Section 7.4.3 of the Alaska Flexible Pavement Design Manual [PDM]).

The pavement section recommendation presented in this memorandum is based on traffic loading and does not account for frost depth or other geotechnical needs (e.g., shallow water table, or reuse of existing material). A geotechnical evaluation should be completed to determine an appropriate total structural section depth, which may exceed the total section depth of 21 inches presented in this memorandum. The Selected Material within the existing pavement section may be acceptable for reuse in-place; however, this should be evaluated in the geotechnical investigation (see the as-built drawings for the DOT&PF Old Steese Highway Reconstruction project [Project F-M-0672(1)/64242]).

1.0 PAVEMENT STRUCTURAL SECTION

The selected pavement design has been generated using the PDM and associated software. ESAL computations were completed using traffic data from the project design designation summarized in Table 1. The ESAL computation worksheets are included in Attachment A.

Historical temperature data from 2005 through the present was reviewed to determine the required Performance Grade (PG) of modified oil for the Hot Mix Asphalt (HMA). The average seven-day high ambient air temperature is 26.9 °C (80.5 °F), and the average one-day low ambient air temperature is -42.1 °C (-43.8 °F), corresponding to high and low pavement temperatures of 37.5 °C and -34.5 °C, respectively. The maximum pavement design temperature was increased by 6 °C because of the lower traffic speed of 35 miles per hour (mph). As such, the lowest PG is 46-40 and the recommended PG is 58-40 (see Attachment B for a temperature data summary and the calculations).

In accordance with the 2015 DOT&PF Standard Specifications for Highway Construction, Section 306, the Asphalt Treated Base (ATB) layer includes 5-percent modified oil with PG 58-40, which is similar to the oil content in the HMA layer. This implies that the ATB layer will provide adequate resistance to fatigue failure and plastic deformation and, hence, will function as a binder layer and a base course layer.

Hard aggregate is not required for this project because the construction year Annual Average Daily Traffic (AADT) is less than 5,000 vehicles per lane. This is in accordance with the recommendations specified in the Hard Aggregate Usage Policy memorandum issued by the DOT&PF on August 2, 2013 (see Attachment C).

Table 1: Design Designation Data Summary

Data	**Johansen Expressway to Helmericks Avenue (Section 1)**	**Helmericks Avenue to Trainor Gate Road (Section 2)**	**Trainor Gate Road to College Road (Section 3)**	**College Road to 3rd Street (Section 4)**	**3rd Street to Wendell Avenue (Section 5)**
Provided in Design Designation					
2014/2015 AADT	8,000	15,800	11,300	9,500	8,450
2030 AADT	10,650	21,050	15,210	12,800	9,810
2040/2045 AADT	12,375	24,400	20,470	14,850	11,390
Growth Rate (%)	2.5% from 2014 to 2019 1.5% from 2019 to 2040		2%	2% from 2015 to 2030 1% from 2030 to 2045	1%
Truck Traffic	3.25% Total 2.80% Class 5 0.25% Class 6 0.10 Class 8 0.10 Class 9		4% Total 0.10 Class 4 2.50 Class 5 0.15 Class 6 1.20 Class 8 0.00 Class 9 0.05 Class 10		

Data	Johansen Expressway to Helmericks Avenue (Section 1)	Helmericks Avenue to Trainor Gate Road (Section 2)	Trainor Gate Road to College Road (Section 3)	College Road to 3rd Street (Section 4)	3rd Street to Wendell Avenue (Section 5)
For Pavement Design					
Truck Traffic by Number of Axles	3.25% Total 2.80% Two Axles 0.25% Three Axles 0.10% Four Axles 0.10% Five Axles		4% Total 2.55% Two Axles 0.60% Three Axles 0.80% Four Axles 0.00% Five Axles 0.05% Six-Plus Axles		
2017 Construction Year AADT	8,615	17,015	11,760	9,880	8,620
2017 Construction Year AADT per Lane	2,370	4,680	3,230	2,720	2,370
2047 Design Year AADT	13,730	27,080	21,300	15,150	11,620
Future Design ESALs (Construction year plus 30 years)	999,059	1,973,038	2,188,445	1,747,078	1,375,916

The pavement sections presented below were selected per General Policy 7 (Section 2.1 of the PDM [DOT&PF 2004]), which states that, for projects with curb and gutter that have AADT greater than 5,000, the Alaska Renewable Pavement (ARP) design should be used. The ARP design states that the pavement section should consist of either:

- Two (2) inches minimum of wearing course (e.g., HMA), over
- Three (3) inches minimum of binder course (e.g., ATB), over
- Four (4) inches minimum of Aggregate Base Course (e.g., D-1), over
- Selected Material as required

or

- Two (2) inches minimum of wearing course (e.g., HMA), over
- Two (2) inches minimum of binder course (e.g., HMA or ATB), over
- Three (3) inches minimum of stabilized base, over
- Selected Material as required.

Stabilized base generally consists of an aggregate material or recycled asphalt material combined with a stabilizing agent such as asphalt emulsion, foamed asphalt cement, lime, portland cement, or recycled asphalt. The use of stabilized base is not considered economically feasible so sections employing a stabilized base have not been evaluated and are not recommended.

The recommended minimum pavement structural section for this project, *based on traffic loading only*, is as follows:

- Two (2) inches of HMA, Type II, Class A, with PG 58-40, over
- Three (3) inches of ATB, with PG 58-40, over
- Four (4) inches of Aggregate Base Course, Grading D-1, over
- Twelve (12) inches, minimum, of Selected Material, Type A.

Each section of the project was evaluated using the design information presented in Table 1. Although Sections 1, 4, and 5 do not require, from a traffic loading standpoint, the same structural section as Sections 2 and 3, we recommend that a single pavement structural section be used throughout the project. The Alaska Flexible Pavement Design Software inputs and outputs included in Attachment D were prepared using the recommended pavement section.

ATTACHMENTS

Attachment A – Equivalent Single Axle Load (ESAL) Computation Worksheets

Attachment B – Temperature Data Summary and Calculations

Attachment C – DOT&PF Hard Aggregate Usage Policy Memorandum

Attachment D – Alaska Flexible Pavement Design Software Inputs and Outputs

ATTACHMENT A

Equivalent Single Axle Load (ESAL) Computation Worksheets

Project Name:	Old Steese Highway - Johansen to Helmericks	Designer:	AKM
Project Number:	61487	Date:	May 17, 2016

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2017
Design Length in Years:	2
Base Year:	2014
Base Year Total AADT:	8000
Growth Rate % per Year:	2.5

% of Base Year AADT for Each Lane

Lane	%
1	44
2	11
3	36
4	9
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.8
3-Axle	0.85	0.25
4-Axle	1.2	0.1
5-Axle	1.55	0.1
>=6-Axle	2.24	0

TOTAL DESIGN ESALs:

52,887

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	3791	2.8	0.5	19,372
3-Axle	3791	0.25	0.85	2,940
4-Axle	3791	0.1	1.2	1,660
5-Axle	3791	0.1	1.55	2,145
>=6-Axle	3791	0	2.24	0
		Total Construction Year ESALs:		26,117

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

Project Name:	Old Steese Highway - Johansen to Helmericks	Designer:	AKM
Project Number:	62487	Date:	May 18, 2016

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2019
Design Length in Years:	28
Base Year:	2019
Base Year Total AADT:	9051.27
Growth Rate % per Year:	1.5

% of Base Year AADT for Each Lane

Lane	%
1	44
2	11
3	36
4	9
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.8
3-Axle	0.85	0.25
4-Axle	1.2	0.1
5-Axle	1.55	0.1
>=6-Axle	2.24	0

TOTAL DESIGN ESALs:

946,172

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	3983	2.8	0.5	20,353
3-Axle	3983	0.25	0.85	3,089
4-Axle	3983	0.1	1.2	1,745
5-Axle	3983	0.1	1.55	2,253
>=6-Axle	3983	0	2.24	0
		Total Construction Year ESALs:		27,440

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

Project Name:	Old Steese Highway - Helmericks to Trainor	Designer:	AKM
Project Number:	62487	Date:	May 17, 2016

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2017
Design Length in Years:	2
Base Year:	2014
Base Year Total AADT:	15800
Growth Rate % per Year:	2.5

% of Base Year AADT for Each Lane

Lane	%
1	44
2	11
3	36
4	9
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.8
3-Axle	0.85	0.25
4-Axle	1.2	0.1
5-Axle	1.55	0.1
>=6-Axle	2.24	0

TOTAL DESIGN ESALs:

104,452

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	7487	2.8	0.5	38,259
3-Axle	7487	0.25	0.85	5,807
4-Axle	7487	0.1	1.2	3,279
5-Axle	7487	0.1	1.55	4,236
>=6-Axle	7487	0	2.24	0
		Total Construction Year ESALs:		51,581

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

Project Name:	Old Steese Highway - Helmericks to Trainor	Designer:	AKM
Project Number:	62487	Date:	May 18, 2016

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2019
Design Length in Years:	28
Base Year:	2019
Base Year Total AADT:	17876.2
Growth Rate % per Year:	1.5

% of Base Year AADT for Each Lane

Lane	%
1	44
2	11
3	36
4	9
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.8
3-Axle	0.85	0.25
4-Axle	1.2	0.1
5-Axle	1.55	0.1
>=6-Axle	2.24	0

TOTAL DESIGN ESALs:

1,868,586

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	7866	2.8	0.5	40,195
3-Axle	7866	0.25	0.85	6,101
4-Axle	7866	0.1	1.2	3,445
5-Axle	7866	0.1	1.55	4,450
>=6-Axle	7866	0	2.24	0
		Total Construction Year ESALs:		54,191

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

Project Name:	Old Steese Highway - Trainor to College	Designer:	AKM
Project Number:	61487	Date:	May 17, 2016

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2017
Design Length in Years:	30
Base Year:	2015
Base Year Total AADT:	11300
Growth Rate % per Year:	2

% of Base Year AADT for Each Lane

Lane	%
1	44
2	11
3	36
4	9
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.55
3-Axle	0.85	0.6
4-Axle	1.2	0.8
5-Axle	1.55	0
>=6-Axle	2.24	0.05

TOTAL DESIGN ESALs:

2,188,445

Historic Data Input

Historic Construction Year:	1999
Backcast % per Year:	2

% of Base Year AADT for Each Lane

Lane	%
1	44
2	11
3	36
4	9
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.55
3-Axle	0.85	0.6
4-Axle	1.2	0.8
5-Axle	1.55	0
>=6-Axle	2.24	0.05

TOTAL HISTORIC ESALs:

808,743

Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	5173	2.55	0.5	24,074
3-Axle	5173	0.6	0.85	9,630
4-Axle	5173	0.8	1.2	18,126
5-Axle	5173	0	1.55	0
>=6-Axle	5173	0.05	2.24	2,115
		Total Construction Year ESALs:		53,945

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	3622	2.55	0.5	16,856
3-Axle	3622	0.6	0.85	6,742
4-Axle	3622	0.8	1.2	12,691
5-Axle	3622	0	1.55	0
>=6-Axle	3622	0.05	2.24	1,481
	Total Historic Construction Year ESALs:			37,770

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Project Name:	Old Steese Highway - College to 3rd	Designer:	AKM
Project Number:	61487	Date:	May 17, 2016

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2017
Design Length in Years:	13
Base Year:	2015
Base Year Total AADT:	9500
Growth Rate % per Year:	2

% of Base Year AADT for Each Lane

Lane	%
1	44
2	11
3	36
4	9
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.55
3-Axle	0.85	0.6
4-Axle	1.2	0.8
5-Axle	1.55	0
>=6-Axle	2.24	0.05

TOTAL DESIGN ESALs:

665,782

Historic Data Input

Historic Construction Year:	1999
Backcast % per Year:	1.5

% of Base Year AADT for Each Lane

Lane	%
1	44
2	11
3	36
4	9
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.55
3-Axle	0.85	0.6
4-Axle	1.2	0.8
5-Axle	1.55	0
>=6-Axle	2.24	0.05

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	4349	2.55	0.5	20,239
3-Axle	4349	0.6	0.85	8,096
4-Axle	4349	0.8	1.2	15,239
5-Axle	4349	0	1.55	0
>=6-Axle	4349	0.05	2.24	1,778
		Total Construction Year ESALs:		45,352

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		2.55	0.5	0
3-Axle		0.6	0.85	0
4-Axle		0.8	1.2	0
5-Axle		0	1.55	0
>=6-Axle		0.05	2.24	0
		Total Historic Construction Year ESALs:		0

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Project Name:	Old Steese Highway - College to 3rd	Designer:	AKM
Project Number:	61487	Date:	May 17, 2016

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2030
Design Length in Years:	17
Base Year:	2030
Base Year Total AADT:	12785.7
Growth Rate % per Year:	1

% of Base Year AADT for Each Lane

Lane	%
1	44
2	11
3	36
4	9
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.55
3-Axle	0.85	0.6
4-Axle	1.2	0.8
5-Axle	1.55	0
>=6-Axle	2.24	0.05

TOTAL DESIGN ESALs:

1,081,296

Historic Data Input

Historic Construction Year:	1999
Backcast % per Year:	1.5

% of Base Year AADT for Each Lane

Lane	%
1	44
2	11
3	36
4	9
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.55
3-Axle	0.85	0.6
4-Axle	1.2	0.8
5-Axle	1.55	0
>=6-Axle	2.24	0.05

TOTAL HISTORIC ESALs:

1,445,905

Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	5626	2.55	0.5	26,182
3-Axle	5626	0.6	0.85	10,473
4-Axle	5626	0.8	1.2	19,714
5-Axle	5626	0	1.55	0
>=6-Axle	5626	0.05	2.24	2,300
		Total Construction Year ESALs:		58,669

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	3546	2.55	0.5	16,502
3-Axle	3546	0.6	0.85	6,601
4-Axle	3546	0.8	1.2	12,425
5-Axle	3546	0	1.55	0
>=6-Axle	3546	0.05	2.24	1,450
	Total Historic Construction Year ESALs:			36,978

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Project Name:	Old Steese Highway - 3rd to Wendell	Designer:	AKM
Project Number:	61487	Date:	May 17, 2016

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2017
Design Length in Years:	30
Base Year:	2015
Base Year Total AADT:	8450
Growth Rate % per Year:	1

% of Base Year AADT for Each Lane

Lane	%
1	44
2	11
3	36
4	9
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.55
3-Axle	0.85	0.6
4-Axle	1.2	0.8
5-Axle	1.55	0
>=6-Axle	2.24	0.05

TOTAL DESIGN ESALs:

1,375,916

Historic Data Input

Historic Construction Year:	1999
Backcast % per Year:	1

% of Base Year AADT for Each Lane

Lane	%
1	44
2	11
3	36
4	9
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.55
3-Axle	0.85	0.6
4-Axle	1.2	0.8
5-Axle	1.55	0
>=6-Axle	2.24	0.05

TOTAL HISTORIC ESALs:

648,601

Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	3793	2.55	0.5	17,652
3-Axle	3793	0.6	0.85	7,061
4-Axle	3793	0.8	1.2	13,291
5-Axle	3793	0	1.55	0
>=6-Axle	3793	0.05	2.24	1,551
		Total Construction Year ESALs:		39,555

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	3171	2.55	0.5	14,757
3-Axle	3171	0.6	0.85	5,903
4-Axle	3171	0.8	1.2	11,111
5-Axle	3171	0	1.55	0
>=6-Axle	3171	0.05	2.24	1,296
		Total Historic Construction Year ESALs:		33,067

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

ATTACHMENT B

Temperature Data Summary and Calculations

Historical Temperature Data

8/9/2005	Max 7 Day Avg		Date	Min 1 Day Temp
8/9/2005	81.0		1/12/2005	-47
7/19/2006	75.9		1/27/2006	-51
6/28/2007	79.9		1/9/2007	-44
7/2/2008	78.3		2/10/2008	-48
7/2/2009	83.3		1/8/2009	-47
7/29/2010	79.3		1/12/2010	-41
5/25/2011	80.9		2/15/2011	-44
6/18/2012	80.1		1/29/2012	-51
6/14/2013	85.7		1/27/2013	-48
7/4/2014	78.6		1/13/2014	-41
6/14/2015	82.4		2/7/2015	-43
5/8/2016			2/19/2016	-21

North Latitude	64.85			
Seven Day Average High Air Temperature	80.5	F	26.9	C
Minimum Average Air Temperature	-43.8	F	-42.1	C
Seven Day Average High Pavement Temperature, T20mm	37.6	C		
Low-speed traffic - add 6 degrees to pavement temperature	43.6	C		
Minimum Pavement Temperature in Average Year, Tmin	-34.5	C		

ATTACHMENT D

Alaska Flexible Pavement Design Software Inputs and Outputs

Section 1 – Johansen Expressway to Helmericks Avenue ii
Section 2 – Helmericks Avenue to Trainor Gate Road iv
Section 3 – Trainor Gate Road to College Road vi
Section 4 – College Road to 3rd Street viii
Section 5 – 3rd Street to 2nd Street x

Figure 1: Section 1 – INPUT ii
Figure 2: Section 1 – OUTPUT iii
Figure 3: Section 2 – INPUT iv
Figure 4: Section 2 – OUTPUT v
Figure 5: Section 3 – INPUT vi
Figure 6: Section 3 – OUTPUT vii
Figure 7: Section 4 – INPUT viii
Figure 8: Section 4 – OUTPUT ix
Figure 9: Section 5 – INPUT x
Figure 10: Section 5 - OUTPUT xi

Section 1 – Johansen Expressway to Helmericks Avenue

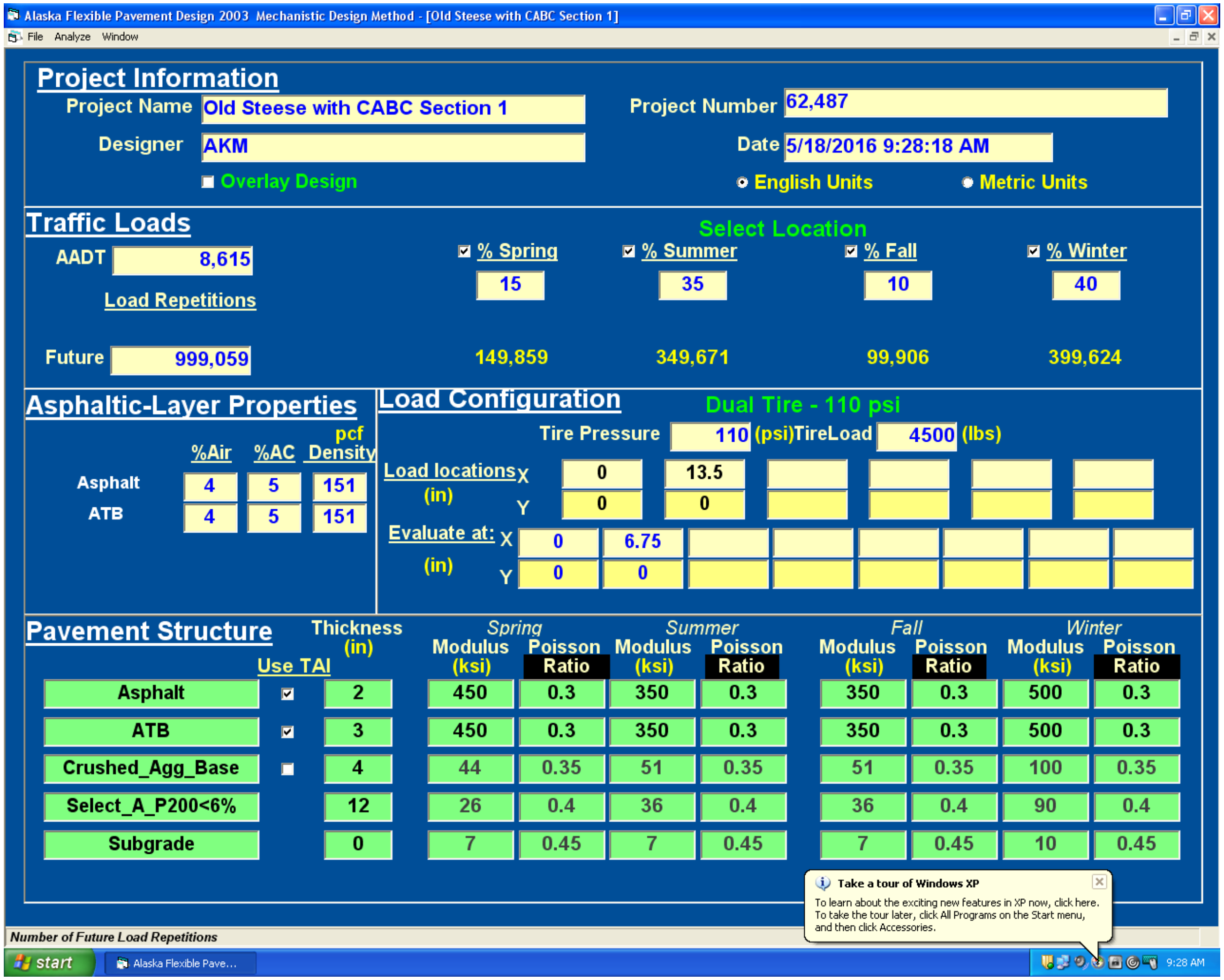
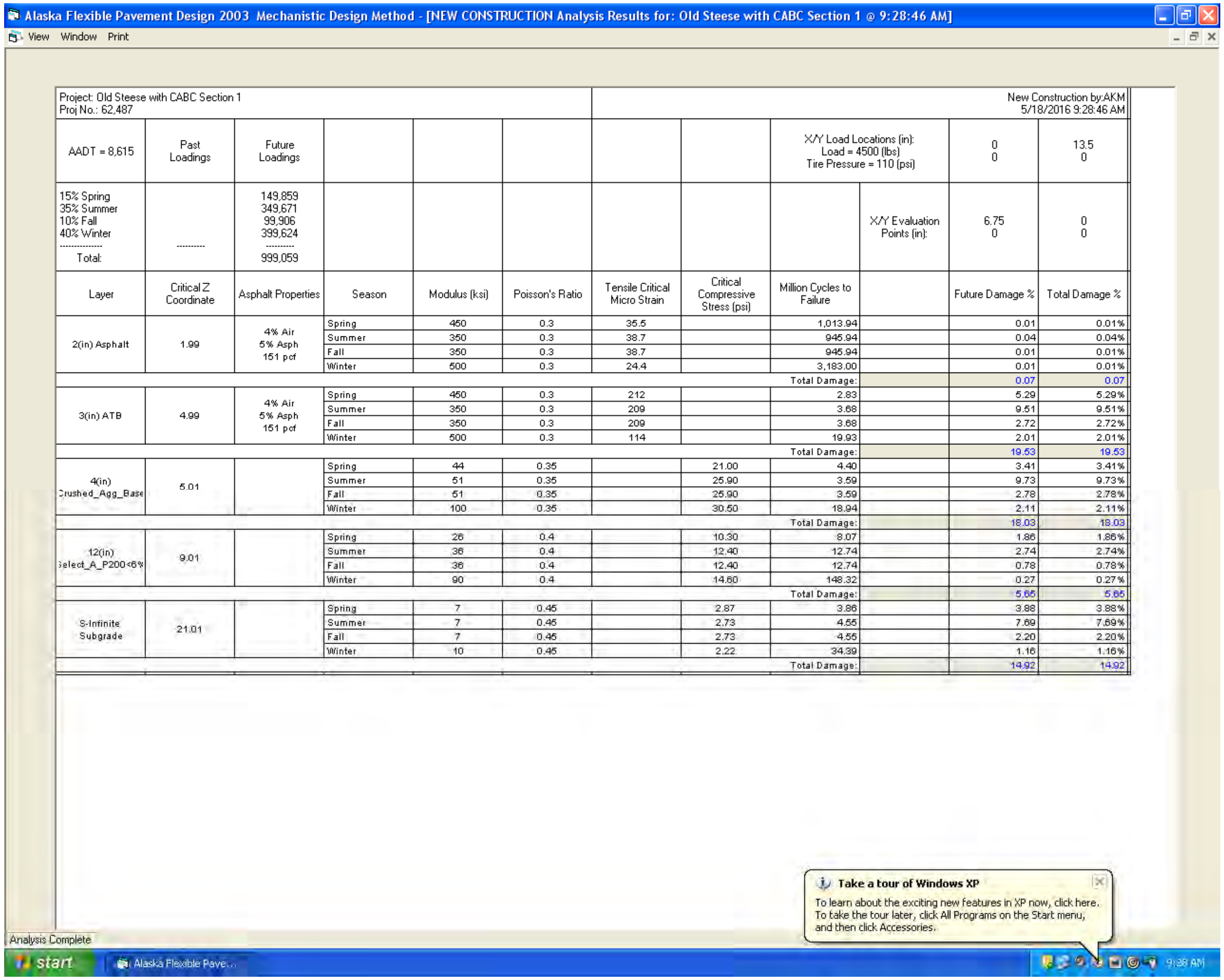


Figure 1: Section 1 – INPUT



Project: Old Steese with CABC Section 1 Proj No.: 62,487						New Construction by:AKM 5/18/2016 9:28:46 AM					
AADT = 8,615	Past Loadings	Future Loadings						X/Y Load Locations (in): Load = 4500 (lbs) Tire Pressure = 110 (psi)		0 0	13.5 0
15% Spring 35% Summer 10% Fall 40% Winter ------------- Total:	----------	149,859 349,671 99,906 399,624 ---------- 999,059							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	1.99	4% Air 5% Asph 151 pcf	Spring	450	0.3	35.5		1,013.94		0.01	0.01%
			Summer	350	0.3	38.7		945.94		0.04	0.04%
			Fall	350	0.3	38.7		945.94		0.01	0.01%
			Winter	500	0.3	24.4		3,183.00		0.01	0.01%
								Total Damage:		0.07	0.07
3(in) ATB	4.99	4% Air 5% Asph 151 pcf	Spring	450	0.3	212		2.83		5.29	5.29%
			Summer	350	0.3	209		3.68		9.51	9.51%
			Fall	350	0.3	209		3.68		2.72	2.72%
			Winter	500	0.3	114		19.93		2.01	2.01%
								Total Damage:		19.53	19.53
4(in) Crushed_Agg_Base	5.01		Spring	44	0.35		21.00	4.40		3.41	3.41%
			Summer	51	0.35		25.90	3.59		9.73	9.73%
			Fall	51	0.35		25.90	3.59		2.78	2.78%
			Winter	100	0.35		30.50	18.94		2.11	2.11%
								Total Damage:		18.03	18.03
12(in) Select_A_P200<6%	9.01		Spring	26	0.4		10.30	8.07		1.86	1.86%
			Summer	36	0.4		12.40	12.74		2.74	2.74%
			Fall	36	0.4		12.40	12.74		0.78	0.78%
			Winter	90	0.4		14.60	148.32		0.27	0.27%
								Total Damage:		5.65	5.65
S-Infinite Subgrade	21.01		Spring	7	0.45		2.87	3.86		3.88	3.88%
			Summer	7	0.45		2.73	4.55		7.69	7.69%
			Fall	7	0.45		2.73	4.55		2.20	2.20%
			Winter	10	0.45		2.22	34.39		1.16	1.16%
								Total Damage:		14.92	14.92

Figure 2: Section 1 – OUTPUT

Section 2 – Helmericks Avenue to Trainor Gate Road

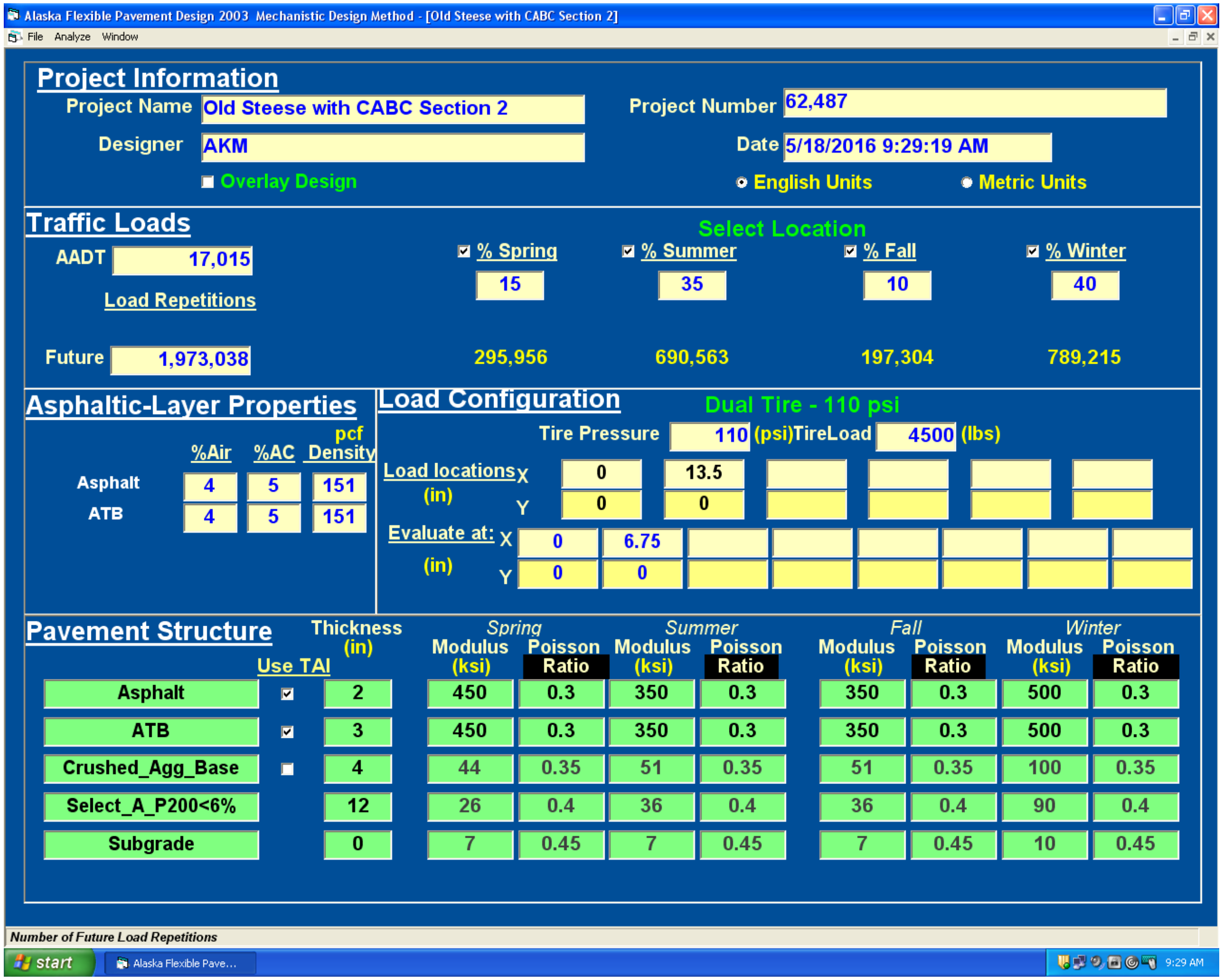


Figure 3: Section 2 – INPUT

Alaska Flexible Pavement Design 2003 Mechanistic Design Method - [NEW CONSTRUCTION Analysis Results for: Old Steese with CABC Section 2 @ 9:29:35 AM]

View Window Print

Project: Old Steese with CABC Section 2
Proj No.: 62,487

New Construction by:AKM
5/18/2016 9:29:35 AM

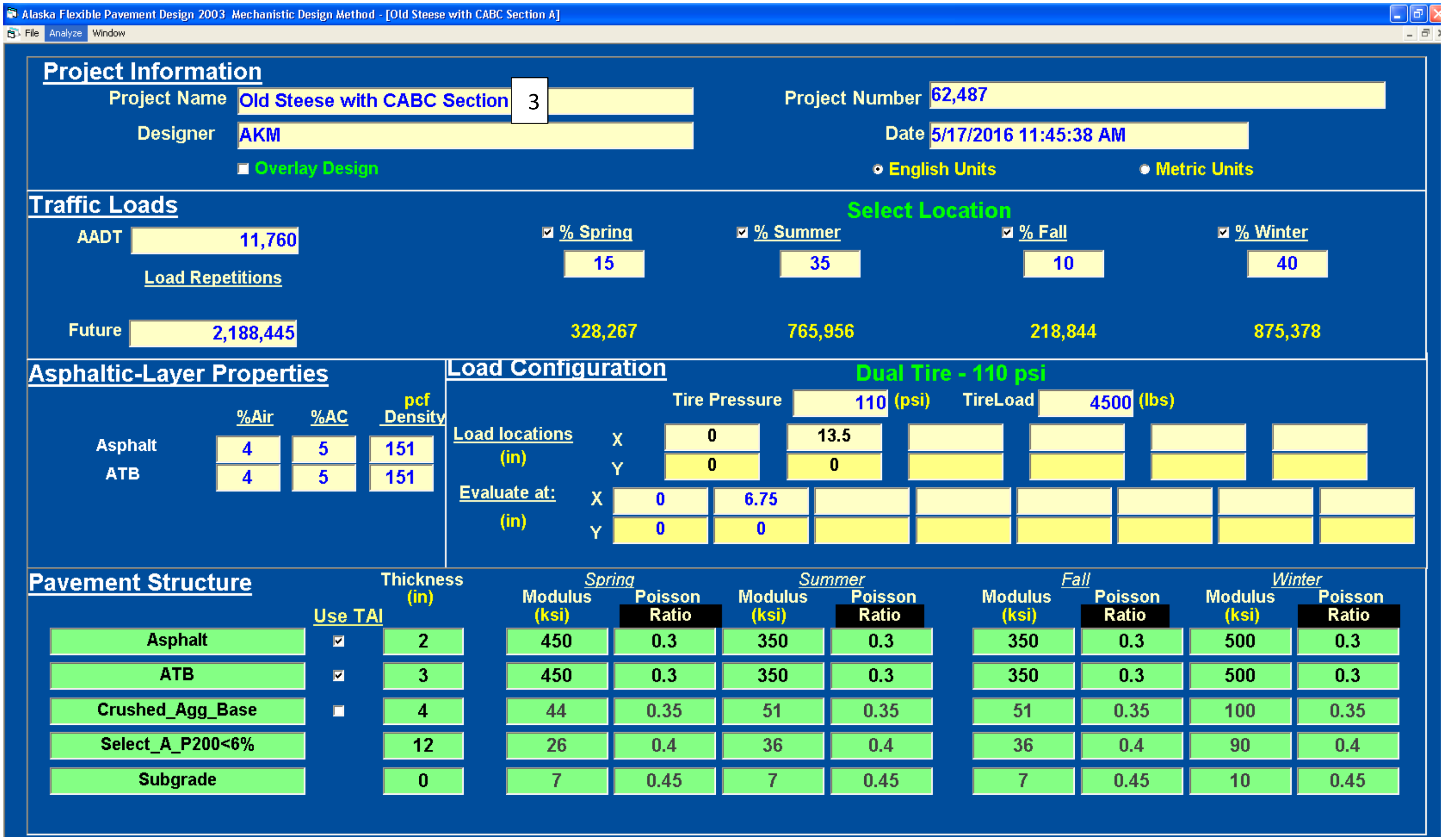
AADT = 17,015	Past Loadings	Future Loadings						X/Y Load Locations (in): Load = 4500 (lbs) Tire Pressure = 110 (psi)		0 0	13.5 0
15% Spring 35% Summer 10% Fall 40% Winter -------------- Total:	----------	295,956 690,563 197,304 789,215 ---------- 1,973,038							X/Y Evaluation Points (in):	6.75 0	0 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	1.99	4% Air 5% Asph 151 pcf	Spring	450	0.3	35.5		1,013.94		0.03	0.03%
			Summer	350	0.3	38.7		945.94		0.07	0.07%
			Fall	350	0.3	38.7		945.94		0.02	0.02%
			Winter	500	0.3	24.4		3,183.00		0.02	0.02%
								Total Damage:		0.15	0.15
3(in) ATB	4.99	4% Air 5% Asph 151 pcf	Spring	450	0.3	212		2.83		10.46	10.46%
			Summer	350	0.3	209		3.68		18.78	18.78%
			Fall	350	0.3	209		3.68		5.37	5.37%
			Winter	500	0.3	114		19.93		3.96	3.96%
								Total Damage:		38.57	38.57
4(in) Crushed_Agg_Base	5.01		Spring	44	0.35		21.00	4.40		6.73	6.73%
			Summer	51	0.35		25.90	3.59		19.22	19.22%
			Fall	51	0.35		25.90	3.59		5.49	5.49%
			Winter	100	0.35		30.50	18.94		4.17	4.17%
								Total Damage:		35.60	35.60
12(in) Select_A_P200<6%	9.01		Spring	26	0.4		10.30	8.07		3.67	3.67%
			Summer	36	0.4		12.40	12.74		5.42	5.42%
			Fall	36	0.4		12.40	12.74		1.55	1.55%
			Winter	90	0.4		14.60	148.32		0.53	0.53%
								Total Damage:		11.17	11.17
S-Infinite Subgrade	21.01		Spring	7	0.45		2.87	3.86		7.66	7.66%
			Summer	7	0.45		2.73	4.55		15.18	15.18%
			Fall	7	0.45		2.73	4.55		4.34	4.34%
			Winter	10	0.45		2.22	34.39		2.29	2.29%
								Total Damage:		29.47	29.47

Analysis Complete

start Alaska Flexible Pave... 9:29 AM

Figure 4: Section 2 – OUTPUT

Section 3 – Trainor Gate Road to College Road



Alaska Flexible Pavement Design 2003 Mechanistic Design Method - [Old Steese with CABC Section A]

File Analyze Window

Project Information

Project Name: Old Steese with CABC Section 3

Project Number: 62,487

Designer: AKM

Date: 5/17/2016 11:45:38 AM

Overlay Design

English Units / Metric Units

Traffic Loads

AADT: 11,760

Load Repetitions

Future: 2,188,445

Select Location

	% Spring	% Summer	% Fall	% Winter
%	15	35	10	40
Future	328,267	765,956	218,844	875,378

Asphaltic-Layer Properties

	%Air	%AC	pcf Density
Asphalt	4	5	151
ATB	4	5	151

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	☑	2	450	0.3	350	0.3	350	0.3	500	0.3
ATB	☑	3	450	0.3	350	0.3	350	0.3	500	0.3
Crushed_Agg_Base	☐	4	44	0.35	51	0.35	51	0.35	100	0.35
Select_A_P200<6%		12	26	0.4	36	0.4	36	0.4	90	0.4
Subgrade		0	7	0.45	7	0.45	7	0.45	10	0.45

Figure 5: Section 3 – INPUT

Alaska Flexible Pavement Design 2003 Mechanistic Design Method - [NEW CONSTRUCTION Analysis Results for: Old Steese with CABC Section A @ 11:45:38 AM]

View Window Print

Project: Old Steese with CABC Section A Proj No.: 62,487											New Construction by:AKM 5/17/2016 11:45:38 AM
AADT = 11,760	Past Loadings	Future Loadings						X/Y Load Locations (in): Load = 4500 (lbs) Tire Pressure = 110 (psi)		0 0	13.5 0
15% Spring 35% Summer 10% Fall 40% Winter --------------- Total:	----------	328,267 765,956 218,844 875,378 ---------- 2,188,445							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	1.99	4% Air 5% Asph 151 pcf	Spring	450	0.3	35.5		1,013.94		0.03	0.03%
			Summer	350	0.3	38.7		945.94		0.08	0.08%
			Fall	350	0.3	38.7		945.94		0.02	0.02%
			Winter	500	0.3	24.4		3,183.00		0.03	0.03%
								Total Damage:		0.16	0.16
3(in) ATB	4.99	4% Air 5% Asph 151 pcf	Spring	450	0.3	212		2.83		11.60	11.60%
			Summer	350	0.3	209		3.68		20.83	20.83%
			Fall	350	0.3	209		3.68		5.95	5.95%
			Winter	500	0.3	114		19.93		4.39	4.39%
								Total Damage:		42.78	42.78
4(in) Crushed_Agg_Base	5.01		Spring	44	0.35		21.00	4.40		7.46	7.46%
			Summer	51	0.35		25.90	3.59		21.32	21.32%
			Fall	51	0.35		25.90	3.59		6.09	6.09%
			Winter	100	0.35		30.50	18.94		4.62	4.62%
								Total Damage:		39.49	39.49
12(in) Select_A_P200<6%	9.01		Spring	26	0.4		10.30	8.07		4.07	4.07%
			Summer	36	0.4		12.40	12.74		6.01	6.01%
			Fall	36	0.4		12.40	12.74		1.72	1.72%
			Winter	90	0.4		14.60	148.32		0.59	0.59%
								Total Damage:		12.39	12.39
S-Infinite Subgrade	21.01		Spring	7	0.45		2.87	3.86		8.50	8.50%
			Summer	7	0.45		2.73	4.55		16.84	16.84%
			Fall	7	0.45		2.73	4.55		4.81	4.81%
			Winter	10	0.45		2.22	34.39		2.55	2.55%
								Total Damage:		32.69	32.69

Figure 6: Section 3 – OUTPUT

Section 4 – College Road to 3rd Street

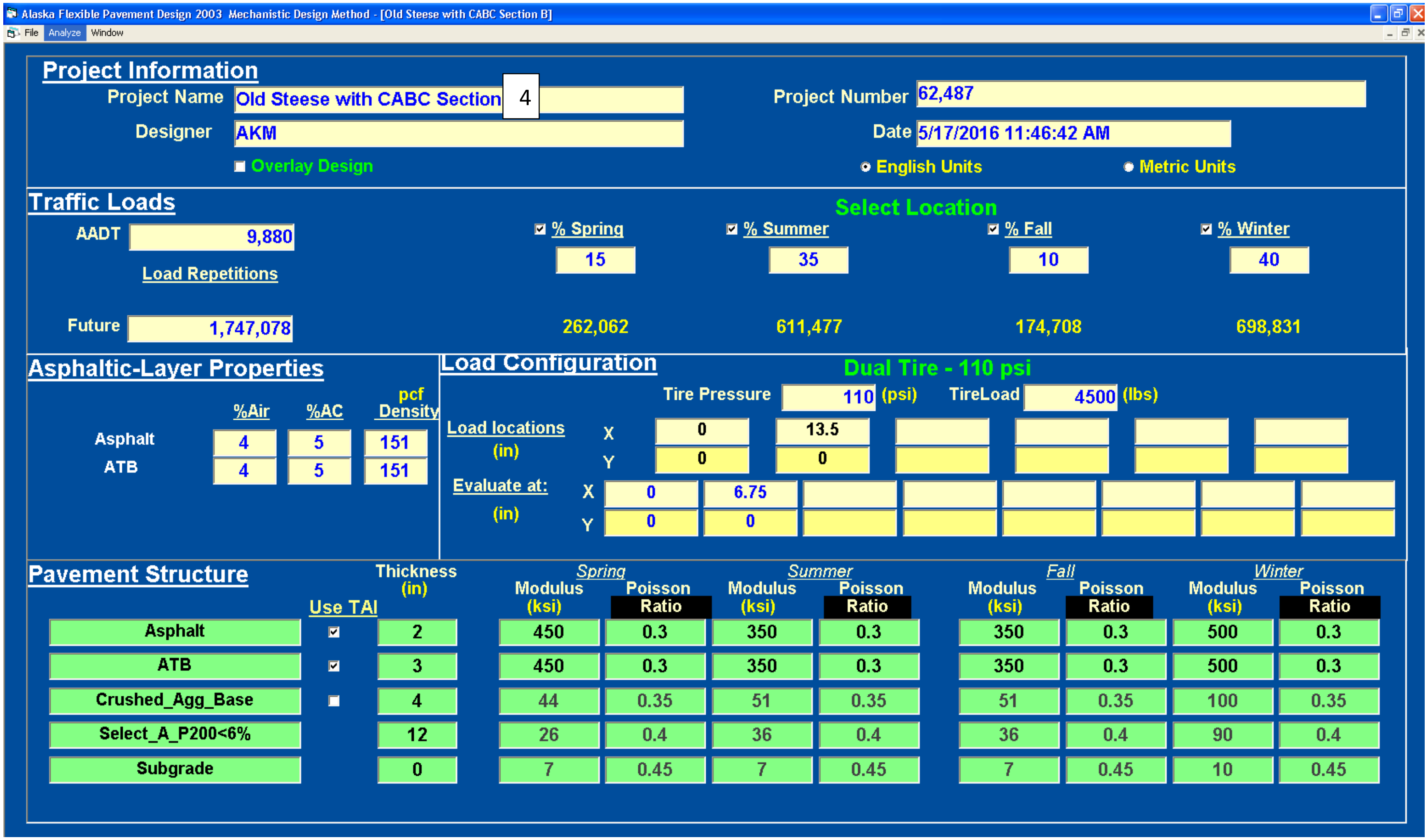


Figure 7: Section 4 – INPUT

Alaska Flexible Pavement Design 2003 Mechanistic Design Method - [NEW CONSTRUCTION Analysis Results for: Old Steese with CABC Section B @ 11:46:42 AM]

View Window Print

Project: Old Steese with CABC Section B Proj No.: 62,487											New Construction by:AKM 5/17/2016 11:46:42 AM
AADT = 9,880	Past Loadings	Future Loadings						X/Y Load Locations (in): Load = 4500 (lbs) Tire Pressure = 110 (psi)		0 0	13.5 0
15% Spring 35% Summer 10% Fall 40% Winter -------------- Total:	-----------	262,062 611,477 174,708 698,831 ---------- 1,747,078							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	1.99	4% Air 5% Asph 151 pcf	Spring	450	0.3	35.5		1,013.94		0.03	0.03%
			Summer	350	0.3	38.7		945.94		0.06	0.06%
			Fall	350	0.3	38.7		945.94		0.02	0.02%
			Winter	500	0.3	24.4		3,183.00		0.02	0.02%
								Total Damage:		0.13	0.13
3(in) ATB	4.99	4% Air 5% Asph 151 pcf	Spring	450	0.3	212		2.83		9.26	9.26%
			Summer	350	0.3	209		3.68		16.63	16.63%
			Fall	350	0.3	209		3.68		4.75	4.75%
			Winter	500	0.3	114		19.93		3.51	3.51%
								Total Damage:		34.15	34.15
4(in) Crushed_Agg_Base	5.01		Spring	44	0.35		21.00	4.40		5.96	5.96%
			Summer	51	0.35		25.90	3.59		17.02	17.02%
			Fall	51	0.35		25.90	3.59		4.86	4.86%
			Winter	100	0.35		30.50	18.94		3.69	3.69%
								Total Damage:		31.53	31.53
12(in) Select_A_P200<6%	9.01		Spring	26	0.4		10.30	8.07		3.25	3.25%
			Summer	36	0.4		12.40	12.74		4.80	4.80%
			Fall	36	0.4		12.40	12.74		1.37	1.37%
			Winter	90	0.4		14.60	148.32		0.47	0.47%
								Total Damage:		9.89	9.89
S-Infinite Subgrade	21.01		Spring	7	0.45		2.87	3.86		6.78	6.78%
			Summer	7	0.45		2.73	4.55		13.44	13.44%
			Fall	7	0.45		2.73	4.55		3.84	3.84%
			Winter	10	0.45		2.22	34.39		2.03	2.03%
								Total Damage:		26.10	26.10

Analysis Complete

Figure 8: Section 4 – OUTPUT

Section 5 – 3rd Street to 2nd Street

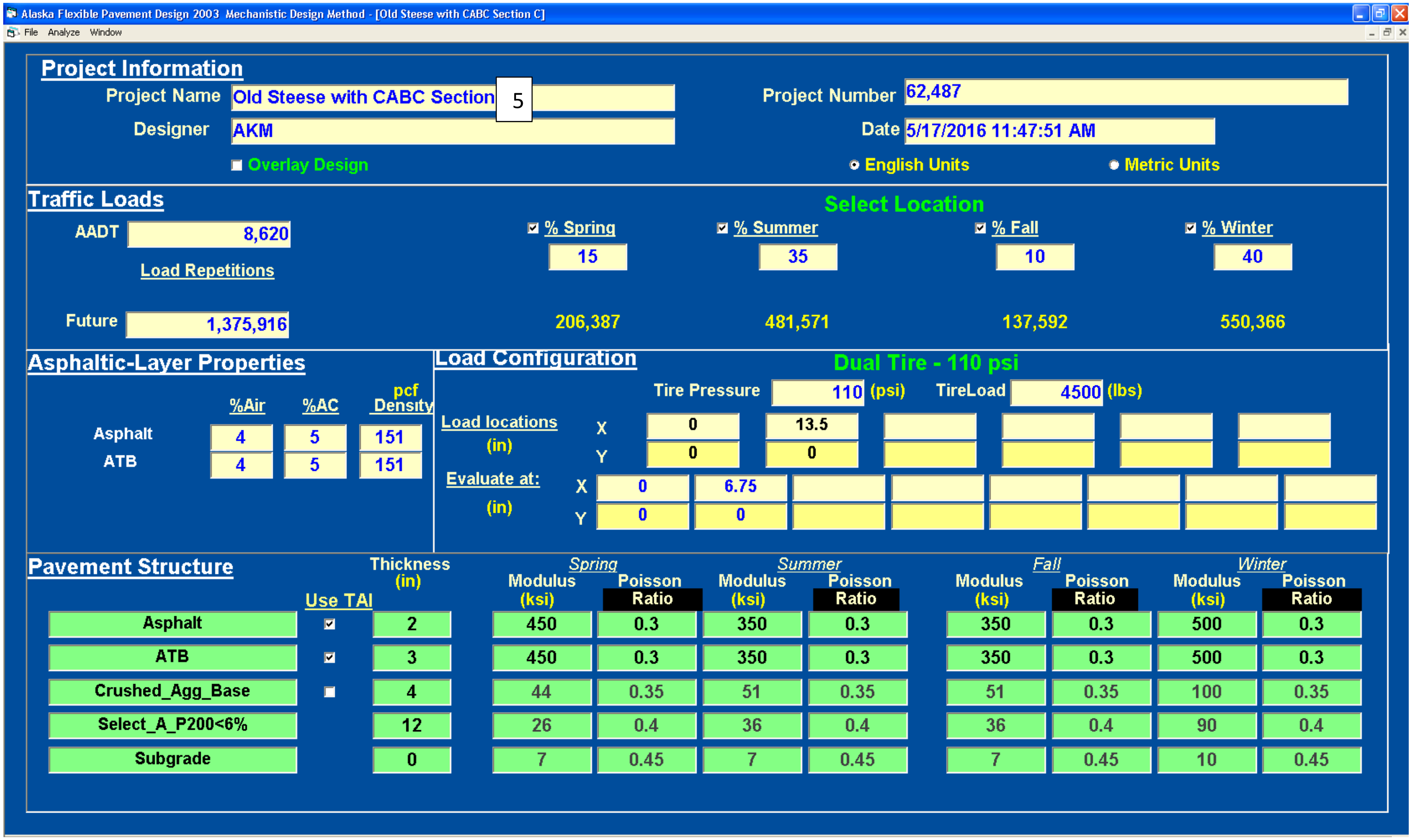


Figure 9: Section 5 – INPUT

Alaska Flexible Pavement Design 2003 Mechanistic Design Method - [NEW CONSTRUCTION Analysis Results for: Old Steese with CABC Section C @ 11:48:20 AM]

View Window Print

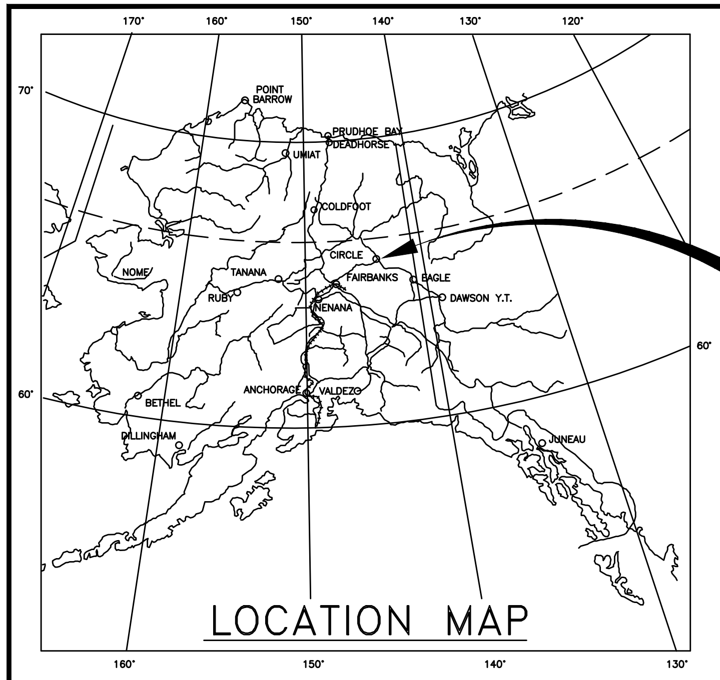
Project: Old Steese with CABC Section C Proj No.: 62,487						New Construction by:AKM 5/17/2016 11:48:20 AM					
AADT = 8,620	Past Loadings	Future Loadings						X/Y Load Locations (in): Load = 4500 (lbs) Tire Pressure = 110 (psi)		0 0	13.5 0
15% Spring 35% Summer 10% Fall 40% Winter --------------- Total:	----------	206,387 481,571 137,592 550,366 ---------- 1,375,916							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	1.99	4% Air 5% Asph 151 pcf	Spring	450	0.3	35.5		1,013.94		0.02	0.02%
			Summer	350	0.3	38.7		945.94		0.05	0.05%
			Fall	350	0.3	38.7		945.94		0.01	0.01%
			Winter	500	0.3	24.4		3,183.00		0.02	0.02%
								Total Damage:		0.10	0.10
3(in) ATB	4.99	4% Air 5% Asph 151 pcf	Spring	450	0.3	212		2.83		7.29	7.29%
			Summer	350	0.3	209		3.68		13.10	13.10%
			Fall	350	0.3	209		3.68		3.74	3.74%
			Winter	500	0.3	114		19.93		2.76	2.76%
								Total Damage:		26.90	26.90
4(in) Crushed_Agg_Base	5.01		Spring	44	0.35		21.00	4.40		4.69	4.69%
			Summer	51	0.35		25.90	3.59		13.40	13.40%
			Fall	51	0.35		25.90	3.59		3.83	3.83%
			Winter	100	0.35		30.50	18.94		2.91	2.91%
								Total Damage:		24.83	24.83
12(in) Select_A_P200<6%	9.01		Spring	26	0.4		10.30	8.07		2.56	2.56%
			Summer	36	0.4		12.40	12.74		3.78	3.78%
			Fall	36	0.4		12.40	12.74		1.08	1.08%
			Winter	90	0.4		14.60	148.32		0.37	0.37%
								Total Damage:		7.79	7.79
S-Infinite Subgrade	21.01		Spring	7	0.45		2.87	3.86		5.34	5.34%
			Summer	7	0.45		2.73	4.55		10.59	10.59%
			Fall	7	0.45		2.73	4.55		3.02	3.02%
			Winter	10	0.45		2.22	34.39		1.60	1.60%
								Total Damage:		20.55	20.55

Analysis Complete

Figure 10: Section 5 - OUTPUT

APPENDIX E

PROPOSED ROW ACQUISITIONS



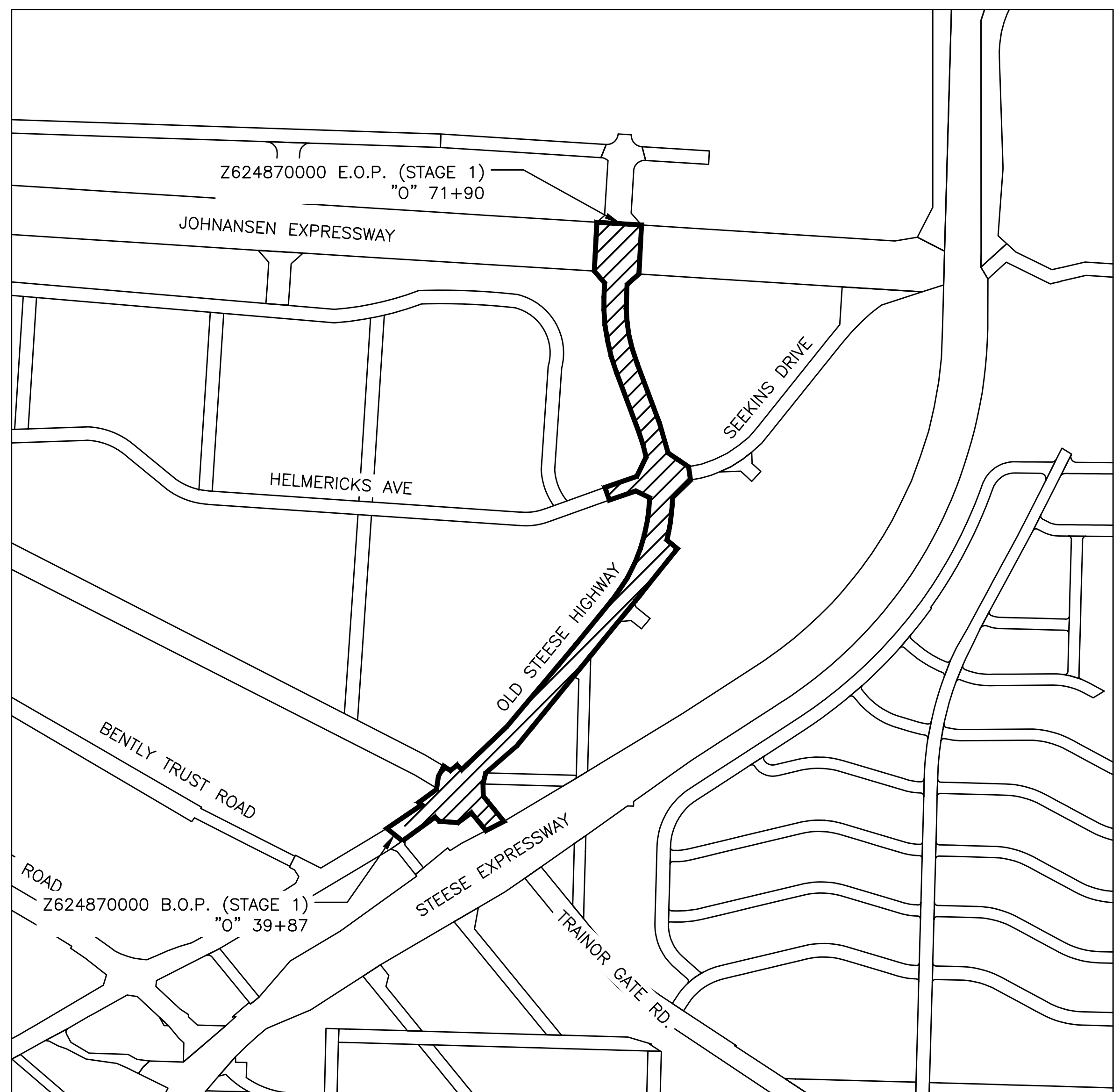
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES

PROPOSED HIGHWAY PROJECT

OLD STEESE HIGHWAY RECONSTRUCTION

Z624870000

STAGE 1 ROW PLAN SHEETS



INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1-4	ROW PLAN SHEETS
5-6	ROW ACQUISITIONS TABLE

WITHIN SECTION 2 AND 11, TOWNSHIP 001 S, RANGE 001 W,
FAIRBANKS MERIDIAN FAIRBANKS RECORDING DISTRICT

C:\Civil 3D Projects\2016\24\90019-01\Civil\62487-A-Title.dwg PLOT DATE 2020-5-27 10:10

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	Z624870000	2020	1	5

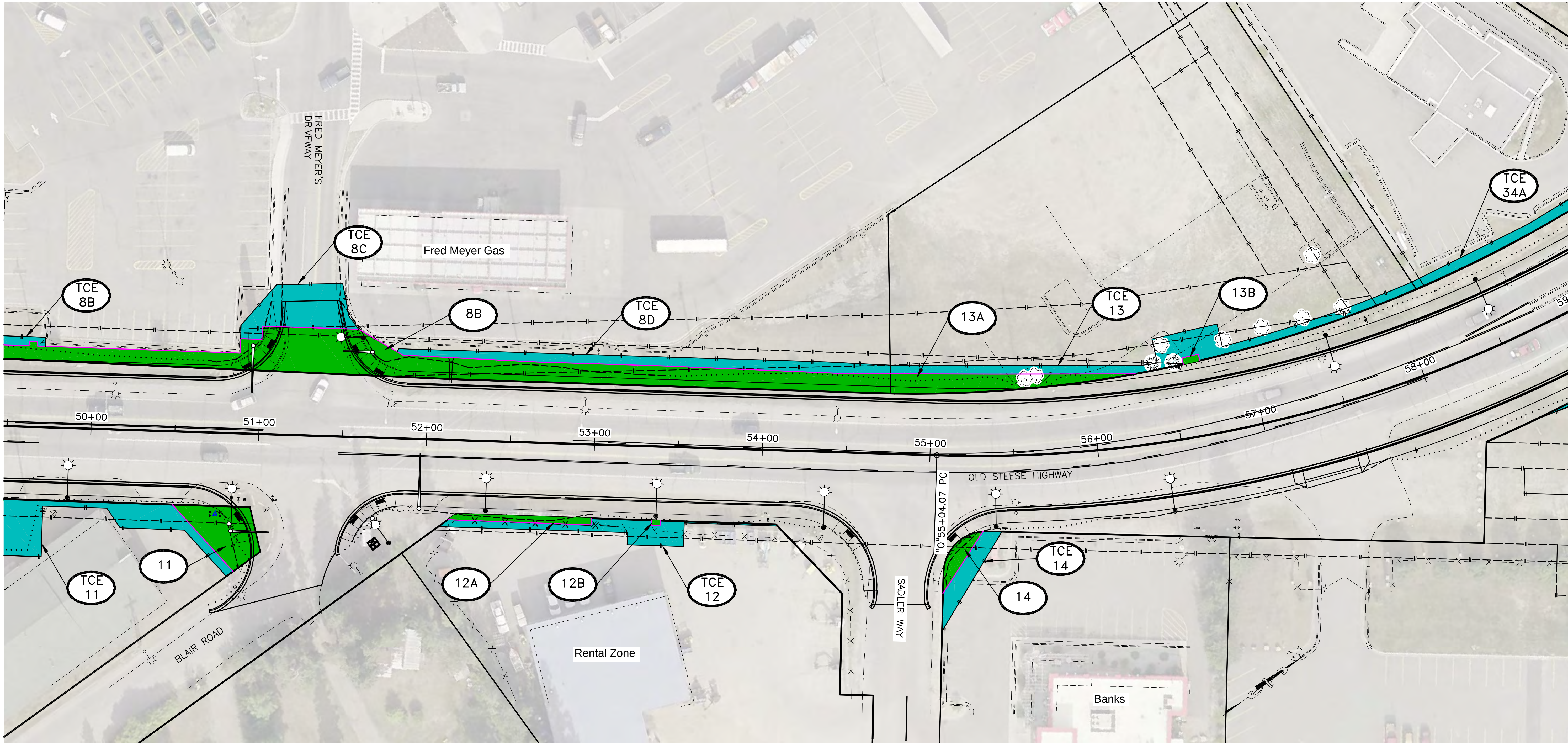
LEGEND

(green)	ROW ACQUISTION
(cyan)	TCE
(brown)	TCP
##	ACQUISTION ID NUMBER

PLANS DEVELOPED BY: STATE OF ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES, NORTHERN REGION, 2301 PEGER ROAD, FAIRBANKS, AK 99709 (907)451-2200
Q:\24\90019 Old Steese Upgrade\50Design\14 ROW_Easements\ROW Take Graphic Stage 1-SHEET_1 Wed, May/27/20 10:57am

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	Z624870000	2020	2	5



LEGEND

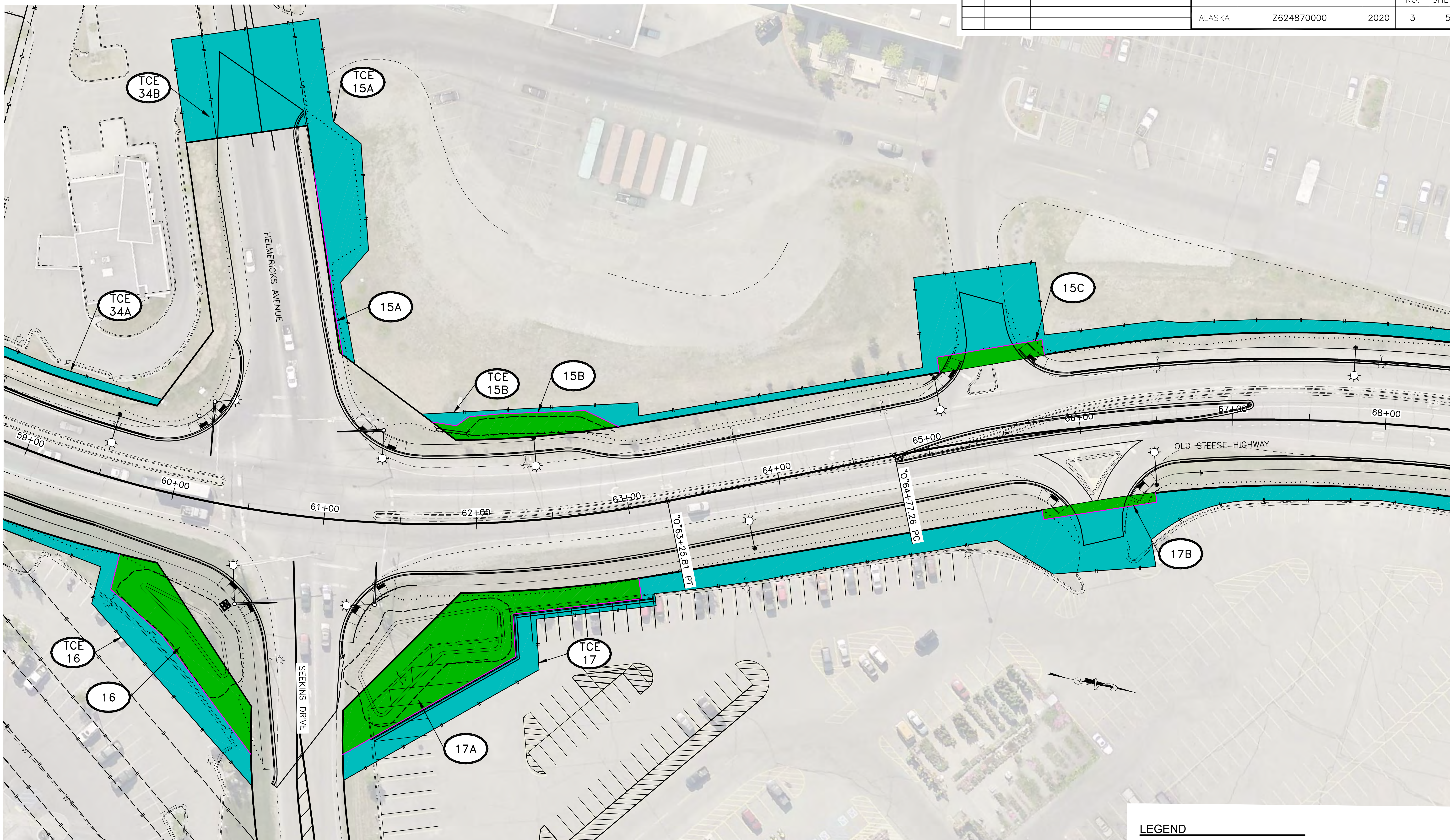
- ROW ACQUISTION
- TCE
- TCP
- ## ACQUISTION ID NUMBER

PLANS DEVELOPED BY: STATE OF ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES, NORTHERN REGION, 2301 PEGER ROAD, FAIRBANKS, AK 99709 (907)451-2200

Q:\24\90019 Old Steese Upgrade\50Design\14 ROW_Easements\ROW Take Graphic Stage 1-SHEET_2 Wed, May/27/20 09:41am

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	Z624870000	2020	3	5



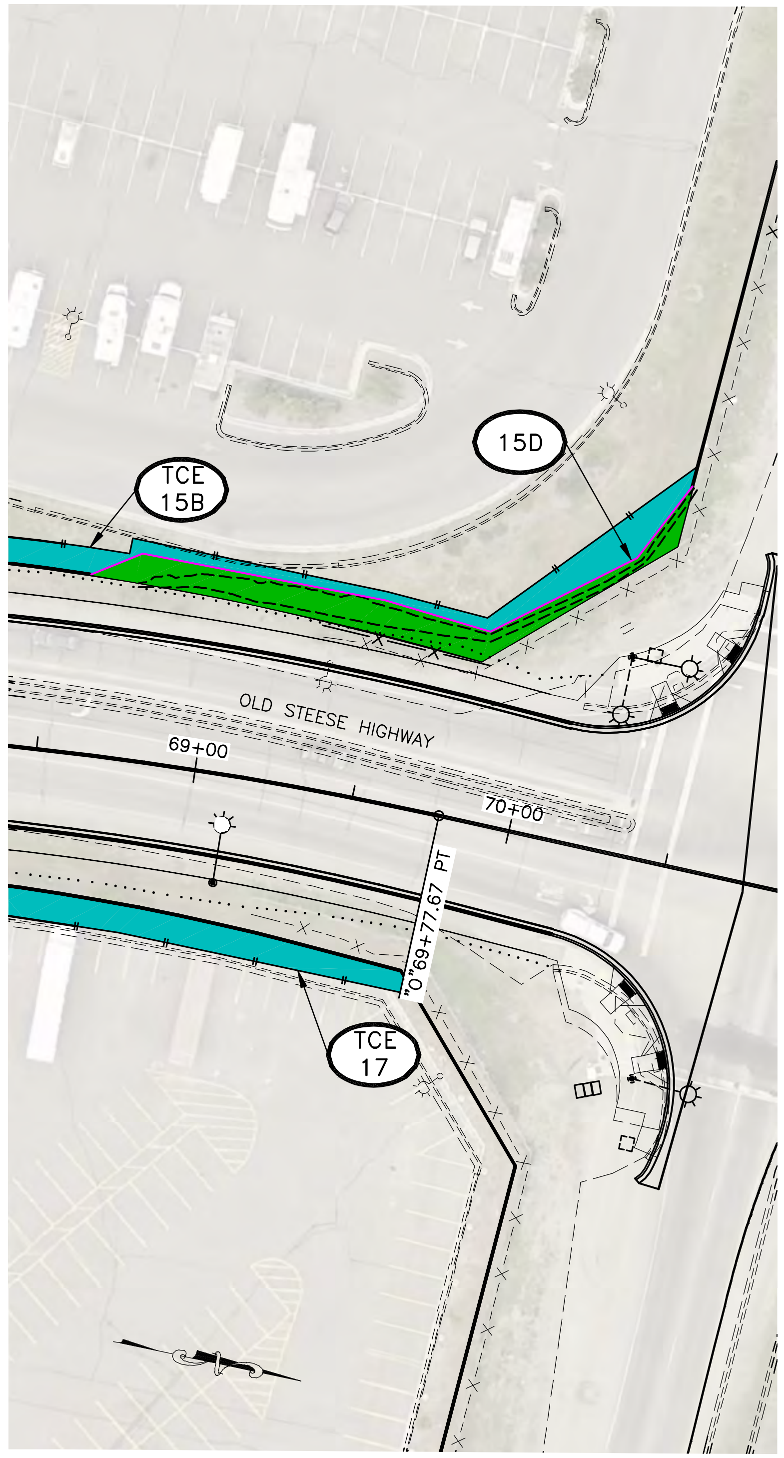
LEGEND

- ROW ACQUISTION
- TCE
- TCP
- ## ACQUISTION ID NUMBER

PLANS DEVELOPED BY: STATE OF ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES, NORTHERN REGION, 2301 PEGER ROAD, FAIRBANKS, AK 99709 (907)451-2200

Q:\24\90019 Old Steese Upgrade\50Design\14 ROW_Easements\ROW Take Graphic Stage 1-SHEET_3 Wed, May/27/20 09:41am

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	Z624870000	2020	4	5



LEGEND

(green)	ROW ACQUISTION
(cyan)	TCE
(brown)	TCP
##	ACQUISTION ID NUMBER

PLANS DEVELOPED BY: STATE OF ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES, NORTHERN REGION, 2301 PEGER ROAD, FAIRBANKS, AK 99709 (907)451-2200

Q:\24\90019 Old Steese Upgrade\50Design\14 ROW_Easements\ROW Take Graphic Stage 1-SHEET_4 Wed, May/27/20 09:41am

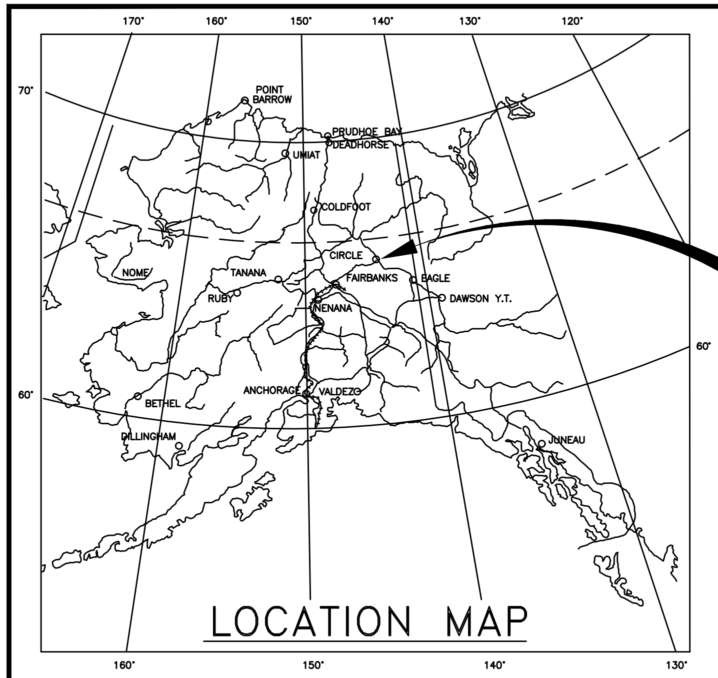
Stage 1

Old Steese Highway: Stage 1 Acquisition Summary
Program # Z624870000
Date: 5-27-2020

Parcel #	ACQUISITION ID	Sheet #	Purpose	Legal Description			Owner	Area (SF)	Comment
				Subdivision	block	Lot			
5	5	1	Adding Lanes and sidewalk	1S 1W	2	202	N C Machinery Co	1,130	ROW Acquisition
	TCE 5B	1	Adding Lanes and sidewalk	1S 1W	2	202	N C Machinery Co	675	Temporary Construction Easement
	TCP 5B	1	Driveway	1S 1W	2	202	N C Machinery Co	550	Temporary Construction Permit
6	6	1	Adding Lanes and sidewalk	Derby Tact		6-1	Barbara & Kevin Rima	660	ROW Acquisition. Parcel size is already smaller than the GU-1 Zone minimum of 40,000 sf; reduced lot size will require a variance
	TCE 6	1	Adding Lanes, sidewalk	Derby Tact		6-1	Barbara & Kevin Rima	780	Temporary Construction Easement
7	7	1	Adding Lanes and sidewalk	Derby Tact		06-5	Franich Law Offices	270	
	TCE 7	1	Adding Lanes and sidewalk	Derby Tact		06-5	Franich Law Offices	295	Temporary Construction Easement
	TCP 7	1	Driveway	Derby Tact		06-5	Franich Law Offices	970	Temporary Construction Permit
35	TCE 35	1	Retention Basin	US Survey		8	Alaska Railroad	500	Temporary Construction Easement
36	TCE 36	1	Retention Basin	Bentley Brothers 1st Addition		10	JJs Development LLC	300	Temporary Construction Easement
8	8A	1	Retention Basin	Bentley Brothers 1st Addition		8A	Fred Meyers Stores Inc	30,110	Due to the size of this parcel, DOWL is reviewing the infiltration design to see if the basin could be reduced in size. Recommend pushing this parcel plat toward the end of the list until this determination can be made.
	8B	1/2	Signalized intersection and added lanes	Bentley Brothers 1st Addition		8A	Fred Meyers Stores Inc	7,300	ROW Acquisition
	TCE 8A	1	Retention Basin	Bentley Brothers 1st Addition		8A	Fred Meyers Stores Inc	900	Temporary Construction Easement
	TCE 8B	1/2	Adding Lanes, Driveway, and sidewalk	Bentley Brothers 1st Addition		8A	Fred Meyers Stores Inc	2,050	Temporary Construction Easement
	TCE 8C	2	Signalized intersection	Bentley Brothers 1st Addition		8A	Fred Meyers Stores Inc	1,500	Temporary Construction Easement
	TCE 8D	2	Adding Lanes and sidewalk	Bentley Brothers 1st Addition		8A	Fred Meyers Stores Inc	1,450	Temporary Construction Easement
32	TCP 32	1	Driveway	RavenTree		1	910 Holdings LLC	390	Temporary Construction Permit
33	TCE 33	1	Adding Lanes and sidewalk	RavenTree		2	910 Holdings LLC	1225	Temporary Construction Easement
	TCP 33	1	Driveway	RavenTree		2	910 Holdings LLC	410	Temporary Construction Permit
9	9	1	Storm Drain inlet	Derby Tract		29A	Barbara & Wallace Hopkins	10	ROW Acquisition
	TCE 9	1	Added Lanes, Storm Drain inlet, and grading	Derby Tract		29A	Barbara & Wallace Hopkins	800	Temporary Construction Easement
	TCP 9	1	Driveway	Derby Tract		29A	Barbara & Wallace Hopkins	270	Temporary Construction Permit
10	10	1	Light Pole	Derby Tact	2	28A	Max & Yvonne Sadtler	6	ROW Acquisition
	TCE 10	1	Added Lanes and Light Pole	Derby Tact	2	28A	Max & Yvonne Sadtler	395	Temporary Construction Easement
	TCP 10A	1	Driveway	Derby Tact	2	28A	Max & Yvonne Sadtler	80	Temporary Construction Permit
	TCP 10B	1	Driveway	Derby Tact	2	28A	Max & Yvonne Sadtler	100	Temporary Construction Permit

Old Steese Highway: Stage 1 Acquisition Summary
Program # Z624870000
Date: 5-27-2020

Parcel #	ACQUISITION ID	Sheet #	Purpose	Legal Description			Owner	Area (SF)	Comment
				Subdivision	block	Lot			
11	11	2	Signalized intersection and utilities	Derby Tact		25	Max & Yvonne Sadtler	1,150	ROW Acquisition
	TCE 11	1/2	Signalized intersection, closed driveway, added lanes, sidewalk, and utilities	Derby Tact		25	Max & Yvonne Sadtler	2,875	Temporary Construction Easement
	TCP 11	1	Driveway	Derby Tact		25	Max & Yvonne Sadtler	510	Temporary Construction Permit
12	12A	2	Added lanes and sidewalk	Saddlers Business Park First			Rental Zone (Business)	320	ROW Acquisition
	12B	2	Storm Drain inlet	Saddlers Business Park First			Rental Zone (Business)	15	ROW Acquisition
	TCE 12	2	Added Lanes, drainage, and Light Pole	Saddlers Business Park First			Rental Zone (Business)	1,100	Temporary Construction Easement
13	13A	2	Added lanes and sidewalk	Bentley Brothers 1st Addition		9A	SEE FOREVER LLC	1,200	ROW Acquisition
	13B	2	Catch Basin Inlet	Bentley Brothers 1st Addition		9A	SEE FOREVER LLC	40	ROW Acquisition
	TCE 13	2	Added lanes, sidewalk, and catch basin inlet	Bentley Brothers 1st Addition		9A	SEE FOREVER LLC	2,100	Temporary Construction Easement
14	14	2	Sidewalk and catch basin inlet	Saddlers Business Park First		1	BANDERAS BAY DEVELOPMENT LLC	300	ROW Acquisition
	TCE 14	2	Sidewalk and catch basin inlet	Saddlers Business Park First		1	BANDERAS BAY DEVELOPMENT LLC	600	Temporary Construction Easement
34	TCE 34A	2/3	Added lanes, and sidewalks	Bentley Brothers		6	Mt Mckinley Bank	1,675	Temporary Construction Easement
	TCE 34B	3	Turn lane and roadway repave	Bentley Brothers		6	Mt Mckinley Bank	1,100	Temporary Construction Easement
15	15A	3	Adding sidewalk	Bentley Brothers		5	Wal-Mart Real Estate Business Trust	90	ROW Acquisition
	15B	3	Right turn lane and drainage culvert	Bentley Brothers		5	Wal-Mart Real Estate Business Trust	1,500	ROW Acquisition
	15C	3	Driveway Sidewalk	Bentley Brothers		5	Wal-Mart Real Estate Business Trust	710	ROW Acquisition
	15D	4	Drainage Ditch Overflow	Bentley Brothers		5	Wal-Mart Real Estate Business Trust	1,510	ROW Acquisition
	TCE 15A	3	Adding sidewalk and roadway work	Bentley Brothers		5	Wal-Mart Real Estate Business Trust	4,300	Temporary Construction Easement
	TCE 15B	3/4	Right Turn lane, added lanes, sidewalk, and drainage	Bentley Brothers		5	Wal-Mart Real Estate Business Trust	9,900	Temporary Construction Easement
16	16	3	Added lanes, sidewalk, and retention basin	Saddlers Business Park First		01A	Alaska USA FCU	3,280	ROW Acquisition
	TCE 16	2/3	Added lanes,sidwalk, and retention basin	Saddlers Business Park First		01A	Alaska USA FCU	3,600	Temporary Construction Easement
17	17A	3	Retention Basin	1S 1W	2	233	Home Depot	6,450	ROW Acquisition
	17B	3	Driveway Sidewalk	1S 1W	2	233	Home Depot	495	ROW Acquisition
	TCE 17	3/4	Retention basin, added lanes, sidewalk, and driveway	1S 1W	2	233	Home Depot	13,200	Temporary Construction Easement



PROJECT LOCATION

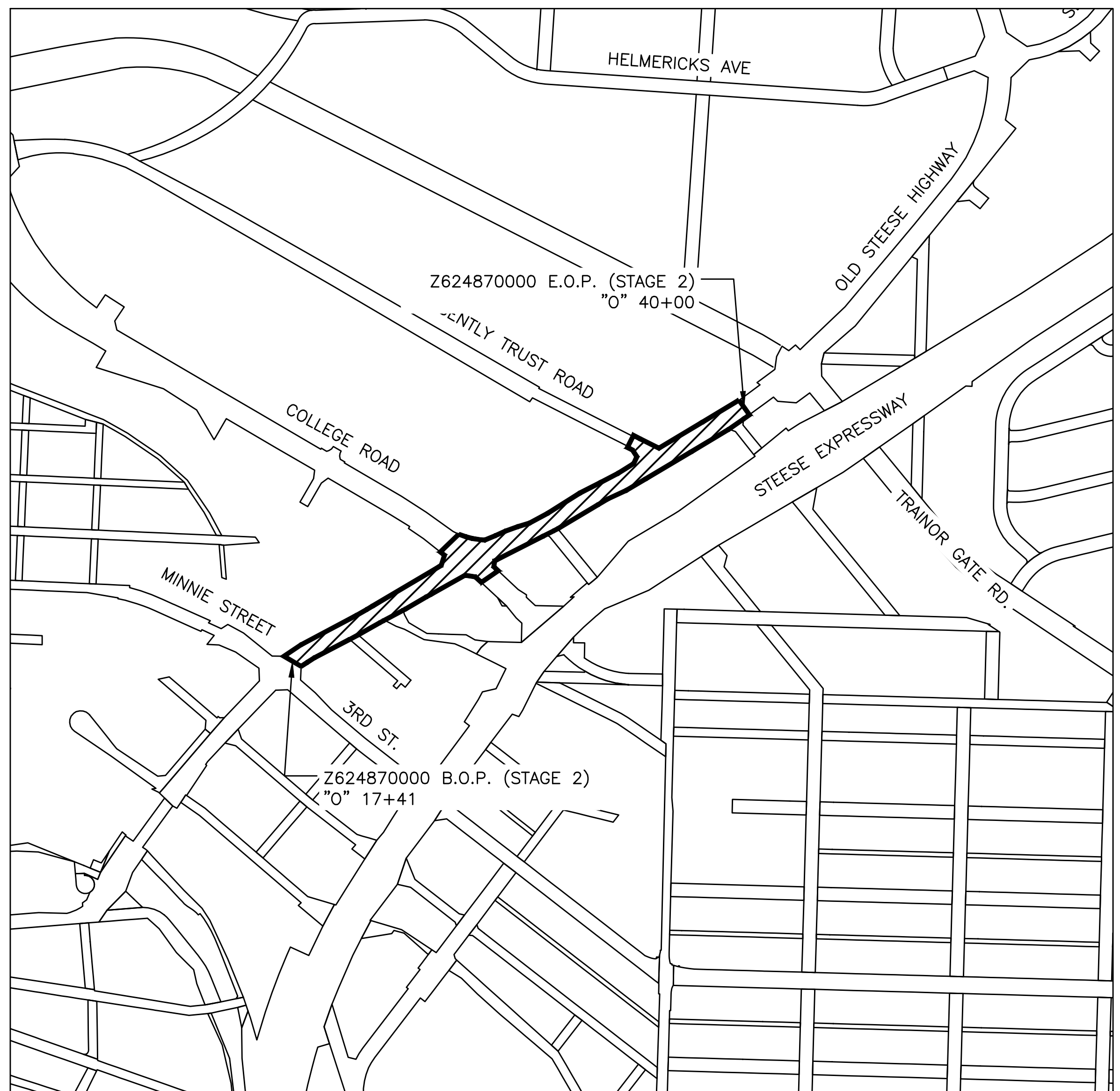
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES

PROPOSED HIGHWAY PROJECT

OLD STEESE HIGHWAY RECONSTRUCTION

Z624870000

STAGE 2 ROW PLAN SHEETS



INDEX OF SHEETS

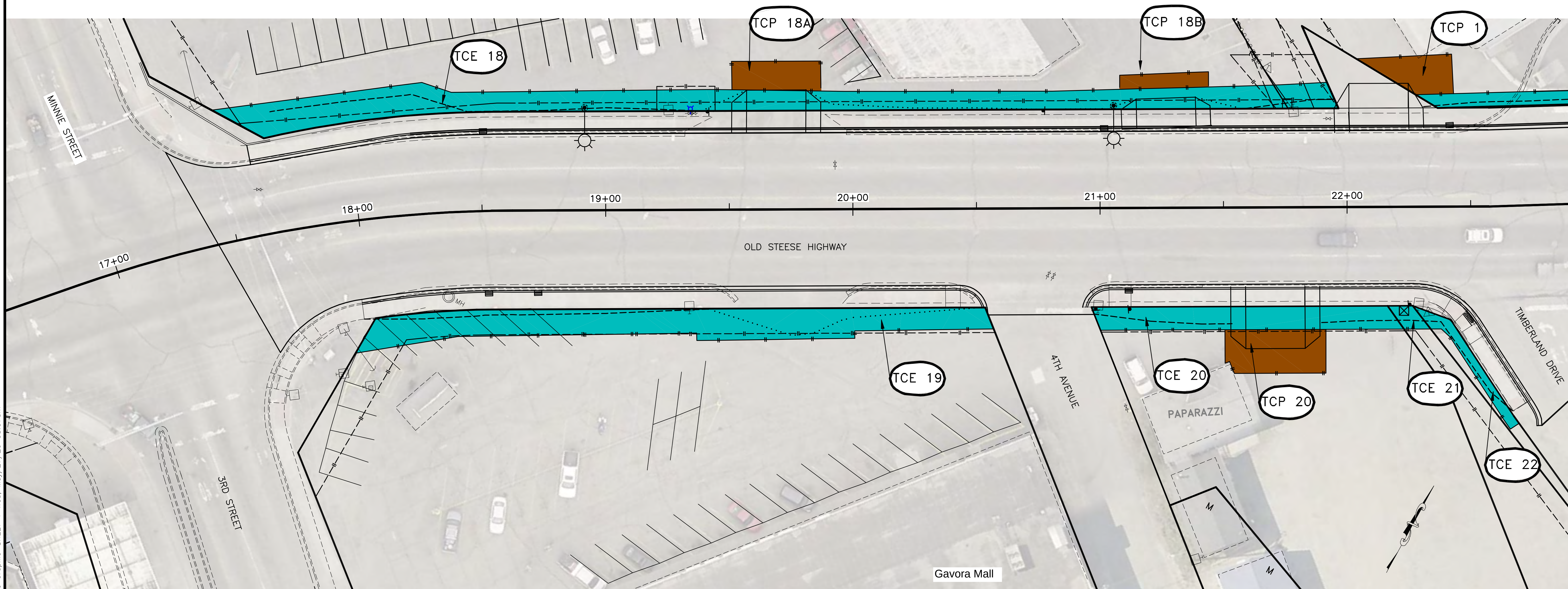
SHEET NO.	DESCRIPTION
1–4	ROW PLAN SHEETS
5	ROW ACQUISITIONS TABLE

ROW ACQUISITION IN STAGE 2 IS IN ANTICIPATION OF A FUTURE WIDENING PROJECT AS DESCRIBED IN SECTION 13.0 OF THE DSR.

WITHIN SECTION 2 AND 11, TOWNSHIP 001 S, RANGE 001 W, FAIRBANKS MERIDIAN FAIRBANKS RECORDING DISTRICT

C:\Civil 3D Projects\2016\24\90019-01\Civil\62487-A-Title.dwg PLOT DATE 2020-5-27 10:10

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	Z624870000	2020	1	5



LEGEND

- ROW ACQUISTION
- TCE
- TCP
- (##) ACQUISTION ID NUMBER

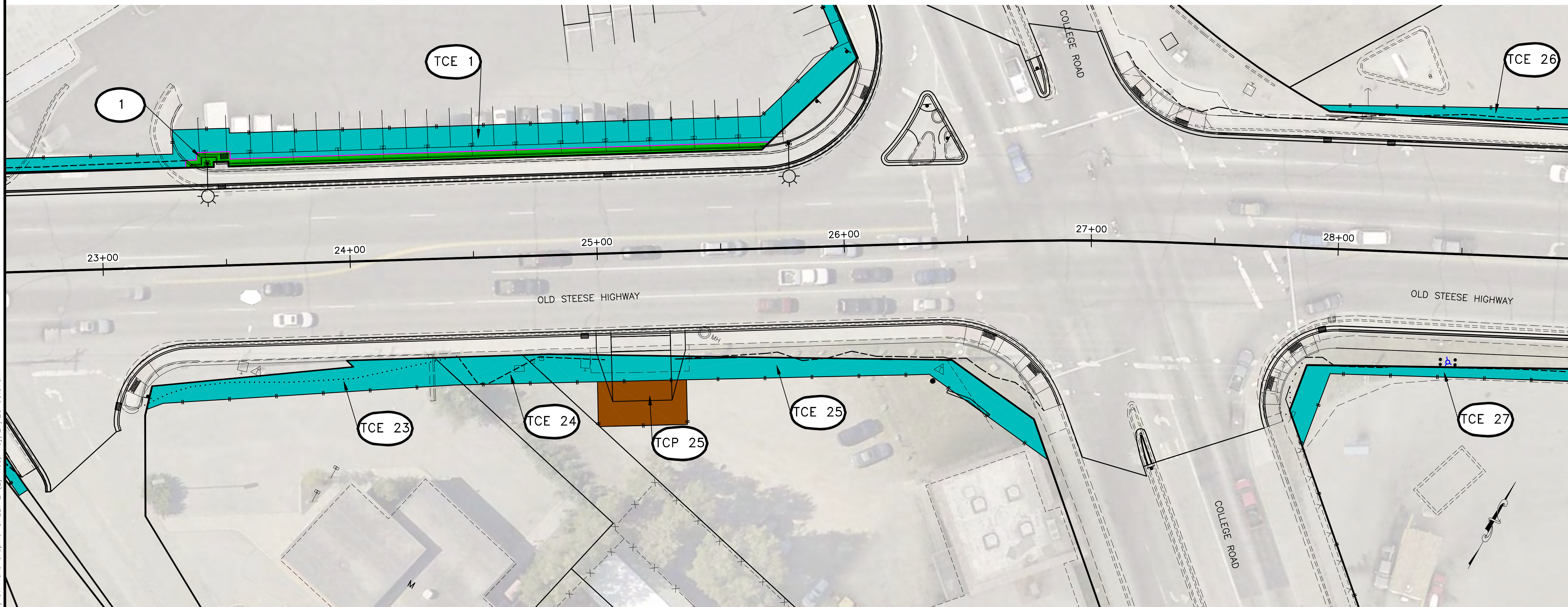
ROW ACQUISITION IN STAGE 2 IS ANTICIPATION OF A FUTURE WIDENING PROJECT AS DESCRIBED IN SECTION 13.0 OF THE DSR.

PLANS DEVELOPED BY: STATE OF ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES, NORTHERN REGION, 2301 PEGER ROAD, FAIRBANKS, AK 99709 (907)451-2200

Q:\24\90019 Old Steese Upgrade\50Design\14 ROW_Easements\ROW Take Graphic-SHEET 1 Wed, May/27/20 08:07am

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	Z624870000	2020	2	5



LEGEND

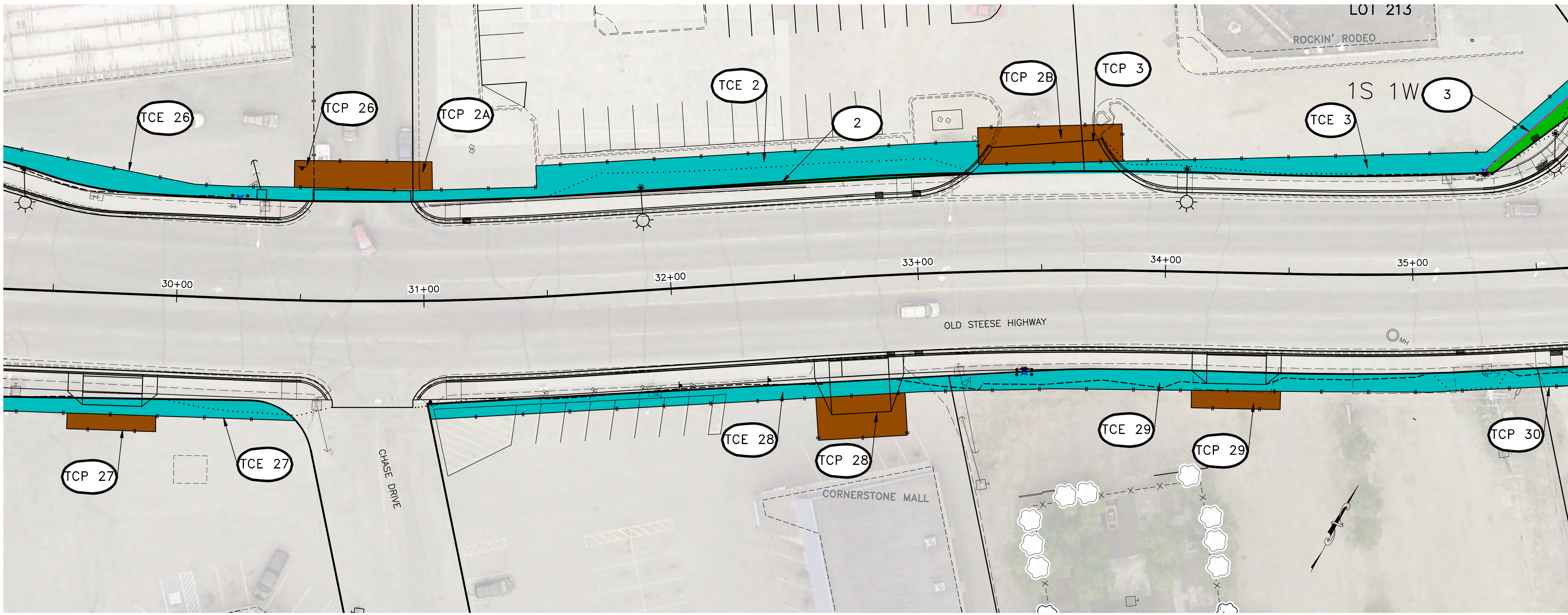
- ROW ACQUISTION
- TCE
- TCP
- ## ACQUISTION ID NUMBER

ROW ACQUISITION IN STAGE 2 IS ANTICIPATION OF A FUTURE WIDENING PROJECT AS DESCRIBED IN SECTION 13.0 OF THE DSR.

PLANS DEVELOPED BY: STATE OF ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES, NORTHERN REGION, 2301 PEGER ROAD, FAIRBANKS, AK 99709 (907)451-2200
Q:\24\90019 Old Steese Upgrade\50Design\14 ROW_Easements\ROW Take Graphic-SHEET 2 (2) Wed, May/27/20 08:07am

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	Z624870000	2020	3	5



LEGEND

ROW ACQUISTION

TCE

TCP

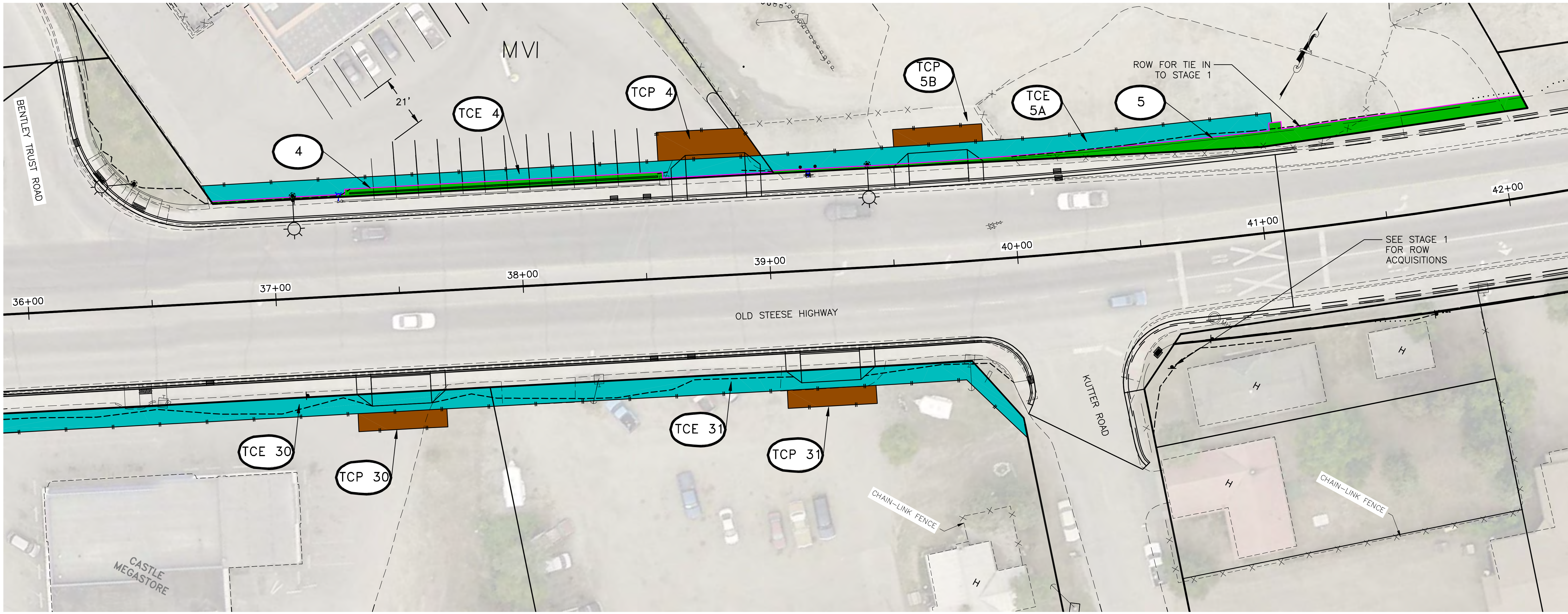
ACQUISTION ID NUMBER

ROW ACQUISITION IN STAGE 2 IS ANTICIPATION OF A FUTURE WIDENING PROJECT AS DESCRIBED IN SECTION 13.0 OF THE DSR.

PLANS DEVELOPED BY: STATE OF ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES, NORTHERN REGION, 2301 PEGER ROAD, FAIRBANKS, AK 99709 (907)451-2200
Q:\24\90019 Old Steese Upgrade\50Design\14 ROW_Easements\ROW Take Graphic—SHEET 3 Wed, May/27/20 08:07am

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	Z624870000	2020	4	5



LEGEND

- ROW ACQUISTION
- TCE
- TCP
- ## ACQUISTION ID NUMBER

ROW ACQUISITION IN STAGE 2 IS ANTICIPATION OF A FUTURE WIDENING PROJECT AS DESCRIBED IN SECTION 13.0 OF THE DSR.

PLANS DEVELOPED BY: STATE OF ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES, NORTHERN REGION, 2301 PEGER ROAD, FAIRBANKS, AK 99709 (907)451-2200
Q:\24\90019 Old Steese Upgrade\50Design\14 ROW_Easements\ROW Take Graphic-SHEET 4 Wed, May/27/20 08:08am

Stage 2

Old Steese Highway: Stage 2 Acquisition Summary
Program # Z624870000
Date: 5-27-2020

Parcel #	ACQUISITION ID	Sheet #	Purpose	Legal Description			Owner	Area (SF)	Comment
				Subdivision	block	Lot			
18	TCE 18	1	Sidewalk	North Gate		1	North Gate Square Commerical Condominiums	4,030	Temporary Construction Easement
	TCP 18A	1	Driveway	North Gate		1	North Gate Square	435	Temporary Construction Permit
	TCP 18B	1	Driveway	North Gate		1	North Gate Square	215	Temporary Construction Permit
19	TCE 19	1	Sidewalk	Graehl Townsite		G1	Gavora Mall	2,750	Temporary Construction Easement
20	TCE 20	1	Sidewalk	Graehl Townsite	13	1	Ricky & Yun Suk Osborne	1,134	Temporary Construction Easement
	TCP 20	1	Driveway	Graehl Townsite	13	1	Ricky & Yun Suk Osborne	710	Temporary Construction Permit
21	TCE 21	1	Sidewalk	Graehl Townsite	13	2	Ricky & Yun Suk Osborne	106	Temporary Construction Easement
22	TCE 22	1	Sidewalk	Graehl Townsite	13	3	Ricky & Yun Suk Osborne	270	Temporary Construction Easement
1	1	2	Sidewalk/Wall	North Gate		2	North Arctic Trust LLC	730	ROW Acquisition
	TCE 1	2	Sidewalk/Wall	North Gate		2	North Arctic Trust LLC	3,700	
	TCP 1	1	Driveway	North Gate		2	North Arctic Trust LLC	550	Temporary Construction Permit
23	TCE 23	2	Sidewalk	Timberland	2	01A	Dallin Young	1,175	Temporary Construction Easement
24	TCE 24	2	Sidewalk	1S 1W	2	236	Farthest North Girl Scout Council	410	Temporary Construction Easement
25	TCE 25	2	Sidewalk	1S 1W	2	237	Farthest North Girl Scout Council	1,925	Temporary Construction Easement
	TCP 25	2	Driveway	1S 1W	2	650	Farthest North Girl Scout Council	1,925	Temporary Construction Permit
26	TCE 26	2/3	Sidewalk	1S 1W	2	227	Safeway Inc.	1,735	Temporary Construction Easement
	TCP 26	3	Driveway	1S 1W	2	227	Safeway Inc.	540	Temporary Construction Permit
27	TCE 27	2/3	Sidewalk	Cornertsone		REM	MV Investments	1,735	Temporary Construction Easement
	TCP 27	3	Driveway	Cornertsone		REM	MV Investments	230	Temporary Construction Permit
2	2	3	Sidewalk	Bentley Annex		01A	OSC Holdings LLC	85	ROW Acquisition
	TCE 2	3	Sidewalk and drainage	Bentley Annex		01A	OSC Holdings LLC	2,570	Temporary Construction Easement
	TCP 2A	3	Driveway	Bentley Annex		01A	OSC Holdings LLC	90	Temporary Construction Permit
	TCP 2B	3	Driveway	Bentley Annex		01A	OSC Holdings LLC	640	Temporary Construction Permit
28	TCE 28	3	Sidewalk	Derby Tract		02N	MV Investments	1,250	Temporary Construction Easement
	TCP 28	3	Driveway	Derby Tract		02N	MV Investments	625	Temporary Construction Permit
29	TCE 29	3	Sidewalk	Derby Tract		03A	Sidney Sanford Estate	1,790	Temporary Construction Easement
	TCP 29	3	Driveway	Derby Tract		03A	Sidney Sanford Estate	260	Temporary Construction Permit

Stage 2

Old Steese Highway: Stage 2 Acquisition Summary
Program # Z624870000
Date: 5-27-2020

Parcel #	ACQUISITION ID	Sheet #	Purpose	Legal Description			Owner	Area (SF)	Comment
				Subdivision	block	Lot			
3	3	3	Bentley Trust road curb return and Storm Drain	1S 1W	2	213	NWD Inc	220	ROW Acquisition
	TCE 3	3	Sidewalk, curb return and Storm Drain	1S 1W	2	213	NWD Inc	1,320	Temporary Construction Easement
	TCP 3	3	Driveway	1S 1W	2	213	NWD Inc	241	Temporary Construction Permit
30	TCE 30	3/4	Sidewalk	Derby Tract		04A	Dennis and Conceicao Stuller	1,800	Temporary Construction Easement
	TCP 30	4	Driveway	Derby Tract		04A	Dennis and Conceicao Stuller	265	Temporary Construction Permit
4	4	4	Sidewalk/Wall	MVI		1	Timmons & Larsons Inc	470	ROW Acquisition
	TCE 4	4	Sidewalk/Wall	MVI		1	Timmons & Larsons Inc	1,225	Temporary Construction Easement
	TCP 4	4	Driveway	MVI		1	Timmons & Larsons Inc	440	Temporary Construction Permit
31	TCE 31	4	Sidewalk	Derby Tract		5	Ken's Fairbanks Alignment	1,740	Temporary Construction Easement
	TCP 31	4	Driveway	Derby Tract		5	Ken's Fairbanks Alignment	265	Temporary Construction Permit
5	5	4	Adding Stage 1 lanes, sidewalk	1S 1W	2	202	N C Machinery Co	1,130	ROW Acquisition
	TCE 5A	4	Adding lanes	1S 1W	2	202	N C Machinery Co	1,420	Temporary Construction Easement
	TCP 5A	4	Driveway	1S 1W	2	202	N C Machinery Co	260	Temporary Construction Permit